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National Nuclear Security Administration

Dual-Axis Radiographic Hydrodynamic Test Facility

Mitigation Action Plan

Annual Report Covering FY 2004

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TABLE

Table 3-1: Summary of Potential Impacts and Commitments Addressed in this MAPAR 4

ACRONYMS

BA	Biological and Floodplain/Wetland Assessment
BSRL	Baseline Statistical Reference Level
DARHT	Dual-Axis Radiographic Hydrodynamic Test (Facility)
DOE	U.S. Department of Energy
DX	Dynamic Experimentation (Division)
ENV-ECO	Ecology Group
ENV-WQH	Water Quality and Hydrology Group
EIS	Environmental Impact Statement
FY	fiscal year
HAZMAT	Hazardous Materials Response Team
ISM	Integrated Safety Management (system)
LANL	Los Alamos National Laboratory
LASO	Los Alamos Site Office
LIR	Laboratory Implementation Requirement
MAPAR	Mitigation Action Plan Annual Report
MAP	Mitigation Action Plan
NCB	NEPA, Cultural Resources, and Biological Resources (LIR)
NCO	NEPA Compliance Officer
NEPA	National Environmental Policy Act of 1969
NNSA	National Nuclear Security Administration
NPDES	National Pollutant Discharge Elimination System
ROD	Record of Decision
SAL	screening action level
SHPO	State Historic Preservation Officer
SWPP	Storm Water Pollution Prevention (Plan)
TA	Technical Area
TCPs	traditional cultural properties
USFWS	U.S. Fish and Wildlife Service
VPB	Vessel Preparation Building
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 design- and operation-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.

The NNSA Los Alamos Site Office (LASO; formerly the Los Alamos Area Operations Office) represents the DOE entity responsible for implementing the DARHT MAP. In June 2004, DOE provided stakeholders with a complete MAPAR that reported on the full scope of commitments and action plans implemented under the DARHT MAP during fiscal year (FY) 2003. DOE LASO did not receive stakeholder comments on the FY 2003 MAPAR. This MAPAR reports on the full scope of actions that were implemented during FY 2004 (October 1, 2003, through September 30, 2004) and represents the fifth 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

The 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 National Environmental Policy Act of 1969 (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 on the DARHT Final EIS states that DOE has decided to complete and operate the DARHT Facility at LANL while implementing a program to conduct most tests inside steel containment vessels with containment to be phased in over 10 years (the Phased Containment Option of the Enhanced Containment Alternative[1]). The ROD further states that DOE will develop and implement several mitigation measures to protect soils, water, and biotic and cultural resources potentially affected by the DARHT Facility construction and operation (DOE 1995). In addition, DOE agreed to an ongoing consultation process with affected American Indian tribes to ensure protection of resources of cultural, historic, or religious importance to the tribes. As discussed in Section 5.11, Volume 1, of the DARHT Final EIS, DOE also committed to taking special precautions to protect the Mexican spotted owl (*Strix occidentalis lucida*) by preparing and implementing a Laboratory-wide habitat management plan for all threatened and endangered species occurring throughout LANL. The DARHT MAP elaborates upon those commitments (DOE 1996).

[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.

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 U.S. Fish and Wildlife Service (USFWS) concurrence with a finding of "may affect, but not likely to adversely affect," and have been used as the basis for establishing mitigation commitments and action plans for potential impacts to threatened or endangered species and critical habitat as identified in the DARHT MAP. These BA mitigation measures, through implementation of the DARHT MAP, have established some of the guidelines under which the DARHT Facility was constructed and will be operated to mitigate the identified potential impacts.

1.2 MAP Function and Organization

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

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

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

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

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

1.3 MAP Duration and 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/organization. The MAP also includes a summary of mitigation actions that identifies the projected/actual period of mitigation action completion. Each mitigation action time frame correlates with one or more of the following DARHT Facility project stages: design, construction, and operation. 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 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 1st axis. In the late fall of 2000 the first major hydrotest using the DARHT 1st axis was performed. Also, 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 archeological site.

In the summer of 2001 one major system checkout experiment and three major hydrotests were performed. 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. Also, during 2002 the DARHT Project continued the major installation of the injector and accelerator components of the 2nd axis that is approximately 99% complete. Two major DARHT 2nd axis commissioning milestones were achieved in 2002. On July 2, 2002, the 2nd axis injector achieved CD-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 CD-4d with e-beam parameters of >1.0 kA at >12.0 MeV for longer than 400 nanoseconds. Finally, the construction of the Vessel Preparation Building (VPB) was complete in 2003.

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. Steel plates and concrete replaced surface gravel at the firing pad to enhance clean up activities following experiments.

In FY 2004, hydrotesting continued with six experiments. None of these experiments were considered to be large shots; therefore, it was not necessary to construct and use fragment mitigation for the purpose of mitigating blast effects.

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 and tracked using a formal project management system. On an annual basis, critical information and data gathered during the implementation of mitigation actions are analyzed and summarized; these results are published in the MAPAR.

The NNSA LASO NEPA Compliance Officer (NCO) is ultimately responsible for implementing the DARHT MAP. The NCO has delegated MAP management and tracking to the Ecology Group (ENV-ECO). Using an annual WPA, ENV-ECO coordinates with the appropriate LANL organizations to ensure mitigation action implementation and to prepare the annual report.

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

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

3.0 DARHT MAP SCOPE, SCHEDULE, AND STATUS

The MAPAR documents the scope of mitigation action tasks that were implemented throughout FY 2004. The scope of tasks completed in FY 2004 represents the fifth 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	MAP page reference	MAPAR section
A. General Environment			
1. Contamination of the environment surrounding DARHT Facility with radioactive or hazardous material: commitments (b–e).	operations	5–6	3.1
2. Contamination of the environment with various types of wastes as a result of cleaning out the containment vessels.	operations	6	3.1
3. Contamination of the environment with various types of hazardous materials as a result of spills within the DARHT Facility.	operations	6	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	6	3.1
B. Soils			

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	6–7	3.2
2. Soil erosion and damage to plants caused by additional construction and operational activities, especially off-road and ground-breaking activities: commitments (a–e).	operations	7	3.2

Table 3-1 cont.

DARHT MAP Potential Impacts/Commitments	DARHT phase	MAP page reference	MAPAR section
C. Biotic Resources			
1. DARHT Facility construction and operations could impact threatened and endangered species as a result of impacts from firings and other operations and activities at the firing sites: commitments (b–d).	operations	7–8	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	8–9	3.3
3. DARHT Facility construction and operation could impact the peregrine falcon (*Falco peregrinus*) as a result of noise from firings and other operations, as well as other activities at the firing sites: commitments (a, b).	operations	9–10	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	10	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	10	3.3
6. DARHT Facility construction and operation could impact the meadow jumping mouse (*Zapus hudsonius*) as a result of noise from firings and other operations, as well as other activities at the firing sites.	operations	11	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	11	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 archeological sites, especially Nake'muu, and the immediately surrounding environment: commitments (b, e–g).	operations	12	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).	operations	12–13	3.4
E. Human Health and Safety			
1. Adverse health effects on workers and the general public from high noise levels associated with the DARHT Facility, especially construction and test firings: commitment (a).	operations	13	3.5
2. Adverse health effects on workers from radiation from DARHT Facility operations: commitments (a, c).	operations	13	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) ENV-ECO will monitor contaminants by sampling soil, plants, mammals, birds, and bees at baseline locations, 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.

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

e) Vessels will be decontaminated.

Status

MAP Section VIII.A.1(b)

Since 1996, soil, sediment, and vegetation samples from around the DARHT Facility have been collected and analyzed. In 1997, ENV-ECO began collecting honeybee, bird, and small mammal tissue samples around the DARHT Facility for the construction phase. The results of four years of analysis of DARHT samples are summarized in a composite report (LANL 2001) and were used to calculate the Baseline Statistical Reference Levels (BSRLs) to be used as reference for the operational phase analyses.

In FY 2000, operational phase environmental monitoring was initiated by collecting a suite of samples similar to those collected during the construction phase. This MAPAR reports the results from FY 2004. The LANL shut down in summer 2004 interrupted fieldwork and, consequently, bird and small mammal samples were not collected.

Soils Most soil and sediment sample radionuclide concentrations were either nondetectable or below BSRL values. Also, most radionuclide concentrations in DARHT soils and sediments were generally similar to radionuclide concentrations found in regional background samples (LANL 2004a).

Soils and sediments were sampled in 2004 and analyzed for ^{3}H, ^{137}Cs, ^{90}Sr, ^{238}Pu, ^{239,240}Pu, ^{241}Am, ^{234}U, ^{235}U, ^{238}U, Ag, As, Ba, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, and Tl. Radionuclides that were above the BSRLs were ^{137}Cs, and ^{238}U in three out of four soil samples, and ^{239,240}Pu

and ^{241}Am in one out of four samples. All concentrations were far below the screening action levels (SALs) established by the Environmental Characterization and Remediation (ECR), formerly Environmental Restoration Project at LANL and do not pose a human health or an environmental hazard.

Most trace elements in soil and sediment samples collected at the DARHT Facility were below BSRLs. Beryllium, Se, and Tl concentrations were above the BSRL in some samples but far below the SALs. In 2003, elevated concentrations of Sb were found in all but two of the soil/sediment sampling locations (LANL 2003a). In 2004, Sb levels were normal in all samples.

Vegetation Overstory and understory vegetation samples collected around the DARHT Facility in 2004 were analyzed for the same suite of radionuclides and trace elements as soils and sediments (LANL 2004a). Most radionuclides, with the exception of ^{238}U in overstory vegetation, were either nondetectable or within BSRL values. All of the overstory samples contained ^{238}U concentrations just above the BSRL.

Analysis of the trace element concentrations in overstory and understory vegetation collected around the DARHT Facility in 2004 shows that most trace elements, with the exception of Cu and Se in overstory and Se in understory vegetation, were below the BSRL values. This pattern of Cu and Se concentrations in overstory and Se in understory vegetation is similar to past years.

Small Mammals No small mammal samples were collected in FY 2004. Samples will be collected in FY05 and reported in the FY05 MAPAR.

Results from 2001 through 2003 were either nondetectable or within BSRLs (LANL 2005a). Some samples had U isotope levels slightly above BSRLs. Isotopic analysis indicates that the U in the samples is primarily depleted U, which is relatively insoluble and unlikely to pose a threat to small mammals or their predators.

Birds No bird samples were collected for the year 2004. Samples will be collected in FY05 and reported in the FY05 MAPAR.

The most recent analysis of samples (FY 2002) shows that radionuclide concentrations were below the BSRLs. All but one of the samples analyzed for trace elements were below detection limits; the single sample with detectable limits was below the BSRLs.

Bees

During 2004, honeybees were collected from four hives located near the DARHT facility. Samples were analyzed for various radionuclides and trace elements. All of the radionuclide and trace element concentrations were within the BSRLs for the site (LANL 2005b).

All of the radionuclide concentrations recorded in FY03 were within the BSRL. Additionally, all trace element concentrations, with the exception of Cu, were within the established BSRLs (LANL 2004b).

Results from the 2002 season show that in general, most radionuclide concentrations, with the exception of ^{3}H, ^{7}Be and ^{137}Cs were within the BSRLs (LANL 2003b). Additionally, most trace element concentrations, with the exception of Ba and Cu, were within the BSRLs. Of the results that exceeded the BSRLs, ^{3}H samples from four colonies were greater than the BSRLs. An ecological dose assessment was calculated for honey bees based on the elevated levels of ^{3}H in their tissues. The doses ranged from 1 E-06 rad per day to 10 E-06 rad per day. DOE has established a dose limit of 0.1 rad per day for the protection of terrestrial wildlife; the calculated doses for these samples are four to five orders of magnitude below that protective limit.

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 be inclusive of 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. There were no substantial accidental spills or releases of hazardous or radioactive materials associated with DARHT Facility operations during FY 2004.

MAP Section VIII.A.1(d)

The process of designing and testing vessels for operational use is proceeding as scheduled but is not complete. Vessel testing was delayed by the suspension of Laboratory operations in late FY04 and first quarter FY05. LANL is on track to use field containment vessels for two experiments in FY06. According to the ROD for the DARHT Final EIS, DOE is operating the DARHT Facility while implementing a program to conduct tests inside steel containment vessels with containment to be phased in over 10 years (the Phased Containment Option of the Enhanced Containment Alternative) (DOE 1995). In the last quarter of FY 2000, two very simple uncontained experiments using 16 lb of high explosives and the first major uncontained hydrotest using the DARHT Facility 1st axis were performed. The post-shot operations for the simple experiments and hydrotest were conducted according to the following established Dynamic Experimentation (DX) Division procedures in place at that time:

- DX-4 PRO-003 General Safety
- DX-4 PRO-004 General Firing Operations
- DX-6 PRO-0031 Firing Operations at TA-15-312 Firing Area
- DX PRO-0012 DX-Division Waste Management Procedure
- DX-PRO-011 Radiological Controls

These procedures are implemented under the LANL Integrated Safety Management (ISM) System as an integral part of DARHT Facility operations. 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.

MAP Section VIII.A.1(e)

In this fifth year of DARHT Facility operations, the double- and single-walled vessels were not utilized for operational activities. LANL has completed construction of a permanent VPB to be operated at Technical Area (TA) 15 near the DARHT Facility. It was anticipated that the VPB would be starting readiness activities in FY 2004, however the Laboratory suspension delayed readiness until FY 2006. This facility will be used to stage, and decontaminate as appropriate, the vessels used in the DARHT Facility experiments.

While DX is preparing to implement vessels, an additional mitigation method has been demonstrated, aqueous foam. While the reduction of material release is not as significant as vessels, this method is used on experiments, which, for technical reasons, cannot be placed in vessels, thus enhancing mitigation levels.

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.

Status

MAP Section VIII.A.2

In this fifth year of DARHT Facility operations, the vessels were not utilized for operational activities. LANL has completed construction of a permanent VPB to be operated at TA-15 near the DARHT Facility. After a series of readiness reviews to take place in FY 2005, this facility will be used to stage, and decontaminate as appropriate, the vessels used in the DARHT Facility experiments. LANL has developed containment vessel cleanout processes in support of the commitment to decontaminate vessels used in experiments.

All process equipment for managing debris from vessel shots has been installed in the VPB. Acceptance testing has been completed. Draft procedures for vessel cleanout, decontamination, and stabilization of debris from vessel shots have been completed and will be finalized in the next year prior to the first vessel experiment at DARHT.

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. Also, 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 are in place and are maintained to contain all hazardous material spills that could occur. A Spill Prevention Control and Countermeasures Plan was completed and approved prior to beginning DARHT Facility operations. This plan will be maintained for the life of the facility consistent with the requirements under the LANL ISM System and Environmental Protection Agency (EPA) 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.

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 Hydrology Group (ENV-WQH) 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-WQH to ensure compliance with the NPDES permit. During this fifth year of DARHT Facility operations, there have been no reportable violations of the DARHT Facility NPDES outfall permit. Additionally, facility management representatives have sited a storm water monitoring station at

the DARHT Facility. ENV-WQH will continue to work with DARHT Facility representatives to monitor and implement the NPDES outfall permit and other storm water monitoring efforts.

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 ground-breaking 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 includes 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 is implemented to ensure that erosion and sedimentation are minimized and that drainage facilities 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 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 Dynamic Experimentation Technical Support Office (DX-TSO) Environmental personnel and ENV-WQH.

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 DX-TSO Environmental personnel and ENV-WQH.

MAP Section VIII.B.1(c)

. Best Management Practices prescribed in the SWPP Plan are continually monitored and maintained by DARHT Facility representatives and DX-TSO Environmental personnel. Current control measures have proven appropriate and effective during the first five years of facility operations. If control measures are determined to be ineffective, the scope and implementation of the SWPP Plan is modified, as necessary, by the DX-TSO Environmental representatives and ENV-WQH.

Mitigation Action Scope

MAP Section VIII.B.2(A-E)

The operational 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-ECO to avoid disturbance to threatened and endangered species and other wildlife species.

c) ENV-ECO must be notified prior to any new ground-breaking activities. ENV-ECO will review all new sites and evaluate any potential impacts associated with the action. ENV-ECO 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-ECO 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 operational activities must comply with the institutional process established under Laboratory Implementation Requirement (LIR) 404-30-02.0–also known as the NEPA, Cultural Resources, and Biological Resources (NCB) LIR. The NCB LIR establishes the institutional requirements that are implemented to ensure that contractual work smart standards for NEPA, cultural resources, and biological resources are consistently met (LANL 2000). In addition to requiring full compliance with applicable NEPA, cultural resources, and biological resources federal regulations, the NCB LIR requires full and effective implementation of the LANL Habitat Management Plan (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-ECO is the Office of Institutional Coordination for the NCB LIR and is responsible for developing, revising, and maintaining the document, as well as technically assisting the institution in full and effective implementation.

Under an institutional 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 starting a wildfire 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 the NCB LIR. 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 USFWS 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 the NCB LIR.

3.3 Mitigation Actions for Biotic Resources

Summary of Potential Impacts

MAP SECTION VIII.C.1 (b–d); 2 (n–x); 3 (a, b); 4 (a–c); 5 (a); 6 (a); AND 7 (a, b)

According to the DARHT MAP, DARHT Facility construction and operation could impact threatened and endangered species. DARHT Facility construction and operation could impact 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 threatened or endangered species potentially occurring in the project area. If present, the following species could be affected: peregrine falcon (*Falco peregrinus*), northern goshawk (*Accipiter gentilis*), spotted bat (*Euderma maculatus*), meadow jumping mouse (*Zapus hudsonius neomexicanus*), and Jemez Mountains salamander (*Plethodon neomexicanus*).

Mitigation Action Scope

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

Since January 1999, LANL has fully implemented the Habitat Management Plan. During FY 2000, site-wide implementation of the Habitat Management Plan was included as part of the institutional requirements in the NCB LIR (LANL 2000). 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 fully addressed through the ongoing implementation of the NCB LIR.

3.4 Mitigation Actions for Cultural/Paleontological 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 archeological sites, especially Nake'muu, and the immediate surrounding environment.

Mitigation Action Scope

MAP Section VIII.D.1 (b, e–g)

The operational 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 ruin 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 DX Division 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 FY 2004, hydrotesting continued with six experiments. None of these experiments were considered to be large shots; therefore, it was not necessary to construct and use fragment mitigation for the purpose of mitigating blast effects to archaeological sites. None of the shots in 2002 or 2003 (two shots each year) required fragment mitigation for mitigating blast effects. Future shots will be evaluated on a case-by-case basis in coordination with the ongoing Nake'muu monitoring program to determine the need for constructing and deploying fragment mitigation.

MAP Section VIII.D.1 (e)

During FY 2004, ENV-ECO continued to implement the Nake'muu monitoring project, including the annual physical assessment and photographic documentation of site conditions (LANL 2004c). Over the seven-year monitoring program, the site has witnessed a 0.7% displacement rate of chinking stones and 0.3% displacement of masonry blocks. Statistical analyses indicate that these displacement rates are significantly correlated with annual snowfall, but not with annual rainfall or experiments from the DARHT Facility.

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. The post-Cerro Grande Fire pueblo site rehabilitation team removed all the trees that could potentially fall and damage the standing wall architecture at the site.

MAP Section VIII.D.1 (g)

In FY 2004 hydrotesting continued with six shots. The post-shot operations for the experiments were conducted according to the following established standard procedures:

- DX-4 PRO-003 General Safety
- DX-4 PRO-004 General Firing Operations
- DX-3 PRO-0031 Firing Operations at TA-15-312 Firing Area
- DX-PRO-012 Division Waste Management Procedure
- DX-PRO-011 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 ENV-ECO completed the Phase II cultural resources assessment and cultural resources report for the DARHT Facility project. On May 20, 1999, the SHPO officially concurred with a DOE and LANL finding that the construction and operation of the DARHT Facility will have "no adverse effect" on cultural resources in the potentially affected area (DOE 1999). In addition, as part of the LANL Site-Wide EIS MAP, in FY 2000 LANL completed the *Comprehensive Plan for the Consideration of Traditional Cultural Properties and Sacred Sites at Los Alamos National Laboratory*. 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 2000). 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 failed to identify any new archeological sites in the vicinity of the DARHT Facility. No new TCP or sacred site issues were identified during FY 2004. 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 2000).

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.D.2 (a, c)

The operational 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.D.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 specifically addressed under the DARHT Axis I –procedure 210. This procedure requires appropriate training, radiation dosimetry program participation, and 1st axis acceleration operations that collectively protect workers for exposure to unacceptable levels of radiation.

4.0 FY 2004 MAP IMPLEMENTATION

Based on the scope and stage of the DARHT Facility project, MAP commitments and action plans may be changed, added, or deleted as appropriate as a function of recommendations provided in each MAPAR. Modification to the scope of commitments and action plans are directed by DOE LASO based on scientifically and legally defensible information that is generated during the implementation of the DARHT MAP.

In July 1999, all construction-related DARHT MAP mitigation commitments and action plans were completed. The FY 2004 DARHT MAP activities represent the fifth year of operational implementation. The DARHT MAP activities implemented during FY 2004 were a continuation of DARHT Facility operational phase MAP tracking and annual reporting. Should the scope of the DARHT Facility project change during the operational stage, as part of the appropriate NEPA review, the scope of the DARHT MAP would be changed by NNSA as necessary.

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