DOE/EIS-0380
MAPAR 2016

Fiscal Year 2016 Mitigation Action Plan for the 2008 Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory

February 2017

LOS ALAMOS FIELD OFFICE
3747 West Jemez Road, MS A-316
Los Alamos, New Mexico 87545

DISCLAIMER: This document was prepared by Los Alamos National Security, LLC (LANS) in their role as management and operating (M&O) contractor for the Los Alamos National Laboratory, under contract to DOE/NNSA (Contract Number DE-AC52-06NA25396). DOE/NNSA LASO has reviewed this document for content and accuracy. The *National Environmental Policy Act* (NEPA) Compliance Officer for DOE/NNSA LASO concurs with this document.

LA-UR-16-28265
Approved for public release; distribution is unlimited.

Title: **Fiscal Year 2016 Mitigation Action Plan Annual Report for the 2008 Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory**

Preparers: Jennifer E. Payne, Karen S. Musgrave, and Marjorie Wright
Environmental Protection and Compliance Division-Environmental Stewardship Services Group

Contributors: Christy Abeyta, Don Ami, Marc Bailey, Andrew Erickson, Phil Fresquez, Charles Hathcock, Teresa Hiteman, Manuel L'Esperance, Peter Maggiore, Ellen McGehee, Daniel Pava, and LeAnn Purtzer

Los Alamos
NATIONAL LABORATORY
EST. 1943

Front cover: White Rock Canyon, Los Alamos, New Mexico

Contents

This page intentionally left blank.

Acronyms and Abbreviations

^{60}Co	Cobalt-60
^{137}Cs	Cesium-137
^{192}Ir	Iridium-192
ADEM	Associate Directorate for Environmental Management
ADNHHO	Associate Director for Nuclear and High-Hazard Operations
ASER	Annual Site Environmental Report
BA	biological assessment
BRMP	Biological Resources Management Plan
CRMP	Cultural Resources Management Plan
DARHT	Dual-Axis Radiographic Hydrodynamic Test
DD&D	decontamination, decommissioning, and demolition
DOE	Department of Energy
EIS	Environmental Impact Statement
EM	Department of Energy Office of Environmental Management
EMS	Environmental Management System
EPC	Environmental Protection and Compliance
EXID	excavation/fill/soil disturbance permit identification
Field Office	US DOE/NNSA 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
ISO	International Organization for Standardization
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
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
SWEIS	Site-Wide Environmental Impact Statement
TA	Technical Area
T&E	threatened and endangered
TRU	transuranic
US	United States
USFWS	US Fish and Wildlife Service
WIPP	Waste Isolation Pilot Plant

Executive Summary

In compliance with the United States Department of Energy Order 451.1B, the Department of Energy Order, National Nuclear Security Administration, Los Alamos Field Office has compiled this fiscal year (2016) Mitigation Action Plan Annual Report (MAPAR) for the 2008 Site-Wide Environmental Impact Statement for the Continued Operation of Los Alamos National Laboratory (SWEIS). Highlights for FY 2016 include:

Highlights for FY 2016 include:

- Completion and distribution of the FY 2015 SWEIS MAPAR
- Completion of all key milestones in the FY 2016 Wildland Fire Operations Plan
- Monitoring of sediments and biota for contaminants
- Publication of biological and cultural resources management reports and articles
- Implementation of the Trails Management Plan at Los Alamos National Laboratory (LANL)
- Completion of the *2015 Chromium Plume Control Interim Measure and Plume-Center Characterization, Los Alamos National Laboratory, Los Alamos, New Mexico (DOE/EA-2005) Mitigation Action Plan* (DOE 2015a)

Several of the mitigation action commitments identified in the SWEIS are completed and officially closed as reported in the second and third revision of 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* (DOE 2014, DOE 2016). This MAPAR reflects the status of and the actions taken for the remaining mitigation action commitments.

Appendix A 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.

This page intentionally left blank.

1.0 Background

The first Record of Decision (ROD) for the 2008 *Final Site-Wide Environmental Impact Statement for the Continued Operation of Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE 2008a; DOE 2008b) was published in September 2008. In January 2009, the 2008 Site-Wide Environmental Impact Statement (SWEIS) Mitigation Action Plan (MAP; DOE 2008c) was finalized and included outstanding 1999 SWEIS (DOE 1999a) MAP commitments, continuing mitigations from National Environmental Policy Act (NEPA) decisions made since the 1999 SWEIS, and those made in the September 2008 and June 2009 RODs for the 2008 SWEIS (DOE 2008a, 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 (DOE 2010a) to incorporate the MAP associated with the *Final 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 2010b). The 2008 SWEIS MAP was again revised during fiscal year (FY) 2014 and FY 2016 (DOE 2014, DOE 2016) to close out mitigations that are officially completed and to revise other mitigations to make them more specific and measurable. This FY 2016 Mitigation Action Plan Annual Report (MAPAR) reflects the status of and the actions taken for the remaining mitigation action commitments. This document is the eighth MAPAR for the 2008 SWEIS.

In accordance with the NEPA, all work performed at Los Alamos National Laboratory (LANL or the Laboratory), or funded by DOE to be conducted elsewhere, must be evaluated for environmental impacts. This process 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 the International Organization for Standardization (ISO) standard: ISO 14001 ISO is the world's largest developer of voluntary International Standards. The standard specifies the requirements for an environmental management system that an organization can use to enhance its environmental performance and is intended for use by an organization seeking to manage its environmental responsibilities in a systematic manner that contributes to environmental sustainability. The Laboratory successfully maintained ISO 14001 certification during FY 2016. LANL will be evaluated to the new ISO 14001:2015 standards in FY 2017.

Environmental work is managed at LANL by several different organizations and includes a wide range of programmatic, facility, and support service resources and personnel. Risk evaluation and management is distributed LANL-wide to directorates,

each of which has an EMS point of contact. This collaborative, cooperative approach has proven a successful model for ensuring that environmental management is focused, responsive, and proactive. In 2016, the Los Alamos National Security, LLC (LANS) EMS staff worked with the 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 the LANL Environmental Protection and Compliance (EPC) Division for incorporation into the quarterly MAP updates and the MAPAR.

The LANL Integrated Review Tool (IRT) is the primary review procedure/process? to identify environmental requirements applicable to a federal activity or project and to convey actions to activity and project owners. Use of the IRT is required for all new and modified projects to identify applicable environmental requirements early in activity and project planning (LANL 2013). The project requirements identification (PRID) system, excavation/fill/soil disturbance permit identification (EXID) process, and site selection reviews using the Decision Support Application are all accessible from within the IRT. The IRT provides helpful gateway questions to activity/project owners to the tool(s) needed to identify their environmental requirements. LANS environmental subject matter experts reviewed and provided comments and requirements for 230 PRIDs and 892 EXIDs in FY 2016. Project owners who do not use the IRT are in violation of LANL policy and put their projects at risk for non-compliance and delays.

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 (EIS) Mitigation Action Plan* (DARHT MAP; DOE 1996) requires a DARHT MAPAR to be prepared as part of implementing the DARHT MAP. The DARHT MAPAR provides a status of specific DARHT facility operations-related mitigation actions that were implemented to fulfill DOE commitments under the DARHT EIS ROD (DOE 1995).

No new commitments are identified for DARHT; however, some of the commitments are complete (e.g., archaeological monitoring of Nake'muu). The DARHT MAP is included in the 2008 SWEIS MAP.

DOE provided stakeholders with the first DARHT MAPAR in June 2004. This MAPAR reports on the full scope of actions implemented during FY 2015 (October 1, 2014, through September 30, 2015) and represents 16 years of DARHT facility operations-related mitigation measures and action plans. All construction-related mitigation measures and action plans are complete (LANL 1999). Appendix B of this MAPAR is the DARHT MAPAR, and provides details of the progress on mitigation action commitments in accordance with the Field Office decision to include the DARHT MAPAR as an appendix to this document. Because sampling results are not available until the second quarter of each year, the DARHT MAPAR is one fiscal year behind the main SWEIS MAPAR.

Mitigations:

1. Monitor contaminants by sampling soils, plants, mammals, birds, and road kills at the facility and surrounding areas as well as at a control site away from the DARHT facility.
2. Site monitoring and evaluation will consist of periodic soil, water, and other environmental analyses for solid, hazardous, mixed, and radioactive wastes.
3. Conduct Tribal tours of Nake'muu as requested and conduct annual maintenance visits.

Actions Taken:

- LANS staff published *Avian Community Composition in Response to High Explosive Testing Operations at Los Alamos National Laboratory in Northern New Mexico* (Keller et al. 2015). The paper summarized 18-years of bird monitoring (abundance, species richness, evenness, diversity, composition, productivity, and survivorship) on the northwest side of the DARHT facility during pre-operation (1997–1999) and operation (2000–2014) periods. The comparison of bird species diversity and composition, a qualitative measurement, before and during DARHT operations over an 18-year period, showed no measurable impacts to the bird populations.

- All sample data collected and analyzed from around the perimeter of the DARHT facility in 2015, which included soil, sediment and small mammals for radionuclides, metals, and organic compounds, were compiled, summarized, tabulated, and statistically analyzed for inclusion into the Annual Site Environmental Report (ASER) for 2015 (LANL 2016a). All sample results were either similar to background or below screening levels protective of biota and the radionuclide and chemical levels were not at concentrations detrimental to human health (DOE 1999b) or to the environment (LANL 2014, DOE 2002, EPA

2014). However, there were still measurable amounts of depleted uranium in all media. Levels have increased over time to at least FY 2006. Concentrations of depleted uranium in most media decreased in FY 2007; the decreases may correspond to a move to contained shots in using steel containment vessels and/or efforts to cleanup detonation debris. However, since increases of uranium in all media were noted until at least FY 2006 and uranium may linger in soils for some time, the monitoring of all or part of these media will continue until the concentrations are consistently similar to baseline statistical reference levels.

- Soil, sediment, and vegetation samples were collected in May 2016 from around the perimeter of the DARHT facility and results will be reported in the FY 2016 DARHT MAPAR.

Mitigation Status:

Mitigation 1: Complete

Mitigation 2: Complete

Mitigation 3: Revised in accordance with the Cultural Resources Management Plan (CRMP) and the National Historic Preservation Act (NHPA) and achieved.

Recommendations:

Continue annual sampling at the DARHT facility (Mitigations 1 and 2).

Continue visits to Nake'muu as requested by the Pueblo de San Ildefonso. Continue annual maintenance visits to Nake'muu and report results in Section 2.11 of this report.

2.2 Trails MAPAR (Appendix C)

NEPA Driver:

In accordance with the 2003 *Environmental Assessment for the Proposed Los Alamos National Laboratory Trails Management Program* (DOE 2003), DOE continues to implement a MAP and MAPAR for this environmental assessment through the Trails Management Pprogram in order to assure that public trails use at LANL continues to respect and protect sensitive natural and cultural resources.

Mitigations:

1. Complete eligibility evaluations for historic trails under the NHPA when possible 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.

Actions Taken:

The Trails Working Group met eight times in FY 2016 and undertook the following actions.

- The Trails Management Plan was completed and published in FY 2016 (LANL 2015a). The Geographical Information System mapping update for LANL trails was initiated and is an ongoing project.
- The LANS Trails Management Program personnel addressed and resolved a potential security issue at Technical Area (TA) 70 and confirmed that the cultural sites at TAs 70 and 71 remain protected.
- The LANS Trails Management Program personnel participated in several meetings to discuss and recommend the closure and reopening of LANL trails due to wildlife encounters.

Mitigations Status:

Mitigation 1: Complete. Actions associated with this mitigation are part of implementation of the CRMP

Mitigation 2: Complete.

Mitigation 3: Complete and revised. New mitigation, implement the Trails Management Plan.

Mitigation 4: Complete, incorporated into the Trails Management Plan.

Mitigation 5: Complete, incorporated into the Trails Management Plan.

Recommendations:

Close out mitigations 1, 2, 4, and 5 and revise Mitigation 3 to implement the Trails Management Plan . FY 2016 is the final year for a stand-alone Trails MAPAR (Appendix B) future actions will be reported here.

2.3 Special Environmental Analysis

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) to mitigate 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. DOE/NNSA also identified mitigations for these actions.

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:

- Vegetation and small mammal samples were collected behind the Los Alamos Canyon weir and the Pajarito Canyon FRS and submitted to the LANL Sample Management Office in June 2016. These samples were analyzed, are being compiled, and will be reported in the next ASER.
- Sampling results from 2015 were compiled, evaluated, and are documented in the 2015 ASER (LANL 2016a). The Pueblo Canyon weir was sampled for comparison purposes to detect trends and potential issues were contaminate transport. The Pueblo Canyon weir was sampled for total inventory of radionuclides, metals, and polychlorinated biphenyls (PCBs) that may be added to the Los Alamos Canyon watershed (Pueblo Canyon meets with Los Alamos Canyon approximately 0.60 miles downgradient of the Los Alamos Canyon weir). The levels of PCBs in field mice approximately 4.5 miles downgradient of both weirs show that the concentrations at background levels.
- Removal of sediments from the Los Alamos Canyon weir was not necessary in FY 2016 due to a lack of sediment accumulations behind the weir.

Mitigation Status:

Mitigation 1: Achieved.

Mitigation 2: Not necessary in 2016.

Recommendations:

Continue annual biota and sediment sampling from behind the Los Alamos Canyon weir for comparison purposes and to ascertain the total inventory and potential sources of radionuclides, metals, and PCBs that may be added to the Los Alamos Canyon watershed. Continue additional cleanouts from behind these structures as necessary.

2.4 Flood and Sediment Retention Structures

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 Pajarito Canyon FRS for structural integrity and safe operations until removed.
2. Remove portions of the FRS in accordance with DOE/EA-1408 (DOE 2002).
3. Recycle demolition spoils from FRS decontamination, decommissioning, and demolition (DD&D) as appropriate.
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 June 13, 2016 (UI-RPT-003, R6). 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. The failures of the north and south fills do not appear to impact retention structure. No corrective actions are recommended at this time."

Mitigation Status:

Mitigation 1: Achieved and ongoing.

Mitigations 2–6: On hold pending removal of the FRS.

Recommendation:

Continue annual inspections of the FRS. The remaining mitigations are on hold until Material Disposal Area (MDA) G (TA-54) is ready for capping because the 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 environmental assessment 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 biological assessment (BA) for the 2008 SWEIS (LANL 2006a) also contributed to the development of this mitigation.

Mitigation:

1. 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. In FY 2016, SERF provided approximately 23 million gallons of water for super-computing cooling. No cooling tower water blow down or SERF product water has been discharged into Sandia Canyon. Therefore, no mitigations associated with hydrologic changes to the S-2 reach of Sandia Canyon were required. A study to determine how much water is needed to maintain healthy Sandia Canyon wetland was completed in 2012 (Katzman 2012). The study 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 1) are also available in the 2015 ASER (LANL 2016a) and the 2014 SWEIS Yearbook (LANL 2016b).

DOE and LANS are committed to outfall reduction and the mitigation initiatives associated with the Radioactive Liquid Waste Treatment Facility (RLWTF) Upgrade Project. The RLTWF outfall into Mortandad Canyon is still permitted (under National Pollutant Discharge Elimination System Permit No. NM0028355) but there has been no discharge to the canyon since November 2010. The solar evaporation tanks for RLWTF

Table 1. Discharges into Sandia Canyon from each of the three permitted outfalls

FY 2016	Outfall 001 (gallons)	Outfall 03A027 (gallons)	Outfall 03A199 (gallons)
Oct 2015	7,412,800	998,900	676,200
Nov 2015	7,444,200	1,095,400	567,700
Dec 2015	8,775,500	1,197,700	551,300
Q1 total	23,632,500	3,292,000	1,795,200
Jan 2016	8,328,900	1,214,000	492,800
Feb 2016	8,327,500	1,233,000	503,100
Mar 2016	5,793,300	956,900	582,300
Q2 total	22,449,700	3,403,900	1,578,200
Apr 2016	4,457,900	949,400	615,100
May 2016	4,081,600	1,063,400	747,700
Jun 2016	2,243,700	1,248,700	898,000
Q3 total	10,783,200	3,261,500	2,260,800
Jul 2016	2,264,900	1,466,600	996,700
Aug 2016	5,265,400	1,110,500	943,000
Sep 2016	5,028,000	254,800	872,800
Q4 total	**12,558,300**	**2,831,900**	**2,812,500**
FY 2016 Total	**69,423,700**	**12,789,300**	**8,446,700**

were installed in October 2012. Operation of the solar evaporation tanks is anticipated with the approval of the State of New Mexico groundwater permit expected in early 2017. Treated RLWTF effluent is currently being evaporated through a mechanical evaporative system.

Effectiveness of the Mitigation:

Mitigation 1: Achieved and complete.

Recommendation:

Close mitigation - all new and modified LANL projects are evaluated for potential impacts through the IRT.

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:

1. 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.

Actions Taken:

- 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 2009b).

Mitigation Status:

Mitigation 1: Not applicable at this time.

Recommendation:

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 environmental assessment (DOE 2010b) and the 2008 SWEIS ROD (DOE 2008a).

Mitigations:

1. Implement the SERF MAP.
   a. Follow the LANL Threatened and Endangered (T&E) Species Habitat Management Plan (HMP) (LANL 2015b).
   b. Use appropriate erosion and runoff controls.
   c. Use best management practices for sensitive species and migratory bird protection.
   d. Revegetate disturbed areas.
   e. Mitigate actions taken within the wetland of the S-2 reach through wetland restoration or enhancement.
   f. Follow wetland and floodplain best management practices.
   g. Develop and use best management practices to prevent or lessen the movement of contaminated silt from the wetlands.
   h. Follow the LANL CRMP.

Actions Taken:

- All mitigation actions complete

Mitigation Status:

Mitigation 1: Complete.

Recommendation:

This mitigation was formally closed out in the 2016 SWEIS MAP Revision 3 (DOE 2016b).

2.8 Wildland Fire Management Plan

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 the 2001 Federal Wildland Fire Management Policy and Implementing Actions (DOE Order 450.1A; DOE 2008d).

Mitigations:

1. Implement an ongoing Wildland Fire Management Plan with adequate funding.
2. Continue to further reduce wildfire risks by shipping legacy transuranic (TRU) waste, currently stored in the TA-54 domes, to the Waste Isolation Pilot Plant (WIPP) under the 3706 TRU Waste Campaign, a framework agreement formed by the New Mexico Environment Department and DOE.

Actions Taken:

- In FY 2016, LANS completed the Five-Year Wildland Management Fire Plan and provided it to the Field Office (LANL 2016c). This fire plan codifies tactical plans, relationships, and coordination with other land management agencies and ensures the program is fully integrated with the National Fire Plan, Environmental Protection and Compliance, and Tribal agencies.

- DOE planned and completed over 500 acres of wildland fire fuel treatment and mitigation around TA-54/Area G. This proactive measure greatly impacted fire modeling behaviors and enabled planners confidently develop a comprehensive plan to protect materials at risk and to address federal, state, and community safety concerns.

Effectiveness of the Mitigations:

Mitigation 1: The current wildland management program is under review and evaluation. The results will be reported in the 2017 MAPAR.

Mitigation 2: On hold until WIPP 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:

Implement pollution prevention projects to reduce or eliminate waste streams. Continue shipments to WIPP when the facility reopens.

2.9 Site-Wide Environmental Impact Statement Biological Assessment

NEPA Driver:

These mitigations are derived from the BA for the 2008 SWEIS (LANL 2006a). Threatened and endangered species HMP (LANL 2014) provides a management strategy for the protection of threatened and endangered species and their habitats on LANL property. The threatened and endangered species HMP provides guidance for what, when, and where different types of activities are allowed without further review by the US Fish and Wildlife Service (USFWS) (LANL 2014, LANL 2015b). If the threatened and endangered species HMP requirements cannot be followed by project personnel, a BA must be prepared. Pursuant to Section 7 of the Endangered Species Act, 16 U.S.C. § 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 threatened and endangered species from construction and operation of projects at LANL that cannot operate within the threatened and endangered species HMP guidelines.

Mitigations:

1. Evaluate, through the IRT (PRID/EXID) system, the use of span bridges instead of land bridges in areas that cross canyons in threatened and endangered species habitats to reduce environmental impacts (land bridge proposals will require USFWS consultation under the Endangered Species Act).

2. Implement all reasonable and prudent measures in the BA through the IRT (PRID/EXID) system and implementation of the threatened and endangered Species HMP (LANL 2014).

Actions Taken:

In FY 2016, LANS biological resources staff completed trend histories of threatened and endangered species surveys at LANL and incorporated these data into the 2015 ASER (LANL 2016a). Threatened and endangered species surveys were conducted for the Mexican Spotted Owl, Southwestern Willow Flycatcher, Yellow-billed Cuckoo, and Jemez Mountains Salamander. Two pairs of Mexican Spotted Owls were identified on site; however, only one of the nests successfully fledged young. Neither Southwestern Willow Flycatchers nor Yellow-billed Cuckoos were detected, but one Jemez Mountains Salamander was identified in Cañon de Valle.

DOE published the following documents in support of the LANL threatened and endangered species HMP.

- Revised HMP (LANL 2015b) that now includes the New Mexico Meadow Jumping Mouse and Yellow-billed Cuckoo (approved by the USFWS),
- *Floodplain Assessment of the Chromium Plume Control Interim Measure and Plume-Center Characterization in Mortandad Canyon, Los Alamos National Laboratory* (LANL 2015c).
- *Status of Federally Listed Threatened and Endangered Species at Los Alamos National Laboratory* (LANL 2015d).
- *Floodplain Assessment for Corrective Actions in Ancho Canyon, Technical Area 39, Los Alamos National Laboratory, Los Alamos, New Mexico* (LANL 2015e).
- *Floodplain Assessment for Corrective Actions in Potrillo Canyon, Technical Area 36, Los Alamos National Laboratory, Los Alamos, New Mexico* (LANL 2016d).

Mitigation Status:

Mitigations 1 and 2: Completed through implementation of the IRT Program.

Recommendation:

Close out the mitigations as they are now part of LANL's stand operating procedures.

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 DOE's 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:

DOE published the following documents in support of the BRMP.

- *Avian Monitoring at the TA-36 Minie Site, TA-39 Point 6, and TA-16 Burn Ground at Los Alamos National Laboratory* (Hathcock 2014).
- *Nestling Development Guide for the Western Bluebird* (Hutchins and Musgrave 2015).
- *Eccentric Pre-formative Molt in the Spotted Towhee* (Fettig and Hathcock 2015).
- *Avian Community Composition in Response to High Explosive Testing Operations at Los Alamos National Laboratory in Northern New Mexico* (Keller et al. 2015).
- *Los Alamos National Laboratory Fall Avian Migration Monitoring Report 2010–2015* (Thompson and Hathcock 2016).
- Outreach through providing biological resources management talks and wildlife safety briefings at St. Michaels High School, NM, the Expanding your Horizons Conference, McCurdy High School, NM, and LANL.
- Presentations at the North American Ornithological Conference in Washington D.C. Two presentations and two posters were presented.

- Installation lighted elk warning signs on Pajarito Road, to increase motorist awareness of elk in this area.
- Installation of a 1500-gallon wildlife water tank in TA-49 in order to improve safety by moving wildlife away from NM State Road 4 and away from personnel training operations.

Mitigation Status:

Mitigation 1: Complete and implemented through the IRT.

Recommendation:

Close the mitigation action commitment, implemented through the IRT.

2.11 Cultural Resources Management Plan

NEPA Driver:

The commitment to create and maintain a CRMP is derived from the 2008 SWEIS ROD (DOE 2008a). In FY 2016, the CRMP (LANL 2006b) has been submitted to the New Mexico State Historic Preservation Office. 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 being taken by the Field Office to manage the cultural heritage at LANL.

Mitigation:

1. Implement the CRMP (LANL 2006b).

Actions Taken:

In FY 2016, a majority of the work focused on sites within the area of potential effect for proposed projects in Mortandad Canyon, TA-05, TA-36, and TA-49. In addition, planning activities and site visits associated with the new Manhattan Project National Historical Park were a significant part of the FY 2016 work scope.

Specific actions include:

- Initiated the new Manhattan Project National Historical Park with the National Park Service.
- Completed erosion controls at archaeological sites on Puye and Sigma Mesa.

- Finalized a Memorandum of Agreement between DOE and the New Mexico State Historic Preservation Office regarding mitigations associating with damage to five archaeological sites in 2012.
- Finalized an institutional agreement between DOE and the National Park Service for the Manhattan Project National Historical Park related historic preservation work.
- As part of NHPA compliance, tours of the Tsirege archaeological site in support of New Mexico Heritage Preservation Month and historic buildings tours including Manhattan Project Park eligible buildings were conducted.
- Completed the annual Report to Congress on the cultural resources at LANL.

Mitigation Status:

Mitigation 1: Complete, implemented through use of IRT.

Recommendation:

Close out the mitigation, implemented through use of the IRT.

2.12 Commitments to Santa Clara Pueblo

NEPA Driver:

NNSA recognizes that Laboratory operations have 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 or adverse impacts to minority or low-income populations, based on comments from the Santa Clara Pueblo, the 2008 SWEIS ROD (DOE 2008a) 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."

To this end, 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. The commitments to Santa Clara Pueblo are derived from the 2008 SWEIS MAP (DOE 2009b; DOE 2014) and the 2008 SWEIS ROD (DOE 2008a).

Mitigation:

1. 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 SWEIS MAP.

Actions Taken:

In June 2016, the Field Office corresponded with Santa Clara Pueblo Governor Michael Chavarria and concurred on the DRAFT *Work Plan for Santa Clara Traditional Human Health Risk Assessment Scenario and Reasonable Maximum Exposure (RME).* The Field Office is seeking funding for the plan. Discussions with Santa Clara Pueblo are ongoing.

Mitigation Status:

Mitigation 1: Ongoing.

Recommendation:

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

3.0 References

DOE 1995 US Department of Energy, 1995. *Dual-Axis Radiographic Hydrodynamic Test Facility Final Environmental Impact Statement Record of Decision*, DOE/EIS-0228, Los Alamos, New Mexico.

DOE 1996 US Department of Energy, 1996. *Dual-Axis Radiographic Hydrodynamic Test Facility Final Environmental Impact Statement Mitigation Action Plan*, DOE/EIS-0228, Los Alamos, New Mexico.

DOE 1999a US Department of Energy, 1999. *Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory, Los Alamos, New Mexico,* Albuquerque Operations Office, DOE/EIS-0238, Albuquerque, New Mexico.

DOE 1999b US Department of Energy, 1999. *The Long-Term Control of Property: Overview of Requirements in Orders DOE 5400.1 and 5400.5*, US Department of Energy Brief EH-412-0014/1099, October 1999.

DOE 2000a US Department of Energy, 2000. *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, Los Alamos, New Mexico*, DOE Los Alamos Area Office, DOE/SEA-03, Los Alamos, New Mexico.

DOE 2000b US Department of Energy, 2000. *Environmental Assessment for the Wildfire Hazard Reduction and Forest Health Improvement Program at Los Alamos National Laboratory, Los Alamos, New Mexico*, DOE Los Alamos Area Office, DOE/EA-1329, Los Alamos, New Mexico.

DOE 2002 US Department of Energy, 2002. *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*, Los Alamos Area Office, DOE/EA-1408, Los Alamos, New Mexico.

DOE 2003 US Department of Energy, 2003. *Environmental Assessment for the Proposed Los Alamos National Laboratory Trails Management Program, Los Alamos, New Mexico,* Los Alamos Area Office, DOE/EA-1431, Los Alamos, New Mexico.

DOE 2004 US Department of Energy, 2004. *Implementation Guide: Wildland Fire Management Program*, DOE G 450-1.4, Los Alamos, New Mexico.

DOE 2008a US Department of Energy, 2008. *Record of Decision: Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory, Los Alamos, New Mexico,* Federal Register, Volume 73, p. 55833. Washington, DC. September 26, 2008.

DOE 2008b US Department of Energy, 2008. *Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory, Los Alamos, New Mexico,* Los Alamos Site Office, DOE/EIS-0380, Los Alamos, New Mexico.

DOE 2008c US Department of Energy, 2008. *Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory, Los Alamos, New Mexico, Mitigation Action Plan*, Los Alamos Site Office, DOE/EIS-0380, Los Alamos, New Mexico.

DOE 2008d US Department of Energy, 2008. Order 450.1A, *Environmental Protection Program.*

DOE 2009a US Department of Energy, 2009. *Record of Decision: Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory, Los Alamos, New Mexico,* Federal Register, Volume 74, p. 33232. Washington, DC. September 26, 2008.

DOE 2009b US Department of Energy, 2009. *Addendum: 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,* Los Alamos Area Office, DOE/EIS-0380, MAP 2008, Los Alamos, New Mexico.

DOE 2010a US Department of Energy, 2010. *MAP Revision 1: 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,* Los Alamos Area Office, DOE/EIS-0380, MAP 2008, Los Alamos, New Mexico.

DOE 2010b US Department of Energy, 2010. *Final 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*, Los Alamos Area Office, DOE/EA-1736, Los Alamos, New Mexico.

DOE 2010c — US Department of Energy, 2010. *Mitigated Finding of No Significant Impact: Final 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*, Los Alamos Area Office, DOE/EA-1736, Los Alamos, New Mexico.

DOE 2014 — US Department of Energy, 2014. 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, Revision 2*, Los Alamos Area Office, DOE/EIS-0380, MAP 2008 Revision 2, June 2014, Los Alamos, New Mexico.

DOE 2015a. — US Department of Energy, 2015. *Mitigation Action Plan for Chromium Plume Control Interim Measure and Plume-Center Characterization, Los Alamos National Laboratory, Los Alamos, New Mexico,* Los Alamos Area Office DOE/EA-2005, December 16, 2015.

DOE 2015b — US Department of Energy, 2015. *Fiscal Year 2014 Site-Wide Environmental Impact Statement Mitigation Action Plan Annual Report,* Los Alamos Area Office, DOE/EIS-0380, MAPAR 2014, Los Alamos, New Mexico.

DOE 2016a — US Department of Energy, 2016. *Fiscal Year 2015 Site-Wide Environmental Impact Statement Mitigation Action Plan Annual Report,* Los Alamos Area Office, DOE/EIS-0380, MAPAR 2015, Los Alamos, New Mexico.

DOE 2016b — US Department of Energy, 2016. *Site-Wide Environmental Impact Statement for the Continued Operation of Los Alamos National Laboratory, Los Alamos, New Mexico, Mitigation Action Plan, Revision 3,* Los Alamos Area Office, DOE/EIS-0380, Los Alamos, New Mexico.

EPA 2014 — US Environmental Protection Agency Glossary from the Risk Assessment Portal, accessed May 2015, http://www.epa.gov/risk_assessment/glossary.htm.

Fettig and Hathcock 2015 — Fettig, S. and C. Hathcock, 2015. *Eccentric Pre-formative Molt in the Spotted Towhee*. *Western Birds* 46 (4):343-346.

Hathcock 2014 — Hathcock, C., 2014. *Avian Monitoring at the TA-36 Minie Site, TA-39 Point 6, and TA-16 Burn Ground at Los Alamos National Laboratory* Los Alamos National Laboratory report LA-UR-14-28161 (2014).

Hutchins and — Hutchins, K. and M. Musgrave, 2015. *Nestling Development Guide for the*

Musgrave 2015 *Western Bluebird* Los Alamos National Laboratory report LA-UR-15-29223 (2015).

Katzman 2012 Katzman, 2012. *Update on Sandia/Mortandad Canyons Groundwater Investigation.* Los Alamos National Laboratory report LA-UR-12-24913 (2012).

Keller et al. 2015 Keller, D., P. Fresquez, L. Hansen, and D. Kaschube, 2015. *Avian Community Composition in Response to High Explosive Testing Operations at Los Alamos National Laboratory in Northern New Mexico*, Los Alamos National Laboratory report LA-UR-15-28386 (2015).

LANL 1999 Los Alamos National Laboratory, 1999. *CD-4 Milestone for the Dual-Axis Radiographic Hydrodynamic Test Facility*, Los Alamos National Laboratory Memorandum ESH-20/Ecol-99-0235 (1999).

LANL 2006a Los Alamos National Laboratory, 2006. *Biological Assessment of the Continued Operation of Los Alamos National Laboratory on Federally Listed Threatened and Endangered Species, Los Alamos National Laboratory, Los Alamos, New Mexico*, Los Alamos National Laboratory report LA-UR-06-6679, Los Alamos, New Mexico.

LANL 2006b Los Alamos National Laboratory, 2006. *A Plan for the Management of the Cultural Heritage at Los Alamos National Laboratory, New Mexico,* Los Alamos National Laboratory report LA-UR-04-8964, Los Alamos, New Mexico.

LANL 2007 Los Alamos National Laboratory, 2007. *Biological Resources Management Plan for Los Alamos National Laboratory*, Los Alamos National Laboratory report LA-UR-07-2595, Los Alamos, New Mexico.

LANL 2013 Los Alamos National Laboratory, 2013. *Program Description PD400 Environmental Protection* issued February 2013, Los Alamos, New Mexico.

LANL 2014 Los Alamos National Laboratory, 2014. *Threatened and Endangered Species Habitat Management Plan for Los Alamos National Laboratory*, Los Alamos National Laboratory report LA-UR-14-21863, Los Alamos, New Mexico.

LANL 2015a Los Alamos National Laboratory, 2015. *Trails Management Plan 2015*. Los Alamos National Laboratory report LA-UR-15-20807, Los Alamos, New Mexico.

LANL 2015b Los Alamos National Laboratory, 2015. *Threatened and Endangered Species Habitat Management Plan for Los Alamos National Laboratory,* Los Alamos National Laboratory report LA-UR-15-28610, Los Alamos, New Mexico.

LANL 2015c Los Alamos National Laboratory, 2015. *Floodplain Assessment of the Chromium Plume Control Interim Measure and Plume-Center Characterization in Mortandad Canyon, Los Alamos National Laboratory,* Los Alamos National Laboratory report LA-UR-15-28814, Los Alamos, New Mexico.

LANL 2015d Los Alamos National Laboratory, 2015. *Status of Federally Listed Threatened and Endangered Species at Los Alamos National Laboratory,* Los Alamos National Laboratory report LA-UR-15-29002, Los Alamos, New Mexico.

LANL 2015e Los Alamos National Laboratory, 2015. *Floodplain Assessment for Corrective Actions in Ancho Canyon, Technical Area 39, Los Alamos National Laboratory, Los Alamos, New Mexico,* Los Alamos National Laboratory report LA-UR-16-26253, Los Alamos, New Mexico.

LANL 2016a Los Alamos National Laboratory, 2016. *Los Alamos National Laboratory 2015 Annual Site Environmental Report,* Los Alamos National Laboratory report LA-UR-16-26788, Los Alamos, New Mexico.

LANL 2016b Los Alamos National Laboratory, 2016. *SWEIS Yearbook—2014 Comparison of 2014 Data to Projections of the 2008 Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory*, Los Alamos National Laboratory report LA-UR-16-24711, Los Alamos, New Mexico.

LANL 2016c Los Alamos National Laboratory, 2016. *LANL Five-Year Wildland Fire Management Plan (2016-2020)*, Los Alamos National Laboratory report LA-UR-16-20979, Los Alamos, New Mexico.

LANL 2016d Los Alamos National Laboratory, 2016. *Floodplain Assessment for Corrective Actions in Potrillo Canyon, Technical Area 36, Los Alamos National Laboratory, Los Alamos, New Mexico,* Los Alamos National Laboratory report LA-UR 16-20393, Los Alamos, New Mexico.

Thompson and Hathcock 2016 Thompson, B. and C. Hathcock, 2016. *Los Alamos National Laboratory Fall Avian Migration Monitoring Report 2010–2015*, Los Alamos National Laboratory report LA-UR-16-21876 (2016).

This page intentionally left blank.

Appendix A
2008 Site-Wide Environmental Impact Statement
FY 2016 Mitigation Action Plan Annual Report
Tracking Log

This page intentionally left blank.

Green indicates a completed action, Yellow is an ongoing action, Blue is an ongoing but incomplete action, Red is a closed or on-hold mitigation. USE SAME TERMS AS IN THE TEXT. IDENTIFY ACTIONS NOT STATUS IN THE ACTIONS TAKEN.

Topic	Mitigation Action Commitment	NEPA Driver	Actions Taken	Mitigation Status	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 at the facility and surrounding areas and at a control site away from the DARHT facility.	MAP for DARHT EIS (DOE/EIS 0228; Oct. 1996)	LANS staff collected samples around the perimeter of DARHT and submitted them for the analysis of radionuclides, heavy metals, dioxin/furans, and PCB congeners.	Achieved and ongoing	Continue annual sampling.	EPC
	Site monitoring and evaluation will consist of periodic soil, water, and other environmental analyses for solid, hazardous, mixed, and radioactive wastes.		LANS staff collected samples around the perimeter of DARHT and submitted them for the analysis of radionuclides, heavy metals, dioxin/furans, and PCB congeners.	Ongoing	Continue annual sampling.	EPC
	On an annual basis, the Field Office will invite tribal officials to visit cultural resource sites within TA-15 that are of particular interest to the Pueblos.		No tours requested by the Pueblo de San Ildefonso.	Tours will be conducted as requested by the Pueblo de San Ildefonso. Annual maintenance visit has been completed.	Continue to conduct tours as requested and annual maintenance visits.	EPC, Field Office: Cultural Resources Program Manager and Intergovernmental Programs

Topic	Mitigation Action Commitment	NEPA Driver	Actions Taken	Mitigation Status	Recommendation	Responsible Party
2.2 Trails MAP	Complete eligibility evaluations for historic trails under the NHPA and identify additional trails use environmental issues.	DOE/EA-1431 (Aug. 2003) and FONSI (Sept. 2003)	Monitoring of cultural resources adjacent to recreational trails in TAs 70 and 71; no issues or impacts were identified.	Ongoing; integrated into the revised LANL CRMP	Implement the Trails Management Plan and continue to implement under the LANL CRMP.	EPC, Field Office: Cultural Resources Program Manager
	Evaluate and manage trails to determine appropriate closures and/or restrictions.		Provided guidance to Los Alamos County on potential constraints for future Canyon Rim Trail alignment west of Knecht Street. Participated in several meetings to advise on trail closures and re-openings related to wildlife encounters.	Ongoing	Implement Trails Management Plan.	EPC, Field Office: Landlord Program Manager
	Prepare management plans for trails in TAs 70 and 71.		Published Trails Management Plan for LANL trails.	Ongoing	Implement Trails Management Plan.	EPC, 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.	No maintenance performed by volunteers in 2016 after Institutional Agreement expired and Task Force no longer wanted to participate. Discussions with new group underway.		LANS and Field Office Legal Counsel

Topic	Mitigation Action Commitment	NEPA Driver	Actions Taken	Mitigation Status	Recommendation	Responsible Party
	Plan, maintain, repair, and construct trails.		Trails Working Group met eight times. Published Trails Management Plan.	Requires new Institutional Agreement and new volunteer group.		EPC
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 collected upgradient of the Los Alamos Canyon weir and the FRS. Results available in the 2015 ASER.	Ongoing	Continue annual sampling and analysis.	EPC, DOE Office of Environmental Management (EM)
	Periodically remove sediment from the Los Alamos Canyon weir based on sedimentation rate and contamination accumulation rate.		No sediment removed or sampled from the Los Alamos Canyon weir in FY 2016. A sediment removal plan for structures that retain sediment is being worked on by EPC staff.	Ongoing	Continue as needed. Continue additional clean outs as necessary.	LANS Associate Directorate for Environmental Management (ADEM), EM
2.4 FRS Environmental Assessment	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 June 13, 2016.	Ongoing	Continue annual inspections of the FRS.	LANS Utilities and Institutional Facilities Division
	Remove portions of the FRS in accordance with DOE/EA-1408.		N/A*	**Mitigation On Hold** It is anticipated that the material generated by the FRS removal would be used to cover MDA G when capped. Thus, activities are on hold until Area G is ready for capping.	Remove portions of the FRS in accordance with DOE/EA-1408.	LANS Associate Directorate for Nuclear and High-Hazard Operations (ADNHHO) EPC
	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	Mitigation Status	Recommendation	Responsible Party
2.4 FRS Environmental Assessment (cont.)	Consider leaving 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 FSR.	LANS ADNHHO EPC
	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 EPC
	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)	There have been no discharges into Mortandad Canyon since 2010.	Ongoing	Ensure IRT system (PRID/ EXID) is used to evaluate projects potentially impacting canyons.	EPC, ADEM, 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)	N/A	**Mitigation On Hold** 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

Topic	Mitigation Action Commitment	NEPA Driver	Actions Taken	Mitigation Status	Recommendation	Responsible Party
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 were completed.	Mitigation Complete	N/A Mitigation closed out in the 2016 SWEIS MAP Revision 3.	EPC, ADEM Field Office: NEPA Compliance Officer
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)	LANS completed the Five-Year Wildland Management Fire Plan and submitted it to the Field Office.	Ongoing	Continue implementing annual plans to mitigate wildfire risks.	LANS Emergency Operations-Emergency Management
	Continue to further reduce wildfire risks by shipping legacy TRU 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. Planned and completed over 500 acres of wildland fire fuel treatment and mitigation around TA-54/Area G.	**Mitigation On Hold during WIPP closure**	Implement pollution prevention projects to minimize or eliminate waste streams. Identify alternative location(s) for waste until WIPP reopens.	LANS ADEM and EPC, EM

Topic	Mitigation Action Commitment	NEPA Driver	Actions Taken	Mitigation Status	Recommendation	Responsible Party
2.9 SWEIS BA	Consider span bridges instead of land bridges in areas that cross canyons in T&E species habitats to reduce environmental impacts (under the Endangered Species Act, land bridge proposals require USFWS consultation).	LANL T&E Species HMP and SWEIS BA	Not the preferred alternative for any projects to date.	**Mitigation On Hold, not the preferred alternative for current projects.**	Span bridges are considered through the use of the IRT system.	EPC
	Implement all reasonable and prudent measures in the BA through the institutional project review process and implementation of the T&E species HMP.		Efforts included completing bird and T&E species surveys, submitting two floodplain assessments to the Field Office, submitting a BA to Santa Fe National Forest and Bandelier National Monument, conducting outreach to local schools and other LANL personnel, and attending trainings.	Ongoing. Implemented through the use of the IRT.	Review projects using the IRT system.	EPC

Topic	Mitigation Action Commitment	NEPA Driver	Actions Taken	Mitigation Status	Recommendation	Responsible Party
2.10 BRMP	Implement LANL BRMP. The BRMP addresses DOE's commitment to conduct site operations using processes that minimize risk to mission and biological resources.	DOE/EIS-0238 ROD (Sept. 1999) and DOE/EIS-0380 ROD (Sept. 2008)	Efforts included giving talks and creating material for internal and external presentations, publishing articles, and supporting public outreach events. LANS biological resources staff received an Honorable Mention for the Migratory Bird Treaty Act Presidential Migratory Bird Stewardship Award.	Mitigation Complete	Review projects using the IRT system.	EPC 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		Mitigation Complete	Review projects using the IRT system.	EPC Field Office: Cultural Resources Program Manager

Topic	Mitigation Action Commitment	NEPA Driver	Actions Taken	Mitigation Status	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 concurred on the *Work Plan for Santa Clara Traditional Human Health Risk Assessment Scenario and Reasonable Maximum Exposure (RME)* and agreed to assist in seeking funding for the plan. The Field Office also continued consultations with Santa Clara Pueblo.	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

* N/A = not applicable.

Appendix B

Dual-Axis Radiographic Hydrodynamic Test Facility

Mitigation Action Plan Annual Report for Fiscal Year 2015

This page intentionally left blank.

Dual-Axis Radiographic Hydrodynamic Test Facility

Mitigation Action Plan

Annual Report for FY 2015

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

This page intentionally left blank.

CONTENTS

List of Tables

List of Figures

This page intentionally left blank.

EXECUTIVE SUMMARY

In fiscal year (FY) 2015, all radionuclides and chemicals in soil, sediment, and small mammals from around the perimeter of the Dual-Axis Radiographic Hydrodynamic Test (DARHT) facility were either similar to background or below ecological screening levels protective of biota. Also, an 18-year study, showed no impacts to bird populations by either open air or contained detonation activities. Species richness and diversity were significantly higher during the vessel containment period (2007–2014) than in the pre-operation period and changes in composition (types of birds) over time 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 2015 radionuclide and chemical 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 increased 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 blast residues released into the environment compared with open-air detonations, and the use of steel containment vessels further reduced those amounts over foam mitigation.

This page intentionally left blank.

ACRONYMS

BA	Biological and Floodplain/Wetland Assessment
CFR	Code of Federal Regulations
DARHT	Dual-Axis Radiographic Hydrodynamic Test (facility)
DOE	U.S. Department of Energy
EIS	Environmental Impact Statement
EPC	Environmental Protection and Compliance
ENV-RCRA (group)	Water Quality and RCRA [Resource Conservation and Recovery Act]
FR	Federal Register
FY	fiscal year
LANL	Los Alamos National Laboratory
MAP	Mitigation Action Plan
MAPAR	Mitigation Action Plan Annual Report
NEPA	National Environmental Policy Act of 1969
NNSA	National Nuclear Security Administration
NPDES	National Pollutant Discharge Elimination System
ROD	Record of Decision
SWEIS	Site-Wide Environmental Impact Statement
SWPPP	Stormwater Pollution Prevention Plan
TA	technical area
TNT	trinitrotoluene(2,4,6-)
VPB	Vessel Preparation Building
WFO-FOD	Weapons Facilities Operations, Facilities Operations Directorate
WPA	Work Package Agreement

This page intentionally left blank.

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 archeological 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 2015 (October 1, 2014, through September 30, 2015) and represents the sixteenth 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 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[1]). 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 the DARHT facility were implemented in May of 2007 to 2015.

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 (LANL 2015) 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 measures 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).

[1] In addition to containment with vessels, additional mitigation measures for use at the DARHT facility 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 the DARHT facility. 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 the DARHT facility. 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 the staging, preparation, and decontamination of containment vessels.

In FY 2007 through 2015, 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, six in FY 2014, and five in FY 2015.

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 Feld 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 Protection and Compliance Division (EPC) manages the MAP. Using the annual WPA, EPC 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 2015. 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
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

DARHT MAP Potential Impacts/Commitments	DARHT Phase	MAPAR Section
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
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) EPC 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 of 4 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; 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 and small mammals collected around the perimeter of the DARHT facility during FY 2015 (Figure 3-1). All of the data can be found in the Annual Site Environmental Report (LANL 2016).

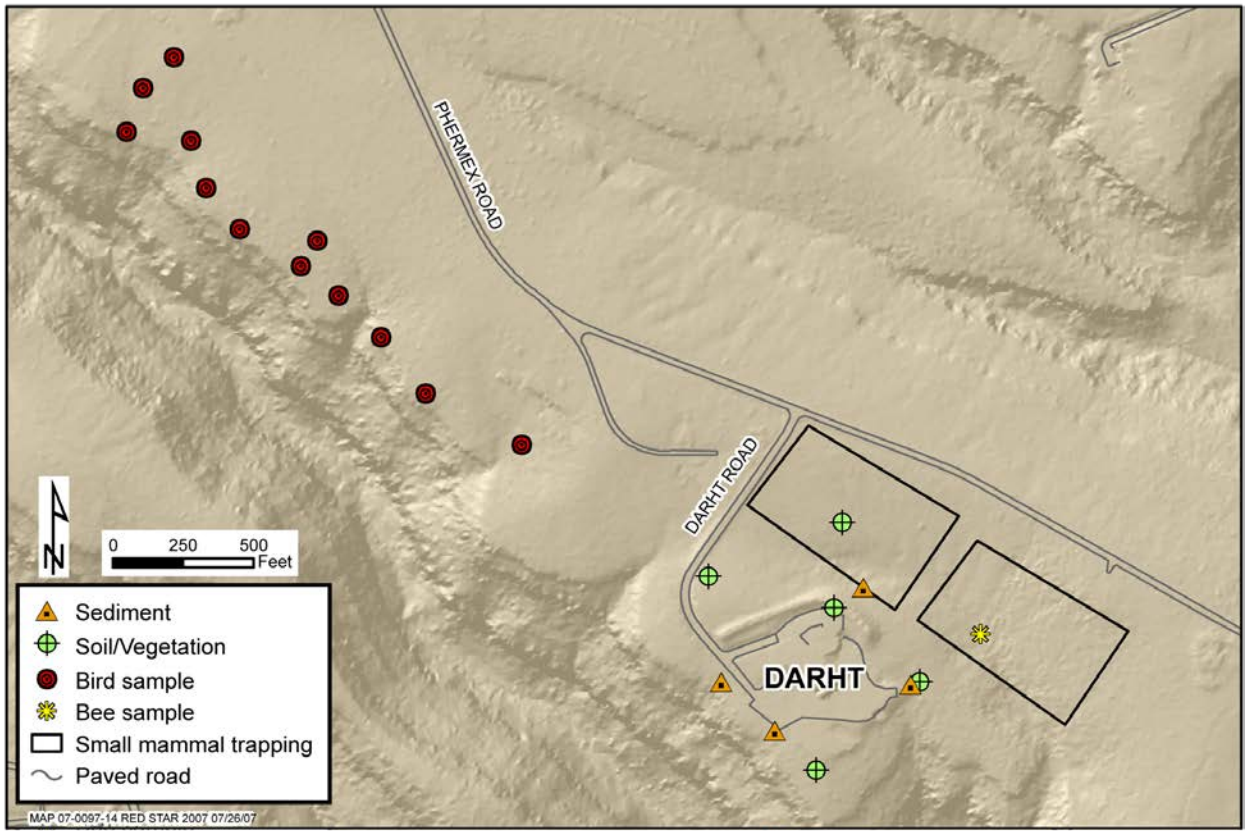

Figure 3-1. Sample locations for soil, sediment, vegetation, field mice, birds, and bees around the DARHT facility.

Composite soil samples (five subsamples per location) were collected in late April 2015 on the north, east, south, and west sides of the DARHT facility perimeter along the fenceline (Figure 3-1). An additional sample was collected about 65 to 75 feet north of the firing point. Sediment grab samples were collected on the north, east, south, and southwest sides. All soil and sediment samples were analyzed for tritium, plutonium-238, plutonium-239/240, strontium-90, americium-241, cesium-137, uranium-234, uranium-235, uranium-238, the inorganic elements listed previously, and high explosives. The sample nearest the firing point was also analyzed for dioxins and furans.

In 2015, field mice were collected on the northeast side of the facility and analyzed for radionuclides, inorganic elements, dioxins, and furans. In animals, results for tritium are reported on a picocuries per milliliter basis, results for the other radionuclides are reported on a picocuries per gram ash weight basis, and results for the inorganic elements and dioxins/furans are reported on a milligrams per kilogram wet weight basis.

Results of most chemical analyses were compared with the baseline statistical reference levels. The baseline statistical reference levels for the DARHT facility are the levels below which 99% of samples collected at the facility occurred during 1996 to 1999, before the beginning of firing site operations (Nyhan et al. 2001). In cases where there are no baseline statistical reference levels, the biota chemical results were compared with regional statistical reference levels for tissue activities and concentrations in mice (Fresquez 2015).

Soil and Sediment Results at the DARHT Facility

All radionuclides in soil and sediment collected from within and around the perimeter of the DARHT facility were either not detected (most results), similar to baseline or regional statistical reference levels, or far below no-effect ecological screening levels.

The only radionuclides in soil and sediment around the DARHT facility site that have been consistently measured above the baseline or regional statistical reference levels over the years are the uranium isotopes, primarily uranium-238. Operations at the DARHT facility have changed since 2007 to include the use of closed containment vessels; since 2008, the uranium-238 activity near the firing point has decreased to the baseline statistical reference level (Figure 3-2).

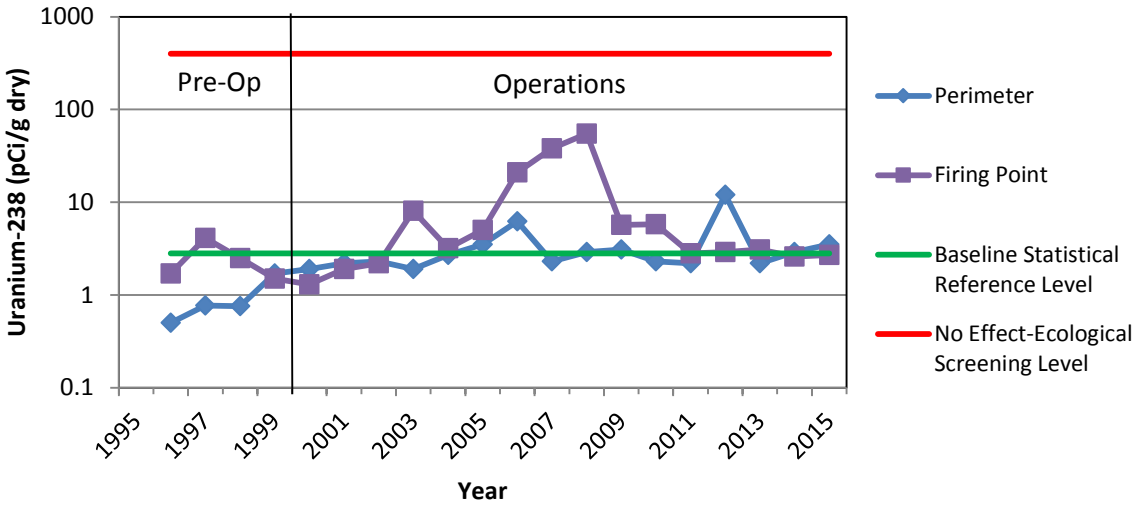

Figure 3-2 **Uranium-238 activities in surface soil collected within (near the firing point) and around the DARHT facility perimeter (north-, west-, south-, and east-side average) at TA-15 from 1996 to 1999 (preoperations) and from 2000 to 2015 (operations) compared with the baseline statistical reference level and the lowest no-effect ecological screening level (plant). Note the logarithmic scale on the vertical axis.**

With the exception of lead, the inorganic element concentrations in the soil and sediment samples collected within and around the facility were below the baseline or

regional statistical reference levels. The highest lead concentration (20 mg/kg) was collected on the south side of the DARHT facility from both soil and sediment samples. The amounts are slightly above the regional statistical reference level of 18 mg/kg and above the lowest no-effect ecological screening level of 14 mg/kg for the robin. The concentration, however, is below the low-effect ecological screening level of 28 mg/kg for the robin, and because these data represent only one area, it is not expected to significantly impact the health of birds at the site overall. Bird abundance and species diversity are not negatively impacted at the DARHT facility (see the Avian Community Characteristics at the DARHT facility: Final Report section of this report, page 10.)

Beryllium, listed as a chemical of potential concern before the start-up of operations at the facility (DOE 1995), was not detected above baseline or regional statistical reference levels in any of the soil or sediment samples during 2015. Beryllium concentrations in soil over the 16-year operations period have mostly remained below the baseline statistical reference level over time.

No high-explosive chemicals were detected in any of the soil or sediment samples collected within or around the perimeter of the DARHT facility, including the sample closest to the firing point. Dioxins and furans also were not detected in any of the soil or sediment samples.

Small Mammal Results at the DARHT Facility

In a composite sample of five field mice collected from the north and northeast sides of the DARHT facility, radionuclides were either not detected (most results) or similar to baseline or regional statistical reference levels and were far below biota screening levels.

The amount of uranium-238 in small mammals, as seen with soil, increased until the year 2007 and then decreased thereafter to the baseline statistical reference level; the decrease is concurrent with the change from open-air and/or foam-mitigated detonations during the 2000 to 2006 period to closed vessel containment, starting in 2007 (Figure 3-3).

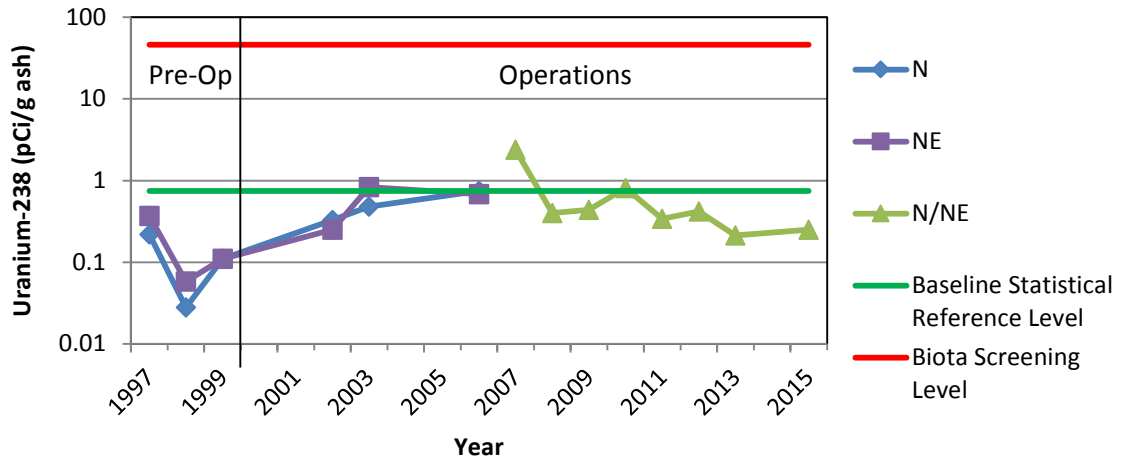

Figure 3-3 **Uranium-238 activities in mice collected from the north and northeast sides of the DARHT facility at TA-15 from 1997 to 1999 (preoperations) and 2002 to 2015 (operations) compared with the baseline statistical reference level and the biota screening level. Note the logarithmic scale on the vertical axis.**

Average concentrations of inorganic elements in three field mice collected from the northeastern perimeter of the DARHT facility were not statistically different from the regional background (Fresquez 2015). Dioxins and furans were not detected in three different field mice collected from the same location.

Avian Community Characteristics at the DARHT Facility: Final Report

The Laboratory conducted an 18-year study of breeding bird abundance, species richness, evenness, diversity, composition, productivity, and survivorship near the DARHT facility during preoperation (1997–1999) and operation (2000–2014) periods to determine whether the firing site operations affected characteristics of local bird populations (Keller et al. 2015).

A total of 2952 bird captures, representing 80 species, were recorded during 18 years of mist net operations. Captured birds were identified to species, aged and sexed, and were banded during May through August of each year.

There were no significant differences in avian abundance and species evenness in any of the operation periods compared with the preoperation period. Species richness and diversity were significantly higher during the vessel containment period (2007–2014) than in the preoperation period.

The time period of this study coincided with a wildfire (2000), a bark beetle infestation (2002), and two periods of drought (November 1999–March 2004 and December 2005–December 2014). These ecological disturbances altered the study area vegetation from a ponderosa pine woodland to a more open woodland/shrub environment. Analysis of

aerial photos determined that the average percentage of canopy cover of mature ponderosa pines within 100 feet of mist net sites declined from 12% to 3% between 1991 and 2014, and the percentage of shrub cover slightly increased. Two bird species associated with large trees became less common over the study period (capture rate dropped below two adults per 600 net-hours relative to the preoperations period), and four bird species associated with edge and scrub habitats became more common over the study period (capture rate increased to more than two adults per 600 net-hours relative to the preoperations period).

Bird productivity and survival were not affected by the initiation of firing site operations. The increase in diversity and the change in bird species composition over time were probably related to the change in vegetation.

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 years (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 the DARHT facility were implemented in May of 2007. Three hydrodynamic test shots within single-walled steel containment vessels at the DARHT facility were conducted in 2007. Two hydrodynamic test shots were conducted within single-walled steel containment vessels at the DARHT facility 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 meters) 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 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 developed containment vessel cleanout processes in support of the commitment to decontaminate vessels used in experiments.

Process equipment for managing debris from vessel shots was installed in the VPB. Procedures for vessel cleanout, decontamination, and stabilization of debris from vessel shots were 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 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 Team. The Team 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 Hazardous Materials Response Team 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 the 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 EPC to avoid disturbance to threatened and endangered species and other wildlife species.

c) EPC must be notified before any new groundbreaking activities. EPC will review all new sites and evaluate any potential impacts associated with the action. EPC 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 EPC 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 LANL Integrated Safety Management System, 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 Habitat Management Plan (LANL 2015). These standards are measured by performance criteria contained in the LANL Performance Requirement 404-00-00 Appendix 3 (Environmental Protection—Ecological and Cultural Resources). EPC 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 EPC) 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.

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 EPC on all DARHT facility site threatened and endangered species issues through the ongoing implementation of the LANL Habitat Management Plan. LANL biologists will conduct the necessary species monitoring and habitat protection measures required for the DARHT facility site through the Habitat Management Plan (LANL 2015).

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 Habitat Management Plan. During FY 2000, site-wide implementation of the Habitat Management Plan 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 Habitat Management Plan was last updated in November 2015. No Mexican spotted owls were found around DARHT in FY 2016.

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). DOE is now conducting visits to cultural resource sites in TA-15 as well as Nake'muu when requested by tribal officials.

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 periodically evaluate procedures/measures for mitigation. 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-year-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 the DARHT facility (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). These field checks, conducted by

the LANL Resources Management Team, include brief assessments of the standing walls at Nake'muu along with checks of the associated fire road and firebreak. During the period of FY 2006 to 2009 the Nake'muu field checks were directly tied into the annual visit by the Pueblo de San Ildefonso required by the DARHT MAP, which provided Pueblo de San Ildefonso visitors on the DARHT tour 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 during FY 2011. Detailed photographic documentation of the site was resumed in FY 2012. The FY 2012 photographs were compared with the photographs taken in FY 2010. Erosion of the mortar exposing the chinking stones between tuff blocks was noted and the fall of three stones from the wall tops. The FY 2015 annual photographic documentation of the site was conducted on July 21 and August 27 to 28, 2015, by the Resources Management Team. Natural erosion continues to be seen throughout the site. Several chinking stones from two locations were identified to have fallen since the previous assessment in October 2014. Mortar loss continues to be noted throughout the site. Small areas of undercutting are evident at several walls and daylight can be seen beneath the base stones. Areas noted have not increased since the FY 2014 assessment.

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. Wildland fire environmental conditions limited safe access to the site during portions of FY 2014. Visits to Nake'muu by members of the Pueblo de San Ildefonso will be provided when requested by the Pueblo. One visit was conducted during FY 2015 for a tribal environmental staff member.

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 aqueous foam, implemented before FY 2007. 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 were determined appropriate by DOE and are implemented under the LANL Integrated Safety Management 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 Integrated Safety Management 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, 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 State Historic Preservation Officer 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 1999a). 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 and sacred sites (DOE 2000b). As part of DARHT facility operations, DOE and LANL will continue to consult with the four Accord Pueblos through requested tours, 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 traditional cultural properties or sacred site issues were identified during FY 2007 through 2015. Any future traditional cultural properties 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).

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 Integrated Safety Management 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 Radiation-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 Integrated Safety Management 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 2015, all radionuclides and chemicals in soil, sediment, and small mammals from around the perimeter of the DARHT facility were either similar to background or below screening levels protective of biota. Also, the comparison of bird species diversity and composition, a qualitative measurement, before and during DARHT operations over an 18-year period, showed no measurable impacts to the bird populations.

Although FY 2015 radionuclide and chemical levels were not at concentrations detrimental to human health (DOE 1999b) or to the environment (LANL 2014, DOE 2002, EPA 2014), there were still measurable amounts of depleted uranium in all media, and the levels were increasing over time to at least FY 2006. Concentrations of depleted uranium in most media decreased in FY 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 FY 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 baseline statistical reference levels for some time.

Foam mitigation significantly reduced the amount of potential contaminants released into the environment compared with open-air detonations (80% reduction), and the use of steel containment vessels further reduced those amounts over foam mitigation (99.9% reduction).

The natural environment is having a greater effect on the deterioration of the standing wall architecture at Nake'muu than the operations at the DARHT facility.

4.1 2015 MAP Implementation

In July 1999, all construction-related DARHT MAP mitigation commitments and action plans were completed. The FY 2015 DARHT MAP activities represent the fifteenth year of operation implementation. The DARHT MAP activities implemented during FY 2015 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 baseline statistical reference levels 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 baseline statistical reference levels or are on increasing trends.

- **Reevaluate environmental monitoring strategy**. The environmental monitoring strategy for the DARHT facility should be reevaluated with consideration of issues such as (1) budget, (2) movement to contained shots in FY 2007, (3) trend in contaminant concentrations and comparison with the benchmark thresholds of baseline statistical reference levels (regional statistical reference levels) 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 LANL Annual Site Environmental Report.
- **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 years for vegetation removal, etc., and annual tribal visits should continue. Future traditional cultural properties 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 Integrated Safety Management.** Under the institutional implementation of the Integrated Safety Management 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.

REFERENCES

DOE 1995 US Department of Energy, 1995. *Dual-Axis Radiographic Hydrodynamic Test Facility Final Environmental Impact Statement Record of Decision*, DOE/EIS-0228, Los Alamos, New Mexico.

DOE 1996 US Department of Energy, 1996. *Dual-Axis Radiographic Hydrodynamic Test Facility Final Environmental Impact Statement Mitigation Action Plan*, DOE/EIS-0228, Los Alamos, New Mexico.

DOE 1999a US Department of Energy, 1999. *Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory, Los Alamos, New Mexico,* Albuquerque Operations Office, DOE/EIS-0238, Albuquerque, New Mexico.

DOE 1999b US Department of Energy, 1999. *The Long-Term Control of Property: Overview of Requirements in Orders DOE 5400.1 and 5400.5*, US Department of Energy Brief EH-412-0014/1099, October 1999.

DOE 2000a US Department of Energy, 2000. *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, Los Alamos, New Mexico,* DOE Los Alamos Area Office, DOE/SEA-03, Los Alamos, New Mexico.

DOE 2000b U.S. Department of Energy, 2000. *A Comprehensive Plan for the Consideration of Traditional Cultural Properties and Sacred Sites at Los Alamos National Laboratory, New Mexico,* Department of Energy, Albuquerque Field Office – Los Alamos Area Office, August 2000.

DOE 2002 U.S. Department of Energy, 2000. *A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota*," U.S. Department of Energy Standard DOE-STD-1153-2002, July 2002.

DOE 2008 U.S. Department of Energy, 2008. *Final Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory, Los Alamos, New Mexico,* DOE/EIS-0380 December 2008.

Duran 2008 Duran, B., 2008. *Environmental Assessment of Foam Mitigation and Vessel Contained Shots,* Los Alamos National Laboratory report LA-UR-08-2289, Los Alamos, New Mexico, April 2008.

EPA 2014 U.S. Environmental Protection Agency Glossary from the Risk Assessment Portal, accessed May 2015, http://www.epa.gov/risk_assessment/glossary.htm.

Fresquez 2015 Fresquez, P.R., 2015. *The Concentrations of Radionuclides, Heavy Metals, and Polychlorinated Biphenyls in Field Mice Collected from Regional*

Background Areas: Revision 3, Los Alamos National Laboratory report LA-UR-15-29613 (2015).

Fresquez et al. 2007 — Fresquez, P.R., C. Hathcock, and D. Keller, *Bird Surveys at DARHT before and during Operations: Comparison of Species Abundance and Composition and Trace Elements,* Los Alamos National Laboratory report LA-14355 (November 2007).

Keller and Risberg 1995 — Keller, D.C., and D. Risberg, 1995, *Biological and Floodplain/Wetland Assessment for the Dual-Axis Radiographic Hydrodynamics Test (DARHT) Facility*, Los Alamos National Laboratory report LA-UR-95-647 (December 1995).

Keller et al. 2015 — Keller, D.C., P.R. Fresquez, L.A. Hansen, and D.R. Kaschube, 2015, *Avian Community Composition in Response to High Explosive Testing Operations at Los Alamos National Laboratory in Northern New Mexico,* Journal of Environmental Protection, 6(12): 1442-1453 (2015).

LANL 1999 — Los Alamos National Laboratory, *CD-4 Milestone for the Dual-Axis Radiographic Hydrodynamic Test Facility,* Los Alamos National Laboratory Memorandum ESH-20/Ecol-99-0235 (June 1999).

LANL 2006 — Los Alamos National Laboratory, *A Plan for the Management of the Cultural Heritage at Los Alamos National Laboratory, New Mexico,* Los Alamos National Laboratory report LA-UR-04-8964 (2006).

LANL 2007 — Los Alamos National Laboratory, *Wildland Fire Management Plan,* Los Alamos National Laboratory report LA-UR-07-6478 (September 2007).

LANL 2014 — Los Alamos National Laboratory, *ECORISK Database, Version 3.2*, Los Alamos National Laboratory document LA-UR-14-28010 (2014).

LANL 2015 — Los Alamos National Laboratory, "Threatened and Endangered Species Habitat Management Plan for Los Alamos National Laboratory," Los Alamos National Laboratory report LA-UR-15-28610 (2015).

LANL 2016 — Los Alamos National Laboratory, "Los Alamos National Laboratory Annual Site Environmental Report 2015," Los Alamos National Laboratory report LA-UR-16-26788 (2016).

Nyhan et al. 2001 — Nyhan, J.W., P.R. Fresquez, K.D. Bennett, J.R. Biggs, T.K. Haarmann, D.C. Keller, and H.T. Haagenstad, *Baseline Concentrations of Radionuclides and Trace Elements in Soils, Sediments, Vegetation, Small Mammals, Birds, and Bees around the DARHT Facility: Construction Phase (1996 through 1999),* Los Alamos National Laboratory report LA-13808-MS (2001).

Vierra and Schmidt 2006, Vierra, B.J., and K.M. Schmidt, 2006, *A Current Assessment of the Nake'muu Monitoring Program* Los Alamos National Laboratory report LA-UR-06-8130 (2006).

Zumbro 2010 Zumbro, M., Los Alamos National Laboratory, personal communication, May 10, 2010.

This page intentionally left blank.

Appendix C

Fiscal Year 2016 Trails Management Program

Annual Report

Mitigation Action Plan

This page intentionally left blank.

LA-UR-16-28265

Approved for public release;
distribution is unlimited.

Title:

Fiscal Year 2016 Trails Management Program Mitigation Action Plan Annual Report

October 2016

Prepared by: Daniel S. Pava, Environmental Protection and Compliance Division, Environmental Stewardship Group

Los Alamos
NATIONAL LABORATORY
EST. 1943

Front cover: Guided hike in Los Alamos Canyon

Contents

Figures

Acronyms

DOE	Department of Energy
FY	fiscal year
LANL	Los Alamos National Laboratory
LANS	Los Alamos National Security, LLC
MAP	Mitigation Action Plan
NNSA	National Nuclear Security Administration
SWEIS	Site-Wide Environmental Impact Statement
TA	Technical Area

Executive Summary

This 2016 Trails Management Program Mitigation Action Plan Annual Report is prepared by US Department of Energy/National Nuclear Security Administration 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, Los Alamos, New Mexico (DOE/EIS 0380) Mitigation Action Plan* (SWEIS MAP; DOE 2008). The Trails 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 report includes a summary of the LANL Trails Management Program activities and actions during fiscal year 2016, October 2015 through September 2016.

This page intentionally left blank.

1.0 Context: Trails at Los Alamos National Laboratory

Trails use at Los Alamos National Laboratory (LANL) is considered one of the benefits of working and living in Los Alamos County. However, there was never an explicit US Department of Energy (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 LANL to establish a program. DOE/National Nuclear Security Administration (NNSA) published the *Final Environmental Assessment for the Proposed Los Alamos National Laboratory Trails Management Program* (DOE 2003a) and a Finding of No Significant Impact (DOE 2003b) in September 2003. The NNSA issued a Mitigation Action Plan (MAP) for this environmental assessment on the same date.

The most significant trails issues identified in the environmental assessment are:

- DOE/NNSA does not have a public recreational mission established by Congress.
- The public gets conflicting messages regarding trail use on LANL property because signs, access controls, and enforcement at LANL vary.
- Trespassing occasionally occurs from LANL onto adjacent lands where trail use is not permitted.
- Trail use poses threats to some cultural and natural resources.
- Trail 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 Trails 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 guidance about trails management issues and to integrate trails management decisions across boundaries.

In fiscal year (FY) 2016, the Trails Management Plan was finalized (LANL 2015a). The plan includes guidance and requirements for trails management at LANL and has specific management plans for more than 30 trails. Summary charts provide trails details and prioritize planned trails work. The plan is posted on the LANL external website at http://www.lanl.gov/environment/protection/trails/index.php.

On April 12, 2016, the National Association of Environmental Professionals recognized the LANL Trails Management Program with a National Environmental Excellence Award, demonstrating excellence in the award category of Environmental Stewardship.

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 trail 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 trail 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.

2.0 Trails Management Program

The Trails Working Group met eight times in FY 2016. 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 subject matter experts from LANL, DOE representatives from Los Alamos County, neighboring Pueblos, Bandelier National Monument, Santa Fe National Forest, and interested local residents. These regular meetings provide an ongoing and in-depth forum for discussing and resolving trails mitigation issues that arise from active adaptive management (Figure 1).

The following sections provide highlights of the Trails Management Program and Trails MAP implementation at LANL during FY 2016.

Figure 1. Michael Brandt, LANS Associate Director for Environment, Safety, and Health, addresses attendees at the trails public meeting held on July 26, 2016.

2.1 Fixing and Protecting Trails

Trail repair and resource protection continued to focus primarily on the 4,000 acres in Technical Areas (TAs) 70 and 71 located between White Rock and Bandelier National Monument. This area is easily accessed from the Pajarito Acres community and State Road 4, and has been used by the public for decades. In 2013, informational kiosks were installed at the trailheads.

During FY 2016, Los Alamos National Security, LLC (LANS) staff made field visits to the wellness/fitness trails on Two-Mile Mesa North to identify opportunities for future volunteer maintenance efforts. Concurrently, a new LANS institutional agreement was drafted because a local cycling organization expressed interest in volunteering to perform trail repairs at LANL. The new agreement is likely to be completed in FY 2017.

2.2 Public Information

On October 2, 2015, LANS staff held a day-long tour of TA-18 and Los Alamos Canyon. This event was held in lieu of the first regular FY 2016 meeting of the Trails Working Group and was well-attended, offering the public an opportunity to walk the entire length of Los Alamos Canyon and learn about the Trails Management Program. Los Alamos County, Forest Service, and Park Service staff were among those who participated in this interpretive hike.

In April 2016, to commemorate Earth Day at LANL, the Trails Management Program held a public guided interpretive tour of the Hidden Canyon and Deadman's Crossing trails. LANS subject matter experts provided running commentary about biological, cultural, and geologic resources and about the Trails Management Program to 25 hikers (Figure 2).

Figure 2. Earth Day hike lead by LANS Trails Management Program staff on the Hidden Canyon Trail, April 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 2016. The website provides current information about trail closures and restrictions, and additional publications were added. The website reminds the public 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 link to the Trails Management Plan (LANL 2015a).

2.3 Cultural and Biological Resources Protection

During FY 2016, LANS cultural resources staff completed a biennial inspection of trails in TAs 70 and 71. Of six sites inspected, only one requires continued monitoring. In that instance, a user-created trail leading through a marked cultural site from an adjacent private lot was found. During the inspection, the person who had created the trail arrived and an opportunity for educational engagement occurred. The trail has been blocked and directional markers will be installed along these and other TA 70 and 71 trails.

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. It 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 (Figure 3). Trail wayfinding markers will also be installed.

The FY 2015 SWEIS Mitigation Action Plan Annual Report (DOE 2016) describes how DOE worked 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. This project has been delayed for several years and will not impact the Anniversary Trail in the near future.

The LANL Habitat Management Plan (LANL 2015b) 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. In FY 2016, the LANL HMP was updated to include the New Mexico Meadow Jumping Mouse (*Zapus hudsonius luteus*) and Yellow-billed Cuckoo (*Coccyzus americanus*) as federally listed threatened or endangered species (LANL 2015b). Mexican Spotted Owl surveys began on March 1 and concluded mid-May 2016. There were

seasonal trail closures when these surveys were conducted. Most trails were reopened, but trails in areas where the surveys indicated owls were present remained closed until August 31.

Figure 3. LANS Environmental Stewardship staff at work along the Potrillo Canyon Loop Trail.

2.4 Security and Safety

Wildlife encounters, primarily with bears, were the most notable trails safety issue during FY 2016. In early July, all LANL trails were closed while experts evaluated the reasons for bear sightings and encounters at LANL. The majority of these events were not on trails but in developed areas especially around dumpsters. A variety of actions were recommended and implemented and LANL trails reopened in early August. A public meeting held in 2016 provided information about wildlife safety and related trail topics such as unexploded ordnance and wildland fire and flooding.

DOE contintues to improve LANL trails data. This effort is coordinated with LANS, Los Alamos County, National Park Service, and Forest Service staff. Eventually, a new web-based application to enable viewing trails across Los Alamos County with various base layers such as land owner, topography, roads, and trailheads will be available. This will facilitate improved trail safety, emergency response, and security.

The Trails Management Program continues to coordinate and assist DOE in matters of physical security relating to trails use at LANL. In one instance, an unofficial trail

leading to the Rio Grande was investigated because of suspected illegal activities. Similar collaborative efforts will continue as part of the Trails Management Program so that the public may use LANL trails in a safe manner while assuring security is not compromised.

3.0 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.

DOE 2008 US Department of Energy, 2008. *Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory, Los Alamos, New Mexico, Mitigation Action Plan*, DOE/EIS-0380, Los Alamos, New Mexico.

DOE 2016 US Department of Energy, 2016. *Fiscal Year 2015 Site-Wide Environmental Impact Statement Mitigation Action Plan Annual Report*, DOE/EIS-0380, MAPAR 2015, Los Alamos, New Mexico.

LANL 2015a Los Alamos National Laboratory, 2015. *Trails Management Plan 2015*. Los Alamos National Laboratory report LA-UR-15-20807, Los Alamos, New Mexico.

LANL 2015b Los Alamos National Laboratory, 2015. *Threatened and Endangered Species Habitat Management Plan for Los Alamos National Laboratory,* Los Alamos National Laboratory report LA-UR-15-28610, Los Alamos, New Mexico.