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FISCAL YEAR 2012 MITIGATION ACTION PLAN ANNUAL REPORT FOR THE 2008 LOS ALAMOS NATIONAL LABORATORY SITE-WIDE ENVIRONMENTAL IMPACT STATEMENT

MARCH 2013

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Title: **FISCAL YEAR 2012 SITE-WIDE ENVIRONMENTAL IMPACT STATEMENT MITIGATION ACTION PLAN ANNUAL REPORT, DECEMBER 2012**

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New expansion of the Sanitary Effluent Reclamation Facility (SERF-E).

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Acronym List

ADESH	Associate Director for Environment, Safety, and Health
AEI	Area of Environmental Interest
BA	Biological Assessment
BAS	Building Automation System
BMPs	Best Management Practices
BRMP	Biological Resources Management Plan
C&D	construction and demolition
CFR	Code of Federal Regulations
CRMP	Cultural Resources Management Plan
CY	calendar year
DARHT	Dual-Axis Radiographic Hydrodynamic Test facility
DD&D	decontamination, decommissioning and demolition
DOE	Department of Energy
EA	Environmental Assessment
EIS	Environmental Impact Statement
EM	Office of Environmental Management
EMIP	Energy Modernization and Investment Program
EMS	Environmental Management System
ENV	Environmental Protection Division
ENV-DO	Environmental Protection Division Office
ENV-ES	Environmental Stewardship Group
EO	Executive Order
EPA	Environmental Protection Agency
ER	Environmental Report
ESPC	Energy Savings Performance Contact
Ex-ID	Excavation Permit
FONSI	Finding of No Significant Impact
FRS	Flood Retention Structure
FY	Fiscal Year
GSAF	Generator Set Aside Fund
HE	high explosives
HEWTF	High Explosives Wastewater Treatment Facility
HMP	Habitat Management Plan
HPSB	High Performance Sustainable Buildings
HVAC	heating, ventilation, and air conditioning
IA	Institutional Agreement
IER	Integrated Environmental Review
ILMP	Integrated Land Management Plan
IPA	Integrated Project Application

IS	Infrastructure and Site Planning
ISO	International Organization for Standardization
LAPP	Los Alamos Pueblo Project
LANL	Los Alamos National Laboratory
LANS	Los Alamos National Security, LLC
LASO	Los Alamos Site Office
LDCC	Laboratory Data Communications Center
LED	light-emitting diode
LEED	Leadership in Energy and Environmental Design
MAP	Mitigation Action Plan
MAPAR	Mitigation Action Plan Annual Report
MBTA	Migratory Bird Treaty Act
MDA	Material Disposal Area
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NGO	non-governmental organization
NM	New Mexico
NNSA	National Nuclear Security Administration
OSRP	Off-Site Source Recovery Project
P2	Pollution Prevention
PNNL	Pacific Northwest National Laboratory
PPTRS	Pollution Prevention Tracking and Report System
PR-ID	Permits and Requirements Identification
REC	Renewable Energy Certificate
RLUOB	Radiological Laboratory Utility Office Building
RLWTF	Radioactive Liquid Waste Treatment Facility
ROD	Record of Decision
SEA	Special Environmental Analysis
SERF	Sanitary Effluent Reclamation Facility
SERF-E	Sanitary Effluent Reclamation Facility Expansion
SHPO	State Historic Preservation Officer
SSP	Site Sustainability Plan
STA	Southern Technical Area
STEM	Science, Technology, Engineering, and Math
SWEIS	Site-Wide Environmental Impact Statement
TA	Technical Area
US	United States
USFS	US Forest Service
USFWS	US Fish and Wildlife Service
WIPP	Waste Isolation Pilot Plant
ZLD	Zero Liquid Discharge

1.0 Executive Summary

In Fiscal Year (FY) 2012, the Los Alamos National Laboratory (LANL) Site-Wide Environmental Impact Statement (SWEIS) Project Office focused on tracking and managing mitigation action commitments and reporting. In November 2011, the SWEIS Mitigation Action Plan (MAP) was revised to reflect the Environmental Assessment (EA) and a Finding of No Significant Impact (FONSI) for the Sanitary Effluent Reclamation Facility Expansion (SERF-E), which also addressed impacts to Sandia Canyon. By the end of FY 2012 several mitigation action commitments were completed and this MAP Annual Report (MAPAR) reflects their status and the steps taken to complete them. Highlights for FY 2012 include the following: completion and distribution of the FY 2011 SWEIS MAPAR (DOE 2012), which included a section for the Las Conchas Fire, completion and distribution of the calendar year (CY) 2010 SWEIS Yearbook in April 2012 (LANL 2012a), construction and operation of SERF-E, construction of an institutional Clean Fill Management Yard, implementation of management plans, and completion of deliverables that support annual mitigation action commitments.

This FY 2012 MAPAR provides a summary of progress on mitigation action commitments from October 2011 to September 2012. Appendix I, the SWEIS MAP tracking log, is a snapshot of accomplishments; Appendix II is the FY 2011 Dual Axis Radiographic Hydrodynamic Test (DARHT) facility MAPAR; Appendix III is the FY 2012 Trails Management Plan MAPAR; and Appendix IV is the FY 2012 Special Environmental Analysis (SEA) MAPAR.

2.0 Background

The first Record of Decision (ROD) for the 2008 *Final Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory* was published in September 2008 (DOE 2008). In January 2009, the SWEIS MAP was finalized and included outstanding 1999 SWEIS 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 SWEIS RODs. After the second SWEIS ROD was published in the Federal Register in June 2009, the United States (US) Department of Energy (DOE)/National Nuclear Security Administration (NNSA) Los Alamos Site Office (LASO) issued a MAP Addendum. The SWEIS MAP was revised in November 2010 and will continue to be revised to reflect subsequent changes as necessary. This is the fourth MAPAR for the 2008 SWEIS.

On September 28, 2011, DOE submitted revisions to its NEPA regulations to the Federal Register. The final regulations (http://energy.gov/gc/articles/doe-revises-its-nepa-

regulations-including-categorical-exclusions) went into effect October 28, 2011. The revisions are designed to focus resources on projects with the potential for significant environmental impact, to better align DOE's regulations with its current activities and recent experiences, and to update the provisions with respect to current technologies and regulatory requirements. DOE established 20 new categorical exclusions to address actions like storm water runoff control, alternative fuel vehicle fueling stations, and small-scale renewable energy projects. Several of these revisions provide additional NEPA coverage for projects undertaken at LANL.

3.0 Mitigation Action Commitments

3.1 Dual-Axis Radiographic Hydrodynamic Test MAP (Appendix II)

Annual Requirement Complete

The *Dual-Axis Radiographic Hydrodynamic Test Facility Final Environmental Impact Statement (EIS) Mitigation Action Plan* (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 have been implemented to fulfill DOE commitments under the DARHT EIS ROD. The FY 2011 DARHT MAPAR reflects 12 years of DARHT facility operations-related mitigation measures and action plans (Appendix II). The ROD for the DARHT EIS states that DOE will develop and implement mitigation measures to protect soils, water, biotic, and cultural resources potentially affected by the facility. Appendix II, the DARHT MAPAR, covers progress on mitigation action commitments for FY 2011 because in 2009 LASO requested that the DARHT MAPAR be published as an appendix to this document.

In FY 2011, there were no significant impacts from contaminants from DARHT operations based on measurements of soil, sediment, vegetation, field mice, and bees. DARHT operations also did not have significant impacts to bird populations. There are no impacts from DARHT operations to archaeological resources (i.e., Nake'muu pueblo), and the natural environment is having a greater effect on the deterioration of the standing wall architecture than operations at DARHT. Although 2011 contaminant levels were not at concentrations detrimental to human health or to the environment, there were measurable amounts of depleted uranium in all media. Concentrations of depleted uranium in most media increased over time until 2006 and then decreased in 2007, which may correspond to the success of employing steel containment vessels at DARHT and/or to a reduction of detonations. 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. Foam mitigation has significantly reduced the amount of

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

FY 2012 soil and biota samples within and around the DARHT facility were collected and submitted for analysis in August 2012. FY 2012 results will be reported in the Environmental Report (ER) and summarized in the FY 2012 DARHT MAPAR, which will be subsequently published in the FY 2013 SWEIS MAPAR.

During the summer of 2012, Los Alamos National Security, LLC (LANS) biologists completed the 16th year of monitoring songbird population and survivorship at Technical Area (TA) 15 to fulfill the DARHT MAP. Results will be published in the FY 2012 DARHT MAPAR. Populations, composition, and the diversity of birds collected just west of the DARHT facility in 2012 were compared with samples collected in 1999 (pre-operational phase). The purpose of this monitoring project is to determine the general ecological stress levels around the vicinity of DARHT that may be associated with facility operations (e.g., noise, disturbance, traffic, etc.). The numbers of birds, number of bird species, diversity, and evenness (distribution) collected in 2012 are similar to the numbers collected before the start-up of operations at DARHT in 1999.

3.2 Trails MAPAR (Appendix III)

Annual Requirement Complete

In accordance with the 2003 *Environmental Assessment for the Proposed Los Alamos National Laboratory Trails Management Program* (DOE 2003), LANL continues to implement a MAP for this EA through the Trails Management Program. FY 2012 activities included clearing trail obstructions, fixing directional signs, addressing pedestrian and bicycle conflicts on trails, managing feral cattle, and resolving issues regarding US Forest Service (USFS) trails along New Mexico (NM) 502, which were impacted by LANS subcontractors repairing drainage culverts. The Trails Working Group held monthly meetings every month in FY 2012 except for December 2011. LANL Director Charles McMillan signed an extension of the Institutional Agreement (IA) between LANS and the Volunteer Task Force on August 15, 2012. The IA allows volunteers to perform trails maintenance on LANL/DOE property for the next five years.

As part of LANL recognition of New Mexico Heritage Preservation month in May, the Trails Working Group organized public tours of the Tsirege archaeological site on May 5, 2012. Seventy-five people visited the site during the tour led by LANS cultural resources staff. A subsequent tour of Tsirege was provided to a group of pottery students from the Poeh Center on May 17. Pojoaque Pueblo's Tribal Council established the Poeh Center, which emphasizes the arts and cultures of Pueblo people with a focus

on Nambe, Pojoaque, Ohkay Owingeh, Santa Clara, Tesuque, Picuris, and Taos Pueblos, and the Pueblo de San Ildefonso.

Details regarding activities supporting implementation of the Trails MAP in FY 2012 are provided in Appendix III.

3.3 Special Environmental Analysis MAP (Appendix IV)

Annual Requirements Complete

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) MAPAR was completed to maintain NEPA compliance. The SEA MAPAR is now published as part of the SWEIS MAPAR (Appendix IV). DOE/NNSA issued the SEA 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. In the SEA MAP, DOE/NNSA identified mitigations for these actions. While a majority of the mitigations have been completed, the FY 2012 SEA MAPAR provides information on the status of the remaining commitments.

3.3.1 Waste and Environmental Services

Native vegetation and small mammal samples were collected from the Los Alamos Canyon Weir and the Pajarito Canyon Flood Retention Structure (FRS) annually to determine if there has been an increase in contaminant concentrations in these areas and to determine to what extent they impact the biota. Subsequently, samples were analyzed for radionuclide, heavy metals, and polychlorinated biphenyls. FY 2011 results were reported in the 2011 Environmental Report (http://permalink.lanl.gov/object/tr?what=info:lanl-repo/eprr/ERID-228615). These results show that all constituents are below dose or risk-based (biota or soil) screening levels. FY 2012 sampling was also completed, and samples have been submitted for analysis; results will be published in the 2012 ER in October 2013.

3.3.2 Cultural Resource Mitigations

The SEA MAP states that review, evaluation, and stabilization of cultural resources situated on LANL lands impacted by the Cerro Grande Fire and within areas prone to flooding or soil erosion would continue until post-fire storm event water flow regimes approximated pre-fire flow rates according to modeling information and monitoring results (DOE 2000a).

In FY 2012, LANS cultural resources staff undertook erosion control actions at sites recommended for treatment in the FY 2011 SEA MAPAR. Monitoring and inspections

of archaeological sites were conducted in July. Rehabilitation efforts were completed in August with the installation of erosion control wattles. Field checks and evaluations at the Civilian Conservation Corps Camp and at V-Site were conducted in August 2012. Results of the annual assessment are reported in Appendix IV.

3.4 Flood Retention Structure(FRS)

Annual Requirement Complete

The annual inspection for the Pajarito Canyon FRS was conducted in June 2012 in partial compliance with the 2002 *Environmental Assessment for the Proposed Future Disposition of Certain Cerro Grande Fire Flood and Sediment Retention Structures at Los Alamos National Laboratory* (DOE 2002). The FRS continues to be stable with no corrective actions recommended at this time.

3.5 Outfall Reduction Initiative/Radioactive Liquid Waste Treatment Facility (RLWTF)

On-going Commitment

This mitigation stems from the 2008 SWEIS commitment related to outfall reduction. The EA and a FONSI for the SERF-E was issued in August 2010. The mitigation action commitments associated with the 2010 FONSI also addressed impacts to Sandia Canyon. In FY 2012, construction activities included digging of evaporation ponds, installation of an underground piping system for utilities, and erection of structural steel for the SERF-E building. The SERF-E Integrated Project Team highlighted the need for Best Management Practices (BMPs) to protect ground and surface water quality and identified measures to ensure that cultural and biological resources were protected during construction. All appropriate BMPs were implemented. Operation of the SERF-E commenced in August 2012. The facility will provide a blend of reclaimed effluent and well water to cool the next generation of supercomputers housed in the Metropolis Center. Current estimates indicate that up to 110 million gallons of water could be provided annually by SERF-E.

No cooling tower water has been diverted from Sandia Canyon to the Sanitary Effluent Reclamation Facility (SERF) or the SERF-E, therefore no mitigations associated with hydrologic changes to the S-2 reach of Sandia Canyon have been required. A study to determine how much water is needed to maintain healthy wetlands in Sandia Canyon was completed in July 2012.

DOE and LANS are also committed to outfall reduction and the mitigation initiatives associated with the RLWTF Upgrade Project. The Zero Liquid Discharge (ZLD) portion will be completed in October 2012. Operation of the ZLD is anticipated with the approval of the updated State of New Mexico ground water permit in 2013.

3.6 Los Alamos Science and Engineering Complex

Mitigation On-hold.

NNSA terminated the proposed project in 2010.

3.7 Off-Site Source Recovery Project

Mitigation On-hold.

The LANL Off-Site Source Recovery Project (OSRP) does not currently accept cobalt, iridium, or cesium sealed sources; the sources for which mitigation measures were identified in the SWEIS MAP.

In October 2011 (FY 2012), DOE published a new rule in the Federal Register. The rule added 20 new categorical exclusions to 10 Code of Federal Regulations (CFR) Part 1021, including the recovery of radioactive sealed sources and sealed source-containing devices from domestic or foreign locations. In FY 2012 LANL's domestic OSRP recovered domestic actinide and non-actinide sources and continued to implement DOE's source recovery project. Categorical Exclusion 10 CFR 1021, Appendix B2.6 was applied by LASO's NEPA Compliance Officer for recovery of domestic sealed sources in FY 2012. FY 2012 results will be reported in the CY 2011 SWEIS Yearbook.

3.8 Air Emissions

On-going Commitment

LANL conducts continuous emissions monitoring at 27 radioactive stacks and tracks operations from more than 50 other minor stacks. In addition, a network of air monitors on and around LANL property measure non-stacked emissions. In June 2012, the annual Radionuclide Air Emissions report was transmitted (LANL 2011a) to LASO and then to the Environmental Protection Agency (EPA) Region 6, describing emissions of airborne radionuclides from LANL operations in 2011. The annual maximum off-site dose potentially received for 2011 was 3.53 millirem. The EPA limit is 10 millirem. The primary contributor to the 2011 off-site dose was environmental remediation activities at Material Disposal Area (MDA) B, along DP Road in the Los Alamos town site. With this remediation action complete, we anticipate a maximum off-site dose received of about 0.5 millirem in the future.

3.9 Wildland Fire Management Plan

Annual Requirement Complete

As part of the *Environmental Assessment for the Wildfire Hazard Reduction and Forest Health Improvement Program at Los Alamos National Laboratory* (DOE 2000b), LANL implements an annual Wildland Fire Management Plan. The FY 2012 Annual Wildland Fire Management Plan was approved October 2011 and was implemented throughout the year. Emergency Operations completed wildfire mitigations on schedule, with only a

few delays related to extreme fire conditions during the summer of 2012. Planned FY 2012 fire road and firebreak maintenance began in November 2011 and was completed in September 2012. FY 2012 management actions included mastication, mowing, and thinning along Pajarito Road, West Jemez Road, TAs 54, 69, 72, and along State Road 4 from the White Rock Y to the Pueblo de San Ildefonso border.

To reduce wildfire risks, shipments of legacy waste to Waste Isolation Pilot Plant (WIPP) are ongoing. On June 26, LASO, LANS, and other community leaders celebrated the 1,000th shipment of transuranic waste to WIPP as part of decontamination, decommissioning, and demolition (DD&D) of the TA-54 domes.

3.10 Environmental Justice

On-going Commitment

Some public comments from surrounding communities (including nearby Pueblos) expressed concerns about the adequacy of the environmental justice analysis contained within the 2008 SWEIS. Some commentors requested assurances that DOE/NNSA would meet the requirements of Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (EO 1994). Currently, DOE/NNSA is implementing the EO and is meeting its objectives. For instance, prior to receipt of public comments, DOE/NNSA had instituted outreach activities in numerous LANS and DOE organizations to ensure consideration of and participation by members of minority and low-income populations surrounding LANL property and its facilities. Many of these activities are incorporated into the LANS contract. Other examples include the Los Alamos Pueblo Project (LAPP), a program funded by NNSA and Environmental Management that allows four tribal governments (Pueblos) to develop and maintain environmental monitoring programs specific to their respective communities and to provide technical input to the NNSA decision-making processes. The four Pueblos—Cochiti, Jemez, Santa Clara, and San Ildefonso—are located adjacent to LANL property.

The LAPP also funds an educational initiative at the Santa Fe Indian School, an Indian-owned residence high school, which incorporates community-based subject matter into the Science, Technology, Engineering, and Math (STEM) curriculum. More than 35 Santa Fe Indian School students, most graduates of the program, have since won Gates Millennium Scholarships. Moreover, the LANS Board of Governors recently agreed to extend its annual investment into the Community Commitment Program for several more years. A Community Commitment Plan is a requirement of all DOE contracts and can be a vehicle for addressing environmental justice concerns. The LANS investment enhances the Community Commitment Plan and is unique to LANL. The plan has three areas of outreach: education, economic development, and charitable giving. This generous reinvestment of a portion of LANS' management fee leverages federal

funding in the same areas of concern, and minority and low-income communities benefit from the outreach activities in many ways.

In FY 2012, DOE/NNSA continued consultations and formal and informal public meetings regarding proposed projects at LANL. During the fourth quarter of FY 2012, DOE/NNSA conducted a formal assessment of LANS' implementation of the EO, which included interviews of representatives from minority and low-income communities surrounding the LANL property and from opposition non-governmental organizations (NGOs). An assessment report will be completed in FY 2013 and presented to the DOE Legacy Management Environmental Justice Office.

3.11 SWEIS Biological Assessment

On-going Commitment

The LANL *Threatened and Endangered Species Habitat Management Plan (HMP) for Los Alamos National Laboratory* (LANL 2011b) provides a management strategy for the protection of threatened and endangered species and their habitats on LANL property. The 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). If HMP requirements cannot be followed by a project, then a Biological Assessment (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 HMP guidelines.

LANL completed three BAs in FY 2012:

- *Effects of Las Conchas Wildfire Mitigations Including Mexican Spotted Owl Habitat Redelineation in Los Alamos Canyon on Federally Listed Threatened and Endangered Species at Los Alamos National Laboratory* (LANL 2011c)
- *Effects of the Sigma Mesa Clean Fill Yard on Federally Listed Threatened and Endangered Species at Los Alamos National Laboratory* (LANL 2012b)
- *Effects of the Construction and Use of the Upper Sandia Canyon Access Road on Federally Listed Threatened and Endangered Species at Los Alamos National Laboratory* (LANL 2011d).

In July 2012, LASO and LANS received USFWS concurrence on the three BAs.

3.12 Biological Resources Management Plan

On-going commitment

The *Biological Resources Management Plan (BRMP) for Los Alamos National Laboratory* outlines LANL's commitment to conduct site operations using processes that minimize risks to mission implementation and biological resources (LANL 2007). The BRMP is implemented annually. The following sections provide an overview of FY 2012 accomplishments.

3.12.1 Riparian Inventory 2012 Report (Hathcock)

During 2011, LANS biologists completed a riparian inventory at LANL. In April, LANS transmitted the *2011 Los Alamos National Laboratory Riparian Inventory Results* (LANL 2012c) to LASO. Between 2007 and 2011, more than 36 kilometers of riparian habitat were inventoried within LANL boundaries. Riparian habitat was classified for prioritization of treatment, if any was recommended. Treatment for high priority sites includes placing objects in stream channels to encourage sediment deposition, eliminating channel incision, and expansion and slowing of water flow across floodplains. In some areas, LANS recommended that feral cattle and exotic plants be removed to aid in riparian habitat recovery. Treatments, contingent on LASO approval, will be initiated in FY 2013 as part of BRMP implementation and reported in a subsequent MAPAR as appropriate.

3.12.2 Federally Protected Species Summary

Federally threatened and endangered species habitat at LANL is protected from major disturbance by the HMP. Continued protection of these areas ensures that LANL complies with federal laws and plays a role in the recovery of threatened and endangered species. LANS biologists conduct presence/absence surveys for federally protected species annually. Two such species, the Southwestern Willow Flycatcher and the Mexican Spotted Owl, either occur on or have suitable nesting and/or foraging habitat on LANL property. In 2012, one Mexican Spotted Owl nest location was occupied on LANL property. The occupied nest produced at least one chick during the breeding season. One of the Mexican Spotted Owl nest locations, which was occupied in 2011, had no evidence of occupation in 2012 and was, therefore, assumed to be unoccupied. No Southwestern Willow Flycatchers were detected during FY 2012 surveys.

3.12.3 State-listed Species Surveys Summary

The 2011 *Sensitive Species Best Management Practices Source Document* report (LA-UR-11-06406, LANL 2011e) functions as a site-wide mitigation plan to reduce risks to species protected under state statutes or otherwise identified as requiring special conservation action. The BMPs in the Sensitive Species plan provide recommendations for projects at

LANL and mitigation measures for the reduction of risks to sensitive species. By avoiding or minimizing the impact of activities to sensitive species, LANS can reduce or eliminate the biological significance of any potential violation of state statutes, as well as the possibility of enforcement action.

Surveys for sensitive species that occur on LANL property are conducted annually. In FY 2012, Jemez Mountain salamander surveys were conducted at TA-57 (Fenton Hill). No Jemez Mountains salamanders were detected during these surveys. Equipment to monitor state-listed bat species at LANL in FY 2013 was purchased in FY 2012 and is currently undergoing testing.

3.12.4 Migratory Bird Treaty Act Summary

The Migratory Bird Treaty Act (MBTA) of 1918 is the primary driver for protection of migratory birds in the United States. In 2001, EO 13186 *Responsibilities of Federal Agencies to Protect Migratory Birds* was signed (EO 2001). Under EO 13186, the USFWS issued Director's Order 172 on Service Guidance to Conserve Migratory Birds. Identifying goals for federal program activities, the USFWS highlighted the need to identify means and measures to avoid and/or minimize potential for take of migratory birds, eggs, and active nests.

In support of EO 13186, on August 1, 2006, a Memorandum of Understanding (MOU) was finalized between the USFWS and DOE regarding the implementation of the MBTA at DOE facilities. Under the MOU, subject to the availability of appropriations and in harmony with the DOE/NNSA missions and capabilities, DOE agreed to several actions.

During the fall of 2012, LANS biologists completed the third year of a monitoring effort to document the fall migration patterns of passerines (songbirds) at LANL. The reports for the first and second year are the *Los Alamos National Laboratory Fall Avian Migration-Monitoring Report 2010* (LANL 2010) and the *Los Alamos National Laboratory Fall Avian Migration Monitoring Report 2011* (LANL 2011f).

During the winter of 2011/2012 and the summer of 2012, LANS biologists completed the second year of point-count surveys to monitor patterns of bird abundance, richness, and population trends over time at LANL. Four habitat types were surveyed for this project including 1) mixed conifer forest, 2) ponderosa forest, 3) wetland/riparian and 4) piñon-juniper woodland. Winter surveys occurred from December 2011 to February 2012 in each of the four habitats. The summer breeding bird surveys were conducted in each of the four habitats from May to July 2012. More than 3,700 birds representing 95 species were recorded during the FY 2012 surveys, with 40 species detected during the winter bird surveys and 76 species detected during the summer breeding bird surveys. Of the 95 species detected during this project, 92 are protected under the MBTA. Additionally,

six of the species detected are on the Birds of Conservation Concern Region 16 (the Southern Rockies/Colorado Plateau region) list. Four species detected during this study are on the top 100 list in the Birder's Conservation Handbook. The reports for the first and second year are *Winter and Breeding Bird Surveys at Los Alamos National Laboratory Progress Report for 2010 to 2011* (LANL 2011g) and *Winter and Breeding Bird Surveys at Los Alamos National Laboratory Progress Report for 2010 to 2012* (LANL 2012d).

3.12.5 Large Game Management Pajarito Corridor Study

The Large Game Management Pajarito Corridor Study was initiated in May 2011. The focus of the study is to develop and implement methods for verification of large game pinch points, or areas of animal movement that are constricted due to natural topographical features or other physical barriers, along the Pajarito Road Corridor. The study included tasks designed to gather information on wildlife and the use of wildlife cameras to gather images of wildlife use in pinch point and in non-pinch-point areas.

In Bennett (2006), a spatial elk movement model was developed to predict how elk move across LANL property on a seasonal basis. Using this movement model and updated information on LANL physical structures, staff from the LANS Environmental Protection Division (ENV), Environmental Stewardship Group (ENV-ES) staff estimated the current location of major large game movement corridors and pinch point areas. By identifying corridors and pinch points, LANL can better manage activities to facilitate wildlife movement as well as to minimize adverse human–large game interactions. Safety issues, including traffic accidents and nuisance animals, are more likely where large game corridors intersect with areas of high human usage. The more spatially accurate corridors and pinch points are delineated, the more effectively they can be managed. Modeled movement corridors and pinch points are the basis for the development of a Large Game Management Plan (being prepared under the BRMP). The Large Game Management Plan will provide guidance on how best to manage large game movement corridors and pinch points. Information derived from the Large Game Management Plan will be incorporated into management tools like the *Integrated Land Management Plan (ILMP)* spatial analysis tool and the *Long Term Strategy for Environmental Stewardship and Sustainability* (LANL 2012e).

The field collection portion of the FY 2011–2012 Large Game Movement Pajarito Corridor study is complete. Data were collected from three pinch points and three control points. Three pinch points were identified along wildlife corridors crossing the Pajarito Corridor. Data were entered into a database, and quality assurance is ongoing. Preliminary data analysis indicates that the cameras recorded just fewer than 500 distinct wildlife observations from the sites (duplicate observations were removed). Figure 1 shows the percentage of all observations recorded for each species. While bear, bobcat, coyote, mountain lion, raccoon, deer, and elk were observed, the majority of

observations were coyote, elk, and deer. A single observation may record more than one animal, and many of the observations recorded large herds of deer and elk. Almost 800 individual mammals were identified from cameras at pinch points and about 720 at control points. However, 62 percent of all control point mammals were from a single control site. Statistical analyses will be conducted on the dataset, and frequency of use at pinch points and control points will be examined. The analysis of the data will begin once the quality assurance process is completed in the first week of November 2012. The final report with all analysis, methods, and conclusions will be published in the second quarter of FY 2013.

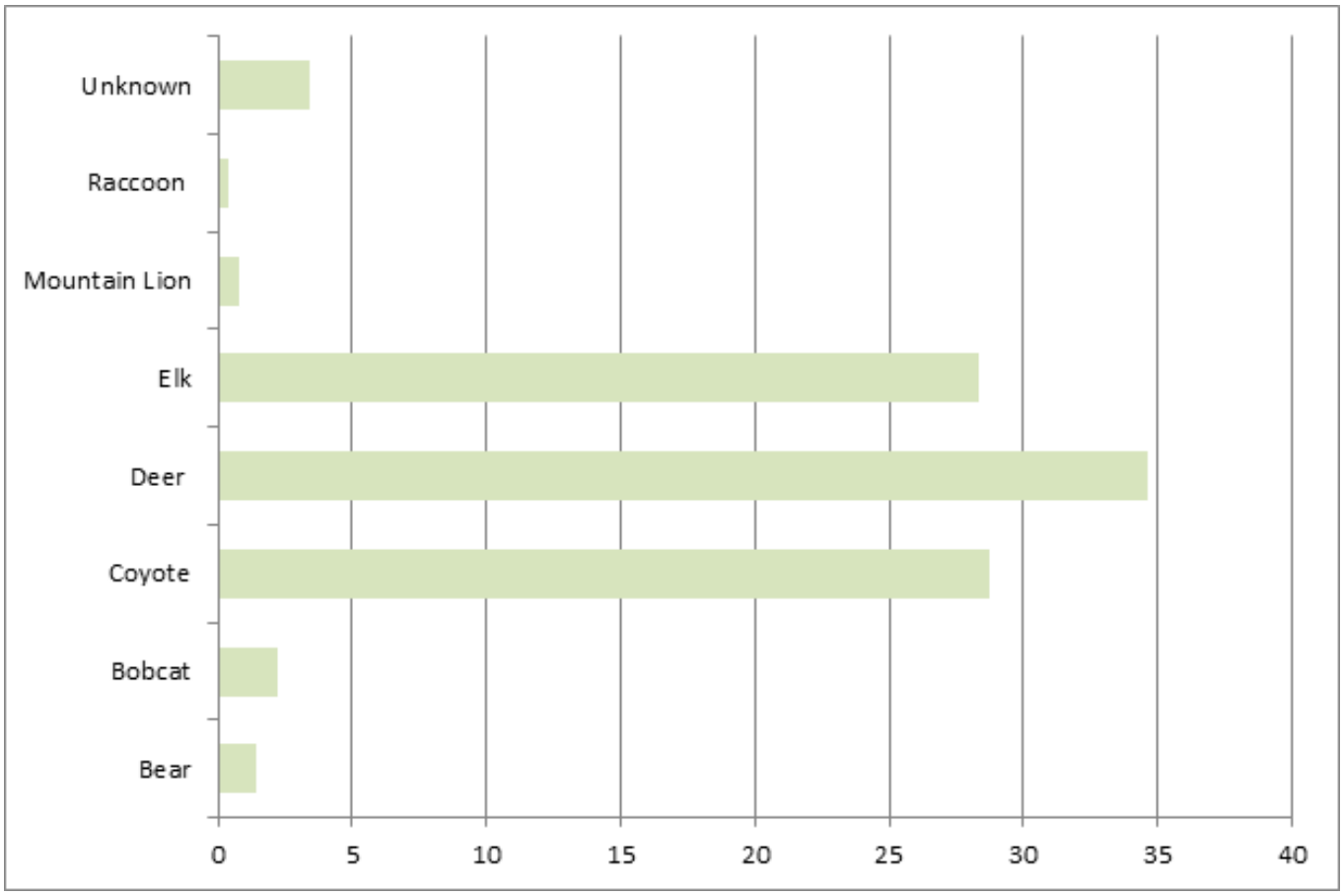

Figure 1. Percent of observations recorded for each species observed in the study.

3.12.6 Updated Habitat Management Plan Report

The LANL HMP was prepared to fulfill a commitment made in the DARHT MAP (DOE 1996). The HMP received concurrence from the USFWS in 1999. During 2012, a small portion of the Los Alamos Canyon Area of Environmental Interest (AEI) was identified as no longer being suitable Mexican Spotted Owl habitat because of actions taken to fight the Las Conchas Fire in 2011. The USFWS concurred with this change in the AEI

boundary as part of the consultation on the *Biological Assessment of the Effects of Las Conchas Wildfire Mitigations* (LANL 2011c).

3.13 Cultural Resources Management Plan

On-going Commitment

The FY 2012 tribal tour of Nake'muu was cancelled at the request of the Pueblo de San Ildefonso. The Cultural Resources Management Plan (CRMP) was revised by LANS in FY 2012 (LANL 2006). The draft CRMP was sent to LASO and to the New Mexico State Historic Preservation Officer (SHPO) in May 2012 for review. The SHPO has not provided edits, comments, or revisions to the CRMP.

In FY 2012, LANS cultural resources staff continued support of the Wildland Fire fuels mitigation across LANL property. No tours for members of the Pueblo de San Ildefonso were conducted this FY.

Post-Las Conchas Fire flooding has impacted the drainage and culvert at West Jemez Road and Water Canyon and LANS cultural resources staff continue to monitor the homestead site located downstream from the culvert for potential erosion issues.

Gun-Site phase II restoration was completed in FY 2012.

Public outreach included a numerous public and private tours and media interviews with CBS television network and National Public Radio.

3.14 Energy Conservation

On-going Commitment

LANS submitted the final FY 2012 Site Sustainability Plan (SSP) and Consolidated Energy Data Report to DOE in December 2011. LANS also submitted an FY 2012 metering plan to LASO. Installation of the first steam meter began and mechanical and electrical design continued for heating hot water, steam, and gas meters as part of the Energy Modernization and Improvement Program–funded metering program. In FY 2012, LANS recommissioned five facilities as part of the High Performance Sustainable Buildings (HPSB) program, developed a focused workshop approach to complete facility energy audits, and focused on night setback efforts in larger gas-heated facilities. LANS began development of a long-range electric system management plan. In June, the Radiological Laboratory Utility Office Building (RLUOB) achieved Leadership in Energy and Environmental Design (LEED) status and LEED Gold certification from the US Green Building Council. In addition, RLUOB is LANL's first HPSB. To date, meter consumption data reflect an increase in energy use and a trending upward of energy intensity. A rolling 12-month average shows energy intensity increased 4 percent through June compared with FY 2011 when there was a cumulative 9.1 percent reduction in energy intensity from the FY 2003 baseline.

All of the 31 SSP milestones were completed for FY 2012. The SSP completion represents strong performance to accomplish the annual goals established in the SSP and meet the expectations of LASO. Those goals continue to build LANL's sustainability program and develop the foundations necessary to continue improving performance on the challenging sustainability goals. The SSP milestone performance also represents LANL's commitment to the program and to making improvements across a broad range of the DOE's SSP goals.

LANL made strong progress to improve night setback implementation across the site. LANL completed installation of nine new Building Automation Systems (BAS), eight through the Energy Savings Performance Contact (ESPC), and began installation of a 10th system in September with completion scheduled in October. In addition, LANL completed re-commissioning of three existing facilities on night setback and demonstrated a 20–25 percent energy savings. LANL has completed night setback implementation in more than 700,000 square feet.

LANL implemented a robust heating, ventilation, and air conditioning (HVAC) retro-commissioning program and completed HPSB assessments in five facilities as part of the HPSB implementation plan. In addition, 65 HVAC assessments and improvements in three facilities were completed, demonstrating strong progress toward meeting the energy intensity goal. LANL achieved a site average of 40 percent for required buildings in the HPSB Guiding Principles program.

Highlights from FY 2012 SSP accomplishments include the following:

- ✓ Completed commissioning of the ESPC project and demonstrated energy savings in 32 buildings across the site.
- ✓ Continued to right-size the vehicle fleet and reduce the fleet size.
- ✓ Installed real-time power usage effectiveness monitoring in the second major data center, the Laboratory Data Communications Center (LDCC).
- ✓ Completed installation of the clean fill yard at TA-60 and documented savings of more than $400,000 in its first two months. The clean fill yard recycles construction and demolition (C&D) material and reduces greenhouse gases.
- ✓ Implemented a pilot program for centrally managed power savings features on personal computers that will be implemented throughout the site as computers are replaced.
- ✓ Completed metering funded by Energy Modernization and Investment Program (EMIP). Project data sheets were completed and submitted to NNSA.
- ✓ Completed construction activities and other support efforts for Los Alamos County and with the Japanese New Energy and Industrial Technology Development Organization to construct and operate a photovoltaic array on

NNSA property at the Los Alamos County landfill. The project began producing electricity in August.

- ✓ Collaborated with Los Alamos County to increase hydro-generation potential with the US Army Corps of Engineers at Abiquiu to maximize renewable energy produced by the Los Alamos County's new low-flow turbine at the federally owned dam.
- ✓ Met the Renewable Energy Certificate (REC) goal of 5 percent for FY 2012 and exceeded the goal with more than 20 percent of the site energy through RECs.
- ✓ Completed the development of a water reduction plan to make progress toward the 16 percent reduction by 2015 using best available technology and cost-effective implementation strategies.

3.14.1 Electrical

On-going Commitment

The power line from the Norton substation to the Southern Technical Area (STA) is on hold. LANL's Power Plan forecasts energy use and demand for the next 10 years of operation and planned mission expansion. The power master plan has been finalized.

LANL began planning efforts to evaluate and foster carbon neutral power purchasing as the key strategy to meet new greenhouse gas reduction goals.

3.14.2 Natural Gas

A Metering Plan that addresses electrical, natural gas, steam, and chilled water metering was submitted to DOE Headquarters on November 2, 2011. LANL installed 20 thermal meters in 2012.

3.14.3 Purchasing

Mitigation Complete FY 2012

The green procurement and sustainable acquisition web pages, listed here, are active:

- ✓ http://asm.lanl.gov/green/default.shtml
- ✓ http://int.lanl.gov/environment/p2/sustainable/epp.shtml

The Designated Procurement Representative Procedure (P842) includes a section on Affirmative Procurement (sustainable acquisition) requirements. ENV-ES staff has completed the LANL Sustainable Acquisition Plan that has a number of deliverables, including developing a Sustainable Acquisition Policy. ENV-ES staff has collaborated with Infrastructure Planning and updated the Office Furniture Master Specifications and Statements of Work to include Sustainable Acquisition Plan requirement language. Energy Star has become the industry standard.

3.14.4 Water

SERF-E Mitigation Complete FY 2012
On-going Commitment

Operation of SERF-E commenced in August 2012. LANS supported a site-wide water assessment at LANL conducted by Pacific Northwest National Laboratory (PNNL) in early FY 2012. LANS received the final assessment report in June 2012 and is working on a site-wide implementation plan.

LANL continued work in FY 2012 on the landscape management plan to reduce maintenance costs and potable water consumption by removing non-native water intensive grass. Descriptions of native vegetation to be used in landscaping have been incorporated into LANL's design and engineering standards to contribute to water reduction goals.

3.15 Pollution Prevention

On-going Commitment

LANL funded 17 Pollution Prevention (P2) projects using the Generator Set Aside Fund (GSAF) for FY 2012. Of the 17 projects originally funded, 16 performed within scope and budget. One project was compromised by mission commitments and was not executed. LANL identified and implemented four additional P2 project opportunities: two projects involved elimination of high explosives (HE) waste sources (close-out of HE wastewater sumps and installation of a protective cover for sand filter at the HE Wastewater Treatment Facility [HEWTF]); another project involved supporting efforts for radioisotope calculations to improve waste characterization capabilities; and lastly, a refit of hallway lighting to use light-emitting diodes (LEDs) at the Occupational Medicine facility). All four projects came in on-schedule and within budget.

LANL's Environmental Management System (EMS) objectives for FY 2012 were to *"Clean the Past, Control the Present, and Create a Sustainable Future"* (http://adep.lanl.gov/adepimageslib/WebDocs/fy12_institutional_objectives.pdf). These objectives have been integrated into LANL's 50-Year Environmental Stewardship Plan and will be incorporated into the 2012 SSP.

Fifty-five projects and more than 400 individuals were recognized at the FY 2012 LANL P2 Awards Ceremony held in April. These projects were completed in FY 2011 and resulted in significant cost savings ($17 million) and risk reduction for LANL. LANL received one DOE Sustainability Award and three NNSA Best-In-Class awards. P2 Team member, Reem Ibrahim, was awarded a LANL 2012 Distinguished Student award for work on sustainable acquisition and other P2 projects.

Independent auditors, using International Organization for Standardization (ISO) requirements, spent a week at LANL in February and recertified the LANL EMS. The auditors determined LANL is in full compliance with ISO 14001-2004 requirements. The auditors noted positive practices, including its large number of grassroots P2 programs, interdisciplinary crosschecking to ensure environmental review during planning phases of work, and emergency-response testing.

In response to the call for FY 2013 P2 project proposals issued in June, 40 proposals were submitted. Projects were discussed, scored, prioritized, and ranked. Based on FY 2013 funding, 13 projects were selected and prioritized for funding.

3.16 Clean Fill

Mitigation Complete FY 2012

A Lean Six Sigma project to develop a clean fill management system was conducted in FY 2010. The Clean Fill Management database, managed by the ENV, has been incorporated into LANL's Evacuation Permit (Ex-ID) and Permits and Requirements Identification (PR-ID) system. The clean fill website became available January 2012, allowing projects to acquire or excess clean fill through this centralized web application. Communication for the web application focused on generators and clean fill users. In February and March, LANL constructed the institutional Clean Fill Yard at TA-60 Sigma Mesa to stage and store clean fill from construction and demolition projects as part of a GSAF project. In April, May, and June, more than 160 cubic yards of fill came to the institutional Clean Fill Yard.

Reuse of clean fill helps limit greenhouse gas emissions and allows LANL to meet its sustainability goals. In July, August, and September, more than 30,000 cubic yards of fill came to the Clean Fill Yard. This project is an institutional program managed by Utilities and Infrastructure. Data are reported annually to DOE.

3.17 Traffic

On-going Commitment

LANL continues to implement recommendations from a multi-directorate Performance Improvement Project regarding fuel conservation and alternative fuels use. The "How's My Driving?" campaign, developed by the LANS Traffic Safety Committee under the Associate Director for Environment, Safety, and Health (ADESH), was initiated in FY 2012. The campaign is in place to promote safe driving. The LANS environmental blog promotes and encourages alternative transportation https://blog.lanl.gov/environmentalstewardship/.

In response to NNSA's complex-wide efforts to promote efficiencies associated with government vehicles, LANL's new "SiteCar" pilot program using four underutilized

vehicles was initiated in August at the National Security Sciences Building. The program evolved through suggestions submitted to the Cost Cutters Committee. The "SiteCar" program is the first official vehicle pilot program to be implemented at LANL. The purpose of the pilot is to gather information to determine if it can be an effective program for government vehicles. If the pilot is successful, additional programs will target 14 additional underutilized vehicles. There are shared government vehicles in certain technical areas, and Fleet Management will work to incorporate these pools into the "SiteCar" concept.

3.18 Integrated Land Management Planning

Mitigation Complete 2011

The ILMP project is complete. The Integrated Project Application (IPA) is co-managed by ENV and Infrastructure and Site Planning (IS); the annual review and update of the system occurred in February and March 2012.

3.19 Compliance Assurance

Mitigation Complete FY 2011

The Compliance Assurance Subtask identified process improvements for LANS's PR-ID system, which are being implemented. Integrated Environmental Review (IER) Program is the primary LANL customer interface for environmental issues, all new and modified activities and projects are subject to environmental reviews using the Ex-ID and PR-ID system. In FY 2012, more than 800 Ex-IDs and more than 180 PR-IDs were submitted and reviewed.

3.20 Commitments to Santa Clara Pueblo

On-going Commitment

DOE/NNSA LASO continues consultations with Santa Clara Pueblo to develop a mutually acceptable plan to address specific environmental justice and human health concerns and issues identified by Santa Clara Pueblo during the SWEIS process. NNSA provided Santa Clara Pueblo financial and technical assistance during the last quarter of FY 2010 to commence work on this type of plan, which would include specific tasks with timelines, and identify resources to implement this plan. Santa Clara Pueblo advised DOE/LASO of data acquisition problems during FY 2011, and LASO conducted meetings to try to address them. A draft plan on environmental justice and human health concerns and issues is near completion, subject to review and approval from the Santa Clara Pueblo Tribal Council. The next steps in developing this plan include sharing a draft with LASO for review and comment. Once LASO's comments are reconciled, this plan would be submitted to the Tribal Council for approval. NNSA and the Office of Environmental Management (EM) partnered to provide a human health

risk assessment workshop to benefit the Four Accord Pueblos during April 2012. Santa Clara Pueblo, subject matter experts, and DOE Headquarters participated.

4.0 References

Bennett, K., 2006. *Development and evaluation of movement corridors used by Rocky Mountain elk within the vicinity of Los Alamos National Laboratory*, Los Alamos, New Mexico. Master's Thesis, Northwest Missouri State University, Maryville, Mo.

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

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

DOE 2012. US Department of Energy, 2012. *Fiscal Year 2011 Site-Wide Environmental Impact Statement Mitigation Action Plan Annual Report, Final*, DOE/EIS-0380 MAPAR 2011, Los Alamos, New Mexico.

EO 1994. Executive Order 12898, 1994. *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, Federal Register, Vol. 59, No. 32.

EO 2001. Executive Order 13186, 1994. *Responsibilities of Federal Agencies to Protect Migratory Birds*, Federal Register, Vol. 66, No. 3853.

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

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

LANL 2010. Los Alamos National Laboratory, 2010. *Los Alamos National Laboratory Fall Avian Migration-Monitoring Report 2010,* LA-UR-07491, Los Alamos, New Mexico.

LANL 2011a. Los Alamos National Laboratory, 2011. *LANL Radionuclide Air Emissions Report.* LA-14458, Los Alamos, New Mexico.

LANL 2011b. Los Alamos National Laboratory, 2011. *Threatened and Endangered Species Habitat Management Plan for Los Alamos National Laboratory*, LA-UR-11-02582, Los Alamos, New Mexico.

LANL 2011c. Los Alamos National Laboratory, 2011. *Biological Assessment of the Effects of Las Conchas Wildfire Mitigations Including Mexican Spotted Owl Habitat Redelineation in Los Alamos Canyon on Federally Listed Threatened and Endangered Species at Los Alamos National Laboratory, Los Alamos, NM*, LA-CP-11-0114, Los Alamos, New Mexico.

LANL 2011d. Los Alamos National Laboratory, 2011. *Biological Assessment of the Effects of the Construction and Use of the Upper Sandia Canyon Access Road on Federally Listed Threatened and Endangered Species at Los Alamos National Laboratory, Los Alamos, NM*, LA-CP-11-01686, Los Alamos, New Mexico.

LANL 2011e. Los Alamos National Laboratory, 2011. *Sensitive Species Best Management Practices Source Document*, LA-UR-11-06406, Los Alamos, New Mexico.

LANL 2011f. Los Alamos National Laboratory, 2011. *Los Alamos National Laboratory Fall Avian Migration Monitoring Report 2011*, LA-UR-12-00488, Los Alamos, New Mexico.

LANL 2011g. Los Alamos National Laboratory, 2011. *Winter and Breeding Bird Surveys at Los Alamos National Laboratory Progress Report for 2010 to 2011*. LA-UR-11-05054, Los Alamos, New Mexico.

LANL 2012a. Los Alamos National Laboratory, 2012. *SWEIS Yearbook – 2010,* LA-UR-12-01648, Los Alamos, New Mexico.

LANL 2012b. Los Alamos National Laboratory, 2012. *Biological Assessment of the Effects of the Sigma Mesa Clean Fill Yard on Federally Listed Threatened and Endangered Species at Los Alamos National Laboratory, Los Alamos, NM*, LA-CP-12-00038, Los Alamos, New Mexico.

LANL 2012c. Los Alamos National Laboratory, 2012. *2011 Los Alamos National Laboratory Riparian Inventory Results,* LA-UR-12-20277, Los Alamos, New Mexico.

LANL 2012d. Los Alamos National Laboratory, 2012. *Winter and Breeding Bird Surveys at Los Alamos National Laboratory Progress Report for 2010 to 2012*, LA-UR-12-25120, Los Alamos, New Mexico.

LANL 2012e. Los Alamos National Laboratory, 2012. *Long-Term Strategy For Environmental Stewardship & Sustainability*, LA-UR-12-24845, Los Alamos, New Mexico.

Appendix I

2008 Site-Wide Environmental Impact Statement Mitigation Action Plan Annual Report

Tracking Log

Acronym List

ADE	Associate Director for Engineering and Engineering Sciences
ADESH	Associate Director for Environment, Safety, and Health
ADNHHO	Associate Director for Nuclear and High-Hazard Operations
ADPM	Associate Directorate for Project Management
ASM	Acquisition Services Management Division
BA	Biological Assessment
BMPs	Best Management Practices
CAP	Corrective Actions Program
CFR	Code of Federal Regulations
DD&D	decontamination, decommissioning and demolition
DOE	Department of Energy
DPR	designated procurement representative
EA	Environmental Assessment
EAP	environmental action plan
EMS	Environmental Management System
ENV	Environmental Protection Division
ENV-ES	Environmental Stewardship Group
EO	Emergency Operations Division
EO-EM	Emergency Management Group
EP	Environmental Programs
EPA	Environmental Protection Agency
ER	Environmental Report
ESA	Endangered Species Act
FOD	Facility Operations Division
FONSI	Finding of No Significant Impact
FRS	Flood Retention Structure
FY	Fiscal Year
HMP	Habitat Management Plan
HPSB	High Performance Sustainable Buildings
HSR	Health Safety Radiation Protection
IFCS	Institutional Facilities and Central Services
ILMP	Integrated Land Management Plan
IP	Infrastructure Planning
IPA	Integrated Project Application
LANL	Los Alamos National Laboratory
LANS	Los Alamos National Security, LLC
LASO	Los Alamos Site Office
LEED	Leadership in Energy and Environmental Design
MAP	Mitigation Action Plan
MAPAR	Mitigation Action Plan Annual Report

MDA	Material Disposal Area
MSS	Maintenance and Site Services Division
N	Nuclear Nonproliferation Division
N/A	not applicable
NNSA	National Nuclear Security Administration
OSRP	Off-Site Source Recovery Project
P2	Pollution Prevention
PIP	performance improvement plan
PPTRS	Pollution Prevention Tracking and Report System
PR-ID	Permits and Requirements Identification
PRS	potential release site
RLUOB	Radiological Laboratory Utility Office Building
RLWTF	Radioactive Liquid Waste Treatment Facility
SERF	Sanitary Effluent Reclamation Facility
SSP	Site Sustainability Plan
SWEIS	Site-Wide Environmental Impact Statement
T&E	threatened and endangered
TA	Technical Area
UI	Utilities and Institutional Facilities Division
WFMP	Wildland Fire Management Plan
WIPP	Waste Isolation Pilot Plant
WX	Weapons Experiments

Table 1. 2008 SWEIS MAPAR Tracking Log FY 2012 (Green items are complete; yellow is an on-going action; red is a closed or on-hold mitigation).

Topic	Action	Mitigation Status	FY 2012 Requirement	Responsible Party
Transition of previous LANL NEPA mitigation commitments into the 2008 SWEIS MAP				
DARHT MAP	Conduct annual Tribal tours and maintenance visits of Nake'muu.	On-going	Maintenance visit completed June 2012	ENV-ES
	Reduce annual surveillance sampling schedule to soils and one additional medium.	Completed 2008/2009	N/A – Complete	ENV-ES
	Emissions data from contained experiments and comparisons with results from previous operations, from 2001, will be in the 2009 SWEIS Yearbook.	Completed 2010	N/A - Complete	DAHRT, WX, ENV
Trails MAP	Complete eligibility evaluations for historic trails under National Historic Preservation Act; identify additional environmental issues on trails use.	On-going, as needed	N/A – As needed	ENV-ES
	Evaluate and manage trails to determine appropriate closures/restrictions.	On-going	Las Conchas closures	ENV-ES
	Prepare cultural resources management plans for trails in TAs-70 and 71.	On-going	Integrated into revised draft CRMP	ENV-ES
	Support the use of volunteers for selected trails maintenance projects.	On-going, as needed	New Institutional Agreement re: volunteer trails work signed 6/12	ENV-ES
SEA MAP	Complete rehabilitation of cultural resources impacted by the Cerro Grande Fire	Complete 2012	N/A - complete	ENV-ES
	Monitor sediment contamination behind the Los Alamos Canyon Weir and the Pajarito Canyon FRS and report results in the ER.	On-going	FY 2012 fieldwork/ monitoring complete	ENV
	Periodically remove sediment from the Los Alamos Canyon Weir based on sedimentation rate and contamination accumulation rate.	On-going, as needed	On-going, as needed	EP-CAP
FRS EA	Annually monitor the FRS for structural integrity and safe operations until removed.	On-going	FY 2012 inspection complete June 2012	IFCS
	Remove portions of the FRS in accordance with DOE/EA-1408.	Removal date not currently scheduled	N/A	ADNHHO
	Recycle demolition spoils from FRS DD&D as appropriate.		N/A	ENV, ADNHHO
	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	ADNHHO
	Remove aboveground portions of the steel diversion wall of the FRS.		N/A	ADNHHO
	Recontour and reseed disturbed areas to protect surface water quality in Pajarito Canyon after the FRS is removed.	Will be reseeded when structure is removed	N/A	ADNHHO
Project-Specific Mitigation Measures Analyzed in the SWEIS: Institutional Resource Management Responsibilities				
RLWTF/Outfall Reduction	All further actions affecting water flow volumes in Mortandad and Sandia canyons will be assessed for positive and negative impacts.	SERF EA and FONSI 2010	N/A-complete	ENV
OSRP Project	Institute adequate controls on the quantities and methods of storing sealed sources containing cobalt-60, iridium-192, or cesium-137 to mitigate the effects of potential accidents.	Mitigation on-hold	N/A	N

Table 1 continued. 2008 SWEIS MAPAR Tracking Log FY 2012.

Topic	Action	Mitigation Status	FY 2012 Requirement	Responsible Party
Project-Specific Mitigation Measures Analyzed in the SWEIS: Institutional Resource Management Responsibilities continued				
Air Emissions	Continue air monitoring program to comply with the Clean Air Act.	On-going	Annual; report submitted to EPA June 2012	ENV
	Use existing PR-ID System to assess potential air quality impacts from new or modified projects and provide BMPs to control emissions.	On-going	On-going	Projects
	Removal of contamination from MDAs and other PRSs would be conducted in a manner that protects the environment, the public, and worker health and safety.	On-going	MDA B remediation complete 2012	EP/Projects
Wildland Fire Management Plan	Implement WFMP with adequately funded on-going program.	On-going	Mastication, thinning and mowing	EO-EM
	Reduce wildfire risks by shipping legacy transuranic waste, currently stored in the TA-54 domes, to WIPP.	On-going	On-going	EP
SWEIS Biological Assessment	Develop and implement a wetlands/floodplains management plan.	Riparian Inventory complete FY 2012	N/A Complete FY 2012	ENV
	Evaluate ecological risks to watershed-specific threatened and endangered (T&E) species and update site-wide modeling of ecological risk.	Complete	Complete	ENV
	Consider span bridges instead of land bridges in areas that cross canyons in T&E species habitats to reduce environmental impacts.	On-going	N/A	Projects
	Implement reasonable and prudent measures in the SWEIS BA through the institutional project review process and implementation of the HMP.	On-going	N/A	Projects
BRMP	Implement Biological Resources Management Plan.	On-going	FY 2012 ESA surveys complete	ENV
CRMP	Implement Cultural Resources Management Plan.	On-going	SHPO reviewing revised CRMP	ENV
Energy Conservation: Electrical	Upgrade electrical infrastructure in buildings to reduce electrical usage.	On-going	N/A	FODs, HSR, PM
	Install gas-fired combustion turbine generator and upgrade existing steam turbines.	Complete	N/A	ADNHHO
	Meter major energy user facilities and sub-meter all other facilities to quantify and evaluate electrical consumption.	On-going		ADNHHO
	Construct the portion of power line from the Norton substation to STA.	On-hold	N/A	ADNHHO
	Construct Pajarito Corridor Electric Substation at TA-50.	On-going	N/A	ADNHHO
	Implement Energy Savings Performance Contract third-party financed retrofit projects to improve building efficiencies Lab-wide.	On-going	N/A	Institutional/ADNHHO
	Purchase additional renewable wind energy.	On-going		ADNHHO
	Purchase and/or lease "Energy Star" electronics.	Industry standard	Industry standard	ASM/DPRs

Table 1 continued. 2008 SWEIS MAPAR Tracking Log FY 2012.

Topic	Action	Mitigation Status	FY 2012 Requirement	Responsible Party
Project-Specific Mitigation Measures Analyzed in the SWEIS: Institutional Resource Management Responsibilities continued				
Energy Conservation: Electrical continued	Improve new building efficiencies by integrating Leadership in Energy and Environmental Design (LEED)/Sustainable Design on line items.	On-going	HPSB working groups; RLUOB LEED Gold certified	PM/Engineering
Energy Conservation: Natural Gas	Meter major energy user facilities and sub-meter other facilities to quantify and evaluate natural gas consumption.	On-going	Ten thermal meters installed FY 2012	ADNHHO/ENV
	Install more efficient gas-fired combustion turbine generators and upgrade existing steam turbines to conserve power and energy.	On-going: 2009-turbine installed	N/A	ADNHHO
Energy Conservation: Water	Expand the SERF to increase the amount of recycled water usage and reduce water consumption.	Expansion complete – ribbon cutting – August 2012	N/A-complete	EP/ADNHHO
Pollution Prevention (P2)	Annually report waste reduction performance against EMS waste reduction goals.	On-going	SSP report, PPTRS, and Hazardous Waste Minimization Report	ENV
	Continue to integrate waste reduction activities into the EMS.	On-going	Goals in FY 2012 EAPs	ENV
Clean Fill	Use excavation and demolition spoils locally to minimize purchase or new excavations of clean fill when possible.	On-going	Database integrated w/ PR-ID; yard operational	UI/MSS/Projects
	Annually report reuse of clean fill materials from excavations and DD&D.	On-going		ENV
Traffic Mitigations	Identify possible solutions to minimize traffic issues related to DD&D, remediation, and construction projects.	No alternate route required	2/2012 "How's my driving?" campaign/"Site Car" pilot project initiated 4Q FY 2012	Projects
	Encourage alternative transportation, including walking, car-pooling, bicycling, and public transportation.	On-going EMS communications.	FY 2012 Sustainability Open House 4/12	ENV/IP
	Improve overall Lab-wide fleet fuel efficiency.	PIP complete 2008	N/A - complete	ASM
	Consider plans for an alternative route off DP Mesa.	No alternate route required	N/A	TA-21 Project
Site Planning	Enhance the decision support tool that offers an objective and semi-quantitative method for integrating opportunities and constraints for project planning and compliance.	Task Complete; education on-going	ILMP complete, IPA transitioned to ENV-ES and IS in FY 2011	IP/ENV
	Use Project Review and Requirements System in concert with the decision support tool and project site selection process to better identify potential site planning constraints early in project development.	On-going integration	ILMP and IPA complete	IP/ENV
	Use the decision support tool to comply with Land Transfer Regulations (10CFR770).	On-going	N/A	ENV

Table 1 continued. 2008 SWEIS MAPAR Tracking Log FY 2012.

Topic	Action	Mitigation Status	FY 2012 Requirement	Responsible Party
Project-Specific Mitigation Measures Analyzed in the SWEIS: Institutional Resource Management Responsibilities continued				
Enhancement of Existing Programs				
Compliance Assurance	Assign a functional manager for the PR-ID process and supporting tool, ensure supporting authority and funding for effective use in project development, compliance, and site planning.	On-going	N/A	ADESH, ADE, ADPM
	Implement compliance assurance process on a sample of PR-ID projects.	Complete	Complete	ENV
	Develop metrics and track results.	Complete	Complete	ENV
	Implement process improvement measures as appropriate.	On-going	On-going	ENV
Consultations with Santa Clara Pueblo	No later than January 30, 2009, DOE/NNSA LASO shall develop, jointly with Santa Clara Pueblo, a plan to address environmental justice and human health concerns and issues identified by the Santa Clara Pueblo during the SWEIS process.	NNSA provided Santa Clara Pueblo financial and technical assistance during the last quarter of FY2010 to commence work on this plan. A draft plan is near completion subject to review/approval by Santa Clara Pueblo Tribal Council. LASO will be provided an opportunity to provide comments on the draft, which will then be submitted to the Tribal Council for approval as the final Plan. DOE/NNSA continues to work with Santa Clara in addressing this action. The status on this task remains open and on-going.	The status of this task remains open and on-going.	DOE/NNSA LASO in conjunction with Santa Clara Pueblo

Appendix II

Dual Axis Radiographic Hydrodynamic Test Facility (DARHT)

Mitigation Action Plan Annual Report Fiscal Year 2011

Prepared by Philip R. Fresquez
Environmental Stewardship Resources Management Team (ENV-ES)

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ACRONYMS

Amps	Amperes
BA	Biological Assessment
BSRL	baseline statistical reference level
CFR	Code of Federal Regulations
CRT	Cultural Resources Team
DARHT	Dual-Axis Radiographic Hydrodynamic Test (facility)
DOE	US Department of Energy
EIS	Environmental Impact Statement
ENV-EDA	Environmental Data and Analysis Group
ENV-ES	Environmental Stewardship Group
ENV-RCRA	Water Quality and Resource Conservation and Recovery Act Group
ENV-RRO	Risk Reduction Office
ER	Environmental Report
FY	fiscal year
HAZMAT	Hazardous Materials Response Team
HMP	habitat management plan
ISL	industrial screening level
ISM	Integrated Safety Management (system)
kA	kilo-amps
lbs	pounds
LANL	Los Alamos National Laboratory
LASO	Los Alamos Site Office
MAP	Mitigation Action Plan
MAPAR	Mitigation Action Plan Annual Report
MeV	mega electron-volt
mg/kg	milligram per kilogram
mg/L	milligram per liter
µg/L	microgram per liter
mrem/yr	millirem per year
NCB	NEPA, Cultural, and Biological
NEPA	National Environmental Policy Act of 1969
NNSA	National Nuclear Security Administration
NPDES	National Pollutant Discharge Elimination System
pCi/g	picocuries per gram
RESRAD	residual radioactivity (computer model)
RCRA	Resource Conservation and Recovery Act
RMT	Resources Management Team

ROD	Record of Decision
RSRL	regional statistical reference level
SEA	Special Environmental Analysis
SHPO	State Historic Preservation Officer
SL	screening level
SWEIS	Site-Wide Environmental Impact Statement
SWPPP	Stormwater Pollution Prevention Plan
TA	technical area
TAL	target analyte list
TCP	traditional cultural property
TNT	trinitrotoluene(2,4,6-)
US	United States
VPB	Vessel Preparation Building
WES-EDA	Waste and Environmental Services Division, Environmental Data and Analysis Group
WFO-FOD	Weapons Facilities Operations, Facilities Operations Directorate
WPA	Work Package Agreement
Yr	year

EXECUTIVE SUMMARY

In Fiscal Year (FY) 2011, there were no significant impacts from contaminants based on measurements of soil, sediment, vegetation, field mice, and bees from Dual-Axis Radiographic Hydrodynamic Test (DARHT) operations. DARHT operations did not have significant impacts to the bird populations. There are no impacts from DARHT operations to archaeological resources (i.e., Nake'muu pueblo) and the natural environment is having a greater effect on the deterioration of the standing wall architecture than operations at DARHT. Although 2011 contaminant levels were not at concentrations detrimental to human health or to the environment, there were measurable amounts of depleted uranium in all media, and the levels increase over time until 2006. Concentrations of depleted uranium in most media decreased in 2007 and may correspond to the success of employing steel containment vessels and/or to a reduction of detonations. 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. Foam mitigation has significantly reduced the amount of potential contaminants released into the environment compared with open-air detonations, and the use of steel containment vessels further reduced those amounts over foam mitigation.

1.0 INTRODUCTION

This Mitigation Action Plan Annual Report (MAPAR) has been prepared by the United States (US) 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 that have been 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 on Los Alamos National Laboratory (LANL) property retaining its original standing walls.

The DOE NNSA Los Alamos Site Office (LASO) 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 that were implemented during FY 2011 (October 1, 2010, through September 30, 2011) and represents the 12th 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 1995a) at LANL in August 1995 and published the ROD in the Federal Register (DOE 1995b) 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 (CFR 1996).

The ROD on the DARHT final EIS states that DOE has decided to complete and operate the DARHT facility at LANL while implementing a program to conduct most tests inside steel containment vessels with containment to be phased in over 10 years (the Phased Containment option of the Enhanced Containment alternative[1]). In general, open-air detonations occurred from 2000–2006, and detonations within a foam medium occurred from 2002–2006. A containment vessel qualification shot was conducted at the Technical Area (TA) 39 Firing Point 6 in 2006, and shots within steel containment vessels at DARHT were implemented in May 2007. 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, and three in FY 2011.

The ROD further states that DOE will develop and implement several mitigation measures to protect soils, water, biotic, and cultural resources potentially affected by the DARHT facility

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

construction and operation (DOE 1995). In addition, DOE agreed to an ongoing consultation process with affected American Indian tribes to ensure protection of resources of cultural, historic, or religious importance to the tribes. As discussed in Section 5.11, Volume 1, of the DARHT Final EIS, DOE also committed to taking special precautions to protect the Mexican Spotted Owl (*Strix occidentalis lucida*) by preparing and implementing a LANL-wide Habitat Management Plan (HMP) (LANL 2011) for all threatened and endangered species occurring throughout LANL property. The DARHT MAP elaborates upon those commitments (DOE 1996).

In December 1995, LANL completed a Biological and Floodplain/Wetland Assessment for the DARHT facility as required under the Endangered Species Act of 1973 (Keller and Risberg 1995). The Biological Assessment (BA) includes mitigation expected to prevent any likely adverse effect to any threatened or endangered species or modification to critical habitat. The mitigation measures identified in the BA were the basis for US 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).

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

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

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

In 2003, the construction of the Vessel Preparation Building (VPB) was completed. One hydrotest was fired in the fall of 2003 and again returned state-of-the-art quantitative radiographic information of a mockup of a stockpile system. This experiment was the initial

implementation of aqueous foam mitigation for a hydrotest experiment at DARHT. The aqueous foam mitigation method achieved at least a 5% reduction in material released to the open air as prescribed for Phase I of the Phased Containment option. Steel plates and concrete replaced surface gravel at the firing pad to enhance cleanup activities following experiments.

In FY 2004, two major hydrotests were conducted. Aqueous foam particulate mitigation was implemented during these experiments to mitigate blast effects. One of these experiments was the first foam-mitigated experiment to use the new fabric tent configuration for containing the foam.

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

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

In FY 2007, hydrotesting continued with three major hydrotest experiments. Single-walled steel containment vessels were used for these 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 were decontaminated on the DARHT firing point and transported to the VPB, where they were 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 were 35 nanoseconds in duration and uniformly spaced 400 nanoseconds apart. The kicker and downstream transport system performed extremely well.

In FY 2008, hydrotesting continued with two major hydrotest experiments. Single-walled steel containment vessels were used for these hydrotest experiments to mitigate the fragments and particulate emissions associated with the experiment.

In FY 2009, no hydrotest experiments were conducted.

In FY 2010, hydrotesting continued with four major hydrotest experiments. Single-walled steel containment vessels were used for these hydrotest experiments to mitigate the fragments and particulate emissions associated with the experiment.

In FY 2011, hydrotesting continued with three major hydrotest experiments. Single-walled steel containment vessels were used for these hydrotest experiments to mitigate the fragments and particulate emissions associated with the experiment.

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 LASO NEPA Compliance Officer, who is ultimately responsible for implementing the DARHT MAP, delegates MAP management and tracking to LANL organizations, currently the Environmental Stewardship Group (ENV-ES) manages the MAP. MAP management and tracking responsibilities currently reside with the Environmental Data and Analysis (ENV-EDA) Group. Using the annual WPA, ENV-EDA 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 should report changes in mitigation actions or to the MAP. In order to ensure the public has full access to this information, hardcopies of the MAPAR are placed in DOE Public Reading Rooms in Los Alamos and Albuquerque.

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 that were implemented throughout FY 2011. The scope of tasks completed in FY 2011 represents the 12th year of operations-related mitigation. 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
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

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

3.1 Mitigation Actions for the General Environment

Summary of Potential Impacts

MAP Section VIII.A.1(b–e)

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

Mitigation Action Scope

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

b) ENV-EDA and ENV-ES will monitor contaminants by sampling soil, plants, mammals, birds, and bees at baseline locations and, following the start of operations, within the potential impact area of DARHT, once per year.

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.

Mitigation Action Commitment 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 four years of analysis of DARHT samples are summarized in a composite report (Nyhan et al. 2001) and were used to calculate baseline statistical reference levels (BSRLs); these are the concentrations of radionuclides and other chemicals (mean plus 3 standard deviations = 99% confidence level) around the DARHT facility before the start-up of operations, as per the DARHT MAP (DOE 1996). Baselines for potential contaminants, populations, and species diversity in birds were developed at a later date (Fresquez et al. 2007).

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

This section of the MAPAR summarizes the results of analyses of soil, sediment, vegetation, field mice, birds, and bees collected around the perimeter of DARHT during FY 2011 (Figure 3-1). All of the raw data can be found in the annual Environmental Report (ER) (LANL 2011a).

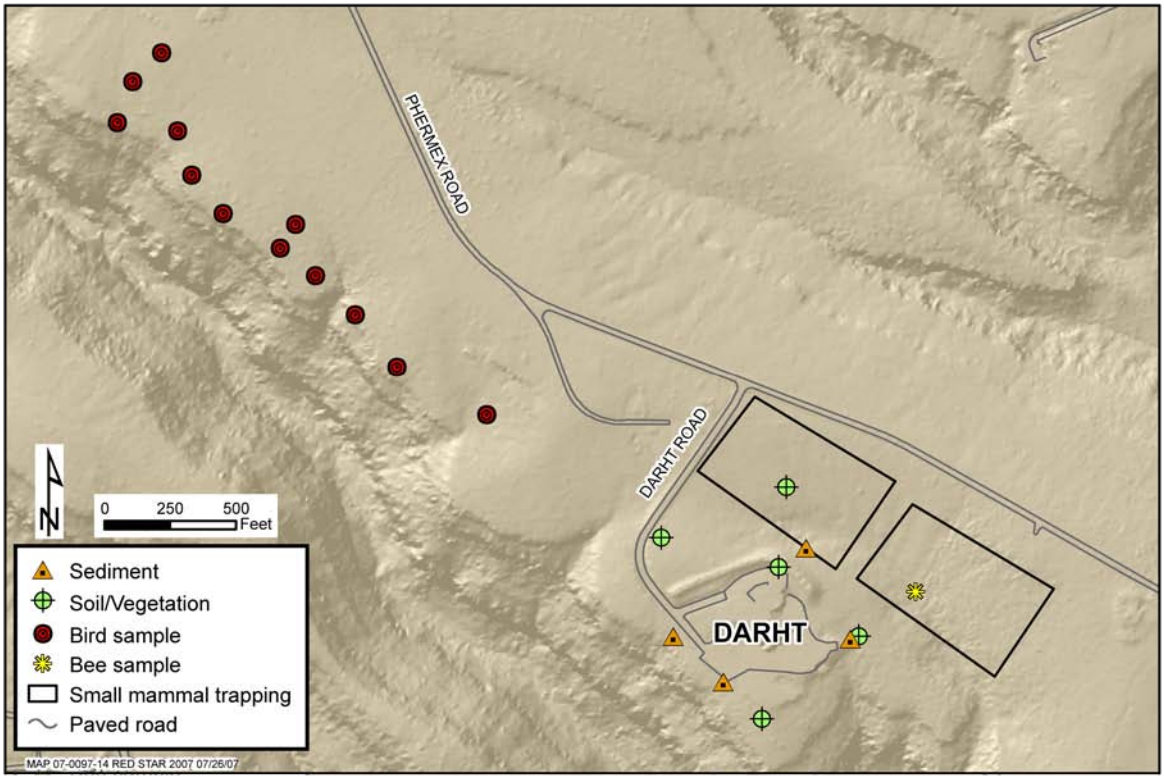

Figure 3-1. Sample locations for soil, sediment, vegetation, field mice, birds, and bees around DARHT.

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

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

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

Most radionuclides in soil and sediment collected from within and around the perimeter of the DARHT facility were either not detected or below the statistical reference levels. A nondetected value is one in which the result is lower than three times the counting uncertainty and is not significantly different ($\alpha = 0.01$, or 99% confidence level) from 0 (Keith 1991, Corely et al. 1981) or less than the minimum detectable activity.

Tritium, americium-241, and uranium-238 were detected above the statistical reference level in only one soil sample, on the south side, but the amounts were far below the industrial screening levels (ISLs) and do not pose an unacceptable dose to any site workers. ISLs for radionuclides are set below the DOE single-pathway dose limit of 25 millirem per year (mrem/yr) (DOE 1993, DOE 1999a) so that potential concerns may be identified in advance, i.e., a “yellow flag.” If a radionuclide exceeds the ISL, LANL investigates the basis for the exceedance. LANL developed ISLs to identify radionuclides of potential concern on the basis of a 15-mrem/yr protective dose limit for an industrial site worker scenario (LANL 2005a) using the residual radioactivity (RESRAD) computer model (Yu et al. 1995).

In the past, uranium isotopes, predominantly uranium-238, were detected above the BSRL in soil samples collected on the north side of the firing point (Figure 3-2). Uranium-238 concentrations peaked in 2008 (55 picocuries per gram [pCi/g] dry), and since operations have changed to closed containment vessels (and subsequent cleanup of debris around the site), the concentrations of uranium-238 within and around the facility have decreased dramatically to baseline levels. See MAP Section VIII.A.1(d) for more information and results concerning the use of steel containment vessels.

All of the TAL elements, including beryllium, in soil and sediment samples collected within and around the DARHT facility were below both the statistical reference levels. Beryllium, listed as a chemical of concern before the start-up of operations at DARHT (DOE 1995), was not detected above reference levels in any of the soil or sediment samples. Also, beryllium concentrations in soil over the 12-year operations period have been mostly below the BSRL, far below ISLs, and remain relatively stable over time (Figure 3-3).

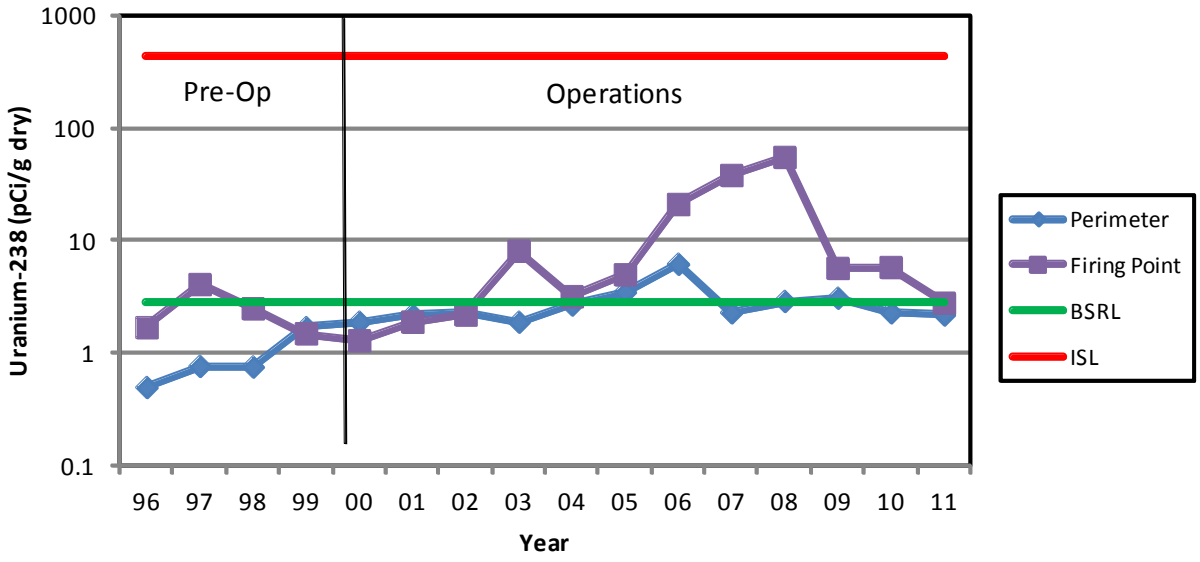

Figure 3-2. Uranium-238 concentrations in soil collected within (near the firing point) and around (north-, east-, south-, and west-side average) the DARHT facility at TA-15 from 1996–1999 (pre-operations) to 2000–2011 (during operations) compared with the BSRL and the ISL. Note the logarithmic scale on the vertical axis.

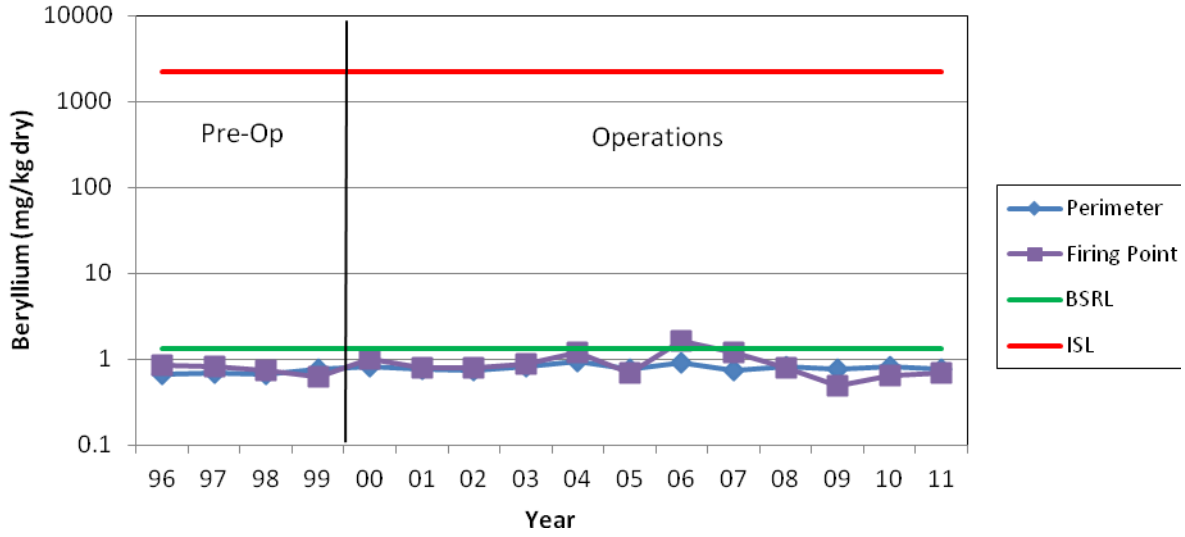

Figure 3-3. Beryllium concentrations in soil collected within (near the firing point) and around the DARHT perimeter (north-, west-, south-, and east-side average) at TA-15 from 1996–1999 (pre-operations) to 2000–2011 (during operations) compared with the BSRL and the ISL. Note the logarithmic scale on the vertical axis.

Other chemicals analyzed around the perimeter of the DARHT facility were high-explosive compounds, dioxins, and furans. There were no high explosives or dioxin/furan concentrations detected above the reporting limits in any of the soil or sediment samples. Although not analytically surveyed for in 2011, polychlorinated biphenyls or semivolatile organic compounds were not detected above the reporting limits in soil and sediment samples collected around the perimeter of the DARHT facility in 2007.

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

All radionuclide concentrations, including uranium-238 (Figure 3-4), in overstory vegetation collected from around the perimeter of the DARHT facility were either not detected (most results) or detected below the BSRLs (or RSRLs when BSRL data were not available). In the past, uranium-238 was usually the only radionuclide to be detected in overstory vegetation around the DARHT facility (probably as a result of foliar deposition more than by root uptake). But since 2007 the concentrations have generally decreased from all sides of the DARHT perimeter. This general decrease in uranium-238 concentrations to the BSRL was probably due to the change in contaminant mitigation procedures from open-air and/or foam mitigation (2000–2006) to closed steel containment (vessel) mitigation starting in 2007. Screening levels (SLs) for biota were set at 10% of the standard by the dose assessment team at the Laboratory to identify the potential contaminants of concern (McNaughton 2006).

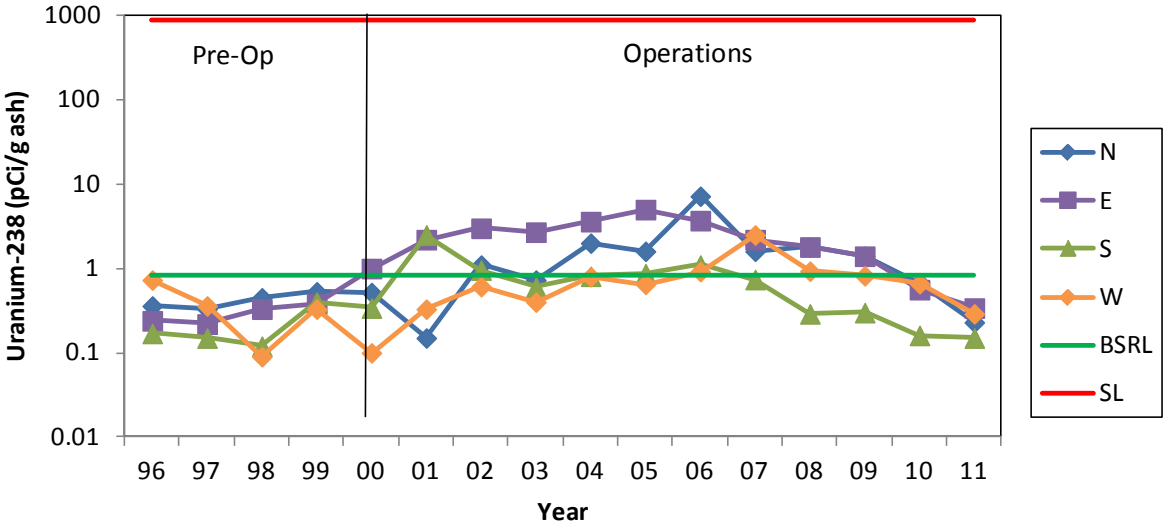

Figure 3-4. Uranium-238 in overstory vegetation collected from the north (N), east (E), south (S), and west (W) side of the DARHT facility at TA-15 from 1996–1999 (pre-operations) through 2000–2011 (during operations) compared with the BSRL and the SL. Note the logarithmic scale on the vertical axis.

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

Small Mammal Monitoring. Small mammals, mostly deer mice (*Peromyscus* spp.), were collected using snap traps from two sample grids located on the north and northeast side of the DARHT facility. Samples of whole-body mice were submitted to ALS Laboratory Group for analyses of the same radionuclides and TAL elements as for the other biota.

All radionuclides in a composite field mouse sample (n=7) collected from the north and northeast side of the DARHT facility were either not detected (most results) or below the BSRLs. The isotopic distribution of uranium-234 to uranium-238 in the field mouse sample collected from the north-northeast side of DARHT indicates the type of uranium is depleted uranium.

Using uranium-238 concentrations to model trends over time, the amounts, as seen with vegetation, exhibit an increase to 2007 and then decrease thereafter to the BSRL; this is concurrent with the change in detonation mitigation practices from open-air and/or foam-mitigated detonations during the 2000–2006 period to closed vessel containment starting in 2007 (Figure 3-5).

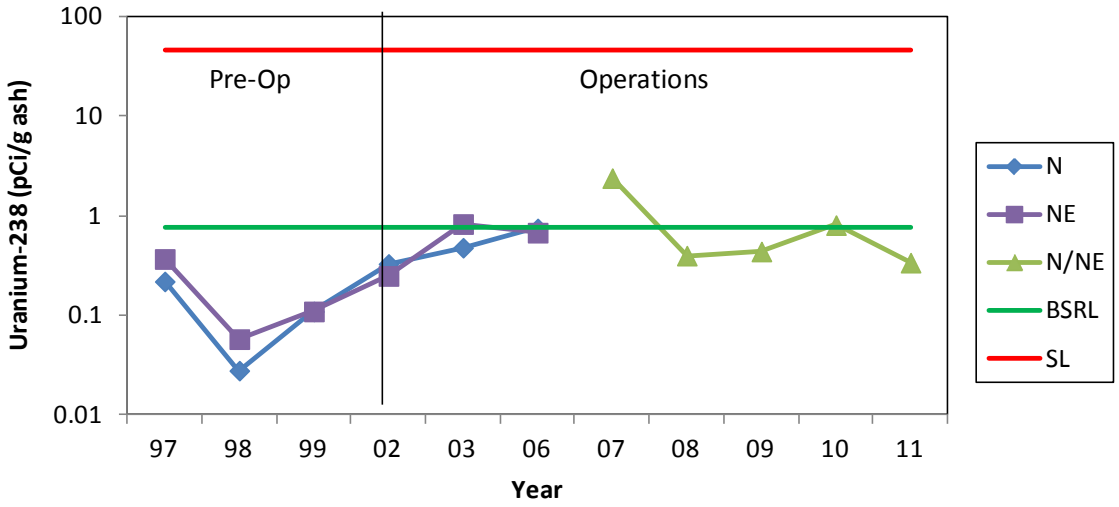

Figure 3-5. Uranium-238 concentrations in (whole-body) mice collected from the north (N), northeast (NE), and north-northeast (N/NE) side of the DARHT facility at TA-15 from 1997–1999 (pre-operations) through 2002–2011 (during operations) compared with the BSRL and the SL. Note the logarithmic scale on the vertical axis.

Most TAL elements, with the exception of barium, in a field mouse sample collected from the northeastern perimeter of the DARHT facility were either not detected or similar to RSRLs (Fresquez 2011). The amounts of barium were detected an order of magnitude higher than the RSRL, but the amounts in soil (120 milligram per kilogram [mg/kg]) from the north-side perimeter of DARHT were far below the ecological screening levels (< 1800 mg/kg) for the deer mouse (LANL 2005b).

Most dioxin or furan chemicals in a field mouse sample were not detected above the method detection limit; only an estimated trace amount (greater than the method detection limit but less than the standard quantification limit) of total tetrachlorodibenzofuran was detected, but the level was similar to the RSRL (Fresquez 2011). Tetrachlorodibenzofuran in soil near the firing point was not detected.

Bee Monitoring. All radionuclide concentrations in two honey bee samples collected from hives located on the northeastern perimeter of the DARHT facility were either not detectable (most results) or below the BSRLs. The isotopic distribution of uranium-234 to uranium-238 in both bee samples indicates that the uranium is in a depleted form.

A comparison of uranium-238 in bee samples over the pre-operational and operational period at DARHT reveals the same general trend observed with the other biotic samples; that there is an increase in activity to around 2006 and then a general decrease concurrent with the change in detonation mitigation practices from open-air/foam (2000–2006) to closed vessel containment starting in 2007 (Figure 3-6).

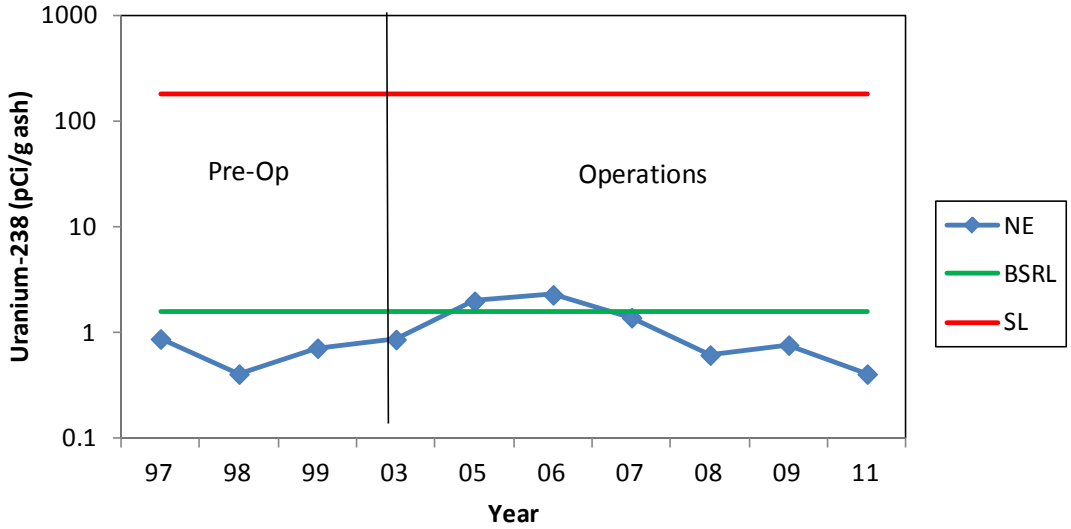

Figure 3-6. Uranium-238 concentrations in bees collected from the northeast (NE) side of the DARHT facility at TA-15 from 1997–1999 (preoperations) through 2003–2011 (during operations) compared with the BSRL and the SL. Note the logarithmic scale on the vertical axis.

Bird Monitoring. Birds were collected for population, composition, and diversity estimates using 12 mist capture net traps spaced about 200 ft to 1,600 ft outward from the west side of the DARHT facility. The objective of the bird monitoring project was to determine the general (ecological) stress levels around the vicinity of DARHT caused by facility operations (e.g., noise, disturbance, traffic).

The number of birds, number of bird species, and the diversity and evenness (distribution) of birds collected in 2011 was similar to those collected before the start-up of operations at DARHT and were similar to past data (Figure 3-7). There were a large number of birds and types of birds located in the vicinity of the DARHT complex; a new entry in 2011 included the white-winged dove (*Zenaida asiatica*), and the five most common bird species collected regardless of time periods were the chipping sparrow (*Spizella passerina*), Virginia's warbler (*Vermivora virginiae*), western tanager (*Piranga ludoviciana*), western bluebird (*Sialia mexicana*), and the broad-tailed hummingbird (*Selasphorus platycercus*). The Virginia's warbler is listed in the top 100 birds at risk in North America in the Birder's Conservation Handbook (Well 2007) and is a common inhabitant of the ecosystem near the DARHT facility.

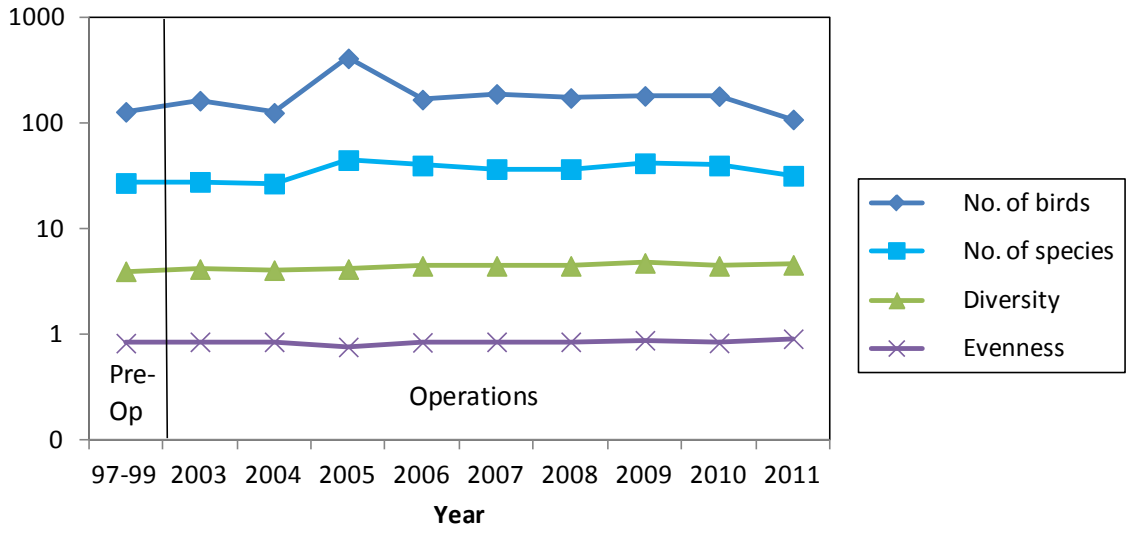

Figure 3-7. Populations, number of species, diversity, and evenness of birds occurring before (1997–1999) and during (2003–2011) operations at DARHT. Note the logarithmic scale on the vertical axis.

MAP Section VIII.A.1(c)

For routine DARHT facility operations, the sampling and analysis methodology used in the environmental baseline monitoring conducted under Section VIII.A.1(b) (see above) was designed to include environmental monitoring requirements under this mitigation action. Should the DARHT facility experience a substantial accidental spill or release of hazardous or radioactive materials, additional environmental monitoring will 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 to be phased in over 10 years (the Phased Containment option of the Enhanced Containment alternative[2]) (DOE 1995). In general, open-air detonations occurred from 2000–2006, and detonations within a foam medium occurred from 2002–2006. A containment vessel qualification shot was conducted at the TA-39 Firing Point 6 in 2006, and shots within single-walled steel containment vessels at DARHT were implemented in May 2007. Three hydrodynamic test shots within single-walled steel containment vessels at DARHT were conducted in 2007. Two hydrodynamic test shots were conducted within single-walled steel containment vessels at DARHT in 2008. These steel containment vessels achieved at least a 40% reduction in material released to the open air as prescribed for Phase II of the Phased Containment option.

[2] Current DARHT nomenclature is confinement

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 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 the 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.

Mitigation Action Commitment Status

MAP Section VIII.A.2

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

vessel cleanout processes in support of the commitment to decontaminate vessels used in experiments.

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

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 will be deployed in the event of an accident. Waste minimization techniques are applied to those materials that cannot be recycled 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).

Mitigation Action Commitment 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 begin. This plan will be maintained for the life of the facility consistent with the requirements under the LANL Integrated Safety Management (ISM) System and Environmental Protection Agency Oil Pollution Prevention Regulation, 40 CFR Part 112. To date 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 (HAZMAT). The HAZMAT is on call full-time to respond to all emergency spills within the LANL site and, as needed, the LANL region. The mineral oil release was not considered a spill because it did not reach the environment and did not require HAZMAT deployment.

Summary of Potential Impacts

MAP Section VIII.A.4

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

Mitigation Action Scope

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

Mitigation Action Commitment 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 microgram per liter (µg/L) (0.5 milligram per liter [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, 2011.

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 storm water runoff. In addition, off-road and groundbreaking activities caused by additional construction and operational activities may result in further soil erosion and damage to vegetation.

Mitigation Action Scope

MAP Section VIII.B.1(a–c)

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

a) All soil erosion mitigation measures are adhered to in accordance with the operational Storm Water Pollution Prevention Plan (SWPPP) to ensure that erosion and sedimentation are minimized and that control measures 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.

Mitigation Action Commitment 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 control measures are in place to control runoff. The plan includes required control measures for temporary and permanent erosion control, sedimentation control, surface restoration and revegetation, storm water 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 will be modified, as necessary, by the WFO-FOD environmental personnel and ENV-RCRA.

Mitigation Action Scope

MAP Section VIII.B.2(a–e)

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

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

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

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

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

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

Mitigation Action Commitment Status

MAP Section VIII.B.2(a)

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

MAP Section VIII.B.2(b–e)

Under the ISM System at LANL, all planning, construction, and operations activities must comply with the institutional process established under LANL Implementation Procedure 405 (P405), also known as the NEPA, Cultural, and Biological (NCB) Review.[3] 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 requires full and effective implementation of the LANL HMP (LANL 2011b). These standards are measured by performance criteria contained in the Laboratory Performance Requirement 404-00-00 Appendix 3 (Environmental Protection—Ecological and Cultural Resources). ENV-ES is the Office of Institutional Coordination for P405 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, andhazardous trees that might damage the fence. The DARHT facility site forest-thinning activities were conducted in consultation with ENV-ES to ensure appropriate protection of the federally listed threatened and endangered 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.

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

[3] These activities previously were governed by Laboratory Implementation Requirement 404-30.02.0.

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

Mitigation Action Scope

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

These sections of the DARHT MAP commit DOE and LANL to implementing mitigation measures selected to protect threatened, endangered, and sensitive species in the DARHT facility area. These mitigation measures collectively require DARHT facility representatives to continue to coordinate with ENV-ES on all DARHT facility site threatened and endangered species issues through the ongoing implementation of the LANL HMP. LANL will conduct the necessary species monitoring and habitat protection measures required for the DARHT facility site through the HMP (LANL 2011b).

Mitigation Action Commitment Status

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

Since January 1999, LANL has fully implemented the HMP. During FY 2000, sitewide implementation of the HMP was included as part of the institutional requirements in P405. 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. The HMP was updated in FY 2011.

3.4 Mitigation Actions for Cultural Resources

Summary of Potential Impacts

MAP Section VIII.D.1(b, e–g)

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

Mitigation Action Scope

MAP Section VIII.D.1(b, e–g)

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

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

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

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

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

Mitigation Action Commitment Status

MAP Section VIII.D.1(b)

In general, open-air detonations occurred from 2000–2006 and detonations within a foam medium and steel containment vessels occurred from 2002–2006 and from 2007–2008, 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 the 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 eliminates this mitigation concern.

MAP Section VIII.D.1(e)

The results of the nine-year-long annual assessment of physical conditions at Nake'muu (1998–2006) led to the conclusion that the amount of yearly snowfall combines with elk moving through the site is responsible for the deterioration of the standing wall architecture, not the operations at DARHT (Vierra and Schmidt 2006). As a result of this statistically quantitative study, additional annual monitoring at Nake'muu under the DARHT MAP was determined to not be required and was suspended in FY 2007. In order to formally close out this specific monitoring requirement, a consultation between the LASO Cultural Resources Program Manager, Environmental Protection Division, the Pueblo of San Ildefonso, and Weapons Facilities Operations is recommended. This meeting has not yet been scheduled. Due to LANS staffing issues and cultural resource priorities, this meeting was not scheduled in FY 2011. Note that yearly qualitative assessments of Nake'muu have also been performed as part of the MAP for the Special Environmental Analysis (SEA) associated with the Cerro Grande fire (DOE 2000a). These field checks, conducted by the ENV-ES Resources Management Team (RMT), 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 2006–2009 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 for the DARHT tour with the opportunity to witness and discuss conditions at this ancestral pueblo.

In September 2003, a team from the Pueblo de San Ildefonso conducted rehabilitation activities at Nake'muu including cutting and slashing of snags, reduction of scrub oak, and using slash for erosion control. No unusual episodes of fallen wall were noticed during a brief condition assessment conducted on July 28, 2006. However, the assessment conducted on October 23, 2007, discovered at least eight small wall sections had fallen since the July 2006 inspection, presumably as a result of moderate to heavy snowfall during the winter of 2006–2007 and wildlife activity within the site. On September 22, 2008, and September 28, 2009, members of the LANL Cultural Resources Team (CRT) visited Nake'muu and conducted detailed photography of all standing walls to use as a baseline for future comparison. They documented the collapse of a partial wall in one room. During the 2010 calendar year, the CRT was amalgamated into the RMT. For the FY 2011 visit, the ENV-ES group leader, Patricia Gallagher, and the Environment, Safety, Health, and Quality associate director, Chris Cantwell, accompanied and assisted the RMT cultural resources specialists in their work at the site on October 27, 2010. No new wall collapse was observed.

MAP Section VIII.D.1(f)

Although the DARHT MAP physical assessment of Nake'muu was completed in 2006, continued visits by members of the Pueblos were projected into the indefinite future. In FY 2007, the LANL RMT began coordination efforts with the LANL Tribal Relations Office to plan for these tours, which resumed in FY 2008. On September 26, 2008, four members of the Environmental Program at the Pueblo de San Ildefonso visited Nake'muu. In FY 2009, the RMT attempted to schedule a Nake'muu tour for members of Pueblo de San Ildefonso. Pueblo de San Ildefonso members participated in a tour of Nake'muu in October 2009 (FY 2010). Tours are now scheduled during the first quarter of each FY (October–December). Annual assessment and monitoring of the site can be conducted at any time during the year. For FY 2011, representatives from San Ildefonso visited Nake'muu with members of the RMT on November 10, 2010.

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

Summary of Potential Impacts

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

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

Mitigation Action Scope

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

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

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

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

Mitigation Action Commitment Status

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

DOE and the Ecology Group completed the Phase II cultural resources assessment and cultural resources report for the DARHT facility project. On May 20, 1999, the SHPO officially concurred with a DOE and LANL finding that the construction and operation of the DARHT facility will have "no adverse effect" on cultural resources in the potentially affected area (DOE 1999b). In addition, as part of the LANL SWEIS MAP, in FY 2000 LANL completed the "Comprehensive Plan for the Consideration of Traditional Cultural Properties and Sacred Sites at Los Alamos National Laboratory" (DOE 2000b). This DOE plan was approved in August 2000 and provides the institutional framework for identifying and documenting two specific types of cultural resources: traditional cultural properties (TCPs) and sacred sites (DOE 2000b). As part of DARHT facility operations, DOE and LANL will continue to consult with the four Accord Pueblos through annual tours, as necessary, to minimize the potential for structural or other damage to as-yet-unknown Native American cultural resources within the area of potential effects for the DARHT facility site. Cultural resource surveys conducted as part of the Cerro Grande Rehabilitation Project did not identify any new archaeological sites in the vicinity of the DARHT facility. No new TCP or sacred site issues were identified during FY 2007 through 2010. Any future TCP and sacred site issues will be addressed as part of the institutional process established under the "Comprehensive Plan for the Consideration of Traditional Cultural Properties and Sacred Sites at Los Alamos National Laboratory" (DOE 2000b).

In the future (beginning in FY 2012), the annual visit of the Pueblo de San Ildefonso to Nake'muu and the associated rehabilitation monitoring and site condition assessment under the SEA MAP will become part of the annual implementation of the Cultural Resources Management Plan (LANL 2006), which is currently being revised and updated.

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.

Mitigation Action Commitment Status

MAP Section VIII.E.1(a)

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

Summary of Potential Impacts

MAP Section VIII.E.2(a–c)

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

Mitigation Action Scope

MAP Section VIII.E.2(a–c)

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

a) Radiation shielding will be provided around the accelerators to limit radiation exposure to workers in the facility.

b) DARHT facility workers will be required to complete DOE-certified core radiological training (minimum Radiological 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.

Mitigation Action Commitment Status

MAP Section VIII.E.2(a–c)

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

4.0 CONCLUSIONS

In FY 2011, there were no significant impacts from contaminants based on measurements of soil, sediment, vegetation, field mice, and bees from DARHT operations. Also, the comparison of bird species diversity and composition, a qualitative measurement, before and during DARHT operations, showed no significant impacts to the bird populations.

Although 2011 contaminant levels were not at concentrations detrimental to human health or to the environment, there were still measurable amounts of depleted uranium in all media, and the levels were increasing over time to at least 2006. Concentrations of depleted uranium in most media began to decrease in 2007 and may correspond to the success of employing steel containment vessels and/or to a reduction of detonations. However, since increases of uranium in all media were noted until at least 2006 and uranium may linger in soils for some time, the monitoring of all or part of these media should be continued to a point where the concentrations are similar to BSRLs.

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

Regarding potential impacts from DARHT operations on Nake'muu, snowfall and wildlife are having a greater effect on the deterioration of the standing wall architecture than the operations at DARHT.

4.1 2012 MAP Implementation

In July 1999, all construction-related DARHT MAP mitigation commitments and action plans were completed. The FY 2011 DARHT MAP activities represent the twelfth year of operation implementation. The DARHT MAP activities implemented during FY 2011 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 will be changed by NNSA as necessary and as directed by DOE LASO.

4.2 Recommendations

- **Continue monitoring for contaminants that are above BSRLs or are on increasing trends.** Future (2012) DARHT operations will likely incorporate more contained tests. As a result, impacts from a given year of DARHT operations on the environment should eventually decrease and this decreasing trend should be considered in future monitoring

decisions. However, uranium-238 appears to have accumulated in soils and sediments, particularly near the firing point, and may impact biotic resources over a period of years. These potential cumulative impacts should continue to be monitored, especially for contaminants such as uranium-238 that are above BSRLs or are on increasing trends.

- **Reevaluate environmental monitoring strategy**. The environmental monitoring strategy for DARHT should be reevaluated with consideration of issues such as (1) budget, (2) movement to contained shots in 2007, (3) trend in contaminant concentrations and comparison with the benchmark thresholds of BSRLs (RSRLs) and SLs, and (4) the results of the 2005 special study on the effects of discontinuity in sample data.
- **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 annual ER.
- **Continue environmental rehabilitation activities and annual tribal visits at Nake'muu.** Annual monitoring at Nake'muu has been discontinued, but site visits every 2 to 3 yr for vegetation removal, etc., and annual tribal visits should continue. Future TCP and sacred site issues should be addressed as part of the institutional process established under the "Comprehensive Plan for the Consideration of Traditional Cultural Properties and Sacred Sites at LANL" (DOE 2000b).
- **Continue to manage DARHT facility operations in accordance with ISM.** Under the institutional implementation of the ISM System, continue to manage DARHT facility operations according to specific procedures that collectively address a wide range of potential impacts to worker safety and health including, but not limited to, noise and radiation hazards.

5.0 REFERENCES

CFR 1996: Code of Federal Regulations. *Department of Energy's Final Rule and Notice for Implementing NEPA*, 10 Code of Federal Regulations 1021, Section 331(a), Revised July 9, 1996.

Corely et al. 1981: Corely, J.P., D.H. Denham, R.E. Jaquish, D.E. Michels, A.R. Olsen, and D.A. Waite, "A Guide for Environmental Radiological Surveillance at US Department of Energy Installations," US Department of Energy report DOE/EP-0023 (1981).

DOE 1993: US Department of Energy, "Radiation Protection of the Public and the Environment," US Department of Energy Order 5400.5 (1993).

DOE 1995a: US Department of Energy, "Dual-Axis Radiographic Hydrodynamic Test Facility Final Environmental Impact Statement," DOE/EIS-0228 (August 1995).

DOE 1995b: US Department of Energy, "Dual-Axis Radiographic Hydrodynamic Test Facility Final Environmental Impact Statement Record of Decision," DOE/EIS-0228 (October 1995).

DOE 1996: US Department of Energy, "Dual-Axis Radiographic Hydrodynamic Test Facility Final Environmental Impact Statement Mitigation Action Plan," DOE/EIS-0228 (January 1996).

DOE 1999a: US Department of Energy, "The Long-Term Control of Property: Overview of Requirements in Orders DOE 5400.1 & DOE 5400.5," EH-412-0014/1099 (October 1999).

DOE 1999b: US Department of Energy, "DOE Memorandum Requesting Concurrence on the Dual-Axis Radiographic Hydrodynamic Test Facility (DARHT) III: Expanded Area of Potential Effects; Cultural Resources Survey Report No. 110, LA-CP-99-36," DOE Albuquerque Operations Office/Los Alamos Area Office memorandum, LAAME:6EW-540 (April 6, 1999) (attached SHPO concurrence dated May 20, 1999).

DOE 2000a: US Department of Energy, "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/SEA-03, Department of Energy, Los Alamos Area Office (September 2000).

DOE 2000b: US Department of Energy, "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 2008: US Department of Energy, "Final Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory Mitigation Action Plan," DOE/EIS-0380 (December 2008).

Duran 2008: Duran, B., "Environmental Assessment of Foam Mitigation and Vessel Contained Shots," Los Alamos National Laboratory report LA-UR-08-2289 (April 2008).

Fresquez 2011: Fresquez, P.R., "The Concentrations of Radionuclides, Heavy Metals, and Polychlorinated Biphenyls in Field Mice Collected from Regional Background Areas: Revision 1," Los Alamos National Laboratory report LA-UR-11-11687 (2011).

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).

Keith 1991: Keith, L.H., *Environmental Sampling and Analysis: A Practical Guide* (CRC Press, Boca Raton, FL, 1991).

Keller and Risberg 1995: Keller, D.C., and D. Risberg, "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).

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 2005a: Los Alamos National Laboratory, "Derivation and Use of Radionuclide Screening Action Levels, Revision 1," Los Alamos National Laboratory report LA-UR-05-1849 (2005).

LANL 2005b: Los Alamos National Laboratory, "Ecological Screening Levels," version 2.2. Los Alamos National Laboratory report LA-UR-05-7424 (2005).

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 2011a: Los Alamos National Laboratory, "Los Alamos National Laboratory Environmental Report 2011," Los Alamos National Laboratory report, in preparation.

LANL 2011: Los Alamos National Laboratory, "Threatened and Endangered Species Habitat Management Plan," Los Alamos National Laboratory report LA-UR-11-02582 (2011).

McNaughton 2006: McNaughton, M., "Calculating Dose to Non-Human Biota," ENV-MAQ-514, R1 (2006).

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, "A Current Assessment of the Nake'muu Monitoring Program," Los Alamos National Laboratory report LA-UR-06-8130 (2006).

Well 2007: Well, J.V., *Birder's Conservation Handbook: 100 North American Birds At Risk*, (Princeton University Press, Princeton, NJ, 2007).

Yu et al. 1995: Yu, C., A.J. Zielen, J.J. Cheng, T.C. Yuan, L.G. Jones, D.J. Lepoire, Y.Y. Wang, C.O. Loueiro, E. Gnanapragasam, J.E. Faillace, A. Wallo, III, W.A. Williams, and H. Peterson, "A Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD, Version 5.60," Argonne National Laboratory report ANL/EAD/LD-2 (1995).

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

Appendix III

FISCAL YEAR 2012 TRAILS MANAGEMENT PROGRAM MITIGATION ACTION PLAN ANNUAL REPORT

Los Alamos National Laboratory
Los Alamos, New Mexico

Prepared by Daniel S. Pava, Environmental Stewardship Group (ENV-ES)
for the Department of Energy, National Nuclear Security Administration,
Los Alamos Site Office

November 2012

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Title: FISCAL YEAR 2012 TRAILS MANAGEMENT PROGRAM MITIGATION ACTION PLAN ANNUAL REPORT NOVEMBER 2012

Preparers: Daniel S. Pava, Environmental Protection Division, Environmental Stewardship Group (ENV-ES)

Tsirege, an archaeological site, photograph taken during the May 2012 public tour.

Los Alamos
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EST. 1943

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ACRONYM LIST

ADEP	Associate Director for Environmental Programs
DOE	Department of Energy
EM&R	Emergency Management and Response
FONSI	Finding of No Significant Impact
FY	Fiscal Year
HMP	Habitat Management Plan
LANL	Los Alamos National Laboratory
LANS	Los Alamos National Security, LLC
LASO	Los Alamos Site Office
MAP	Mitigation Action Plan
MAPAR	Mitigation Action Plan Annual Report
NM	New Mexico
NNSA	National Nuclear Security Administration
SWEIS	Site-Wide Environmental Impact Statement
TA	Technical Area
TAWG	Trails Assessment Working Group
TCP	Traditional Cultural Property
USFS	US Forest Service

1.0 EXECUTIVE SUMMARY

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

This MAPAR includes a summary of the LANL Trails Management Program activities and actions during Fiscal Year (FY) 2012, from October 2011 through September 2012. The first Trails MAPAR was submitted to NNSA in January 2006 (LANL 2006), and the second MAPAR was submitted in March 2007 (LANL 2007). The third MAPAR was submitted in March 2008, but only covered a portion of FY 2008, because DOE issued the 2008 LANL SWEIS and the Record of Decision was imminent (DOE 2008). The fourth MAPAR was submitted in October 2009 (DOE 2009), and the fifth in October 2010 (DOE 2010). The previous (sixth) MAPAR was published in April 2012 (DOE 2012).

2.0 CONTEXT: TRAILS AT LANL

Trails use at LANL has been considered one of the benefits of working and living in Los Alamos County. However, there was never an explicit DOE or LANL policy or mechanism to balance recreational trails use on LANL property with environmental, cultural, safety, security, and operational concerns. In 2003, the DOE directed LANL to establish such a program. DOE/NNSA published the *Final Environmental Assessment for the Proposed Los Alamos National Laboratory Trails Management Program* and a Finding of No Significant Impact (FONSI) (DOE 2003) in September 2003. The NNSA issued a MAP for this EA on the same date. The most pertinent trails issues identified during the scoping of the EA were:

- DOE/NNSA does not have a public recreational mission established by Congress.
- The public gets conflicting messages regarding trails 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 MAP for the LANL Trails Management Program established the Trails Management Program, which would be 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 Assessment Working Group

(TAWG) made up of LANL and other agency's stakeholders was formed to carry out this program. The TAWG is now called the Trails Working Group.

The goals of the trails management program are:

Reduce the risk of damage and injury to property, human life, and 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 posing a threat to DOE and NNSA mission support work at LANL or disrupting LANL operations.

Maintain the security of LANL operations.

Respect the wishes of local Pueblos to maintain access to traditional cultural properties (TCPs) by Pueblo members while also preventing unauthorized public access to adjacent Pueblo lands and other lands identified as both religious and culturally sensitive areas to Native American communities.

Adapt trail use at LANL to changing conditions and situations in a responsive manner.

Maintain the recreational functionality of the DOE lands so that the land owned by the DOE remains open to all members of the public for non-motorized recreation, in compliance with federal laws and LANL operational constraints.

3.0 MEETINGS

The Trails Working Group met nine times in FY 2012. The Trails Working Group held its 80th meeting in September 2012. Typically, Trails Working Group attendees include subject-matter experts from LANL, representatives from Los Alamos County, nearby Pueblos, Bandelier National Monument, the Santa Fe National Forest, and interested local residents. Agendas are distributed the week prior to each meeting, and meetings provide an ongoing and in-depth forum for discussing and resolving trails mitigation issues. What follows are the highlights of the FY 2012 Trails Management Plan implementation at LANL.

3.1 Fixing and Protecting Trails

Working with Bandelier National Monument law enforcement, the Trails Working Group advised that both a cabin in TA-71 and a fort-like structure just off of Gate 11 be removed. The cabin will be dismantled in order to preclude inappropriate use of DOE lands and mitigate wildland fire concerns because of the hearth at the structure.

The Anniversary Trailhead and parking area was cleaned up. Barbed wire and fallen signs were removed and/or reinstalled.

3.2 Public Information

In FY 2012, the Trails Management Program coordinated with the Los Alamos National Security, LLC (LANS) Communications Office and Emergency Management and Response (EM&R) to inform LANS employees and the public of trail closures due to the Las Conchas fire and dangerous fire conditions that existed during the spring and summer of 2012. The Trails Working Group coordinated on other trails issues, including completing the environmental remediation actions in Los Alamos Canyon, threatened and endangered species surveys, and programmatic conflicts.

The Trails Management Program, working with the LANS Prime Contracts Office, prepared a new five-year Institutional Agreement between LANS and the Volunteer Task Force. The agreement was signed by LANL Director Charles McMillan in August 2012 and will facilitate ongoing volunteer trails maintenance work events to be held at LANL for the next five years.

The LANL internal and external trails websites were updated and revised in FY 2012. New links to the US Forest Service (USFS), Los Alamos County, and Bandelier National Monument trail websites were established. Subsequent changes to the LANL trails website have temporarily resulted in these new pages not being available; however, they will be re-established in FY 2013.

The Hidden Canyon Trail, which provides a link between the Los Alamos town site and LANL property was reopened in coordination with the Associate Directorate of Environmental Programs (ADEP).

As part of New Mexico Heritage Preservation month in May, LANS organized a public tour of the Tsirege archaeological site on May 5, 2012. Seventy-five people visited the site during the tour led by LANS archaeologists (Figure 1). A subsequent tour of Tsirege was provided to a group of pottery students from the Poeh Center on May 17. Pojoaque Pueblo's Tribal Council established the Poeh Center, which emphasizes the arts and cultures of Pueblo people with a focus on Nambe, Pojoaque, Ohkay Owingeh, Santa Clara, Tesuque, Picuris, and Taos Pueblos, and the Pueblo de San Ildefonso (Figure 2). Tsirege was selected for the FY 2012 tours in consultation with San Ildefonso Pueblo and was preferred.

Figure 1. Tour participants ascend the mesa stairs to visit Tsirege.

Figure 2. Pottery students from the POEH Center visited Tsirege on May 17th.

3.3 Cultural and Biological Resources Protection

Signs were reposted and oriented correctly to reinforce earlier efforts to reroute and block certain spur trails in Technical Areas (TAs) 70 and 71 near Pajarito Acres in an effort to minimize damage to sensitive sites where there is equestrian use.

As part of the LANL Habitat Management Plan (HMP), which provides a strategy for the protection of threatened and endangered species and their habitats on LANL property, Mexican Spotted Owl surveys began on March 1 and concluded mid-May. There were seasonal trail closures when the surveys were conducted. Most trails were reopened, but trails in areas where the surveys indicated owls were present remained closed until August 31. The Mexican Spotted Owl (*Strix occidentalis lucida*) and Southwestern Willow Flycatcher (*Empidonax trailii extimus*) are federally listed threatened or endangered species.

In FY 2012, the Trails Working Group revisited the presence of feral cattle in White Rock Canyon (where there are popular hiking trails). This is a trails management issue for several reasons. The canyon is part of the White Rock Canyon Reserve, which is an inappropriate place for bovines. There are sensitive species present, and there is a potential for the cows to damage habitat and cultural resources, and they threaten the safety of hikers because they are not tame. Cameras will be installed on the Ancho Springs Trail in FY 2013 in an effort to determine if these cattle are branded. Once ownership is better known, removal strategies will be considered.

3.4 Security and Safety

The Trails Management Program continues to coordinate with Bandelier National Monument law enforcement on patrols and trespassing issues. LANS cultural resources staff contacts Bandelier when doing field work in the areas patrolled by National Park Service rangers. The Trails Working Group contacts LANS security on matters of unauthorized trails use and parking to access trails. The Trails Management Program also coordinated with the Los Alamos County Trails and Open Space Program on a variety of issues affecting both Los Alamos County and LANL/DOE, including trails maintenance, closures, and way-finding.

The Trails Management Program advised coordinators of the Jemez Mountain Trail Run held on May 19. LANL security and program managers were consulted during the development of the race route.

The Trails Working Group investigated derelict right-of-way fencing along State Road 4 at TAs 70 and 71 regarding maintenance or removal issues and requirements. The Trails Working Group coordinated with Bandelier law enforcement to correct a sign and decided to keep the area open to the public. A dead pine that had fallen across an access road was removed. Members of the Trails Working Group are looking into the situation where private vehicles are parked and block access gates into TAs 70 and 71, which could prevent an emergency vehicle from accessing the areas.

The Trails Working Group worked with the Wellness Center to address wildlife encounters on the Wellness Trails and is looking at how signs or other safety-related changes might prevent near misses and collisions between cyclists and pedestrians on these popular LANL trails.

3.5 Las Conchas Fire

In the summer of 2012, there was more post-Las Conchas Fire flooding in and around the Pajarito and Water Canyon drainages that flowed onto LANL between TAs 9 and 16: south of Pajarito Canyon and north of Canyon de Valle . LANS maintenance crews were dispatched to areas along New Mexico (NM) 501 on several occasions to repair the road and prevent further damage . In one instance, LANS subcontractor crews mistakenly entered USFS land and damaged the Canyon de Valle Trail 289, which had been recently repaired. The trail head was fixed and the Trails Working Group worked to improve the coordination of such efforts to avoid similar situations in the future.

4.0 REFERENCES

DOE 2003. US Department of Energy, 2003. *Finding of No Significant 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 the Continued Operation of Los Alamos National Laboratory (DOE/EIS-0380) Mitigation Action Plan,* DOE/EIS-0380, Los Alamos, New Mexico.

DOE 2009. US Department of Energy, 2009. *2008 Site-Wide Environmental Impact Statement Mitigation Action Plan 2009 Annual Report,* LA-UR-09-06935, Los Alamos, New Mexico.

DOE 2010. US Department of Energy 2010. *FY 2010 2008 Site Wide Environmental Impact Statement Mitigation Action Plan Annual Report,* LA-UR-107245, Los Alamos, New Mexico.

DOE 2012. US Department of Energy, 2010. *Fiscal Year 2011 Mitigation Action Plan Annual Report for the 2008 Los Alamos National Laboratory Site-Wide Environmental Impact Statement*, DOE/EIS-0380 MAPAR 2011, Los Alamos, New Mexico.

LANL 2006: Los Alamos National Laboratory 2006. *Trails Management Program Mitigation Action Plan First Annual Report (FY05),* Los Alamos, New Mexico.

LANL 2007: Los Alamos National Laboratory, 2007. *Trails Management Program Mitigation Action Plan Second Annual Report (FY06),* LA-UR-071548, Los Alamos, New Mexico.

Appendix IV

Special Environmental Assessment Mitigation Action Plan (SEA-MAP)

Annual Reporting for Heritage Resources

Fiscal Year 2012

Prepared by
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National Nuclear Security Administration,
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Title: FISCAL YEAR 2012 SPECIAL ENVIRONMENTAL ASSESSMENT MITIGATION ACTION PLAN (SEA-MAP) FOR HERITAGE RESOURCES ANNUAL REPORT

NOVEMBER 2012

Preparers: Alan L. Madsen and Ellen McGehee,
Environmental Protection Division, Environmental Stewardship Group (ENV-ES)

Archaeological site treated as part of the SEA-MAP Fiscal Year 2012 activities (2012).

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ACRONYM LIST

CCC	Civilian Conservation Corp
DOE	Department of Energy
ENV-ES	Environmental Stewardship Group
FSR	facilities services request
FY	Fiscal Year
LANL	Los Alamos National Laboratory
LANS	Los Alamos National Security, LLC
LASO	Los Alamos Site Office
MAP	Mitigation Action Plan
MAPAR	Mitigation Action Plan Annual Report
NNSA	National Nuclear Security Administration
RMT	Resources Management Team
SEA	Special Environmental Assessment
SHPO	State Historic Preservation Office
SME	subject matter expert
WFO	Weapons Facilities Operations

1.0 EXECUTIVE SUMMARY

This report summarizes the Fiscal Year (FY) 2012 monitoring results of archaeological sites (both Ancestral Pueblo and Homestead sites) and historic buildings damaged or otherwise impacted by the 2000 Cerro Grande fire. The project was conducted in compliance with the *Special Environmental Analysis for Actions Taken in Response to the Cerro Grande Fire* Mitigation Action Plan (SEA-MAP) (DOE 2000) by the Resources Management Team.

The SEA-MAP states that review, evaluation, and stabilization of cultural resources situated on Los Alamos National Laboratory (LANL) lands impacted by the Cerro Grande fire and within areas prone to flooding or soil erosion would continue until post-fire storm event water flow regimes approximated pre-fire flow rates according to modeling information and monitoring results (DOE 2000). Site stabilization and/or protection measures would also be performed where necessary. Ongoing consultation with the New Mexico State Historic Preservation Office (SHPO), as well as with local Pueblos and tribes, could result in the identification of additional sites at LANL that require action. These sites would also undergo appropriate review, evaluation, and stabilization as needed. Generally, these measures would consist of the placement of sandbags, straw bales, jute matting, rock check dams, and other similar preventive measures. LANL returned to pre-fire hydrologic conditions in 2008 and subsequent work under the SEA-MAP has been conducted to close out the requirements set for these cultural resources.

2.0 PREHISTORIC (ANCESTRAL PUEBLO) SITES

2.1 Mitigation History

Cultural resources management staff from the Environmental Stewardship Group (ENV-ES) Resources Management Team (RMT) are responsible for conducting work required in the SEA-MAP at prehistoric and historic archaeological sites (DOE 2012, LANL 2009, LANL 2010). Large areas of LANL have been subject to intensive archaeological surveys by cultural resources staff to assess the range of impacts from the Cerro Grande fire on prehistoric sites (Nisengard et al. 2002). A report on these surveys was prepared for the US Department of Energy (DOE), National Nuclear Security Administration (NNSA), Los Alamos Site Office (LASO) in 2002 (Nisengard et al. 2002). Rehabilitation at 107 archaeological sites, identified during these surveys was conducted in 2003 by a team from the Pueblo de San Ildefonso. This rehabilitation consisted of the removal of burned snags, the thinning and slashing of some unburned or partially burned trees, the placement of straw wattles, the filling of stump holes, and revegetation using the seeds of native grasses and shrubs. In addition, three-strand smooth wire fences were erected along and around 87 sites situated near fire roads or other areas potentially vulnerable to fire suppression activities. Single sites and clusters of sites were fenced.

In August and September 2005, archaeological site monitoring was performed by LANL cultural resources staff at 96 of the 107 rehabilitated sites (Nisengard et al. 2005). Seven of the 11 sites not visited were situated in Rendija Canyon and had been excavated as part of mitigations associated with the Land Conveyance and Transfer Project and were no longer eligible to the Federal Register of Historic Places. The remaining four sites (three in Rendija Canyon and one in what is now the Weapons Facilities Operations [WFO]) could not be visited due to logistical

considerations with respect to LANL mission activities. The purpose of the monitoring effort was to evaluate the success of the 2003 mitigations and to recommend additional monitoring and/or mitigation actions at these 107 sites, as warranted. Several sites required no additional monitoring or treatment and subsequently, did not require annual visits (Nisengard et al. 2005).

In FY 2006, cultural resources staff conducted SEA-MAP field checks at 32 Ancestral Pueblo sites in various LANL technical areas and at two fenced areas in Rendija Canyon. These 34 locations were identified in the 2005 SEA-MAP cultural resources report as requiring potential mitigation actions in the near future (Nisengard et al. 2005). The same 34 sites were revisited in FY 2007 and FY 2008, but no photographs were taken in FY 2008. In 2008, cultural resources staff determined that rehabilitation was complete at seven of these sites and that they should be removed from the annual monitoring requirement.

In FY 2009, field checks were conducted at the 25 remaining sites and the two Rendija Canyon locations recommended for continued monitoring. Twenty-eight sites were assessed during the FY 2009 SEA-MAP monitoring program. The two areas in Rendija Canyon were removed from SEA-MAP monitoring in FY 2009. Eight sites were recommended for removal from the annual monitoring requirement in FY 2009, leaving 18 sites for continued monitoring.

In FY 2010 SEA-MAP monitoring was undertaken by a two-person team in July and August 2010. Most of the individual site issues identified in FY 2009 persisted in FY 2010. Of the 18 prehistoric sites assessed in FY 2010, two were recommended for rehabilitation and/or treatment and 15 were slated for additional mitigation (e.g., fence repair, snag removal, and wattle installation) in FY 2011.

In FY 2011 SEA-MAP monitoring was undertaken by a two-person team in August 2010. Nearly all of the sites slated for monitoring and mitigation during FY 2011 had returned to pre-fire conditions and required no further action. The five sites identified for FY 2012 rehabilitation actions required wattle installation and hydroseeding; one site (LA 4697) required an assessment by a LANL stormwater subject matter expert (SME).

2.2 FY 2012 Observations and Rehabilitation Actions (Prehistoric Sites)

Five sites were assessed by RMT cultural resources staff in FY 2012 based upon recommendations made in FY 2011 (LANL 2011). Results of this assessment resulted in a determination that four sites required treatment and one site required additional annual monitoring. Straw wattles were installed at four sites to control erosion (Figures 1–8). One site, LA 136825, had been subject to erosional controls in 2011; however, annual monitoring is recommended because there are some standing burned trees/snags that have potential to fall onto the site and damage the perimeter fence. Table 1 summarizes the recommendations and rehabilitation actions from the FY 2012 SEA-MAP monitoring. The table includes columns describing the FY 2010 and 2011 recommendations and 2012 recommendations and mitigations/treatment. The five sites assessed in 2012 are recommended for one additional year of monitoring in FY 2013 to determine if the erosion controls installed in FY 2012 remedied the identified issues or if additional erosion controls are needed. Once these sites have returned to pre-Cerro Grande fire conditions, this mitigation commitment will be complete.

Figure 1. LA 4601B, before wattle installation.

Figure 2. LA 4601B, after wattle installation.

Figure 3. LA 4602A, before wattle installation.

Figure 4. LA 4602A, after wattle installation.

Figure 5. LA 4602B, before wattle installation.

Figure 6. LA 4602B, after wattle installation.

Figure 7. LA 4697, before wattle installation.

Figure 8. LA 4697, after wattle installation.

Table 1. Prehistoric (Ancestral Pueblo) sites revisited by the RMT from FY 2010-2012.

Site Number	TA or Canyon	FY 2010 Recommendations / Mitigations	FY 2011 Recommendations / Mitigations	FY 2012 Recommendations / Mitigations
LA 4601B	TA-5	Reassess and define fence repairs. As observed in FY 2010 damage does not appear as extensive as reported in FY2009. Also reassess the wall segments/stones reported in FY 2009 in roadbed. These were not identified in FY2010. There is still significant erosion of the road side berms that contain intact cultural deposits. Devise strategy for erosion control, if feasible. Recommendation field consultation visit with Water Quality stormwater SME.	Revisited with Water Quality stormwater SME, who recommended installing two wattles on north side of site adjacent to road and hydroseeding main rubblemound in FY 2112. Fence repairs complete. Continue monitoring.	Installed wattles on north side of site adjacent to road. Recommend hydroseeding in FY 2013. One additional year of monitoring to determine the success of the FY 2012 treatment.
LA 4602A	TA-5	Erosion continues to be a problem on the LA 4602A rubblemound and to a somewhat lesser extent along old road bed. Slash and spread fallen snags, and re-seed the old road (ca. 1/8 acre). Recommend field consultation visit with Water Quality stormwater SME.	Revisited with Water Quality stormwater SME, who recommend hydroseeding eastern portion of rubblemound adjacent to old road bed in FY 2012. Continue monitoring.	Installed wattles to stabilize erosion. Recommend hydroseeding in FY 2013. One additional year of monitoring to determine the success of the FY 2012 treatment.
LA 4602B	TA-5	Erosion continues to be a problem on the LA 4602A rubblemound. However, unlike the FY 2009 recommendation, it appears that attempting to use wattles on the rubblemound may further damage the rubblemound. Rather, the best erosion control solution may be that of hydroseeding the rubblemound and lightly eroded area nearby (ca. 1/8 acre). Recommend field consultation visit with Water Quality stormwater SMEs.	Revisited with Water Quality stormwater SME who recommend installing wattles on eastern side of rubblemound and hydroseeding denuded areas in FY 2012. Continue monitoring.	Installed wattles to stabilize erosion. Recommend hydroseeding in FY 2013. One additional year of monitoring to determine the success of the FY 2012 treatment.
LA 136825	TA-16	Erosion continues to be a problem, with no grass growing on hard pan soils upslope to the west of the structure and to the south of the structure. Existing slash not capturing soil. Recommend two wattles cut into pieces and hydroseeding approximately ¼ acre. Slack fence wires and the absence of posts and wires on south side of feature a very minor issue.	Three wattles installed to north and south of site. Recommend hydroseeding in FY 2012. Continue to monitor.	Continue monitoring of a few standing trees, which appear to be dead and have the potential to fall onto the site. Damage could displace architectural stones or damage the perimeter fence.
LA 4697	TA-49	Site also assessed as part of the 2010 fire road and firebreak damage assessment project (Masse and Hoagland 2010). Because there was no blading of firebreaks in FY 2010, there was no additional damage by blading.	Site assessed and recommend visit with erosion expert in FY 2012. Continue to monitor.	Installed wattles to stabilize erosion. Recommend hydroseeding in FY 2013. One additional year of monitoring to determine the success of the FY 2012 treatment.

3.0 HOMESTEAD AND DEPRESSION ERA SITES (CIRCA 1887–1942)

FY 2011 SEA-MAP annual reporting recommended that FY 2012 rehabilitation actions associated with Homestead and Depression era sites should include the chipping of cut trees at the former Civilian Conservation Corp (CCC) camp (LA 21369B). All other rehabilitation actions at these sites have been discontinued because the sites are no longer at risk for data loss due to fire-related impacts.

3.1 FY 2012 SEA-MAP Summary (Homestead and Depression Era Sites)

In FY 2011, members of the RMT submitted a facilities services request (FSR) for the removal of hazard trees at the CCC camp and at Anchor Ranch, another Homestead era site. At the CCC camp, downed trees were limbed and sectioned, but were left in close proximity to site features (Figure 9). In FY 2012, RMT personnel moved cut tree limbs away from one of the most impacted features instead of having the tree limbs chipped using heavy equipment (Figure 10).

Figure 9. Feature at CCC camp after tree was limbed and sectioned (2011).

Figure 10. The same feature after tree limbs were relocated (2012).

4.0 MANHATTAN PROJECT AND COLD WAR ERA HISTORIC BUILDINGS AND STRUCTURES (1942–1963)

The FY 2011 SEA-MAP Annual Report recommended continued monitoring at historic V-Site, which was damaged extensively during the Cerro Grande fire (DOE 2012). Other recommendations included repairs to address the fire-related impacts at V-Site (i.e., repairs to the earthen berms, the burned concrete pads, and the sump area at the former location of the Radiography Building) (Figures 11 and 12). Furthermore, RMT personnel were to make recommendations regarding the appropriate disposition of burned artifacts currently located outside at V-Site.

Figure 11 (top) and 12 (bottom). Burned and deteriorating concrete pads (former building locations) at V-Site (2012).

4.1 FY 2012 SEA-MAP Summary (V-Site)

RMT staff visited V-Site (TA-16-516 and TA-16-517) many times during FY 2012, conducting tours and checking on site conditions. Site work carried out in FY 2012 under a new FSR included the removal of the large hazard trees located within the V-Site boundary fence that had originally been cut down in FY 2011 but were left on site.

Burned artifacts were also evaluated for future disposition (Figure 13). However, the building at TA-18 that will eventually house the burned artifacts from V-Site is not ready to accept additional collections.

Figure 13. Artifacts, salvaged from a former high explosives casting building that were being stored at V-Site when the area was burned during the Cerro Grande fire (2012).

5.0 SUMMARY OF RECOMMENDATIONS (HISTORIC SITES)

FY 2013 rehabilitation activities at historic building areas should focus on continued work at V-Site, including repairs to concrete pads, berms, and building foundations that were burned during the Cerro Grande fire (Table 2). Artifacts at V-Site should continue to be evaluated for retention or disposal, pending the availability of a more appropriate storage facility.

Table 2. Recommendations for FY 2013 SEA-MAP Field Work/Other Actions (Historic Sites)

Historic Property Name	TA	Recommendations for FY 2013 SEA-MAP Actions
Homestead and Depression Era Sites		
CCC	TA-16	Moved cut tree limbs away from one of the most impacted features by hand, instead of having the tree limbs chipped using heavy equipment.
Manhattan Project and Cold War Buildings and Structures		
TA-16, V-Site	TA-16	Repair sump area at burned Radiography Building and continue burned artifact evaluation and disposition work. Have estimate prepared for repairs to deteriorating burned concrete pads in former building areas.

6.0 REFERENCES

DOE 2000: 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 Area Office, DOE/SEA-03, Los Alamos, New Mexico.

DOE 2002: US Department of Energy, 2002. *Special Environmental Analysis for Actions Taken in Response to the Cerro Grande Fire Mitigation Action Plan Annual Report for 2001*. Los Alamos, New Mexico.

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

DOE 2012: US Department of Energy, 2012. *Fiscal Year 2011 Mitigation Action Plan Annual Report for the 2008 Los Alamos National Laboratory Site-Wide Environmental Impact Statement*, DOE/EIS-0380 Los Alamos, New Mexico.

LANL 2009: Los Alamos National Laboratory, 2009. *2008 Site-Wide Environmental Impact Statement Mitigation Action Plan 2009 Annual Report*, LA-UR-09-06935 Los Alamos, New Mexico.

LANL 2010: Los Alamos National Laboratory, *2008 Site-Wide Environmental Impact Statement Mitigation Action Plan Annual Report 2010*, LA-UR-10-07245, Los Alamos, New Mexico.

LANL 2011: Los Alamos National Laboratory, *Fiscal Year 2011 Special Environmental Assessment Mitigation Action Plan Annual Report for Heritage Resources*, LA-UR-11-06159, Los Alamos, New Mexico.

Masse, W.B., and S.R. Hoagland 2010: *An Assessment of Potential Damage to Los Alamos National Laboratory Archaeological Sites Caused by the FY 2009 Emergency Operations Division Fire Road and Firebreaks Maintenance Program.* Cultural Resources Report No. 304, Survey 1070. Los Alamos National Laboratory report LA-CP-10-01602, Los Alamos, New Mexico.

Nisengard et al. 2002: Nisengard, J.E., B.C. Harmon, K.M. Schmidt, A.L. Madsen, W.B. Masse, E.D. McGehee, K.L.M. Garcia, J. Isaacson, and J.S. Dean, *Cerro Grande Fire Assessment Project: An Assessment of the Impact of the Cerro Grande Fire on Cultural Resources at Los Alamos National Laboratory, New Mexico*. Los Alamos National Laboratory report LA-UR-02-5713, Los Alamos, New Mexico.

Nisengard et al. 2005: Nisengard, J.E., K.M. Schmidt, B.C. Harmon, and W.B. Masse, *Archaeological Site Monitoring for the 2005 Special Environmental Analysis-Mitigation Action Plan (SEA-MAP) Los Alamos National Laboratory, New Mexico.* Cultural Resources Report No. 259, Survey 1006. Los Alamos National Laboratory report LA-CP-05-1080, Los Alamos, New Mexico.