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MAPAR 2011

FISCAL YEAR 2011 MITIGATION ACTION PLAN ANNUAL REPORT FOR THE 2008 LOS ALAMOS NATIONAL LABORATORY SITE-WIDE ENVIRONMENTAL IMPACT STATEMENT

APRIL 2012

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Title: **FISCAL YEAR 2011 SITE-WIDE ENVIRONMENTAL IMPACT STATEMENT MITIGATION ACTION PLAN ANNUAL REPORT, FINAL**

APRIL 2012

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Aerial view of the Pajarito Plateau (2011).

Los Alamos
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ACRONYM LIST

ADESHQ	Associate Director for Environment, Safety, Health and Quality
ADPMSS	Associate Director for Project Management and Site Services
AEI	Area of Environmental Interest
BA	Biological Assessment
BAS	Building Automation Systems
BMPs	Best Management Practices
BRMP	Biological Resources Management Plan
CMR	Chemistry and Metallurgy Research facility
CMRR	Chemistry and Metallurgy Research facility Replacement
CRMP	Cultural Resources Management Plan
DARHT	Dual-Axis Radiographic Hydrodynamic Test facility
DD&D	decontamination, decommissioning and demolition
DOE	Department of Energy
EA	environmental assessment
EIS	environmental impact statement
EMS	Environmental Management System
ENV	Environmental Protection Division
ENV-ES	Environmental Stewardship Group
Ex-ID	Excavation Permit
FONSI	Finding of No Significant Impact
FRS	Flood Retention Structure
FY	Fiscal Year
GHG	greenhouse gas
GSAF	Generator Set Aside Fund
HMP	Habitat Management Plan
HPSB	High Performance Sustainable Buildings
IER	Integrated Environmental Review
ILMP	Integrated Land Management Planning project
IPA	Integrated Project Application
IPT	Integrated Project Team
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
MDA	Material Disposal Area
NEPA	National Environmental Policy Act
NNSA	National Nuclear Security Administration

OSRP	Off-Site Source Recovery Project
PCBs	polychlorinated biphenyls
PR-ID	Permits and Requirements Identification
RCRA	Resource Conservation and Recovery Act
RLWTF	Radioactive Liquid Waste Treatment Facility
RMT	Resources Management Team
ROD	Record of Decision
SA	Supplement Analysis
SEA	Special Environmental Assessment
SERF	Sanitary Effluent Reclamation Facility
SHPO	State Historic Preservation Office
SME	Subject Matter Expert
SSP	Site Sustainability Plan
STA	Southern Technical Area
SWEIS	Site-Wide Environmental Impact Statement
TA	Technical Area
TRU	transuranic
TWF	transuranic waste facility
USFWS	U.S. Fish and Wildlife Service
WIPP	Waste Isolation Pilot Plant

1.0 EXECUTIVE SUMMARY:

Fiscal Year (FY) 2011 was a busy year for the Site-Wide Environmental Impact Statement (SWEIS) Project. 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 (SERF) expansion, which also addressed impacts to Sandia Canyon. In May 2011, the SWEIS Project Office and National Environmental Policy Act (NEPA) subject matter experts from the Resources Management Team (RMT) participated in a Los Alamos Site Office (LASO) management assessment of the programs. Los Alamos National Security, LLC (LANS) completed a factual review in May and the report was transmitted to LANS in June. No findings were identified, but several opportunities for improvement were provided in the assessment. LANS submitted an implementation plan to LASO in July. The FY 2009 SWEIS Yearbook was completed and distributed in June 2011.

The Las Conchas Fire began on June 26, 2011, which resulted in the closure of Los Alamos National Laboratory (LANL) for about 10 days. In August, the RMT submitted a list of actions undertaken in response to the Las Conchas Fire and a summary of relevant NEPA documents to LASO. Appendix II of this MAP Annual Report (AR) includes a detailed description of these actions. On July 20, 2011, the Department of Energy/National Nuclear Security Administration (DOE/NNSA) issued an Amended Record of Decision (ROD) for the SWEIS to address a Supplement Analysis (SA) (DOE/EIS-0380-02) for the Off-Site Sealed Source Recovery Project (http://www.gpo.gov/fdsys/pkg/FR-2011-07-20/html/2011-18312.htm). The SWEIS MAP will be modified to include this document in FY 2012.

This Mitigation Action Plan Annual Report (MAPAR) provides a summary of progress on mitigation action commitments in FY 2011. The MAPAR includes six appendices, written by project subject matter experts (SMEs), which provide additional information from these projects regarding their progress on mitigation action commitments. Appendix I, the SWEIS MAP tracking log, is a snapshot of accomplishments; Appendix II is the Las Conchas Fire Report; Appendix III is the Dual Axis Radiographic Hydrodynamic Test (DARHT) facility MAPAR; Appendix IV is the Trails MAPAR; Appendix V is the Special Environmental Assessment (SEA) MAPAR; and Appendix VI is the Large Game Management Plan status report.

2.0 BACKGROUND:

The first ROD for the *2008 Site Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory* (DOE/EIS-0380) was published in September 2008. In January 2009, the SWEIS MAP was finalized; it includes outstanding 1999 SWEIS MAP commitments, all continuing mitigations from 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, LASO issued a MAP Addendum. The SWEIS MAP was revised in November 2010 and will be revised again in 2012 to reflect the Amended ROD issued for the Off-Site Source Recovery Project (OSRP).

3.0 MITIGATION ACTION COMMITMENTS:

3.1 DARHT MAPAR: (Fresquez, 2011) (see Appendix III)

The DARHT Environmental Impact Statement (EIS) (DOE/EIS-0228) requires a DARHT MAPAR to be prepared as part of implementing the DARHT MAP. The 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 2010 MAPAR reflects eleven years of DARHT facility operations-related mitigation measures and action plans (Appendix III). The DARHT MAPAR, covers progress on mitigation action commitments for FY 2010. Data collected for the DARHT MAPAR takes some time to analyze, as a result, this MAPAR is not available until June. For this reason and at the request of LASO the DARHT MAPAR is published as an appendix to the SWEIS MAPAR, rather than as a separate document earlier in the year.

The ROD states that DOE will complete and operate the DARHT facility while implementing a program to conduct most tests inside steel containment vessels with containment to be phased in over 10 years. The ROD also states that DOE will develop and implement mitigation measures to protect soils, water, and biotic and cultural resources potentially affected by the facility. The FY 2010 DARHT MAPAR includes the analysis and results of 2010 soil, sediment, vegetation, small mammal, bee, and bird sample data from within and around the DARHT facility.

In FY 2010, there were no significant impacts from contaminants based on measurements of soil, sediment, vegetation, field mice, and bees from DARHT operations. In addition, the comparison of bird species diversity and composition, a qualitative measurement, before and during DARHT operations, showed no significant impacts to the bird populations.

FY 2011 sampling was completed in August 2011; results will be published in the FY 2012 MAPAR.

3.2 Trails MAPAR: (Pava, 2011) (see Appendix IV)

In accordance with the 2003 *Final Environmental Assessment for the Proposed Los Alamos National Laboratory Trails Management Program* (DOE/EA-1431; DOE 2003), LANL continues to implement a MAP for this EA through the Trails Management Program (http://int.lanl.gov/environment/outreach/working_groups/tawg.shtml). Cultural resource protection and Las Conchas Fire related trail closures were the focus of the FY 2011 Trails Management Program.

The Trails Working Group sponsored public tours of Tsirege on May 7, 2011 as part of New Mexico Heritage Preservation Month. The Working Group completed trails rehabilitation and stabilization (e.g., waddles and trail rerouting to avoid sites along trails) in Technical Areas (TA) 70 and 71 in May. In July 2011, in response to the Las Conchas Fire, DOE/LANL closed trails on DOE property until areas could be assessed for safety related issues. Trails were reopened in late July.

At the January 2011 Trails Working Group meeting, Environmental remediation and LANL outreach staff attended to discuss support and ideas to reinforce the ongoing closure of trails into Los Alamos Canyon and unauthorized recreational use of Omega Road during remediation (Middle Los Alamos Canyon Aggregate Project) on the north slopes below Timber Ridge. Risks include dislodging rocks, fallen trees, and heavy equipment. The purpose is to clean to recreational standards for future trails access.

Two reports, *The Mortandad Cavate Baseline Study* and *2010 Response to the Impact of Social Trails Use on Cultural Resources in Technical Areas 70 and 71*, funded by the Trails Management Program, were posted to the website in FY 2011. Twenty-four trailhead signs were posted at LANL trails (e.g., Anniversary, Ancho Springs, Hidden Canyon, Devaney/Longmire, Deadman's Crossing, and Wellness) in FY 2011.

3.3 Special Environmental Assessment (SEA) MAP: (Fresquez, Johnson, McGehee 2011) (see Appendix V)

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 as part of the SEA-MAP and again after the Las Conchas Fire. Samples are analyzed for radionuclides, heavy metals, and polychlorinated biphenyls (PCBs). Native understory vegetation is monitored because it is the primary food source of many animals, and deer mice are monitored because they have the smallest home range and indicate local contamination.

3.4 Flood Retention Structure (FRS): (Erickson, 2011)

The annual inspection of the Pajarito Canyon FRS was completed April 25, 2011; the inspection report was completed in May 2011. The FRS was also inspected after the Las Conchas Fire to determine if it was impacted by the fire and to ensure that fire related debris was not impacting the structure; the structure is stable and functioning.

3.5 Outfall Reduction Initiative/Radioactive Liquid Waste Treatment Facility (RLWTF): (Pava, Wingo 2011)

This mitigation stems from the 2008 SWEIS commitment related to outfall reduction. The EA and a FONSI for the SERF Expansion was issued in August 2010. LANL prepared a list of mitigation action commitments associated with the 2010 FONSI,

which also addressed impacts to Sandia Canyon. SERF Expansion began in the second quarter 2011 and continues. Construction activities for the evaporation ponds on Sigma Mesa for the SERF Expansion began September 2011. All appropriate Best Management Practices (BMPs) are being implemented, the Integrated Project Team (IPT) has a Storm Water plan, and they have been monitored via the Storm Water Program. The mitigation for construction activities relative to an identified archaeological site on Sigma Mesa was via avoidance. The design team shifted the location of the new evaporation pond away from identified archaeological sites marked for avoidance by LANL archaeologists during mechanized activity. The old lagoons, east of the current building, were filled in last month as well. In-fill activities also have a Storm Water plan, use appropriate BMPs and are being monitored by the Storm Water Program. No cooling tower water has been diverted from Sandia Canyon to the SERF so no mitigations associated with hydrologic changes to the S-2 reach of Sandia Canyon have been required. In the planning phase, the IPT highlighted the need for BMPs to protect ground/surface water quality, and identified appropriate measures to ensure that cultural and biological resources identified in the SERF MAP are protected during construction activities.

The RLWTF is being constructed to reach zero liquid discharge.

3.6 Los Alamos Science and Engineering Complex: (Pava, 2011)

This mitigation is on-hold. NNSA terminated the proposed project in 2010.

3.7 Off-site Source Recovery Project (OSRP): (Pearson, Day 2011)

This mitigation is on-hold. An SA (DOE/EIS-0380-02) for the OSRP was issued in April 2011 and an amended ROD was published in the Federal Register on July 20, 2011. However, LANL's OSRP does not currently accept cobalt, iridium, or cesium sealed sources, which are the only sources for which mitigation measures were identified in the SWEIS MAP.

3.8 Air Emissions: (Fuehne, 2011)

The Laboratory conducts continuous emissions monitoring at 27 radioactive stacks and tracks operations from over 50 other minor stacks. Air monitoring activities along the fenceline of Material Disposal Area (MDA) B were tracked consistently to evaluate LANL's emissions compliance status as cleanup activities were conducted. The 2010 emissions report was sent to the Environmental Protection Agency Region 6 in June 2011. Excavation at MDA B was completed in September 2011.

3.9 Wildland Fire Management Plan: (L'Esperance, Stanford, Nisengard, Wright 2011); (see Appendix II)

As part of the *Environmental Assessment for the Wildfire Hazard Reduction and Forest Health Improvement Program at Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE-

EA-1329) LANL implements a Wildland Fire Plan annually. The FY 2011 Plan was implemented. Tree thinning, fuels reduction, and the creation of defensible space in some areas of the Laboratory and DOE were expedited during the Las Conchas Fire. Fuel reduction was conducted at TAs 49, 54, 70, 71, Rendija Canyon, and along the LANL perimeter during the Las Conchas Fire to prevent/limit the spread of the fire onto Laboratory property. Mitigation actions included mastication, thinning, and the creation of firebreaks. All actions were reviewed for environmental impacts and LANL's cultural resources staff accompanied mitigation crews to mark archaeological sites and avoid impacts to these resources. No impacts to cultural or biological resources occurred as a result of LANL's mitigation activities. Cultural resource staff continues to assess erosional impacts to sites related to post-Las Conchas Fire flooding. A detailed assessment of the mitigations undertaken in response to the Las Conchas Fire and post-fire related activities can be found in Appendix II.

Shipments of legacy waste to the Waste Isolation Pilot Plan (WIPP) are on-going, as is decontamination, decommissioning and demolition (DD&D) of the TA-54 domes.

Fence repairs along fire roads and firebreaks, in accordance with a LASO/LANL commitment to the State Historic Preservation Office (SHPO) were completed in May 2011; these repairs to protective fences facilitated the resumption of fire road/firebreak maintenance activities.

3.10 SWEIS Biological Assessment (BA): (Hathcock, Hansen, Keller, 2011)

LANL completed several BAs in FY 2011 including, one for the proposed indoor firing range and one for the March 2005 LANL Compliance Order on Consent (Consent Order) well drilling.

U. S. Fish and Wildlife Service (USFWS) provided concurrence on the BA for the proposed Chemistry and Metallurgy Research facility Replacement (CMRR) Nuclear Facility in May 2011 and a BA for the Transuranic Waste Facility April 2011. LANL completed a BA for the proposed Los Alamos Canyon Reservoir project in September 2011. The BA was transmitted to LASO for submission to the USFWS.

3.11 Biological Resources Management Plan (BRMP): (Hathcock, Keller, Bennett, Robinson, Hansen, Zemlick 2011)

3.11.1 Riparian Inventory 2008-2009 Report (Hansen)

During 2008 and 2009, LANL biologists inventoried riparian areas in Two Mile Canyon, Cañada del Buey, DP Canyon, Effluent Canyon, and Potrillo Canyon, and in portions of Water Canyon, Sandia Canyon, Pajarito Canyon (including Starmer's Gulch and Bulldog Gulch), and Ancho Canyon within LANL boundaries (LA-UR-11-04768). The goals of the LANL Riparian Area Inventory are to 1) map the location of all distinct riparian vegetative communities within LANL; 2) classify community

type and assess functioning condition of each occurrence; 3) identify contributing risk factors for areas that are not functioning properly or are at risk; and 4) identify areas where riparian area management could reduce risks of contaminant transport.

3.11.2 Riparian Inventory 2011 Summary (Hathcock)

During 2011, LANL biologists completed the rest of the riparian inventory at LANL. The final areas inventoried were in Three-Mile Canyon, Cañon de Valle, Chaquihui Canyon, Pajarito Canyon, and Water Canyon. The data analysis and report for the 2011 riparian inventory will be completed in FY 2012. A best management practices document for riparian occurrences at LANL will also be completed in FY 2012.

3.11.3 Federally Protected Species Surveys Report (Keller)

LANL conducts presence/absence surveys for federally protected species annually. Two such species, the Southwester Willow Flycatcher and Mexican Spotted Owl, either occur on LANL or have suitable nesting and/or foraging habitat at LANL. In 2011, two Mexican Spotted Owl territories were occupied at LANL. In 2011, a Willow Flycatcher, not necessarily of the endangered southwestern subspecies, was detected in surveys at LANL. The flycatcher did not nest. During the nineteen years of surveys, Mexican Spotted Owls at LANL have successfully fledged chicks that have been detected during eight of those years. The habitat surrounding the nest locations is protected from major disturbance by the Habitat Management Plan (HMP), continued protection of the area ensures that LANL complies with federal laws and plays a role in the recovery of the species. LANS's monitoring program ensures that biologists know the locations of nesting birds so they can assist in project planning and help projects understand when they could be impacted by the location of these birds.

3.11.4 State-listed Species Surveys Summary 2011 (Hathcock)

The 2008 *Sensitive Species Best Management Practices* report (LA-UR-08-1464) 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 this 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 or potentially occur at LANL are conducted annually. In FY 2011, a Gray Vireo survey was conducted at TA-33 and a Jemez Mountains salamander survey was conducted at TA-16. Both surveys were negative;

no individuals were detected. A literature review was conducted in FY 2011 to determine what the minimum habitat requirements are for the Yellow-billed Cuckoo. An analysis of aerial photos determined that the minimum habitat patch size to sustain this species is not available on LANL property.

3.11.5 Fall, Winter, and Summer Bird Surveys and Report (Hathcock), (LA-UR-10-07491 and LA-UR-11-05054)

During the fall of 2010, LANS biologists completed a monitoring effort to document fall migration patterns of passerines (songbirds) at LANL. A mist-netting station was established in wetland/riparian habitat at LANL. Birds were captured and banded with USFWS migratory bird bands. The fall migration-monitoring began in August with 11 nets. Four hundred and seventy-two birds, representing 42 species, were banded as part of this effort. The ecological importance of LANL's wetlands complex is supported by the results of this study. A diverse group of birds use this area, including willow flycatchers, a subspecies of which is federally endangered.

LANS initiated a multi-year study of migratory birds in FY 2011 to implement the BRMP, and comply with federal laws, executive orders and regulations related to migratory birds. The objective of the study is to monitor patterns of bird abundance, richness, and population trends over time at the LANL. LANS biologists completed point count surveys beginning in the winter of 2010 and again in the summer of 2011. Four habitat types were surveyed for this project including 1) mixed conifer forest, 2) ponderosa forest, 3) wetland/riparian, and 4) pinyon-juniper woodland. Transects were about 2.50 to 2.75 km in length and contained 10 survey points spaced about 250 meters apart. Winter surveys occurred from December 2010 to February 2011 in each of the four habitats. The summer breeding bird surveys were conducted in each of the four habitats from May to July 2011. The final survey in the mixed conifer habitat was cancelled because of the Las Conchas Fire.

More than 1900 birds, representing 81 species were recorded during the FY 2011 surveys. Thirty-one species were detected during the winter surveys and 73 species were detected during the summer surveys. Two detected species, the Willow Flycatcher and Juniper Titmouse, are listed in the USFWS Birds of Conservation Concern. One detected species, the Virginia's Warbler, is listed in the top 100 birds at risk in North America in the Birder's Conservation Handbook.

3.11.6 Large Game Management Plan Pilot Project Report (Bennett and Robinson); Appendix VI

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, along the

Pajarito Corridor. The study included tasks designed to gather information on wildlife sightings and the use of wildlife cameras to gather images of wildlife use in pinch points and in non-pinch-point areas. Appendix VI is a status report of the study and covers the period of May through August 2011. LANL employee reported wildlife observations revealed that elk and deer were the most commonly observed animals. Many of these observations occurred along the Pajarito Corridor. Overall, elk and deer were also the most common observation at camera stations. Camera stations showed consistent animal usage of pinch point areas within Pajarito Road.

3.11.7 Summary of FY 2011 Biological Assessments (Zemlick)

The purpose of LANL's HMP is to provide a management strategy for the protection of threatened and endangered species and their habitats (LA-UR-11-02582). The plan provides guidance by species for what, when, and where different types of activities are allowed without further review by the USFWS. If the HMP requirements cannot be followed by a project, then a BA must be prepared. Pursuant to Section 7 of the Endangered Species Act, 16 U.S.C. § 1536(a)(2), a BA is used to determine and document whether a proposed major construction activity under the authority of a federal action agency 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 of construction and operation of projects at LANL that cannot operate within the HMP guidelines. USFWS concurred with the following BAs in FY 2011, except for the *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*, which was not transmitted to them until FY 2012.

3.11.7.1 *Biological Assessment of the Effects of the Construction of Five Protective Force Training Facilities at LANL (LA-CP-10-01807), December, 2010*

Asset protection is an important component of the LANS mission and the Laboratory's protective force is tasked with maintaining the highest level of protection for equipment and personnel. Changes in the DOE Design Basis Threat guidance have led to the development of new protection strategies for LANL. To implement new protection strategies, improved training capabilities are necessary. Since FY 2008, five new training facilities at LANL have been proposed and/or constructed, including an outdoor running track, a tactical training facility, an indoor live fire range, an outdoor live fire range, and an office building. This BA evaluated the individual and cumulative impacts of these five projects on federally listed threatened and endangered species.

While there is habitat for the Southwestern Willow Flycatcher at LANL, no habitat for this species will be removed or disturbed during the project activities; therefore, the assessment decision is that these actions should have no effect on the Southwestern Willow Flycatcher. The proposed project areas are near core and buffer nesting habitat for the Mexican Spotted Owl. The actions will remove 5.06 ha (12.5 ac) of Mexican Spotted Owl restricted foraging habitat, but no core or buffer nesting habitat will be removed. An analysis of potential effects led to the assessment decision that, after applying reasonable and prudent measures, these actions may affect, but are not likely to adversely affect, the Mexican Spotted Owl.

3.11.7.2 *Amended Consultation for 22420-2006-I-0090: Biological Assessment of the Potential Effects of the Monitoring and Maintenance of Monitoring Stations and Wells on Federally Listed Threatened and Endangered Species at LANL, January, 2011*

LASO and LANL have previously proposed a plan for installation, maintenance, and sampling of monitoring wells, samplers, and weirs. Actions included in this BA for the project include installing or re-drilling 18 additional new wells, sampling, and conducting maintenance and repair on these wells and their sampling instrumentation when necessary.

While HMP screening evaluations by LANL have identified habitat for the Southwestern Willow Flycatcher within LANL's boundaries, no habitat will be removed or lost. However, this project will occur in proximity to Southwestern Willow Flycatcher habitat. Impacts to Willow Flycatchers were analyzed because of the proximity of these actions to potentially suitable habitat. These analyses led to the assessment decision that, after applying reasonable and prudent measures, these actions may affect, but are not likely to adversely affect, the Southwestern Willow Flycatcher. Some proposed project activities are within undeveloped core and buffer habitat for the Mexican Spotted Owl. A small amount of habitat will be removed at three of the new well locations as a result of these projects, and noise will be produced during well construction and during sampling and maintenance. Noise levels during construction will be above the limits set in the HMP. A detailed analysis of the potential magnitude of the disturbance within Areas of Environmental Interest (AEI) led to the assessment decision that, after applying reasonable and prudent measures, these actions may affect, but are not likely to adversely affect, the Mexican Spotted Owl.

3.11.7.3 *Biological Assessment of the Effects of Construction and Operation of a Transuranic Waste Facility at LANL, February, 2011*

This BA evaluated the effects of the construction and operation of a transuranic waste facility at LANL on federally listed threatened and endangered species.

LANL and the DOE/NNSA proposed to build and operate a transuranic (TRU) waste facility (TWF) at LANL (DOE 2008). LANL must have a continuing capability to conduct waste management operations including the storage and characterization of TRU waste before shipment to WIPP. The TWF will be located in TA-52, approximately 300 m (1,000 ft) east of building 52-001, south of Puye Road. It will be designed, permitted, constructed, and commissioned as a Hazard Category 2 nuclear facility with a Resource Conservation and Recovery Act (RCRA) permit to store hazardous wastes and will be operated within the conditions analyzed in the 2008 SWEIS and the associated 2008 and 2009 RODs (DOE 2008). An area of approximately 10 ha (24 ac) that contains a mixture of disturbed and undisturbed buffer habitat is expected to be removed during the construction of this facility. This disturbance will include the facility, new access roads including a new intersection on Pajarito Road, and a lay down area for material storage.

The LANL HMP determined that there is habitat for the Southwester Willow Flycatcher at LANL; however, the only area currently recognized as possible suitable Southwestern Willow Flycatcher nesting habitat at LANL is the large wetlands complex along the north side of Pajarito Road in TA-36. No habitat for this species will be removed or disturbed during the project activities. These analyses led to the assessment decision that these actions should have no effect on Southwestern Willow Flycatcher. The two project sites contain developed and undeveloped buffer habitat for the Sandia-Mortandad Canyon and Pajarito Canyon AEIs. The actions will remove approximately 0.48 ha (1.19 ac) of Mexican Spotted Owl core nesting habitat and 2.69 ha (6.64 ac) of Mexican Spotted Owl buffer habitat. A detailed analysis of the potential magnitude of the effects within led to the assessment decision that, after applying reasonable and prudent measures, these actions may affect, but are not likely to adversely affect, the Mexican Spotted Owl.

3.11.7.4 *Proposed Temporary Spoils Storage, Staging, New Parking, and Vehicle Turnaround on Federally Listed Threatened and Endangered Species at LANL (LA-CP-11-00306), March, 2011*

The DOE/NNSA is considering construction of a replacement for the Chemistry and Metallurgy Research (CMR) facility at LANL. BAs have previously been completed for the CMRR project (Keller 2004, 2007, and 2009). In addition, the area was analyzed under the SWEIS BA (DOE 2008; LANL 2008). This BA describes the effects of proposed storage of CMRR and other spoils materials and construction of a new parking lot and vehicle turnaround at LANL. There are six proposed spoils storage locations in TAs 51, 54, and 36, which together consist of 28.2 ha (69.7 ac).

In addition, there will be a staging area in TA-52 of 9.2 ha (22.6 ac). The proposed areas would be clear-cut, leveled, and used as needed to store clean spoils generated by construction projects. BMPs, including erosion control measures, would be used at each site to ensure that the spoils (i.e., stockpiled clean, uncontaminated fill temporarily stored until needed for other actions) remain uncontaminated, stabilize, and stationary until reused. The areas would be revegetated with native vegetation once they are no longer needed. The proposed parking lot is located at TA-72 along East Jemez Road and would be 6.1 ha (15 ac). This proposed lot will accommodate about 1,000 cars and would be used as a vehicle turnaround.

The LANL HMP determined there is potential habitat for the Southwestern Willow Flycatcher, but actions would not remove habitat. A detailed analysis of the potential effects led to the assessment decision that, after applying reasonable and prudent measures, these actions may affect, but are not likely to adversely affect, the Southwestern Willow Flycatcher. The proposed project areas are also near core and buffer nesting habitat for the Mexican Spotted Owl. The actions would remove about 5.2 ha (12.9 ac) of buffer habitat and 3.9 ha (9.7 ac) of core habitat for the Mexican Spotted Owl. A detailed analysis of the potential effects led to the assessment decision that, after applying reasonable and prudent measures, these actions may affect, but are not likely to adversely affect, the Mexican Spotted Owl.

3.11.7.5 *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 LANL, September 2011*

This BA accounts for the direct, indirect, and cumulative effects of the Las Conchas Fire mitigations and includes a proposed redelineation of the Los Alamos Canyon Mexican Spotted Owl AEI. In June and July 2011, LANL and the County of Los Alamos participated in an interagency effort to fight the Las Conchas Fire, which included actions (e.g., fuels reduction and the creation of firebreaks) taken to prevent the spread of the fire onto LANL property, which impacted Mexican Spotted Owl habitat in Los Alamos Canyon. The purpose of this BA is to retrospectively evaluate the impacts of emergency actions taken during the Las Conchas Fire and adjust the boundaries of managed Mexican Spotted Owl habitat in Los Alamos Canyon to reflect current habitat conditions.

The LANL HMP determined there is habitat for the Southwestern Willow Flycatcher and fire mitigations impacted 2.20 ha (5.43 ac) of buffer and 0.14 ha (0.35 ac) of core habitat from the AEI. An analysis of the potential effects of this action led to the assessment decision that, after applying reasonable and prudent measures, these actions may affect, but are not likely to adversely affect, the

Southwestern Willow Flycatcher. There is also habitat and two occupied breeding territories for the Mexican Spotted Owl. Impacts from the fire mitigations in upper Los Alamos Canyon Mexican Spotted Owl AEI, along with cumulative impacts of planned recreational access and activities involving this area, have lead LANL to determine that an upper section of the Los Alamos Canyon AEI is no longer suitable habitat for Mexican Spotted Owl, and LANL proposes to remove that area from the Los Alamos Canyon AEI. The result will be a reduction of 325.90 ha (805.33 ac) of core and 535.39 ha (1,322.97 ac) of the buffer for this AEI.

Direct effects from the Las Conchas Fire were also analyzed. Active wildfire and human-ignited back burns around the LANL boundary impacted 64.74 ha (159.98 ac) of Mexican Spotted Owl foraging habitat, but no core or buffer nesting habitat were removed. Expanded storm water runoff through several of the Mexican Spotted Owl AEI's has occurred due to the Las Conchas Fire; however, the runoff did not permanently remove any habitat. An analysis of the potential magnitude of the effects of these actions led to the assessment decision that, after applying reasonable and prudent measures, these actions may affect, but are not likely to adversely affect, the Mexican Spotted Owl. This BA was submitted to the USFWS by LASO in late October 2011.

3.11.8 Updated Habitat Management Plan Report (Hansen)

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 (USFWS consultation numbers 2-22-98-I-336 and 2-22-95-I-108). In the 2011 update, LANL retained the management guidelines from the 1999 HMP for listed species. LANL also 1) updated some descriptive information, 2) included habitat boundary changes that received USFWS concurrence in 2005 (USFWS consultation number 22420-2006-I-0010), and 3) removed species that are no longer federally listed as threatened or endangered (LA-UR-11-02582).

3.11.9 Summary of FY 2011 BRMP Outreach (Hathcock)

Subject matter experts in the biological resources program annually conduct outreach at LANL and beyond to better educate and promote the conservation work performed by the team. In FY 2011, LANL biologists engaged in outreach to groups including: the Southwest Chapter of the Native American Fish and Wildlife Society; a Conservation Biology Class at University of New Mexico; the New Mexico Ornithological Society; students from the Bosque School, Albuquerque; the DOE citizen's advisory board; and northern New Mexico school groups.

3.12 Cultural Resources Management Plan (CRMP; LANL 2006): (McGehee, 2011)

The FY 2011 Tribal tour of Nake'muu did not occur at the request of the Pueblo of San Ildefonso. The CRMP is being revised and updated; a final draft is anticipated in FY 2012. The revised CRMP will be reviewed by the SHPO and neighboring Pueblos for concurrence and approval. Public tours and tours for LASO of V-site and Tsirege were conducted in May as part of New Mexico Heritage Resources Month.

3.13 Energy Conservation: (Witt, Erickson, 2011)

Policy Document 910 and the FY 2011 Executable Energy Management Plan are being executed. LANL's Energy Management Council submitted the 2011 Site Sustainability Plan (SSP) to NNSA. The 2011 SSP includes a proposed Metering Plan for electrical, natural gas, steam, and water and a variety of conservation, greenhouse gases (GHG), and sustainability goals. Monica Witt (Utilities and Infrastructure) prepared a charter for the multi-site Sustainability Transformation Team. DOE Order 436.1 replaced/cancelled 450.1A and 430.2B in May 2011.

3.13.1 Electrical:

- Five buildings are part of the FY 2011 High Performance Sustainable Buildings (HPSB) project and are being retrofitted and upgraded to meet the standards.
- The FY 2011 meter installation plan is complete.
- The powerline from the Norton substation to the Southern Technical Area (STA) is on-hold.
- LANL has an institutional procedure that requires facilities with Building Automation Systems (BAS) to use the night setback feature to reduce energy consumption. Utilities and Institutional Facilities initiated an FY 2011 BAS night setback implementation project.
- LANL's Power Plan forecasts energy use and demand for the next 10 years of operation and planned mission expansion. The power master plan is being finalized.
- LANL began planning efforts to evaluate and foster carbon neutral power purchasing as the key strategy to meet new GHG reduction goals.

3.13.2 Natural Gas:

A new draft Metering Plan that addresses electrical, natural gas, steam, and water metering was submitted to DOE Headquarters with the FY 2011 SSP.

3.13.3 Purchasing: (Hall, Davis, Ibrahim, August 2011)

The green procurement and Sustainable Acquisition web pages are active (http://asm.lanl.gov/green/default.shtml) (http://int.lanl.gov/environment/p2/sustainable/epp.shtml). Designated Procurement Representative Procedure (P842) includes a section on Affirmative Procurement

(sustainable acquisition) requirements. The Environmental Stewardship Group (ENV-ES) has completed the LANL Sustainable Acquisition Plan that has a number of deliverables including developing a Sustainable Acquisition Policy. ENV-ES has collaborated with Infrastructure Planning and updated the Office Furniture Master Specifications and Statements of Work to include Sustainable Acquisition Plan requirement language.

3.13.4 Water: (Pava, Wingo, Witt, 2011)

LANL received funds for the SERF Expansion with the signing of the 2011 Defense Authorization Act. The intent of the project is to increase water recycling at LANL and avoid the use of potable water for computer center cooling. A review of CD2 and CD3 is complete.

A landscape management plan to reduce maintenance costs and potable water consumption by removing non-native water intensive grass continued in FY 2011. Detailed descriptions of native vegetation to be used in landscaping, as outlined in the HMP, will be incorporated into LANL's design and engineering standards to contribute to water reduction goals.

3.14 Pollution Prevention: (Poff, Gallagher, 2011)

NNSA Deputy Administrator for Defense Programs, Don Cook presented the six FY 2010 NNSA awards in September 2011. The awards included four Environmental Stewardship awards, and two Best In Class awards, and were presented to representatives of the winning teams. In April 2011, LANL held its 16th annual pollution prevention awards ceremony as part of the Earth Day Week activities. Sixty-eight project teams, consisting of 470 individuals, were recognized with awards. Project efforts resulted in savings (cost avoidance) conservatively estimated at 16 million dollars. LANL funded 20 pollution prevention projects using the Generator Set Aside Fund (GSAF) for FY 2011.

The FY 2011 Environmental Management System (EMS) objectives for compliance improvement, pollution prevention, energy, fuel and water conservation, materials disposition, outfall reduction, and long-term sustainability planning are being implemented and were integrated into LANL's SSP.

3.15 Clean Fill: (Nisengard, Atencio, Ibrahim, Stockton, 2011)

A lean six-sigma project to develop a clean-fill management system was conducted in FY 2010. The Clean Fill Management database was reviewed by Subject Matter Experts (SME) from across the Laboratory and incorporated into LANL:'s Permits and Requirements Identification (PR-ID) system in September 2011. The database will be managed by the Environmental Protection Division (ENV) and the yard will be managed by Maintenance and Site Services. In October 2010, members of the project

secured GSAF funding to develop and implement a system and a database for clean fill management at LANL.

Sigma Mesa, the borrow pit, and several other locations are being discussed for the clean-fill storage yard location. Once a location is selected, a badge reader and controls will be installed to limit access to the area. The Clean Fill Management database will also be included in the PR-ID system.

3.16 Traffic: (Witt, Nisengard, 2011)

LANL continues to implement recommendations from a multi-directorate Performance Improvement Project regarding fuel conservation and the use of alternative fuels. Traffic studies are conducted as part of environmental project reviews and encourage the use of alternative transportation and carpooling. Representatives from DOE, LASO, and LANL met with the Superintendent of Bandelier National Monument on August 24 to discuss the impacts of the Las Conchas Fire on the park.

Alternative transportation was encouraged in FY 2011 through posters, LANL website announcements, and at LANL's Fourth Annual Emery Town Hall and Exposition, which featured an All-Aboard America display and contest. LANL continued to implement recommendations from a multi-directorate Performance Improvement Project regarding fuel conservation and the use of alternative fuels. LANL also installed traffic cameras in two locations to provide commuters with up to the minute traffic information.

3.17 Integrated Land Management Planning: (Isaacson, 2011) – Task Complete

The Integrated Land Management Planning (ILMP) project was established to prepare a comprehensive analysis of development opportunities and constraints to three land use scenarios: mission development, environmental stewardship, and potential land transfer for economic development across the Laboratory. The ILMP will assist project managers to make informed land use decisions, streamline environmental compliance, and increase the probability of favorable land use outcomes, while meeting LANL's environmental stewardship responsibilities. The tool is accessible through a web-based application allowing individuals to compare opportunities and constraints for potential siting options. The web-based application uses standard software and employs easy to use navigation tools to access the more than 50 land use variables. The Integrated Project Application (IPA) is complete and it will be co-managed and updated by ENV. The project is chartered by the Associate Director for Environment, Safety, Health and Quality (ADESHQ) and the Associate Director for Project Management and Site Services (ADPMSS) and was completed in FY 2011.

3.18 Compliance Assurance (Wright 2011)

Between FY 2009 and 2010, the compliance assurance team met with project personnel associated with PR-IDs and conducted field visits, these activities resulted in two reports (LA-UR-10-07064). The Compliance Assurance Subtask identified possible process improvements. Process improvements identified in the Compliance Assurance Subtask in FY 2009 and 2010 are being implemented. In May 2011, LASO recommended additional compliance assurance; LANS described how these recommendations would be implemented in a July 2011 report. No findings were associated with the assessment. Integrated Environmental Review (IER) Program is the primary LANL customer interface for environmental issues, all new and modified activities & projects are subject to environmental reviews using the Excavation Permit (Ex-ID) and PR-ID tool. FY 2011 ENV reviewed more than 700 Ex-IDs and more than 160 PR-IDs.

3.19 Commitments to Santa Clara Pueblo: (DOE/LASO)

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 the Santa Clara Pueblo during the SWEIS process. The plan will include specific tasks and timelines, and will identify the necessary resources to help ensure implementation of the plan.

4.0 REFERENCES

DOE 1999a. U.S. Department of Energy, 1999. *Final Environmental Impact Statement for the Conveyance and Transfer of Certain Land Tracts Administered by the U.S. Department of Energy and Located at Los Alamos National Laboratory*, Los Alamos and Santa Fe Counties, New Mexico, DOE Los Alamos Site Office, DOE/EIS-0293, Los Alamos, New Mexico.

DOE 1999b. U.S. Department of Energy, 2008. *Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory, Los Alamos, NM,* DOE Los Alamos Site Office, DOE/EIS-0238, Los Alamos, New Mexico.

DOE 2000a. U.S. 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 2000b. U.S. 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 2002. U.S. 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. U.S. 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. U.S. Department of Energy, 2008. *Final Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory, Los Alamos, NM*, DOE Los Alamos Site Office, DOE/EIS-0380, Los Alamos, New Mexico.

LANL 2000. Los Alamos National Laboratory, 2000. *A Special Edition of the SWEIS Yearbook, Wildfire 2000, LA-UR-00-3471*, Los Alamos, New Mexico.

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 2011a. 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 2011b. Los Alamos National Laboratory, 2011. *Las Conchas Wildfire Effects and Mitigation Actions in Affected Canyons*, LA-UR-11-4793, Los Alamos, New Mexico.

APPENDIX I

2008 Site-Wide Environmental Impact Statement (SWEIS) Mitigation Action Plan (MAP) Fiscal Year (FY) 2011 MAP Tracking Log

LA-UR-11-06159

ACRONYM List

ADE	Engineering and Engineering Sciences Directorate
ADESHQ	Associate Directorate for Environment, Safety, Health and Quality
ADNHHO	Associate Directorate for Nuclear and High Hazard Operations
ADPMSS	Associate Directorate for Project Management and Site Services
ASM	Acquisition Services Management
BA	Biological Assessment
BMPs	Best Management Practices
BRMP	Biological Resources Management Plan
CRMP	Cultural Resources Management Plan
DARHT	Dual-Axis Radiographic Hydrodynamic Test facility
DD&D	decontamination, decommissioning and demolition
DOE	Department of Energy
DPR	Designated Procurement Representative
EA	environmental assessment
EMS	Environmental Management System
ENV	Environmental Protection Division
ENV-ES	Environmental Stewardship Group
EOC	Emergency Operations Center
EP	Environmental Programs
EP-CAP	Environmental Programs - Corrective Actions Project
ESR	Environmental Surveillance Report
Ex-ID	Excavation Permit
FOD	Facility Operations Director
FONSI	Finding of No Significant Impact
FRS	Flood Retention Structure
FY	Fiscal Year
HMP	Habitat Management Plan
HPSB	High Performance Sustainable Buildings
HX	Hydrodynamic Experiments Division
IFCS	Institutional Facilities and Central Services
ILMP	Integrated Land Management 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
LWSP	LANL Water Stewardship Project
MAP	Mitigation Action Plan

MAPAR	Mitigation Action Plan Annual Report
MDA	Material Disposal Area
MSS	Maintenance and Site Services
N	Nuclear Nonproliferation Division
NEPA	National Environmental Policy Act
NNSA	National Nuclear Security Administration
OSRP	Off-Site Source Recovery Project
P^2	Pollution Prevention
PIP	Performance Improvement Process
PR-ID	Permits and Requirements Identification
PRS	Potential Release Site
REC	Renewable Energy Credits
RLWTF	Radioactive Liquid Waste Treatment Facility
RLUOB	Radiological Laboratory Utility Office Building
SEA	Special Environmental Assessment
SERF	Sanitary Effluent Reclamation Facility
SHPO	State Historic Preservation Office
SSP	Site Sustainability Plan
STA	Southern Technical Area
SWEIS	Site-Wide Environmental Impact Statement
TA	Technical Area
T&E	Threatened and Endangered
WES	Waste and Environmental Services
WFMP	Wildland Fire Management Plan
WIPP	Waste Isolation Pilot Plant

2008 SWEIS MAPAR Tracking FY 2011 (Green items are complete; yellow is an on-going action; red is a closed or on-hold mitigation).

Topic	Action	Mitigation Completed	Annual Requirement Completed	Responsible Party
Transition of previous LANL NEPA mitigation commitments into the 2008 SWEIS MAP				
DARHT MAP (Appendix III)	Conduct annual Tribal tours of Nake'muu and maintenance visits.	On-going	Complete October 2010	ENV-ES
	Reduce annual surveillance sampling schedule to soils and one additional medium.	Complete 2008/2009	N/A – Complete	WES
	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, HX, ENV
Trails MAP (Appendix IV)	Complete eligibility evaluations for historic trails under National Historic Preservation Act; identify additional environmental issues on trails use.	On-going	Completed - SHPO concurrence on Anniversary Trail eligibility July 2011	ENV-ES
	Evaluate and manage trails to determine appropriate closures and/or restrictions.	On-going	Trails closures during and after the Las Conchas Fire while assessments were conducted.	ENV-ES
	Prepare cultural resources management plans for trails in TAs-70 and 71.	On-going	Completed - site mitigations in July/August 2011	ENV-ES
	Support the use of volunteers for selected trails maintenance projects at LANL.	On-going	Completed – volunteer task force work in May 2011.	ENV-ES
SEA MAP (Appendix V)	Complete rehabilitation of cultural resources impacted by the Cerro Grande Fire	On-going	Completed - Annual site monitoring September 2011	ENV-ES
	Monitor sediment contamination behind the Los Alamos Canyon Weir and the Pajarito Canyon FRS and report results in the ESR.	On-going	Completed - July 2011	WES
	Periodically remove sediment from the Los Alamos Canyon Weir based on sedimentation rate and contamination accumulation rate.	On-going	July 2011 sediment removed and recontouring completed	EP-CAP/LWSP
FRS EA	Annually monitor the FRS for structural integrity and safe operations until removed.	On-going	Completed - April and July 2011	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.	Completed-Clean Fill database complete and integrated into PR-ID and Ex-ID 2011	Annual reuse of clean fill will be reported in the SSP and as part of Pollution Prevention goals	ADNHHO
	Consider leaving an aboveground portion of the FRS equivalent to the dimensions of a low-head weir to retain potentially contaminated sediments on Laboratory land.	Removal date not currently scheduled	N/A	ADNHHO
	Remove aboveground portions of the steel diversion wall of FRS.	Removal date not currently scheduled	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

2008 SWEIS MAPAR Tracking FY 2011 continued (Green items are complete; yellow is an on-going action; red is a closed or on-hold mitigation).

Topic	Action	Mitigation Completed	Annual Requirement Completed	Responsible Party
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 August 2010; MAP modified in FY 2011	N/A	ENV
OSRP	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 LANL does not currently accept these sources 1/2009**	N/A	N
Air Emissions	Continue air monitoring program to comply with the Clean Air Act.	On-going	Monitoring of 27 stacks FY 2011	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	More than 160 PR-ID reviews in FY 2011	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	Monitoring at MDA B in FY 2011, excavations completed 9/14/2011	EP/Projects
Wildland Fire Management Plan (Appendix II)	Implement WFMP with adequately funded on-going program.	On-going	Completed FY 2011 WFMP implemented (Appendix II)	EOC
	Reduce wildfire risks by shipping legacy transuranic waste, currently stored in the TA-54 domes, to WIPP.	On-going	Ongoing	EP
SWEIS Biological Assessment	Develop and implement a wetlands/floodplains management plan.	On-going	Wetland/Floodplain assessments FY 2010.	ENV
	Evaluate ecological risks to watershed-specific T&E species and update site-wide modeling of ecological risk.	Complete	N/A	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	FY 2011 accomplishments (Appendix X)	Projects
BRMP (Appendix VI)	Implement Biological Resources Management Plan.	On-going	FY 2011 accomplishments (Appendix X)	ENV
CRMP	Implement Cultural Resources Management Plan.	On-going	Multiple FY 2011 accomplishments	ENV
Energy Conservation: Electrical	Upgrade electrical infrastructure in buildings to reduce electrical usage.	On-going		FODs, ADNHHO, Projects
	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	2010 metering plan goals complete	ADNHHO
	Construct the portion of power line from the Norton substation to STA.	On-hold	N/A	ADNHHO

2008 SWEIS MAPAR Tracking FY 2011 continued (Green items are complete; yellow is an on-going action; red is a closed or on-hold mitigation).

Topic	Action	Mitigation Completed	Annual Requirement Completed	Responsible Party
Project-Specific Mitigation Measures Analyzed in the SWEIS: Institutional Resource Management Responsibilities continued				
Energy Conservation: Electrical continued	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	Purchased RECs 14,000 megawatt hours	ADNHHO
	Purchase and/or lease "Energy Star" electronics.	On-going	Industry standard	ASM/DPRs
	Improve new building efficiencies by integrating Leadership in Energy and Environmental Design (LEED)/Sustainable Design on line-item contracts.	On-going	HPSB working group	Projects/Engineering
	Upgrade electrical infrastructure in buildings to reduce electrical usage.	On-going	2011 Site Sustainability Plan; HPSB	FODs, HSR, Projects
	Install gas-fired combustion turbine generator and upgrade existing steam turbines.	Complete	2008/2009-turbine installed	ADNHHO
	Meter major energy user facilities and sub-meter all other facilities to quantify and evaluate electrical consumption.	On-going	2011 metering plan goals complete	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	Purchased RECs 14,000 megawatt hours	ADNHHO
	Purchase and/or lease "Energy Star" electronics.	On-going	Industry standard	ASM/DPRs
	Improve new building efficiencies by integrating Leadership in Energy and Environmental Design (LEED)/Sustainable Design on line-item contracts.	On-going	RLUOB will be LEED Silver, HPSB working group	Projects/Engineering
Energy Conservation: Natural Gas	Meter major energy user facilities and sub-meter other facilities to quantify and evaluate natural gas consumption.	On-going (2012 deadline)	Complete FY 2011 metering plan goals met	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.	EA and FONSI complete FY 2010. Expansion began FY 2011.	N/A	EP/ADNHHO
Pollution Prevention (P^2)	Annually report waste reduction performance against EMS waste reduction goals.	On-going	Complete FY 2011	ENV
	Continue to integrate waste reduction activities into the EMS.	On-going	Complete FY 2011	ENV

2008 SWEIS MAPAR Tracking FY 2011 continued (Green items are complete; yellow is an on-going action; red is a closed or on-hold mitigation).

Topic	Action	Mitigation Completed	Annual Requirement Completed	Responsible Party
Project-Specific Mitigation Measures Analyzed in the SWEIS: Institutional Resource Management Responsibilities continued				
Clean Fill	Use excavation and demolition spoils locally to minimize purchase or new excavations of clean fill when possible.	On-going	PIP completed FY 2010; database complete and integrated into PR-ID and Ex-ID FY 2011	ENV/MSS/Projects
	Report annually on reuse of clean fill materials from excavations and DD&D.	On-going	Reported by UI and P^2	ENV
Traffic Mitigations	Identify possible solutions to minimize traffic issues related to DD&D, remediation, and construction projects.	On-going	N/A	Projects
	Encourage alternative transportation, including walking, car-pooling, bicycling, and public transportation.	On-going	Forth Annual Energy Town Hall and Exposition April 2011	ENV
	Improve overall Lab-wide fleet fuel efficiency.	On-going	PIP complete 2008; ongoing implementation.	ASM
	Consider plans for an alternative route off DP Mesa.	No alternate route required	N/A	TA-21 DD&D Project
Enhancement of Existing Programs				
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 development complete, IPA tool transitioned in FY 2011	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	N/A	IP/ENV
	Use the decision support tool to comply with Land Transfer Regulations (10CFR770).	On-going	N/A	ENV
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	Complete FY 2011	ADESHQ, ADE, ADPMSS
	Implement compliance assurance process on a sample of PR-ID projects.	On-going	On-going	ENV
	Develop metrics and track results.	On-going	On-going	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. The plan will include specific tasks and timelines, and identify the necessary NNSA and Pueblo resources to help ensure implementation of the plan. In consultation with Santa Clara Pueblo, LASO will update the MAP to incorporate these actions.	LASO	LASO	DOE/NNSA LASO

APPENDIX II

Actions Taken in Response to the 2011 Las Conchas Fire at Los Alamos National Laboratory, Los Alamos, New Mexico

LA-UR 11-05877

Prepared by Marjorie A. Wright, Hallie E. Mahowald, and Jennifer E. Payne

Environmental Stewardship, Resources Management Team (ENV-ES)

LA-UR 11-05877

Approved for public release; distribution is unlimited.

Title: **FISCAL YEAR 2011 ACTIONS TAKEN IN RESPONSE TO THE LAS CONCHAS FIRE AT LOS ALAMOS NATIONAL LABORATORY, LOS ALAMOS, NEW MEXICO**

APRIL 2012

Preparers: Marjorie A. Wright, Hallie E. Mahowald, and Jennifer E. Payne, Environmental Protection Division, Environmental Stewardship Group (ENV-ES)

Prepared for the U.S. Department of Energy, National Nuclear Security Administration, Los Alamos Site Office

Los Alamos
NATIONAL LABORATORY
EST. 1943

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ACRONYM List

AEI	Area of Environmental Interest
ASPECT	Airborne Spectral Photometric Environmental Collection Technology
BA	Biological Assessment
BMPs	Best Management Practices
BNM	Bandelier National Monument
CAMNET	Continuous Air Monitoring Network
CX	Categorical Exclusion
DBH	diameter at breast height
DOE	Department of Energy
EA	Environmental Assessment
EIS	Environmental Impact Statement
ENV-ES	Environmental Stewardship Group
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
EPO	LASO Environmental Projects Office
FONSI	Finding of No Significant Impact
FRS	Flood Retention Structure
FY	Fiscal Year
HMP	Habitat Management Plan
HPAL	Health Physics Analytical Laboratory
IFRAT	Interagency Flood Risk Assessment Team
IWMT	Interagency Wildfire Management Team
LANL	Los Alamos National Laboratory
LANS	Los Alamos National Security, LLC
LANSCE	Los Alamos Neutron Science Center
LASO	Los Alamos Site Office
MAFFS	Modular Airborne Firefighting System
MAP	Mitigation Action Plan
MAPAR	Mitigation Action Plan Annual Report
MOU	Memorandum of Understanding
MSS	Maintenance and Site Services
NEPA	National Environmental Policy Act
NM	New Mexico
NMCF	New Mexico Community Foundation
NMED	New Mexico Environment Department
NNSA	National Nuclear Security Administration
NPS	National Park Service
PRS	Potential Release Site

RACER	Risk Analysis, Communication, Evaluation, and Reduction
RAP	Radiation Assistance Program
RMT	Resources Management Team
ROD	Record of Decision
SEA	Special Environmental Assessment
SHPO	State Historic Preservation Office
SMA	Site Monitoring Area
SR	State Road
SWEIS	Site-Wide Environmental Impact Statement
TA	Technical Area
TAL	Target Analyte List
T&E	Threatened and Endangered
USACE	U.S. Army Corps of Engineers
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service

1.0 Executive Summary

The Las Conchas fire began June 26, 2011 (Photograph 1). The fire spread quickly, driven by strong winds and extremely dry conditions, burning 43,000 acres (17,401 ha) on the first day. By the time it was fully contained on August 1, 2011, the Las Conchas fire had burned 156,593 acres (63,371 ha), making it the largest wildfire in New Mexico history (Figure 1). Fortunately, no lives were lost because of the Las Conchas fire. Approximately 133 acres (52 ha) of Los Alamos National Laboratory (LANL or the Laboratory) and Department of Energy (DOE)/National Nuclear Security Administration (NNSA) property were burned by the Las Conchas fire and related back burns. Approximately 131 acres were intentionally back burned to help limit the spread of the wild fire, a small spot fire in TA-49 burned about one acre, and a small wildlife-related fire burned another acre (Figure 2). Between 2000 and 2011, LANL and the Los Alamos Site Office (LASO) worked together to complete many fire/fuels mitigation projects, which limited the ability of the fire to cross onto LANL property. Although the fire burned only a small area of LANL, it affected areas above the Laboratory, which created areas with little or no vegetation, increasing the risk of flooding and erosion at the Laboratory and to surrounding communities.

Photograph 1. The Las Conchas fire burns in the Jemez Mountains above LANL.

The majority of the actions taken in response to the Las Conchas fire were related to erosion control, fuel mitigation, and fire suppression. These activities and the associated National Environmental Policy Act (NEPA) coverage for them are discussed here.

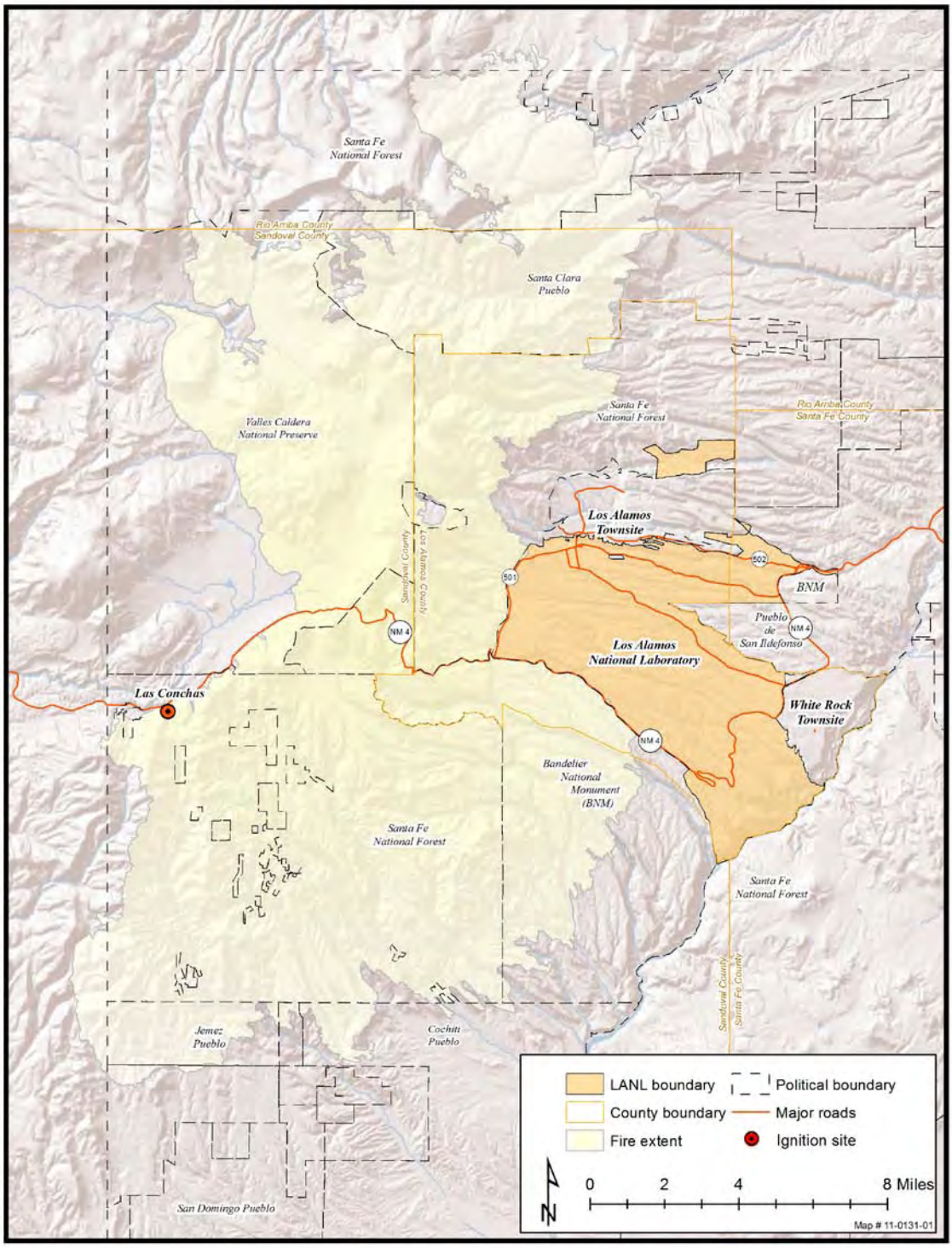

Figure 1. Extent of the Las Conchas fire and LANL boundary.

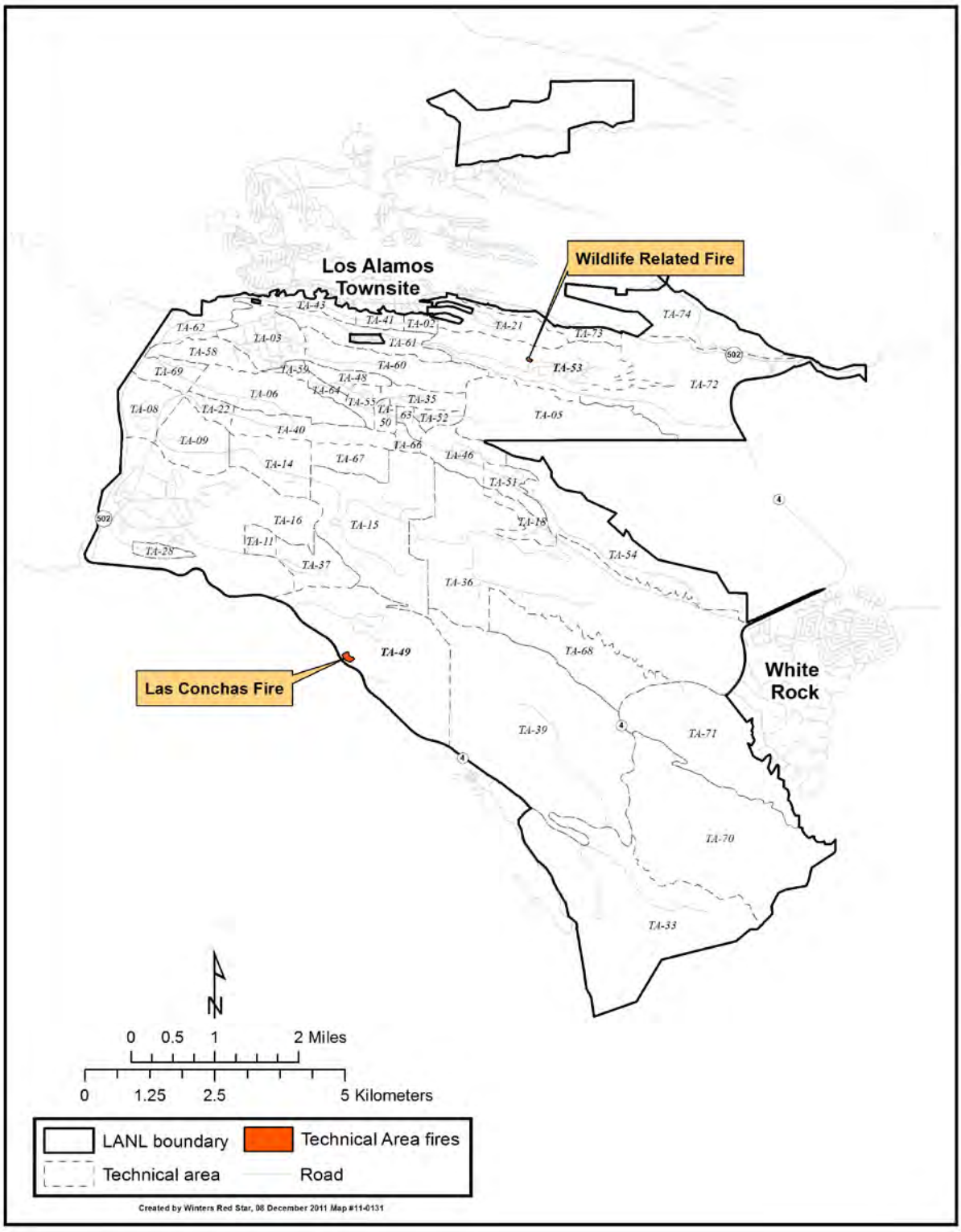

Figure 2. Locations of two small, one-acre or less, fires that occurred at LANL during the Las Conchas fire.

2.0 Las Conchas Fire

The Las Conchas fire began on June 26, 2011, as the result of a wind-thrown tree striking and shorting out an electrical power line. The fire burned southwest, west, north, and northwest of the town of Los Alamos, New Mexico (Figure 1). It began on private property and impacted Sandoval, Los Alamos, and Rio Arriba counties, Santa Clara Pueblo, Jemez Pueblo, Cochiti Pueblo, Santo Domingo Pueblo, Bandelier National Monument (BNM or Bandelier), Santa Fe National Forest, Valles Caldera National Preserve, DOE, and other state and private lands.

Voluntary evacuations of the Los Alamos and White Rock communities began June 26, 2011 and a mandatory evacuation order for Los Alamos was issued on Monday, June 27, 2011. LANL was closed from June 27 to July 6, 2011 and the Emergency Operations Center (EOC) was activated on June 26. Teams from Type 1 Incident Management Team, a federally or state-certified team with the highest level of training and experience, were activated, due, in part, to the fire's rapid growth. A Type 1 Team is activated for the most complicated fires. More than 1,200 firefighters from Los Alamos, neighboring communities, and across the country came to northern New Mexico to fight the Las Conchas fire (Photographs 2 and 3).

Photograph 2. Las Conchas fire team preparing for next firefight.

Photograph 3. Vale Hotshots sing the National Anthem the morning of July 4, 2011.

On LANL property administered by DOE, only one acre of land burned as a result of the wild fire, one acre burned as a result of wildlife accident, and approximately 131 additional acres burned through intentional back burns. The fire burned small areas on LANL/DOE property. A one-acre spot fire along the south boundary of Technical Area (TA)-49 occurred when the fire crossed State Road (SR) 4 onto LANL property (Figure 2). This area had been subject to previous tree thinning measures and the fire was extinguished within an hour. This fire occurred only on the mesa top and not in the canyon. On July 2, 2011, a wildlife-related fire occurred at TA-53, the Los Alamos Neutron Science Center (LANSCE) (Figure 2). This small fire was started when a squirrel touched contacts in an electrical substation's transformer. The transformer sparked a small fire, which the Los Alamos Fire Department extinguished within a short period of time. About 131 acres of DOE administered lands were burned during prescribed back burns along New Mexico (NM) 501, SR 4, and in Rendija Canyon.

More than 150,000 acres burned along the mountain range above LANL, to the south, and to the north of LANL. Bandelier and Santa Clara Pueblo sustained major impacts from the fire. The Las Conchas fire was the most destructive wildfire in recorded New Mexico history. With such large areas of burned vegetation, including areas of bare ash along the steep slopes and canyon sides above LANL, there was a very high risk for flooding within the LANL facility and in residential communities downstream all the way to the Rio Grande.

About 36 percent of the annual precipitation for the Los Alamos area falls in the form of rain, primarily during intense thunderstorms that occur in July and August each year, but may occur as late as October. Temporary, semi-permanent, and permanent flood control measures were undertaken during and after the fire to prevent the potential loss of life and property damage, and to protect sensitive cultural resources and potential habitat for federally listed threatened and endangered species present within floodplain areas. Until enough vegetation is established to cover the hillsides and canyons to act as a deterrent to soil erosion and flooding, the potential for flooding will continue for several years and possibly for decades in some locations.

3.0 National Environmental Policy Act (NEPA) Documentation

To date, all mitigation actions undertaken in response to the Las Conchas fire are covered under existing NEPA determinations (Table 1). NEPA analyses completed after the 2000 Cerro Grande fire provided NEPA coverage for most actions taken in response to the Las Conchas fire (DOE/SEA-03, DOE 2000b). Other routine type activities taken in response to the Las Conchas fire (e.g., culvert cleanouts, environmental monitoring) were covered under the 2008 Site-Wide Environmental Impact Statement (SWEIS; DOE 2008). LANL's Policy Document 400 requires all new and/or modified projects to be reviewed for potential environmental impacts. Actions taken in response to the Las Conchas fire were subjected to such reviews. In an August 9, 2011 letter, DOE/NNSA LASO directed LANS to prepare an environmental summary of the actions taken in response to the Las Conchas fire. In response to that request, LANS prepared and transmitted a final memorandum and environmental summary (Table 1, ESHQ 11-034) for LASO's Environmental Projects Office (EPO) to assist DOE in determining NEPA coverage for these mitigation activities. The summary table includes a comprehensive list of activities conducted for erosion/flood mitigation activities, fire mitigation activities, emergency measures, post-fire maintenance repair/response to potential flood events, additional environmental monitoring, and planned/anticipated activities. The table, included in this report as a reference, also includes existing NEPA coverage for the activities undertaken at LANL as well as dates associated with the activities. This appendix provides a more detailed description of these activities. No new NEPA coverage was necessary.

DOE and LANL learned a great deal during the 2000 Cerro Grande fire. After the Cerro Grande fire, DOE mitigated many fire-related effects and undertook several projects to help protect the Laboratory and its neighbors in case of subsequent wildfires (e.g., flood retention and detention structures, erosion controls, and tree thinning to create defensible space). DOE has worked diligently over the past decade to analyze projects related to potential wildfires and flood events, so that in case of an emergency, actions

could be undertaken and the environmental impacts would already be analyzed and understood.

In response to the Las Conchas fire, emergency actions were taken to protect human life and property. During the fire, members of the Resources Management Team (RMT), within the Environment, Safety, Heath, and Quality Directorate at LANS, worked with fuels mitigation crews to avoid impacts to cultural and biological resources. Staff archaeologists worked ahead of crews to flag sites in areas planned for treatment and accompanied crews into areas that had not been previously surveyed. The RMT also worked with DOE/NNSA LASO, who notified the State Historic Preservation Office (SHPO) and the U.S. Fish and Wildlife Service (USFWS) of emergency actions being taken in response to the Las Conchas fire. Emergency actions are discussed in Section 5 below. There were no violations of federal or state laws that protect cultural and biological resources identified on DOE property during the Las Conchas fire.

Existing NEPA coverage relevant to the mitigations taken in response to the Las Conchas fire includes the 2008 SWEIS (DOE 2008), the 2000 Special Environmental Analysis (SEA; DOE 2000b), and the Environmental Assessments (EAs) for the Trails Management Program (DOE 2003), the Wildfire Hazard Reduction (DOE 2000a), and the Flood Retention Structure (DOE 2002). In accordance with the 2008 SWEIS Mitigation Action Plan (MAP), which includes mitigations associated with EAs, LANS committed to report post-fire mitigation actions in the Fiscal Year (FY) 2011 SWEIS Mitigation Action Plan Annual Report (MAPAR) and, if necessary, in the FY 2012 SWEIS MAPAR.

4.0 Cerro Grande Fire Mitigations

Following the 2000 Cerro Grande fire, which burned substantial areas of LANL, DOE issued the SEA (DOE 2000b) to document its assessment of impacts associated with emergency activities conducted at LANL during that fire. In 2000, DOE addressed many fire-related mitigations and undertook several projects to help protect LANL and its surrounding neighbors. The main goal of LANL rehabilitation efforts after the Cerro Grande fire was to reduce the risk of potential flooding and the movement of Cold War-era contaminants off-site. Actions were designed to stabilize ash and soil, reduce runoff, and improve infiltration. These flood control measures have been in place around the Los Alamos town site and LANL for the last 11 years. DOE, in partnership with the U.S. Army Corps of Engineers (USACE), undertook post-Cerro Grande fire construction actions, which have been analyzed for environmental impacts in a variety of documents. These post-fire construction actions included the following:

- Construction of rock gabion low-head weir structures in Los Alamos and Pueblo canyons to reduce transport of contaminates off-site,
- Reinforcement of Los Alamos Canyon Reservoir (also in coordination with Los Alamos County),
- Construction of the Pajarito Canyon Flood Retention Structure (FRS) to protect LANL facilities downstream from post-fire flooding,
- Reinforcement of three drainage crossings along SR 501, and
- Reinforcement of Anchor Ranch Road drainage crossing at Two-mile Canyon.

LANL implemented a multi-year fire safety improvement program, starting with an emergency Congressional appropriation shortly after the Cerro Grande fire. LANL purchased more than 35 new fire trucks, service vehicles, and pieces of heavy equipment; built a state-of-the-art EOC; conducted tree-thinning, cleared ground fuels, and constructed firebreaks and roads; built a new interagency fire center with a helicopter base and water dip tanks at TA-49 (Photograph 4); enacted interagency agreements and training with the U.S. Forest Service (USFS), National Park Service (NPS), Los Alamos County, and the state of New Mexico; improved storm water runoff and erosion controls; planted more than 10,000 willows; and built structures to help prevent Cold War-era contaminants from flowing off-site.

Storm water control measures, known as best management practices (BMPs), were put in place to protect potential release sites (PRSs) that burned during the Cerro Grande fire. During the same time that the SEA was published, DOE issued an Environmental Assessment (EA) for the Wildfire Hazard Reduction and Forest Health Improvement Program at LANL (DOE/EA-1329). This EA addressed the immediate needs of the Laboratory to: (1) reduce the risk of damage and injury to property, human life and health, and resources from high-intensity wildfires and (2) enhance forest health.

In the 11 years since the Cerro Grande fire, LANL has implemented a Wildland Fire Management Plan, successfully creating defensible space buffers around all facilities, performing tree thinning to remove hazard trees and dense understory vegetation, and constructing new fire roads and firebreaks to facilitate access for fire suppression vehicles in the event of a wildfire. These mitigation activities proved critical and minimized the amount of LANL/DOE property that burned during the Las Conchas fire. There will also be lessons learned from the Las Conchas fire, which will provide information and help to improve LANS/DOE responses to future emergency events.

Photograph 4. Helicopter bucket refills at TA-49.

5.0 Mitigation Actions Taken in Response to the Las Conchas Fire

All DOE/NNSA and LANS fire activities were coordinated through the EOC (Photographs 5 and 6). At the EOC, representatives from LANS, DOE/NNSA, Los Alamos County, the State of New Mexico, the Environmental Protection Agency (EPA), the NPS, USFS, and others participated in briefings and updates. The following sections describe mitigation actions taken in response to the Las Conchas fire.

5.1 Erosion/Flood Mitigation Activities

The Las Conchas fire burned in watersheds above or immediately adjacent to LANL sufficient to have significant impact on slope and soil stability and to create conditions favorable for generation of large damaging floods. Affected watersheds include Los Alamos, Pajarito/Two-mile, Water Canyon/Canon de Valle, Frijoles, and Guaje Canyons. As part of the Laboratory's mitigation activities, several priority actions were taken to reduce the consequences associated with post-fire flooding (Photograph 7).

5.1.1 Los Alamos Canyon Low-Head Weir

The potential for large floods generated from burned areas was present even while the fire was still active. The Los Alamos watershed was one of the watersheds most affected by the Las Conchas fire. The Los Alamos Canyon low-head weir was installed near the downstream boundary of the Laboratory after the Cerro Grande fire to collect sediments mobilized by floodwaters and to reduce the transport of contaminated sediments off-site (DOE 2002).

In anticipation of increased sediment loads following rain events after the Las Conchas fire, approximately 1,200 cubic yards of sediment were removed from the weir and staged in Los Alamos Canyon in a borrow pit approximately one mile (1.6 kilometers) from the weir and 400 feet (121.9 meters) south of the active stream channel and floodplain. The staging area was lined with reinforced polypropylene plastic liner before the sediment was emplaced. This activity was performed from July 8 to 11, 2011 (Photograph 8). This sediment removal is part of an on-going, annual maintenance activity that was accelerated in schedule to ensure adequate capacity for potential sediment flow after the Las Conchas fire.

To prevent potential overtopping of the weir by floodwaters, more of the discharge standpipe at the base of the weir was exposed to increase the flow rate through the weir (Photograph 9). This activity was performed in conjunction with the sediment-removal activities described above. At the request of the New Mexico Environment Department (NMED), the standpipe was returned to its original configuration and wrapped with filter fabric on August 18, 2011 (LANL 2011b; Photograph 9).

Photograph 5. Fire Chief Doug Tucker briefs management at the LANS EOC.

Photograph 6. Senator Tom Udall (second from right) and Laboratory Director Charlie McMillan (center) discuss issues with Tony Stanford (right), Andrew Erickson (second from left), and Tim Walker-Foster (left) at the EOC.

Photograph 7. Flooding in Canyon on LANL property after the Las Conchas fire.

Photograph 8. Crews using heavy machinery to remove sediment from the Los Alamos Canyon Weir to restore its storage capacity.

Photograph 9. Crews expose discharge standpipe and wrap it with filter fabric.

5.1.2 Removal of Contamination and Waste from LANL Canyons

Crews removed and disposed of legacy contamination and waste from the canyon systems, including Los Alamos, Pajarito, and Water Canyons. Waste removal is a standard LANL activity that was completed in response to the potential threat of post-fire flooding (DOE 2008). More than 100 drums, eight roll-off bins, and more than 13,000 gallons of investigation-derived waste (waste from collecting environmental samples) from 40 poly-tanks were removed and disposed of (Photograph 10).

5.1.3 Los Alamos Canyon Retention Basins

In anticipation of increased sediment loads following rain events after the Las Conchas fire, sediments were removed from upper Los Alamos Canyon retention basins (Los Alamos Solid Waste Monitoring Unit (SWMU)-2, LA SMA-2) to restore their storage capacity. Crews removed and disposed of approximately 25–30 cubic yards of contaminated sediments. Sediment removal is a standard, on-going LANL activity; basins are maintained and cleaned regularly. However, the removal activity was accelerated in schedule to ensure that the maximum capacity of existing structures was available in case of post-fire flooding events (DOE 2002; DOE 2008; Photograph 11).

Photograph 10. Crews remove sediments and waste from canyon.

Photograph 11. Los Alamos Canyon retention basin.

5.1.4 Armoring Utility Infrastructure, Wellheads, and Sediment Collection Systems

LANS crews placed armoring (concrete barriers) around utility infrastructure, groundwater monitoring wells, and sediment collection systems in Los Alamos and Water Canyons as necessary, to protect these structures from potential floods and damage by floating debris (Photographs 12 and 13). Crews from Los Alamos County placed concrete barriers around the Los Alamos Ice Rink in order to protect it from the fire and associated flooding (DOE 2008; Photograph 14).

Photographs 12 and 13. Armoring at groundwater wellhead (left) and armoring of a sediment collection system (right).

Photograph 14. Armoring at the Los Alamos County Ice Rink.

5.2 Fire Mitigation Activities

During the Las Conchas fire, LANS personnel conducted several fuels mitigation projects. The coordination between LANS Emergency Management, Maintenance and Site Services (MSS), and the RMT was an example of successful collaboration during the fire. Crews were deployed to several areas to complete fuels thinning and to improve existing fire roads and firebreaks. Crews used industrial-sized mowers and large-vegetation mulching machines, known as *masticators,* to reduce grasses, shrubs, and small trees to help prevent the spread of the fire (Photographs 15 and 16).

In accordance with LANS' Cultural Resources Management Plan (LANL 2006) and in consultation with LASO, LANS archaeologists were part of these crews. An archaeologist was assigned to each crew and marked archaeological sites in areas scheduled for thinning so that the sites could be avoided and not impacted by these activities.

Photograph 15. Mowers work to create firebreaks along Pajarito Road.

Photograph 16. Ellen McGehee, LANS cultural resources specialist, with a masticator.

LANS biologists were also on call during the fire; however, the Biological Resources Management Plan does not require a biologist to accompany these crews. In consultation with LASO, emergency notifications were made to the USFWS to inform them of the work that was being conducted.

5.2.1 Firebreaks, Mastication, and Mowing

Crews created permanent firebreaks at TA-33 and TA-70. Firebreak construction resulted in soil disturbance and potential increased risk of soil erosion. Crews also graded the existing fire road and mowed alongside the road at Cañada del Buey and Pajarito Road near TA-54.

During the fire, crews reduced fuels at TA-54 along the LANL perimeter and along Pajarito Road using a masticator (Photograph 17). A major area of public concern was Area G, a 63-acre site that stores containers of transuranic waste awaiting transport to the Waste Isolation Pilot Plant (WIPP) in Carlsbad, New Mexico (Photograph 18). Area G is the site of the Laboratory's only active disposal pit for radioactive low-level waste (e.g., clothing or tools contaminated by exposure to radioactive materials). The risk of fire at Area G, however, is low since it is paved and ground fuels have been removed. Daily inspections were conducted at the site, which is surrounded by groundwater monitoring wells, air-monitoring stations, sensors, and radiation alarms. The Las Conchas fire did not impact Area G.

Mastication was also conducted to create fuel breaks at TA-71 and Rendija Canyon and to reduce fuel under power lines along NM 501 and SR 4 (Photographs 19 and 20).

Along with the mastication work, crews reduced fuel along Pajarito Road by mowing. Masticated material was left on-site to provide soil stability and erosion control.

Photograph 17. A masticator works to complete tree thinning along the LANL perimeter.

Photograph 18. Aerial view of TA-54, Area G, on June 29, 2011.

Photograph 19. Preparing a fire line along SR 4 during the Las Conchas fire.

Photograph 20. Tree thinning and mastication along SR 4; evidence of the fire can be seen on the left side.

5.2.2 Tree Thinning

Tree thinning occurred in Los Alamos Canyon from the Los Alamos County Ice Rink to the western DOE boundary. This work was completed by Los Alamos County workers and volunteers. Trees with a diameter of nine inches and greater when measured at 4.5 feet (1.4 meters) were cut, which would have been a violation of LANL's Habitat Management Plan (HMP). However, LASO conducted an emergency consultation with the USFWS regarding the tree thinning in Los Alamos Canyon and the USFWS determined that no violation of the HMP occurred. The HMP, a comprehensive site-wide management plan that addresses the management of federally protected species, was prepared by LANL and approved by the USFWS in 1999. The plan details how threatened and endangered (T&E) species and their habitats are managed at LANL. Included in the plan are specific work controls for any LANL activities that occur in or near T&E species habitat.

Photograph 21. Tree thinning along the LANL perimeter during the Las Conchas fire.

Photograph 22. Hand thinning.

LANS crews cleared brush and thinned trees along the LANL perimeter of TA-54 (Photographs 21 and 22). When the Las Conchas fire shifted farther north and east, DOE/NNSA directed LANS to conduct fire mitigation activities in Rendija Canyon to limit the ability of the fire to move into the Los Alamos residential areas of Barranca Mesa. Aggressive tree thinning and mastication was conducted from July 1 to July 12, 2011 (Photograph 23). The environmental impacts associated with tree thinning at LANL were analyzed in DOE's Environmental Assessment of Wildfire Hazard Reduction (DOE 2000a).

Photograph 23. An aerial view of fuels mitigation activities in Rendija Canyon.

5.2.3 Back Burning and Pre-Burns Conducted by the U.S. Forest Service

During the Las Conchas fire, fire crews lit a series of back burns/controlled burns in areas adjacent to and on DOE property to prevent the spread of the wildfire (Photograph 24). These burns accounted for most of the acreage (about 131 acres) that burned on LANL/DOE property during the fire. No resources were impacted as a result of these back burns. The environmental impacts associated with conducting controlled burns at LANL were analyzed in DOE's Environmental Assessment of Wildfire Hazard Reduction (DOE 2000a). A Finding of No Significant Impact (FONSI) was issued for this EA on October 18, 2004.

Photograph 24. Area of back burn along LANL's western boundary, NM 501.

5.2.4 Impacts to Biological and Cultural Resources

Biological Resources. LANS biologists completed a floodplain/wetland assessment for areas scheduled for mitigation actions situated within a floodplain or wetland. The assessment was issued on June 29 and published online on July 13, 2011. The assessment stated, "fires will be fought as they occur and any suppression in sensitive habitat will have storm water protection and will be restored as soon as emergency conditions will allow." In anticipation of fires entering LANL property, firebreaks were installed in Pajarito and Los Alamos Canyons, as well as in the canyons surrounding TA-54 (Area G). "Installation of these breaks in the floodplains in Pajarito and Los

Alamos Canyons temporarily increased run off and erosion" (LANL 2011c). Firebreak construction resulted in soil disturbance and potential increased risk of soil erosion. Erosion controls and rehabilitation measures have been implemented since the fire and these sites will be monitored to ensure their recovery. During the Las Conchas fire, fuels mitigation activities mowed less than one acre of the Pajarito wetlands. LANS biologists assessed the wetlands and determined that the impacts to the wetlands are temporary and biologists will continue monitoring the wetlands to document their recovery.

There is habitat as well as two occupied breeding territories for the Mexican Spotted Owl (*Strix occidentalis lucida*) at LANL (Figure 3). A Biological Assessment (BA) assessed the direct, indirect, and cumulative effects of the Las Conchas fire mitigations including a proposed redelineation of the Los Alamos Canyon Mexican Spotted Owl Area of Environmental Interest (AEI) at LANL. The BA was transmitted to LASO in September 2011 (LANL 2011a) and LASO was to transmit the BA to the USFWS in October 2011. LASO awaits a determination. The BA concluded that the impacts of the emergency mitigation activities conducted by Los Alamos County workers and volunteers in Los Alamos Canyon did impact the Mexican Spotted Owl AEI. Due to impacts from the fire mitigations in the upper end of the Los Alamos Canyon AEI, along with cumulative impacts of planned recreational access and activities involving this area, LANS biologists determined that an upper section of the Los Alamos Canyon AEI is no longer suitable habitat for Mexican Spotted Owl and propose to remove that area from the AEI. The result will be a reduction of 805.33 acres (325.90 ha) in the size of core and 1,322.97 acres (535.39 ha) in the size of the buffer for the Los Alamos Canyon AEI. USFWS will make the final determination in their response to the BA.

LANL's HMP identifies habitat for the Southwestern Willow Flycatcher (*Empidonax trailii extimus*) at LANL. Fire mitigations impacted 5.43 acres (2.20 ha) of buffer and 0.35 acres (0.14 ha) of core Southwestern Willow Flycatcher habitat. However, LANS recommends application of reasonable and prudent measures such that these actions may affect, but are not likely to adversely affect, the Southwestern Willow Flycatcher. Again, USFWS will make the final determination in their response to the BA.

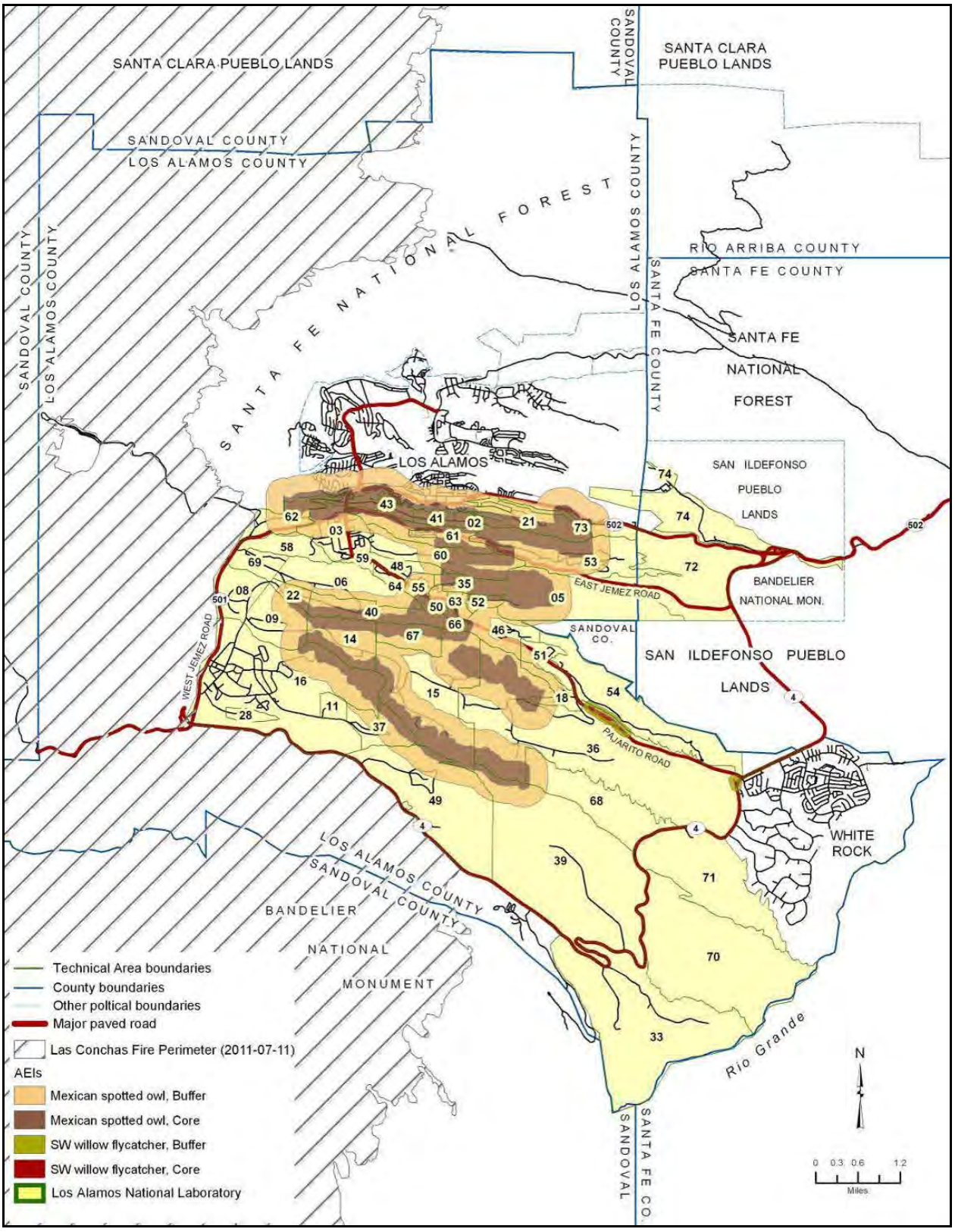

Figure 3. Mexican Spotted Owl and Southwestern Willow Flycatcher habitat (LANL 2011a).

Cultural Resources. During the fire, LANS archaeologists worked with the fuels mitigation crews to mitigate potential impacts to any identifiable cultural resources. Archaeological sites are not always clearly visible, so having cultural resource experts, trained to recognize and evaluate sites, working with fuels mitigation crews was essential to support LANL's mission, to maintain compliance with federal and state laws and regulations, and to protect these resources during the Las Conchas fire. Cultural resources were flagged in areas subject to back burns along SR 4 and West Jemez Road and potential archaeological sites were marked that could be impacted by potential future flood mitigation activities as well. Surveyed areas included a dozer cut that encircled and contained the spot fire in TA-49 and masticator/dozer lines placed in TA-54, TA-70, and TA-71 that were used as firebreaks to prevent the fire from progressing into these areas. Also surveyed were masticated areas located along the north side of SR 4 in TA-36. Field assessments of the areas treated between June 26 and July 8, 2011, have been completed, and no impacts to cultural resources by any fire suppression activities were identified.

5.3 Emergency Measures

5.3.1 LANL Road Closures

The Laboratory was closed from June 27 through July 6, 2011, to non-essential employees. The EOC, however, was in full operation around the clock beginning June 26, 2011, and certain employees were instructed to report to the EOC. All employees entered onto Laboratory property through staffed guard gates and were required to check in at the EOC. A voluntary evacuation for Los Alamos and White Rock was issued on June 26, 2011. A mandatory evacuation for the Los Alamos town site was issued Monday, June 27, 2011, which was initially enforced by the Los Alamos Police Department and NM State Police. The U.S. Army National Guard and the Air Guard were also called in to enforce the evacuation and closures (Photograph 25). Los Alamos reopened to residents on July 3, 2011.

West Road, NM 501, and SR 4 were closed temporarily during the fire. In late July and August, during the monsoon rains, post-fire flooding caused the closure of West Road and NM 501. As of September 30, 2011, West Road remains closed and will be reopened when the damage has been assessed and mitigated and there is no risk of flooding.

Photograph 25. The U.S. Army National Guard enforced road closures during the fire.

5.3.2 Fire Suppression

LANS workers used water trucks (Photograph 26) to spray down areas subject to tree thinning, mastication, and fuels mitigation along SR 4 on the southern LANL boundary to prevent spot fires and hold the fire line. A mesa-top spot fire did occur on LANL property on June 27, 2011. The fire was approximately one acre in size, located along the southern boundary of TA-49 (Photographs 27 and 28).

Fire suppression activities on LANL property included creation of fire lines and the use of helicopter water and slurry drops (Photographs 29, 30, and 31). LANS employees were not engaged in firefighting activities; firefighters specializing in wildland fires conducted those activities. Water drops by C-130 aerial attack occurred near DOE property in Rendija Canyon (Photograph 32). The C-130, Modular Airborne Fire Fighting System (MAFFS), is a self-contained aerial firefighting system that can discharge 3,000 gallons of water or fire retardant in less than five seconds, drawing lines of containment that can cover an area one-quarter of a mile long by 60 feet wide. Once the load is discharged, the MAFFS system can be refilled in less than 12 minutes.

Fire suppression activities may have resulted in increased soil erosion potential. Information on the aerial application of wildland fire retardant and its associated NEPA analysis can be found on the USFS website: http://www.fs.fed.us/fire/retardant/.

A regional Interagency Wildfire Management Team (IWMT) was formed in 1996 to provide fire control advice and a forum to exchange expertise and information among land stewards in the East Jemez region. The IWMT has representatives from the Laboratory, DOE, Los Alamos County, the USFS, the NPS, the Pueblo of San Ildefonso, the State of New Mexico, and other interested parties. The IWMT fostered consultations between agencies and developed information for evaluating wildfire problems,

proposing optimal mitigation strategies, and undertaking implementation. The IWMT collaborated on the fuel break activities along NM 501 and the fire cache/heliport development at TA-49.

Under an Interagency Memorandum of Understanding (MOU) between NPS, DOE, and the USFS, prior to the Las Conchas fire as part of a Cerro Grande fire follow-up, DOE authorized the NPS to construct a single permanent structure at TA-49. The facility also includes a helipad and dip tank. These dip tanks were used during the Las Conchas fire to refill the helicopter water buckets allowing emergency personnel to quickly extinguish the one acre fire that burned on Laboratory property.

Photograph 26. LANS worker stands in front of a water truck (aka a water buffalo).

Photograph 27. Aerial view of the burned area at TA-49 five days after the fire was extinguished.

Photograph 28. Burned area at TA-49 two months after fire was extinguished.

Photograph 29. Skycrane Helicopter at Los Alamos Airport.

Photograph 30. A helicopter makes a slurry drop.

Photograph 31. A helicopter makes a water drop at TA-49.

Photograph 32. A Modular Airborne Fire Fighting System (MAFFS) C-130 #7, U.S. Air Force, flying over the Las Conchas fire.

5.3.3 Trail Closures

LANL was closed during the Las Conchas fire and reopened on July 6, 2011. Trails situated on LANL/DOE property were also closed and remained closed in the interest of public safety. Environmental impacts associated with recreational trails use were analyzed in the 2003 EA for the proposed Trails Management Program and its mitigated FONSI (DOE 2003). Signs were posted at trailheads during and after the fire (Photograph 33).

On July 28, 2011, most trails, with the exception of trails that access Los Alamos Canyon and those that are potentially affected by flooding between TA-3 and TA-16, were reopened. LANS' actions were consistent with measures taken by Los Alamos County, and trail users were reminded of the risks of trail use in burned areas. Risks included falling trees, uneven ground, displaced wildlife, and other safety issues.

Fire impacts did not affect the Los Alamos County trail system except for the Quemazon and Perimeter trails that were used by firefighters and for firebreaks. Three major watersheds (Alamo, Frijoles, and Capulin Canyons) at Bandelier were severely burned and rebuilding the trails into the backcountry canyons will require extensive work. The Tsankawi Unit at Bandelier has experienced a large increase in use, and parking adjacent to SR 4 may compromise/impact traffic safety. Bandelier has asked LANL and LASO to help address this situation. The most impacted trails in the Santa Fe National Forest above LANL were those in Water Canyon where trails were obliterated. Cañon de Valle was not as severely affected. The Caballo Mountain and Pajarito Canyon trails on USFS land were destroyed. The USFS will work with the Volunteer Task Force and others to resume trails maintenance on the Los Alamos Country trail system.

Photograph 33. Trail closure sign on trail into Los Alamos Canyon.

5.3.4 Emergency Fueling Station and Emergency Power at Pajarito Ski Hill

LANS crews set up an emergency fueling station at the parking lot at LANL's Wellness Center (TA-3-1163) to provide fuel to emergency vehicles and fire trucks (Photographs 34 and 35). No fuel spills occurred. LANS also provided emergency power to Pajarito Mountain during the fire. Because communications from Pajarito Mountain were being cut off by the loss of power due to the fire, LANS crews transported a LANL generator to Pajarito Tower, providing emergency power.

Photograph 34. Fueling vehicles at the emergency fueling station.

Photograph 35. A fire truck fuels up at the emergency fueling station.

5.4 Post-Fire Maintenance/Repair Response to Flood Events

5.4.1 Removal of Debris, Ash, and Sediment and Pumping Ash-laden Runoff

After the Las Conchas fire, the monsoon rains arrived. Flooding, erosion, and transport of debris, ash, and sediment became a significant issue at LANL. Post-fire flooding of roads and drainages created safety and environmental hazards (Photograph 36). In response, LANS crews acted quickly and removed post-fire debris, ash, and sediment from culvert inlets and outlets along NM 501 and Anchor Ranch Road. Crews pumped accumulated ash-laden runoff out of the area, removed debris, and re-established the flow of the culvert under NM 501 at the Water Canyon drainage crossing (DOE 2008). Blockage of storm water runoff and damming by debris also caused storm water to pond and ash to accumulate along NM 501 (Photographs 37 and 38). Ponding resulted from soil saturation, which then resulted in roadbed failure.

Since monsoon season in Los Alamos can persist into October, these activities and restoration of areas impacted by post-fire floods will continue for subsequent years.

Photograph 36. Post-fire flooding effects on NM 501.

Photograph 37. Ponding of ash and debris along NM 501.

Photograph 38. Ash accumulation at Water Canyon crossing and NM 501.

5.4.2 *Planned/Anticipated Activities*

As inspections of BMPs continue, erosion controls in Site Monitoring Areas (SMAs) are expected to need repair. As rain events persist, crews will continue to clean out culverts, as necessary, in Water Canyon, Pajarito Canyon, Cañon de Valle, and along NM 501 and Anchor Ranch Road (Photograph 39). Crews will repair roads damaged by flooding around LANL as necessary (Photograph 40).

Photograph 39. Cleaned out culvert along Anchor Ranch Road.

Photograph 40. Post-Las Conchas fire flooding impacts a road at LANL.

5.4.3 *Fence Repair*

LANS crews repaired a security fence at TA-16 damaged by post-Las Conchas fire flooding in August 2011. A heavy rain event caused post-fire flooding in and around the Pajarito Canyon and Water Canyon drainages that flowed onto LANL, south of Pajarito Canyon and north of Cañon de Valle. The flow crossed Anchor Ranch Road and destroyed about 20 feet of fence (Photographs 41 and 42).

Photograph 41. Post-fire flooding at Anchor Ranch Road.

Photograph 42. Security fence at along Anchor Ranch Road damaged by flood event.

5.5 Additional Environmental Monitoring

5.5.1. Air Sampling

During the Las Conchas fire, there was considerable interest in radioactive and chemical air emissions. Samples of the smoke plume were collected and analyzed by DOE, LANL, EPA, and NMED for constituents naturally present in forest fire smoke and to evaluate whether materials associated with Laboratory operations were present. Preliminary results of air samples showed no radioactive materials from LANL operations or legacy waste in smoke from the Las Conchas fire.

AIRNET is a radiological ambient air sampling network in Los Alamos, Santa Fe, and Rio Arriba counties designed to measure levels of airborne radionuclides such as plutonium, tritium, and uranium that may be emitted from Laboratory operations. There were approximately 55 AIRNET stations in existence around the perimeter of the Laboratory at the start of the fire (Figure 4; Photograph 43). Eleven additional AIRNET high-volume air samplers were installed along the perimeter of the Laboratory. Five high-volume air samplers were installed by the Field Monitoring Team around LANL. Seven high-volume air samplers were installed by DOE's Radiological Assistance Program (RAP) in surrounding communities including Chimayo, El Valle, Socorro, Taos, Embudo, and Las Vegas. These high-volume air samplers were temporary. Four Continuous Air Monitoring Network (CAMNET) stations were installed in surrounding communities including Santa Fe, El Rancho, San Ildefonso and Espanola.

The equipment was used heavily during the Las Conchas fire to monitor any possible radiochemical release (Photograph 44). Data were also obtained by the EPA's Airborne Spectral Photometric Environmental Collection Technology (ASPECT). Each sample collected during the fire was split into two samples and sent to the Health Physics Analytical Laboratory (HPAL) at LANL for fast preliminary results (24-hour turnaround) and to ALS Laboratory in Colorado for expedited conventional analysis. These results enabled Laboratory managers to update the public on air quality data during the fire. Filters from the AIRNET and high-volume samplers were analyzed at ALS for americium-241, plutonium-238, plutonium-239, uranium-234, uranium-235, uranium-238, gross alpha and beta, a suite of gamma emitters, Target Analyte List (TAL) metals, beryllium, and mercury. LANS also analyzed high-volume filters on site at the HPAL for gross alpha and a suite of gamma emitters. The results from the preliminary testing performed at HPAL are posted in the New Mexico Community Foundation (NMCF)'s Risk Analysis, Communication, Evaluation and Reduction (RACER) database at http://racernm.com. On June 29, LANL made the following statement, "Preliminary results of air samples taken at Los Alamos National Laboratory boundaries show no radioactive materials from Laboratory operations or legacy waste in smoke from the Las Conchas fire." The air quality monitoring data showed that the

observed constituents were typical of any wildland fire, they were consistent with those measured during the Cerro Grande fire (DOE 2000b), and indicated no measurable contamination from LANL.

The complete set of data was reported in the RACER database and will be discussed in the Environmental Report for 2011 (formerly the Environmental Surveillance Report).

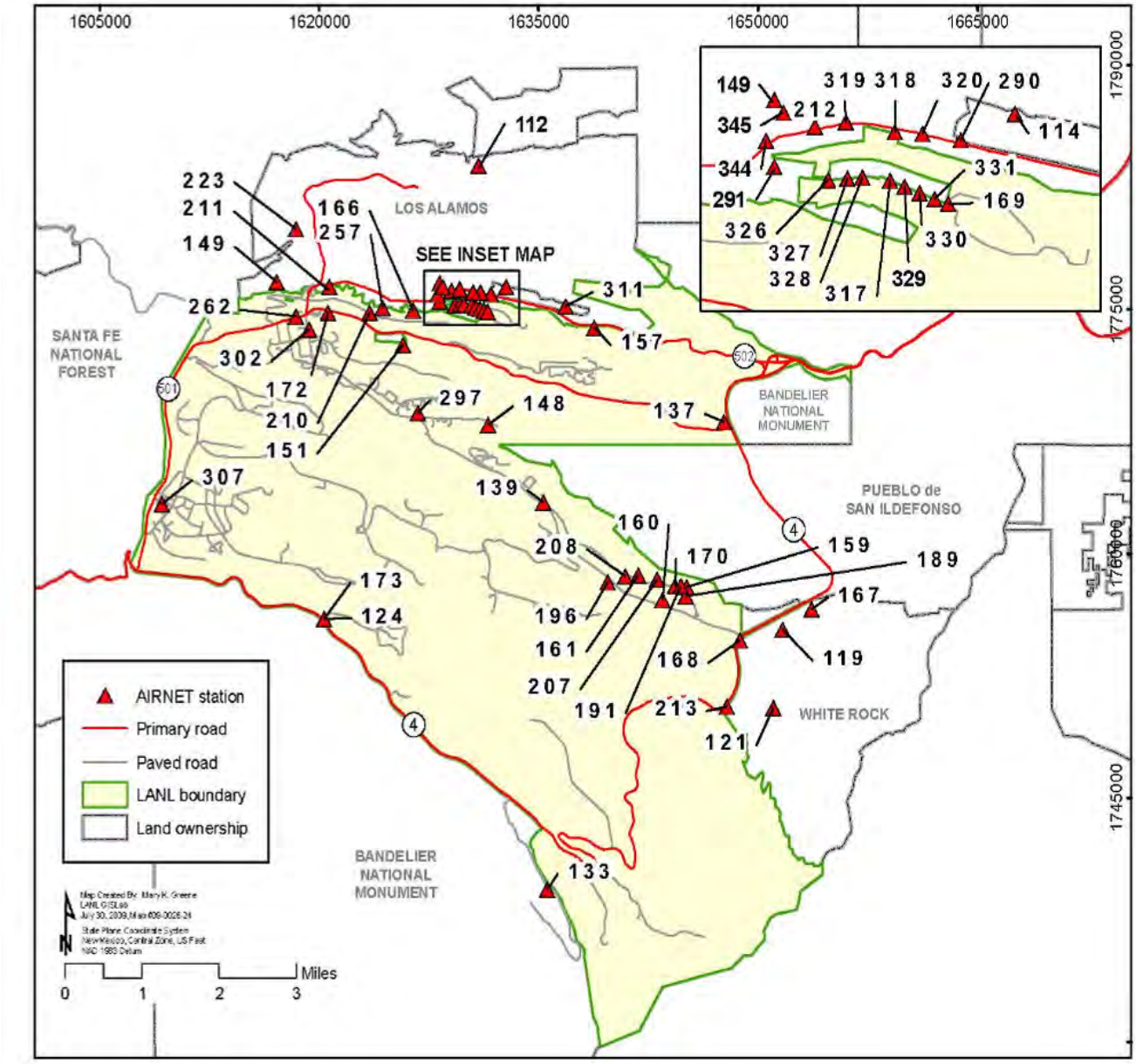

Figure 4. LANL AirNet Stations (NMCF, RACER database).

Photograph 43. Air monitoring equipment bordering TA-21.

Photograph 44. AIRNET Station being checked during the fire.

5.5.2 Water Monitoring

During the Las Conchas fire, 17 water monitoring stations were identified around LANL for quick turnaround water sampling. In addition, crews inspected rain gauge and sampler notification systems around LANL. Water monitoring results will be published in the RACER database at http://racernm.com.

Surface Water. Following initial startup activities and implementation of the first-priority mitigation actions described above, the Laboratory began implementation of a comprehensive storm water monitoring plan designed to provide data to support a regional-scale post-fire risk assessment. The Interagency Flood Risk Assessment Team (IFRAT) was initiated in late summer 2011 and is being conducted as a multi-agency effort led by the New Mexico Department of Health and includes participation by LANL, DOE, NMED, the City of Santa Fe's Buckman Direct Diversion Project, and the Albuquerque water utility. Storm water samples will continue to be collected from runoff events at gage stations located around the LANL region to measure water quality for runoff flowing onto and off of Laboratory property. All post-fire storm water data has been loaded into the RACER database. Surface water monitoring results will be published and available to the public in the RACER database as well.

Groundwater. Alluvial groundwater wells will continue to be monitored to determine the movement or transport of contaminants on and off Laboratory property. Groundwater monitoring results will be published and available to the public in the RACER database.

5.5.3 Biota Sampling

In addition to LANL's standard contaminant monitoring program, LANS biologists collected biota samples upstream and downstream along the Rio Grande after the Las Conchas fire. Biota samples were also collected from Cochiti Lake in August 2011 (Photographs 45 and 46). Results from the biota samples collected will be published in the 2011 Environmental Report (formerly the Environmental Surveillance Report).

Photograph 45 and 46. LANS biologists collecting biota samples on Cochiti Lake.

6.0 References

DOE 1999a. U.S. Department of Energy, 1999. *Final Environmental Impact Statement for the Conveyance and Transfer of Certain Land Tracts Administered by the U.S. Department of Energy and Located at Los Alamos National Laboratory*, Los Alamos and Santa Fe Counties, New Mexico, DOE Los Alamos Site Office, DOE/EIS-0293, Los Alamos, New Mexico.

DOE 1999b. U.S. Department of Energy, 2008. *Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory, Los Alamos, NM,* DOE Los Alamos Site Office, DOE/EIS-0238, Los Alamos, New Mexico.

DOE 2000a. U.S. 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 2000b. U.S. 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 2002. U.S. 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. U.S. 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. U.S. Department of Energy, 2008. *Final Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory, Los Alamos, NM*, DOE Los Alamos Site Office, DOE/EIS-0380, Los Alamos, New Mexico.

LANL 2000. Los Alamos National Laboratory, 2000. *A Special Edition of the SWEIS Yearbook, Wildfire 2000, LA-UR-00-3471*, Los Alamos, New Mexico.

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 2011a. 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 2011b. Los Alamos National Laboratory, 2011. *Las Conchas Wildfire Effects and Mitigation Actions in Affected Canyons*, LA-UR-11-4793, Los Alamos, New Mexico.

LANL 2011c. Los Alamos National Laboratory, 2011. *Floodplain Assessment of the continued response to the Las Conchas fire*, LA-UR-11-03907, Los Alamos, New Mexico.

New Mexico Community Foundation 2003. *The RACER Project (Risk Analysis, Communication, Evaluation and Reduction), http://racernm.com/*, Santa Fe, New Mexico.

"3,500-acre Jemez blaze brings back memories of Cerro Grande". *The Santa Fe New Mexican*. http://www.santafenewmexican.com/Local%20News/New-forest-fire-burning-SW-of-Los-Alamos. Retrieved September 20, 2011.

"Las Conchas Wildfire". *Incident Information System*. http://www.inciweb.org/incident/2385/. Retrieved September 20, 2011.

http://www.nv.doe.gov/library/factsheets/RAP.pdf

http://www.epa.gov/NaturalEmergencies/flyinglab.htm

6.1 Data Sources for Figures 1 - 4

TA Boundaries; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Office; September 2007; as published August 13, 2010.

LANL Areas Used and Occupied; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Office; 19 September 2007; as published August 13, 2010.

Fire extent (burnSeverityBARC_FINAL); various data sets created to support the emergency stabilization efforts of the Interagency DOI BAER Team responding to the Las Conchas fire, New Mexico in July 2011.

Paved Road Arcs; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; as published August 17, 2011.

Dirt Road Arcs; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; as published August 17, 2011.

Structures; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; as published August 17, 2011.

Technical Area Boundaries; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Office; as published August 13, 2010.

Ownership Boundaries Around LANL Area; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Office; as published August 13, 2010.

Drainages; Los Alamos National Laboratory, Environmental Protection, RCRA and Water Quality Permitting and Compliance; currently unpublished 2010 project data (08-0106).

Table 1. ESHQ 11-034. Summary of Las Conchas Fire Mitigation Activities at Los Alamos National Laboratory and Existing National Environmental Policy Act (NEPA) Coverage

Location	Task Description	Date(s) of Activity	Existing NEPA Coverage	Additional CX or EA	Notes/Comments	Resource Impacts
Erosion/Flood Mitigation Activities						
Los Alamos Canyon Low-Head Weir	Removal and disposing of 1200 cubic yards of sediments to restore capacity. On-going activity, the Los Alamos Canyon weir is maintained and cleaned out annually and as necessary.	7/8–7/11/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	DOE/EA-1408 Cerro Grande Fire Flood and Sediment Retention Structures, http://www.doeal.gov/EA-1408; DOE/SEA-03 Special Environmental Analysis: Actions Taken in Response to the Cerro Grande Fire SEA-03-2000.pdf	Activity part of baseline work executed earlier than planned as part of post-fire efforts. Clean sediment would be land applied or stockpiled as clean fill. Contaminated soil would be disposed of as part of LANL's routine waste operations.	Beneficial impact by reduction of potential damage from storm water runoff, erosion, and contaminant transport.
Los Alamos, Pajarito, and Water Canyons	Removal and disposal of contamination and waste from canyon system: • >100 drums • Eight (8) roll off bins • >13,000 gallons of investigation derived waste from 40 poly-tanks	7/8–7/11/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	Activity part of baseline work was executed earlier than planned to accommodate the post-fire efforts.	Beneficial impact by reduction of potential damage from contaminant transport.
Los Alamos Canyon Retention Basins	Removal and disposing of approximately 25-30 cubic yards contaminated sediments. On-going activity, these basins are maintained and cleaned out as necessary.	7/8–7/11/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	DOE/EA-1408 Cerro Grande Fire Flood and Sediment Retention Structures, http://www.doeal.gov/EA-1408;	None	Beneficial impact by reduction of potential damage from storm water runoff, erosion, and contaminant transport.
Los Alamos Canyon	Armoring (placement of concrete barriers) around utility infrastructure and wellheads	7/8–7/11/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None
Los Alamos, Pajarito, and Water Canyons	Armoring of sediment collection systems	7/8–7/11/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None

Location	Task Description	Date(s) of Activity	Existing NEPA Coverage	Additional CX or EA	Notes/Comments	Resource Impacts
Los Alamos Canyon	Armoring (placement of concrete barriers) around the Los Alamos Ice Rink	6/27–7/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	This work was completed by Los Alamos County	Protection of existing structure.
Fire Mitigation Activities						
TA-33	Firebreak	6/27–7/2011 (Complete)	EA Wildfire Hazard Reduction and Forest Health Improvement (DOE EA 1329) DOE-EA-1329-2000.pdf	N/A	RMT staff accompanied crews to avoid cultural resource impacts; DOE notified SHPO of emergency mitigation activities.	Firebreak construction exposed mineral soils, potential increased soil erosion.
Los Alamos Canyon (TA-43)	Tree thinning (Los Alamos County Ice Rink to western DOE boundary) was completed by Los Alamos County workers and volunteers	6/27–7/2011 (Complete)	EA Wildfire Hazard Reduction and Forest Health Improvement (DOE EA 1329) DOE-EA-1329-2000.pdf	N/A	Trees >9 inches dbh were cut, however there was an emergency consultation with the USFWS about the tree thinning, so there was no violation of the HMP.	Degradation of Mexican Spotted Owl core habitat.
TA-49	Fuel reduction by masticator	6/27–7/2011 (Complete)	EA Wildfire Hazard Reduction and Forest Health Improvement (DOE EA 1329) DOE-EA-1329-2000.pdf	N/A	Masticated material was left onsite to provide soil stability and erosion control. RMT staff accompanied crews to avoid cultural resource impacts; DOE notified SHPO of emergency mitigation activities.	None
TA-54 along LANL perimeter	Tree thinning	6/27–7/2011 (Complete)	EA Wildfire Hazard Reduction and Forest Health Improvement (DOE EA 1329) DOE-EA-1329-2000.pdf	N/A	RMT staff accompanied crews to avoid cultural resource impacts; DOE notified SHPO of emergency mitigation activities.	None
Canada del Buey (TA-54)	Graded existing fire road; mowing	6/29–7/2011 (Complete)	EA Wildfire Hazard Reduction and Forest Health Improvement (DOE EA 1329) DOE-EA-1329-2000.pdf	N/A	RMT staff accompanied crews to avoid cultural resource impacts; DOE notified SHPO of emergency mitigation activities.	None
Pajarito Road from TA-54 to NM 4 (TA-36)	Fuel reduction by masticator; mowing	6/27–7/2011 (Complete)	EA Wildfire Hazard Reduction and Forest Health Improvement (DOE EA 1329) DOE-EA-1329-2000.pdf	N/A	Masticated material was left onsite to provide soil stability and erosion control. RMT staff accompanied crews to avoid cultural resource impacts; DOE notified SHPO of emergency mitigation activities.	None
TA-70	Firebreak	6/27–7/2011 (Complete)	EA Wildfire Hazard Reduction and Forest Health Improvement (DOE EA 1329) DOE-EA-1329-2000.pdf	N/A	Resource Management Team staff accompanied crews to avoid cultural resource impacts; DOE notified SHPO of emergency mitigation activities.	Firebreak construction exposed mineral soils, potential increased soil erosion.

Location	Task Description	Date(s) of Activity	Existing NEPA Coverage	Additional CX or EA	Notes/Comments	Resource Impacts
TA-71	Fuel break by masticator	6/27–7/2011 (Complete)	EA Wildfire Hazard Reduction and Forest Health Improvement (DOE EA 1329) DOE-EA-1329-2000.pdf	EA-1431 Trails Management Program http://energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/EA-1431-FEA-2003.pdf	Masticated material was left on-site to provide soil stability and erosion control. RMT staff accompanied crews to avoid cultural resource impacts; DOE notified SHPO of emergency mitigation activities.	Some trail cleanup work needed; no permanent damage
LANL Western Boundary	Pre-burn by U.S Forest Service	6/29/2011 (Complete)	EA Wildfire Hazard Reduction and Forest Health Improvement (DOE EA 1329) DOE-EA-1329-2000.pdf	N/A	10/18/2004 FONSI addressed controlled burning on LANL. Resource Management Team staff accompanied crews to avoid cultural resource impacts; DOE notified SHPO of emergency mitigation activities.	Minor and temporary air and soil impacts; small-scale, temporary impacts to vegetation/habitat
Rendija Canyon	Fuel reduction by masticator	7/8–7/12/2011 (Complete)	EA Wildfire Hazard Reduction and Forest Health Improvement (DOE EA 1329) DOE-EA-1329-2000.pdf	DOE/EIS-0293 Conveyance and Transfer of Certain Land Tracts http://energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/EIS-0293-FEIS-01-1999.pdf	Masticated material left on-site for soil stability and erosion control. Resource Management Team staff accompanied crews to avoid cultural resource impacts; DOE notified SHPO of emergency mitigation activities.	None
NM 501 (East Side)	Fuel reduction under power lines by masticator	6/29/2011 (Complete)	EA Wildfire Hazard Reduction and Forest Health Improvement (DOE EA 1329) DOE-EA-1329-2000.pdf	N/A	Masticated material left on-site for soil stability and erosion control. RMT staff accompanied crews to avoid cultural resource impacts; DOE notified SHPO of emergency mitigation activities.	None
Emergency Measures						
LANL	LANL closed	6/27–7/04/2011 (Complete)	N/A	N/A	Temporary, no resource impacts	None
West Road	Road closure – the road will reopen when flooding is no longer an issue.	6/27 to present (On-going)	N/A	N/A	Temporary, no resource impacts	None
West Jemez Road (NM 501)	Road closure due to flooding danger	8/3/2011 (Complete)	N/A	N/A	Temporary, no resource impacts	None
NM 4 at West Jemez Road (NM 501)	Road closure	6/27–7/7/2011 (Complete)	N/A	N/A	Temporary, no resource impacts	None
NM 4 along Southern LANL boundary	Spraying of water for fire suppression	6/26–6/29/2011 (Complete)	2008 SWEIS considered wildfire as an accident, fire suppression used in outdoor burning explosives is covered by CX B1.12 and B1.2 has long been a “routine” part of LANL operations	N/A	Workers held fire line by spraying water along southern LANL boundary.	Erosion - negligible

Location	Task Description	Date(s) of Activity	Existing NEPA Coverage	Additional CX or EA	Notes/Comments	Resource Impacts
Along NM 4; Southern LANL boundary	Fire suppression activities	6/26–6/29/2011 (Complete)	2008 SWEIS considered wildfire as an accident; fire suppression used in outdoor burning explosives is covered by CX B1.12 and B1.2 has long been a "routine" part of LANL operations	N/A	Workers held fire line by spraying water along southern LANL boundary	None
TA-49	Fire suppression activities	6/27/2011 (Complete)	2008 SWEIS considered wildfire as an accident; fire suppression used in outdoor burning explosives is covered by CX B1.12 and B1.2 has long been a "routine" part of LANL operations	N/A	Fire suppression activities included fire lines, helicopter water drops, and slurry drops. For slurry ingredients go to: http://www.fs.fed.us/rm/fire/wfcs/index.htm	Fire suppression activities could cause minor soil erosion.
LANSCE (TA-53)	Fire suppression activities	7/2/2011 (Complete)	2008 SWEIS considered wildfire as an accident; fire suppression used in outdoor burning explosives is covered by CX B1.12 and B1.2 has long been a "routine" part of LANL operations	N/A	The TA-53 fire was not part of Las Conchas fire, but it did occur during the fire. This fire ignited when a squirrel touched contacts in electrical substation transformer. The transformer sparked a one-acre fire. The fire was extinguished by Los Alamos County firefighters using fire trucks and water.	Fire suppression activities could cause minor soil erosion.
LANL Trails	Trail closures	7/8-8/1/2011 (Complete)	EA for the Los Alamos National Laboratory Trails Management, Los Alamos, New Mexico (DOE EA- 1431) http://energy.gov/EA-1431	N/A	None	None
TA-3-1663 Parking Lot	Emergency fueling location	6/27-7/6/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	LANL provided an emergency fueling area for fire trucks. No fuel spills occurred.	None
Pajarito Ski Hill	LANL generator transported to Pajarito Tower to provide emergency power	Complete	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	Outside LANL/DOE boundary	None

Location	Task Description	Date(s) of Activity	Existing NEPA Coverage	Additional CX or EA	Notes/Comments	Resource Impacts
Post-fire maintenance/ repair- response to potential flood events						
NM 501/Anchor Ranch Road	Removal of post-fire debris, ash, and sediment from culvert inlets and outlets	8/4-8/9/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	RMT staff accompanied crews to avoid cultural resource impacts; DOE notified SHPO of emergency mitigation activities.	None
Water Canyon at NM 501	Pumping of accumulated ash laden runoff, removal of debris, reestablishment of flow to culvert under NM 501. On-going activity, debris removal as necessary, routine road maintenance.	8/5-8/9/2011 (On-going)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	Storm water runoff and debris damming could cause storm water to pond.	Ponding could result in soil saturation, which could result in roadbed failure.
TA-16	Repair damaged security fence	8/4-8/9/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None
Additional Environmental Monitoring						
Los Alamos and White Rock	11 AIRNET High Volume Air Samplers	6/27-6/30/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None
LANL	Five (5) High Volume Air Samplers installed by the Field Monitoring Team	6/27-7/1/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None

Location	Task Description	Date(s) of Activity	Existing NEPA Coverage	Additional CX or EA	Notes/Comments	Resource Impacts
Surrounding communities (Santa Fe, El Rancho, San Ildefonso, Espanola)	Four (4) CAMNET installed	6/30-7/19/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None
Surrounding communities (Chimayo, El Valle, Socorro, Taos, Embudo Las Vegas)	Seven (7) High Volume Air Samplers by DOE's Radiological Assistance Program (RAP)	6/29-7/5/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None
LANL	17 monitoring stations identified for quick turnaround water sample analysis. On-going, routine sampling, expedited analysis in response to the Las Conchas fire.	7/8/2011 to present (On-going)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None
LANL	Inspections of rain gauge and sampler notification systems. On going, inspections and test of the notification system is part of routine maintenance.	7/5/2011 to present (On-going)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None
Rio Grande	Additional biota samples collected upstream and downstream along Rio Grande.	8/8-8/11/2011 (Complete)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None

Location	Task Description	Date(s) of Activity	Existing NEPA Coverage	Additional CX or EA	Notes/Comments	Resource Impacts
Planned/Anticipated Activities						
LANL	Repair of baseline Best Management Practices (BMPs) controls in Site Monitoring Area (SMA)s/routine maintenance.	On-going	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None
Water and Pajarito Canyons; Canon de Valle, NM 501	Culvert cleanouts. On going, baseline, BMPs, and routine maintenance.	On-going	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None
LANL	Road repair. On going, baseline, BMPs, and routine maintenance.	On-going	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None
Cochiti Lake	Additional biota samples collected from the lake in August 2011	9-10/2011 (On-going)	2008 SWEIS, Appendix L, http://www.doeal.gov/SWEIS/AppendixL.pdf and Records of Decision (2008, 2009) http://www.lanl.gov/environment/nepa/docs/2008_SWEIS_ROD.pdf, http://www.lanl.gov/environment/nepa/docs/2009_SWEIS_ROD_2.pdf	N/A	None	None

APPENDIX III

Dual Axis Radiographic Hydrodynamic Test Facility (DARHT) Mitigation Action Plan Annual Report Fiscal Year 2010

LA-UR-11-06159

Prepared by Philip R. Fresquez

Waste and Environmental Services Environmental Data and Analysis (WES-EDA)

Dual-Axis Radiographic Hydrodynamic Test Facility

Mitigation Action Plan Annual Report, Final

Annual Report Covering FY 2010

LA-UR-11-06159

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

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ACRONYM LIST

BA	Biological and Floodplain/Wetland Assessment
BSRL	baseline statistical reference level
CRT	Cultural Resources Team
DARHT	Dual-Axis Radiographic Hydrodynamic Test (facility)
DOE	US Department of Energy
EIS	Environmental Impact Statement
ENV-EAQ	Ecology and Air Quality (group)
ENV-ES	Environmental Stewardship (group)
ENV-RCRA	Water Quality and RCRA [Resource Conservation and Recovery Act] (group)
ESL	ecological screening level
ESR	Environmental Surveillance Report
FY	fiscal year
HAZMAT	Hazardous Materials Response Team
HMP	habitat management plan
ISL	industrial screening level
ISM	Integrated Safety Management (System)
LANL	Los Alamos National Laboratory
LASO	Los Alamos Site Office
MAP	Mitigation Action Plan
MAPAR	Mitigation Action Plan Annual Report
NEPA	National Environmental Policy Act of 1969
NNSA	National Nuclear Security Administration
NPDES	National Pollutant Discharge Elimination System
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
SWPP	Storm Water Pollution Prevention (Plan)
TA	Technical Area
TAL	target analyte list
TCPs	traditional cultural properties
VPB	Vessel Preparation Building

WES-EDA (group)	Waste and Environmental Services, Environmental Data and Analysis
WFO-FOD	Weapons Facilities Operations, Facilities Operations Directorate
WPA	Work Package Agreement

1.0 INTRODUCTION

This Mitigation Action Plan Annual Report (MAPAR) has been prepared by the U. S. Department of Energy (DOE) National Nuclear Security Administration (NNSA) as part of implementing the Dual-Axis Radiographic Hydrodynamic Test (DARHT) Facility Mitigation Action Plan (MAP; DOE 1996). This MAPAR provides status on specific DARHT facility operations-related mitigation actions 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. The 2008 SWEIS MAP includes all National Environmental Policy Act of 1969 (NEPA) mitigation commitments subsequent to the 1999 SWEIS MAP and new mitigation actions related to the September 2008 and July 2009 SWEIS RODs. Although no new commitments were identified for DARHT, some commitments are complete; for example, the need to continue the archeological monitoring of Nake'muu.)

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 2010 and represents the eleventh year of DARHT facility operations-related mitigation measures and action plans. All construction-related mitigation measures and action plans were completed in FY 1999 (LANL 1999).

1.1 Background

DOE issued the Final EIS on the DARHT facility (DOE/EIS-0228) at Los Alamos National Laboratory (LANL) in August 1995 and published the ROD in the Federal Register (60 FR 53588) on October 16, 1995. The DARHT MAP is being implemented consistent with DOE regulations under the NEPA as stated in DOE's Final Rule and Notice for Implementing NEPA [10 CFR 1021, section 331(a), revised July 9, 1996]. The ROD 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) 36-06 firing point in 2006, and shots within steel containment vessels at DARHT were implemented in May of 2007. Overall, three hydrodynamic test shots within steel

[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.

containment vessels at DARHT were conducted in FY 2007, two were conducted in FY 2008, none in FY 2009, and four in FY 2010.

The ROD further states that DOE will develop and implement several mitigation measures to protect soils, water, and biological and cultural resources potentially affected by the DARHT facility construction and operation (DOE 1995). In addition, DOE agreed to an ongoing consultation process with affected American Indian tribes to ensure protection of resources of cultural, historic, or religious importance to the tribes. As discussed in Section 5.11, Volume 1, of the DARHT Final EIS, DOE also committed to taking special precautions to protect the Mexican spotted owl (*Strix occidentalis lucida*) by preparing and implementing a Laboratory-wide habitat management plan (HMP; LANL 1998) for all threatened and endangered species occurring throughout LANL. The DARHT MAP elaborates upon those commitments (DOE 1996).

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

- general environment, including impacts to air and water;
- soils, especially impacts affecting soil loss and contamination;
- biological 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 mitigation commitment for the potential impact is identified. An action plan for each commitment 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 is also included.

1.3 MAP Duration and Close-out

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 or organization. The MAP also includes a summary of mitigation actions that identifies the projected/actual period of mitigation action completion. Each mitigation action timeframe 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 lb of 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 post-shot 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 post-shot 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 mock-ups 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 mock-ups of stockpiled systems. Fragment mitigation measures were in place and post-shot 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. In addition, during 2002 the DARHT Project continued the major installation of the injector and accelerator components of the second axis. Two major DARHT second axis commissioning milestones were achieved in 2002. On July 2, 2002, the second axis injector achieved conceptual design-4a early with e-beam parameters of >250 amps at >2.0 MeV. On December 21, 2002, the full accelerator achieved the technical criteria of conceptual design-4d with e-beam parameters of >1.0 kA at >12.0 MeV for longer than 400 nanoseconds.

In 2003, the construction of the Vessel Preparation Building (VPB) was completed. One hydrotest was fired in the fall of 2003 and again returned state-of-the-art quantitative radiographic information of a mock-up 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 implemented during these experiments to mitigate blast effects. The VPB underwent a Phase II readiness review 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.

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 is responsible for implementing the DARHT MAP and had delegated MAP management and tracking to the SWEIS Project Office. Using the annual WPA, WES-EDA coordinates with other 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.

The organization of the MAPAR is intended to provide 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 and 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 2010. The scope of tasks completed in FY 2010 represents the eleventh year of operations-related mitigation. A summary of the scope of potential impacts and commitments addressed in this MAPAR is provided in Table 3-1.

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 storm water 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

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

DARHT MAP Potential Impacts/Commitments	DARHT phase	MAPAR section
C. Biological 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 (*Strix occidentalis lucida*) 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 other activities at the firing sites.	operations	3.3
7. DARHT facility construction and operation could impact the Jemez Mountains salamander (*Plethodon neomexicanus*) as a result of noise from firings and other operations, as well as other activities at the firing sites: commitments (a, b).	operations	3.3
8. DARHT facility construction and operation could impact the bald eagle (*Haliaeetus leucocephalus*) as a result of noise from firings and other operations, as well as other activities at the firing sites: commitments (a, b).	operations	3.3
9. DARHT facility construction and operation could impact the Townsend's pale big-eared bat (*Corynorhinus townsendii*) as a result of noise from firings and other operations, as well as other activities at the firing sites: commitments (a, b).	operations	3.3
10. DARHT facility construction and operation could impact the wood lily (*Lilium philadelphicum* var. *andinum*) as a result of firings and other operations, as well as other activities at the firing sites: commitments (a, b).	operations	3.3
D. Cultural/Paleontological Resources		
1. Blast effects, such as shock waves and flying debris, from shots using high explosive charges could affect nearby archaeological sites, especially Nake'muu, and the immediately surrounding environment: commitments (b, e–g).	operations	3.4
2. Structural or other damage to as-yet-unknown Native American cultural resources within the area of potential effects for the DARHT facility site. This could occur as a result of DOE's lack of knowledge of these resources in the DARHT facility area: commitments (a, b).	construction/ operations	3.4

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

DARHT MAP Potential Impacts/Commitments	DARHT phase	MAPAR section
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 this potential impact are as follows:

b) WES-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.

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 nonradionuclides (mean plus three 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 summarizes the results of analyses of soil, sediment, vegetation, field mice, birds, and bees collected around the perimeter of DARHT during FY 2010 (Figure 1). All of the raw data can be found in the annual Environmental Surveillance Report (ESR) (LANL, in preparation).

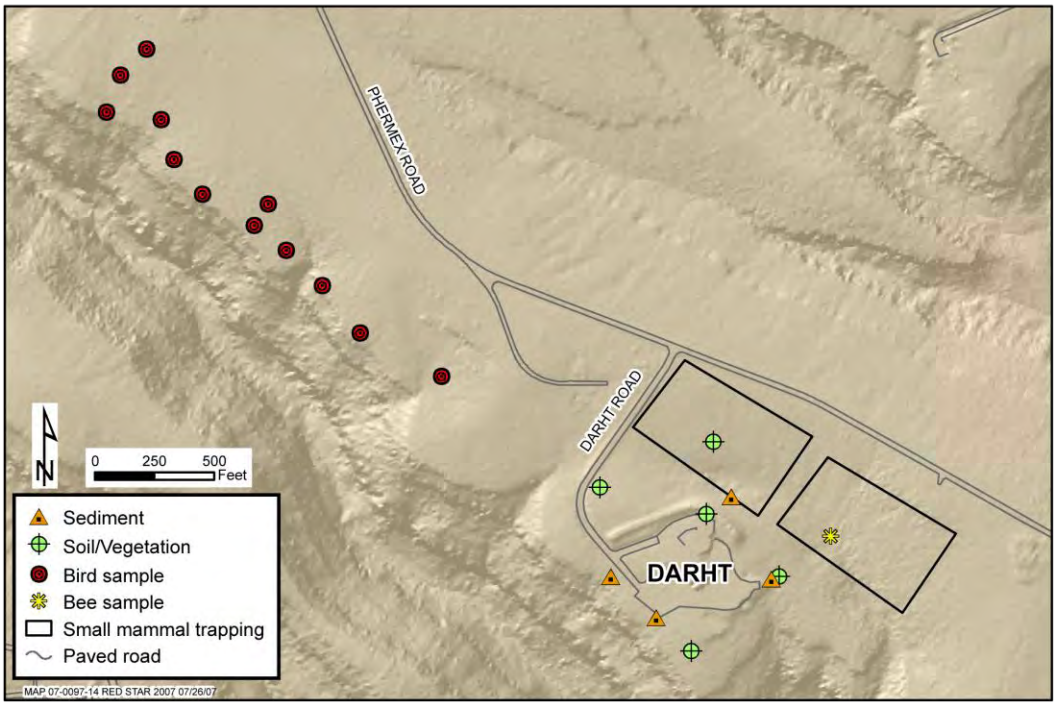

Figure 1. Sample locations for soil, sediment, vegetation, field mice, birds, and bees around DARHT.

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 1). In addition, sediment samples were collected on the north, east, south, and southwest sides. All samples were submitted to ALS Analytics, Inc., 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, dioxin and furans were analyzed by Cape Fear Analytical in one soil sample collected nearest the firing point.

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

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, with the exception of uranium isotopes, 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 non-detected value is one in which the result is lower than three times the counting uncertainty and is not significantly different (α = 0.01, or 99% confidence level) from zero (Keith 1991, Corely et al. 1981) or less than the minimum detectable activity.

Uranium isotopes, but predominantly uranium-238, were detected above the BSRL in two of the five soil samples collected. The highest amount of uranium-238 was detected in a soil sample collected just north of the firing point (5.8 pCi/g dry); however, this amount was dramatically lower than some of the previous years, particularly in 2008 (55 pCi/g dry), and far below the industrial screening level (ISL) (Figure 2). ISLs for radionuclides are set below the DOE single-pathway dose limit of 25 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, we investigate 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 radioactive (RESRAD) computer model (Yu et al. 1995).

The general decrease in concentration of uranium-238 in soil collected around the perimeter since 2006 and the significant decrease within the firing point since 2008 may reflect the change in the contaminant mitigation procedures at the DARHT facility in the past years as well as the number of detonations. The changes in contaminant mitigation at DARHT in the past years have included open and/or foam mitigation (2000–2006) to closed steel containment (vessel) mitigation starting in 2007. In addition, there has been a decrease in the number of detonations in the latter years: three in 2007, two in 2008, none in 2009, and four in 2010 (Martha Zumbro, personal communication, February 2011). 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 prior to the start up of operations at DARHT (DOE 1995), was not detected in any of the soil or sediment samples above reference levels. In addition, beryllium concentrations in soil over the 11-year operations period has been mostly below the BSRL, far below ISLs, and remains relatively stable over time (Figure 3).

Figure 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 2000–2010 (during operations) as compared with the baseline statistical reference level (BSRL) and the industrial screening level (ISL). Note the logarithmic scale on the vertical axis.

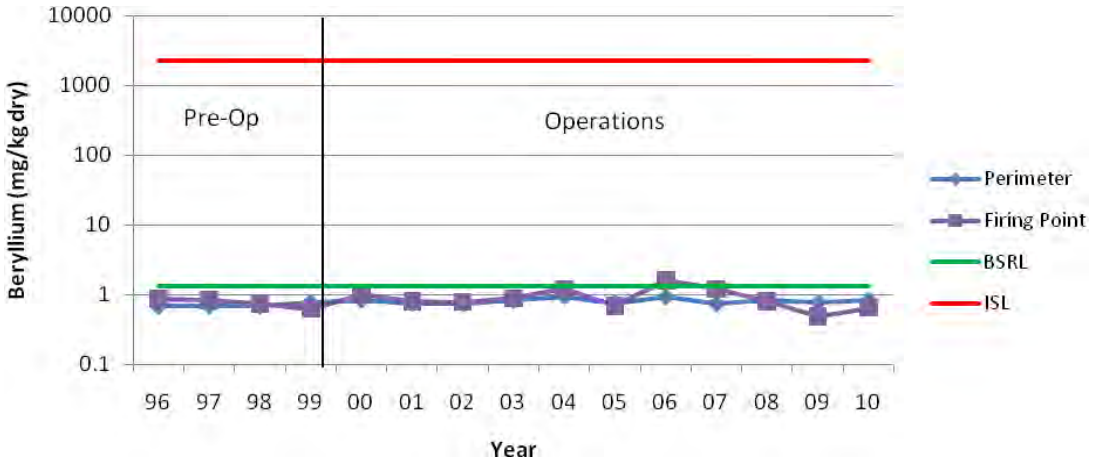

Figure 3. Beryllium concentrations in soil collected within (near the firing point) and around the DARHT perimeter (north, west, south, and east side average) at TA-15 from 1996–1999 (pre-operations) to 2000–2010 (during operations) as compared with the baseline statistical reference level (BSRL) and the industrial screening level (ISL). Note the logarithmic scale on the vertical axis.

Other chemicals analyzed around the perimeter of the DARHT facility were high explosive compounds and dioxin and furans; and 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 2010, polychlorinated biphenyls and semivolatile organic compounds in soil and sediment samples collected around the perimeter of the DARHT facility in 2007 showed no detections in any of the constituents above the reporting limits.

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 Analytics, Inc., for the analyses of the same radionuclides and TAL chemicals as for soil (Figure 4).

All radionuclide concentrations, including uranium-238, in overstory vegetation collected from around the perimeter of the DARHT facility were either not detected or detected below the BSRLs (or RSRLs when BSRL data were not available). In the past, uranium-238, was the only radionuclide much of the time to be detected in overstory vegetation around the DARHT facility, but since 2007 the concentrations have generally decreased from all sides of the DARHT perimeter. This general decrease in uranium-

238 concentrations to BSRLs was probably due to the change in contaminant mitigation procedures from open 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 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 2000–2010 (during operations) compared with the baseline statistical reference level (BSRL) and the screening level (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.), are collected using snap traps from two sample grids located on the north and northeast side of the DARHT facility. Samples of composite whole body mice (>five field mice per sample) were submitted to ALS Analytics, Inc., for analyses of the same radionuclides and TAL chemicals as the other biota.

Most radionuclides were either not detected or below the BSRLs in a composite field mouse sample (five mice per sample) collected from the north and northeast side of the DARHT facility. Uranium-234, uranium-235, and uranium-238 concentrations were just

slightly above their respective BSRLs but the amounts were orders of magnitude below the SL.

The isotopic distribution of uranium-234 to uranium-238 in the field mouse sample collected from the north-northeast side of DARHT indicates that 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 and/or foam-mitigated detonations during the 2000–2006 period to closed vessel containment starting in 2007 (Figure 5).

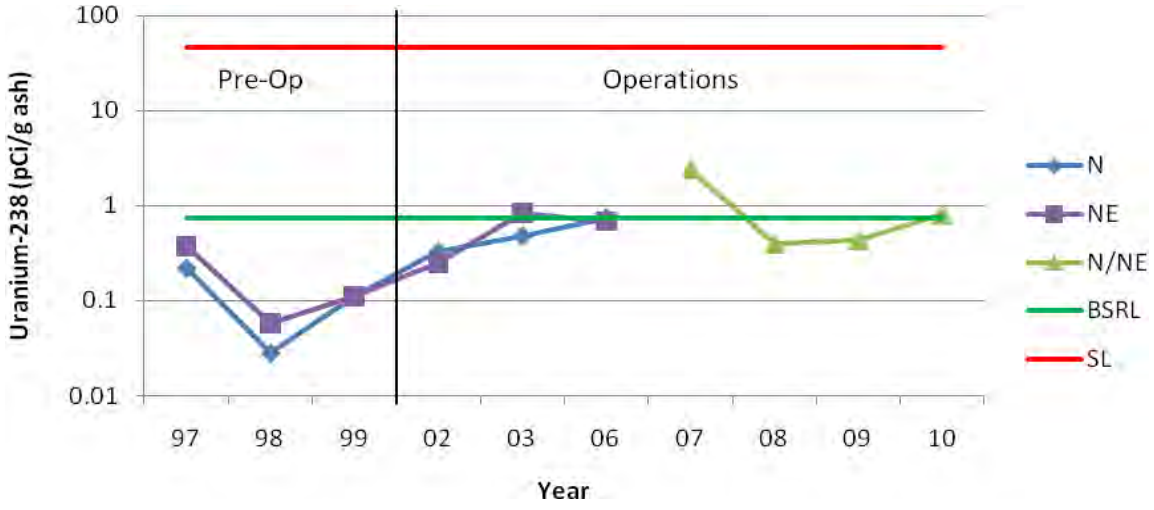

Figure 5. **Uranium-238 concentrations in (whole body) mice collected from the north (N) and northeast (NE) side of the DARHT facility at TA-15 from 1997–1999 (pre-operations) through 2002–2010 (during operations) compared with the baseline statistical reference level (BSRL) and the screening level (SL). Note the logarithmic scale on the vertical axis.**

No TAL element analysis was conducted on the field mice in 2010. However, based on the previous years all TAL elements in field mice collected from the perimeter of the north and northeastern sides of the DARHT facility were either not detected, were similar to RSRLs, or below ecological screening levels (ESLs). No evident trends were present. ESLs are based on the chemical concentrations in the soil because there are no direct SLs based on biota tissue concentrations (LANL 2005b).

Bee Monitoring. Radionuclide concentrations in bees from hives located on the northeastern perimeter of the DARHT facility were not analyzed this year. However, based on previous years, there were no significantly elevated levels of radionuclides in bees collected near the DARHT facility. In fact, the most prevalent radionuclide at DARHT, uranium-238, basically mimics the trends shown with other matrices, in that uranium-238 after an initial rise in 2005/2006 decreases to the BSRL (Figure 6). Again, this decrease may have been a result of the change in detonation mitigation practices from open and/or foam-mitigated detonations during the 2000–2006 periods to closed vessel containment starting in 2007.

Because we did not have a strong background data base for TAL elements, resources were diverted to analyze bees from regional sites; one sample from the DARHT facility was analyzed for TAL elements, however. Most of the TAL elements in bee samples collected from hives northeast of the DARHT facility were similar to RSRLs. The few TAL elements in bees that were higher than the RSRLs included aluminum, copper, vanadium, and lead. There are no ESLs listed for these elements in soil for bees, but the highest levels of these elements in soil around the grounds at DARHT are far below ESLs for other indicator biota receptors.

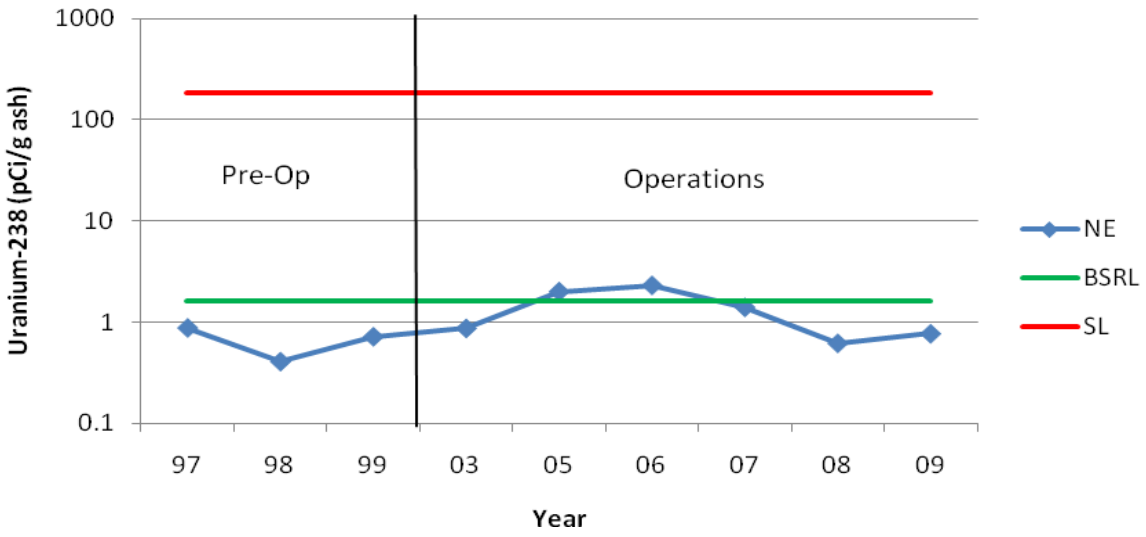

Figure 6. Uranium-238 concentrations in bees collected from the northeast (NE) side of the DARHT facility at TA-15 from 1997–1999 (pre-operations) through 2003–2009 (during operations) compared with the baseline statistical reference level (BSRL) and the screening level (SL). Note the logarithmic scale 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 is to determine the general (ecological) stress levels around the vicinity of DARHT caused by facility operations (e.g., noise, disturbance, traffic, etc.).

The number of birds, number of bird species, diversity, and evenness (distribution) collected in 2010 are similar to the same collected before the start up of operations at DARHT in 1999 (Figure 7). The 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*).

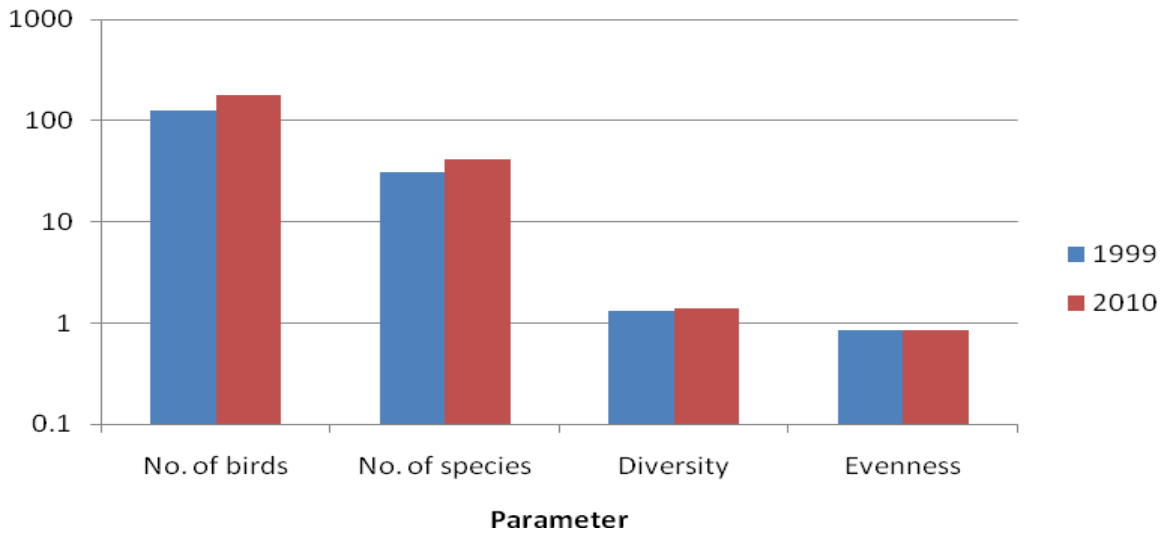

Figure 7. Populations, number of species, diversity, and evenness of birds occurring before (1999) and during (2010) operations at DARHT. Note the logarithmic scale on the vertical axis.

MAP Section VIII.A.1(c)

For routine DARHT facility operations, the sampling and analysis methodology used in the environmental baseline monitoring conducted under Section VIII.A.1(b) (see above) was designed to include environmental monitoring requirements under this mitigation action. Should the DARHT facility experience a substantial accidental spill or release of hazardous or radioactive materials, additional environmental monitoring would be conducted under this mitigation action as necessary. On January 18, 2005,

approximately 385 gallons of mineral oil were released from an aboveground storage tank into the secondary containment system during an oil transfer—this released material did not reach the environment since it was captured in secondary containment.

MAP Section VIII.A.1(d)

In accordance with the ROD for the DARHT Final EIS, DOE was operating the DARHT facility while implementing a program to conduct tests inside single-walled steel containment vessels with containment (Note: current DARHT nomenclature is confinement) to be phased in over 10 years (the Phased Containment Option of the Enhanced Containment Alternative) (DOE 1995). In general, open-air detonations occurred from 2000–2006 and detonations within a foam medium occurred from 2002–2006. A containment vessel qualification shot was conducted at the TA-36-06 firing point in 2006 and shots within single-walled steel containment vessels at DARHT were implemented in May of 2007. Three hydrodynamic test shots within single-walled steel containment vessels at DARHT were conducted in 2007. Two hydrodynamic test shots were conducted within single-walled steel containment vessels at DARHT in 2008. These steel containment vessels achieved at least a 40% reduction in material released to the open air as prescribed for Phase II of the Phased Containment Option.

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

Similarly, comparisons of potential contaminant releases during foam mitigation and the use of steel containment vessels using surface swipes, particulate air sampling, and monitoring of detonation gases at the vessel and around the immediate work area were made. 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 Impact

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 operation 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. Typically, non-recyclable materials are placed into 55-gallon drums, fixed with cement, and disposed of at TA-54, Area G (Martha Zumbro, personal communication, May 10, 2010).

Status

MAP Section VIII.A.2

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

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

Summary of Potential Impact

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 has been 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. In addition, a spill response/emergency response team and/or equipment would be available and could be deployed in the event of an accident.

Status

MAP Section VIII.A.3

Spill containment (physical barriers or sills) within the DARHT facility is in place and is maintained to contain all hazardous material spills that could occur. A Spill Prevention Control and Countermeasures Plan was completed and approved before DARHT facility operations began. This plan will be maintained for the life of the facility consistent with the requirements under the LANL Integrated Safety Management (ISM) System and Environmental Protection Agency Oil Pollution Prevention Regulation, 40 CFR Part 112. The DARHT facility has not had a substantial accidental spill of hazardous materials. Should an accidental spill occur in the DARHT facility, appropriate emergency actions will be taken in accordance with existing operational procedures. These emergency actions would include deployment of the LANL Hazardous Materials Response 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 was captured in secondary

containment and therefore did not reach the environment and did not require HAZMAT deployment.

Summary of Potential Impact

MAP Section VIII.A.4

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

Mitigation Action Scope

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

Status

MAP Section VIII.A.4

Water flow from the DARHT facility cooling tower is routinely monitored by ENV-RCRA to ensure compliance with the NPDES permit. There was an NPDES chlorine exceedance at the DARHT cooling tower (Outfall 03A185) in FY 2006. The compliance sample result of >2.2 mg/l exceeded the daily maximum permit requirement of 500 ug/l (0.5 mg/l). Corrective actions were taken to get the discharge back into compliance. There were no recorded NPDES permit exceedances at the DARHT cooling tower (Outfall 03A185) in FY 2010. ENV-RCRA continues to support DARHT facility representatives through monitoring and implementation of the requirements of the NPDES outfall permit.

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 plants.

Mitigation Action Scope

MAP Section VIII.B.1(a–c)

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

a) Adherence to all soil erosion mitigation measures in accordance with the operational Storm Water Pollution Prevention (SWPP) Plan to ensure that erosion and sedimentation are minimized and that drainage facilities are in place to control runoff. These measures include temporary and permanent erosion control, sedimentation control, surface restoration and revegetation, storm water 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 SWPP Plan if control measures are ineffective.
c) Establishment and continuance of erosion/sediment control best management practices. The best management practices required by the SWPP Plan shall be continually monitored and maintained.

Status

MAP Section VIII.B.1(a)

The DARHT facility operations are conducted in full compliance with an existing SWPP Plan. The SWPP Plan has been implemented to ensure that erosion and sedimentation are minimized and measures are in place to control runoff. The plan includes required measures for temporary and permanent erosion control, sedimentation control, surface restoration and revegetation, 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 SWPP Plan 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 SWPP Plan are determined to be ineffective, the scope and implementation of the operational SWPP Plan 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 SWPP Plan 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 SWPP Plan are modified, as necessary, by the WFO-FOD environmental personnel and ENV-RCRA.

Mitigation Action Scope

MAP Section VIII.B.2(a–e)

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

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

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

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

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

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

Status

MAP Section VIII.B.2(a)

DARHT facility operations are conducted according to procedures that, in part, restrict facility workers to designated areas. Access to undesignated areas of the DARHT facility site is managed according to procedures that restrict access to authorized personnel on special work assignments such as post-shot material recovery or fire

suppression operations. All other workers avoid off-road activities and stay within approved rights-of-way.

MAP Section VIII.B.2(b–e)

Under the ISM System at LANL, all planning, construction, and operations activities must comply with the institutional process established under LANL Implementation Procedure 405.0—also known as the NEPA, Cultural, and Biological (NCB) Review. [Note: These activities previously were governed by Laboratory Implementation Requirement 404-30.02.0.] This Implementation Procedure establishes the institutional requirements to ensure that contractual work smart standards for NEPA, cultural resources, and biological resources are consistently met. In addition to requiring full compliance with applicable NEPA, cultural resources, and biological resources federal regulations, P405.0 requires full and effective implementation of the LANL HMP (LANL 1998). 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 P405.0 and is responsible for developing, revising, and maintaining the document, as well as technically assisting the institution in 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 hazard trees that might damage the fence. The DARHT facility site forest thinning activities were conducted in consultation with the Ecology Group (now ENV-ES) to ensure appropriate protection (such as vegetation buffer zones and erosion control) of Mexican spotted owl and other wildlife habitat in the area. All applicable NEPA, biological resources, and cultural resources regulatory requirements—including MAP Section VIII.B.2(b–e)—for DARHT facility operations and other facility management activities around the DARHT facility site are fully addressed through the ongoing implementation of P405.0.

3.3 Mitigation Actions for Biological Resources

Summary of Potential Impacts

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

According to the DARHT MAP, DARHT facility construction and operation could impact federally protected threatened and endangered species such as the Mexican spotted owl because of noise from firings and other operations, as well as other activities at the firing site. These activities could impact other sensitive species potentially occurring in 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 Mountain 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 conducts the necessary species monitoring and habitat protection measures required for the DARHT facility site through the HMP (LANL 1998).

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, site-wide implementation of the HMP was included as part of the institutional requirements in P405.0. All applicable NEPA, biological resources, and cultural resources regulatory requirements (including MAP Section VIII.C.1 [b–d]; 2 [n–x]; 3 [a, b]; 4 [a–c]; 5 [a]; 6 [a]; and 7 [a, b]) for DARHT facility operations are addressed through the ongoing implementation of P405.0.

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 this potential impact 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, would be constructed as necessary on a case-by-case basis to mitigate blast effects.

e) Implementation of a long-term monitoring program 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 (at least once a year) arrange for tribal officials to visit cultural resource sites within TA-15 that are of particular interest to the tribes.

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 would evaluate procedures/measures for mitigation periodically. If damage is discovered, needed changes will be implemented and reported in the MAPAR. This will be done in consultation with the four Accord Pueblos (Cochiti, Jemez, Santa Clara, and San Ildefonso).

Status

MAP Section VIII.D.1(b)

In general, open-air detonations occurred from 2000–2006 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 a plume and the dispersal of materials (Duran 2008).

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

MAP Section VIII.D.1(e)

Based on the results of the annual nine-year-long (1998–2006) physical conditions assessment of Nake'muu, it was concluded that the natural environment, in particular the amount of yearly snowfall and elk moving through the site, is responsible for the deterioration of the standing wall architecture, not the operations at DARHT (Vierra and Schmidt 2006). As a result of this statistically quantitative study, it was determined that additional annual monitoring at Nake'muu under the DARHT MAP is not 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.

It is noted 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). During the period of FY 2006–2009 this LANL Cultural Resources Team (CRT) field check of Nake'muu was directly tied into the annual visit by the Pueblo of San Ildefonso required by the DARHT MAP. The field check provides a brief condition assessment of the standing walls to discuss with Pueblo of San Ildefonso visitors during the DARHT tour visit, as well as to check the condition of the fire road and fire break into Nake'muu.

In September 2003, a team from the Pueblo of 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 wall fall were noticed during a brief condition assessment conducted on July 28, 2006. However, the assessment conducted of Nake'muu 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 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 ENV-ES Resources Management Team (RMT). For the subsequent October 27, 2010, 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. No new wall collapse was observed.

MAP Section VIII.D.1(f)

In September 2004, DOE and LANL conducted site tours for tribal representatives to discuss Nake'muu monitoring and Cerro Grande fire rehabilitation projects. A tour of Nake'muu was conducted on May 18, 2005, with approximately 12 members of the Pueblo of San Ildefonso. In September 2006, a tour of Nake'muu was conducted with members of the Pueblo of Santa Clara.

Although the DARHT MAP physical assessment of Nake'muu was completed in 2006, it was determined that visits by the Pueblos would continue into the indefinite future. In FY 2007, the LANL CRT 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 of San Ildefonso visited Nake'muu. They were joined by then ENV-EAQ group leader, Dianne Wilburn, and Environmental Protection division leader, Victoria George. In FY 2009, the CRT attempted to schedule a Nake'muu tour for members of San Ildefonso Pueblo during September 2009, in accordance with site access restrictions and past practices. However, the interested San Ildefonso Pueblo members were unable to participate in a tour of Nake'muu until October 2009 (in FY 2010). To prevent site access restrictions and scheduling conflict issues, it was determined at that time that future tours will be conducted during the first quarter of each fiscal year (October–December), rather than in September. 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 from experiments that have the potential to generate fragments. Steel containment vessels were implemented in FY 2007 for the mitigation of material releases to the environment. Aqueous foam has been implemented as an alternative for the mitigation of material releases to the environment. The post-shot 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 Impact

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. This could occur as a result of DOE's lack of knowledge of these resources in the DARHT facility area.

Mitigation Action Scope

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

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

a) Consultation with the four Accord Pueblos will continue to identify and protect any such cultural resources throughout the life of activities at the DARHT facility.
b) Evaluation of cultural resources in the vicinity of TA-15 will also be coordinated with the New Mexico State Historic Preservation Officer (SHPO), as appropriate, for concurrence of eligibility determinations and potential effects.

Status

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

DOE and the 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).

To assist in the formal closure of DARHT MAP mitigation actions for cultural resources, we recommend that, beginning in FY 2011 or FY 2012, the annual visit of the Pueblo of San Ildefonso to Nake'muu and the associated rehabilitation monitoring and site condition assessment under the SEA MAP become part of the annual implementation of the Laboratory Cultural Resources Management Plan (LANL 2006) by the RMT, which is currently (2011) being revised and updated.

3.5 Mitigation Actions for Human Health and Safety

Summary of Potential Impact

MAP Section VIII.E.1(a)

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

Mitigation Action Scope

MAP Section VIII.E.1(a)

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

Status

MAP Section VIII.E.1(a)

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

Summary of Potential Impact

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 complete DOE-certified core radiological training (minimum Rad-Worker I level) and be enrolled in the LANL dosimetry program.

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

Status

MAP Section VIII.E.2(a–c)

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

4.0 CONCLUSIONS

In FY 2010, there were no significant impacts from contaminants based on measurements of soil, sediment, vegetation, field mice, and bees from DARHT operations. In addition, 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 2010 contaminant levels were not at concentrations detrimental to human health or to the environment, there were still measurable amounts of depleted uranium in all media and the levels were increasing over time to at least 2006. Concentrations of depleted uranium in most media decreased in 2007 and may correspond to the success of employing steel containment vessels and/or to a reduction of detonations. However, since increases of uranium in all media were noted to 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 as compared to open-air detonations, and the use of steel containment vessels further reduced those amounts over foam mitigation.

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

4.1 2011 MAP Implementation

In July 1999, all construction-related DARHT MAP mitigation commitments and action plans were completed. The FY 2010 DARHT MAP activities represent the eleventh year of operation implementation. The DARHT MAP activities implemented during FY 2010

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

4.2 Recommendations

- Future (2011) DARHT operations are anticipated to incorporate more contained tests. As a result, impacts from a given year of DARHT operations on the environment are expected to eventually decrease and this should be considered in future monitoring; however, uranium-238 appears to have accumulated in soils and sediments, particularly near the firing point, and may impact biological 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, and/or are on an increasing trend.
- Re-evaluate the environmental monitoring strategy for DARHT considering 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.
- The DARHT MAPAR will continue to be issued annually until the issuance of the new LANL SWEIS ROD and MAP. Upon the issuance of the new LANL SWEIS ROD and MAP, the DARHT MAPAR will be incorporated into a consolidated annual MAP report that will include all ongoing NEPA mitigation actions and any mitigation commitments associated with the new SWEIS ROD, scheduled to be issued in FY 2008. As has been done in the past, detailed analysis and the data of DARHT monitoring results are published in the annual ESR.
- Annual monitoring at Nake'muu has been discontinued, but site visits every two to three years 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).
- 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.

REFERENCES

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," 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 1995: 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).

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 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 1998: Los Alamos National Laboratory, "Threatened and Endangered Species Habitat Management Plan Overview," Los Alamos National Laboratory report LA-LP-98-112 (October 1998).

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, in preparation: Los Alamos National Laboratory, "Environmental Surveillance at Los Alamos during 2010," Los Alamos National Laboratory report in preparation.

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

NMED 2006: New Mexico Environment Department, "Technical Background Document for Development of Soil Screening Levels, Rev. 4.0," New Mexico Environment Department report (2006).

Nyhan et al. 2001: J.W. Nyhan, 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).

Yu et al. 1995: C. Yu, 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).

APPENDIX IV

Trails Management Program Mitigation Action Plan Annual Report Fiscal Year 2011

LA-UR-11-06159

Prepared by Daniel S. Pava
Environmental Stewardship Resources Management Team (ENV-ES)

LA-UR-11-06159
Approved for public release; distribution is unlimited.

Title: **FISCAL YEAR 2011 TRAILS MANAGEMENT PROGRAM MITIGATION ACTION PLAN ANNUAL REPORT OCTOBER 31, 2011**

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

Portion of the Anniversary Trail (2011).

Prepared for the Department of Energy/National Nuclear Security Administration Los Alamos Site Office

Los Alamos
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EST. 1943

ACRONYM LIST

BNM	Bandelier National Monument
DOE	Department of Energy
EA	environmental assessment
ENV-ES	Environmental Stewardship Group
FONSI	Finding of No Significant Impact
FY	Fiscal Year
LANL	Los Alamos National Laboratory
LANS	Los Alamos National Security, LLC
LASO	Los Alamos Site Office
LiDAR	Light Detection And Ranging
MAP	Mitigation Action Plan
MAPAR	Mitigation Action Plan Annual Report
NNSA	National Nuclear Security Administration
NPS	National Park Service
PRS	Potential Release Site
RMT	Resources Management Team
SHPO	State Historic Preservation Office
SME	Subject Matter Expert
SWEIS	Site-Wide Environmental Impact Statement
TA	Technical Area
TWG	Trails Working Group
USFS	U.S. Forest Service

Introduction and Background

In accordance with the 2003 *Final Environmental Assessment for the Proposed Los Alamos National Laboratory Trails Management Program* (DOE/EA-1431; DOE 2003), Los Alamos National Laboratory (LANL) continues to implement a Mitigation Action Plan (MAP) for this Environmental Assessment (EA) through the Trails Management Program. This MAP Annual Report (MAPAR) has been prepared for the Department of Energy (DOE), National Nuclear Security Administration (NNSA) as part of implementing the Los Alamos National Laboratory (LANL) Trails Management Program MAP, which is now a part of the 2008 LANL Site-Wide Environmental Impact Statement (SWEIS) MAP. The objective of the MAP is to continue to implement the Trails Management Program and integrate future mitigation actions with the SWEIS MAP to decrease risks associated with trails use on DOE/LANL lands.

This MAPAR includes a summary of the Fiscal Year (FY) 2011 (October 2010 through September 2011) activities and accomplishments of the Trails Management Program. This is the sixth MAPAR, first was submitted to NNSA in January 2006.

Context: Trails at LANL

Trails use at LANL has been considered one of the benefits of working and living in Los Alamos. However, there was never an explicit DOE or LANL policy or mechanism to balance recreational trails use with environmental, cultural, safety, security, and operational concerns. In 2003, DOE directed LANL to look at establishing such a program. DOE/NNSA published the *Final Environmental Assessment for the Proposed Los Alamos National Laboratory Trails Management Program* and Finding of No Significant Impact (FONSI, DOE/EA-1431) on September 2, 2003. The NNSA issued a MAP for this EA on the same date. The most pertinent trails issues identified during scoping of the EA were:

- DOE/NNSA does not have a public recreational mission established by Congress.
- Public gets conflicting messages because signs, access controls, and enforcement at LANL vary.
- Trespassing occurs from LANL onto adjacent lands where trail use is not permitted.
- Trail use may pose 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. Some of the natural hazards have been magnified by the Cerro Grande Fire, and
- Security concerns are posed by the use of certain LANL trails.

The MAP for the LANL Trails Management Program established that the Trails Management Program 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 Working Group (TWG) made up of LANL and other agency's stakeholders was formed to carry out this program.

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.

Meetings

The TWG met nine times in FY 2011 (October 2010 to September 2011). The TWG held its 70th meeting in October 2010. Typically, attendees include LANL subject-matter experts along with representatives from Los Alamos County, neighboring Pueblos, Bandelier National Monument, the Santa Fe National Forest, and interested local residents. Agendas are distributed prior to each meeting and include in-depth and continuing discussion and resolution of trails mitigation actions. What follows are the highlights of the 2011 Trails Management Plan implementation.

Fixing and Protecting Trails

Rerouting and blocking certain spur trails in Technical Areas (TAs) 70 and 71 near Pajarito Acres continued in FY 2011 in an effort to minimize damage to sensitive sites.

Public Information

The Trails Management Program continued to coordinate with LANL Outreach and Emergency Management and Response to inform the public of trails closures due to the Las Conchas Fire, environmental remediation actions in Los Alamos Canyon, threatened and endangered species surveys, and programmatic conflicts. Additionally, a letter was drafted at the request of the LASO Site Manager to respond to a member of the Northern New Mexico Citizens Advisory Board about opening the Los Alamos Canyon trail. Twenty-four new metal trail head signs were posted at a variety of LANL trail heads. They are now visible on the Ancho Springs, Anniversary, Deadman's Crossing, Devaney/Longmire, Hidden Canyon, Potrillo Canyon, Water Canyon and Wellness Trails (Photograph 1).

Photograph 1. New trail sign installed in 2011 at the Anniversary Trail.

On May 7, 2011, the TWG and archaeologists from the Resources Management Team (RMT) hosted public tours of Tsirege Pueblo at TA-54 as part of New Mexico Heritage Preservation Month. There was great interest in the tours and long waiting lists for the 45 available spots. Three tours were offered beginning at 9am, then at 11 am and at 1pm. Each tour departed from the Environmental Stewardship Group (ENV-ES) office's

parking lot in White Rock where an Atomic City Transit bus conveyed visitors to the trailhead just about a mile and a half away. Participants were briefed about Tsirege by LANL cultural resources subject matter experts (SMEs) and were provided with an article about early archeological excavations at the site. They were told of potential hazards and proper etiquette while at the site. Bryan Montoya, Lieutenant Governor of the Pueblo de San Ildefonso joined the first tour. Much was learned from this day of tours that can be applied to future openings of this site and others at LANL.

Cultural Resources Protection

Two studies funded by the Trails Management program were released in October 2010. One of the reports is the *Mortandad Cavate Complex Baseline Study*, and the other is the *2010 Response to the Impact of Social Trails Use on Cultural Resources in Technical Areas 70 and 71, at Los Alamos National Laboratory, New Mexico.* Both reports are online at http://www.lanl.gov/environment/outreach/working_groups/tawg.shtml.

Site visits were made to TA-70 and 71 to determine where trails needed to be rerouted, and to assess options for protecting cultural sites from erosion and runoff. Revegetating, hydroseeding and straw waddles will be used at TA-70 and 71 to help stabilize these sites. Twenty "this way" arrow signs were fabricated and have been posted on trails in TA-70 and 71. The signs direct trail users to preferred and realigned routes, avoiding cultural sites that require protection.

Members of the TWG presented the results of the Light Detection And Ranging (LiDAR) studies at Mortandad Cave Kiva that document rock images around and in the Mortandad Cavates.

TWG members submitted documentation to the New Mexico State Historic Preservation Office (SHPO), which led to a determination that the Anniversary Trail and the Camp Hamilton Trail were not eligible for the National Register of Historic Places. In both cases, this determination of not eligible will make trail repairs easier in the future.

The Trails Management Program provided the LASO with a map detailing areas of concern such as Potential Release Sites (PRSs) and other hazards that will assist the National Park Service (NPS) on an action plan for patrolling certain LANL areas and trails.

Biological Resources Protection

Mexican Spotted Owl surveys began March 1st and concluded May 1st. There were seasonal trail closures while the surveys were conducted. Most trails were reopened, but trails in areas where the surveys indicated owls were present remained closed until August 31st.

Security and Safety

The Trails Management Program continues to coordinate with Bandelier National Monument (BNM or Bandelier) law enforcement on patrols and trespassing issues, and LANL cultural resources staff members contact Bandelier when doing field work in the areas patrolled by their rangers; and with LANL security on matters of site visits, 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 the county and LANL, including trails maintenance, closures, and way finding.

Las Conchas Fire

LANL was closed for about 10 days during the Las Conchas fire beginning June 27 and reopening on July 6, 2011 most trails remained closed ("Warning Stay Out" signs had been posted at trailheads during the closure) based upon consultation with the Trails Management Program. Assessments of trails for safety and to document any impacts were conducted before any trails were reopened to the public. On July 27, most trails, with the exception of trails that accessed Los Alamos Canyon, and in those potentially affected by flooding between TA-3 and TA-16 were reopened. Assessments at TA-70 showed there was no damage to cultural resources during the fire.

There was post-fire flooding in and around the Pajarito and Water Canyon drainages that flowed onto LANL between TA-9 and TA-16; south of Pajarito Canyon and north of Cañon de Valle. The flow crossed Anchor Ranch Road and took out 20 feet of fence. There was ten feet of sediment in one area. Trail users (and others in the area) need to be aware of the changed conditions and the possibility that flooding may now happen where it was not previously expected.

Fire impacts to the Los Alamos County trail system were nil except for the Quemazon and Perimeter trails that were used by fire fighters and for fire breaks. Three major watersheds (Alamo, Frijoles, and Capulin Canyons) at Bandelier were severely burned. Mesa-tops fared better. It will take a lot of work to rebuild the trails into the backcountry canyons. The Tsankawi Unit at Bandelier has experienced a large increase in use, but parking adjacent to New Mexico State Road 4 compromises traffic safety. The NPS has asked LANL and LASO to help address this situation. The most-impacted trails in the Santa Fe National Forest were those in Water Canyon where trails were obliterated. Valles Canyon is not quite as bad but the situation is similar. The Caballo Mountain and Pajarito Canyon Trails on U.S. Forest Service (USFS) land were completely erased. Flooding is likely in all of these areas. The USFS will be working with the Volunteer Task Force and others to resume trails maintenance.

APPENDIX V

Fiscal Year 2011 Special Environmental Assessment Mitigation Action Plan (SEA-MAP) Annual Reporting for Heritage Resources

LA-UR-11-06159

Prepared by Alexander Johnson and Ellen McGehee
Environmental Stewardship, Resources Management Team (ENV-ES)

LA-UR-11-06159
Approved for public release; distribution is unlimited.

Title: **FISCAL YEAR 2011 SPECIAL ENVIRONMENTAL ASSESSMENT MITIGATION ACTION PLAN ANNUAL REPORT FOR HERITAGE RESOURCES**

APRIL 2012

Preparers: **Alexander Johnson and Ellen McGehee, Environmental Stewardship, Resources Management Team (ENV-ES)**

Montoya Homestead Site, LA 21334 (2011).

Prepared for the Department of Energy/National Nuclear Security Administration, Los Alamos Site Office

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ACRONYM LIST

CCC	Civilian Conservation Corps
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
NMCRIS	New Mexico Cultural Resource Information System
NNSA	National Nuclear Security Administration
RMT	Resources Management Team
SEA MAP	Special Environmental Assessment Mitigation Action Plan
SHPO	State Historic Preservation Office
SME	Subject Matter Expert
TA	Technical Area
TCP	Traditional Cultural Property
WFO	Weapons Facilities Operations

EXECUTIVE SUMMARY

This report summarizes the Fiscal Year (FY) 2011 findings of the Los Alamos National Security, LLC (LANS) Environmental Stewardship (ENV-ES) Group relating to the monitoring of archaeological sites (both Ancestral Pueblo and Homestead sites) and historic buildings damaged or otherwise compromised by the May 2000 Cerro Grande Fire. The project was conducted in support of the Cerro Grande Fire Special Environmental Analysis Mitigation Action Plan (SEA MAP) (DOE 2001).

The original SEA MAP stated that review, evaluation, and stabilization of cultural resources within the Los Alamos National Laboratory (LANL) and land administered by the Department of Energy (DOE) areas burned by the Cerro Grande Fire and in 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. Where site stabilization or protection measures would be determined necessary, these measures would be performed. Ongoing consultation with the New Mexico State Historic Preservation Officer (SHPO), as well as local pueblos and tribes, could result in the identification of additional sites at LANL that require such action. These sites would also undergo appropriate review, evaluation, and stabilization as needed. Generally, these measures consisted of the placement of sandbags, straw bales, jute matting, rock check dams, and other similar preventive measures.

Prehistoric (Ancestral Pueblo) Sites

Mitigation History

Cultural resources management staff from the ENV-ES Resources Management Team (RMT) are responsible for carrying out the SEA MAP prehistoric site monitoring. The Laboratory has been surveyed by cultural resources staff to assess the range of impacts from the fire on prehistoric sites. A report on these data and analyses was prepared for the DOE/National Nuclear Security Administration (NNSA), Los Alamos Site Office (LASO) (Nisengard et al. 2002). Rehabilitation at 107 archaeological sites was conducted in 2003 by a team from the Pueblo of 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 along fire roads or other sites potentially vulnerable to fire suppression activities. Single sites as well as clusters of sites were fenced.

In August and September 2005, monitoring was performed by LANL cultural resources staff at 96 of these 107 rehabilitated sites (Nisengard et al. 2005). Seven of the 11 sites not

visited were excavated as part of the ongoing DOE Land Conveyance and Transfer Project archaeological data recovery in Rendija Canyon, and they no longer have cultural significance under the National Historic Preservation Act. The remaining four sites (three in Rendija Canyon and one in what is now the Weapons Facilities Operations or 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 mitigation program and to recommend additional monitoring and/or mitigation actions at these 107 sites, as warranted.

During FY 2006, the cultural resources staff conducted SEA MAP field checks at 32 Ancestral Pueblo sites in various LANL Technical Areas (TAs) and at the two Traditional Cultural Property (TCP) 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 34 locations were visited again in FY 2007 and FY 2008, but no photographs were taken in FY 2008. The determination was made in FY 2008 that rehabilitation was complete at seven of the sites, and that they be removed from the annual monitoring requirement. FY 2009 field checks were made at the 25 remaining sites and the two TCP fenced areas recommended for continued monitoring. Because of the close proximity of LA 4602A (which had been recommended in FY 2008 for no further monitoring) to LA 4602B, observations were made during the monitoring of LA 4602B suggesting that at least one more year of monitoring and treatment for LA 4602A was warranted. Twenty-eight sites were assessed during the FY 2009 SEA MAP monitoring program. Field work was conducted by cultural resources staff using a two-person team during the period of July 21, 2009, to August 4, 2009, and during September 23–24, 2009. Eight additional sites were recommended for removal from monitoring in FY 2010, leaving just 18 sites for continued monitoring. The two TCP fences in Rendija Canyon were repaired in FY 2008, and after inspection in FY 2009 were removed from SEA MAP monitoring.

FY 2010 SEA MAP monitoring was undertaken by a two-person team on July 31, 2010, and from August 18–25, 2010. Most of the individual site issues identified during the FY 2009 monitoring program persisted as issues in FY 2010. Altogether, 18 prehistoric sites were assessed. Two were recommended for rehabilitation measures during FY 2010, and 15 were slated for mitigations in FY 2011. These mitigations primarily consisted of fence repair, snag removal, and wattle installation (Figures 1–10).

Figure 1. LA 89727, before snag removal (FY 2011).

Figure 2. LA 89727, snag removal, facing south (FY 2011.

Figure 3. LA 89779, before wattle reinstallation (FY 2010).

Figure 4. LA 89779, after lowering wattles (2011).

Figure 5. LA 86651, logs for erosion control (FY 2009).

Figure 6. LA 86651, a return to pre-fire hydrologic conditions (FY 2011).

Figure 7. LA 89803, fence absent (FY 2005).

Figure 8. LA 89803, fence repaired (FY 2011).

Figure 9. LA 89714, fence down (FY 2010).

Figure 10. LA 89714, fence repaired (FY 2011).

FY 2011 Observations and Rehabilitation Actions (Prehistoric Sites)

Nearly all of the sites slated for monitoring and mitigation during FY 2011 have returned to pre-fire conditions, thus requiring no further action. The five sites slated for rehabilitation in FY 2012 will require wattle installation and hydroseeding; one site (LA 4697) needs an assessment by a LANL stormwater subject matter expert.

Table 1 summarizes the recommendations and rehabilitation actions from the FY 2011 SEA MAP field monitoring season for the 15 sites recommended in FY 2010 for continued monitoring and mitigation. The table includes a column listing the FY 2009 recommendations, which is then followed by columns listing the 2010 and 2011 recommendations and mitigations. The green color cells indicate sites with ongoing issues requiring monitoring and associated rehabilitation through FY 2012. The pink colored cells indicate sites deemed to be rehabilitated and recommended for removal from future SEA MAP monitoring requirements. Ten additional sites are recommended for removal from monitoring in FY 2012, leaving just five sites for continued monitoring as part of the SEA MAP. Once these five sites have been rehabilitated and mitigated, it is anticipated that all SEA MAP prehistoric sites will have returned to pre-fire conditions and monitoring of these sites can come to an end.

Table 1. Prehistoric (Ancestral Pueblo) sites revisited in FY 2009, 2010, and 2011. Green cells indicate ongoing monitoring and other recommendations; pink cells represent rehabilitated sites that no longer require monitoring.

Site Number	TA or Canyon	FY 2009 Recommendations	FY 2010 Recommendations / Mitigations	FY 2011 Recommendations / Mitigations
LA 4601B	TA-5	Repair one fence section north of road damaged by snag, and two sections and t-post damaged by vehicle. Remove snags and repair east end of south fence. Cut and slash three snags along south fence. Blading of fire road and erosion has exposed possibly masonry wall stone and wall segments within roadbed. Erosion of road berms threatens intact deposits.	Reassess and define fence repairs. As observed in FY10 they did not appear as extensive as reported in FY09. Also, reassess the wall segments/stones reported in FY09 in roadbed. These could not be identified in FY10. 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 LANL Water Quality erosion expert. Recommended installing two wattles on north side of site adjacent to road and hydroseeding main rubblemound in FY12. Fence repairs completed. Continue monitoring.
LA 4602A	TA-5	Revisited as part of monitoring for the nearby site of LA 4602B. Erosion is still a problem on LA4602A rubblemound and along old road bed. Slash and spread fallen snags, and re-seed the old road (ca. 1/8 acre).	Erosion continues to be a problem on the LA4602A 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 LANL Water Quality stormwater SME.	Revisited with LANL Water Quality erosion expert. Recommend hydroseeding eastern portion of rubblemound adjacent to old road bed in FY12. Continue monitoring.
LA 4602B	TA-5	Place one to two wattles along east side of rubblemound, adjacent to and above the eroded area. Slash and scatter fallen snags. Reseed rubblemound and lightly eroded area nearby (ca. 1/8 acre).	Erosion continues to be a problem on the LA4602A rubblemound. However, unlike the FY09 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 consultation visit with Water Quality stormwater SMEs.	Revisited with LANL Water Quality erosion expert. Recommend installing wattles on eastern side of rubblemound and hydroseeding denuded areas in FY12. Continue monitoring.

Site Number	TA or Canyon	FY 2009 Recommendations	FY 2010 Recommendations / Mitigations	FY 2011 Recommendations / Mitigations
LA 89727	TA-15	Repair 10 sections (150-160 ft) of fence damaged by fallen snags. Cut and slash six fallen snags and scatter slash. Monitor vegetation for erosion control at least one more year.	Repair 10 sections (150-160 ft) of fence damaged by fallen snags. Cut and slash six fallen snags and scatter slash. Vegetation no longer a problem. Repairing the fence is a low priority due to the difficulty of emergency vehicles driving into site area.	Fence repaired and snags removed. Site assessed to have returned to pre-fire conditions. Remove from SEA MAP monitoring.
LA 89803	TA-15	Two broken fence sections to repair. Tighten three fence sections. Cut and slash two fallen snags. One large snag remains, 75 ft SW of SW corner.	Two broken fence sections to repair. Tighten three fence sections. Cut and slash two fallen snags. The large snag at SW corner is most likely too far to damage the fence if it were to fall.	Fence repaired and snags removed. Site assessed to have returned to pre-fire conditions. Remove from SEA MAP monitoring.
LA 15855	TA-16	Cut and slash snag and trim scrub oak in Feature C. Check fall snags by cliff face and their relationship to any and all petroglyphs on the cliff face at this location.	Cut and slash snag and trim scrub oak in Feature C. The fallen snag at the cliff face does not appear to be in a position to move during the next several years, and even then is unlikely to damage the petroglyph shrine area at the base of the small cliff.	Fallen snag assessed and determined to be no threat. Snag and scrub oak in Feature C cut and removed. Site assessed to have returned to pre-fire conditions. Remove from SEA MAP monitoring.
LA 86651	TA-16	Slash nearby fallen snags, and use for erosion control on south and southwest side of mound. Reseeding not necessary.	Additional vegetation has entered erosion area and the potential for erosion has lessened somewhat. Continue to monitor vegetation growth and erosion potential.	Site assessed to have returned to pre-fire conditions. Remove from SEA MAP monitoring.
LA 122031	TA-16	Erosion is no longer a problem, and few snags are present in the site area. Recommended treatment is for the placement of a fence along the southwestern edge of site next to road to prevent vehicles from driving over features (tire tracks were observed inside site boundary).	Vegetation growth is good, and erosion is no longer a problem. The only remaining issue is the need for a three-strand smooth wire fence adjacent to the dirt road along the western-southwestern boundary of the site.	Site assessed and determined that fencing is unnecessary due to lack of any vehicular traffic. Site has returned to pre-fire conditions. Remove from SEA MAP monitoring.

Site Number	TA or Canyon	FY 2009 Recommendations	FY 2010 Recommendations / Mitigations	FY 2011 Recommendations / Mitigations
LA 136825	TA-16	Cut nearby fallen snags and use slash for erosion control, especially upslope to the west of the structure, and to the south of the structure. Re-seed approximately ¼ acre to the south and west of structure.	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 FY12. Continue to monitor.
LA 12655 (Nake'muu)	TA-37	No erosion or snag problems. Need to trim scrub oak in next year or two.	No erosion or snag problems. Scrub oak grew vigorously in 2009-2010, and is starting to contact standing walls. Recommend trimming in 2011, but no later than 2012.	Site assessed to have returned to pre-fire conditions. Remove from SEA MAP monitoring.
LA 4697	TA-49	Masonry walls are visible extending across the fire break, with an estimated depth of cultural fill of 10-15 cm extending across a slight mounded area representing the original roomblock. Some erosion of nearby fire break and fire break berms. This area will be reassessed during 1st Qtr FY10 fire roads and fire break damage and site condition assessment. Snags and erosion inside the fence is only a very minor problem.	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 FY10, there was no additional damage by blading.	Site assessed and recommend visit with erosion expert in FY12. Continue to monitor.
LA 89746	TA-49	The two snags have fallen but still may pose a modest threat to the masonry rubblemound. Carefully slash and scatter branches without disturbing the rubblemound.	Same situation as 2009. The two fallen snags may pose a modest threat to the masonry rubblemound. Carefully slash and scatter branches without disturbing the rubblemound.	Snags removed from site. Site assessed to have returned to pre-fire conditions. Remove from SEA MAP monitoring.

Site Number	TA or Canyon	FY 2009 Recommendations	FY 2010 Recommendations / Mitigations	FY 2011 Recommendations / Mitigations
LA 89779	TA-60	High priority for treatment. Slash and scatter enough branches from the large splitting pinyon snag so as to reduce the weight load and prevent further damage to the masonry rubblemound. Erosion control needed to the west, north, and east sides of the rubblemound. Recommend four to five wattles, slash, and re-seeding to north and east (0.25 acres).	Site selected for mitigation in FY10. The pinyon snag was cut, with slash being scattered and trunk sections being placed in a circle around the structure for its protection. Six wattles were variously placed on the south, east, and north of the site for erosion control. An inspection of the wattles by Water Quality stormwater SME indicates that some of the wattles can be moved slightly and reset for more effective erosion control. Monitor the erosion during 2011 and reset any wattles as may be appropriate.	Wattles lowered to provide for better erosion protection. Site assessed to have returned to pre-fire conditions. Remove from SEA MAP monitoring.
LA 89714	TA-67	Repair 4 sections (ca. 50 ft) of eastern fence. Repair 1 section (ca. 16 ft) of western fence. Cut and slash four fallen snags; use slash for erosion control. Fill in two stump/root holes from fallen snags.	Same situation as FY09. Repair four sections (ca. 50 ft) of eastern fence. Repair one section (ca. 16 ft) of western fence. Cut and slash four fallen snags; use slash for erosion control. Fill in two stump/root holes from fallen snags.	Fence repaired and snags removed. Site assessed to have returned to pre-fire conditions. Remove from SEA MAP monitoring.
LA 89790	TA-67	Cut and slash seven fallen snags, and scatter slash for erosion control. Tighten five to six sections (70-80 ft) of fence badly bent by fallen snags, replacing fence strands as may be necessary.	Same situation as FY09. Cut and slash seven fallen snags, and scatter slash for erosion control. Tighten five to six sections (70-80 ft) of fence badly bent by fallen snags, replacing fence strands as may be necessary.	Fence repaired and snags removed. Site assessed to have returned to pre-fire conditions. Remove from SEA MAP monitoring.

Homestead and Depression Era Sites (circa 1887–1942)

FY 2010 SEA MAPAR recommended discontinuing the monitoring of the Civilian Conservation Corps (CCC) camp and several homestead sites that had been affected by the Cerro Grande fire because the sites were stable and no longer at risk for data loss due to fire-related impacts. Recommendations for FY 2011 work included repairing erosion-control measures at the Montoya Homestead, removing downed trees from historic features at the CCC camp and at Anchor Ranch, and submitting site form updates and revised eligibility recommendations for three historic trash scatters where in-field analysis was conducted as part of FY 2009 SEA MAP fieldwork (LA 89769, LA 89831, and LA 131236).

FY 2011 SEA MAP Summary (Homestead and Depression Era Sites)

Updated New Mexico Cultural Resource Information System (NMCRIS) site record forms were submitted to the SHPO in FY 2011 for the three historic trash scatters, and concurrence with revised eligibility determinations was received.

In FY 2011, members of the LANL RMT submitted a facilities services request (FSR) for removal of hazard trees at the CCC camp and at Anchor Ranch. Erosion control work at the Montoya Homestead was also part of the FSR's scope. Trees originally placed in erosion channels as post-Cerro Grande fire rehabilitation measures were removed and rock erosion-control measures were installed following recommendations from LANL stormwater SMEs (Figures 11–14). At the CCC camp, downed trees were limbed, sectioned, and removed from the immediate vicinity of the two affected site features; these trees were not removed from the site area and will be chipped in FY 2012.

The 2011 Las Conchas fire burned land west of Anchor Ranch and post-fire flooding impacted the reservoir where FY 2011 SEA MAP rehabilitation work was planned, making tree removal impossible. Future rehabilitation activities at Anchor Ranch will be part of Las Conchas fire recovery activities and not part of the SEA MAP scope.

Figure 11. Detail of erosion channel, Montoya Homestead, LA 21334 (2010).

Figure 12. New rock erosion-control measures, LA 21334 (2011).

Figure 13. Downed fire-killed tree on CCC camp feature (LA 21369B).

Figure 14. Same feature at CCC camp after tree was limbed and sectioned (2011).

Manhattan Project and Cold War Era Historic Buildings and Structures (1942–1963)

The FY 2010 SEA MAP annual report recommended continued monitoring at historic V-Site. Other recommendations included continued FY 2011 work to address 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 building TA-16-515. Furthermore, LANL RMT personnel were to make recommendations regarding the appropriate disposition of burned artifacts currently located at V-Site.

FY 2011 SEA MAP Summary (V-Site)

LANS RMT visited V-Site (TA-16-516 and TA-16-517) many times during FY 2011, conducting tours and checking on site conditions. Site work carried out in FY 2011 included identifying hazard trees located within the V-Site boundary fence, especially trees burned during the Cerro Grande fire that were contributing to fuel loading or threatening the remaining V-Site buildings and former building areas. The FSR for tree removal at homestead sites was modified to include the V-Site hazard trees. Trees were cut but left within the V-Site enclosure and will need to be chipped during FY 2012.

Burned artifacts were also evaluated for future disposition. Recommendations for treatment include keeping a representative collection of items, sending duplicate artifacts to salvage, keeping a few of the most significant artifacts to display inside the Assembly Building (TA-16-516), and, once cleared for release from TA-16, relocating the remaining representative artifacts to the RMT's historic artifact storage facility at TA-18.

Summary of Recommendations (Historic Sites)

Table 2 includes recommended FY 2012 rehabilitation for homestead sites including the chipping of cut trees at the CCC camp (LA 21369B). Additionally, cut hazard trees at V-Site should also be chipped. FY 2012 activities at historic building areas should focus on continued work at V-Site areas burned during the Cerro Grande fire, including the repairs to concrete pads, berms, and building foundations that were identified in FY 2010. Artifacts at V-Site should be disposed of or retained following RMT staff recommendations.

Table 2. Recommendations for FY 2012 SEA MAP Field Work/Other Actions (Historic Sites)

Historic Property Name	TA	Recommendations for FY 2012 SEA MAP Actions
Homestead and Depression Era Sites		
CCC Camp (Depression era), LA 21369B	TA-16	Chip cut trees previously located on historic features.
Manhattan Project and Cold War Buildings and Structures		
TA-16, V-Site	TA-16	Chip hazard trees cut in FY 2011; repair burned concrete pads in former building areas; repair berms and sump area at TA-16-515; and sort and document artifacts, retain representative collection for storage at TA-18, and display selected artifacts inside TA-16-516 at V-Site.

REFERENCES

DOE (Department of Energy)

2001 *Special Environmental Analysis for Actions Taken in Response to the Cerro Grande Fire Mitigation Action Plan Annual Report for 2001*. 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, NM.

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

2002 *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, NM.

Nisengard, J.E., K.M. Schmidt, B.C. Harmon, and W.B. Masse

2005 *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, NM.

APPENDIX VI

Large Game Management Plan Pajarito Corridor Study
Fiscal Year 2011 Status Report

LA-UR-11-06159

Prepared by Kathryn Bennett, Rhonda Robinson, and Leslie Hansen
Environmental Stewardship Resources Management Team (ENV-ES)

LA-UR-11-06159
Approved for public release; distribution is unlimited.

Title:	**LARGE GAME MOVEMENT CORRIDOR STUDY FISCAL YEAR 2011 STATUS REPORT** **APRIL 2012**
Preparers:	Kathryn Bennett, Rhonda Robinson, and Leslie Hansen Environmental Protection Division, Environmental Stewardship Group, Resources Management Team

Large game crossing a utility corridor at LANL.

Prepared for the Department of Energy/National Nuclear Security Administration Los Alamos Site Office

Los Alamos
NATIONAL LABORATORY
EST.1943

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ACRONYM LIST

BRMP	Biological Resource Management Plan
CP	control point, non-pinch point
ENV-ES	Environmental Stewardship Group
LANL	Los Alamos National Laboratory
LANS	Los Alamos National Security, LLC
LAPD	Los Alamos Police Department
LGMP	Large Game Management Plan
PP	pinch point
SWEIS	Site-Wide Environmental Impact Statement
TA	Technical Area

1.0 EXECUTIVE SUMMARY

The Large Game Corridor Study was initiated in the spring of 2011. The goals of the study are to develop and implement methods for verification of large game movements across pinch points, to identify areas on the Pajarito Corridor where animal movement may be constricted, and to understand where human-animal encounters occur most frequently. Initially, information on wildlife sightings and vehicular-animal accidents was collected using a reporting tool on the Los Alamos National Laboratory (LANL) website. In May, Los Alamos National Security, LLC (LANS) biologists installed wildlife cameras at pinch point and non-pinch point locations in the Pajarito Corridor. This report provides an interim status of the study for May through August 2011 a final report will be submitted in 2012.

Elk and deer are the most commonly observed animals reported by employees through the LANL website. Camera stations established for this project captured consistent animal use of pinch point areas along Pajarito Road. Camera data, gathered from May to August 2011, may provide information on the movements of large game animals on the Pajarito Corridor.

2.0 BACKGROUND

Activities on the Pajarito Plateau have the potential to influence how large mammals (e.g., elk, deer, and coyotes) move across the landscape. Impacts to wildlife on the Pajarito Plateau come in multiple forms. Two major wildfires (the 2000 Cerro Grande fire and the 2011 Las Conchas fire), bark beetle tree mortalities, drought, construction, development, and tree thinning have all played a role in the lives of wildlife on the Pajarito Plateau. Questions about the impacts of LANL operations on wildlife have been raised in the past. Bennett (2006) developed a spatial elk movement model to predict how elk move across LANL on a seasonal basis. Using the movement model and updated information on LANL facilities, biologists estimated the location of large game movement corridors and pinch point areas. Pinch points are areas of the movement corridors that are constricted by topographic features or other physical barriers including fences and buildings. Three pinch points were identified along wildlife corridors that cross the Pajarito Corridor.

The goal of the Large Game Corridor Study is to develop methodology to validate the modeled pinch points that lie within the Pajarito Corridor. The more spatially accurate corridors and pinch points are, the more effectively they can be managed. By identifying corridors and pinch points, projects are better equipped to manage activities and minimize adverse human / large game interactions. Safety issues (e.g., traffic accidents and nuisance animals) are more likely when large game corridors cross areas of high human usage.

Modeled movement corridors and pinch points are the basis for the development of a Large Game Management Plan (LGMP), which will be implemented under the Biological Resource Management Plan (BRMP). The LGMP will provide management strategies for large game corridors and pinch points, which will be incorporated into the Integrated Land Management Plan spatial analysis tool and the 50-Year Environmental Stewardship Plan for LANL.

3.0 STUDY AREA

The Pajarito Corridor is a series of Technical Areas (TAs) along Pajarito Road. Over the next 10 years, many of the facilities will be updated and modernized. The Pajarito Corridor starts at the intersection of Diamond Drive and Pajarito Road and extends east to the intersection of State Road 4 and Pajarito Road.

The elevation within the Pajarito Corridor ranges from 6521 ft on the east side to 7420 ft on the west side. The habitat within the general area varies from ponderosa pine on the mesa tops within the higher elevations to piñon-juniper woodlands at the lower elevations. There are open field areas on some mesa tops containing grasslands, and areas of wetlands and riparian habitats within the bottom of Pajarito Canyon. Two-mile Canyon lies to the south of the Pajarito Corridor in the upper or western part of the Corridor. In the central portion of the Pajarito Corridor, Pajarito Canyon lies to the south. In the lower or eastern portion of the Pajarito Corridor, Pajarito Road lies in the bottom of Pajarito Canyon. Mortandad Canyon lies to north of the Pajarito Corridor in the upper west portion, and Cañada del Buey lies to the north in the eastern portion of the corridor.

Three pinch points on the Pajarito Corridor have been identified with many large game corridors crossing the Pajarito Road (Figure 1). One pinch point is located to the east of TA-59, in a small drainage area. The second pinch point occurs mainly on the south side of Pajarito Road in TA-55/50/63/66. The last pinch point occurs near TA-18 and TA-54 on the south side of Pajarito Road in TA-51.

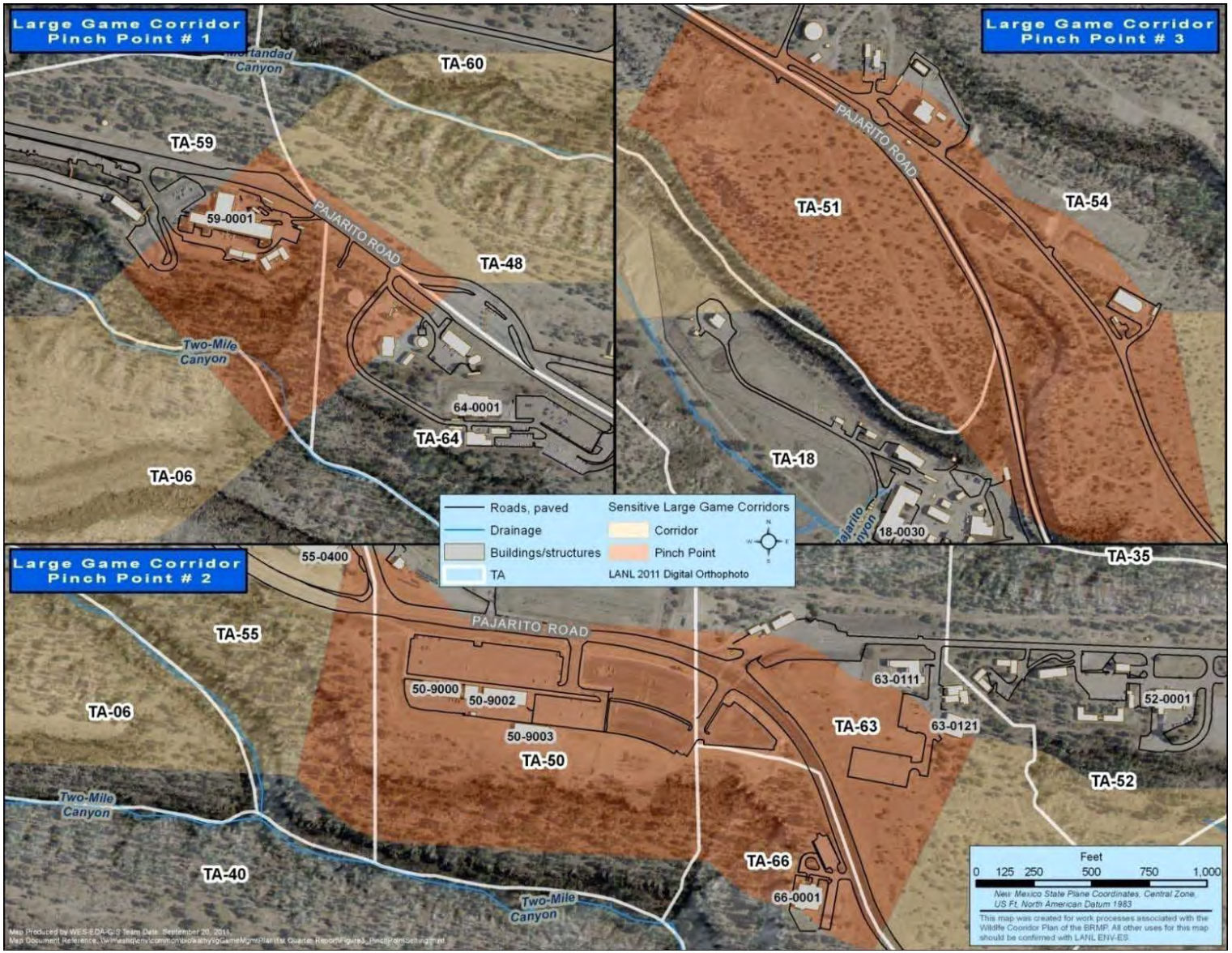

Figure 1. Large game pinch points in the Pajarito Corridor.

4.0 METHODOLOGY

This study was designed in two tiers. The first tier focused on using administrative efforts to increase the awareness and reporting of wildlife sightings, including vehicular accidents involving large game. These sightings can aid in verifying the large game corridors. The second tier involves the use of remotely triggered cameras to capture wildlife observations in the pinch point (PP on Figure 2) and control point (CP on Figure 2; non-pinch point) locations.

Administrative tasks were designed to increase the reporting of wildlife sighting observations. Information on wildlife observations or vehicular accidents with wildlife is reported sporadically. Quality observational data can be used in the model validation process. Observations must include accurate spatial information and date and time. Observational data is dependent on the quality and number of observations recorded. The Los Alamos Police Department (LAPD) and LANL's Emergency Operation Center were contacted to obtain police reports of vehicular-animal accidents. Information concerning vehicular–animal accidents was recorded and accident locations were plotted on maps. Accident data were analyzed by animal species and time of day.

4.1 Wildlife Cameras and site selection

Wildlife cameras are an effective way to gather observational type data remotely (Cutler and Swann 1999). The Bushnell Trophy Cam is a digital camera equipped with a highly sensitive passive infrared motion sensor and consumes little power. The Trophy Cam is equipped with a built-in infrared LED that functions as a flash, so pictures can be taken in low-light conditions. Low light or night photographs are taken in black in white while day photographs with sufficient sunlight are taken in color. Two digital cameras were used at each observation area to gain information on the species observed, date, time, sex, and in some cases the identification of individual animals. Two cameras were at each station to maximize the potential of viewing wildlife in case of a camera failure.

Six wildlife camera stations were selected within the Pajarito Corridor (Figure 2). Three camera stations were placed in the three pinch points, one in each pinch point. The camera stations were placed in areas that highlighted the area of constriction and had evidence of wildlife use. Three additional camera stations were established in non-pinch point areas to serve as controls. The control area camera stations were placed in non-movement corridor areas, but areas where wildlife encounters were possible (e.g., areas used by wildlife for foraging). A more detailed description of the camera station placement methodologies will be included in the final report.

The cameras were deployed at the six selected sites in early April and the study began officially on May 12, 2011. All cameras were set with the same camera settings. Cameras were set to place a date and time stamp on each image as well as the moon phase and

the ambient temperature. Cameras were checked on a weekly basis and the memory cards were replaced. All details of the camera check were recorded in the field log book by date.

4.2 Image Processing

Each image was carefully screened for wildlife. Information collected included date and time of the image, wildlife species, number of animals, sex of the animal (when detectable), and camera station. Unique observations were determined by the time stamp between images. Time stamps were compared between cameras at the same station to reduce double-counting. In night images, animal identification was based on animal size, body shape, and if multiple time series pictures existed, by movement.

4.3 Data Analysis

Species composition, abundance, and time of day data were calculated for each camera station on a monthly basis. Species composition is based on the number of species observed at each site and species abundance is the number of animals observed at each site. Time of day provides information about the frequency of animals by species at a given time. A day is divided into six intervals (12 am to 4 am; 4 am to 8 am; 8 am to 12 pm; 12 pm to 4 pm; 4 pm to 8 pm and 8 pm to 12 am). Once one year's data are collected, additional analysis and statistical examination of the data will be performed.

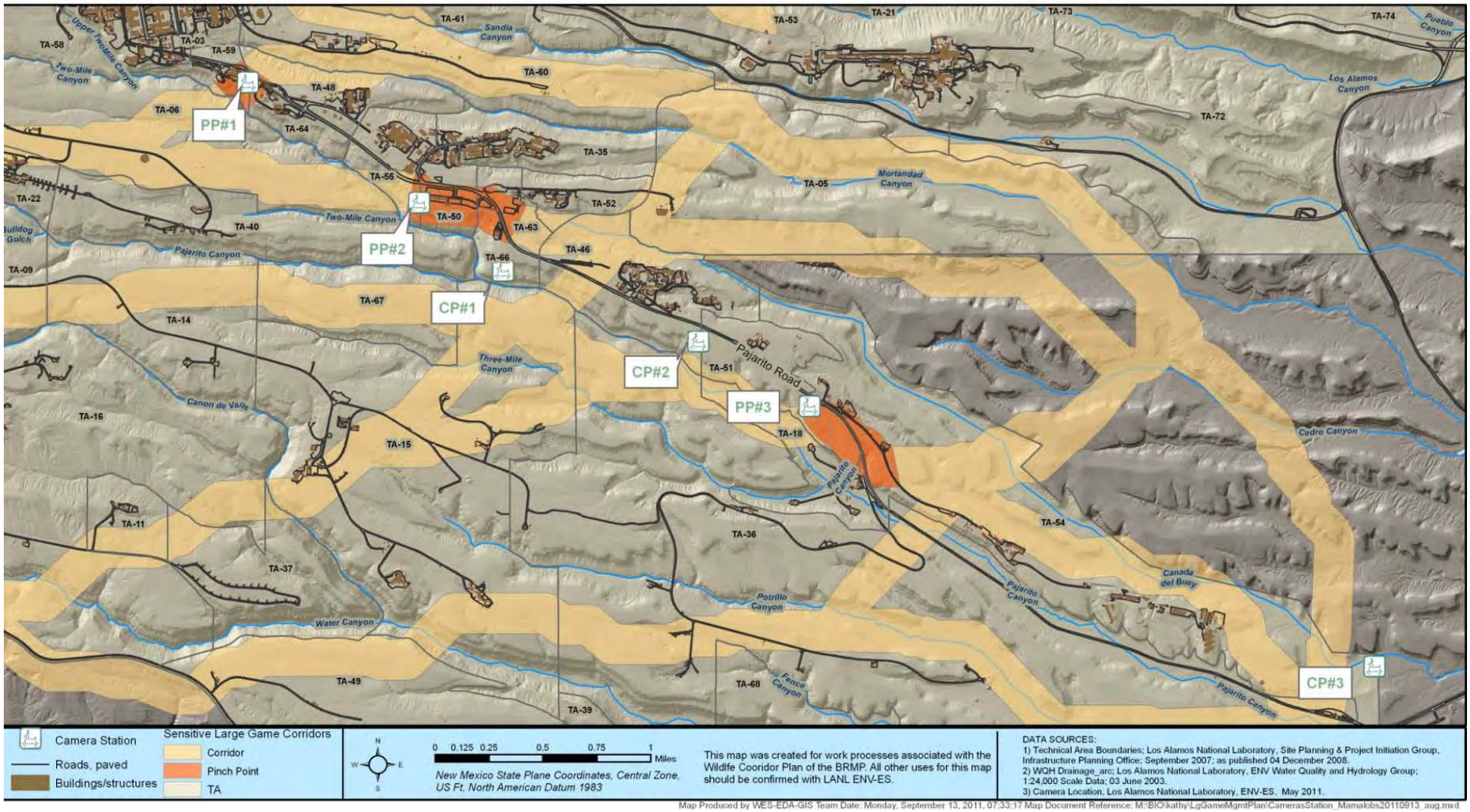

Figure 2. Location of wildlife camera stations.

5.0 RESULTS

5.1 LANL Wildlife Reporting

In 2011, LANL employees reported 174 wildlife observations through the LANL website (Figure 4). Deer were the most common and elk were the second most common observation (Table 2). The majority of these observations occurred on LANL lands.

Table 2. Wildlife incident reporting through the LANL reporting tool.

Wildlife Observation	Percent	Count
Bear	12.1	21
Bobcat	3.4	6
Coyote	13.2	23
Deer	32.8	57
Elk	20.7	36
Mountain lion	2.3	4
Raccoon	1.7	3
Unknown	1.1	2
Other	12.6	22
Total	***100.0***	**174**

5.2 Vehicular-Animal Accidents

According to records held by LAPD, from 1990 through July 2011, (data was not available for 2003 and 2004), there have been 335 reported vehicular-animal accidents in Los Alamos County. Nearly 74 percent of those accidents occurred on Laboratory lands (Figure 5). Within LANL, Pajarito Road had the most vehicular-animal accidents with 104 accidents or 31 percent. When broken out by three time periods (1990-1996, 1996-2002, and 2005 – July 2011), Pajarito Road consistently had the largest amount of vehicular–animal accidents on LANL. However, when comparing the three time periods, the first time period (1990-1996) had the highest number of animal related accidents on major LANL roads, and the last time period (2005- July, 2011) had the lowest number of accidents.

Vehicular accidents most commonly involved deer or elk. Vehicular-animal accidents were broken down into three periods and the frequency of accidents by species were plotted (Figure 6). When comparing periods, all periods showed more vehicular-animal accidents involved deer than any other species. However, from 2005 to July 2011, fewer accidents involved elk and more accidents involved deer. For all periods, the second most common animal involved in vehicular accidents was elk. While other species were involved in vehicular accidents, their frequency of accidents over the three different periods was one percent or less.

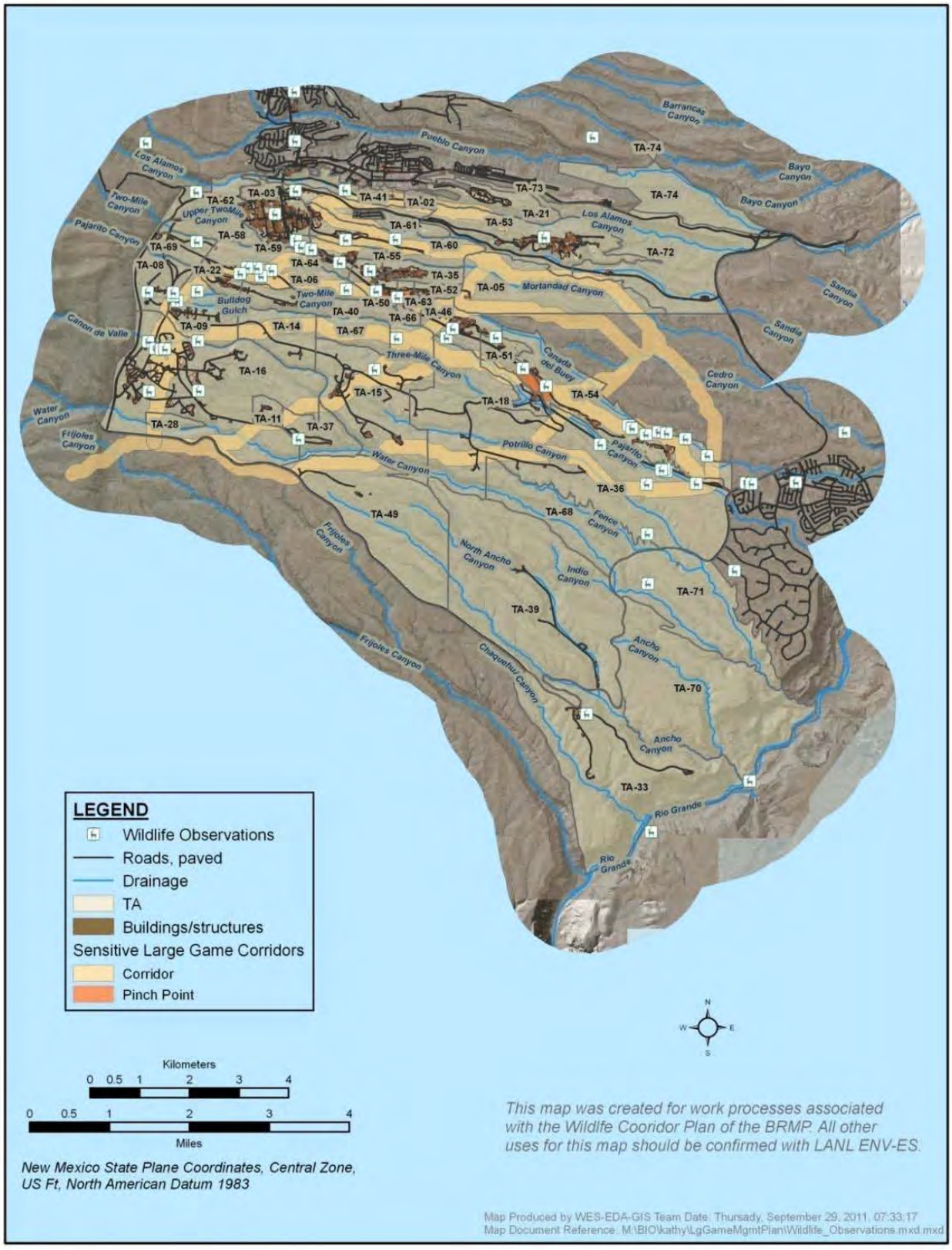

Figure 4. Locations of reported wildlife observations through the LANL reporting tool.

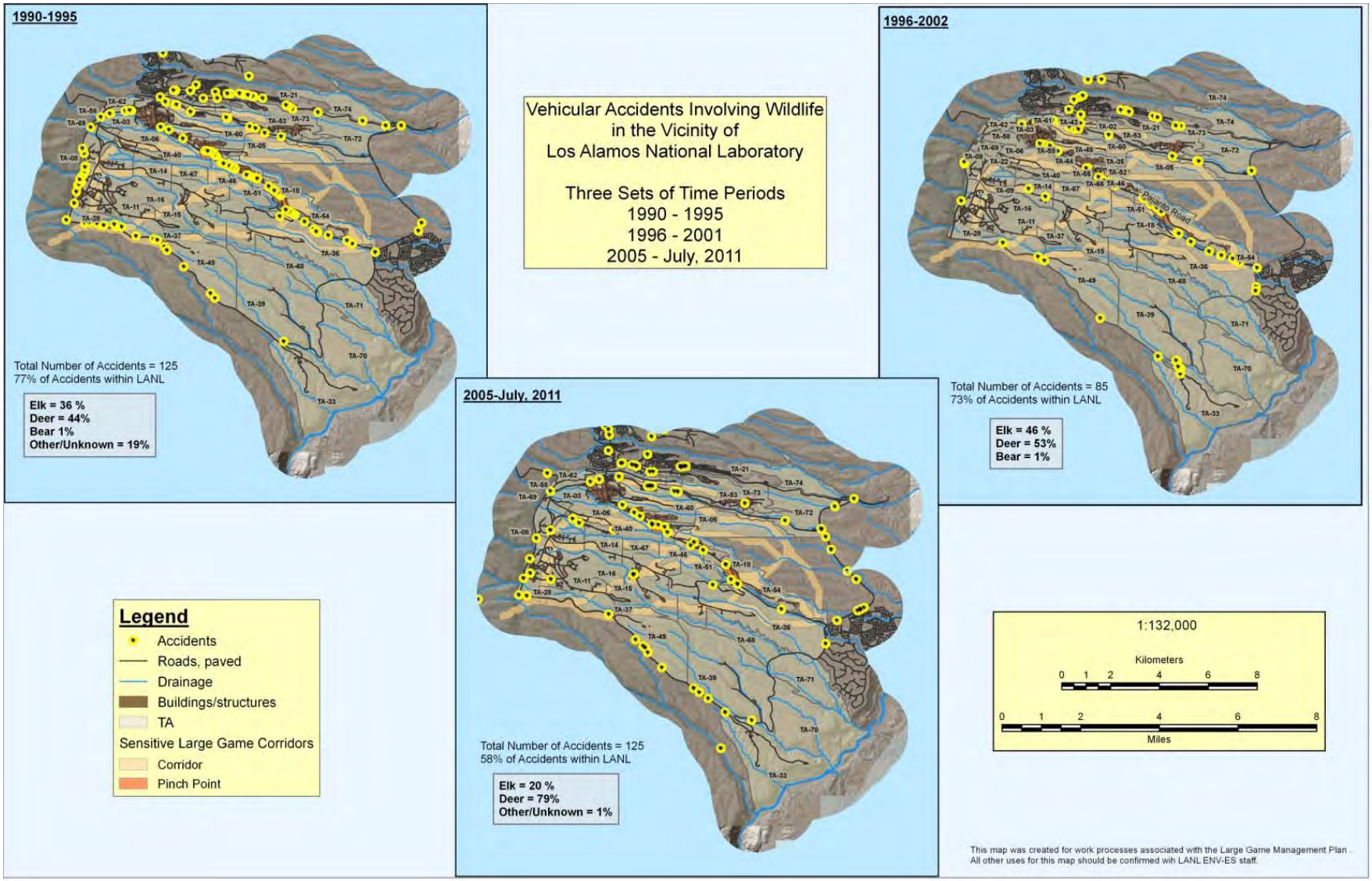

Figure 5. Locations of vehicular accidents involving wildlife for three different periods.

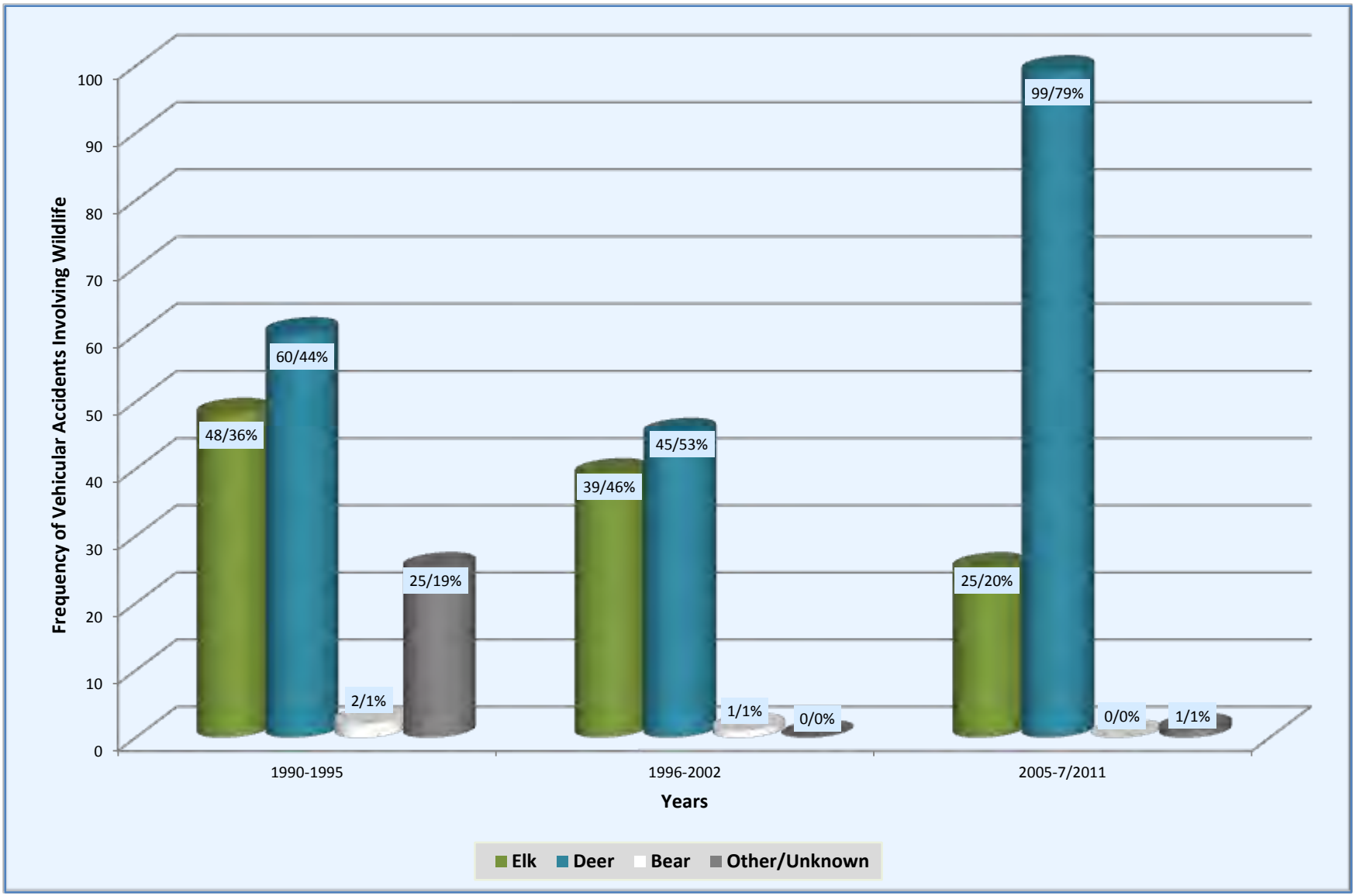

Figure 6. Frequency of vehicular accidents involving wildlife from 1990 to July 2011 in Los Alamos County.

5.3 Species Composition and Abundance

Camera stations captured images of bear, elk, bobcat, coyote, elk, deer, and other wildlife such as various birds. The numbers of animals observed were plotted by species and camera station (Figure 7). Elk were the most abundant species observed from May to August 2011 (713 elk). Deer were the second most common with 129 observations. PP-1 had the highest species richness of 7. CP-2 had the lowest species richness of 4 species. Over the four months, CP-1 had the highest number of individuals observed (356 animals), and CP-2 had the lowest number (43 animals). For the month of July, a map was created showing each camera station and highlighting a species observed at each station (Figures 8).

5.4 Time of Day Analysis

A breakdown of camera observations into six periods (12 am to 4 am, 4 am to 8 am, 8 am to 12 pm, 12 pm to 4 pm, 4 pm to 8 pm, and 8 pm to 12 am) within a day was conducted on the species with the most abundant observations, elk and deer.

The majority of the elk observations occurred during the time period of 12 am to 4 am (31 percent) and the second largest percent elk observations occurred in the 4 pm to 8 pm time period. The lowest percent elk observations occurred in the 12 pm to 4 pm time period.
The majority of deer observations occurred during the time period of 4 am to 8 am (47 percent); the second highest percent deer observations occurred from 8 pm to 12 am. The lowest percent deer observations occurred during the time period of 12 pm to 4 pm (Figure 9).

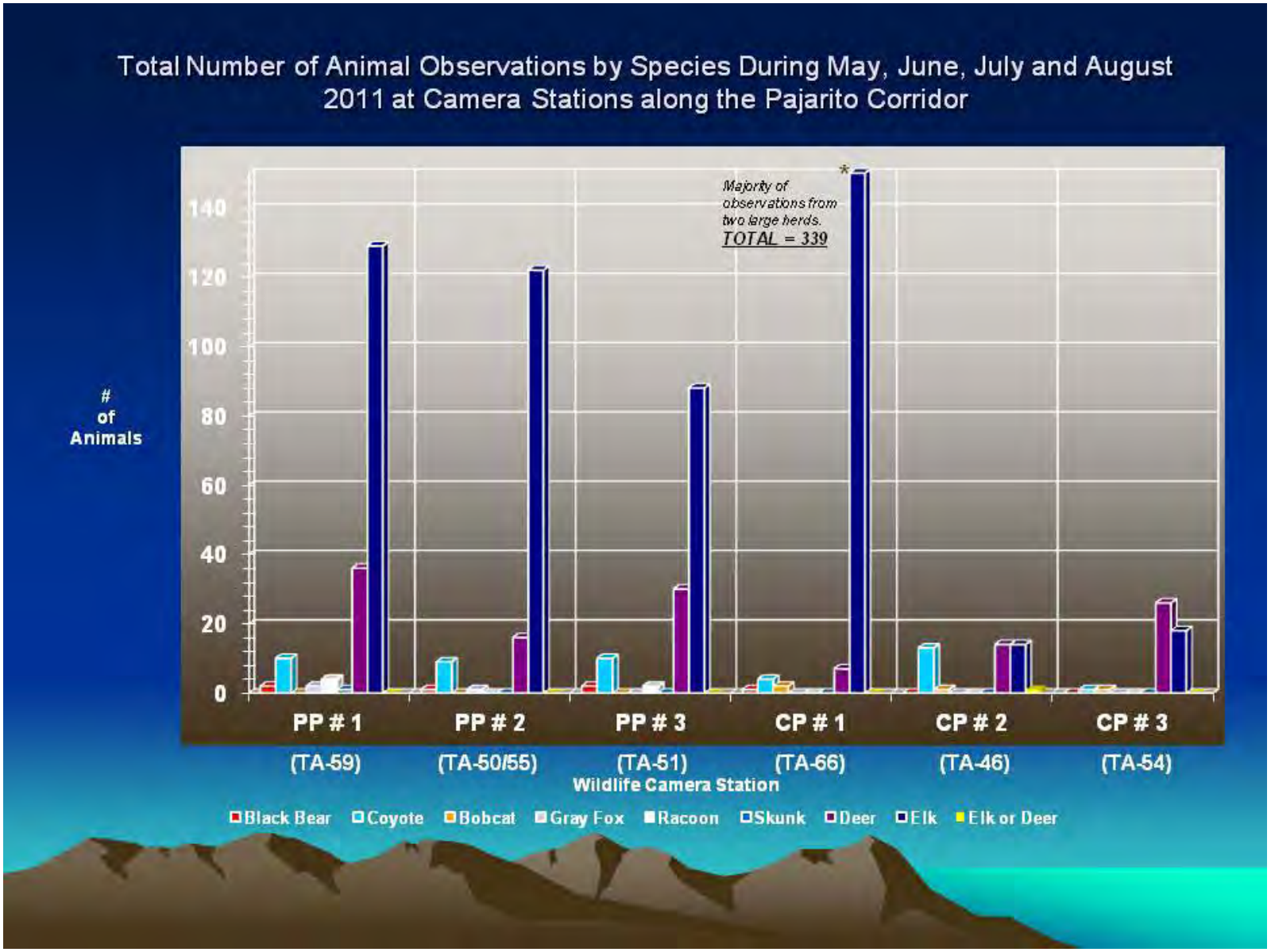

Figure 7. Total number of animal observations by species at camera stations, May-August 2011.

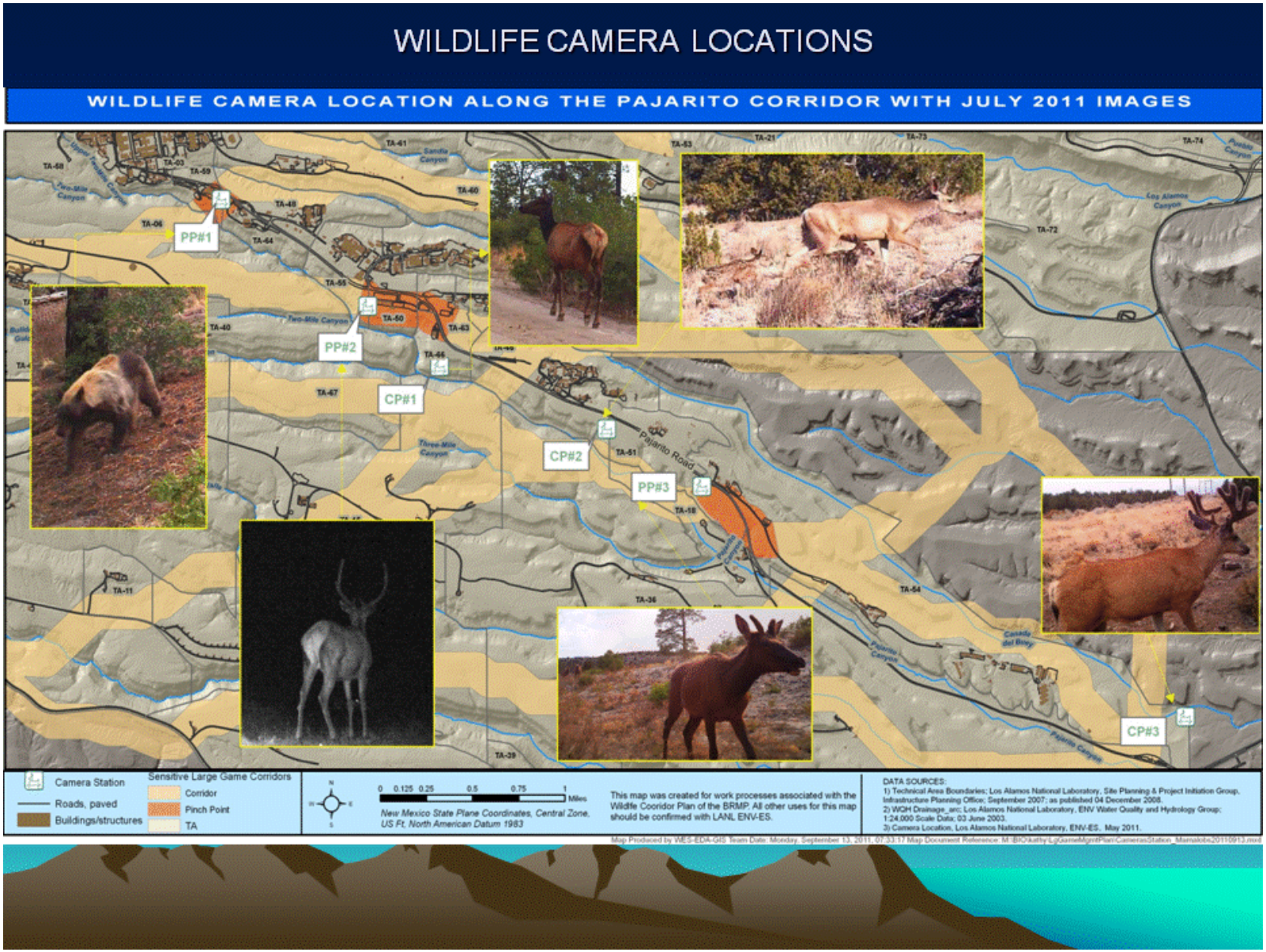

Figure 8. Wildlife camera locations showing examples of images taken in July 2011.

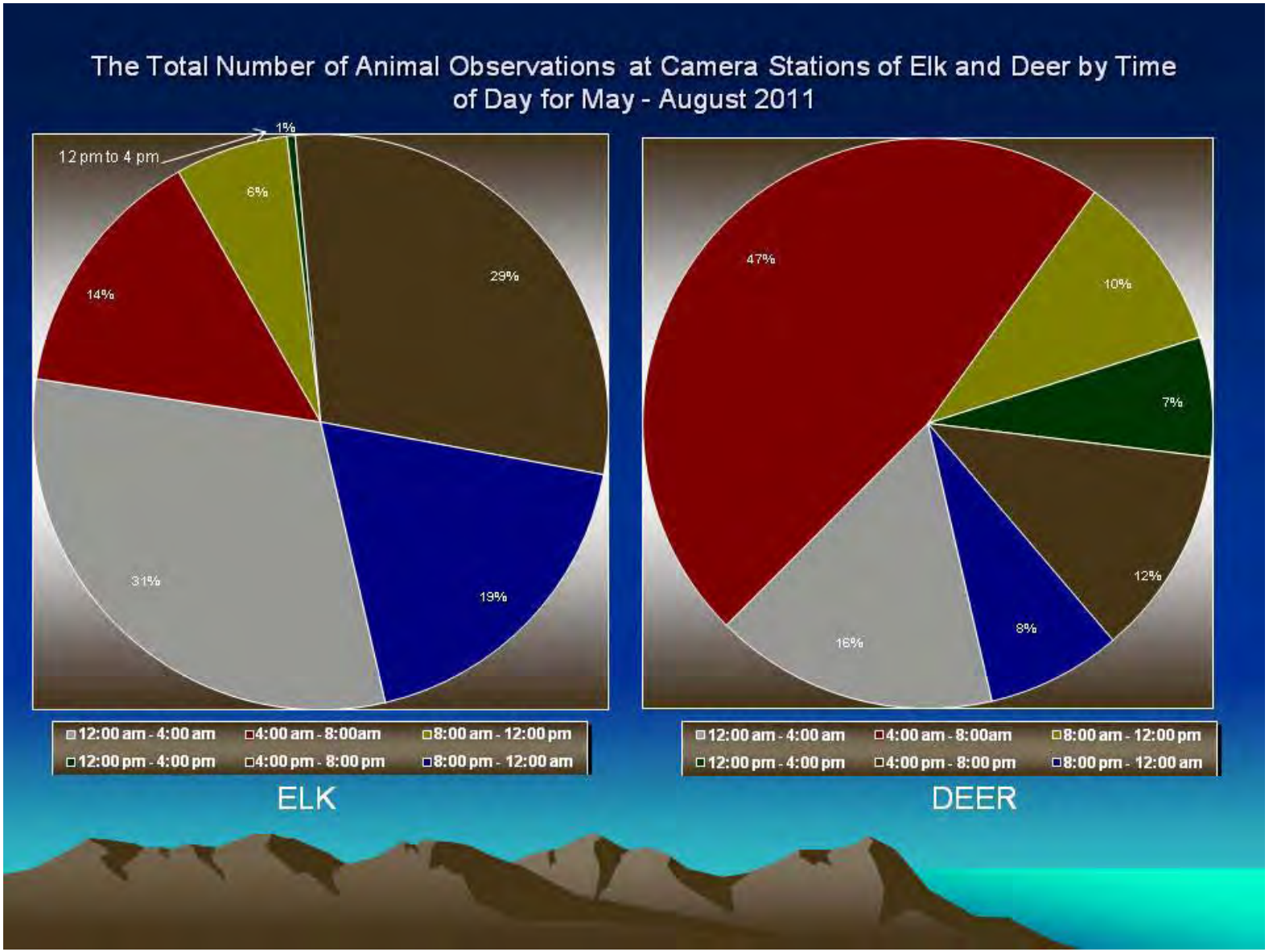

Figure 9. Percent observations of elk and deer shown by time May-August 2011.

6.0 CONCLUSION AND DISCUSSION

The Large Game Corridor Study was initiated in the spring of 2011. Camera stations showed consistent animal usage of pinch point areas within Pajarito Road. Even though elk had the highest number of observations, deer had the highest percent of vehicular-animal related accidents. These data suggest there are other factors that influence the rate of vehicular-animal accidents besides simple abundance. A decrease in elk-vehicular accidents was seen over the three periods, with the lowest number of elk accidents occurring in the past six years. Pinch points and movement corridors may be used consistently over time or may be used more heavily during particular seasons. Image analysis and time-of-day analysis of camera observations of elk and deer showed that the two species are using the locations of the camera stations at different times. Deer used the areas throughout the entire day. Future statistical analysis should be developed to investigate these two different types of usage.

7.0 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.

Cutler, T.L. and Swann, D.E. 1999. Using Remote Photography in Wildlife Ecology: A Review. Wildlife Society Bulletin 27(3):571-581.

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9.0 A SELECTION OF IMAGES FROM PAJARITO CORRIDOR CAMERAS


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