CHAPTER 5
APPLICABLE LAWS, REGULATIONS, AND OTHER REQUIREMENTS

5 APPLICABLE LAWS, REGULATIONS, AND OTHER REQUIREMENTS

5.1 Introduction

As part of the National Environmental Policy Act (NEPA) process, an environmental impact statement (EIS) must consider whether actions described under its alternatives would threaten a violation of Federal, state, or local law or requirement imposed for the protection of the environment [40 *Code of Federal Regulations* (CFR) 1508.27] or require a permit, license, or other entitlement (40 CFR 1502.25). This chapter provides a summary of environmental requirements, agreements, and permits that relate to consolidation and relocation of mission-critical chemistry and metallurgy research (CMR) capabilities. This chapter includes the requirements from the 2003 *Final Environmental Impact Statement for the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE 2003b) that remain valid, as well as new requirements identified since the first EIS was prepared.

A number of Federal environmental laws affect environmental protection, health, safety, compliance, and/or consultation at every U.S. Department of Energy (DOE) location. Certain environmental requirements also have been delegated to state authorities for enforcement and implementation, and state legislatures have adopted additional laws to protect health and safety and the environment. It is DOE policy to conduct its operations in a manner that ensures the protection of public health, safety, and the environment through compliance with all applicable Federal and state laws, regulations, directives, and other requirements.

The various action alternatives analyzed in this *Supplemental Environmental Impact Statement for the Nuclear Facility Portion of the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, New Mexico (CMRR-NF SEIS)* involve either the operation of existing DOE facilities or the construction and operation of new DOE facilities and the transportation of materials. Actions required to comply with statutes, regulations, and other Federal, state, and local requirements may depend on whether a facility is newly built (preoperational) or is incorporated in whole or in part into an existing facility. Chapter 2 provides a detailed discussion of these alternatives.

5.2 Background

Requirements governing the consolidation and relocation of CMR operations arise primarily from six sources: Congress, Federal agencies, Executive orders, state legislatures, state agencies, and local governments. In general, Federal statutes establish national policies, create broad legal requirements, and authorize Federal agencies to create regulations that conform to the statutes. Detailed implementation of these statutes is delegated to various Federal agencies such as DOE, the U.S. Department of Transportation, and the U.S. Environmental Protection Agency (EPA). For many environmental laws under EPA jurisdiction, state agencies may be delegated responsibility for the majority of program implementation activities, such as permitting and enforcement, but EPA usually retains oversight of the delegated program.

Some applicable laws, such as NEPA, the Endangered Species Act, and the Emergency Planning and Community Right-To-Know Act, require specific reports and/or consultations rather than ongoing permits or activities. Such requirements would be satisfied through the legal/regulatory process, including preparation of this *CMRR-NF SEIS*, leading to the consolidation and relocation of CMR operations.

Other applicable laws establish general requirements that must be satisfied, but do not include processes (such as the issuance of permits or licenses) to consider compliance prior to specific instances of violations or other events that trigger their provisions. These include the Toxic Substances Control Act (which addresses polychlorinated biphenyl [PCB] transformers and other designated substances); the Federal Insecticide, Fungicide, and Rodenticide Act; the Hazardous Materials Transportation Act; and (in the case of a hazardous substance spill) the Comprehensive Environmental Response, Compensation, and Liability Act (also known as Superfund).

Executive orders establish policies and requirements for Federal agencies. Such orders are applicable to Executive branch agencies, but do not have the force of law or regulation.

State legislatures develop their own laws to supplement, as well as implement, Federal laws for protection of air, water, and groundwater quality. State legislation may address solid waste management programs; locally rare or endangered species; and local resource, historic, and cultural values. The laws of local governments add an additional level of public protection, often focusing on zoning, utilities, and public health and safety concerns.

Regulatory agreements and compliance orders may also be initiated to establish responsibilities and timeframes for Federal facilities to come into compliance with provisions of applicable Federal and state laws. There are also other agreements, memoranda of understanding, or formalized arrangements that establish cooperative relationships and requirements.

The alternatives being considered for the consolidation and relocation of CMR operational capabilities and materials would all be located within New Mexico, on Los Alamos National Laboratory (LANL) property controlled by DOE. For a broader review of environmental regulations and compliance issues at LANL, see the 2008 *Final Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE 2008a).

DOE has authority to regulate some environmental activities, as well as the health and safety aspects of nuclear facility operations. The Atomic Energy Act of 1954, as amended, is the principal authority for DOE regulatory activities not externally regulated by other Federal or state agencies. Regulation of DOE activities is primarily established through the use of DOE orders and regulations.

External environmental laws, regulations, and Executive orders can be categorized as applicable to either broad environmental planning and consultation requirements or regulatory environmental protection and compliance activities, although some requirements are applicable to both planning and operations compliance.

Section 5.3 of this chapter discusses the major applicable Federal laws and regulations that impose nuclear safety and environmental protection requirements on the subject facilities and might require the facilities to obtain a permit or license (or amendment thereof) prior to initiation of the relocation project. Each of the applicable regulations and statutes establishes how activities are to be conducted or how potential releases of pollutants are to be controlled or monitored. They include requirements for the issuance of permits or licenses for new operations or new emission sources and for amendments to existing permits or licenses to allow new types of operations at existing sources.

Section 5.4 discusses applicable Executive orders. Section 5.5 identifies applicable DOE directives and regulations for compliance with the Atomic Energy Act; the Occupational Safety and Health Act; and other environmental, safety, and health requirements. Section 5.6 identifies state and local laws, regulations, and ordinances, as well as local agreements potentially affecting the consolidation and relocation of CMR operations. Section 5.7 discusses consultations with applicable agencies and federally recognized American Indian tribes.

5.3 Applicable Federal Laws and Regulations

This section describes the Federal environmental, safety, and health laws and regulations that could apply to the various alternatives analyzed in this *CMRR-NF SEIS*. These regulations address such areas as energy conservation, administrative requirements and procedures, nuclear safety, and classified information. They are identified in **Table 5–1**. For ease of identification, a citation column is included in the table, where laws are identified using a *United States Code* (U.S.C.) or Public Law citation, regulations are identified with a CFR citation, and Executive orders are listed by number. This table does not include DOE directives, which are provided in Section 5.5, or state requirements, which are provided in Section 5.6.

Table 5–1 Potentially Applicable Environmental, Safety, and Health Laws, Regulations, and Executive Orders

Laws, Regulations, Orders, Other Requirements	*Citation*
Radioactive Materials and Waste Management	
Atomic Energy Act of 1954, as amended	42 U.S.C. 2011 et seq.
Bob Stump National Defense Authorization Act for Fiscal Year 2003	Public Law 107-314
"Byproduct Material"	10 CFR Part 962
"Environmental Radiation Protection Standards for Management of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Materials"	40 CFR Part 191
Low-Level Radioactive Waste Policy Act of 1980, as amended	42 U.S.C. 2021 et seq.
Price-Anderson Act	42 U.S.C. 2210
Waste Isolation Pilot Plant Land Withdrawal Act, as amended	Public Law 102-579, as amended by Public Law 104-201
"Schedule C–Quantities of Radioactive Materials Requiring Consideration of the Need for an Emergency Plan for Responding to a Release"	10 CFR 30.72, Schedule C
Ecological Resources	
Bald and Golden Eagle Protection Act of 1973, as amended	16 U.S.C. 668 et seq.
Endangered Species Act of 1973, as amended	16 U.S.C. 1531 et seq.
Farmland Protection Policy Act of 1981	7 U.S.C 4201 et seq.
Fish and Wildlife Coordination Act	16 U.S.C. 661 et seq.
Invasive Species	Executive Order 13112
Migratory Bird Treaty Act of 1918, as amended	16 U.S.C. 703 et seq.
Protection of Wetlands	Executive Order 11990
Responsibilities of Federal Agencies to Protect Migratory Birds	Executive Order 13186
Cultural and Paleontological Resources	
American Indian Religious Freedom Act of 1978	42 U.S.C. 1996
Antiquities Act of 1906, as amended	16 U.S.C. 431 et seq.
Archaeological and Historic Preservation Act of 1960, as amended	16 U.S.C. 469 et seq.
Archaeological Resources Protection Act of 1979, as amended	16 U.S.C. 470aa et seq.
Consultation and Coordination with Indian Tribal Governments	Executive Order 13175
Indian Sacred Sites	Executive Order 13007
Manhattan Project National Historical Park Study Act	Public Law 108-340
National Historic Preservation Act of 1966, as amended	16 U.S.C. 470 et seq.
Protection and Enhancement of the Cultural Environment	Executive Order 11593

Laws, Regulations, Orders, Other Requirements	***Citation***
Native American Graves Protection and Repatriation Act of 1990	25 U.S.C. 3001 et seq.
Preserve America	Executive Order 13287
"Protection of Historic and Cultural Properties"	36 CFR Part 800
Trails for America in the 21st Century	Executive Order 13195
Worker Safety and Health	
"Chronic Beryllium Disease Prevention Program"	10 CFR Part 850
"Occupational Radiation Protection"	10 CFR Part 835
Occupational Safety and Health Act of 1970	29 U.S.C. 651 et seq.
"Occupational Safety and Health Standards"	29 CFR Part 1910
Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction	Executive Order 12699
"Worker Safety and Health Program"	10 CFR Part 851
Radiological Safety Oversight and Radiation Protection	
"Procedural Rules for DOE Nuclear Activities"	10 CFR Part 820
"Nuclear Safety Management"	10 CFR Part 830
Transportation	
Hazardous Materials Transportation Act of 1975, as amended	49 U.S.C. 5101 et seq.
"Packaging and Transportation of Radioactive Material"	10 CFR Part 71
"Hazardous Materials Tables and Communications Emergency Response Information Requirements"	49 CFR Part 172
Emergency Planning, Pollution Prevention, and Conservation	
Assignment of Emergency Preparedness Responsibilities	Executive Order 12656
Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (also known as Superfund)	42 U.S.C. 9601 et seq.
Emergency Management and Assistance	44 CFR 1.1
Emergency Planning and Community Right-to-Know Act	42 U.S.C. 11001 et seq.
Federal Emergency Management	Executive Order 12148
Federal Compliance with Pollution Control Standards	Executive Order 12088
Federal Leadership in Environmental, Energy and Economic Performance	Executive Order 13514
Homeland Security Act of 2002	6 U.S.C. 101 et seq.
Justice Assistance Act of 1984	42 U.S.C. 3701–3799
National Defense Industrial Resources Preparedness	Executive Order 12919
Pollution Prevention Act of 1990	42 U.S.C. 13101 et seq.
Proliferation of Weapons of Mass Destruction	Executive Order 12938
Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988, as amended	42 U.S.C. 5121
Strengthening Federal Environmental, Energy, and Transportation Management	Executive Order 13423
Superfund Implementation	Executive Order 12580
Environmental Justice and Protection of Children	
Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations	Executive Order 12898
Protection of Children from Environmental Health Risks and Safety Risks	Executive Order 13045
Environmental Quality	
Council on Environmental Quality National Environmental Policy Act Regulations	40 CFR Parts 1500–1508
"Energy Code for New Federal, Commercial, and Multi-Family High Rise Residential Buildings," "Energy Efficiency Standards for New Federal Low-Rise Residential Buildings"	10 CFR Part 434, 10 CFR Part 435
Energy Independence and Security Act of 2007	Public Law 110-140

Laws, Regulations, Orders, Other Requirements	***Citation***
"Federal Energy Management and Planning Programs"	10 CFR Part 436
Federal Insecticide, Fungicide, and Rodenticide Act	7 U.S.C. 136 et seq.
National Environmental Policy Act of 1969	42 U.S.C. 4321 et seq.
"National Environmental Policy Act Implementing Procedures"	10 CFR Part 1021
Protection and Enhancement of Environmental Quality	Executive Order 11514
Relating to Protection and Enhancement of Environmental Quality	Executive Order 11991
Air Quality and Noise	
Clean Air Act of 1970, as amended	42 U.S.C. 7401 et seq.
"National Emission Standards for Hazardous Air Pollutants"	40 CFR Part 61
"National Emission Standards for Hazardous Air Pollutants for Source Categories"	40 CFR Part 63
Noise Control Act of 1972, as amended	42 U.S.C. 4901 et seq.
"Standards of Performance for New Stationary Sources"	40 CFR Part 60
Water Resources	
Clean Water Act of 1972, as amended	33 U.S.C. 1251 et seq.
"Compliance with Floodplain and Wetland Environmental Review Requirements"	10 CFR Part 1022
"EPA-Administered Permit Programs: The National Pollutant Discharge Elimination System"	40 CFR Part 122
Floodplain Management	Executive Order 11988
"National Primary Drinking Water Regulations"	40 CFR Parts 141–149
Safe Drinking Water Act of 1974, as amended	42 U.S.C. 300(f) et seq.
Hazardous Waste and Materials Management	
"EPA Administered Permit Programs: The Hazardous Waste Permit Program"	40 CFR Part 270
Federal Facility Compliance Act of 1992	Public Law 102-386
"Hazardous Waste Management System"	40 CFR Part 260
"Land Disposal Restrictions"	40 CFR Part 268
"Standards for Universal Waste Management"	42 CFR Part 273
Resource Conservation and Recovery Act of 1976, as amended	42 U.S.C. 6901 et seq.
Toxic Substances Control Act of 1976	15 U.S.C. 2601 et seq.

CFR = *Code of Federal Regulations*, U.S.C. = *United States Code.*

American Indian Religious Freedom Act of 1978 (42 U.S.C. 1996)—This act reaffirms American Indian religious freedom under the First Amendment and sets U.S. policy to protect and preserve the inherent and constitutional right of American Indians to believe, express, and exercise their traditional religions. This act further requires Federal actions to avoid interfering with access to sacred locations and traditional resources that are integral to the practice of religions.

Antiquities Act of 1906, as amended (16 U.S.C. 431 et seq.)—This act protects historic and prehistoric ruins, monuments, and antiquities, including paleontological resources, on federally controlled lands from appropriation, excavation, injury, and destruction without permission from the appropriate Federal department.

Archaeological and Historic Preservation Act of 1960, as amended (16 U.S.C. 469 et seq.)—The purpose of this act is to preserve historical and archaeological data (including relics and specimens) that might otherwise be irreparably lost or destroyed as a result of Federal actions.

Archaeological Resources Protection Act of 1979, as amended (16 U.S.C. 470aa et seq.)—This act requires a permit for any excavation or removal of archaeological resources from Federal or American Indian lands. Excavation must be undertaken to further archaeological knowledge in the public interest, and resources removed are to remain the property of the United States. This law also requires that, whenever any Federal agency finds that its activities may cause irreparable loss or destruction of significant scientific, prehistoric, or archaeological data, that agency must notify the U.S. Department of the Interior and may request the Department of the Interior to undertake the recovery, protection, and preservation of such data. Consent must be obtained from the American Indian tribe or Federal agency that has authority over the land on which a resource is located before issuance of a permit, and the permit must contain the terms and conditions requested by the tribe or Federal agency.

Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.), as amended by the Price-Anderson Act (42 U.S.C. 2210) and the Bob Stump National Defense Authorization Act (Public Law 107-314)—This act provides fundamental jurisdictional authority to DOE and the U.S. Nuclear Regulatory Commission (NRC) over governmental and commercial use of nuclear materials. The Atomic Energy Act authorizes DOE to establish standards to protect health or minimize dangers to life or property for activities under DOE jurisdiction. DOE has issued a series of orders that establish an extensive system of standards and requirements to ensure safe operation of DOE facilities (see Section 5.5).

DOE regulations are found in Title 10 of the CFR. The DOE regulations that are most relevant to radioactive materials and waste management and worker health and safety include the following:

- "Nuclear Safety Management" (10 CFR Part 830)
- "Occupational Radiation Protection" (10 CFR Part 835)
- "Chronic Beryllium Disease Prevention Program" (10 CFR Part 850)
- "Worker Safety and Health Program" (10 CFR Part 851)
- "Byproduct Material" (10 CFR Part 962)

The Atomic Energy Act also gives EPA the authority to develop generally applicable standards for protection of the general environment from radioactive materials. EPA has promulgated several regulations under this authority. The EPA regulation that is relevant to the radioactive materials and waste management activities addressed in this *CMRR-NF SEIS* is the "Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes" (40 CFR Part 191). This regulation establishes radiation standards for the management and storage of spent nuclear fuel, high-level radioactive waste, and transuranic waste at facilities regulated by NRC or Agreement States, as well as radiation standards for management and storage of spent nuclear fuel, high-level radioactive waste, and transuranic waste at disposal facilities operated by DOE that are not regulated by NRC or Agreement States. The regulation also establishes limitations on radiation doses that might occur after closure of the disposal system. These standards include both individual protection requirements and groundwater protection standards.

The Price-Anderson Act, which was signed into law in 1957 as an amendment to the Atomic Energy Act of 1954, provides for payment of public liability claims in the event of a nuclear incident. The following are key features of this act:

- Assures the availability of billions of dollars to compensate members of the public who suffer a loss as the result of a nuclear incident
- Establishes a simplified claims process for the public to expedite recovery for losses

- Provides for immediate emergency reimbursement of costs associated with any evacuation that may be ordered
- Establishes liability limits for each nuclear incident involving commercial nuclear energy and government use of nuclear materials
- Guarantees that the Federal Government will review the need for compensation beyond that provided

The Bob Stump National Defense Authorization Act, enacted by the Congress in 2002, amended the Atomic Energy Act to add Section 234C, requiring DOE to promulgate worker health and safety regulations to cover contractors with Price-Anderson indemnification agreements in their contracts. DOE promulgated regulations under this act in February 2006 (71 *Federal Register* [FR] 6857) as 10 CFR Part 851, "Worker Safety and Health Program." The regulations codified and enhanced the DOE worker protection program.

Bald and Golden Eagle Protection Act of 1973, as amended (16 U.S.C. 668 et seq.)—This act makes it unlawful to take, pursue, molest, or disturb bald (American) and golden eagles, their nests, or their eggs anywhere in the United States. A permit must be obtained from the U.S. Department of the Interior to relocate a nest that interferes with resource development or recovery operations.

Clean Air Act of 1970, as amended (42 U.S.C. 7401 et seq.)—This act is intended to "protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population." Section 118 of the Clean Air Act (42 U.S.C. 7418) requires that each Federal agency with jurisdiction over any property or facility engaged in any activity that might result in the discharge of air pollutants comply with "all Federal, state, interstate, and local requirements" regarding the control and abatement of air pollution.

Section 109 of the Clean Air Act (42 U.S.C. 7409 et seq.) directs EPA to set National Ambient Air Quality Standards for criteria pollutants. EPA has identified and set National Ambient Air Quality Standards under 40 CFR Part 50 for the following criteria pollutants: particulate matter, sulfur dioxide, carbon monoxide, ozone, nitrogen dioxide, and lead. Section 111 of the Clean Air Act (42 U.S.C. 7411) requires establishment of national standards of performance for new or modified stationary sources of atmospheric pollutants. Section 160 of the Clean Air Act (42 U.S.C. 7470 et seq.) requires that specific emission increases be evaluated prior to permit approval to prevent significant deterioration of air quality. Section 112 of the Clean Air Act (42 U.S.C. 7412) requires specific standards for releases of hazardous air pollutants (including radionuclides).

Emissions of air pollutants are regulated by EPA under 40 CFR Parts 50 through 99. Emissions of radionuclides and hazardous air pollutants from DOE facilities are regulated under the National Emission Standards for Hazardous Air Pollutants Program (40 CFR Parts 60, 61, and 63).

Clean Water Act of 1972, as amended (33 U.S.C. 1251 et seq.)—The Clean Water Act, which amended the Federal Water Pollution Control Act, was enacted to "restore and maintain the chemical, physical, and biological integrity of the Nation's water." The Clean Water Act prohibits the "discharge of toxic pollutants in toxic amounts" to navigable waters of the United States. Section 313 of the Clean Water Act requires all branches of the Federal Government engaged in any activity that might result in a discharge of runoff of pollutants to surface waters to comply with Federal, state, interstate, and local requirements. Section 404 of the Clean Water Act gives the U.S. Army Corps of Engineers permitting authority over activities that discharge dredge or fill materials into waters of the United States, including wetlands.

The Clean Water Act also provides guidelines and limitations for effluent discharges from point source discharges and establishes the National Pollutant Discharge Elimination System (NPDES) permit program. The NPDES program is administered by EPA, pursuant to regulations in 40 CFR Part 122, and authority may be delegated to states. Sections 401 through 405 of the Water Quality Act of 1987 added Section 402(p) to the Clean Water Act, which requires EPA to establish regulations for permits for stormwater discharges associated with industrial activities, including construction activities disturbing 5 or more acres (2 hectares) (64 FR 68721). After March 2003, the threshold for obtaining a permit was lowered to 1 acre (0.4 hectares). Stormwater provisions of the NPDES program are set forth in 40 CFR 122.26. Permit modifications are required if discharge effluent is altered.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (42 U.S.C. 9601 et seq.) (also known as Superfund)—CERCLA provides (1) a program for emergency response to and reporting of a release or threat of a release of a hazardous substance to the environment and (2) a statutory framework for remediation of hazardous substance releases from Federal, state, and private sites. Using the Hazard Ranking System, contaminated sites are ranked and may be included on the National Priorities List. Section 120 of CERCLA specifies requirements for investigations, remediation, and natural resource restoration, as necessary, at Federal facilities, and also provides reporting requirements for hazardous substance contamination on properties to be transferred. LANL is not on the National Priorities List. Potential release sites at LANL are investigated and remediated under state authorities.

Emergency Management and Assistance (44 CFR 1.1)—This regulation contains the policies and procedures for the Federal Emergency Management Act, National Flood Insurance Program, Federal Crime Insurance Program, Fire Prevention and Control Program, Disaster Assistance Program, and Preparedness Program, including radiological planning and preparedness.

Emergency Planning and Community Right-to-Know Act (42 U.S.C. 11001 et seq.)—This amendment to CERCLA requires that facilities provide notice to and coordinate emergency planning with communities and government agencies concerning inventories and any unplanned releases of specific hazardous chemicals. EPA implements this act under regulations found in 40 CFR Parts 355, 370, and 372. Under Subtitle A of this act, Federal facilities are required to provide information to and coordinate with local and state emergency response planning authorities to ensure that emergency plans are sufficient to respond to unplanned releases of hazardous substances. Voluntary implementation of the provisions of this act at LANL began in 1987, and chemical inventories and emissions have been reported annually since 1988.

Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)—This act is intended to prevent the further decline of endangered and threatened species and to restore these species and their habitats. Section 7 of this act requires Federal agencies that have reason to believe that a prospective action may affect an endangered or threatened species or its habitat to consult with the U.S. Fish and Wildlife Service (USFWS) of the U.S. Department of the Interior or the National Marine Fisheries Service of the U.S. Department of Commerce to ensure the action does not jeopardize the species or destroy its habitat. If, despite reasonable and prudent measures to avoid or minimize such impacts, the species or its habitat would be jeopardized by the action, a review process is specified to determine whether the action may proceed as an incidental taking (50 CFR Part 17).

"Energy Code for New Federal, Commercial, and Multi-Family High Rise Residential Buildings" (10 CFR Part 434), "Energy Efficiency Standards for New Federal Low-Rise Residential Buildings" (10 CFR Part 435)—The provisions of these regulations provide minimum standards for energy efficiency and energy conservation performance for the design of new Federal, commercial, and multi-family high rise residential buildings and new Federal low-rise residential buildings. The performance standards are designed to achieve the maximum practicable improvements in energy efficiency and conservation and increases in the use of nondepletable sources of energy.

Energy Independence and Security Act of 2007 (Public Law 110-140)—This act establishes energy management goals and requirements and amends portions of the National Energy Conservation Policy Act. This act sets Federal energy management requirements in several areas, including the following: energy reduction goals for Federal buildings; facility management/benchmarking; performance and standards for new building, major renovations, and high-performance buildings; energy savings performance contracts; metering; energy-efficient product procurement; Office of Management and Budget reporting; and reductions in petroleum use/increases in alternative fuel use.

Farmland Protection Policy Act of 1981 (7 U.S.C. 4201 et seq.)—This act requires Federal agencies to consider prime or unique farmlands when planning major projects and programs on Federal lands. Federal agencies are required to use prime and unique farmland criteria developed by the U.S. Department of Agriculture's Soil Conservation Service. Under the Farmland Protection Policy Act, the Soil Conservation Service is authorized to maintain an inventory of prime and unique farmlands in the United States to identify the location and extent of rural lands important in the production of food, fiber, forage, and oilseed crops (7 CFR Part 657).

"Federal Energy Management and Planning Programs" (10 CFR Part 436)—The objectives of Federal energy management and planning programs are (1) to apply energy conservation measures to and improve the design of Federal buildings such that the energy consumption per gross square foot of Federal buildings in use during fiscal year 1995 is at least 10 percent less than the energy consumption per gross square foot in 1985; (2) to promote the methodology and procedures for conducting life-cycle cost analyses of proposed investments in building energy systems, building water systems, and energy and water conservation measures; (3) to promote the use of energy savings performance contracts by Federal agencies for implementation of privately financed investment in building and facility energy conservation measures for existing Federally owned buildings; and (4) to promote efficient use of energy in all agency operations through general operations plans.

Federal Facility Compliance Act of 1992 (42 U.S.C. 6961 et seq.)—This act, enacted on October 6, 1992, amends the Resource Conservation and Recovery Act (RCRA), making Federal facilities subject to potential fines and penalties for violations of RCRA, the law that sets requirements for management of hazardous waste. Prior to its passage, mixed waste stored at DOE sites generally did not comply with RCRA mixed waste land disposal restrictions because of a lack of treatment options. This act requires DOE to (1) prepare and submit a national inventory report identifying its mixed waste volume, characteristics, treatment capacity, and available technologies and (2) prepare and submit (to the appropriate state or EPA regulators) Site Treatment Plans for developing or using the needed treatment capacity along with schedules for treating the mixed waste at each DOE site. The LANL approved Site Treatment Plan is enforced by a compliance order issued by the New Mexico Environment Department in October 1995. It is available for public review.

Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 et seq.)—This act regulates the use, registration, and disposal of several classes of pesticides to ensure that pesticides are applied in a manner that protects the applicators, workers, and the environment. Implementing regulations include recommended procedures for the disposal and storage of pesticides (40 CFR Part 165) and worker protection standards (40 CFR Part 170).

Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.)—This act promotes effective planning and cooperation between Federal, state, public, and private agencies for the conservation and rehabilitation of the Nation's fish and wildlife and authorizes the U.S. Department of the Interior to provide assistance. This act requires consultation with USFWS on the possible effects of construction, projects, or activities affecting bodies of water in excess of 10 acres (approximately 4 hectares) in surface area on wildlife. This act also requires consultation with the head of the state agency that administers wildlife resources in the affected state.

Hazardous Materials Transportation Act of 1975, as amended (49 U.S.C. 5101 et seq.)—This act requires the U.S. Department of Transportation to prescribe uniform national regulations for transportation of hazardous materials (including radioactive materials). Most state and local regulations regarding such transportation that are not substantively the same as the U.S. Department of Transportation regulations are preempted (49 U.S.C. 5125). This, in effect, allows state and local governments to enforce only the Federal regulations, not to change or expand upon them.

This program is administered by the Research and Special Programs Administration of the U.S. Department of Transportation, which, when covering the same activities, coordinates its regulations with NRC (under the Atomic Energy Act) and EPA (under RCRA). The U.S. Department of Transportation regulations, which may be found in 49 CFR Parts 171 through 178 and 49 CFR Parts 383 through 397, contain requirements for identifying a material as hazardous or radioactive. These regulations interface with the NRC regulations for identifying material, but U.S. Department of Transportation hazardous material regulations govern the hazard communication (such as marking, labeling, vehicle placarding, and emergency response information) and shipping requirements. Requirements for transport by rail, air, and public highway are included. In addition, EPA regulations established in 40 CFR Part 262 apply to offsite transportation of hazardous wastes from LANL.

Public access to many portions of the LANL facility is controlled at all times through the use of gates and guards. Onsite transportation of hazardous materials, wastes, and contaminated equipment that is conducted entirely on DOE property is subject to applicable DOE directives and safety requirements set forth in 10 CFR Part 830, Subpart B. Offsite transportation of hazardous materials, wastes, and contaminated equipment from LANL over public highways is subject to applicable U.S. Department of Transportation and EPA regulations, as well as applicable DOE directives.

The NRC "Packaging and Transportation of Radioactive Material" (10 CFR Part 71) regulations include detailed packaging design requirements and package certification testing requirements. Complete documentation of design and safety analysis and the results of required certification tests are submitted to NRC to certify the package for use. This certification testing involves the following components: heat, physical drop onto an unyielding surface, water submersion, puncture by dropping the package onto a steel bar, and gas tightness.

Justice Assistance Act of 1984 (42 U.S.C. 3701–3799)—This act establishes emergency Federal law enforcement assistance to state and local governments in responding to a "law enforcement emergency," defined as an uncommon situation that requires law enforcement, that is or threatens to become of serious or epidemic proportions, and with respect to which state and local resources are inadequate to protect the lives and property of citizens or to enforce the criminal law. Emergencies that are not of an ongoing or chronic nature (for example, the Mount Saint Helens volcanic eruption) are eligible for Federal law enforcement assistance, including funds, equipment, training, intelligence information, and personnel.

Low-Level Radioactive Waste Policy Act of 1980, as amended (42 U.S.C. 2021 et seq.)—This act amends the Atomic Energy Act to specify that the Federal Government is responsible for disposal of low-level radioactive waste generated by certain activities and that each state is responsible for disposal of other low-level radioactive waste generated within its borders. It provides for and encourages interstate compacts to carry out state responsibilities. As a result of this act, low-level radioactive waste owned or generated by DOE remains the responsibility of the Federal Government.

Manhattan Project National Historical Park Study Act (Public Law 108-340)—This act directs the Secretary of the Interior to conduct a study on the preservation and interpretation of the historic sites of the Manhattan Project for potential inclusion in the National Park System (October 18, 1998).

Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. 703 et seq.)—This act is intended to protect birds that follow common migration patterns across the United States, Canada, Mexico, Japan, and Russia. It regulates the harvest of migratory birds by specifying conditions such as mode of harvest, hunting seasons, and bag limits. This act stipulates that it is unlawful, unless permitted by regulations, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, …any migratory bird…or any part, nest, or egg of any such bird." Although no permit for the proposed Chemistry and Metallurgy Research Building Replacement (CMRR) Project is required under this act, DOE is required to consult with USFWS regarding impacts on migratory birds and to avoid or minimize these effects in accordance with the U.S. Fish and Wildlife Service Mitigation Policy. A split of authority currently exists between Federal courts regarding whether this act applies to Federal agencies.

National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321 et seq.)—The purposes of NEPA are to (1) declare a national policy that will encourage productive and enjoyable harmony between people and their environment, (2) promote efforts that will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of people, (3) enrich the understanding of the ecological systems and natural resources important to the Nation, and (4) establish a Council on Environmental Quality (CEQ). NEPA establishes a national policy requiring that Federal agencies consider the environmental impacts of major Federal actions significantly affecting the quality of the human environment before making decisions and taking actions to implement those decisions. Implementation of NEPA requirements in accordance with CEQ regulations (40 CFR Parts 1500–1508) can result in a categorical exclusion, an environmental assessment and Finding of No Significant Impact, or an EIS and Record of Decision. This *CMRR-NF SEIS* was prepared in accordance with NEPA requirements, CEQ regulations for implementing the procedural requirements of NEPA (40 CFR Parts 1500–1508), and "National Environmental Policy Act Implementing Procedures" (10 CFR Part 1021; DOE Order 451.1B, Change 1). It discusses reasonable alternatives and their potential environmental consequences.

National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 et seq.)—This act requires that sites with significant national historic value be placed on the National Register of Historic Places, which is maintained by the Secretary of the Interior. The major provisions of this act for DOE consideration are Sections 106 and 110. Both sections aim to ensure that historic properties are appropriately considered in planning Federal initiatives and actions. Section 106 is a specific, issue-related mandate to which Federal agencies must adhere. It is a reactive mechanism driven by a Federal action. Section 110, in contrast, sets out broad Federal agency responsibilities with respect to historic properties. It is a proactive mechanism that emphasizes ongoing management of historic preservation sites and activities at Federal facilities. No permits or certifications are required under the act.

Section 106 requires the head of any Federal agency with direct or indirect jurisdiction over a proposed Federal or federally assisted undertaking to ensure compliance with the provisions of the act. It compels Federal agencies to "take into account" the effect of their projects on historical and archaeological resources and to give the Advisory Council on Historic Preservation the opportunity to comment on such effects. Section 106 mandates consultation during Federal actions if the undertaking has the potential to affect a historic property. This consultation normally involves State or Tribal Historic Preservation Officers, or both, and may include other organizations and individuals, such as local governments and American Indian tribes. If an adverse effect is found, the consultation often ends with the execution of a Memorandum of Agreement that states how the adverse effect will be resolved.

The regulations implementing Section 106, found in 36 CFR Part 800, were revised on December 12, 2000, to modify the process by which Federal agencies consider the effects of their undertakings on historic properties and to provide the Advisory Council on Historic Preservation with a reasonable opportunity to comment on such undertakings, as required by Section 106 of this act. In promulgating the new regulations, CEQ sought to better balance the interests and concerns of various users of the Section 106 process, including Federal agencies, State Historic Preservation Officers, Tribal Historic Preservation Officers, American Indians and Native Hawaiians, industry, and the public.

Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001 et seq.)—This act establishes a means for American Indians to request the return or repatriation of human remains and other cultural items presently held by Federal agencies or federally assisted museums or institutions. This act also contains provisions regarding the intentional excavation and removal of, inadvertent discovery of, and illegal trafficking in American Indian human remains and cultural items. Major actions under this law include the following: (1) establishing a review committee with monitoring and policymaking responsibilities; (2) developing regulations for repatriation, including procedures for identifying lineal descent or cultural affiliation needed for claims; (3) providing oversight of museum programs designed to meet the inventory requirements and deadlines of this law; and (4) developing procedures to handle unexpected discoveries of graves or grave goods during activities on Federal or Tribal lands. All Federal agencies that manage land or are responsible for archaeological collections obtained from their lands or generated by their activities must comply with this act. DOE managers of ground-disturbing activities on Federal and tribal lands are to be aware of the statutory provisions treating inadvertent discoveries of American Indian remains and cultural objects. Regulations implementing this act are found in 43 CFR Part 10.

Noise Control Act of 1972, as amended (42 U.S.C. 4901 et seq.)—Section 4 of the Noise Control Act of 1972, as amended, directs all Federal agencies to carry out "to the fullest extent within their authority" programs within their jurisdictions that further the national policy of promoting an environment free from noise that jeopardizes health and welfare. Federal, state, and local agencies enforce the standards and requirements of this act to regulate noise at facilities such as LANL. DOE must comply with this act for any of the activities being considered in this *CMRR-NF SEIS.*

Occupational Safety and Health Act of 1970 (29 U.S.C. 651 et seq.)—Section 4(b)(1) of the Occupational Safety and Health Act exempts DOE and its contractors from the occupational safety requirements of the Occupational Safety and Health Administration. However, 29 U.S.C. 668 requires Federal agencies to establish their own occupational safety and health programs for their places of employment, consistent with Occupational Safety and Health Administration standards.
DOE Order 440.1A, *Worker Protection Management for DOE Federal and Contractor Employees*, states that DOE will implement a written worker protection program that (1) provides a place of employment free from recognized hazards that are causing or are likely to cause death or serious physical harm to their employees, and (2) integrates all requirements contained in paragraphs 4a to 4l of DOE Order 440.1A;

29 CFR Part 1960, "Basic Program Elements for Federal Employee Occupational Safety and Health Programs and Related Matters;" and other related site-specific worker protection activities.

"Occupational Safety and Health Standards" (29 CFR Part 1910)—This regulation establishes Occupational Safety and Health Administration requirements for employee safety in a variety of working environments. It addresses employee emergency and fire prevention plans (Section 1910.38), hazardous waste operations and emergency response (Section 1920.120), and hazards communication (Section 1910.1200) to make employees aware of the dangers they face from hazardous materials in their workplace. These regulations do not directly apply to Federal agencies. However, Section 19 of the Occupational Safety and Health Act (29 U.S.C. 668) requires all Federal agencies to have occupational safety programs "consistent" with Occupational Safety and Health Act standards.

Pollution Prevention Act of 1990 (42 U.S.C. 13101 et seq.)—This act establishes a national policy for waste management and pollution control. Source reduction is given first preference, followed by environmentally safe recycling, with disposal or releases to the environment as a last resort. In response to the policies established by the Pollution Prevention Act, DOE committed to participation in the Superfund Amendments and Reauthorization Act, Section 313, EPA 33/50 Pollution Prevention Program. The goal for facilities involved in compliance with Section 313 was to achieve a 33 percent reduction (from a 1993 baseline) in the release of 17 priority chemicals by 1997. On November 12, 1999, then-U.S. Secretary of Energy Bill Richardson established 14 pollution prevention and energy efficiency goals for DOE to build environmental accountability and stewardship into DOE's decisionmaking process. Under these goals, DOE strives to minimize waste and maximize energy efficiency as measured by continuous cost-effective improvements in the use of materials and energy, using the years 2005 and 2010 as interim measurement points.

"Schedule C–Quantities of Radioactive Materials Requiring Consideration of the Need for an Emergency Plan for Responding to a Release" (10 CFR 30.72, Schedule C)—This section of the regulations provides a list that is the basis for both the public and private sector to determine whether the radiological materials they handle must have an emergency response plan for unscheduled releases and is one of the threshold criteria documents for DOE hazards assessments required by DOE Order 151.C, *Comprehensive Emergency Management System.* The *Federal Radiological Emergency Response Plan*, dated May 1, 1996, primarily discusses offsite Federal response in support of state and local governments with jurisdiction during a peacetime radiological emergency.

Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988, as amended (42 U.S.C. 5121)—This act provides an orderly, continuing means of providing Federal Government assistance to state and local governments in managing their responsibilities to alleviate suffering and damage resulting from disasters. The President, in response to a state governor's request, may declare an "emergency" or "major disaster" to provide Federal assistance under this act. The President, in Executive Order 12148, as amended, delegated all functions except those in Sections 301, 401, and 409 to the Director of the Federal Emergency Management Agency. The act provides for the appointment of a Federal coordinating officer who will operate in the designated area with a state coordinating officer for the purpose of coordinating state and local disaster assistance efforts with those of the Federal Government.

Safe Drinking Water Act of 1974, as amended (42 U.S.C. 300(f) et seq.)—The primary objective of the Safe Drinking Water Act is to protect the quality of public drinking water supplies and sources. The implementing regulations, administered by EPA unless delegated to the states, establish standards applicable to public water systems. These regulations include maximum contaminant levels (including those for radioactivity) in public water systems, which are defined as water systems with at least 15 service connections that are used by year-round residents or regularly serve at least 25 year-round residents. EPA regulations implementing the Safe Drinking Water Act are found in 40 CFR Parts 141 through 149. For radioactive material, the regulations specify that the average annual concentration of beta particles and photon energy from manmade radionuclides in drinking water, as delivered to the user by such a system, shall not produce a dose equivalent to the total body or an internal organ greater than 4 millirem per year. They further specify a concentration limit for gross alpha particle activity (excluding radon and uranium) of 15 picocuries per liter and for uranium of 0.03 milligrams per liter (40 CFR 141.66). Other programs established by the Safe Drinking Water Act include the Sole Source Aquifer Program, the Wellhead Protection Program, and the Underground Injection Control Program.

Solid Waste Disposal Act of 1965, as amended by the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments of 1984 (42 U.S.C. 6901 et seq.)—This act, as amended, governs the transportation, treatment, storage, and disposal of hazardous and nonhazardous wastes. Under RCRA, which amended the Solid Waste Disposal Act of 1965, EPA defines and identifies hazardous waste; establishes standards for its transportation, treatment, storage, and disposal; and requires permits for persons engaged in hazardous waste activities. Section 3006 of RCRA (42 U.S.C. 6926) allows states to establish and administer these permit programs with EPA approval.

The EPA regulations implementing RCRA are found in 40 CFR Parts 260 through 283. The New Mexico Environment Department is authorized to administer the RCRA program in New Mexico and issued the RCRA operating permit. Regulations imposed on a generator or on a treatment, storage, or disposal facility vary according to the type and quantity of hazardous waste generated, treated, stored, or disposed of and the methods of treatment, storage, and disposal.

Toxic Substances Control Act of 1976 (15 U.S.C. 2601 et seq.)—This act provides EPA with the authority to require testing of chemical substances entering the environment and to regulate them as necessary. The law complements and expands existing toxic substance laws, such as Section 112 of the Clean Air Act and Section 307 of the Clean Water Act. This act requires compliance with the inventory reporting and chemical control provisions of the legislation to protect the public from risks of exposure to chemicals.

This act also imposes strict limitations on the use and disposal of PCBs, chlorofluorocarbons, asbestos, dioxins, certain metal-working fluids, and hexavalent chromium. EPA issued the disposal authorization documents for management of its PCB waste disposal facility in Technical Area 54.

Waste Isolation Pilot Plant Land Withdrawal Act (Public Law 102-579) and Waste Isolation Pilot Plant Land Withdrawal Act Amendments (Public Law 104-201)—The Waste Isolation Pilot Plant Land Withdrawal Act withdrew land from the public domain for the purpose of creating and operating the Waste Isolation Pilot Plant (WIPP), the geologic repository in New Mexico designated as the national disposal site for defense transuranic waste. The act also defined the characteristics and amount of waste that can be disposed of at the facility. Amendments to the act exempt waste to be disposed of at WIPP from the RCRA land disposal restrictions. Prior to sending any transuranic waste from LANL to WIPP, DOE would have to determine whether the waste meets all statutory and regulatory requirements for disposal at WIPP.

5.4 Applicable Executive Orders

This section identifies environment-, health-, and safety-related Executive orders applicable to LANL operations. Activities under all alternatives would need to be conducted in compliance with applicable Executive orders. Chapter 3 describes the resources at LANL and Chapter 4 discusses the potential impacts on those resources under each alternative. Consultations with applicable agencies and federally recognized American Indian nations, as required by these Executive orders, are discussed in Section 5.7.

Executive Order 11514, *Protection and Enhancement of Environmental Quality* (March 5, 1970), as amended by Executive Orders 11541 (July 1, 1970) and 11991 (May 24, 1977)—This Executive order requires Federal agencies to continually monitor and control their activities to (1) protect and enhance the quality of the environment and (2) develop procedures to ensure the fullest practicable provision of timely public information and understanding of Federal plans and programs that may have potential environmental impact so that interested parties can submit their views. DOE has issued regulations (10 CFR Part 1021) and DOE Order 451.1B, *National Environmental Policy Act Compliance Program*, for compliance with this Executive order.

Executive Order 11593, *Protection and Enhancement of the Cultural Environment* (May 13, 1971)—This Executive order directs Federal agencies to locate, inventory, and nominate properties under their jurisdiction or control to the National Register of Historic Places if they qualify. This process requires DOE to provide the Advisory Council on Historic Preservation an opportunity to comment on the possible impacts of proposed activities on any potentially eligible or listed resources.

Executive Order 11990, *Protection of Wetlands* (May 24, 1977)—This Executive order (implemented by DOE in 10 CFR Part 1022) requires Federal agencies to avoid any short- or long-term adverse impacts on wetlands wherever there is a practicable alternative. Each agency must also provide opportunities for early public review of any plans or proposals for new construction in wetlands.

Executive Order 11988, *Floodplain Management* (May 24, 1977)—This Executive order (implemented by DOE in 10 CFR Part 1022) requires Federal agencies to establish procedures to ensure that the potential effects of flood hazards and floodplain management are considered for any action undertaken in a floodplain and that floodplain impacts are avoided to the extent practicable.

Executive Order 12088, *Federal Compliance with Pollution Control Standards* (October 13, 1978), as amended by Executive Order 12580, *Superfund Implementation* (January 23, 1987)—This Executive order directs Federal agencies to comply with applicable administrative and procedural pollution control standards established by, but not limited to, the Clean Air Act, the Noise Control Act, the Clean Water Act, the Safe Drinking Water Act, the Toxic Substances Control Act, and RCRA.

Executive Order 12148, *Federal Emergency Management* (July 20, 1979), as amended by Executive Order 12919, *National Defense Industrial Resources Preparedness*, the Homeland Security Act of 2002 (Public Law 107-296), and Title 3 of U.S.C. Section 301—This Executive order transfers functions and responsibilities associated with Federal emergency management to the director of the Federal Emergency Management Agency. This order assigns the director the responsibility to establish Federal policies for, and to coordinate all civil defense and civil emergency planning, management, mitigation, and assistance functions of, Executive branch agencies. The amendment replaces the name "Federal Emergency Management Agency" with "Department of Homeland Security" wherever it appears.

Executive Order 12656, ***Assignment of Emergency Preparedness Responsibilities*** **(November 18, 1988)**—This Executive order assigns emergency preparedness responsibilities to Federal departments and agencies.

Executive Order 12699, ***Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction*** **(January 5, 1990)**—This Executive order requires Federal agencies to do the following in a cost-effective manner: (1) reduce risks to occupants of buildings owned, leased, or purchased by the Federal Government or constructed with Federal assistance and to persons who would be affected by failures of Federal buildings in earthquakes; (2) improve the capability of existing Federal buildings to function during or after an earthquake; and (3) reduce earthquake losses of public buildings. Each Federal agency responsible for the design and construction of a Federal building shall ensure that the building is designed and constructed in accordance with appropriate seismic design and construction standards.

Executive Order 12898, ***Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*** **(February 11, 1994)**—This Executive order requires each Federal agency to identify and address the disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations.

The CEQ, which oversees the Federal Government's compliance with Executive Order 12898 and NEPA, has developed guidelines to assist Federal agencies in incorporating the goals of Executive Order 12898 into the NEPA process. This guidance, published in 1997, is intended to "...assist Federal agencies with their NEPA procedures so that environmental justice concerns are effectively identified and addressed." As part of this process, DOE conducted an analysis to determine whether implementing any of the proposed alternatives would result in disproportionately high or adverse impacts on minority and low-income populations. The results of this analysis are discussed in the environmental justice sections of Chapter 4 of this *CMRR-NF SEIS* for each of the alternatives under consideration.

Executive Order 12938, ***Proliferation of Weapons of Mass Destruction*** **(November 14, 1994)**—This Executive order states that the proliferation of nuclear, biological, and chemical weapons ("weapons of mass destruction") and the means of delivering such weapons constitute an unusual and extraordinary threat to the national security, foreign policy, and economy of the United States and that a national emergency would be declared to deal with that threat.

Executive Order 13007, ***Indian Sacred Sites*** **(May 24, 1996)**—This Executive order directs Federal agencies to (1) accommodate access to and ceremonial use of American Indian sacred sites by their religious practitioners and (2) avoid adversely affecting the physical integrity of such sacred sites to the extent practicable and when consistent with essential agency functions. Where appropriate, agencies are to maintain the confidentiality of sacred sites.

Executive Order 13045, ***Protection of Children from Environmental Health Risks and Safety Risks*** **(April 21, 1997), as amended by Executive Order 13229 (October 9, 2001)**—This Executive order requires each Federal agency to give high priority to identifying and assessing environmental health risks and safety risks that may disproportionately affect children and to ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health or safety risks.

Executive Order 13112, ***Invasive Species*** **(February 3, 1999)**—This Executive order requires Federal agencies to prevent the introduction of invasive species; to provide for their control; and to minimize their economic, ecological, and human health impacts.

Executive Order 13175, ***Consultation and Coordination with Indian Tribal Governments*** **(November 6, 2000)**—This Executive order supplements the Executive Memorandum (dated April 29, 1994) entitled, "Government-to-Government Relations with Tribal Governments," and states that each Executive branch department and agency shall consult, to the greatest extent practicable and to the extent permitted by law, with tribal governments prior to taking actions that affect federally recognized tribal governments. This order also states that each Executive branch department and agency shall assess the impact of Federal Government plans, projects, programs, and activities on tribal trust resources and assure that tribal government rights and concerns are considered during the development of such plans, projects, programs, and activities.

Executive Order 13186, ***Responsibilities of Federal Agencies to Protect Migratory Birds*** **(January 10, 2001)**—This Executive order directs departments and agencies to take certain actions to further implement the Migratory Bird Treaty Act. Specifically, this order directs Federal agencies whose direct activities will likely result in the take of migratory birds to develop and implement a Memorandum of Understanding with USFWS to promote the conservation of bird populations.

Executive Order 13195, ***Trails for America in the 21st Century*** **(January 18, 2001)**—This Executive order states that Federal agencies will, to the extent permitted by law and where practicable—and in cooperation with tribes, states, local governments, and interested citizen groups—protect, connect, promote, and assist trails of all types throughout the United States.

Executive Order 13287, ***Preserve America*** **(March 3, 2003)**—The goals of the initiative addressed by this Executive order include a greater shared knowledge about the Nation's past, strengthened regional identities and local pride, increased local participation in preserving cultural and natural heritage assets, and support for the economic vitality of our communities. This order establishes Federal policy to provide leadership in preserving America's heritage by actively advancing the protection, enhancement, and contemporary use of the historic properties owned by the Federal Government and by promoting intergovernmental cooperation and partnerships for the preservation and use of historic properties.

Executive Order 13423, ***Strengthening Federal Environmental, Energy, and Transportation Management*** **(January 24, 2007)**—This Executive order sets goals for Federal agencies to conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions in an environmentally, economically, and fiscally sound, integrated, continuously improving, efficient, and sustainable manner.

Executive Order 13514, ***Federal Leadership in Environmental, Energy, and Economic Performance*** **(October 5, 2009)**—The goals of this Executive order are to expand upon the energy reduction and environmental performance requirements of Executive Order 13423. Executive Order 13514 sets numerous Federal energy requirements in several areas, including accountability and transparency, strategic sustainability performance planning, greenhouse gas management, sustainable buildings and communities, water efficiency, electronic products and services, fleet and transportation management, and pollution prevention and waste reduction. Activities under all of the alternatives would need to be conducted to comply with this order.

5.5 Applicable U.S. Department of Energy Directives and Regulations

The Atomic Energy Act authorizes DOE to establish standards to protect health and/or minimize the dangers to life or property from activities under DOE's jurisdiction. Through a series of DOE orders and regulations, an extensive system of standards and requirements has been established to ensure safe operation of DOE facilities.

DOE regulations are found in Title 10 of the CFR. These regulations address such areas as energy conservation, administrative requirements and procedures, nuclear safety, and classified information. For the purposes of this EIS, relevant regulations include "Procedural Rules for DOE Nuclear Activities" (10 CFR Part 820), "Nuclear Safety Management" (10 CFR Part 830), "Occupational Radiation Protection" (10 CFR Part 835), "National Environmental Policy Act Implementing Procedures" (10 CFR Part 1021), and "Compliance with Floodplain and Wetland Environmental Review Requirements" (10 CFR Part 1022).

The Atomic Energy Act authorizes DOE to establish standards to protect health and minimize the dangers to life or property from activities under DOE's jurisdiction. Through a series of DOE directives and regulations, an extensive system of standards and requirements has been established to ensure safe operation of DOE facilities. A number of DOE directives have been issued in support of environmental, safety, and health programs. Many of these were revised and reorganized to reduce duplication and eliminate obsolete provisions. The new DOE Directives System is organized by series, with each directive identified by three digits. Directives can include policies, orders, notices, manuals, and guides.

Existing DOE directives (identified by four digits) are expected to be revised and converted to the new DOE numbering system. All current directives are in effect without regard to the expiration date. The major DOE directives pertaining to the alternatives of this EIS are listed in **Table 5–2**.

Table 5–2 Applicable U.S. Department of Energy Directives

DOE Directive Number	*Title*	*Date*
Leadership/Management Planning		
P 141.1	Department of Energy Management of Cultural Resources	5-2-2001
P 141.2	Public Participation and Community Relations	5-2-2003
O 144.1	Department of Energy American Indian Tribal Government Interactions and Policy	1-16-2009 Chg 1: 11-6-2009
O 151.1C	Comprehensive Emergency Management System	11-2-2005
O 153.1	Departmental Radiological Emergency Response Assets	6-27-2007
Information and Analysis		
O 221.1A	Reporting Fraud Waste and Abuse to the Office of Inspector General	4-19-2008
O 221.2A	Cooperation with the Office of Inspector General	2-25-2008
O 221.3A	Establishment of Management Decisions on Office of Inspector General Reports	4-19-2008
O 231.1A	Environment Safety and Health Reporting	8-9-2003 Chg 1: 6-3-2004
M 231.1-1A	Environment Safety and Health Reporting Manual	3-19-2004 Chg 2: 6-3-2004
M 231.1-2	Occurrence Reporting and Processing of Operations Information	8-19-2003
Work Processes		
O 410.1	Central Technical Authority Responsibilities Regarding Nuclear Safety Requirements	8-28-2007
O 410.2	Management of Nuclear Materials	8-17-2009

DOE Directive Number	Title	Date
P 411.1	Safety Management Functions Responsibilities and Authorities Policy	1-28-1997
M 411.1-1C	Safety Management Functions Responsibilities and Authorities Manual	12-31-2003
P 413.1	Program and Project Management Policy for the Planning, Programming, Budgeting, and Acquisition of Capital Assets	6-10-2000 Chg 1: 7-14-2004
O 413.1B	Internal Control Program	10-28-08
P 413.2	Value Engineering	1-7-2004
O 413.2B	Laboratory Directed Research and Development	4-19-2006
O 413.3B	Program and Project Management for the Acquisition of Capital Assets	11-29-2011
O 414.1C	Quality Assurance	6-17-2005 Chg 1: 7-7-2005
P 420.1	Nuclear Safety Policy	2-8-2011
O 420.1B	Facility Safety	12-22-2005 Chg 1: 4-19-10
O 422.1	Conduct of Operations	6-29-2010
O 425.1D	Verification of Readiness to Start Up or Restart Nuclear Facilities	4-16-2010
P 426.1	Federal Technical Capability Policy for Defense Nuclear Facilities	12-10-1998
O 426.1	Federal Technical Capability	11-19-2009
O 426.2	Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities	4-21-2010
P 430.1	Land and Facility Use Planning	12-21-1994
O 430.1B	Real Property Asset Management	9-24-2003 Chg 1: 2-8-2008
O 430.2B	Departmental Energy, Renewable Energy and Transportation Management	2-27-2008
O 433.1B	Maintenance Management Program for DOE Nuclear Facilities	4-21-2010
P 434.1	Conduct and Approval of Select Agent and Toxin Work at Department of Energy Sites	6-5-2009
O 435.1	Radioactive Waste Management	7-9-1999 Chg 1: 8-28-2001 Certified 1-9-2007
M 435.1-1	Radioactive Waste Management Manual	7-9-1999 Chg 1: 6-19-2001 Certified 1-9-2007
O 440.1B	Worker Protection Program for DOE (Including the National Nuclear Security Administration) Federal Employees	5-17-2007 Chg 1: 8-21-2007
M 440.1-1A	DOE Explosives Safety Manual	1-9-2006
P 441.1	DOE Radiological Health and Safety Policy	4-26-1996
M 441.1-1	Nuclear Material Packaging Manual	3-7-2008
P 443.1A	Protection of Human Subjects	12-20-2007
O 443.1A	Protection of Human Subjects	12-20-2007
O 450.1A	Environmental Protection Program	6-4-2008
P 450.2A	Identifying, Implementing and Complying with Environment, Safety and Health Requirements	5-15-1996
P 450.3	Authorizing Use of the Necessary and Sufficient Process for Standards-Based Environment, Safety and Health Management	1-25-1996
M 450.3-1	DOE Closure Process for Necessary and Sufficient Sets of Standards	3-1-1996
P 450.4	Safety Management System Policy	11-15-1996
M 450.4-1	Integrated Safety Management System Manual	11-1-2006 Chg 1: 11-16-2006
P 450.7	Environment Safety and Health (ESH) Goals	8-2-2004

DOE Directive Number	***Title***	***Date***
O 451.1B	National Environmental Policy Act Compliance Program	10-26-2000 Chg 1: 9-28-2001 Chg 2: 6-25-2010
O 452.1D	Nuclear Explosive and Weapon Surety Program	4-14-2009
O 452.2D	Nuclear Explosive Safety	4-14-2009
M 452.2-1A	Nuclear Explosive Safety Manual	4-14-2009
M 452.2-2	Nuclear Explosive Safety Evaluation Processes	4-14-2009
O 452.3	Management of the Department of Energy Nuclear Weapons Complex	6-8-2005
O 452.4B	Security and Use Control of Nuclear Explosives and Nuclear Weapons	1-22-2010
O 452.6A	Nuclear Weapon Surety Interface with the Department of Defense	4-14-2009
O 452.7	Protection of Use Control Vulnerabilities and Designs	5-14-2010
P 454.1	Use of Institutional Controls	4-9-2003
P 455.1	Use of Risk-Based End States	7-15-2003
P 456.1	Secretarial Policy Statement on Nanoscale Safety	9-15-2005 Certified 9-23-2010
N 456.1	The Safe Handling of Unbound Engineered Nanoparticles	1-15-2009
O 457.1	Nuclear Counterterrorism	2-7-2006
M 457.1-1	Control of Improvised Nuclear Device Information	8-10-2006
O 460.1C	Packaging and Transportation Safety	5-14-2010
O 460.2A	Departmental Materials Transportation and Packaging Management	12-22-2004
M 460.2-1A	Radioactive Material Transportation Practices Manual	6-4-2008
O 461.1B	Packaging and Transportation for Offsite Shipment of Materials of National Security Interest	12-20-2010
O 461.2	Onsite Packaging and Transfer or Transportation of Materials of National Security Interest	4-26-2004
O 462.1	Import and Export of Category 1 and 2 Radioactive Sources and Aggregated Quantities	11-10-2008
P 470.1A	Safeguards and Security Program	12-29-2010
O 470.2B	Independent Oversight and Performance Assurance Program	10-31-2002
O 470.3B	Graded Security Protection (GSP) Policy	8-12-2008
O 470.4A	Safeguards and Security Program	5-25-2007
M 470.4-1	Safeguards and Security Program Planning and Management	8-26-2005 Chg 1: 3-7-2006 Chg 2: 10-20-2010
M 470.4-2A	Physical Protection	7-23-2009
M 470.4-3A	Contractor Protective Force	11-5-2008
M 470.4-4A	Information Security Manual	1-16-2009 Chg 1: 10-12-2010
M 470.4-5	Personnel Security	8-26-2005
M 470.4-6	Nuclear Material Control and Accountability	8-26-2005 Chg 1: 8-14-2006
M 470.4-8	Federal Protective Force	7-15-2009
N 470.5	Implementation of Section 1072 of the National Defense Authorization Act for Fiscal Year 2008	8-12-2009
O 471.B	Identification and Protection of Unclassified Controlled Nuclear Information	3-1-2010
M 471.2-3B	Special Access Program Policies, Responsibilities, and Procedure	10-29-2007
O 471.3	Identifying and Protecting Official Use Only Information	4-9-2003 Chg. 1: 1-13-2011
M 471.3-1	Manual for Identifying and Protecting Official Use Only Information	4-9-2003 Chg. 1: 1-13-2011
O 475.2A	Identifying Classified Information	2-1-2011

DOE Directive Number	Title	Date
	Environmental Quality and Impact	
O 458.1	Radiation Protection of the Public and the Environment	2-11-2011
O 5480.30	Nuclear Reactor Safety Design Criteria	1-19-2003 Chg 1: 3-14-2001

M = Manual, N = Notice, O = Order, P = Policy.

5.6 Applicable State and Local Laws, Regulations, and Agreements

Certain environmental requirements, including some discussed in Section 5.3, have been delegated to state authorities for implementation and enforcement. It is DOE policy to conduct its operations in an environmentally safe manner that complies with all applicable laws, regulations, and standards, including state laws and regulations. A list of applicable state and local laws, regulations, and agreements is provided in **Table 5–3**.

Table 5–3 Applicable State and Local Regulations, and Agreements

Laws, Regulations, Agreements	*Citation*	*Requirements*
Endangered Plant Species	*New Mexico Administrative Code* (NMAC) Title 19, Chapter 21, "Endangered Plants" (revised November 30, 2006).	Establishes plant species list and rules for collection.
Environmental Oversight and Monitoring Agreement	Agreement in Principle Between DOE and the State of New Mexico, November 2000.	Provides DOE support for state activities in environmental oversight, monitoring, access, and emergency response.
Federal Facility Compliance Order	October 1995 (issued to both DOE and LANL).	Order used by the New Mexico Environment Department to enforce the Federal Facility Compliance Act. It requires compliance with the approved LANL Site Treatment Plan, which documents the development and use of treatment capacities and technologies, as well as use of offsite facilities for treating mixed radioactive waste stored at LANL.
Los Alamos County Noise Restrictions	*Los Alamos County Code*, Chapter 8.28.	Imposes noise restrictions and makes provisions for exceedances.
Environmental Improvement Act	*New Mexico Statutes Annotated* (NMSA) 1978, Sections 74-1-1 through 74-1-15; NMAC Sections 20.5.1 through 20.5.17, August 15, 2003. The New Mexico Environment Department recently changed its regulations for storage tanks, combining the regulations for aboveground and underground storage tanks into the Petroleum Storage Tank regulations. Petroleum Storage Tank regulations are found in NMAC Sections 20.5.1 through 20.5.17; filed for publication in the *New Mexico Register* on July 16, 2003; effective August 15, 2003.	Aboveground tank regulations were modified to include requirements for the registration, installation, modification, repair, and closure or removal of aboveground storage tanks, as well as release detection, record-keeping, and financial responsibility in the state of New Mexico.

Laws, Regulations, Agreements	***Citation***	***Requirements***
New Mexico Air Quality Control Act	NMSA Chapter 74, "Environmental Improvement," Article 2, "Air Pollution" (revised October 31, 2002), and implementing regulations at NMAC Title 20, "Environmental Protection," Chapter 2, "Air Quality" (revised October 31, 2002).	Establishes air quality standards and requires a permit prior to construction or modification of an air contaminant source. Also requires an operating permit for major producers of air pollutants and imposes emission standards for hazardous air pollutants.
New Mexico Cultural Properties Act	NMSA Chapter 18, "Libraries and Museums," Article 6, "Cultural Properties."	Establishes the State Historic Preservation Office and requirements to prepare an archaeological and historic survey and consult with the State Historic Preservation Office.
New Mexico Groundwater Protection Act	NMSA Chapter 74, Article 6B, "Groundwater Protection."	Establishes state standards for protection of groundwater from leaking underground storage tanks.
New Mexico Hazardous Chemicals Information Act	NMSA Chapter 74, Article 4E-1, "Hazardous Chemicals Information."	Implements the hazardous chemical information and toxic release reporting requirements of the Emergency Planning and Community Right-to-Know Act of 1986 (SARA Title III) for covered facilities.
New Mexico Hazardous Waste Act	NMSA Chapter 74, Article 4, "Hazardous Waste," and implementing regulations found in NMAC Title 20, "Environmental Protection," Chapter 4, "Hazardous Waste" (revised June 14, 2000).	Establishes permit requirements for construction, operation, modification, and closure of a hazardous waste management facility and establishes state standards for cleanup of releases from leaking underground storage tanks.
New Mexico Endangered Plant Species Act	NMSA Chapter 75, "Miscellaneous Natural Resource Matters," Article 6, "Endangered Plants."	Requires coordination with the State of New Mexico.
New Mexico Night Sky Protection Act	NMSA Chapter 74, Article 12, "Night Sky Protection": 74-12-1 to 74-12-10 (House Bill 39/A, March 1, 1999).	Regulates outdoor night lighting fixtures to preserve and enhance the State of New Mexico's dark sky while promoting safety, conserving energy, and preserving the environment for astronomy.
New Mexico Radiation Protection Act	NMSA Chapter 74, Article 3, "Radiation Control" and implementing regulations found in NMAC Title 20, Chapter 3, "Radiation Protection" (revised April 15, 2004) "Environmental Protection."	Establishes state requirements for worker protection.
New Mexico Raptor Protection Act	NMSA Chapter 17, Article 2-14.	Makes it unlawful to take, attempt to take, possess, trap, ensnare, injure, maim, or destroy any of the species of hawks, owls, and vultures.
New Mexico Solid Waste Act	NMSA Chapter 74, Article 9, Solid Waste Act, and implementing regulations found in NMAC Title 20, "Environmental Protection," Chapter 9, "Solid Waste" (revised November 27, 2001).	Requires permit prior to construction or modification of a solid waste disposal facility.
New Mexico Water Quality Act	NMSA Chapter 74, Article 6, "Water Quality," and implementing regulations found in NMAC Title 20, "Environmental Protection," Chapter 6, "Water Quality" (revised February 16, 2006).	Establishes water quality standards and requires a permit prior to the construction or modification of a water discharge source.
New Mexico Wildlife Conservation Act	NMSA Chapter 17, "Game and Fish," Article 2, "Hunting and Fishing Regulations," Part 3, Wildlife Conservation Act.	Requires a permit and coordination if a project may disturb habitat or otherwise affect threatened or endangered species.

Laws, Regulations, Agreements	*Citation*	*Requirements*
Compliance Order on Consent	March 1, 2005 (entered into by the State of New Mexico, DOE, and the University of California) (NMED 2005).	Requires site investigations of known or potentially contaminated sites at LANL and cleanup in accordance with a specified process and schedule.
Pueblo Accords	DOE 2006 Restatement of Accords with the Pueblos of Cochiti, Jemez, Santa Clara, and San Ildefonso.	Set forth the specifications for maintaining a government-to-government relationship between DOE and each of the four pueblos closest to LANL.
Threatened and Endangered Species of New Mexico	NMAC Title 19, "Natural Resources and Wildlife," Chapter 33, "Threatened and Endangered Species," Section 19.33.6.8 (revised December 29, 2006).	Establishes the list of threatened and endangered species.

5.7 Consultations with Agencies and Federally Recognized American Indian Nations

Certain laws, such as the Endangered Species Act, the Fish and Wildlife Coordination Act, and the National Historic Preservation Act, require consultation and coordination by DOE with other governmental entities, including other Federal agencies, state and local agencies, and federally recognized American Indian nations. These consultations must occur on a timely basis and are generally required before any land disturbance can begin. Most of these consultations are related to biotic resources, cultural resources, and American Indian rights.

As part of its government-to-government interactions, twice yearly executive meetings are held among the Los Alamos Site Office manager, the LANL director, and the respective Accord Pueblo governors (or their representatives) of the four Accord Pueblos (Cochiti, San Ildefonso, Jemez, and Santa Clara). In addition, the Los Alamos Site Office manager meets monthly with each governor of the two pueblos closest to LANL (San Ildefonso and Santa Clara) and with the other Accord Pueblo governors on a less-frequent basis. In both the executive meetings and the monthly meetings, the Los Alamos Site Office manager discusses current and planned activities taking place at LANL and seeks comment on these activities from the governors.

The biotic resource consultations generally pertain to the potential for activities to disturb sensitive species or habitats. Cultural resource consultations relate to the potential for disruption of important cultural resources and archaeological sites. American Indian consultations concern the sovereign rights of tribal nations regarding the potential for disturbance of ancestral American Indian sites and the traditional practices of American Indians.

With respect to biotic resources, NNSA has determined that the proposed action would be similar to those described as acceptable in the *Los Alamos National Laboratory Threatened and Endangered Species Habitat Management Plan* (LANL 2000a); however, informal consultation by the National Nuclear Security Administration (NNSA) is necessary to comply with the provisions of 50 CFR Part 402 (Section 7), "Interagency Cooperation – Endangered Species Act of 1973, as amended." NNSA initiated consultation with USFWS, as the Federal agency with regulatory responsibility for the Endangered Species Act, in April 2003 regarding the CMRR Facility (that is, the CMRR Nuclear Facility and the Radiological Laboratory/Utility/Office Building). Subsequent consultations occurred in February 2005, January 2006, August 2007, and June 2009. Consultations resulted in concurrence by USFWS with NNSA's determination that construction and operation of the CMRR Facility in Technical Area 55, including use of other areas for construction support activities, may affect, but is not likely to adversely affect, either individuals of threatened or endangered species currently listed by USFWS or their critical habitat at LANL (USFWS 2003, 2005, 2006, 2007, 2009). Informal consultation has been reopened and NNSA has determined that additional activities and land use may affect but is not likely to adversely affect the Mexican spotted owl. Consultation is expected to be completed by June 2011.

Prior to any ground-disturbing activities, the LANL staff would further evaluate whether any of the subject activities would affect eligible or potentially eligible cultural resources. The *LANL Cultural Resources Management Plan*, as implemented at LANL, serves to identify and protect historic and cultural resources, as well as provide a framework for consultation with and visitation of resources by local tribes and pueblos. Should any adverse impacts be identified as a result of activities evaluated in this *CMRR-NF SEIS*, DOE would work with the State Historic Preservation Office, as well as any of the affected pueblos, to resolve any adverse effects.

CHAPTER 6
GLOSSARY

6 GLOSSARY

actinide — Any member of the group of elements with atomic numbers from 89 (actinium) to 103 (lawrencium), including uranium and plutonium. All members of this group are radioactive.

activation products — Nuclei, usually radioactive, formed by bombardment and absorption in material with neutrons, protons, or other nuclear particles.

active fault — A fault that is likely to have another earthquake sometime in the future. Faults are commonly considered to be active if they have moved one or more times in the last 10,000 years (i.e., during the Quaternary Period).

acute exposure — A single, short-term exposure to a radiation source, a toxic substance, or other stressors that may result in biological harm. Pertaining to radiation, the absorption of a relatively large amount of radiation (or intake of radioactive material) over a short period of time.

administrative control level — A dose level that is established well below the regulatory limit to administratively control and help reduce individual and collective radiation doses. Facility management should establish an annual facility administrative control level that should, to the extent feasible, be more restrictive than the more general administrative control level.

aggregate — Any of various loose, particulate materials, such as sand, gravel, or pebbles, added to a cementing agent to make concrete, plaster, or grout.

air pollutant — Generally, an airborne substance that could, in high enough concentrations, harm living things or cause damage to materials. From a regulatory perspective, an air pollutant is a substance for which emissions or atmospheric concentrations are regulated or for which maximum guideline levels have been established due to potential harmful effects on human health and welfare.

air quality control region — Geographic subdivisions of the United States, designed to deal with pollution on a regional or local level. Some regions span more than one state.

alluvium (alluvial) — Unconsolidated, poorly sorted detrital sediments ranging from clay to gravel sizes deposited by streams.

alpha particle — A positively charged particle ejected spontaneously from the nuclei of some radioactive elements. It is identical to a helium nucleus and has a mass number of 4 and an electrostatic charge of +2. It has low penetrating power and a short range (a few centimeters in air). (See *alpha radiation.*)

alpha radiation — A strongly ionizing, but weakly penetrating, form of radiation consisting of positively charged alpha particles emitted spontaneously from the nuclei of certain elements during radioactive decay. Alpha radiation is the least penetrating of the four common types of ionizing radiation (alpha, beta, gamma, and neutron). Even the most energetic alpha particle generally fails to penetrate the layers of dead cells covering the skin and can be easily stopped by a sheet of paper. Alpha radiation is most hazardous when an alpha-emitting source resides inside an organism. (See *alpha particle.*)

A.M. peak hour — The highest design hour of traffic on a roadway in the morning (A.M.) hours. A.M. hours are typically between 7 and 9 A.M.

ambient air — The surrounding atmosphere as it exists around people, plants, and structures.

ambient air quality standards — The level of pollutants in the air prescribed by regulations that may not be exceeded during a specified time in a defined area. Air quality standards are used to provide a measure of the health-related and visual characteristics of the air.

analytical chemistry — The branch of chemistry that deals with the separation, identification, and determination of the components of a sample.

annual average daily traffic (AADT) — The total volume of traffic passing a point or segment of a highway in both directions for 1 year divided by the number of days in a year.

aquatic — Living or growing in, on, or near water.

aquifer — A body of rock or sediment that is capable of transmitting groundwater and yielding usable quantities of water to wells or springs.

archaeological sites (resources) — Any location where humans have altered the terrain or discarded artifacts during either prehistoric or historic times.

areas of environmental interest (AEI) — Areas within Los Alamos National Laboratory (LANL) that are being managed and protected because of their significance to biological or other resources. Habitats of threatened and endangered species that occur or may occur at LANL are designated as AEIs. In general, a threatened and endangered species AEI consists of a core area that contains important breeding or wintering habitat for a specific species and a buffer area around the core area. The buffer protects the area from disturbances that would degrade the value of the core area to the species.

artifact — An object produced or shaped by human workmanship of archaeological or historical interest.

arterial roadway — A roadway that primarily serves through traffic and that secondarily provides access to adjoining properties.

as low as is reasonably achievable (ALARA) — An approach to radiation protection to manage and control worker and public exposures (both individual and collective) and releases of radioactive material to the environment to as far below applicable limits as social, technical, economic, practical, and public policy considerations permit. ALARA is not a dose limit, but, rather, a process for minimizing doses to as far below limits as is practicable.

atmospheric dispersion — The process of air pollutants being dispersed in the atmosphere. This occurs by wind that carries the pollutants away from their source, by turbulent air motion that results from solar heating of the Earth's surface, and by air movement over rough terrain and surfaces.

Atomic Energy Commission — A five-member commission, established by the Atomic Energy Act of 1946, to supervise nuclear weapons design, development, manufacturing, maintenance, modification, and dismantlement. In 1974, the Atomic Energy Commission was abolished, and all functions were transferred to the U.S. Nuclear Regulatory Commission (NRC) and the Administrator of the Energy Research and Development Administration. The Energy Research and Development Administration was later terminated, and functions vested by law in the Administrator were transferred to the Secretary of Energy.

atomic number — The number of positively charged protons in the nucleus of an atom or the number of electrons in an electrically neutral atom.

attainment area — An area that the U.S. Environmental Protection Agency has designated as being in compliance with one or more of the National Ambient Air Quality Standards for sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, lead, and particulate matter. An area may be in attainment for some pollutants, but not for others. (See *ambient air quality standards*, *nonattainment area*, and *particulate matter.*)

attractiveness level — A categorization of nuclear material types and compositions that reflects the relative ease of processing and handling required to convert a material to a nuclear explosive device.

barrier — Any material or structure that prevents or substantially delays movement of radionuclides toward the accessible environment.

basalt — The most common volcanic rock, dark gray to black in color, high in iron and magnesium, and low in silica. It is typically found in lava flows.

baseline — The existing environmental conditions against which impacts of a proposed action and its alternatives can be compared.

bearing capacity — Capacity of soil to support the loads applied to the ground.

beryllium — An extremely lightweight element with the atomic number 4. It is metallic and is used in reactors as a neutron reflector.

best management practices (BMPs) — Structural, nonstructural, and managerial techniques, to prevent or reduce negative impacts or to promote positive impacts. They are the most effective and practical means for controlling impacts that are compatible with the productive use of the resource to which they are applied. BMPs are used in both urban and agricultural areas. BMPs can include schedules of activities; prohibitions of practices; maintenance procedures; treatment requirements; operating procedures; and practices to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

beta particle — A particle emitted in the radioactive decay of many radionuclides. A beta particle is identical to an electron. It has a short range in air and a small ability to penetrate other materials.

block — A U.S. Census Bureau term describing small areas bounded on all sides by visible features or political boundaries; used in tabulation of census data.

bound — To use simplifying assumptions and analytical methods in an analysis of impacts or risks such that the result overestimates, or describes an upper limit on (i.e., "bounds"), potential impacts or risks.

cancer — The name given to a group of diseases characterized by uncontrolled cellular growth, with cells having invasive characteristics such that the disease can transfer from one organ to another.

capable fault — A fault that has exhibited one or more of the following characteristics: (1) movement at or near the ground surface at least once within the past 35,000 years, or movement of a recurring nature within the past 500,000 years; (2) macroseismicity instrumentally determined with records of sufficient precision to demonstrate a direct relationship with the fault; and/or (3) a structural relationship to a capable fault according to characteristic (1) or (2) above, such that movement on one could reasonably be expected to be accompanied by movement on the other.

carbon dioxide — A colorless, odorless gas that naturally occurs in the atmosphere; it also results from fossil fuel combustion and biomass burning.

carbon dioxide equivalent — A metric measure used to compare the emissions from various greenhouse gases based upon their global warming potential (GWP). The carbon dioxide equivalent for a gas is derived by multiplying the tons of the gas by the associated GWP. As the reference gas, carbon dioxide has a GWP of 1.

carbon monoxide — A colorless, odorless, poisonous gas produced by incomplete fossil fuel combustion.

carcinogen — An agent that may cause cancer. Ionizing radiation is a physical carcinogen; there are also chemical and biological carcinogens. Biological carcinogens may be external (e.g., viruses) or internal (genetic defects).

cask — A heavily shielded container used to store or ship radioactive materials.

categories of special nuclear material (Categories I, II, III, and IV) — A designation determined by the quantity and type of special nuclear material or a designation of a special nuclear material location based on the type and form of the material and the amount of nuclear material present. A designation of the significance of special nuclear material based upon the material type, form of the material, and amount of material present in an item, grouping of items, or in a location.

cavate — Consists of a room carved into a cliff face within the Bandelier Tuff geological formation. The category includes isolated cavates, multi-roomed contiguous cavates, and groups of adjacent cavates that together form a cluster or complex.

cell — See *hot cell.*

Class I areas — Specifically designated areas where the degradation of air quality is stringently restricted (e.g., many national parks and wilderness areas). (See *Prevention of Significant Deterioration.*)

Class II areas — Most of the country not designated as Class I is designated as Class II. Class II areas are generally cleaner than air quality standards require, and moderate increases in new pollution are allowed after an impacts review mandated by regulations.

classified information — (1) Information that has been determined pursuant to Executive Order 12958, any successor order, or the Atomic Energy Act of 1954 (42 *United States Code* [U.S.C.] 2011) to require protection against unauthorized disclosure; (2) certain information requiring protection against unauthorized disclosure in the interest of national defense and security or foreign relations of the United States pursuant to Federal statute or Executive order.

climbing lane — A passing lane added on an upgrade to allow traffic to pass heavy vehicles whose speeds are reduced.

collective dose — The sum of the individual doses received in a given period of time by a specified population from exposure to a specified source of radiation. Collective dose is expressed in units of person-rem or person-sieverts.

collector roadway — A roadway that primarily serves to provide access to adjoining properties and to provide traffic circulation within the local area.

colluvium (colluvial) — A loose deposit of rock debris accumulated at the base of a cliff or slope.

community (biotic) — All plants and animals occupying a specific area under relatively similar conditions.

community (environmental justice) — A group of people or a site within a spatial scope exposed to risks that potentially threaten health, ecology, or land values or who are exposed to industry that stimulates unwanted noise, smells, industrial traffic, particulate matter, or other nonaesthetic impacts.

computational modeling — Use of a computer to develop a mathematical model of a complex system or process and to provide conditions for testing it.

conformity — Conformity is defined in the Clean Air Act as (1) an action's compliance with an implementation plan's purpose of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards, (2) expeditious attainment of such standards, and (3) assurance that such activities will not: cause or contribute to any new violation of any standard in any area; increase the frequency or severity of any existing violation of any standard in any area; or delay timely attainment of any standard, required interim emission reduction, or other milestones in any area.

contact-handled waste — Radioactive waste or waste packages whose external dose rate is low enough to permit contact handling by humans during normal waste management activities (typically, waste with a surface dose rate not greater than 200 millirem per hour). (See *remote-handled waste.*)

container — Regarding radioactive waste, the metal envelope in the waste package that provides the primary containment function of the waste package, which is designed to meet the containment requirements of Title 10 of the *Code of Federal Regulations* (CFR), Part 60 (10 CFR Part 60).

contamination — The deposition of undesirable radioactive material on the surfaces of structures, areas, objects, or people.

criteria pollutants — An air pollutant that is regulated by the National Ambient Air Quality Standards. The U.S. Environmental Protection Agency must describe the characteristics and potential health and welfare effects that form the basis for setting, or revising, the standard for each regulated pollutant. Criteria pollutants include sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, lead, and two size classes of particulate matter, less than 10 micrometers (0.0004 inches) in diameter, and less than 2.5 micrometers (0.0001 inches) in diameter. New pollutants may be added to, or removed from, the list of criteria pollutants as more information becomes available.

critical habitat — Habitat essential to the conservation of an endangered or threatened species that has been designated as critical by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service following the procedures outlined in the Endangered Species Act and its implementing regulations (50 CFR Part 424). (See *endangered species* and *threatened species.*)

The lists of critical habitats can be found in 50 CFR 17.95 (fish and wildlife), 50 CFR 17.96 (plants), and 50 CFR Part 226 (marine species).

criticality — The condition in which a system is capable of sustaining a nuclear chain reaction.

cultural resources — Archaeological sites, historical sites, architectural features, traditional use areas, and Native American sacred sites.

cumulative impacts — Impacts on the environment that result when the incremental impact of a proposed action is added to the impacts from other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non–Federal) or person undertakes the other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time (40 CFR 1508.7).

curie — A unit of radioactivity equal to 37 billion disintegrations per second (i.e., 37 billion becquerels); also, a quantity of any radionuclide or mixture of radionuclides having 1 curie of radioactivity.

day–night average sound level — The 24-hour, "A-weighted" equivalent sound level expressed in decibels. A 10-decibel penalty is added to sound levels between 10:00 P.M. and 7:00 A.M. to account for increased annoyance due to noise during night hours.

decibel (dB) — A unit for expressing the relative intensity of sounds on a logarithmic scale from 0 for the average least perceptible sound to about 130 for the average level at which sound causes pain to humans. For traffic and industrial noise measurements, the A-weighted decibel (dBA), a frequency-weighted noise unit, is widely used. The dBA scale corresponds approximately to the frequency response of the human ear and thus correlates well with loudness.

decibel, A-weighted (dBA) — A unit of frequency-weighted sound pressure level, measured by the use of a metering characteristic and the "A" weighting specified by the American National Standards Institution (ANSI S1.4-1983 [R1594]) that accounts for the frequency response of the human ear.

decommissioning — Retirement of a facility, including any necessary decontamination and/or dismantlement.

decontamination — The actions taken to reduce or remove substances that pose a substantial present or potential hazard to human health or the environment, such as radioactive or chemical contamination from facilities, equipment, or soils by washing, heating, chemical or electrochemical action, mechanical cleaning, or other techniques.

defense-in-depth — The use of multiple, independent protection elements combined in a layered manner so that the system capabilities do not depend on a single component to maintain effective protection against defined threats.

degrees Centigrade (° C) — A unit for measuring temperature using the Centigrade scale in which the freezing point of water is 0° and the boiling point is 100°.

degrees Fahrenheit (° F) — A unit for measuring temperature using the Fahrenheit scale in which the freezing point of water is 32° and the boiling point is 212°.

depleted uranium — Uranium whose content of the fissile isotope uranium-235 is less than the 0.7 percent (by weight) found in natural uranium, so that it contains more uranium-238 than natural uranium.

deposition — In geology, the laying down of potential rock-forming materials; sedimentation. In atmospheric transport, the settling out on ground and building surfaces of atmospheric aerosols and particles ("dry deposition"), or their removal from the air to the ground by precipitation ("wet deposition" or "rainout").

design basis — For nuclear facilities, information that identifies the specific functions to be performed by a structure, system, or component, and the specific values (or ranges of values) chosen for controlling parameters for reference bounds for design. These values may be: restraints derived from generally accepted state-of-the-art practices for achieving functional goals; requirements derived from analysis (based on calculation and/or experiments) of the effects of a postulated accident for which a structure, system, or component must meet its functional goals; or requirements derived from Federal safety objectives, principles, goals, or requirements.

design-basis earthquake — The earthquake that a system, component, or structure is designed to withstand and maintain a certain level of performance. For a performance category 3 facility, the design-basis earthquake has a return period of 2,500 years.

design-basis threat — The elements of a threat postulated for the purpose of establishing requirements for safeguards and security programs, systems, components, equipment, and information. (See *threat.*)

detention pond — An area where excess stormwater is collected and stored or held temporarily to prevent flooding and erosion.

diversion — The unauthorized removal of nuclear material from its approved use or authorized location.

dose (radiological) — A generic term meaning absorbed dose, dose equivalent, effective dose equivalent, committed dose equivalent, committed effective dose equivalent, or committed equivalent dose. It is a measure of the energy imparted to matter by ionizing radiation. The unit of dose is the rem or rad. (See *dose equivalent, effective dose equivalent,* and *rad.*)

dose equivalent — A measure of radiological dose that correlates with biological effect on a common scale for all types of ionizing radiation. Defined as a quantity equal to the absorbed dose in tissue multiplied by a quality factor (the biological effectiveness of a given type of radiation) and all other necessary modifying factors at the location of interest. The units of dose equivalent are the rem and sievert.

drinking water standards — The level of constituents or characteristics in a drinking water supply specified in regulations under the Safe Drinking Water Act as the maximum permissible.

ecosystem — A community of organisms and their physical environment interacting as an ecological unit.

effective dose equivalent — The dose value obtained by multiplying the dose equivalents received by specified tissues or organs of the body by the appropriate weighting factors applicable to the tissues or organs irradiated, and then summing all of the resulting products. It includes the dose from internal and external radiation sources. The effective dose equivalent is expressed in units of rem or sieverts.

effluent — A waste stream flowing into the atmosphere, surface water, ground water, or soil. Most frequently, the term applies to wastes discharged to surface waters.

emission — A material discharged into the atmosphere from a source operation or activity.

emission standards — Legally enforceable limits on the quantities and/or kinds of air contaminants that can be emitted into the atmosphere.

endangered species — Plants or animals that are in danger of extinction through all or a significant portion of their ranges and that have been listed as endangered by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service following the procedures outlined in the Endangered Species Act and its implementing regulations (50 CFR Part 424). The lists of endangered species can be found in 50 CFR 17.11 (wildlife), 50 CFR 17.12 (plants), and 50 CFR 222.23(a) (marine organisms).

enriched uranium — Uranium whose content of the fissile isotope uranium-235 is greater than the 0.7 percent (by weight) found in natural uranium. (See *uranium* and *highly enriched uranium.*)

environment, safety, and health requirements — In the context of the U.S. Department of Energy (DOE), encompasses those requirements, activities, and functions in the conduct of all DOE and DOE-controlled operations that are concerned with impacts on the biosphere; compliance with environmental laws, regulations, and standards controlling air, water, and soil pollution; limiting the risks to the well-being of both the operating personnel and the general public; and protecting property against accidental loss and damage. Typical activities and functions related to this program include, but are not limited to, environmental protection, occupational safety, fire protection, industrial hygiene, health physics, occupational medicine, process and facility safety, nuclear safety, emergency preparedness, quality assurance, and radioactive and hazardous waste management.

environmental impact statement (EIS) — The detailed written statement required by Section 102(2)(C) of the National Environmental Policy Act (NEPA) for a proposed major Federal action significantly affecting the quality of the human environment. A U.S. Department of Energy (DOE) EIS is prepared in accordance with applicable requirements of the Council on Environmental Quality NEPA regulations in 40 CFR Parts 1500–1508 and the DOE NEPA regulations in 10 CFR Part 1021. The statement includes, among other information, discussions of the environmental impacts of the proposed action and all reasonable alternatives; adverse environmental effects that cannot be avoided should the proposal be implemented; the relationship between short-term uses of the human environment and enhancement of long-term productivity; and any irreversible and irretrievable commitments of resources.

environmental justice — The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of Federal, state, local, and tribal programs and policies. Executive Order 12898 directs Federal agencies to make achieving environmental justice part of their missions by identifying and addressing disproportionately high and adverse effects of agency programs, policies, and activities on minority and low-income populations.

ephemeral watercourse — A stream that flows only after a period of heavy precipitation.

fault — A fracture or a zone of fractures within a rock formation along which vertical, horizontal, or transverse slippage has occurred. A normal fault occurs when the hanging wall has been depressed in relation to the footwall. A reverse fault occurs when the hanging wall has been raised in relation to the footwall.

fault escarpment — A steep slope or long cliff that results from faulting and separates two relatively level areas of differing elevations.

***fissile materials* —**

General definition: Although sometimes used as a synonym for fissionable material, this term has acquired a more restricted meaning; namely, any material fissionable by low-energy (i.e., thermal or slow) neutrons. Fissile materials include uranium-235, uranium-233, plutonium-239, and plutonium-241.

Definition specific to hazardous materials transportation: Plutonium-238, plutonium-239, plutonium-241, uranium-233, uranium-235, or any combination of these radionuclides. The definition does not apply to nonirradiated natural uranium and depleted uranium, and natural uranium or depleted uranium that has been irradiated in a thermal reactor. Certain additional exceptions are provided in 49 CFR 173.453.

***fission* —** A nuclear transformation that is typically characterized by the splitting of a heavy nucleus into at least two other nuclei, the emission of one or more neutrons, and the release of a relatively large amount of energy. Fission of heavy nuclei can occur spontaneously or be induced by neutron bombardment.

***fission products* —** Nuclei (fission fragments) formed by the fission of heavy elements, plus the nuclides formed by the fission fragments' radioactive decay.

***floodplain* —** The lowlands and relatively flat areas adjoining inland and coastal waters and the flood-prone areas of offshore islands. Floodplains include, at a minimum, that area with at least a 1.0 percent chance of being inundated by a flood in any given year.

The *base floodplain* is defined as the area that has a 1.0 percent or greater chance of being flooded in any given year. Such a flood is known as a 100-year flood.

The *critical action floodplain* is defined as the area that has at least a 0.2 percent chance of being flooded in any given year. Such a flood is known as a 500-year flood. Any activity for which even a slight chance of flooding would be too great (e.g., the storage of highly volatile, toxic, or water-reactive materials) should not occur in the critical action floodplain.

The *probable maximum flood* is the hypothetical flood considered to be the most severe reasonably possible flood, based on the comprehensive hydrometeorological application of maximum precipitation and other hydrological factors favorable for maximum flood runoff (e.g., sequential storms and snowmelts). It is usually several times larger than the maximum recorded flood.

***formation* —** In geology, the primary unit of formal stratigraphic mapping or description. Most formations possess certain distinctive features.

***freeway* —** A multilane divided highway with a minimum of two lanes in each direction and full access control.

***fugitive emissions* —** (1) Emissions that do not pass through a stack, vent, chimney, or similar opening where they could be captured by a control device, or (2) any air pollutant emitted to the atmosphere other than from a stack. Sources of fugitive emissions include pumps; valves; flanges; seals; area sources such as ponds, lagoons, landfills, or piles of stored material (e.g., coal); and road construction areas or other areas where earthwork is occurring.

***fumarolic* —** Pertaining to a vent in the ground surface, located in or near a volcano, from which hot gases, especially steam, are emitted.

gamma radiation — High-energy, short wavelength, electromagnetic radiation emitted from the nucleus of an atom during radioactive decay. Gamma radiation frequently accompanies alpha and beta emissions and always accompanies fission. Gamma rays are very penetrating and are best stopped or shielded by dense materials, such as lead or depleted uranium. Gamma rays are similar to, but are usually more energetic than, x-rays.

geology — The science that deals with the Earth: the materials, processes, environments, and history of the planet, including rocks and their formation and structure.

glovebox — A large enclosure that separates workers from equipment used to process hazardous material while allowing the workers to be in physical contact with the equipment; normally constructed of stainless steel, with large laminated safety-glass windows. Workers have access to equipment through the use of heavy-duty, lead-impregnated rubber gloves, the cuffs of which are sealed in portholes in the glovebox windows.

ground motion attenuation relationships — Predictions of ground motion parameters using a simplified model in which the effects of the earthquake source are represented by earthquake magnitude or moment.

groundwater — Water below the ground surface in a zone of saturation.

Related definition: Subsurface water is all water that exists in the interstices of soil, rocks, and sediment below the land surface, including soil moisture, capillary fringe water, and groundwater. That part of subsurface water in interstices completely saturated with water is called groundwater.

habitat — The environment occupied by individuals of a particular species, population, or community.

half-life — The time in which one-half of the atoms of a particular radionuclide disintegrate to another nuclear form. Half-lives for specific radionuclides vary from millionths of a second to billions of years.

Hazard Quotient — The value used as an assessment of non-cancer-associated toxic effects of chemicals, e.g., kidney or liver dysfunction. It is a ratio of the estimated exposure to that exposure at which it would be expected that adverse health effects would begin to be produced. It is independent of cancer risk, which is calculated only for those chemicals identified as carcinogens.

hazards classification — The process of identifying the potential threat to human health of a chemical substance.

hazardous air pollutants — Air pollutants not covered by the National Ambient Air Quality Standards, but that may present a threat of adverse human health or environmental effects. Those specifically listed in 40 CFR 61.01 are asbestos, benzene, beryllium, coke oven emissions, inorganic arsenic, mercury, radionuclides, and vinyl chloride. More broadly, hazardous air pollutants are any of the 189 pollutants listed in or pursuant to Section 112(b) of the Clean Air Act. Very generally, hazardous air pollutants are any air pollutants that may realistically be expected to pose a threat to human health or welfare.

hazardous chemical — Under 29 CFR Part 1910, Subpart Z, hazardous chemicals are defined as "any chemical which is a physical hazard or a health hazard." Physical hazards include combustible liquids, compressed gases, explosives, flammables, organic peroxides, oxidizers, pyrophorics, and reactives. A health hazard is any chemical for which there is good evidence that acute or chronic health effects occur in exposed individuals. Hazardous chemicals include carcinogens; toxic or highly toxic agents; reproductive toxins; irritants; corrosives; sensitizers; hepatotoxins; nephrotoxins; agents that act on the hematopoietic system; and agents that damage the lungs, skin, eyes, or mucous membranes.

hazardous material — A material, including a hazardous substance, as defined by 49 CFR 171.8, that poses a risk to health, safety, and property when transported or handled.

hazardous substance — Any substance subject to the reporting and possible response provisions of the Clean Water Act and the Comprehensive Environmental Response, Compensation, and Liability Act.

hazardous waste — A category of waste regulated under the Resource Conservation and Recovery Act (RCRA). To be considered hazardous, a waste must be a solid waste under RCRA and must exhibit at least one of four characteristics described in 40 CFR 261.20–261.24 (i.e., ignitability, corrosivity, reactivity, or toxicity) or be specifically listed by the U.S. Environmental Protection Agency in 40 CFR 261.31 through 261.33.

high-efficiency particulate air (HEPA) filter — An air filter capable of removing at least 99.97 percent of particles 0.3 micrometers (about 0.00001 inches) in diameter. These filters include a pleated fibrous medium, typically fiberglass, capable of capturing very small particles.

high-level radioactive waste — High-level radioactive waste is the highly radioactive waste material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations, and other highly radioactive material that the U.S. Nuclear Regulatory Commission, consistent with existing law, determines by rule requires permanent isolation.

highly enriched uranium — Uranium whose content of the fissile isotope uranium-235 has been increased through enrichment to 20 percent or more (by weight). (See *enriched uranium* and *depleted uranium.*)

historic resources — Physical remains that postdate the emergence of written records; in the United States, they are architectural structures or districts, archaeological objects, and archaeological features dating from 1492 and later.

hot cell — A shielded facility that requires the use of remote manipulators for handling radioactive materials.

hydro-collapse — The process whereby soils that appear to be strong and stable in their natural (dry) state rapidly consolidate under wetting conditions, generating large and often unexpected settlement.

hydrology — The science dealing with the properties, distribution, and circulation of natural water systems.

indirect jobs — Within a regional economic area, jobs generated or lost in related industries as a result of a change in direct employment.

intracontinental rift zone — A large area within a continent in which plates of the Earth's crust are moving away from each other, forming an extensive system of fractures and faults.

ion — An atom that has too many or too few electrons, causing it to be electrically charged.

ionizing radiation — Alpha particles, beta particles, gamma rays, high-speed electrons, high-speed protons, and other particles or electromagnetic radiation that can displace electrons from atoms or molecules, thereby producing ions.

irradiated — Exposure to ionizing radiation. The condition of reactor fuel elements and other materials in which atoms bombarded with nuclear particles have undergone nuclear changes.

isotope — Any of two or more variations of an element in which the nuclei have the same number of protons (i.e., the same atomic number), but different numbers of neutrons so that their atomic masses differ. Isotopes of a single element possess almost identical chemical properties, but often different physical properties. (e.g., carbon-12 and -13 are stable, while carbon-14 is radioactive).

joule — A metric unit of energy, work, or heat, equivalent to one watt-second, 0.737 foot-pounds, or 0.239 calories.

latent cancer fatalities — Deaths from cancer resulting from, and occurring some time after, exposure to ionizing radiation or other carcinogens.

level of service — A quantitative measure describing operational conditions within a traffic stream, based on service measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort, and convenience.

loam — A rich soil consisting of a mixture of sand and clay and decaying organic materials.

low-income population — Low-income populations, defined in terms of U.S. Census Bureau annual statistical poverty levels (*Current Population Reports*, Series P-60 on Income and Poverty), may consist of groups or individuals who live in geographic proximity to one another or who are geographically dispersed or transient (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect. (See *environmental justice* and *minority population.*)

low-level radioactive waste — Radioactive waste that is not high-level radioactive waste, transuranic waste, spent nuclear fuel, or byproduct tailings from processing of uranium or thorium ore. Low-level radioactive waste is generated in many physical and chemical forms and levels of contamination.

low-slump concrete — A concrete mix that is stiffer and spreads less than a slump concrete when emplaced. Low-slump concrete contains less water than normal concrete.

magnitude — A quantity characteristic of the total energy released by an earthquake that describes its effects at a particular place. Magnitude is determined by taking the common logarithm (base 10) of the largest ground motion recorded on a seismograph during the arrival of a seismic wave type and applying a standard correction factor for distance to the epicenter. Three common types of magnitude are Richter (or local) (ML), P body wave (mb), and surface wave (Ms).

Additional magnitude scales, notably the moment magnitude (Mw), have been introduced to increase uniformity in representation of earthquake size. *Moment magnitude* is defined as the rigidity of the rock multiplied by the area of faulting multiplied by the amount of slip.

A one-unit increase in magnitude (for example, from magnitude 6 to magnitude 7) represents a 30-fold increase in the amount of energy released.

material at risk (MAR) — the amount of radionuclides (in grams or curies of activity for each radionuclide) available to be acted on by a given physical stress. For facilities, processes, and activities, the MAR is a value representing some maximum quantity of radionuclide present or reasonably anticipated for the process or structure being analyzed. Different MARs may be assigned for different accidents as it is only necessary to define the material in those discrete physical locations that are exposed to a given stress. For example, a spill may involve only the contents of a tank in one glovebox. Conversely, a seismic event may involve all of the material in a building.

material control and accountability — The part of safeguards that detects or deters theft or diversion of nuclear materials and provides assurance that all nuclear materials are accounted for appropriately.

materials characterization — The measurement of basic material properties, and the change in those properties as a function of temperature, pressure, or other factors.

maximally exposed individual — A hypothetical individual whose location and habits result in the highest total radiological or chemical exposure (and thus dose) from a particular source for all exposure routes (e.g., inhalation, ingestion, direct exposure).

maximally exposed individual (transportation analysis) — A hypothetical individual receiving radiation doses from transporting radioactive materials on the road. For the incident-free transport operation, the maximally exposed individual would be an individual stuck in traffic next to the shipment for 30 minutes. For accident conditions, the maximally exposed individual is assumed to be an individual located approximately 33 meters (100 feet) directly downwind from the accident.

maximum contaminant level — The designation for U.S. Environmental Protection Agency (EPA) standards for drinking water quality under the Safe Drinking Water Act. The maximum contaminant level for a given substance is the maximum permissible concentration of that substance in water delivered by a public water system. Primary maximum contaminant levels (40 CFR Part 141) are intended to protect public health and are federally enforceable. They are based on health factors, but are also required by law to reflect the technological and economic feasibility of removing the contaminant from the water supply. Secondary maximum contaminant levels (40 CFR Part 143) are set by EPA to protect the public welfare. The secondary drinking water regulations control substances in drinking water that primarily affect aesthetic qualities (such as taste, odor, and color) relating to the public acceptance of water. These regulations are not federally enforceable, but are intended as guidelines for the states.

megawatt — A unit of power equal to 1 million watts. Megawatt-thermal is commonly used to define heat produced, while megawatt-electric defines electricity produced.

meteorology — The science dealing with the atmosphere and its phenomena, especially as it relates to weather.

micron — One-millionth of 1 meter.

migration — The natural movement of a material through the air, soil, or groundwater; also, seasonal movement of animals from one area to another.

millirem — One-thousandth of 1 rem (0.001 rem).

***minority population* —** Minority populations exist where either: the minority population of the affected area exceeds 50 percent, or the minority population percentage of the affected area is meaningfully greater than in the general population or other appropriate unit of geographic analysis (such as a governing body's jurisdiction, a neighborhood, census tract, or other similar unit). "Minority" refers to individuals who are members of the following population groups: American Indian or Alaska Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. "Minority populations" include either a single minority group or the total of all minority persons in the affected area. They may consist of groups of individuals living in geographic proximity to one another or a geographically dispersed/transient set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect. (See *environmental justice* and *low-income population.*)

***mitigate* —** Mitigation includes: avoiding an impact altogether by not taking a certain action or parts of an action; minimizing impacts by limiting the degree or magnitude of an action and its implementation; rectifying an impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of an action; or compensating for an impact by replacing or providing substitute resources or environments.

***mixed waste* —** Waste that contains both hazardous waste, as defined under the Resource Conservation and Recovery Act, and source material, special nuclear material, or by-product material subject to the Atomic Energy Act.

***Modified Mercalli Intensity* —** A level on the modified Mercalli scale. A measure of the perceived intensity of earthquake ground shaking with 12 divisions, from I (not felt by people) to XII (nearly total damage). It is a unitless expression of observed effects.

***National Emission Standards for Hazardous Air Pollutants* —** Standards set by the U.S. Environmental Protection Agency for air pollutants that are not covered by the National Ambient Air Quality Standards and that may, at sufficiently high levels, cause increased fatalities, irreversible health effects, or incapacitating illness. These standards are given in 40 CFR Parts 61 and 63. National Emission Standards for Hazardous Air Pollutants are given for many specific categories of sources (e.g., equipment leaks, industrial process cooling towers, dry-cleaning facilities, petroleum refineries). (See *hazardous air pollutants.*)

***National Pollutant Discharge Elimination System* —** A provision of the Clean Water Act that prohibits discharge of pollutants into waters of the United States unless a special permit is issued by the U.S. Environmental Protection Agency, a state, or, where delegated, a tribal government. The National Pollutant Discharge Elimination System permit lists either permissible discharges, the level of cleanup technology required for wastewater, or both.

***National Register of Historic Places* —** The official list of the Nation's cultural resources that are worthy of preservation. The National Park Service maintains the list under direction of the Secretary of the Interior. Buildings, structures, objects, sites, and districts are included in the National Register for their importance in American history, architecture, archaeology, culture, or engineering. Properties included on the National Register range from large-scale, monumentally proportioned buildings to smaller-scale, regionally distinctive buildings. The listed properties are not just of nationwide importance; most are significant primarily at the state or local level. Procedures for listing properties on the National Register are found in 36 CFR Part 60.

***neutron* —** An uncharged elementary particle with a mass slightly greater than that of the proton. Neutrons are found in the nucleus of every atom heavier than hydrogen-1.

nitrogen — A natural element with the atomic number 7. It is diatomic in nature and is a colorless and odorless gas that constitutes about four-fifths of the volume of the atmosphere.

nitrogen oxides — Refers to the oxides of nitrogen, primarily nitrogen oxide and nitrogen dioxide. These are produced in the combustion of fossil fuels and can constitute an air pollution problem. Nitrogen dioxide emissions contribute to acid deposition and the formation of atmospheric ozone.

noise — Undesirable sound that interferes or interacts negatively with the human or natural environment. Noise may disrupt normal activities (e.g., hearing, sleep), damage hearing, or diminish the quality of the environment.

nonattainment area — An area that the U.S. Environmental Protection Agency has designated as not meeting (i.e., not being in attainment of) one or more of the National Ambient Air Quality Standards for sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, lead, and particulate matter. An area may be in attainment for some pollutants, but not for others.

nonplastic soils — Soils that are not clay-rich.

nonproliferation — Preventing the spread of nuclear weapons, nuclear weapon materials, and nuclear weapon technology.

normal operations — All normal (incident-free) conditions and those abnormal conditions that frequency estimation techniques indicate occur with a frequency greater than 0.1 events per year.

Notice of Intent — The notice that an environmental impact statement (EIS) will be prepared and considered. The notice is intended to briefly describe the proposed action and possible alternatives; describe the agency's proposed scoping process including whether, when, and where any scoping meeting will be held; and state the name and address of a person within the agency who can answer questions about the proposed action and the EIS.

nuclear weapon component — A part of a nuclear weapon that contains fissionable or fusionable material.

nuclear criticality — See *criticality.*

nuclear explosive — Any assembly containing fissionable and/or fusionable materials and main-charge high-explosive parts or propellants capable of producing a nuclear detonation.

nuclear facility — A facility subject to requirements intended to control potential nuclear hazards. Defined in U.S. Department of Energy directives as any nuclear reactor or any other facility whose operations involve radioactive materials in such form and quantity that a significant nuclear hazard potentially exists for the employees or the general public.

nuclear material — Composite term applied to: special nuclear material; source material such as uranium, thorium, or ores containing uranium or thorium; and byproduct material, which is any radioactive material that is made radioactive by exposure to the radiation incident or to the process of producing or using special nuclear material.

nuclear weapon — The general name given to any weapon in which the explosion results from the energy released by reactions involving atomic nuclei, by fission, fusion, or both.

nuclear weapons complex — The sites supporting the research, development, design, manufacture, testing, assessment, certification, and maintenance of the Nation's nuclear weapons and the subsequent dismantlement of retired weapons.

nuclide — A species of atom characterized by the constitution of its nucleus and, hence, by the number of protons, the number of neutrons, and the energy content.

Occupational Safety and Health Administration — The U.S. Federal Government agency that oversees and regulates workplace health and safety; created by the Occupational Safety and Health Act of 1970.

offsite — The term denotes a location, facility, or activity occurring outside of the boundary of a U.S. Department of Energy complex site.

onsite — The term denotes a location or activity occurring within the boundary of a U.S. Department of Energy complex site.

outfall — The discharge point of a drain, sewer, or pipe as it empties into a body of water.

ozone — The triatomic form of oxygen; in the stratosphere, ozone protects the Earth from the Sun's ultraviolet rays, but in lower levels of the atmosphere, ozone is considered an air pollutant.

package — For radioactive materials, the packaging, together with its radioactive contents, as presented for transport (the packaging plus the radioactive contents equals the package).

packaging — The assembly of components necessary to ensure compliance with Federal regulations. It may consist of one or more receptacles, absorbent materials, spacing structures, thermal insulation, radiation shielding, and devices for cooling or absorbing mechanical shocks. The vehicle tie-down system and auxiliary equipment may be designated as part of the packaging.

paleontological resources — The physical remains, impressions, or traces of plants or animals from a former geologic age; may be sources of information on ancient environments and the evolutionary development of plants and animals.

paleoseismic — Pertaining to ancient seismic events.

paleotopographic surface — The topographic surface of a given area in the geologic past.

particulate matter (PM) — Any finely divided solid or liquid material, other than uncombined (i.e., pure) water. A subscript denotes the upper limit of the diameter of particles included. Thus, PM_{10} includes only those particles equal to or less than 10 micrometers (0.0004 inches) in diameter; $PM_{2.5}$ includes only those particles equal to or less than 2.5 micrometers (0.0001 inches) in diameter.

peak ground acceleration — A measure of the maximum horizontal acceleration (as a percentage of the acceleration due to the Earth's gravity) experienced by a particle on the surface of the Earth during the course of earthquake motion.

peak hour traffic — The volume of traffic anticipated to occur in the 30th highest traffic hour of the year; used by engineers to determine the level of service.

perched groundwater — A body of groundwater of small lateral dimensions separated from an underlying body of groundwater by an unsaturated zone.

Permian — The final geologic time period of the Paleozoic era, spanning between about 286 and 245 million years ago.

permeability — In geology, the ability of rock or soil to transmit a fluid.

perennial stream — A stream that flows throughout the year.

person-rem — A unit of collective radiation dose applied to populations or groups of individuals (see *collective dose*); that is, a unit for expressing the dose when summed across all persons in a specified population or group. One person-rem equals 0.01 person-sieverts.

physiographic province — A geographic region with a specific geomorphology and often specific subsurface rock type or structural elements.

pit — The core element of a nuclear weapons primary or fission component. The pit contains a potentially critical mass of fissile material, such as plutonium-239 or highly enriched uranium, arranged in a subcritical geometry and surrounded by some type of casing.

plume — The elongated volume of contaminated water or air originating at a pollutant source such as an outlet pipe or a smokestack. A plume eventually diffuses into a larger volume of less-contaminated material as it is transported away from the source.

plutonium — A heavy, radioactive, metallic element with the atomic number 94. It is produced artificially by neutron irradiation of uranium. Plutonium has 15 isotopes with atomic masses ranging from 232 to 246 and half-lives from 20 minutes to 76 million years. Its most important isotope is fissile plutonium – plutonium-239.

plutonium-239 — An isotope of plutonium with a half-life of 24,110 years that is the primary radionuclide in weapons-grade plutonium. When plutonium-239 decays, it emits alpha particles.

P.M. peak hour — The highest design hour of traffic on a roadway in the afternoon (P.M.) hours. P.M. hours are typically between 4 P.M. and 6 P.M.

population dose — See *collective dose.*

prehistoric resources — The physical remains of human activities that predate written records; they generally consist of artifacts that may alone or collectively yield otherwise inaccessible information about the past.

Prevention of Significant Deterioration (PSD) — Regulations established to prevent significant deterioration of air quality in areas that already meet National Ambient Air Quality Standards. Specific details of PSD are found in 40 CFR 51.166. Among other provisions, cumulative increases in sulfur dioxide, nitrogen dioxide, and PM_{10} levels after specified baseline dates must not exceed specified maximum allowable amounts. These allowable increases, also known as increments, are especially stringent in areas designated as Class I areas (e.g., national parks, wilderness areas) where the preservation of clean air is particularly important. All areas not designated as Class I are currently designated as Class II. Maximum increments in pollutant levels are also given in 40 CFR 51.166 for Class III areas, if any such areas should be so designated by the U.S. Environmental Protection Agency. Class III increments are less stringent than those for Class I or Class II areas.

probabilistic risk — A comprehensive, logical, and structured methodology that accounts for population dynamics and human activity patterns at various levels of sophistication, considering time-space distributions and sensitive subpopulations. The probabilistic method results in a more complete characterization of the exposure information available, which is defined by probability distribution functions. This approach offers the possibility of an associated quantitative measure of the uncertainty around the value of interest.

process — Any method or technique designed to change the physical or chemical character of the product.

Quaternary — The second geologic time period of the Cenozoic era, dating from about 1.6 million years ago to the present. It contains two epochs: the Pleistocene and the Holocene. It is characterized by the first appearance of human beings on Earth.

radiation (ionizing) — Particles (alpha, beta, neutrons, and other subatomic particles) or photons (i.e., gamma, x-rays) emitted from the nucleus of unstable atoms as a result of radioactive decay. Such radiation is capable of displacing electrons from atoms or molecules in the target material (such as biological tissues), thereby producing ions.

radioactive waste — In general, waste that is managed for its radioactive content. Waste material that contains source, special nuclear, or byproduct material is subject to regulation as radioactive waste under the Atomic Energy Act. Also, waste material that contains accelerator-produced radioactive material or a high concentration of naturally occurring radioactive material may be considered radioactive waste.

radioactivity —

Defined as a process: The spontaneous transformation of unstable atomic nuclei, usually accompanied by the emission of ionizing radiation.

Defined as a property: The property of unstable nuclei in certain atoms to spontaneously emit ionizing radiation during nuclear transformations.

radioisotope or radionuclide — An unstable isotope that undergoes spontaneous transformation, emitting radiation. (See *isotope*.)

radon — A gaseous, radioactive element with the atomic number 86, resulting from the radioactive decay of radium. Radon occurs naturally in the environment and can collect in unventilated enclosed areas, such as basements. Large concentrations of radon can cause lung cancer in humans.

Record of Decision (ROD) — A concise public document that records a Federal agency's decision(s) concerning a proposed action for which the agency has prepared an environmental impact statement. The ROD is prepared in accordance with the requirements of the Council on Environmental Quality National Environmental Policy Act regulations (40 CFR 1505.2). A ROD identifies the alternatives considered in reaching the decision, the environmentally preferable alternative(s), factors balanced by the agency in making the decision, whether all practicable means to avoid or minimize environmental harm have been adopted, and if not, why they were not. (See *environmental impact statement.*)

region of influence (ROI) — A site-specific geographic area in which the principal direct and indirect effects of actions are likely to occur and are expected to be of consequence for local jurisdictions.

rem (roentgen equivalent man) — A unit of dose equivalent. The dose equivalent in rem equals the absorbed dose in rad in tissue multiplied by the appropriate quality factor and possibly other modifying factors. Derived from "roentgen equivalent man," referring to the dosage of ionizing radiation that will cause the same biological effect as 1 roentgen of x-ray or gamma-ray exposure. One rem equals 0.01 sievert. (See *dose equivalent.*)

remediation — The process, or a phase in the process, of rendering radioactive, hazardous, or mixed waste environmentally safe, whether through processing, entombment, or other methods.

remote-handled waste — In general, refers to radioactive waste that must be handled at a distance to protect workers from unnecessary exposure (waste with a dose rate of 200 millirem per hour or more at the surface of the waste package). (See *contact-handled waste.*)

right-sizing — Facility modification, rearrangement, and refurbishment necessary to size future weapon manufacturing facilities appropriately for the workload to be accomplished. In general, right-sizing involves reduction in the size of facilities, but not in their capabilities. Right-sizing is not driven by assumptions about future U.S. Department of Energy budget levels, but rather by the need to size facilities at the level necessary for long-term workload accomplishment.

riparian — Of, on, or relating to the banks of a natural course of water.

risk — The probability of a detrimental effect from exposure to a hazard. To describe impacts, risk is often expressed quantitatively as the probability of an adverse event occurring multiplied by the consequence of that event (i.e., the product of these two factors). However, a separate presentation of probability and consequence to describe impacts is often more informative.

roadway capacity — The maximum sustainable flow rate at which vehicles reasonably can be expected to traverse a section of roadway.

runoff — The portion of rainfall, melted snow, or irrigation water that flows across the ground surface and eventually enters streams.

safeguards — An integrated system of physical protection, material accounting, and material control measures designed to deter, prevent, detect, and respond to unauthorized access, possession, use, or sabotage of nuclear materials.

safety analysis report — A report that systematically identifies potential hazards within a nuclear facility, describes and analyzes the adequacy of measures to eliminate or control identified hazards, and analyzes potential accidents and their associated risks. Safety analysis reports are used to ensure that a nuclear facility can be constructed, operated, maintained, shut down, and decommissioned safely and in compliance with applicable laws and regulations. Safety analysis reports are required for U.S. Department of Energy (DOE) nuclear facilities and as a part of applications for U.S. Nuclear Regulatory Commission (NRC) licenses. The NRC regulations or DOE orders and technical standards that apply to the facility type provide specific requirements for the content of safety analysis reports. (See *nuclear facility.*)

sanitary waste — Waste generated by normal housekeeping activities, liquid or solid (includes sludge), that are not hazardous or radioactive.

scope — In a document prepared pursuant to the National Environmental Policy Act, the range of actions, alternatives, and impacts to be considered.

scoping — An early and open process for determining the scope of issues and alternatives to be addressed in an environmental impact statement (EIS) (or other National Environmental Policy Act [NEPA] documents) and for identifying the significant issues related to a proposed action. The scoping period begins after publication in the *Federal Register* of a Notice of Intent to prepare an EIS (or other NEPA document). The public scoping process is that portion of the process where the public is invited to participate. The U.S. Department of Energy (DOE) also conducts an early internal scoping process for environmental assessments or EISs (and supplemental environmental impact statements [SEISs]). For EISs and SEISs, this internal scoping process precedes the public scoping process. DOE's scoping procedures are found in 10 CFR 1021.311.

security — An integrated system of activities, systems, programs, facilities, and policies for the protection of restricted data and other classified information or matter, nuclear materials, nuclear weapons and nuclear weapons components, and/or U.S. Department of Energy contractor facilities, property, and equipment.

security category — The U.S. Department of Energy uses a cost-effective, graded approach to providing special nuclear materials safeguards and security. Quantities of special nuclear materials are categorized as Security Category I, II, III, or IV, with the greatest quantities included under Security Category I and lesser quantities included in descending order under Security Categories II through IV. Types and compositions of special nuclear materials are further categorized by their "attractiveness" to saboteurs using an alphabetical system. Materials that are most attractive for conversion into nuclear explosive devices are identified by the letter "A." Less attractive materials are designated progressively by the letters "B" through "E."

seismic — of, subject to, or caused by an earth vibration resulting from an earthquake or an explosion.

seismic moment — A quantity used by earthquake seismologists to measure the size of an earthquake.

seismic wave velocity — The speed at which waves of energy travel through the Earth.

seismicity — The relative frequency and distribution of earthquakes.

severe accident — An accident with a frequency of less than 10^{-6} per year that would have more-severe consequences than a design-basis accident in terms of damage to the facility, offsite consequences, or both.

shielding — In regard to radiation, any material of obstruction (e.g., bulkheads, walls, or other construction) that absorbs radiation to protect personnel or equipment.

shutdown — For a U.S. Department of Energy (DOE) reactor, the condition in which a reactor has ceased operations, and DOE has officially declared that it does not intend to operate it further.

sievert — The SI (International System of Units) unit of radiation dose equivalent. The dose equivalent in sieverts equals the absorbed dose in grays multiplied by the appropriate quality factor (1 sievert = 100 rem). (See *rem.*)

silica gel — An amorphous, highly adsorbent form of silicon dioxide.

soil cohesion — The ability of soil molecules to bind together.

soil compressibility — Used in the earth sciences to quantify the ability of a soil or rock to reduce in volume with applied pressure.

soils — All unconsolidated materials above bedrock. Natural earthy materials on the Earth's surface, in places modified or even made by human activity, containing living matter, and supporting or capable of supporting plants out of doors.

source material — In general, material from which special nuclear material can be derived. Under the Atomic Energy Act and U.S. Nuclear Regulatory Commission regulations, source material means uranium and thorium in any physical or chemical form, as well as ores that contain one-twentieth of 1 percent (0.05 percent) or more by weight of uranium or thorium. (See *special nuclear material.*)

special nuclear material(s) — A category of material subject to regulation under the Atomic Energy Act, consisting primarily of fissile materials. It is defined to mean plutonium, uranium-233, uranium enriched in the isotopes of uranium-233 or -235, and any other material that the U.S. Nuclear Regulatory Commission determines to be special nuclear material, but it does not include source material.

spectral (response) acceleration — An approximate measure of the acceleration (as a percentage of the acceleration due to Earth's gravity) experienced by a building, as modeled by a particle on a massless vertical rod having the same natural period of vibration as the building.

spoils — The soil and rock (uncontaminated) removed from an excavation. If excavated material is contaminated with chemical or radioactive constituents, it is managed as waste.

staging — The process of using several layers to achieve a combined effect greater than that of one layer.

stockpile — The inventory of active nuclear weapons for the strategic defense of the United States.

stockpile stewardship program — A program that ensures the operational readiness (i.e., safety and reliability) of the U.S. nuclear weapons stockpile through the appropriate balance of surveillance, experiments, and simulations.

sulfur oxides — Common air pollutants, primarily sulfur dioxide, a heavy, pungent, colorless gas (formed in the combustion of fossil fuels, considered a major air pollutant), and sulfur trioxide. Sulfur dioxide is involved in the formation of acid rain. It can also irritate the upper respiratory tract and cause lung damage.

surface water — All bodies of water on the surface of the Earth and open to the atmosphere, such as rivers, lakes, reservoirs, ponds, seas, and estuaries.

sustainable development — The incorporation of concepts and principles in the development of the built environment that are responsive (not harmful) to the environment, use materials and resources efficiently, and are sensitive to surrounding communities. Sustainable development and design encompasses the materials to build and maintain a building, the energy and water needed to operate the building, and the ability to provide a healthy and productive environment for occupants of the building.

sustainable buildings *(or high-performance buildings)* — buildings designed and built to minimize resource consumption, reduce life cycle costs, and maximize health and environmental performance across a wide range of measures – from indoor air quality to habitat protection.

threat — (1) A person, group, or movement with intentions to use extant or attainable capabilities to undertake malevolent actions against U.S. Department of Energy interests; (2) the capability of an adversary coupled with his intentions to undertake any actions detrimental to the success of program activities or operation.

threatened species — Any plants or animals likely to become endangered species within the foreseeable future throughout all or a significant portion of their ranges and which have been listed as threatened by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service following the procedures set in the Endangered Species Act and its implementing regulations (50 CFR Part 424). (See *endangered species.*)

total effective dose equivalent — The sum of the effective dose equivalent from external exposures and the committed effective dose equivalent from internal exposures.

transuranic — Refers to any element whose atomic number is higher than that of uranium (atomic number 92), including neptunium, plutonium, americium, and curium. All transuranic elements are produced artificially and are radioactive.

transuranic waste — Radioactive waste not classified as high-level radioactive waste and that contains more than 100 nanocuries (3,700 becquerels) per gram of alpha-emitting transuranic isotopes with half-lives greater than 20 years.

trip or ***trip end*** — A single or one-directional vehicle movement.

tuff — A fine-grained rock composed of ash or other material formed by volcanic explosion or aerial expulsion from a volcanic vent.

Type B packaging — A regulatory category of packaging for transportation of radioactive material. The U.S. Department of Transportation and U.S. Nuclear Regulatory Commission (NRC) require Type B packaging for shipping highly radioactive material. Type B packages must be designed and demonstrated to retain their containment and shielding integrity under severe accident conditions, as well as under the normal conditions of transport. The current NRC testing criteria for Type B packaging designs (10 CFR Part 71) are intended to simulate severe accident conditions, including impact, puncture, fire, and immersion in water. The most widely recognized Type B packages are the massive casks used for transporting spent nuclear fuel. Large-capacity cranes and mechanical lifting equipment are usually needed to handle Type B packages.

uranium — A radioactive, metallic element with the atomic number 92; the heaviest naturally occurring element. Uranium has 14 known isotopes, of which uranium-238 is the most abundant in nature. Uranium-235 is commonly used as a fuel for nuclear fission. (See *enriched uranium*, *highly enriched uranium*, and *depleted uranium.*)

U.S. Nuclear Regulatory Commission (NRC) — The Federal agency that regulates the civilian nuclear power industry in the United States.

vault (special nuclear material) — A penetration-resistant, windowless enclosure with an intrusion alarm system activated by opening the door; walls, a floor, and a ceiling substantially constructed of materials that afford forced-penetration resistance at least equivalent to that of 20-centimeter- (8-inch-) thick reinforced concrete; and a built-in combination-locked steel door, which for existing structures is at least 2.54 centimeters (1 inch) thick exclusive of bolt work and locking devices, and which for new structures meets standards set forth in Federal specifications and standards.

viewshed — The extent of an area that may be viewed from a particular location. Viewsheds are generally bounded by topographic features such as hills or mountains.

vital area — A type of U.S. Department of Energy security area that is located within the Protected Area and that has a separate perimeter and access controls to afford layered protection, including intrusion detection, for vital equipment.

Visual Resource Management class — Any of the classifications of visual resources established through application of the Visual Resources Management process of the U.S. Bureau of Land Management. Four classifications are employed to describe different degrees of modification to landscape elements: Class I areas where the natural landscape is preserved, including national wilderness areas and the wild sections of national wild and scenic rivers; Class II areas with very limited land development activity, resulting in visual contrasts that are seen but do not attract attention; Class III areas, in which development may attract attention, but the natural landscape still dominates; and Class IV areas, in which development activities may dominate the view and may be the major focus in the landscape.

volatile organic compounds — A broad range of organic compounds, often halogenated, that vaporize at ambient or relatively low temperatures (e.g., benzene, chloroform, and methyl alcohol). In regard to air and water pollution, any organic compound that participates in atmospheric photochemical reaction, except for those designated by the Administrator of the U.S. Environmental Protection Agency as having negligible photochemical reactivity.

waste management — The planning, coordination, and direction of those functions related to the generation, handling, treatment, storage, transport, and disposal of waste, as well as associated surveillance and maintenance activities.

waste minimization and pollution prevention — An action that economically avoids or reduces the generation of waste and pollution by source reduction, reducing the toxicity of hazardous waste and pollution, improving energy use, or recycling. These actions are consistent with the general goal of minimizing present and future threats to human health, safety, and the environment.

watt — A unit of power equal to 1 joule per second. (See *joule*.)

welded tuff — a tuff that was sufficiently hot at the time of deposition to weld together (see *tuff*).

wetland — Those areas that are inundated by surface or groundwater with a frequency sufficient to support, and that, under normal circumstances, do or would support, a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas (e.g., sloughs, potholes, wet meadows, river overflow areas, mudflats, natural ponds).

yield — The force, in tons of TNT [2,4,6-trinitrotoluene], of a nuclear or thermonuclear explosion.

CHAPTER 7
REFERENCES

7 REFERENCES

AASHTO (American Association of State Highway and Transportation Officials), 1993, *AASHTO Guide for Design of Pavement Structures*, Washington, DC.

ACE (U.S. Army Corps of Engineers), 2005, *Wetlands Delineation Report*, Albuquerque District, Albuquerque, New Mexico, October.

ACE, Reclamation, and ISC (U.S. Army Corps of Engineers, Bureau of Reclamation, and New Mexico Interstate Stream Commission), 2007, *Upper Rio Grande Basin Water Operations Review and Final Environmental Impact Statement*, Albuquerque District; Albuquerque Area Office, April.

ATSDR (Agency for Toxic Substances and Disease Registry), 2006, *Public Health Assessment, Final, Los Alamos National Laboratory*, EPA Facility ID: NM0890010515, Site and Radiological Assessment Branch, Division of Health Assessment and Consultation, Atlanta, Georgia, August 31.

Balkey, S., 2011, *FY2011 Radioactive Liquid Waste Influent Boundary Condition Assessment and Forecast*, LA-UR-11-00151, January.

BDDP (Buckman Direct Diversion Project), 2010a, Memorandum of Understanding Between the U.S. Department of Energy and the Buckman Direct Diversion Board Regarding Water Quality Monitoring, Santa Fe, New Mexico, May.

BDDP (Buckman Direct Diversion Project) 2010b, Executive Summary of Results for the Buckman Direct Diversion Project Independent Peer Review, Santa Fe, New Mexico, December.

BLM (Bureau of Land Management), 1986, *Visual Resource Contrast Rating*, BLM Manual Handbook 8431-1, Washington, DC, January 17.

BLM (Bureau of Land Management), 2006a, *Mid-America Pipeline Company Western Expansion Project EA, Project Description* (available at http://www.nm.blm.gov/nmso/midampipeline/project_description.html), February 15.

BLM (Bureau of Land Management), 2006b, *San Juan Public Lands (San Juan Field Center & San Juan National Forest) Final Environmental Impact Statement (EIS) Northern San Juan Basin Coal Bed Methane Project*, San Juan Public Land Center, Durango, Colorado.

BLM (Bureau of Land Management), 2009a, *Environmental Assessment for the Windstream Communications Fiber-Optic Cable Installation*, Rio Puerco Field Office, Albuquerque, New Mexico, October.

BLM (Bureau of Land Management), 2009b, *Finding of No Significant Impact for the Environmental Assessment for the Windstream Communications Fiber-Optic Cable Installation*, Rio Puerco Field Office, Albuquerque, New Mexico, November.

BLM (Bureau of Land Management), 2009c, Decision Record for the Environmental Assessment for the Windstream Communications Fiber-Optic Cable Installation, Rio Puerco Field Office, Albuquerque, New Mexico, November.

BLM (Bureau of Land Management), 2010a, *Environmental Assessment for April 2010 Oil and Gas Lease Sale- Finding of No Significant Impact and Decision Record*, Rio Puerco Field Office, New Mexico, February 2.

BLM (Bureau of Land Management), 2010b, "Draft Taos Resource Management Plan," Taos Field Office, Taos, New Mexico, June.

BLM (Bureau of Land Management), 2010c, "New Mexico Planning Documents" (accessed January 6, 2011, http://www.blm.gov/nm/st/en/prog/planning.html), December 12.

BLM and USFS (U.S. Department of the Interior, Bureau of Land Management and U.S. Department of Agriculture, Forest Service), 2007, *Final Environmental Impact Statement for the Buckman Water Diversion Project, Santa Fe National Forest and Taos Field Office of the BLM in Santa Fe County, New Mexico*, May 24.

BLS (U.S. Bureau of Labor Statistics), 2010a, Workplace Injuries and Illnesses-2009, Chart 1 Total recordable nonfatal occupational injury and illness incident rates by case type, private industry, 2003-2009, accessed through http://www.bls.gov/iif/oshsum.htm , November 18.

BLS (Bureau of Labor Statistics) 2010b, Quarterly Census of Employment and Wages, 2009 Employment by Industry (available at ftp://ftp.bls.gov/pub/special.requests/cew/2009/county_high_level/).

CEQ (Council on Environmental Quality), 1997, *Environmental Justice, Guidance Under the National Environmental Policy Act,* Executive Office of the President, Washington, DC, December 10.

CFLHD (Central Federal Lands Highway Division), 2009, CFLHD Projects (New Mexico) (accessed on December 14, 2010, http://www.cflhd.gov/projects/StateProjects.cfm?State=NM), June 29.

DOC (U.S. Department of Commerce), 1990, Hispanic Origin by Race, Data Set: 1990 Summary Tape File 1 (STF 1) - 100 Percent Data (http://factfinder/census.gov/home/en/datanotes/expstf190.htm).

DOC (U.S. Department of Commerce), 2010a, Census Bureau, Population Division, County Characteristics Resident Population Estimates File, 2009 Estimates of Age, Sex, Race, and Hispanic Origin (accessed at http://www.census.gov/popest/counties/asrh/CC-EST2009-alldata.html), June.

DOC (U.S. Department of Commerce), 2010b, Census Bureau, Population Division, Table 4, Annual Estimates of Housing Units for Counties in New Mexico: April 1, 2000 to July 1, 2009 (HU-EST2009-04-35) (accessed at http://www.census.gov/popest/housing/HU-EST2009-4.html), September.

DOC (Department of Commerce), 2010c, Census Bureau, 2005-2009 American Community Survey 5-Year Estimates (accessed at http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=ACS&_submenuId=datasets_2&_lang=en), December 14.

DOC (Department of Commerce), 2010d, Census Bureau, 2007-2009 American Community Survey 3-Year Estimates (accessed at http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=ACS&_submenuId=datasets_2&_lang=en), December 14.

DOC (Department of Commerce), 2010e, Census Bureau, 2009 American Community Survey 1-Year Estimates (accessed at http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program= ACS&_submenuId=datasets_2&_lang=en), December 14.

DoD (U.S. Department of Defense), 2010, *Nuclear Posture Review Report* (accessed February 2, 2011, http://www.defense.gov/npr/docs/2010%20nuclear%20posture%20review%20report.pdf), Washington, DC, April 6.

DOE (U.S. Department of Energy) 1996a, *Final Programmatic Environmental Impact Statement for Stockpile Stewardship and Management*, DOE/EIS-0236, Washington, DC, September.

DOE (U.S. Department of Energy), 1996b, *Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic Environmental Impact Statement*, DOE/EIS-0229, Office of Fissile Materials Disposition, Washington, DC, December.

DOE (U.S. Department of Energy) 1997a, *Environmental Assessment for the Proposed CMR Building Upgrades at the Los Alamos National Laboratory, Los Alamos, New Mexico*, DOE/EA-1101, February.

DOE (U.S. Department of Energy), 1997b, *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement*, DOE/EIS-0026-S-2, Carlsbad Area Office, Carlsbad, New Mexico, September.

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

DOE (U.S. Department of Energy), 1999b, Radiological Control, DOE Standard DOE-STD-1098-99, Washington, DC, July.

DOE (U.S. Department of Energy), 1999c, *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/EIS-0293, Los Alamos Area Office, Los Alamos, New Mexico, October.

DOE (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/SEA-03, Los Alamos Area Office, Los Alamos, New Mexico, September.

DOE (U.S. Department of Energy), 2002a, *DOE Standard, Natural Phenomena, Hazards Design and Evaluation Criteria for Department of Energy Facilities*, DOE-STD-1020-2002, Washington, DC, January.

DOE (U.S. Department of Energy), 2002b, *National Transuranic Waste Management Plan*, DOE/NTP-96-1204, Rev. 3, Carlsbad Field Office, (accessed March 20, 2008, http://www.wipp.energy.gov/library/ntwmp/rev3/NTWMPrev3.pdf), July.

DOE (U.S. Department of Energy), 2002c, *DOE Standard, Natural Phenomena Hazards Performance Categorization Guidelines for Structures, Systems, and Components*, DOE-STD-1021, Reaffirmed with Errata, Washington, DC, April.

DOE (U.S. Department of Energy), 2002d, *Proposed Future Disposition of Certain Cerro Grande Fire Flood and Sediment Retention Structures at Los Alamos National Laboratory*, DOE/EA-1408, Los Alamos Site Office, Los Alamos, New Mexico, August 8.

DOE (U.S. Department of Energy), 2003a, Estimating Radiation Risk from Total Effective Dose Equivalent (TEDE) ISCORS Technical Report No. 1, DOE/EH-412/0015/0802, Rev. 1, Office of Environmental Policy and Guidance, January.

DOE (U.S. Department of Energy), 2003b, *Final Environmental Impact Statement for the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, New Mexico*, DOE/EIS-0350, National Nuclear Security Administration, Los Alamos Site Office, Los Alamos, New Mexico, November.

DOE (U.S. Department of Energy), 2004a, *Record of Decision for Final EIS for the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory*, DOE/EIS-0350, 69 *FR* 6967, National Nuclear Security Administration, Los Alamos Site Office, Albuquerque, New Mexico, February.

DOE (U.S. Department of Energy), 2004b, *Department of Energy FY 2005 Congressional Budget Request*, ME-0032, Volume 1, Office of Management, Budget and Evaluation/CFO, Washington, DC, February.

DOE (U.S. Department of Energy), 2005a, *Supplement Analysis, Environmental Impact Statement for the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, New Mexico, Changes to the Location of the CMRR Facility Components* (DOE/EIS-0350-SA-01), January.

DOE (U.S. Department of Energy), 2005b, *Department of Energy FY 2006 Congressional Budget Request*, ME-0046, Volume 1, Office of Management, Budget and Evaluation/CFO, Washington, DC, February.

DOE (U.S. Department of Energy), 2005c, *Facility Safety*, DOE Order 420.1B, Washington, DC, December 22.

DOE (U.S. Department of Energy), 2006, "Programmatic Agreement for Management of Historic Properties at Los Alamos National Laboratory," LA-UR-06-1975, June 14.

DOE (U.S. Department of Energy), 2008a, *Final Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory, Los Alamos, New Mexico*, DOE/EIS-0380, National Nuclear Security Administration, Los Alamos Site Office, Los Alamos, New Mexico, May.

DOE (U.S. Department of Energy), 2008b, *DOE 2009 Occupational Radiation Exposure*, DOE Office of Health, Safety and Security, September.

DOE (U.S. Department of Energy), 2008c, *Final Complex Transformation Supplemental Programmatic Environmental Impact Statement*, DOE/EIS-0236-S4F, October.

DOE (U.S. Department of Energy), 2008d, *Annual Transuranic Waste Inventory Report – 2007*, DOE/TRU-2008-3379, Revision 1 (accessed November 3, 2008, http://www.wipp.energy.gov/library/Baseline2004,Final7.20Annual%20TRUWaste%20Waste%20Inventory%20Report-2007%20Main%20Body.pdf), Carlsbad Field Office, Carlsbad, New Mexico.

DOE (U.S. Department of Energy), 2009a, *Annual Transuranic Waste Inventory Report* — 2008, DOE/TRU-2009-3425, Rev. 0, Carlsbad Field Office, Carlsbad, New Mexico.

DOE (U.S. Department of Energy), 2009b, *Emissions of Greenhouse Gases in the United States 2008*, Energy Information Administration, DOE/EIA-0573(2008), Washington, DC, December.

DOE (U.S. Department of Energy), 2010a, *DOE 2009 Occupational Radiation Exposure*, Office of Health, Safety and Security, accessed through http://www.hhs.energy.gov/csa/analysis/rems/, September.

DOE (U.S. Department of Energy), 2010b, *Annual Transuranic Waste Inventory Report – 2010*, DOE/TRU-10-3425, Revision 0, Carlsbad Field Office, Carlsbad, New Mexico, November.

DOE (U.S. Department of Energy) 2010c, *November 2010 Update to the National Defense Authorization Act of FY2010 Section 1251 Report, New START Treaty Framework and Nuclear Force Structure Plans,* National Nuclear Security Administration, Washington, DC, November.

DOE (U.S. Department of Energy), 2011a, *Computerized Accident Incident Reporting and Recordkeeping System (CAIRS)*, "Doe and Contractor Injury and Illness Experience by Year by Quarter, 2002 through 2009, 4th Quarter," Office of Health, Safety and Security, accessed through http://www.hss.energy.gov/CSA/Analysis/cairs/cairs/summary/oipds094/tl.html, February 4.

DOE (U.S. Department of Energy), 2011b, *Draft Environmental Impact Statement for the Disposal of Greater-Than-Class C (GTCC) Low-Level Radioactive Waste and GTCC-Like Waste*, DOE/EIS-0375-D, Vol. 1, Washington, DC, February.

DOT (U.S. Department of Transportation), 2006, *FHWA Roadway Construction Noise Model User's Guide.* Prepared for the U.S. Department of Transportation Federal Highway Administration Office of Environment Planning, Washington, DC, January.

English, L., U.S. Department of Energy, 2010, Personal communication (email) to K. Owens, Science Applications International Corporation, "CMR Worker Head Count," December 16.

EPA (U.S. Environmental Protection Agency), 1988, *Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion, Federal Guidance* Report No. 11, EPA 520/1-88-020, September.

EPA (U.S. Environmental Protection Agency), 1993a, *External Exposure to Radionuclides in Air, Water, and Soil, Federal Guidance* Report No. 12, EPA 402-R-93-081, September.

EPA (U.S. Environmental Protection Agency), 1993b, *Cancer Risk Coefficients for Environmental Exposure to Radionuclides*, Federal Guidance Report No. 13, EPA 402-R-99-001, September.

EPA (U.S. Environmental Protection Agency), 2002, *2002 National Emissions Inventory Microsoft Access Database* (accessed at http://www.epa.gov/ttn/chief/net/2002inventory.html), October.

EPA (U.S. Environmental Protection Agency), 2009a, *National Ambient Air Quality Standards (NAAQS)* (accessed at http://epa.gov/air/criteria.html), July 14.

EPA (U.S. Environmental Protection Agency), 2009b, *Transportation and Air Quality* (accessed February 6, 2009 at http://www.epa.gov/otaq/), January 26.

EPA (U.S. Environmental Protection Agency), 2010a, Commercially Permitted PCB Disposal Companies, last updated on March 12, 2010 (accessed at http://www.epa.gov/epawaste/hazard/tsd/pdbs.pubs/stordisp.htm).

EPA (U.S. Environmental Protection Agency), 2010b, National Ambient Air Quality Standards (accessed December 29, 2010, http://www.epa.gov/air/criteria.html), June.

EPA (U.S. Environmental Protection Agency), 2010c, National Pollutant Discharge Elimination System (NPDES), National Menu of Stormwater Best Management Practices, 4. Construction, "Construction Site Stormwater Runoff Control" (accessed on November 19, 2010, http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=min_measure&min_measure_id=4).

Flavin, C. A, 2011, Personal communication (email) to E. W. English, "Geologic stability items for NEPA", February 16.

Garcia, K. L. M., E. D. McGehee, and W. B. Masse, 2009, *Historic Building Assessment of the Chemistry and Metallurgy Research (CMR) Building (TA-3-29)*, Historic Building Survey Report No. 280, LA-UR-09-04611, Los Alamos National Laboratory, Los Alamos, New Mexico, July 17.

Gardner, J.N., F. Goff, S. Garcia and R.C. Hagan, 1986, Stratigraphic Relations and Lithologic Variations in the Jemez Volcanic Field, New Mexico, Journal of Geophysical Research, Volume 91, pp. 1763-1778.

Gordon, S., National Security Technologies, 2009, Personal communication (email) to S. Enyeart, Science Applications International Corporation, "RE: Updated NTS Information for SWEIS," October 22.

Hultquist, J., Utah Department of Environmental Quality, 2010, Personal communication (email) to G. Roles, Science Applications International Corporation, "RE: Annual waste volumes at the EnergySolutions facility at Clive," December 21.

IPCC (Intergovernmental Panel on Climate Change), 2007, "Climate Change 2007: The Physical Science Basis, Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change," Cambridge University Press, Cambridge, United Kingdom and New York, New York, 996 pp.

ITE (Institute of Transportation Engineers), 2003, *Trip Generation, 7th Edition*, ISBN No:0.935403-79-5, Washington, DC.

Karl, T. R., J. M. Melillo and T. C. Peterson, 2009, *Global Climate Change Impacts in the United States*, National Science and Technology Council, Cambridge University Press.

Kilgour, P., 2011, Interview Record – Future Actions for Cumulative Impacts, Rio Arriba County, Planning and Zoning Department, Personal communication with B. Minichino, Science Applications International Corporation, January 5.

Kleinfelder (Kleinfelder, Inc.), 2007a, *Geotechnical Engineering Report, Chemistry and Metallurgy Research Facility Replacement (CMRR) Project, Los Alamos National Laboratory*, Kleinfelder Project No. 19435, Rev. 0, Kleinfelder DCN 19435.10528.5-ALB06RP002, Los Alamos National Laboratory, Los Alamos, New Mexico, May 25.

Kleinfelder (Kleinfelder, Inc.), 2007b, *Geotechnical Data Report, Special Block Test, Chemistry and Metallurgy Research Facility Replacement (CMRR) Project, Los Alamos National Laboratory*, Kleinfelder Project No. 19435, Rev. 0, Kleinfelder DCN 19435.SBT.7-ALB05RP001, Los Alamos National Laboratory, Los Alamos, New Mexico, May 31.

Kleinfelder (Kleinfelder, Inc.), 2010a, *Phase I Ground Modification Alternatives Feasibility Study, Chemistry and Metallurgy Research Replacement (CMRR) Nuclear Facility, Los Alamos National Laboratory*, DCN 101492.5.3-ALB10RP001, Revision 0, Albuquerque, New Mexico, February 22.

Kleinfelder (Kleinfelder, Inc.), 2010b, *Work Plan, Excavation Support Design, Chemistry and Metallurgy Research Facility Replacement (CMRR) Project, Los Alamos National Laboratory*, DCN 101492.10.1-ALB10WP001, Revision C, Albuquerque, New Mexico, June 22.

LAC (Los Alamos County), 2010a, Los Alamos County Public Utilities Projects – Bayo Wastewater Treatment Plant (accessed on January 4, 2011, http://www.losalamosnm.us/Pages/default.aspx), Los Alamos, New Mexico, May.

LAC (Los Alamos County), 2010b, *Los Alamos County Environmental Services – Eco Station* (accessed on January 4, 2011, http://www.losalamosnm.us/Pages/default.aspx), Los Alamos, New Mexico.

LACBPU (Los Alamos County Board of Public Utilities), 2010, *Minutes, Board of Public Utilities Meeting, August 18, 2010, and September 15, 2010*, Los Alamos, New Mexico.

LADPU (Los Alamos Department of Public Utilities), 2010, "Conservation Plan for Water and Energy," Los Alamos, New Mexico, December 15.

LANL (Los Alamos National Laboratory), 1998, *Stratigraphy and Geologic Structure at the Chemical and Metallurgy (CMR)Building, Technical Area 3, Los Alamos National Laboratory,* LA-13522-MS, Los Alamos, New Mexico, October.

LANL (Los Alamos National Laboratory), 2000a, *Threatened and Endangered Species Habitat Management Plan*, LA-UR-00-4747, Los Alamos, New Mexico, April.

LANL (Los Alamos National Laboratory), 2000b, *Los Alamos National Laboratory Comprehensive Site Plan 2000: Los Alamos National Laboratory Project Management and Planning*, LA-UR-99-6704, Los Alamos, New Mexico.

LANL (Los Alamos National Laboratory), 2000c, *Environmental Surveillance at Los Alamos during 1999*, 30th Anniversary Edition, LA-13775-ENV, Los Alamos, New Mexico, December.

LANL (Los Alamos National Laboratory), 2002a, *A Special Edition of the SWEIS Yearbook, Description of Technical Areas and Facilities at Los Alamos National Laboratory*, LA-CP-02-75, Los Alamos, New Mexico. **[OUO]**

LANL (Los Alamos National Laboratory), 2002b, LANL Sustainable Design Guide, LA-UR 02-6914 (accessed at http://www.doeal.gov/SWEIS/LANLDocuments/184%20LA-UR-02-6914.pdf), Los Alamos, New Mexico, December.

LANL (Los Alamos National Laboratory), 2003, *Preliminary Chemistry and Metallurgy Research Building Disposition Study*, LA-UR-03-1122, Los Alamos National Laboratory, Chemistry and Metallurgy Research Facility Replacement Project, Los Alamos, New Mexico, February 11.

LANL (Los Alamos National Laboratory), 2004, *Information Document in Support of the Five-Year Review and Supplement Analysis for the Los Alamos National Laboratory Site-Wide Environmental Impact Statement (DOE/EIS-0238)*, LA-UR-04-5631, Los Alamos, New Mexico, August 17.

LANL (Los Alamos National Laboratory), 2005, *Evaluation of Faulting at the Chemistry and Metallurgy Research Facility Replacement (CMRR) Site, Based on Examination of Core from Geotechnical Drilling Studies, TA-55, Los Alamos National Laboratory*, LA-14170, Los Alamos, New Mexico, January.

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

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

LANL (Los Alamos National Laboratory), 2007a, *Final Report, Update of the Probabilistic Seismic Hazard Analysis and Development of Seismic Design Ground Motions at the Los Alamos National Laboratory*, LA-UR-07-3965, URS Corporation Job No. 24342433, May 25.

LANL (Los Alamos National Laboratory), 2007b, *Final Geotechnical Engineering Study, CMRR Radiological Laboratory/Utility Office Building (RLUOB)*, Los Alamos, New Mexico, January 12.

LANL (Los Alamos National Laboratory), 2007c, *Seismic Fragility of the LANL Fire Water Distribution System*, Los Alamos, New Mexico, March.

LANL (Los Alamos National Laboratory), 2007d, *SWEIS Yearbook—2006, Comparison of 2006 Data to Projections of the Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory*, LA-UR-07-6628, Environmental Stewardship Group, Environment, Protection Division, Los Alamos, New Mexico, October.

LANL (Los Alamos National Laboratory), 2008a, *Geology and Structure of the Chemistry and Metallurgy Research Facility Replacement Site, Los Alamos National Laboratory, New Mexico*, LA-14378, Los Alamos, New Mexico, October.

LANL (Los Alamos National Laboratory), 2008b, *The Land Conveyance and Transfer Data Recovery Project: 7000 Years of Land Use on the Pajarito Plateau*, LA-UR-07-6205, accessed through http://www.lanl.gov/environment/nepa/docs/LA-UR-07-6205-Vol4.pdf, Los Alamos, New Mexico, June.

LANL (Los Alamos National Laboratory), 2009, *SWEIS Yearbook—2007, Comparison of 2007 Data to Projections of the Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory*, LA-UR-09-01653, Environmental Stewardship Group, Environment, Protection Division, Los Alamos, New Mexico.

LANL (Los Alamos National Laboratory), 2010a, *SWEIS Yearbook – 2008, Comparison of 2008 Data Projections of the Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory*, LA-UR-10-03439, Environmental Stewardship Group, Environmental Protection Division, Los Alamos, New Mexico, June.

LANL (Los Alamos National Laboratory), 2010b, *Environmental Surveillance at Los Alamos During 2009*, LA-14427-ENV, Los Alamos, New Mexico, September.

LANL (Los Alamos National Laboratory), 2010c, *Biological Assessment Summaries for the CMRR Supplement EIS*, LA-UR-10-08280, Los Alamos, New Mexico, December.

LANL (Los Alamos National Laboratory), 2010d, *CMRR-NF Project and Environmental Description Document*, LA-UR-10-07497, Environmental Protection Group, Los Alamos, New Mexico, December 22.

LANL (Los Alamos National Laboratory), 2010e, *Fiscal Year 2011 Sustainability Plan*, UI-OKAB-00X, Los Alamos, New Mexico, December.

LANL (Los Alamos National Laboratory), 2010f, *Overview Map-Wildfire Mitigation Planning, Los Alamos National Laboratory*, LA-UR-10-07960, Los Alamos, New Mexico, December.

LANL (Los Alamos National Laboratory), 2010g, *Phase II Investigation Work Plan for Upper Mortandad Canyon Aggregate Area*, LA-UR-10-7423, Los Alamos, New Mexico, December.

LANL (Los Alamos National Laboratory), 2010h, *Migratory Bird Best Management Practices Source Document for Los Alamos National Laboratory, Revision 1*, LA-UR-07-8434, Los Alamos, New Mexico, January.

LANL (Los Alamos National Laboratory), 2011, "Supplemental Environmental Impact Statement for the Nuclear Facility Portion of the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, New Mexico," Data Call Response.

LANS (Los Alamos National Security), 2011a, *CMR Building Hazards Analysis Information.*

LANS (Los Alamos National Security), 2011b, *CMRR-NF Hazards Analysis Information.*

Lewis, C. J., J. N. Gardner, E. S. Schultz-Fellenz, A. Lavine, S. L. Reneau, and S. Olig, 2009, *Fault Interaction and Along-Strike Variation in Throw in Pajarito Fault System, Rio Grande Rift, New Mexico*, in *Geosphere*, v. 5, no. 3, p. 1-18, June.

Loftin, S. R., 2001, *A Biological Assessment of the Potential Effects of the Wildfire Hazard Reduction Project on Federally Listed Threatened and Endangered Species*, LA-UR-01-2253, Los Alamos National Laboratory, Los Alamos, New Mexico, May 3.

Lucas-Kamat, S., 2010, New Mexico Mining and Minerals Division, Santa Fe, New Mexico, Personal communication to B. Minichino, Science Applications International Corporation, Germantown, Maryland, "Availability of Aggregate near Los Alamos, New Mexico," November 5.

McKown, B., S. W. Koch, R. G. Balice, and P. Neville, 2003, *Land Cover Map for the Eastern Jemez Region*, LA-14029, Los Alamos National Laboratory, Los Alamos, New Mexico, June.

Napier, B.A., R.A. Peloquin, D.L. Strenge, and J.V. Ramsdell, 1988, *GENII – The Hanford Environmental Radiation Dosimetry Software System*, PNL-6584, Pacific Northwest Laboratory, Richland, Washington, December.

NCI (National Cancer Institute), 2011, National Cancer Institute State Cancer Profiles (accessed through http://statecancerprofiles.cancer.gov/index.html, February 4.

NMAQB (New Mexico Air Quality Bureau), 2010, Air Dispersion Modeling Guidelines (accessed on December 29, 2010, http://www.nmenv.state.nm.us/aqb/modeling/documents/NM_AirDispersionModelingGuidelines_Apr082010.pdf), p. 19, April.

NMDOT (New Mexico Department of Transportation), 2010, NMDOT Projects, Road Construction Projects (accessed December 14, 2010, available at http://nmshtd.state.nm.us/main.asp?secid=11369).

NMDWS (New Mexico Department of Workforce Solutions), 2010a, Economic Research and Analysis, TABLE C - Civilian Labor Force, Employment, Unemployment and Unemployment Rate, 2000 - 2009 Annual Averages, March 31

NMDWS (New Mexico Department of Workforce Solutions), 2010b, Economic Research and Analysis, TABLE A – Monthly Civilian Labor Force, Employment, Unemployment and Unemployment Rate 2010, November 22.

NMED (New Mexico Environmental Department), 2004, 2004-2006 State of New Mexico Integrated Clean Water Act §303(d) §305(b) Report, Appendix B: 303(d)/305(b) Integrated List for Assessed Surface Waters, Surface Water Quality Bureau, Santa Fe, New Mexico (available at www.nmenv.state.nm.us/wqcc/303d-305b/2004/AppendixB/index.html).

NMED (New Mexico Environment Department), 2005, Compliance Order on Consent, Proceeding Under the New Mexico Hazardous Waste Act §74-4-10 and the New Mexico Solid Waste Act §74-9-36(D), March 1.

NMED (New Mexico Environment Department), 2009, 2009 New Mexico Solid Waste Annual Report, Albuquerque, New Mexico, August.

NMED (New Mexico Environmental Department), 2010, *Inventory of New Mexico Greenhouse Gas Emissions: 2000-2007,* Santa Fe, New Mexico, March 15.

NNSA (National Nuclear Security Administration), 2010a, Categorical Exclusion, Pajarito Road Right-of-Way Shift at TA-50 and TA-55, NEPA Review, LASO-10-002, Los Alamos Site Office, Los Alamos, New Mexico, April.

NNSA (National Nuclear Security Administration), 2010b, *Environmental Assessment for the Expansion of the SERF and ER of Reach S-2 of Sandia Canyon at LANL*, DOE/EA-1736, Los Alamos, New Mexico, August 24.

PNM, 2005, Public Invited to Comment on PNM Electric Transmission Line Routes (accessed at www.pnm.com/news/2005/0204_sfe.html), February 4.

PNNL (Pacific Northwest National Laboratory), 2007, *GENII Version 2 Users' Guide,* PNNL-14583, Rev. 2, Richland, Washington, March.

NPS (National Park Service), 2005, Fire Management Plan for Bandelier National Monument, National Park Service.

NRC (U.S. Nuclear Regulatory Commission), 1997, *Recommendations for Probabilistic Seismic Hazard Analysis-Guidance on Uncertainty and Use of Experts*, prepared by the NRC Senior Seismic Hazard Analysis Committee, Document NUREG/CR-6327, Rockville, Maryland.

NRC/EPA/DOE (U.S. Nuclear Regulatory Commission, U.S. Environmental Protection Agency, and U.S. Department of Energy), 2000, *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM),* NUREG-1575, Rev. 1, EPA 402-R-97-016, Rev. 1, DOE/EH-0624, Rev. 1, Washington,

NRCS (National Resource Conservation Service), 2008, Soil Survey of Sandoval County Area, New Mexico, Parts of Los Alamos, Sandoval, and Rio Arriba Counties (http://soils.usda.gov/survey/online_surveys/new_mexico/[Part I] and http://soildatamart.nrcs.usda.gov/Manuscripts/NM656/0/Maps/GSM.pdf [Part II]).

NRCS (National Resource Conservation Service), 2011, *Prime Farmland (if irrigated) Locations*, prepared by Resource Inventories and Assessments Group, New Mexico State Office, for Perry Russell, Science Applications International Corporation, Carpinteria, California, January 13.

Reclamation (U.S. Bureau of Reclamation), 2004, City of Albuquerque Drinking Water Project Final Environmental Impact Statement, Bureau of Reclamation, U.S. Department of the Interior, and City of Albuquerque. Albuquerque, New Mexico. March.

Reneau, S. L., E. V. McDonald, J. N. Gardner, T. R. Kolbe, J. S. Carney, P. M. Watt, and P. Longmire, 1996, Erosion and Deposition of the Pajarito Plateau, New Mexico, and Implications for Geomorphic Responses to Late Quaternary Climatic Changes, the Jemez Mountains Region: New Mexico Geological Society, Forty-Seventh Annual Field Conference Guidebook, pp. 391-397, December.

Romero, K., 2011, Interview Record – Future Actions for Cumulative Impacts, Sandoval County, New Mexico, County Development, Personal communication with B. Minichino, Science Applications International Corporation, January 5.

Santa Fe (Santa Fe, New Mexico), 2010, (accessed January 4, 2011, http://www.santafenm.gov/index.aspx?NID=177), Santa Fe, New Mexico.

Saricks, C. L., and M. M. Thompkins, 1999, *State-Level Accident Rates of Surface Freight Transportation: A Reexamination*, The Center for Transportation Research, Argonne National Laboratory, Argonne, Illinois, April.

Schiavo, N., 2011, Interview Record – Future Actions for Cumulative Impacts, City of Santa Fe, New Mexico, Energy Efficiency and Renewable Energy, Personal communication with B. Minichino, Science Applications International Corporation, January 5.

SDDCTEA (Military Surface Deployment and Distribution Command Transportation Engineering Agency), 2006, *Traffic and Safety Engineering for Better Entry Control Facilities*, Pamphlet 55-16, Newport News, Virginia.

Sena, E., 2011, Interview Record – Future Actions for Cumulative Impacts, Mora County, New Mexico, County Manager's Office, Personal communication with B. Minichino, Science Applications International Corporation, January 5.

SNL (Sandia National Laboratories), 2010, *Annual Site Environmental Report for Sandia National Laboratories, New Mexico, Calendar Year 2009*, SAND2010-5349P, Albuquerque, New Mexico, September.

USFS (U.S. Forest Service), 2010a, Santa Fe National Forest, Projects & Plans (accessed December 14, 2010, www.fs.fed.us/r3/sfe/projects/projects/index.html), July 22.

USFS (U.S. Forest Service), 2010b, Decision Notice and Finding of No Significant Impact for the Restoration of Los Alamos Dam and Reservoir, Los Alamos County, New Mexico, September.

USFS (U.S. Forest Service), 2011, "Schedule of Proposed Action (SOPA), 10/01/2010 to 12/31/2010, Santa Fe National Forest," Forest Service, U.S. Department of Agriculture, (accessed December 15, 2010, http://www.fs.fed.us/r3/sfe/projects/projects/index.html).

USFWS (U.S. Fish and Wildlife Service), 2003, "Consultation letter regarding the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Albuquerque, New Mexico," Cons. #2-22-03-F-0302, U.S. Department of the Interior, Albuquerque, New Mexico, May 14.

USFWS (U.S. Fish and Wildlife Service), 2005, "Consultation letter regarding the potential change in project effects of the Chemistry and Metallurgy Research Building Replacement Project on Federally Listed threatened and endangered species at Los Alamos National Laboratory, Albuquerque, New Mexico," Cons. #2-22-03-I-0302, U.S. Department of the Interior, Albuquerque, New Mexico, March 9.

USFWS (U.S. Fish and Wildlife Service), 2006, "Consultation letter regarding the amended biological assessment of the potential effects of the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Albuquerque, New Mexico," Cons. #2-22-03-I-0302, U.S. Department of the Interior, Albuquerque, New Mexico, February 7.

USFWS (U.S. Fish and Wildlife Service), 2007, "Consultation letter regarding expanding the footprint of the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Albuquerque, New Mexico to the east for additional lay down areas and to construct and operate a cement plant," Cons. #22430-2007-I-0126, U.S. Department of the Interior, Albuquerque, New Mexico, September 26.

USFWS (U.S. Fish and Wildlife Service), 2009, "Consultation letter regarding the potential change in project effects of the Chemistry and Metallurgy Research Building Replacement Project on Federally Listed threatened and endangered species at Los Alamos National Laboratory, Albuquerque, New Mexico," Cons. #22420-09-I-0066, U.S. Department of the Interior, Albuquerque, New Mexico, August 6.

USFWS (U.S. Fish and Wildlife Service), 2010, *Species Profile Search*, Environmental Conservation Online System (available at http://ecos.fws.gov/ecos/indexPublic.do), November 16.

Valencia, B., 2010, Traffic Engineer, New Mexico Department of Transportation, New Mexico, Personal communication (email) to M. Smith, Science Applications International Corporation, St. Louis, Missouri, "Looking for Traffic Count Information in Los Alamos County" November 4.

WAPA (Western Area Power Administration), 2010, Infrastructure Maintenance and Upgrades (accessed on December 14, www.wapa.gov/transmission/infrastruct.htm).

Wilson (Wilson and Company, Inc.), 2010, *Pajarito Road Closure Impact Traffic Study, Los Alamos, New Mexico, Rev. 0*, Document Number: 75181-TO 10-004, Albuquerque, New Mexico, September 10.

CHAPTER 8
LIST OF PREPARERS

8 LIST OF PREPARERS

This *Supplemental Environmental Impact Statement for the Nuclear Facility Portion of the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, New Mexico* was prepared by the U.S. Department of Energy. The organizations and individuals listed below contributed to the overall effort in the preparation of this document.

JOHN TEGTMEIER, U.S. DEPARTMENT OF ENERGY, NATIONAL NUCLEAR SECURITY ADMINISTRATION, LOS ALAMOS SITE OFFICE
SEIS RESPONSIBILITIES: NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) DOCUMENT MANAGER

Education: M.S., Civil Engineering, New Mexico State University
B.S., Civil Engineering, New Mexico State University

Experience/Technical Specialty:
Thirty-three years. Facility planning, construction and project management, waste management, nuclear safety specialist.

ELIZABETH WITHERS, U.S. DEPARTMENT OF ENERGY, NATIONAL NUCLEAR SECURITY ADMINISTRATION, ALBUQUERQUE SERVICE CENTER
SEIS RESPONSIBILITIES: DEPUTY NEPA DOCUMENT MANAGER

Education: M.S., Life Sciences, Louisiana Tech University
B.S., Botany, Louisiana Tech University

Experience/Technical Specialty:
Twenty-seven years. Environmental investigations and NEPA compliance.

KIRK OWENS, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
SEIS RESPONSIBILITIES: PROJECT MANAGER

Education: B.S., Environmental Resource Management, The Pennsylvania State University

Experience/Technical Specialty:
Thirty-three years. Radioactive waste management, regulatory analysis, environmental compliance and assessment, and radiological impacts assessment.

KAREN ANTIZZO, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
SEIS RESPONSIBILITIES: APPLICABLE LAWS REGULATIONS AND OTHER REQUIREMENTS, SITE INFRASTRUCTURE, AND RESOURCE COMMITMENTS

Education: M.S., Environmental Management, University of Maryland
B.S., Education, Towson State University

Experience/Technical Specialty:
Eighteen years. Infrastructure, radioactive waste management, regulatory review, and public participation.

ALYSIA BAUMANN, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
SEIS RESPONSIBILITIES: AIR QUALITY AND NOISE

Education: B.S., Chemical Engineering with an Interdisciplinary Study in Biomedical Engineering, Colorado State University

Experience/Technical Specialty:
Seven years. Air quality and noise analysis and modeling, solid waste, utilities, and hazardous materials/wastes issues and analyses.

HANA BINDER, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
SEIS RESPONSIBILITIES: TECHNICAL EDITOR

Education: B.A., Journalism, University of Oregon

Experience/Technical Specialty:
Four years. Technical writing and editing.

TERRI BINDER, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
SEIS RESPONSIBILITIES: LEAD - ENVIRONMENTAL CONSEQUENCES

Education: M.A., Organizational Learning and Instructional Technology, University of New Mexico
B.A., Mathematics, University of California, Los Angeles

Experience/Technical Specialty:
Nineteen years. Radiological facility site-specific training, U.S. Department of Energy compliance, and computer programming.

KAREN BULL, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
SEIS RESPONSIBILITIES: WATER RESOURCES

Education: Professional Designation in Business Management, University of California, Los Angeles Extension
B.A., Aquatic Biology, University of California

Experience/Technical Specialty:
Twenty-five years. NEPA analysis and compliance, water resources, and environmental regulatory compliance.

JOHN EICHNER, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
SEIS RESPONSIBILITIES: DEPUTY PROJECT MANAGER, LEAD - PROJECT DESCRIPTION AND ALTERNATIVES, CUMULATIVE IMPACTS, SITE INFRASTRUCTURE, SOCIOECONOMICS, ENVIRONMENTAL JUSTICE, RESOURCE MANAGEMENT

Education: B.S., Accounting, Syracuse University
B.S., Finance, Syracuse University

Experience/Technical Specialty:
Twenty-eight years. Project management, impact analysis, socioeconomics, and cost-benefit analyses.

DANIEL W. GALLAGHER, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
SEIS RESPONSIBILITIES: HUMAN HEALTH IMPACTS

Education: M.E., Nuclear Engineering, Rensselaer Polytechnic Institute
B.S., Nuclear Engineering, Rensselaer Polytechnic Institute

Experience/Technical Specialty:
Thirty-one years. Nuclear risk analysis.

SUSAN GOODAN, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
SEIS RESPONSIBILITIES: LEED CONSTRUCTION

Education: Master of Architecture, University of New Mexico
B.A., Ethics/Archaeology, University of Cape Town, South Africa

Experience/Technical Specialty:
Twenty-one years. Project manager and environmental planner.

HEATHER GORDON, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
SEIS RESPONSIBILITIES: GIS SUPPORT

Education: M.S., Geography, University of New Mexico
B.A., Environmental Studies and Planning, Sonoma State University

Experience/Technical Specialty:
Twelve years. GIS [geographic information system] support.

MARK GROSSENBACHER, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
SEIS RESPONSIBILITIES: TRANSPORTATION AND TRAFFIC ANALYSIS

Education: B.S., Civil Engineering, University of Missouri at Rolla

Experience/Technical Specialty:
Twenty-seven years. Transportation planning and traffic engineering.

AMANDA HANSEN, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
SEIS RESPONSIBILITIES: AIR QUALITY AND NOISE

Education: Ph.D., Meteorology, Florida State University
M.S., Meteorology, Florida State University
B.S., Marine Science, Florida State University

Experience/Technical Specialty:
Eight years. Air quality and monitoring.

NICOLE HARDEN, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
SEIS RESPONSIBILITIES: AFFECTED ENVIRONMENT, ECOLOGICAL RESOURCES

Education: B.S., Biology, Indiana University

Experience/Technical Specialty:
One year. Ecological resources and affected environment.

ROBERT HULL, LOS ALAMOS TECHNICAL ASSOCIATES, INC.
SEIS RESPONSIBILITIES: ALTERNATIVES, SITE TECHNICAL LIAISON

Education: Doctoral Studies, Civil Engineering, Stanford University
M.S., Civil Engineering, Stanford University
M.S., Geochemistry and Environmental Geology, Florida State University
B.S., Geology, Florida State University

Experience/Technical Specialty:
Thirty-seven years. Environmental impacts assessments, environmental baseline surveys, human health risk assessment, and environmental remediation.

ROY KARIMI, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
SEIS RESPONSIBILITIES: TRANSPORTATION AND TRAFFIC, AND HUMAN HEALTH IMPACTS

Education: Sc.D., Nuclear Engineering, Massachusetts Institute of Technology
N.E., Nuclear Engineering, Massachusetts Institute of Technology
M.S. Nuclear Engineering, Massachusetts Institute of Technology
B.S., Chemical Engineering, Abadan Institute of Technology

Experience/Technical Specialty:
Thirty years. Nuclear power plant safety, risk and reliability analysis, design analysis, criticality analysis, accident analysis, consequence analysis, spent fuel dry storage safety analysis, and probabilistic risk assessment.

BRIAN MINICHINO, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
SEIS RESPONSIBILITIES: LEAD - METHODOLOGY, RESOURCE COMMITMENTS, DATA AND QUALITY MANAGEMENT

Education: B.S., Chemistry, Virginia Polytechnic Institute and State University

Experience/Technical Specialty:
Two years. Quality assurance/quality control and technical writing.

STEVE MIXON, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
SEIS RESPONSIBILITIES: TECHNICAL EDITOR

Education: B.S., Communications, University of Tennessee

Experience/Technical Specialty:
Twenty-one years. Program analyst, technical writer and editor, speechwriter, and publications specialist.

DOUGLAS OUTLAW, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
SEIS RESPONSIBILITIES: HUMAN HEALTH IMPACTS

Education: Ph.D, Nuclear Physics, North Carolina State University
M.S., Nuclear Physics, North Carolina State University
B.S., Physics, North Carolina State University

Experience/Technical Specialty:
Thirty-three years. Nuclear physics, safety analysis, and risk assessment.

GARY ROLES, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
SEIS RESPONSIBILITIES: WASTE MANAGEMENT AND POLLUTION PREVENTION

Education: M.S., Nuclear Engineering, University of Arizona
B.S., Mechanical Engineering, Arizona State University

Experience/Technical Specialty:
Thirty-one years. Radioactive waste management, regulatory and compliance analysis, and NEPA analysis.

PERRY RUSSELL, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
SEIS RESPONSIBILITIES: GEOLOGY AND SOILS

Education: M.S., Geological Sciences, California State University
B.A., Geological Sciences, University of California

Experience/Technical Specialty:
Twenty-four years. Professional Geologist/hydrogeologist. Geology, water resources, hazardous materials, and public safety.

SEAN SCHATZEL, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
SEIS RESPONSIBILITIES: SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

Education: B.A., Political Economics/Public Administration, Bloomsburg University

Experience/Technical Specialty:
Four years. Socioeconomics and environmental justice.

JAMES SCHINNER, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
SEIS RESPONSIBILITIES: LEAD - AFFECTED ENVIRONMENT, LAND USE, VISUAL RESOURCES, ECOLOGICAL RESOURCES, CULTURAL AND PALEONTOLOGICAL RESOURCES

Education: Ph.D., Wildlife Management, Michigan State University
M.S., Zoology, University of Cincinnati
B.S., Zoology, University of Cincinnati

Experience/Technical Specialty:
Thirty-eight years. Ecological field assessments, NEPA documentation, and regulatory reviews.

ALISON SMITH-CHURCHILL, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
SEIS RESPONSIBILITIES: TECHNICAL EDITOR

Education: B.A., English, Language, and Literature, University of Maryland, College Park

Experience/Technical Specialty:
Four years. NEPA document preparation.

MIKE SMITH, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
SEIS RESPONSIBILITIES: TRANSPORTATION AND TRAFFIC

Education: M.S., Civil Engineering, University of Missouri
B.S., Engineering of Mines, West Virginia University
J.D., Doctor of Jurisprudence, West Virginia University

Experience/Technical Specialty:
Twenty-nine years. Professional engineer. Transportation engineering support and remedial/environmental design.

ELLEN TAYLOR, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
SEIS RESPONSIBILITIES: LEAD – INTRODUCTION AND PURPOSE AND NEED FOR AGENCY ACTION, PROJECT DESCRIPTION AND ALTERNATIVES, MITIGATION MEASURES

Education: Ph.D., Biology, University of Pennsylvania
B.A., Zoology, University of Vermont

Experience/Technical Specialty:
Twenty-seven years. Environmental compliance and NEPA assessments.

JOHN W. WILLIAMS, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
SEIS RESPONSIBILITIES: PROJECT DEVELOPMENT AND ANALYSIS

Education: Ph.D., Physics, New Mexico State University
M.S., Physics, New Mexico State University
B.S., Mathematics, North Texas State University

Experience/Technical Specialty:
Thirty years. Geographical information systems and demographics.

CHAPTER 9
DISTRIBUTION LIST

9 DISTRIBUTION LIST

The U.S. Department of Energy provided copies of the *Draft Supplemental Environmental Impact Statement for the Nuclear Facility Portion of the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, New Mexico (CMRR-NF SEIS)* to Federal, State, and local elected and appointed government officials and agencies; American Indian representatives; national, state, and local environmental and public interest groups; and other organizations and individuals as listed. Approximately 25 copies of the complete *CMRR-NF SEIS*, 50 copies of the Summary of the *CMRR-NF SEIS*, and 200 CDs of the *CMRR-NF SEIS* were sent to interested parties. Copies will be provided to others on request.

United States Congress

U.S. Senate – New Mexico

The Honorable Jeff Bingaman
The Honorable Tom Udall

U.S. Senate Committees

Committee on Appropriations
The Honorable Daniel Inouye, Chairman
The Honorable Thad Cochran, Ranking Member

Committee on Appropriations, Subcommittee on Energy and Water Development
The Honorable Dianne Feinstein, Chairman
The Honorable Lamar Alexander, Ranking Member

Committee on Energy and Natural Resources
The Honorable Jeff Bingaman, Chairman
The Honorable Lisa Murkowski, Ranking Member

Committee on Energy and Natural Resources, Subcommittee on Energy
The Honorable Maria Cantwell, Chairman
The Honorable James E. Risch, Ranking Member

Committee on Environment and Public Works
The Honorable Barbara Boxer, Chairman
The Honorable James M. Inhofe, Ranking Member

Committee on Environment and Public Works, Subcommittee on Clean Air and Nuclear Safety
The Honorable Thomas R. Carper, Chairman
The Honorable John Barrasso, Ranking Member

U.S. House of Representatives – New Mexico

The Honorable Martin T. Heinrich, District 1
The Honorable Steve Pearce, District 2
The Honorable Ben R. Lujan, District 3

U.S. House of Representatives Committees

Committee on Appropriations
The Honorable Harold Rogers, Chairman
The Honorable Norman Dicks, Ranking Member

Committee on Appropriations, Subcommittee on Energy and Water Development
The Honorable Rodney P. Frelinghuysen, Chairman
The Honorable Peter J. Visclosky, Ranking Member

Committee on Energy and Commerce
The Honorable Fred Upton, Chairman
The Honorable Henry A. Waxman, Ranking Member

Committee on Energy and Commerce, Subcommittee on Energy and Power
The Honorable Ed Whitfield, Chairman
The Honorable Bobby L. Rush, Ranking Member

Committee on Energy and Commerce, Subcommittee on Environment and the Economy
The Honorable John Shimkus, Chairman
The Honorable Gene Green, Ranking Member

Federal Agencies

Bandelier National Monument
Santa Fe National Forest
U.S. Department of the Army
U.S. Department of the Interior
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

State Government

New Mexico State Government

Governor
Susana Martinez

Senators
Eric G. Griego
Lynda M. Lovejoy
Richard C. Martinez
John Pinto

Representatives
Rhonda S. King
Ben Lujan
Patricia A. Lundstrom
Alfred Park
Debbie A. Rodella
Henry Saavedra
Nick L. Salazar
Jeannette O. Wallace
James P. White

State NEPA Clearinghouses

Julie Roybal, New Mexico Environment Department

State NEPA Points of Contact

F. David Martin, New Mexico Environment Department

State Agencies

New Mexico Environment Department
Bill Bartels
James Bearzi
Sarah Cottrel
Eric Galloway
Thomas Skibitski
Steve Yanicak

New Mexico Energy, Minerals, and Natural Resources Department
Stewart Liley
Jim Noel

Local Government

Randy M. Autio, Acting Administrator, County of Los Alamos
Martha Perkins, Senior Planner, County of Los Alamos
Michael Wismer, Council Chairman, County of Los Alamos
Lorenzo Valdez, Rio Arriba County

Native American Representatives

Neil Weber, Director, Department of Environmental and Cultural Preservation
Michael Miller, Director, Eight Northern Indian Pueblo Council
Mark Chino, President, Mescalero Apache Tribe
Holly Houghten, Tribal Historic Preservation Officer, Mescalero Apache Tribe
Randall Vicente, Governor, Pueblo of Acoma
Jacob Pecos, Environmental Director, Pueblo of Cochiti
Robert B. Pecos, Governor, Pueblo of Cochiti
Michael Toledo, Governor, Pueblo of Jemez
Greg Kaufman, Resource Protection Officer, Pueblo of Jemez
Perry Martinez, Governor, Pueblo of San Ildefonso
Paul Baca, Pueblo of Santa Clara
Joseph Chavarria, Environmental Director, Pueblo of Santa Clara
Walter Dasheno, Governor, Pueblo of Santa Clara
J. Gilbert Sanchez, Tribal Environmental Watch Alliance

Public Reading Rooms and Libraries

A complete copy of the *CMRR-NF SEIS* and references may be reviewed at any of the reading rooms and libraries listed below.

Espanola Public Library
313 North Paseo de Onate
Espanola, NM 87532
(505) 747-6087

DOE Public Reading Room
Government Information Department
Zimmerman Library
University of New Mexico
1 University of New Mexico
Albuquerque, NM 87131
(505) 277-7180

New Mexico State Library
1209 Camino Carlos Rey
Santa Fe, NM 87507
(505) 476-9717

Santa Fe Public Library
145 Washington Street
Santa Fe, NM 87501
(505) 955-6780

Santa Fe Public Library
Oliver La Farge Branch
1730 Llano Street
Santa Fe, NM 87501
(505) 955-4860

U.S. Department of Energy
Freedom of Information Act Reading Room
1000 Independence Avenue, SW, 1G-033
Washington, DC 20585
(202) 586-5955

Organizations/Public Interest Groups

Dorelen Bunting, Albuquerque Center for Peace and Justice
David McCoy, Citizen Action New Mexico
Janet Greenwald, Citizens for Alternatives to Radioactive Dumping
Charles Pergler, Community of the Pajarito Group of the Sierra Club
Joni Arends, Concerned Citizens for Nuclear Safety
Robin Laughlin, Concerned Citizens for Nuclear Safety
Basia Miller, Ph.D., Concerned Citizens for Nuclear Safety
Clarissa Duran, CSO del Norte/Una Resolana
Virginia Miller, Department of Peace Initiative New Mexico
S. Kotowski, Embudo Valley Environmental Monitoring Group
Jessica Frechette-Gutfreund, Espanola Valley Women's Health
Michelle Peixinho, Espanola Valley Women's Health
Angela Moreno, Indigenous Women's Health Program
Penelope McMullen, Sisters of the Loretto
Greg Mello, Los Alamos Study Group
Aaron Tovish, Mayors for Peace
James Baird, Jr., New Mexico Conference of Churches
Menice S. Manzanares, Executive Director, Northern New Mexico Citizens' Advisory Board
Jay Coghlan, Nuclear Watch New Mexico
Scott Kovac, Nuclear Watch New Mexico
Geoffrey Petrie, Nuclear Watch New Mexico
John Witham, Nuclear Watch New Mexico
Ralph Hutchison, Oak Ridge Environmental Peace Alliance
Bud Ryan, Pax Christi New Mexico
Peggy Prince, Peace Action New Mexico
Dr. James Leehan, Peace and Justice Community New Mexico Conference of Churches
Edwin Fernandez, Penasco Area Communities Association, Inc.
LeRoy Moore, Ph.D., Rocky Mountain Peace and Justice Center
Juan Montes, Rural Alliance for Military Accountability
Bernard Foy, Sangre de Cristo Audubon Society
Kathryn Sherlock, Ph.D., Santa Fe RESULTS

Bonnie Bonneau, Segrons of Giving Sight
Liz Woodruff, Snake River Alliance
Don Hancock, Southwest Research and Information Center
William Paul Robinson, Southwest Research and Information Center
Ann Hunkins, Tewa Women United Environmental Justice Focus Group
Kathy Sanchez, Tewa Women United
Beata Tsosie-Pena, Tewa Women United Environmental Justice Program
Alice Roos, The Sanctuary Foundation
Alicia Dressman, Think Outside the Bomb National Youth Network
Marylia Kelley, Tri-Valley CAREs
Scott Yundt, Tri-Valley CAREs
Jennette Bando, Una Resolana/TWU's Env. Justice Focus Group
David Garcia, Una Resolana
Enrique Martinez, Una Resolana
Luis Pena, Una Resolana
Rosalia Triana, Una Resolana

Individuals

David Bacon
Jody Benson
Brenda Blume
James Cobble
Aurora Craig-McBride
Jackie Dulle
Lisa Fox
B. Foy
Richard Geddes
John Geddie
Stephen Gilbert
Jeanne Green
Linda Hibbs
Stephanie Hiller
Marilyn Hoff
Dee Homans
Cynthia Jaramillo
Katharine Kagel
Suzy Kane
John Klingel
Bruce Krasnow
Erich Kuerschner
Melissa Larson
Elizabeth Lerer
Francine Lindberg
Donald Machen
Gerald Maestas
Peter McCarthy
Doug McClellen
Sarah Meyer
Betsy Millard
Marian Naranjo
Jean Nichols
John Otter
Phil Parker
Ruth Parrish
Adam Rankin
Steven Reneau
Liana Sanchez
Sharon Scarlett
Elliott Skinner
Steve Stoddard
Elana Sue St. Pierre
Cathie Sullivan
Jeff Tollefson
David Torney
Alice Rebekah Twocrows
Bob Walsh
Robert Watt
Astrid Webster

CHAPTER 10
INDEX

10 INDEX

N

P

R

S

T

W

APPENDIX A
FEDERAL REGISTER NOTICES

This appendix presents *Federal Register* notices related to this *Draft Supplemental Environmental Impact Statement for the Nuclear Facility Portion of the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, New Mexico (CMRR-NF SEIS).* They include Records of Decision from previous programmatic, site-wide, and project-specific environmental impacts statements, as well as notices related to the current SEIS. The following *Federal Register* notices are included:

75 FR 67711	Extension of Scoping Period for the Supplemental Environmental Impact Statement for the Nuclear Facility Portion of the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, NM
75 FR 60745	Notice of Intent to Prepare a Supplemental Environmental Impact Statement for the Nuclear Facility Portion of the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, NM
74 FR 33232	Record of Decision: Site-Wide Environmental Impact Statement for the Continued Operation of Los Alamos National Laboratory, Los Alamos, NM
73 FR 77644	Record of Decision for the Complex Transformation Supplemental Programmatic Environmental Impact Statement—Operations Involving Plutonium, Uranium, and the Assembly and Disassembly of Nuclear Weapons
73 FR 55833	Record of Decision: Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory, Los Alamos, NM
69 FR 6967	Record of Decision: Final Environmental Impact Statement for the Chemistry and Metallurgy Research Building Replacement Project, Los Alamos National Laboratory, Los Alamos, NM

DEPARTMENT OF ENERGY

Extension of Scoping Period for the Supplemental Environmental Impact Statement for the Nuclear Facility Portion of the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, NM

AGENCY: National Nuclear Security Administration, U.S. Department of Energy.

ACTION: Notice; extension of scoping period.

SUMMARY: On October 1, 2010, the National Nuclear Security Administration (NNSA), a semi-autonomous agency within the U.S. Department of Energy (DOE), published a notice of intent to prepare the *Supplemental Environmental Impact Statement for the Nuclear Facility Portion of the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, New Mexico* (CMRR–NF SEIS; DOE/EIS–0350–S1). That notice stated that the scoping period would continue until November 1, 2010. NNSA has extended the public scoping period through November 16, 2010.

ADDRESSES: Written comments or suggestions concerning the scope of the CMRR–NF SEIS, or requests for more information on the SEIS and public scoping process, should be directed to: Mr. John Tegtmeier, CMRR–NF SEIS Document Manager, U.S. Department of Energy, National Nuclear Security Administration, Los Alamos Site Office, 3747 West Jemez Road, TA–3 Building 1410, Los Alamos, New Mexico, 87544; facsimile at 505–667–5948; or e-mail at: *NEPALASO@doeal.gov.* Mr. Tegtmeier may also be reached by telephone at 505–665–0113. Additionally, may record their comments, ask questions concerning the EIS, or request to be placed on the EIS mailing or document distribution list by leaving a message on the SEIS Hotline at (toll free) 1–877–427–9439. The Hotline will provide instructions on how to record comments and requests.

FOR FURTHER INFORMATION CONTACT: For general information on the NNSA NEPA process, please contact: Ms. Mary Martin (NA–56), NNSA NEPA Compliance Officer, U.S. Department of Energy, 1000 Independence Avenue, SW., Washington, DC 20585, or telephone 202–586–9438.

For general information concerning the DOE NEPA process, contact: Ms. Carol M. Borgstrom, Director, Office of NEPA Policy and Compliance (GC–54), U.S. Department of Energy, 1000 Independence Avenue, SW., Washington, DC 20585; (202) 586–4600; leave a message at (800) 472–2756; or send an e-mail to *askNEPA@hq.energy.gov.* Additional information regarding DOE NEPA activities and access to many DOE NEPA documents are available on the Internet through the DOE NEPA Web site at *http://nepa.energy.gov.*

SUPPLEMENTARY INFORMATION: The Council on Environmental Quality's implementing regulations for the National Environmental Policy Act (NEPA) (40 CFR 1502.9[c] [1] and [2]) and DOE's NEPA implementing regulations (10 CFR 1021.314) require the preparation of a supplement to an environmental impact statement (EIS) when there are substantial changes to a proposal or when there are significant new circumstances or information relevant to environmental concerns. DOE may also prepare a supplemental EIS at any time to further the purposes of NEPA. Pursuant to these provisions, the NNSA intends to prepare a supplemental environmental impact statement (SEIS) to assess the potential environmental impacts of the construction and operation of the nuclear facility portion of the Chemistry and Metallurgy Research Building Replacement Project (CMRR–NF) at Los Alamos National Laboratory (LANL), Los Alamos, New Mexico.

On October 1, 2010, NNSA published a notice of intent to prepare the *Supplemental Environmental Impact Statement for the Nuclear Facility Portion of the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE/EIS–0350–S1). That notice stated that the scoping period would continue until November 1, 2010. In response to public requests, NNSA has extended the public scoping period through November 16, 2010. NNSA will consider comments received after this date to the extent practicable as it prepares the Draft CMRR–NF SEIS.

Issued in Washington, DC, on November 1, 2010.

Thomas P. D'Agostino,

Administrator, National Nuclear Security Administration.

[FR Doc. 2010–27864 Filed 11–1–10; 4:15 pm]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

National Nuclear Security Administration

Notice of Intent To Prepare a Supplemental Environmental Impact Statement for the Nuclear Facility Portion of the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, NM

AGENCY: U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA).

ACTION: Notice of intent.

SUMMARY: The Council on Environmental Quality's implementing regulations for the National Environmental Policy Act (NEPA) (40 CFR 1502.9[c][1] and [2]) and DOE's NEPA implementing regulations (10 CFR 1021.314) require the preparation of a supplement to an environmental impact statement (EIS) when there are substantial changes to a proposal or when there are significant new circumstances or information relevant to environmental concerns. DOE may also prepare a supplemental EIS at any time to further the purposes of NEPA. Pursuant to these provisions, the NNSA, a semi-autonomous agency within the DOE, intends to prepare a supplemental environmental impact statement (SEIS) to assess the potential environmental impacts of the construction and operation of the nuclear facility portion of the Chemistry and Metallurgy Research Building Replacement Project (CMRR–NF) at Los Alamos National Laboratory (LANL), Los Alamos, New Mexico.

The CMRR Project, including the CMRR–NF, was the subject of NNSA's *Final Environmental Impact Statement for the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE/EIS–0350; the CMRR EIS) issued in November 2003, and a February 2004 Record of Decision (ROD) (69 FR 6967). Over time, due in large part to detailed site geotechnical investigations, some aspects of the CMRR–NF Project have changed from what was foreseen when the CMRR EIS was prepared. The potential environmental impacts of these proposed changes will be analyzed in the CMRR–NF SEIS.

DATES: NNSA invites stakeholders and members of the public to submit comments and suggestions on the scope of the SEIS during the SEIS scoping period, which starts with the publication of this Notice and will continue for 30 days until November 1, 2010. NNSA will consider all comments received or postmarked by that date in defining the scope of this SEIS. Comments received or postmarked after that date will be considered to the extent practicable. Two public scoping meetings will be held to provide the public with an opportunity to present comments, ask questions, and discuss concerns regarding the SEIS with NNSA officials. Public scoping meetings will be held on October 19, 2010, at the White Rock Town Hall, 139 Longview Drive, White Rock, New Mexico and October 20, 2010, at the Cities of Gold Casino Hotel, Pojoaque, New Mexico. Both meetings will begin at 4 p.m. and end at 7 p.m. The NNSA will publish additional notices regarding the scoping meetings in local newspapers in advance of the scheduled meetings. Any necessary changes will be announced in the local media.

Any agency, state, pueblo, tribe, or unit of local government that desires to be designated a cooperating agency should contact Mr. John Tegtmeier at the address listed below by the closing date of the scoping period.

ADDRESSES: Written comments or suggestions concerning the scope of the CMRR–NF SEIS or requests for more information on the SEIS and public scoping process should be directed to: Mr. John Tegtmeier, CMRR–NF SEIS Document Manager, U.S. Department of Energy, National Nuclear Security Administration, Los Alamos Site Office, 3747 West Jemez Road, TA–3 Building 1410, Los Alamos, New Mexico, 87544; facsimile at 505–667–5948; or e-mail at: *NEPALASO@doeal.gov.* Mr. Tegtmeier may also be reached by telephone at 505–665–0113.

In addition to providing comments at the public scoping meetings, all interested parties are invited to record their comments, ask questions concerning the EIS, or request to be placed on the EIS mailing or document distribution list by leaving a message on the SEIS Hotline at (toll free) 1–877–427–9439. The Hotline will provide instructions on how to record comments and requests.

FOR FURTHER INFORMATION CONTACT: For general information on the NNSA NEPA process, please contact: Ms. Mary Martin (NA–56), NNSA NEPA Compliance Officer, U.S. Department of Energy, 1000 Independence Avenue, SW., Washington, DC 20585, or telephone 202–586–9438. For general information about the DOE NEPA process, please contact: Ms. Carol Borgstrom, Director, Office of NEPA Policy and Compliance (GC–54), U.S. Department of Energy, 1000 Independence Avenue, SW., Washington, DC 20585, telephone 202–586–4600, or leave a message at 1–800–472–2756. Additional information about the DOE NEPA process, an electronic archive of DOE NEPA documents, including those referenced in this announcement, and other NEPA resources are provided at *http://nepa.energy.gov.*

SUPPLEMENTARY INFORMATION: LANL is located in north-central New Mexico, 60 miles north-northeast of Albuquerque, 25 miles northwest of Santa Fe, and 20 miles southwest of Española in Los Alamos and Santa Fe Counties. It is located between the Jemez Mountains to the west and the Sangre de Cristo Mountains and Rio Grande to the east. LANL occupies an area of about 25,600 acres [10,360 hectares] or approximately 40 square miles and is operated for NNSA by a contractor, Los Alamos National Security, LLC. It is a multidisciplinary, multipurpose institution engaged in theoretical and experimental research and development. LANL has been assigned science, research and development, and production mission support activities that are critical to the accomplishment of the NNSA's national security objectives as reflected in the Stockpile Stewardship and Management Programmatic EIS (DOE/EIS–0236) and the Complex Transformation Supplemental Programmatic EIS (DOE/EIS–0236–S4). LANL's main role in NNSA mission objectives includes a wide range of scientific and technological capabilities that support nuclear materials handling, processing and fabrication; stockpile management; materials and manufacturing technologies; nonproliferation programs; research and development support for national defense and homeland security programs; and DOE waste management activities.

The capabilities needed to execute the NNSA mission activities require facilities at LANL that can be used to handle actinides and other radioactive materials in a safe and secure manner. (The actinides are any of a series of 14 chemical elements with atomic numbers ranging from 89 (actinium) through 103 (lawrencium)). Of primary importance are the facilities located within the Chemistry and Metallurgy Research (CMR) Building and the Plutonium Facility (located at Technical Areas (TAs) 3 and 55, respectively), which are used for processing, characterizing, and storage of special nuclear material. (Special nuclear material is defined by the Atomic Energy Act of 1954 as plutonium, uranium-233, or uranium enriched in the isotopes uranium-233 or uranium-235). Most of the LANL mission support functions previously listed require analytical chemistry, material characterization, and actinide research and development support capabilities that currently exist within the CMR Building and are not available elsewhere. Other unique capabilities are located at the adjacent Plutonium Facility. Work is sometimes moved between the CMR Building and the Plutonium Facility to make use of the full suite of capabilities that these two facilities provide. CMR Building operations and capabilities are currently restricted in scope due to safety and security constraints; it cannot be operated to the full extent needed to meet NNSA operational requirements.

The CMR building contains about 550,000 square feet (about 51,100 square meters) of floor space on two floors divided between a main corridor and seven wings. It was constructed in the early 1950s. DOE maintained and upgraded the building over time to provide for continued safe operations. However, beginning in 1997 and 1998, a series of operational, safety, and seismic issues surfaced regarding the long-term viability of the CMR Building. In January 1999, the NNSA approved a strategy for managing operational risks at the CMR Building. The strategy included implementing operational restrictions to ensure safe operations. These restrictions are impacting the assigned mission activities conducted at the CMR Building. This strategy also committed NNSA to develop plans to relocate the CMR capabilities elsewhere at LANL to maintain support of national security and other NNSA missions. The CMRR EIS was prepared and issued in 2003, followed by a ROD in 2004.

The CMRR EIS analyzed four action alternatives: (1) The construction and operation of a new CMRR facility at TA–55; (2) the construction of a new CMRR facility at a "greenfield" location within TA–6; (3) a "hybrid" alternative maintaining administrative offices and support functions at the existing CMR building with a new Hazard Category 2 laboratory facility built at TA–55; and, (4) a "hybrid" alternative with the laboratory facility being constructed at TA–6. The CMRR EIS also analyzed a no action alternative where the existing CMR building would continue to be kept in service. In the 2004 ROD, NNSA announced its decision to implement the preferred alternative (alternative 1): To construct a new CMRR facility which would include a single above-ground, consolidated nuclear material-capable, Hazard Category 2 laboratory building (construction option 3) with a separate, adjacent administrative office and support functions building, now referred to as the CMRR Radiological Laboratory/Utility/Office Building (CMRR RLUOB). Upon completion, the CMRR Facility would replace the CMR Building, operations would be moved to the new CMRR Facility, and the vacated CMR Building would undergo decommissioning, decontamination, and demolition. (While the CMRR RLUOB has been constructed in TA–55 at LANL, the installation of laboratory equipment has not been completed and operations have not begun). Since 2004, the planning process for the construction and operation of the CMRR–NF has continued to progress and take into consideration newly gathered site-specific data and safety and security requirements.

Purpose and Need: The NNSA's purpose and need for proposing the construction and operation of the CMRR–NF have not changed since the CMRR EIS was prepared and issued in 2003. NNSA needs to provide the physical means for accommodating the CMR Building's functional, mission-critical nuclear capabilities, and to consolidate activities for safer and more efficient operations. In the 2003 CMRR EIS, NNSA analyzed the potential environmental impacts associated with the proposed relocation of LANL analytical chemistry (AC) and materials characterization (MC), and associated research and development capabilities that currently exist primarily at the existing CMR building, to a newly constructed facility, and operation of the new facility for the next 50 years. In the May 2008, *Final Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE/EIS–0380), the CMRR was considered and its potential environmental impacts analyzed as a part of the No Action Alternative and each of the action alternatives for continued operation of LANL.

The potential environmental impacts associated with the construction and operation of the CMRR–NF were also analyzed within certain alternatives in the Complex Transformation SPEIS (DOE/EIS–0236–S4) as part of the proposal to reconfigure and streamline NNSA's nuclear security enterprise. NNSA issued two RODs based on the Complex Transformation SPEIS analysis in December 2008. In the SPEIS ROD for operations involving plutonium, uranium, and the assembly and disassembly of nuclear weapons (73 FR 77644), NNSA announced its decision to retain plutonium manufacturing and research and development at LANL, and in support of these activities, to proceed with construction and operation of the CMRR–NF at LANL as essential to its ability to meet national security requirements regarding the nation's nuclear deterrent.

Proposed Action and Alternatives

Proposed Action: The Proposed Action is to construct the CMRR–NF at TA–55. Over time some aspects of the proposed CMRR–NF Project plans have changed. These proposed changes include, for example:

- Changes to the CMRR–NF structure required for seismic safety based on new information from additional geotechnical investigations conducted at the site. These changes involve incorporating additional structural steel and concrete into the building construction and increasing the quantity of material that must be excavated for the building foundation;
- Changes to the infrastructure to support the CMRR–NF construction activities, such as concrete batch plants, construction material lay-down areas and warehouses, and temporary office trailers and parking areas. Some of these changes involve the use of additional acreage. Most of these proposed changes are temporary in duration;
- Changes to the CMRR–NF structure to ensure 10 CFR part 830 nuclear safety basis requirements are met for facility engineering controls to ensure protection of the public, workers, and the environment; and
- Changes to incorporate additional sustainable design principles and environmental conservation measures. These changes minimize the environmental impacts of construction and operation of the CMRR–NF.

The potential environmental impacts of these and similar changes will be analyzed in the CMRR–NF SEIS.

No Action Alternative: The No Action alternative would be the construction of the CMRR–NF and the ancillary and support activities as announced in the 2004 ROD.

CMR Alternative 1: Do not construct a replacement facility to house the capabilities planned for the CMRR–NF. Continue to perform analytical chemistry, material characterization, and actinide research and development activities in the CMR Building, with no facility upgrades, while performing routine maintenance at the level needed to sustain programmatic operations for as long as feasible.

CMR Alternative 2: Same as CMR Alternative 1, but includes making the extensive facility upgrades needed to sustain CMR programmatic operations for another 20 to 30 years.

Preliminary Identification of Environmental Issues. NNSA has tentatively identified the following issues for analysis in this SEIS. Additional issues may be identified as a result of the scoping process.

1. Potential impacts to air, water, soil, visual resources and viewsheds.
2. Potential impacts to plants and animals, and to their habitats, including Federally-listed threatened or endangered species and their critical habitats.
3. Potential impacts from irretrievable and irreversible consumption of natural resources and energy, including transportation issues.
4. Potential impacts to cultural resources, including historical and prehistorical resources and traditional cultural properties.
5. Potential impacts to infrastructure and utilities.
6. Potential impacts to socioeconomic conditions.
7. Potential environmental justice impacts to minority and low-income populations.
8. Potential cumulative impacts from the Proposed Action and alternatives together with other past, present, and reasonably foreseeable actions at LANL.

CMRR–NF SEIS Preparation Process: The scoping process for a NEPA document is an opportunity for the public to assist the NNSA in determining the alternatives and issues for analysis. Alternatives may be added, deleted, or modified as a result of scoping. The purpose of the scoping meetings is to receive oral and written comments from the public. The meetings will use a format to facilitate dialogue between NNSA and the public and will be an opportunity for individuals to provide written or oral statements. NNSA welcomes specific comments or suggestions on the content of these alternatives, or on other alternatives that should be considered. The above list of issues to be considered in the SEIS analysis is tentative and is intended to facilitate public comment on the scope of the SEIS. It is not intended to be all-inclusive, nor does it imply any predetermination of potential impacts. The CMRR–NF SEIS will describe the potential environmental impacts of the alternatives, using available data where possible and obtaining additional data where necessary. Copies of written comments and transcripts of oral comments will be available as soon as practicable after the public scoping meeting on the Internet at: *http://www.doeal.gov/laso/NEPADocuments.aspx.*

Following the scoping period announced in this Notice of Intent, and after consideration of comments received during scoping, NNSA will prepare a *Draft Supplemental Environmental Impact Statement for the Construction of the Chemistry and Metallurgy Replacement Project's Nuclear Facility at Technical Area-55 Within Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE/EIS–0350–S1). Comments received on the Draft SEIS during the planned 45-day comment period will be considered and addressed in the Final SEIS, which NNSA anticipates issuing by July 2011. NNSA will issue a ROD no sooner than 30 days after publication by the Environmental Protection Agency of a Notice of Availability of the Final SEIS.

Issued in Washington, DC, this 28th day of September 2010.

Thomas P. D'Agostino,

Administrator, National Nuclear Security Administration.

[FR Doc. 2010–24681 Filed 9–30–10; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

National Nuclear Security Administration

Record of Decision: Site-Wide Environmental Impact Statement for the Continued Operation of Los Alamos National Laboratory, Los Alamos, NM

AGENCY: National Nuclear Security Administration, U.S. Department of Energy.

ACTION: Record of decision.

SUMMARY: The National Nuclear Security Administration (NNSA), a separately organized agency within the U.S. Department of Energy (DOE), is issuing this Record of Decision (ROD) for the continued operation of the Los Alamos National Laboratory (LANL) in Los Alamos, New Mexico, pursuant to the *Final Site-Wide Environmental Impact Statement for the Continued Operation of Los Alamos National Laboratory, Los Alamos, New Mexico,* DOE/EIS–0380 (SWEIS) (73 FR 28453, May 16, 2008). This ROD is the second ROD based on the information and analyses contained in the SWEIS and other factors, including comments received on the SWEIS, costs, technical and security considerations, and the missions of NNSA. These decision factors also include results from the analyses in the October 24, 2008, *Final Complex Transformation Supplemental Programmatic Environmental Impact Statement* (DOE/EIS–0236–S4, 73 FR 63460) (Complex Transformation SPEIS) and its two RODs (73 FR 77644, 73 FR 77656, December 19, 2008). NNSA issued the first ROD for the continued operation of LANL based on the SWEIS (73 FR 55833) on September 26, 2008.

In the LANL SWEIS, NNSA analyzed three alternatives for the continued operation of LANL: (1) No Action, (2) Reduced Operations, and (3) Expanded Operations. NNSA identified the Expanded Operations Alternative as its Preferred Alternative.

For this second ROD, NNSA continues to select the No Action Alternative, announced in the 2008 ROD as its decision for continuing the operation of LANL, and has decided to implement additional elements of the Expanded Operations Alternative. Specific projects that will be implemented under this ROD are: (1) Complete the environmental remediation and closure of Technical Area 18 (TA–18) Pajarito Site; (2) complete the environmental remediation and closure of TA–21 (also referred to as the Delta Prime or DP Site); (3) refurbish the Plutonium Facility Complex at TA–55; (4) construct and operate a new Radioactive Liquid Waste Treatment Facility in TA–50 and operate a zero liquid discharge facility in TA–52 as an auxiliary action; (5) install additional processors and equipment to further expand the capabilities and operation level of the Nicholas C. Metropolis Center for Modeling and Simulation in TA–3; and (6) construct and operate a new Science and Engineering Complex at TA–62. These projects and the changes in operations associated with them are needed to support DOE and NNSA missions; to maintain and improve the safety and security of existing capabilities at LANL; and to further LANL intra-site facility consolidation. Decisions that NNSA is announcing in this ROD will not change the plutonium pit production throughput capability at LANL (20 plutonium pits per year), nor will they influence or be impacted by future decisions that may be made based on the upcoming Nuclear Posture Review.[1]

FOR FURTHER INFORMATION CONTACT: For copies of the SWEIS, the 2008 SWEIS ROD or this ROD, or to receive further information about other issues regarding the Los Alamos Site Office's National Environmental Policy Act (NEPA) compliance program, contact: Mr. George J. Rael, Assistant Manager Environmental Operations, NEPA Compliance Officer, U.S. Department of Energy, National Nuclear Security Administration, Los Alamos Site Office, 3747 West Jemez Road, Los Alamos, NM

[1] The Nuclear Posture Review is a congressionally mandated comprehensive review of U.S. nuclear deterrence policy and strategy that the Secretary of Defense will conduct in consultation with the Secretary of Energy and the Secretary of State. The requirement for this review can be found in the National Defense Appropriations Act for 2008, Public Law 110–181.

87544. Mr. Rael may be contacted by telephone at (505) 665–5658, or by e-mail at LASO.SWEIS@doeal.gov. For information on the DOE NEPA process, contact: Ms. Carol M. Borgstrom, Director, Office of NEPA Policy and Compliance (GC–20), U.S. Department of Energy, 1000 Independence Avenue, SW., Washington, DC 20585, (202) 586–4600, or leave a message at (800) 472–2756. Additional information regarding DOE NEPA activities and access to many DOE NEPA documents, including those referenced in this ROD, are available on the Internet through the DOE NEPA Web site at *http://www.gc.energy.gov/nepa/*.

SUPPLEMENTARY INFORMATION:

Background

NNSA prepared this ROD pursuant to the regulations of the Council on Environmental Quality (CEQ) for implementing NEPA (40 CFR parts 1500–1508) and DOE's NEPA Implementing Procedures (10 CFR part 1021). Decisions presented in this second ROD are based on information and analysis contained in the SWEIS (including a classified appendix that assesses the potential environmental impacts of a representative set of credible intentional destructive acts that include terrorism scenarios) (73 FR 28453, May 16, 2008), comments received on the Final SWEIS; NNSA's two December 19, 2008, RODs resulting from information and analysis contained in the Complex Transformation SPEIS (73 FR 77644, 73 FR 77656); and other factors, including costs, technical and security considerations, and the missions of NNSA.

LANL is a multidisciplinary, multipurpose research institution in north-central New Mexico, about 60 miles (97 kilometers) north-northeast of Albuquerque, and about 25 miles (40 kilometers) northwest of Santa Fe. LANL occupies about 25,600 acres (10,360 hectares), or approximately 40 square miles (104 square kilometers). About 2,000 structures with approximately 8.6 million square feet under roof serve to house LANL operations and activities, with about half the square footage used as laboratory or production space, and the remaining half used for administrative, storage, service, and other purposes.

LANL is one of three national security laboratories within NNSA's Nuclear Security Enterprise. The main role of LANL in the fulfillment of NNSA and DOE missions is scientific and technological work that supports nuclear materials handling and processing, and weapons component fabrication; stockpile management; materials and manufacturing technologies; nonproliferation programs; and waste management activities. LANL plays a key role in providing stewardship for the nation's nuclear stockpile that includes manufacturing some nuclear weapons components, such as plutonium pits. In addition to weapons component manufacturing, LANL performs weapons component testing, stockpile assurance, component replacement, surveillance, and maintenance. Research and development activities at LANL include high explosives processing, chemical research, nuclear physics research, materials science research, systems analysis and engineering, human genome mapping, biotechnology applications, and remote sensing technologies. Work at LANL is also conducted for other Federal agencies such as the Departments of Defense and Homeland Security, as well as for universities, institutions, and private entities.

The alternatives evaluated in the SWEIS span a range of potential operations from minimum levels that would maintain essential mission support capabilities (Reduced Operations Alternative), through the highest reasonably foreseeable levels that could be supported by current facilities or new facilities (Expanded Operations Alternative). The No Action Alternative analyzed in the SWEIS is essentially a continuation of current operations based on previous NEPA analyses and decisions, including the 1999 LANL SWEIS (DOE/EIS–0238, January 1999) and its ROD (64 FR 50797, September 20, 1999). The Reduced Operations and Expanded Operations Alternatives analyzed in the SWEIS are reductions or expansions of the level of operations for the No Action Alternative. As a matter of convenience, actions associated with implementing the March 2005 LANL Compliance Order on Consent (Consent Order) with the State of New Mexico [2] are only analyzed in the Expanded Operations Alternative. However, NNSA stated in the SWEIS that DOE intends to implement actions necessary to comply with the Consent Order, regardless of decisions it makes on other actions analyzed in the LANL SWEIS.

The 2008 SWEIS ROD announced NNSA's decision to continue to implement the No Action Alternative with certain elements of the Expanded Operations Alternative. These specific elements were: (1) Continuing to implement actions necessary to comply with the Consent Order, which requires investigation and remediation of environmental contamination at LANL; (2) broadening the types and quantities of radioactive sealed sources for isotopes of Cobalt, Iridium, Californium and Radium, (Co-60, Ir-192, Cf-252, Ra-226), that LANL will manage and store prior to disposal; (3) expanding the capabilities and operational level of the Nicholas C. Metropolis Center for Modeling and Simulation to support the Roadrunner super computing platform; (4) performing research regarding beryllium detection and mitigation measures; (5) retrieving and disposing of about 3,100 cubic yards of contact-handled and 130 cubic yards of remote-handled legacy transuranic (TRU) waste from below-ground storage; (6) planning, design, construction, and operation of the Waste Management Facilities Transition projects to facilitate actions required by the Consent Order; (7) repairing and replacing mission critical cooling system components for buildings in Technical Area–55 (TA–55); and (8) completing final design of a new Radioactive Liquid Waste Treatment Facility, and designing and constructing the zero liquid discharge facility auxiliary component of the new treatment facility.

NNSA has previously announced its determination that the Expanded Operations Alternative is both its Preferred Alternative and the Environmentally Preferred Alternative. Considering the many aspects of the alternatives analyzed in the SWEIS, and looking out over the long term, NNSA believes that the implementation of changes analyzed in the Expanded Operations Alternative would allow it to best achieve both its mission and environmental responsibilities. Under this alternative, NNSA would be better positioned to minimize the use of electricity and water; streamline operations through consolidation; replace older laboratory and production facilities with new buildings that incorporate modern safety, security, and energy efficiency standards improving NNSA's ability to protect human health; reduce the "footprint" of LANL as a whole; and allow some areas to return to a natural state.

NNSA published as Volume 3 of the SWEIS all comments received on the

[2] The March 2005 LANL Compliance Order on Consent was issued pursuant to the New Mexico Hazardous Waste Act and entered into by the State of New Mexico, the Department of Energy and its Management and Operating Contractor to address requirements concerning certain groundwater contaminants toxic pollutants and explosive compounds. The Consent Order may be viewed at *http://www.lanl.gov/environment/compliance/consent_order.shtml.*

Draft SWEIS together with NNSA's responses, and discussions of how comments resulted in changes to the document. The 2008 SWEIS ROD included a detailed discussion of the comments received on the Final SWEIS, and will not be repeated here. In response to the concern raised by several of the commenters that proceeding with an increase in plutonium pit production at this time would be premature, NNSA agrees that making decisions at this time on future plutonium pit production levels is premature, and will delay making any decisions in this area until after the completion of the upcoming Nuclear Posture Review. Decisions that NNSA is announcing in this ROD will not change the 20 plutonium pits per year level of plutonium pit production throughput capability established in the 1999 LANL SWEIS ROD.

On December 19, 2008, NNSA issued two RODs based in part on the Complex Transformation SPEIS for the continued transformation of the nuclear weapons complex. One ROD addressed the implementation of programmatic alternatives involving plutonium, uranium, and the assembly and disassembly of nuclear weapons (73 FR 77644). The other announced the implementation of project-specific alternatives involving tritium research and development, flight test operations, and major environmental test facilities (73 FR 77656). NNSA's programmatic decision to retain and consolidate plutonium pit manufacturing and research and development work at LANL means that special nuclear materials and work performed with plutonium will be consolidated from some of the other NNSA sites to LANL. This decision supports the transformation of the nuclear weapons complex into a smaller, more efficient nuclear security enterprise that can respond to changing national security challenges and ensure the long-term safety, security, and reliability of the nuclear weapons stockpile. Two of NNSA's project-specific decisions also directly affect LANL operations: (1) The consolidation of tritium research and operations at the Savannah River Site, which reduces tritium operations at LANL; and (2) the consolidation of major environmental test facilities at Sandia National Laboratories/New Mexico, which closes four facilities at LANL.

Basis for Decision

In this second ROD, NNSA is announcing its decision to continue to implement the No Action Alternative with the addition of elements from the Expanded Operations Alternative of the SWEIS. NNSA has also decided that it will now implement additional elements from the Expanded Operations Alternative that complement the actions taken under the 2008 SWEIS ROD. These additional elements collectively include increases in the operation of some existing facilities and the implementation of a limited number of additional new facility projects needed to support ongoing stockpile stewardship and environmental closure and remediation programs; to enhance nuclear safety and security; and to provide modern features for the protection of workers and the environment. NNSA will continue to undertake intra-site consolidation of operations and activities to reduce the physical "footprint" of LANL and improve efficiency and address the LANL Land Transfer requirements of Public Law 105–119. NNSA also will continue to coordinate with the DOE's Office of Environmental Management to execute environmental closure and remediation actions including major material disposal area (MDA) remediation, canyon cleanups and all activities necessary to meet Consent Order requirements, the LANL Federal Facility Compliance Agreement, and DOE commitments regarding the use of resources provided through the American Recovery and Reinvestment Act of 2009 (ARRA) (Pub. L. 111–5).

Environmental Impacts Associated With Decisions

In making the decisions announced in this ROD, NNSA considered the potential impacts for normal operations (those operations without accidents or intentional destructive acts) as well as impacts analyzed in the SWEIS from potential accidents and intentional destructive acts, including credible terrorism scenarios, on workers and surrounding populations, as it did in developing the 2008 ROD. NNSA also evaluated the potential impacts associated with the irreversible or irretrievable commitments of resources, and the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity. These analyses and results are described in the Summary and Chapters 4 and 5 of the SWEIS. Additional project specific analyses are included in the Appendices to the SWEIS.

Decisions

Operations at LANL provide a wide range of scientific and technological capabilities for NNSA's National Nuclear Security Enterprise (Nuclear Weapons Complex). NNSA's decisions are based on its current and anticipated mission responsibilities and its need to continue to operate LANL in a manner that allows NNSA to efficiently and effectively fulfill its mission responsibilities in an environmentally protective and fiscally prudent manner. The need for the decisions identified in this ROD exists regardless of any future decisions that may be made about the level of plutonium pit production at LANL. National security policies and related laws require NNSA to maintain the Nation's nuclear weapons stockpile, as well as its core competencies in nuclear weapons. The nuclear facilities at LANL are essential to NNSA's ability to execute this core program and to support NNSA's aggressive and far-reaching nuclear non-proliferation efforts. The changes in operations and new projects announced in this ROD are needed to fulfill NNSA and DOE mission responsibilities and meet various requirements that have arisen since 1999, and are consistent with recent decisions regarding the nuclear weapons complex transformation.

Consistent with the decisions announced in the first ROD under the SWEIS, NNSA and DOE's Office of Environmental Management will continue to implement actions required by the March 2005 Consent Order along with other activities needed for environmental cleanup at LANL:

(1) Analytical chemistry sample processing, waste management activities such as waste characterization operations and waste processing, storage and transportation actions, as well as waste disposal at appropriate waste disposal facilities located both on-site and off-site; (2) the clearing of site vegetation; (3) decontamination, decommissioning and demolition (DD&D) of structures and buildings with priority to those that must be removed to reach buried contamination; (4) exhumation of buried contamination; (5) exhumation and transportation of soil and rock from on-site borrow pits; (6) construction of roads to reach sites with heavy equipment, lay-down areas for equipment and materials and waste storage and staging, and parking sites to meet the needs of vehicles involved in transporting wastes, equipment and materials; and (7) delineation and fencing of clean-up sites.

Environmental cleanup projects that will be undertaken and completed under this ROD include:

- Completing the remediation and closure of TA–18 Pajarito Site. This would include relocating remaining operations to existing facilities within LANL, performing the DD&D of existing site structures and completing remediation of the TA–18 canyon-bottom site.

• Completing the remediation and closure of TA–21 Delta Prime (DP) Site with an emphasis on DD&D and environmental remediation of MDAs. This would include the DD&D of the TA–21 buildings. Those structures that cover or could interfere with activities to investigate and remediate MDAs and other potential release sites under the Consent Order would be given priority. Both DP West and DP East facilities will undergo DD&D and thorough characterization, decontamination, and demolition, with waste disposal dependent on facility characterization information. The underlying waste sites can then be properly investigated, considered for corrective actions that may be required under the Consent Order and remediated as appropriate.

The NNSA has also decided to implement the additional projects specified in this ROD that involve the design, construction and operation of new replacement buildings, and the renovation of certain existing facilities. This decision includes the implementation of all associated actions needed to facilitate construction or renovation projects, including those related to the transfer of operations, and those necessary for the DD&D of spaces vacated by moving existing facilities. These projects are part of the vision that NNSA has established for the future Nuclear Security Enterprise.

NNSA's vision for the future remains a smaller, safer, more secure and less expensive enterprise that leverages the scientific and technical capabilities of its workforce to meet all our national security requirements. The specific projects that NNSA has decided to implement are:

• Refurbish the Plutonium Facility Complex (PF–4) at TA–55: This refurbishment project consists of seven subprojects that either replace or upgrade obsolete and/or worn-out facility components/safety systems or address regulatory-driven requirements at the PF–4 building in TA–55. Replacement and maintenance of critical infrastructure and safety systems is necessary to ensure the reliability of this facility and compliance with safety and regulatory requirements.

• Construct and operate a new Radioactive Liquid Waste Treatment Facility, (RLWTF), at TA–50 together with the operation of a zero liquid discharge facility at TA–52 as an auxiliary action: These actions replace/restore an existing capability at LANL for processing radioactive liquid wastes. The existing RLWTF at TA–50 is the only facility available at LANL to treat a broad range of transuranic and low-level radioactive liquid wastes. It is an aging facility (over 40 years old) that has exceeded its design life.

• Install additional processors and equipment as necessary to further expand the capabilities and operation level of the Nicholas C. Metropolis Center for Modeling and Simulation at TA–3: These actions will be undertaken to support future operations up to the level of operations analyzed in the SWEIS as attainable through the consumption of a maximum electric power use of 15 megawatts, and a maximum potable water use of 51 million gallons per year. Calculations performed at the Nicholas C. Metropolis Center support the continued certification of the nuclear weapons stockpile without conducting underground nuclear tests, and also support research on global energy challenges and other scientific issues.

• Construct and operate a new Science and Engineering Complex at TA–62 (analyzed as the Science Complex Option 1 in Appendix G of the SWEIS): This action consolidates offices and light laboratories currently located in several outmoded structures at LANL into a new, state-of-the-art facility of approximately 400,000 gsf. It would support scientific research activities in both basic and applied sciences. Execution of this project would be accompanied by DD&D of excess structures at LANL.

The NNSA will implement changes to operational levels at existing facilities and install new infrastructure analyzed as part of the Expanded Operations Alternative that support decisions announced in this ROD, the 2008 SWEIS ROD and the two SPEIS RODs. The changes to on-going operational levels at existing facilities (and their replacement facilities) include: (1) Changes and increases to the capabilities for waste storage, characterization, packaging, and labeling at solid and liquid radioactive waste and chemical waste management and treatment facilities to support the processing and disposition of transuranic, low-level and mixed low-level radioactive waste, and chemical waste from site DD&D activities; and (2) the performance of site assessments, soil remediation, and the enhancement of field capabilities to support of environmental remediation and risk mitigation at LANL.

Mitigation Measures

As described in the SWEIS, NNSA and LANL operate pursuant to a number of Federal laws including environmental laws, DOE Orders, and Federal, State, and local controls, and agreements. Many of these mandate actions that serve to mitigate potential adverse environmental impacts. A Los Alamos Mitigation Action Plan (MAP) for the SWEIS RODs has been issued and will be reviewed and updated as necessary to implement this ROD. As discussed in the 2008 ROD, this MAP contains a summary of all commitments for LANL that are either underway or will be initiated. These commitments include such actions as continued forest management efforts, trail management efforts, and implementation of a variety of site sampling and monitoring measures, as well as additional measures to reduce potable water use and pollutant emissions and implement resource conservation initiatives.

In addition, with respect to concerns raised by the Santa Clara Pueblo, as discussed in the 2008 ROD, NNSA will continue its efforts to support the Pueblo and other tribal entities in matters of human health and will participate in various intergovernmental efforts to protect indigenous practices and locations of concern. NNSA will conduct government-to-government consultations with the Pueblo and other tribal entities to incorporate these matters into the MAP.

Issued at Washington, DC, this 29 day of June 2009.

Thomas P. D'Agostino,

Administrator, National Nuclear Security Administration.

[FR Doc. E9–16343 Filed 7–9–09; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

Record of Decision for the Complex Transformation Supplemental Programmatic Environmental Impact Statement—Operations Involving Plutonium, Uranium, and the Assembly and Disassembly of Nuclear Weapons

AGENCY: National Nuclear Security Administration, U.S. Department of Energy.

ACTION: Record of decision.

SUMMARY: The National Nuclear Security Administration (NNSA), a separately organized agency within the U.S. Department of Energy (DOE), is issuing this Record of Decision (ROD) for the continued transformation of the nuclear weapons complex (Complex). This ROD is based on information and analyses contained in the *Complex Transformation Supplemental Programmatic Environmental Impact Statement* (SPEIS) (DOE/EIS–0236–S4) issued on October 24, 2008 (73 FR 63460); comments received on the SPEIS; other NEPA analyses as noted; and other factors, including cost, technical and security considerations, and the missions of NNSA. The SPEIS analyzes the potential environmental impacts of alternatives for transforming the nuclear weapons complex into a smaller, more efficient enterprise that can respond to changing national security challenges and ensure the long-term safety, security, and reliability of the nuclear weapons stockpile.

The alternatives analyzed in the SPEIS are divided into two categories: programmatic and project-specific. Programmatic alternatives involve the restructuring of facilities that use or store significant (i.e., Category I/II) quantities of special nuclear material (SNM).[1] These facilities produce plutonium components (commonly called pits [2]), produce highly enriched uranium (HEU) components (including secondaries [3]), fabricate high explosives (HE) components, and assemble and disassemble nuclear weapons. The decisions announced in this ROD relate to the programmatic alternatives analyzed in the SPEIS. NNSA is issuing a separate ROD relating to the project-specific alternatives.

NNSA has decided to implement its preferred programmatic alternative as described in the SPEIS and summarized in this ROD. This decision will transform the plutonium and uranium manufacturing aspects of the complex into smaller and more efficient operations while maintaining the capabilities NNSA needs to perform its national security missions. The three major elements of the decisions announced in this ROD are:

(1) Manufacturing and research and development (R&D) involving plutonium will remain at the Los Alamos National Laboratory (LANL) in New Mexico. To support these activities, NNSA will construct and operate the Chemistry and Metallurgy Research Replacement–Nuclear Facility (CMRR–NF) at LANL as a replacement for portions of the Chemistry and Metallurgy Research (CMR) facility, a structure that is more than 50 years old

[1] As defined in section 11 of the *Atomic Energy Act of 1954*, special nuclear material is: (1) Plutonium, uranium enriched in the isotope 233 or in the isotope 235 and any other material which the U.S. Nuclear Regulatory Commission determines to be special nuclear material; or (2) any material artificially enriched by any of the foregoing. Special nuclear material is separated into Security Categories I, II, III, and IV based on the type, attractiveness level, and quantity of the material. Categories I and II require the highest level of security.

[2] A pit is the central core of a nuclear weapon, principally made of plutonium or enriched uranium.

[3] A secondary is the component of a nuclear weapon that contains elements needed to initiate the fusion reaction in a thermonuclear explosion.

and faces significant safety and seismic challenges to its continued operation.

(2) Manufacturing and R&D involving uranium will remain at the Y–12 National Security Complex in Tennessee. NNSA will construct and operate a Uranium Processing Facility (UPF) at Y–12 as a replacement for existing facilities that are more than 50 years old and face significant safety and maintenance challenges to their continued operation.

(3) Assembly and disassembly of nuclear weapons and high explosives production and manufacturing will remain at the Pantex Plant in Texas.

These decisions will best enable NNSA to meet its statutory mission while minimizing technical risks, risks to mission objectives, costs, and environmental impacts. These decisions continue the transformation begun following the end of the Cold War and the cessation of nuclear weapons testing, particularly decisions announced in the 1996 ROD for the *Programmatic Environmental Impact Statement for Stockpile Stewardship and Management* (SSM PEIS) (DOE/EIS–0236) (61 FR 68014; Dec. 26, 1996). This ROD explains why NNSA is making these programmatic decisions, why it is appropriate to make them at this time, and the flexibility NNSA has to adapt these decisions as needed in response to any changes in national security requirements that may occur in the near term.

FOR FURTHER INFORMATION CONTACT: For further information on the Complex Transformation SPEIS or this ROD, or to receive copies of these, contact: Ms. Mary E. Martin, NNSA NEPA Compliance Officer, Office of Environmental Projects and Operations, NA–56, U.S. Department of Energy, 1000 Independence Avenue, SW., Washington, DC 20585, toll free 1–800–832–0885 ext. 69438. A request for a copy of the SPEIS or this ROD may be sent by facsimile to 1–703–931–9222, or by e-mail to *complextransformation@nnsa.doe.gov*. The SPEIS, this ROD, the project-specific ROD, and additional information regarding complex transformation are available at *http://www.ComplexTransformationSPEIS.com* and *http://www.nnsa.doe.gov*.

For information on DOE's NEPA process, contact: Ms. Carol M. Borgstrom, Director, Office of NEPA Policy and Compliance (GC–20), U.S. Department of Energy, 1000 Independence Avenue, SW., Washington, DC 20585, 202–586–4600, or leave a message at 800–472–2756. Additional information regarding DOE NEPA activities and access to many DOE NEPA documents are available through the DOE NEPA Web site at: *http://www.gc.energy.gov/NEPA*.

SUPPLEMENTARY INFORMATION:

Background

NNSA prepared this ROD pursuant to the regulations of the Council on Environmental Quality (CEQ) for implementing the *National Environmental Policy Act* (NEPA) (40 CFR Parts 1500–1508) and DOE's NEPA Implementing Procedures (10 CFR Part 1021). This ROD is based on information and analyses contained in the *Complex Transformation Supplemental Programmatic Environmental Impact Statement* (SPEIS) (DOE/EIS–0236-S4) issued on October 24, 2008 (73 FR 63460); comments received on the SPEIS; other NEPA analyses as noted; other factors, including cost, technical and security considerations, and the missions of NNSA. NNSA received approximately 100,000 comment documents on the Draft SPEIS from Federal agencies; state, local, and tribal governments; public and private organizations; and individuals. In addition, during the 20 public hearings that NNSA held, more than 600 speakers made oral comments.

National security policies require DOE, through NNSA, to maintain the United States' nuclear weapons stockpile, as well as the nation's core competencies in nuclear weapons. Since completing the SSM PEIS and associated ROD in 1996, DOE has pursued these objectives through the Stockpile Stewardship Program. This program emphasizes development and application of greatly improved scientific and technical capabilities to assess the safety, security, and reliability of existing nuclear warheads without nuclear testing. Throughout the 1990s, DOE also took steps to consolidate the Complex to its current configuration of three national laboratories (and a flight test range operated by Sandia National Laboratories), four industrial plants, and a nuclear test site. This Complex enables NNSA to design, develop, manufacture, maintain, and repair nuclear weapons; certify their safety, security, and reliability; conduct surveillance on weapons in the stockpile; store Category I/II SNM; and dismantle and disposition retired weapons. Sites within the Complex and their current weapons program missions are described in the following paragraphs.

Lawrence Livermore National Laboratory (LLNL), Livermore, California—LLNL conducts research, design, and development of nuclear weapons; designs and tests advanced technology concepts; provides safety, security, and reliability assessments and certification of stockpile weapons; conducts plutonium and tritium R&D, hydrotesting, HE R&D and environmental testing; and stores Category I/II quantities of SNM. LLNL also conducts destructive and nondestructive surveillance evaluations on pits to evaluate their reliability. NNSA is currently removing Category I/II SNM from the site and by 2012 LLNL will not maintain these categories of SNM. NNSA is constructing the National Ignition Facility (NIF) at LLNL, which will allow a wide variety of high-energy-density investigations. NIF is scheduled to begin operations in 2009.

Los Alamos National Laboratory (LANL), Los Alamos, New Mexico—LANL conducts research, design, and development of nuclear weapons; designs and tests advanced technology concepts; provides safety, security, and reliability assessments and certification of stockpile weapons; maintains production capabilities for limited quantities of plutonium components (i.e., pits) for delivery to the stockpile; manufactures nuclear weapon detonators for the stockpile; conducts plutonium and tritium R&D, hydrotesting, HE R&D and environmental testing; and stores Category I/II quantities of SNM. LANL also conducts destructive and nondestructive surveillance evaluations on pits to assess their reliability.

Nevada Test Site (NTS), 65 miles northwest of Las Vegas, Nevada—NTS maintains the capability to conduct underground nuclear testing; conducts high hazard experiments involving nuclear material and high explosives; provides the capability to process and dispose of a damaged nuclear weapon or improvised nuclear device; conducts non-nuclear experiments; conducts hydrodynamic testing and HE testing; conducts research and training on nuclear safeguards, criticality safety, and emergency response; and stores Category I/II quantities of SNM.

Pantex Plant (Pantex), Amarillo, Texas—Pantex dismantles retired weapons; fabricates HE components, and performs HE R&D; assembles HE, nuclear, and non-nuclear components into nuclear weapons; repairs and modifies weapons; performs nonintrusive pit modification;[4] and evaluates and performs surveillance of weapons. Pantex stores Category I/II

[4] Nonintrusive pit modification involves changes to the external surfaces and features of a pit.

quantities of SNM for the weapons program and stores other SNM in the form of surplus plutonium pits pending transfer to SRS for disposition.

Savannah River Site (SRS), Aiken, South Carolina—SRS extracts tritium and performs loading, unloading, and surveillance of tritium reservoirs, and conducts tritium R&D. SRS does not store Category I/II quantities of SNM for NNSA's weapons activities, but does store Category I/II quantities for other DOE activities. SRS is currently receiving Category I/II surplus, non-pit plutonium from LLNL for storage pending its disposition.

Y–12 National Security Complex (Y–12), Oak Ridge, Tennessee—Y–12 manufactures uranium components for nuclear weapons, cases, and other nuclear weapons components; evaluates and tests these components; stores Category I/II quantities of HEU; conducts dismantlement, storage, and disposition of HEU; and supplies HEU for use in naval reactors.

The following two sites are part of the Complex but would not be affected by decisions announced in this ROD.

Kansas City Plant (KCP), Kansas City, Missouri—KCP manufactures and procures non-nuclear components for nuclear weapons and evaluates and tests these components. KCP has no SNM. The General Services Administration, as the lead agency, and NNSA, as a cooperating agency, prepared an Environmental Assessment (DOE/EA–1592, Apr. 2008) regarding the potential environmental impacts of modernizing the facilities and infrastructure for the non-nuclear production activities conducted by the KCP as well as moving these activities to other locations. The agencies issued a Finding of No Significant Impact (73 FR 23244; Apr. 29, 2008) regarding an alternative site in the Kansas City area. The SPEIS does not assess alternatives for the activities conducted at the KCP.

Sandia National Laboratories (SNL), Albuquerque, New Mexico; Livermore, California; and other locations—SNL conducts systems engineering of nuclear weapons; conducts research, design, and development of non-nuclear components; manufactures non-nuclear components, including neutron generators, for the stockpile; provides safety, security, and reliability assessments of stockpile weapons; and conducts HE R&D, tritium R&D, and environmental testing. The principal laboratory is located in Albuquerque, New Mexico (SNL/NM); a division of the laboratory (SNL/CA) is located in Livermore, California. SNL also operates the Tonopah Test Range (TTR) near Tonopah, Nevada, for flight testing of gravity weapons (including R&D and testing of nuclear weapons components and delivery systems). In 2008, NNSA completed the removal of SNL/NM's Category I/II SNM. SNL/NM no longer stores or uses these categories of SNM on an ongoing basis, although it may use Category I/II SNM for limited periods in the future. No SNM is stored at TTR, although some test operations have involved SNM.

Alternatives Considered

NNSA has been considering how to continue the transformation of the Complex since the Nuclear Posture Review [5] was transmitted to Congress by the Department of Defense in early 2002. NNSA considered the Stockpile Stewardship Conference in 2003, the Department of Defense Strategic Capabilities Assessment in 2004, the recommendations of the Secretary of Energy Advisory Board Task Force on the Nuclear Weapons Complex Infrastructure in 2005, and the Defense Science Board Task Force on Nuclear Capabilities in 2006 as to how transformation should continue. Based on these studies and other information, NNSA developed the range of reasonable alternatives for the Complex that could reduce its size, reduce the number of sites with Category I/II SNM (and storage locations for these categories of SNM within sites), eliminate redundant activities, and improve the responsiveness of the Complex. The following programmatic capabilities involving SNM are evaluated in the SPEIS:

• Plutonium operations, including pit manufacturing; Category I/II SNM storage; and related R&D;

• Enriched uranium operations, including canned subassembly manufacturing, assembly, and disassembly; Category I/II SNM storage; and related R&D; and

• Weapons assembly and disassembly and HE production (collectively, A/D/HE).

The programmatic alternatives analyzed in the SPEIS are discussed in the following paragraphs.

No Action Alternative. NNSA evaluated a No Action Alternative, which represents continuation of the status quo including implementation of past decisions. Under the No Action Alternative, NNSA would not make additional major changes to the SNM missions now assigned to its sites.

Programmatic Alternative 1: Distributed Centers of Excellence. This alternative would locate the three major SNM functional capabilities (plutonium, uranium, and weapons assembly and disassembly) involving Category I/II quantities of SNM at two or three separate sites. This alternative would create a consolidated plutonium center (CPC) for R&D, storage, processing, and manufacture of pits. Production rates of up to 125 pits per year for single shift operations and up to 200 pits annually for multiple shifts and extended work weeks are assessed for a CPC in this alternative. A CPC could consist of new facilities, or modifications to existing facilities at LANL, NTS, Pantex, SRS, or Y–12. The SPEIS also evaluated an option under this alternative that would upgrade facilities at LANL to produce up to 80 pits per year. This option would involve the construction and operation of the CMRR-NF. Highly-enriched uranium storage and uranium operations would continue at Y–12. Under this alternative, NNSA analyzed two options—construction of a new UPF and an upgrade of existing facilities at Y–12. The weapons A/D/HE mission would remain at Pantex under this programmatic alternative.

Programmatic Alternative 2: Consolidated Centers of Excellence. NNSA would consolidate the three major SNM functions (plutonium, uranium, and weapons assembly and disassembly) involving Category I/II quantities of SNM at one or two sites under this alternative. Two options were assessed: (1) The single site option (referred to as the consolidated nuclear production center [CNPC] option); and (2) the two-site option (referred to as the consolidated nuclear centers [CNC] option). Under the CNPC option, a new CNPC could be established at LANL, NTS, Pantex, SRS, or Y–12. Under the CNC option, the plutonium and uranium component manufacturing missions would be separate from the A/D/HE mission. The Consolidated Centers of Excellence Alternative assumed production rates of up to 125 weapons per year for single shift operations and up to 200 weapons annually for multiple shifts and extended work weeks.

Programmatic Alternative 3: Capability-Based Alternative. Under this alternative, NNSA would maintain a basic capability for manufacturing components for all stockpile weapons, as well as laboratory and experimental capabilities to support stockpile stewardship, but would reduce production facilities in-place such that NNSA would produce only a nominal level of replacement components (approximately 50 components per year). Within this alternative, NNSA

[5] The Nuclear Posture Review is a comprehensive analysis that lays out the direction for the United States' nuclear forces.

also evaluated a No Net Production/Capability-Based Alternative, in which NNSA would maintain capabilities to continue surveillance of the weapons stockpile, produce limited life components, and dismantle weapons, but would not add new types or increased numbers of weapons to the stockpile. This alternative involves minimum production (i.e., production of 10 sets of components or assembly of 10 weapons per year) within facilities with a larger manufacturing capability. Both options of this alternative would involve the construction and operation of a CMRR–NF.

Preferred Alternative

The Final SPEIS identified the following preferred alternatives for restructuring facilities that use significant quantities of SNM:

• Plutonium R&D and manufacturing: LANL would provide a consolidated plutonium research, development, and manufacturing capability within TA–55 (the Technical Area at LANL containing plutonium processing facilities) enabled by construction and operation of the CMRR-NF. The CMRR-NF would replace the existing CMR facility (a 50-year-old facility that has significant safety issues that cannot be addressed in the existing structure), to support transfer of plutonium R&D and Category I/II quantities of SNM from LLNL, and consolidation of weapons-related plutonium operations, including plutonium R&D and storage of Category I/II quantities of SNM, at LANL. Until completion of a new Nuclear Posture Review in 2009 or later, the net production at LANL would be limited to a maximum of 20 pits per year. Other national security actinide missions (e.g., emergency response, material disposition, nuclear energy) would continue at TA–55.

• Uranium manufacturing and R&D: Y–12 would continue as the uranium center, producing components and canned subassemblies, and conducting surveillance and dismantlement. NNSA completed construction of the Highly Enriched Uranium Materials Facility (HEUMF) in 2008 and will consolidate HEU storage in that facility.[6] NNSA would build a UPF at Y–12 to provide a smaller and modern highly-enriched uranium production capability, replacing 50-year-old facilities.

• Assembly/disassembly/high explosives production and manufacturing: Pantex would remain the assembly/disassembly/high explosives production and manufacturing center. NNSA would consolidate non-destructive weapons surveillance operations at Pantex.

• Consolidation of Category I/II SNM: NNSA would continue ongoing actions to transfer Category I/II SNM from LLNL under the No Action Alternative and phase out Category I/II operations at LLNL by the end of 2012.

Environmentally Preferable Alternative

Section 101 of NEPA (42 U.S.C. 4331) establishes a policy of federal agencies having a continuing responsibility to improve and coordinate their plans, functions, programs, and resources so that, among other goals, the nation may fulfill its responsibilities as a trustee of the environment for succeeding generations. The CEQ, in its "Forty Most Asked Questions Concerning CEQ's NEPA Regulations" (46 FR 18026; Mar. 23, 1981), defines the "environmentally preferable alternative" as the alternative "that will promote the national environmental policy expressed in NEPA's Section 101."

The analyses in the SPEIS of the environmental impacts associated with the programmatic alternatives indicated that the No Net Production/Capability-Based Alternative is environmentally preferable. This alternative would result in the minimum infrastructure demands (e.g., electricity and water use would be reduced by almost 50 percent at some sites); produce the least amount of wastes (radioactive wastes would be reduced by approximately 33–50 percent compared to the No Action Alternative); reduce worker radiation doses (by approximately 33–50 percent compared to the No Action Alternative); and require the fewest employees (up to 40 percent fewer at some sites). Almost all of these reductions in potential impacts result from the reduced production levels assumed for this alternative.

Alternatives Considered but Eliminated From Detailed Study

NNSA considered programmatic alternatives other than those described above, but concluded that these alternatives were not reasonable and eliminated them from detailed analysis. As discussed in the SPEIS, the following alternatives were considered but eliminated from detailed study: (1) Consolidate the Three Nuclear Weapons Laboratories (LLNL, LANL and SNL); (2) Curatorship Alternative; (3) Smaller CNPC Alternative; (4) New CPC with a Smaller Capacity; (5) Purchase Pits; (6) Upgrade Building 332 at LLNL to enable pit production; (7) Consider Other Sites for the CPC; (8) Redesign Weapons to Require Less or No Plutonium; and (9) Do Not Produce New Pits (see Section 3.15, Volume I of the SPEIS).

Decisions

With respect to the three major SNM functional capabilities (plutonium, uranium, and weapons assembly and disassembly) involving Category I/II quantities of SNM, NNSA has decided to keep these functional capabilities at three separate sites:

• Plutonium manufacturing and R&D will remain at LANL, and NNSA will construct and operate the CMRR-NF there to support these activities;

• Uranium manufacturing and R&D will remain at Y–12 and NNSA will construct and operate a UPF there to support these activities;

• Assembly/disassembly/high explosives production and manufacturing will remain at Pantex.

With respect to SNM consolidation, NNSA will continue ongoing activities[7] to transfer Category I/II SNM from LLNL under the No Action Alternative and phase out Category I/II operations at LLNL by the end of 2012.

Bases for Decisions

Overview

NNSA's decision locates the three major functional capabilities involving Category I/II quantities of SNM at three separate sites where these missions are currently performed. The selected alternative, which is a combination of the Distributed Centers of Excellence and Capability-Based Alternatives, has the least cost and lowest risk. Consolidation or transfer of uranium and plutonium operations to other sites (as analyzed in several options under the Distributed and Consolidated Centers of Excellence Alternatives) could result in lower operational costs and other benefits if and when such an alternative were fully implemented. However, movement of any of these three major capabilities to another site poses unacceptable programmatic risks and would cost far more than the selected alternative for an extended period of time. Moving one or more of these capabilities would take years to achieve and might be unsuccessful; in the interim, NNSA would need to build some new facilities at the sites where these capabilities are currently located

[6] The environmental impacts of HEUMF and its alternatives are analyzed in the *Site-wide Environmental Impact Statement for the Y–12 National Security Complex* (DOE/EIS–0309, 2001); NNSA announced its decision to construct and operate HEUMF on March 13, 2002 (67 FR 11296).

[7] In regard to surplus, non-pit, weapons-usable plutonium currently at LLNL, transfer to SRS for storage pending disposition is being undertaken consistent with decisions announced on September 11, 2007, in an Amended ROD (72 FR 51807) based on the *Storage and Disposition of Weapons-Usable Fissile Materials Programmatic EIS.*

simply to maintain those capabilities during the relocation process.

Similarly, the No Action Alternative is unacceptable because it would require NNSA to continue operations in facilities that are outdated, too costly to operate, and not capable of meeting modern environment, health and safety (ES&H) or security standards. These facilities cannot be relied upon much longer, and must be replaced or closed.

Under NNSA's decision, plutonium operations remain at LANL. It will not construct a new pit manufacturing facility such as a CPC or a CNPC because it appears unlikely there will be a need to produce more than 10–80 pits per year in the future and because constructing these facilities would be very expensive. Instead, NNSA will upgrade the existing plutonium facilities at the laboratory and will construct a CMRR–NF.[8] Construction of this facility is a needed modernization of LANL's plutonium capabilities—continued use of the existing CMR facility is inefficient and poses ES&H and security issues that cannot be addressed by modifying the CMR. Uranium operations remain at Y–12, and NNSA will construct a UPF because the existing uranium production facilities are also beyond their useful lives, inefficient, and present ES&H and security issues similar to those at CMR. CMRR–NF and UPF will be safer, seismically robust, and easier to defend from potential terrorist attacks. Their size will support production rates appropriate for a reasonable range of future stockpile sizes, and would not be much smaller if future production rates were much lower than currently anticipated.[9]

Plutonium Operations

With respect to plutonium manufacturing, NNSA is not making any new decisions regarding production capacity until completion of a new Nuclear Posture Review in 2009 or later. NNSA does not foresee an imminent need to produce more than 20 pits per year to meet national security requirements. This production level was established almost 10 years ago in the ROD (64 FR 50797, Sept. 20, 1999) based on the *Site-wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory* (1999 LANL SWEIS; DOE/EIS–0238). The ROD based on the 2008 LANL SWEIS (DOE/EIS–0380) continued this limit on production (73 FR 55833; Sept. 26, 2008). NNSA will continue design of a CMRR–NF that would support a potential annual production (in LANL's TA–55 facilities) of 20–80 pits. The design activities are sufficiently flexible to account for changing national security requirements that could result from a new Nuclear Posture Review, further changes to the size of stockpile, or future Federal budgets. Furthermore, because NNSA's sensitivity analyses have shown that there is little difference in the size of a facility needed to support production rates between 1 and 80 components per year, the future production capacity is not anticipated to have a significant impact on the size of the CMRR–NF.[10] With a new CMRR–NF providing support, the existing plutonium facility at LANL will have sufficient capability to produce between 1 and 80 pits per year. A new CMRR–NF will also allow NNSA to better support national security missions involving plutonium and other actinides (including, e.g., the plutonium-238 heat source program undertaken for the National Aeronautics and Space Administration (NASA); non-proliferation programs, including the sealed source recovery program; emergency response; nuclear counter-terrorism; nuclear forensics; render safe program (program to disable improvised nuclear devices); material disposition; and nuclear fuel research and development).

Uranium Operations

With respect to uranium manufacturing, NNSA will maintain the current capacity in existing facilities at Y–12 as discussed in Section 3.5 of the SPEIS and within the planning basis discussed in Section 3.1.2 of the 2001 *Site-wide Environmental Impact Statement for the Y–12 National Security Complex* (2001 Y–12 SWEIS; DOE/EIS–0309). NNSA is preparing a new SWEIS for Y–12 (*Site-wide Environmental Impact Statement for the Y–12 National Security Complex, Oak Ridge, Tennessee* (Y–12 SWEIS; DOE/EIS–0387)), which will evaluate site-specific issues associated with continued production operations at Y–12, including issues related to construction and operation of a UPF such as its location and size. The Y–12 SWEIS will consider any new information (such as a new Nuclear Posture Review or further changes to the stockpile) that becomes available during the preparation of that document.

Assembly and Disassembly of Weapons and High Explosives Production

NNSA will continue to conduct these operations at Pantex as announced in the ROD (62 FR 3880; Jan. 27, 1997) for the *Environmental Impact Statement for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components* (DOE/EIS–0225, 1996).

Production Rates and New Facilities

While NNSA is not making any new decisions regarding the production rates of plutonium or uranium components, it has decided that a CMRR–NF and UPF are essential to its ability to meet national security requirements regarding the nation's nuclear deterrent. The existing facilities where these operations are now conducted cannot be used much longer and cannot be renovated in a manner that is either affordable or acceptable (from ES&H, security, and production perspectives). As NNSA continues the design and, in the case of a UPF, NEPA analysis of these facilities, it can modify them to reflect changing requirements such as those resulting from a new Nuclear Posture Review, further changes to stockpile size, and future federal budgets. In short, a CMRR–NF and UPF are needed for NNSA to maintain its basic nuclear weapons capabilities because they would replace outdated and deteriorating facilities. These facilities are needed regardless of how many or what types of weapons may be called for in the future.

National Security Requirements and Stockpile Size

In making these decisions, NNSA considered its statutory responsibilities to support the nuclear weapons stockpile as determined by the President and the Congress. President Bush's goal is to achieve a credible nuclear deterrent with the lowest possible number of nuclear warheads consistent with

[8] NNSA prepared an *Environmental Impact Statement for the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, New Mexico* (CMRR EIS) (DOE/EIS–0350). The CMRR EIS evaluates potential impacts of the proposed relocation of analytical chemistry and materials characterization activities and associated R&D to a new CMRR. The proposed CMRR consists of a nuclear facility—CMRR–NF—and a separate radiological laboratory, administrative office, and support building. See also the 2008 *Site-Wide Environmental Impact Statement for Los Alamos National Laboratory* (2008 LANL SWEIS, DOE/EIS–0380). In deciding to construct the CMRR–NF at LANL, NNSA considered the analyses in the CMRR EIS and the 2008 LANL SWEIS, as well as those in the SPEIS.

[9] NNSA evaluated various sizes for facilities analyzed in the SPEIS to determine if smaller facilities should be considered in detail for the Distributed and Consolidated Centers of Excellence Alternatives. NNSA evaluated the programmatic risk, cost effectiveness, and environmental impacts of smaller facilities and concluded that smaller facilities were not reasonable for some of these alternatives (see Section 3.15 of the SPEIS). Smaller facilities were considered for the Capability-Based Alternative.

[10] *See* note 9 *supra*.

national security needs. In 2002, he and Russia's President Putin signed the Moscow Treaty, under which the United States and Russia will each reduce the number of operationally deployed strategic nuclear weapons to 1,700–2,200 by 2012. In 2004, President Bush issued a directive to cut the entire U.S. stockpile—both deployed and reserve warheads—in half by 2012. This goal was later accelerated and achieved in 2007, five years ahead of schedule. At the end of 2007, the total stockpile was almost 50 percent below what it was in 2001. On December 18, 2007, the White House announced the President's decision to reduce the entire nuclear weapons stockpile by another 15 percent by 2012. This means the U.S. nuclear stockpile will be less than one-quarter its size at the end of the Cold War—the smallest stockpile since the Eisenhower Administration.

NNSA's analyses in the SPEIS are based on current national policy regarding stockpile size (1,700–2,200 operationally deployed strategic nuclear warheads by 2012) with flexibility to respond to future Presidential direction to make further changes in the numbers of weapons. Maintaining a stockpile requires the ability to detect aging effects and other changes in weapons (a surveillance program), the ability to fix identified problems without nuclear testing (the stockpile stewardship program), and the ability to produce replacement components and reassemble weapons (a fully capable set of production facilities).

NNSA understands that at least two major reviews of the requirements for the future nuclear weapons program are expected during the next year. These reviews may influence the size and composition of the future nuclear weapons stockpile, and the nuclear infrastructure required to support that stockpile. First, the Congress has established the Congressional Commission on the Strategic Posture of the United States. This commission is to conduct a review of the strategic posture of the United States, including a strategic threat assessment and a detailed review of nuclear weapons policy, strategy, and force structure. Its recommendations, currently scheduled for completion in the spring of 2009, are expected to address the size and nature of the future nuclear weapons stockpile, and the capabilities required to support that stockpile. Second, Congress has directed the Administration to conduct another Nuclear Posture Review in 2009 to clarify the United States' nuclear deterrence policy and strategy for the near term (i.e., the next 5–10 years). A report on this Nuclear Posture Review is due on December 1, 2009.

NNSA has structured its programs and plans in a manner that allows it to continue transforming the complex and to replace antiquated facilities while retaining the flexibility to respond to evolving national security requirements, which is essential for a truly responsive infrastructure. The decisions in this ROD allow NNSA to continue to rely on LANL facilities (with a new CMRR–NF) to provide maximum flexibility to respond to future changes in plutonium requirements.

Costs, Technical Risks, and Other Factors

NNSA prepared detailed business case studies of the programmatic alternatives. These studies are available at *http://www.ComplexTransformationSPEIS.com*. They provide a cost comparison of the alternatives and include costs associated with construction, transition, operations, maintenance, security, decontamination and decommissioning, and other relevant factors.[11] Based on these studies, NNSA determined that the costs through 2030 for the consolidation alternatives would be approximately 20–40 percent greater than for the alternatives that would maintain the three major capabilities—plutonium operations, uranium operations, and A/D/HE operations—at their current sites. Additionally, NNSA's analysis found that, through 2060, the costs for the consolidation alternatives would be greater than those for the alternatives that maintain the three capabilities where they are currently located.

With respect to technical risk, as part of the business case studies, NNSA evaluated five types of risk: (1) Engineering and construction; (2) implementation; (3) program; (4) safety and regulatory; and (5) security. These analyses balance nearer-term risks incurred while transitioning to an alternative with longer-term operational risks. For example, consolidation alternatives would have higher risks during the transition due to the challenges associated with mission relocations, but could have lower long-term operational risks because of reduced safety, regulatory, or security risks. All risk criteria were rated equally (20 percent each); a sensitivity analysis determined that the conclusions were not significantly affected by adjustments of plus or minus five percent in risk rating criteria.

The risk assessment was performed by a group of NNSA and contractor employees who are subject-matter experts, site experts, or both. The least risky options are those where the sites have previous experience with the mission or the nuclear material used in that mission. Alternatives that would locate the plutonium mission at LANL or SRS, the uranium mission at Y–12, and the weapons assembly and disassembly mission at Pantex, were determined to pose the lowest risk. Overall, the consolidation alternatives were judged to have 25–160 percent more technical risk than alternatives that would not consolidate or relocate missions.

With respect to plutonium R&D and manufacturing, the cost and risk analyses showed that keeping this mission at LANL has the least cost and poses the lowest risk. This results primarily from the fact that plutonium facilities are very expensive to construct and LANL has existing facilities, infrastructure, and trained personnel that can be used for this mission.

The CMRR–NF was analyzed in the *Environmental Impact Statement for the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE/EIS–0350, Nov. 2003). The CMRR EIS evaluated potential environmental impacts of the proposed relocation of analytical chemistry and materials characterization activities and associated R&D to a new CMRR. Following completion of that EIS, NNSA announced its decision to construct and operate a CMRR consisting of two main buildings, one of which was the CMRR–NF (69 FR 6967; Feb. 12, 2004). The second building—providing laboratory, administrative, and support functions—currently is under construction at LANL. However, NNSA decided to defer a decision regarding construction and operation of the CMRR–NF until it completed the Complex Transformation SPEIS (see Section 1.5.2.1, Volume 1 of the SPEIS).

Analyses of the potential impacts of constructing and operating the CMRR–NF were updated in the *Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory, Los Alamos, New Mexico* (2008 LANL SWEIS; DOE/EIS–0380, May 2008) as part of the Expanded Operations and the No Action Alternatives. In a ROD based on the 2008 LANL SWEIS, NNSA announced its decision to continue to implement the No Action Alternative with the

[11] The cost analyses considered both life-cycle costs (i.e., the cumulative costs over an approximately 50-year life) and discounted cash flows (i.e., a net present value in which all future costs are reduced by a common factor (generally the cost of capital)).

addition of some elements of the Expanded Operations Alternative. NNSA did not make any decision related to the CMRR–NF. It explained in the SWEIS ROD that it would not make any decisions regarding proposed actions analyzed in the SPEIS prior to completion of the SPEIS (73 FR 55833; Sept. 26, 2008). NNSA considered the analyses in the CMRR EIS and the 2008 LANL SWEIS, as well as those in the SPEIS in deciding to construct the CMRR–NF.

With respect to uranium manufacturing and R&D, the cost analyses indicated that building a UPF at Y–12, eliminating excess space, and shrinking the security area at the site will significantly reduce annual operational costs. The UPF at Y–12 will replace 50-year-old facilities, providing a smaller and modern production capability. It will enable NNSA to consolidate enriched uranium operations from six facilities at Y–12, and to reduce the size of the protected area at that site by as much as 90 percent. A new UPF will also allow NNSA to better support broader national security missions. These missions include providing fuel for Naval Reactors; processing and down-blending incoming HEU from the Global Threat Reduction Initiative; down-blending HEU for domestic and foreign research reactors in support of nonproliferation objectives; providing material for high-temperature fuels for space reactors (NASA); and supporting nuclear counter-terrorism, nuclear forensics, and the render safe program (program to disable improvised nuclear devices).

The life cycle cost analysis predicts an average annual savings over the 50-year facility life of approximately $200 million in FY 2007 dollars. The risk analysis found that moving the uranium mission to a site other than Y–12 would more than double the technical risks. The site-specific impacts for a UPF, including issues such as its location and size, will be analyzed in a new SWEIS for Y–12 that NNSA is currently preparing.

With respect to weapons assembly and disassembly and high explosives production, NNSA's decision to keep that mission at Pantex will result in the least cost and pose the lowest programmatic risk because the facilities necessary to conduct this work safely and economically already exist. Although no further NEPA analysis is required to continue these missions at Pantex, NNSA will continue to evaluate and update site-specific NEPA documentation as required by DOE regulations (10 CFR Part 1021).

With respect to SNM removal from LLNL, transferring Category I/II SNM to other sites and limiting LLNL operations to Category III/IV SNM will achieve a security savings of approximately $30 million per year at LLNL.

Potential Environmental Impacts

As described in greater detail in the following paragraphs, NNSA considered potential environmental impacts in making these decisions. It analyzed the potential impacts of each alternative on land use; visual resources; site infrastructure; air quality; noise; geology and soils; surface and groundwater quality; ecological resources; cultural and paleontological resources; socioeconomics; human health impacts; environmental justice; and waste management. NNSA also evaluated the impacts of each alternative as to irreversible or irretrievable commitments of resources, the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity, and cumulative impacts. In addition, it evaluated impacts of potential accidents on workers and surrounding populations. The SPEIS includes a classified appendix that assesses the potential environmental impacts of a representative set of credible terrorist scenarios.

The environmental impacts of the alternatives are analyzed in Chapter 5 of the SPEIS. The impacts of the alternatives NNSA has decided to pursue are summarized as follows:

Land Use—Minor land disturbance during construction of new facilities (approximately 6.5 acres at LANL for a CMRR–NF and 35 acres at Y–12 for a UPF); less area would be disturbed after construction is complete. At Y–12, construction of a UPF will allow NNSA to reduce the protected area by as much as 90 percent, which will improve security and reduce costs. At all sites, land uses will remain compatible with surrounding areas and with land use plans. At LANL and Y–12, the land required for operations will be less than 1 percent of the sites' total areas.

Visual Resources—Changes consistent with currently developed areas, with no changes in the Visual Resource Management classification. All sites will remain industrialized.

Infrastructure—Existing infrastructure is adequate to support construction and operating requirements at all sites. During operations, any changes to power requirements would be less than 10 percent of the electrical capacity at each site.

Air Quality—During construction, temporary emissions will result, but National Ambient Air Quality Standards will not be exceeded as a result of this construction. Operations will not introduce any significant new emissions and will not exceed any standards.

Water Resources—Water use will not change significantly compared to existing use and will remain within the amounts of water available at the NNSA sites. Annual water use at each site will increase by less than 5 percent.

Biological Resources—No adverse effects on biota and endangered species. Consultations with the U.S. Fish and Wildlife Service have been completed for the CMRR–NF. Consultations with the Fish and Wildlife Service will be conducted for a UPF during preparation of the Y–12 SWEIS.

Socioeconomics—Short-term employment increases at LANL and Y–12 during construction activities. The selected alternatives will have the least disruptive socioeconomic impacts at all sites. At Y–12, the total workforce will be reduced by approximately 750 workers (approximately 11 percent of the site's workforce) after UPF becomes operational. Employment at all other sites will change by less than 1 percent compared to any changes expected under the No Action Alternative.

Environmental Justice—No disproportionately high and adverse effects on minority or low-income populations will occur at any affected site; therefore, no environmental justice impacts will occur.

Health and Safety—Radiation doses to workers and the public will remain well below regulatory limits at all facilities and at all sites. Doses to the public and workers will cause less than one latent cancer fatality annually at all sites. Conducting future operations in the CMRR–NF and UPF will reduce the dose to workers compared to the doses they receive in existing facilities.

Accidents—The risk of industrial accidents is expected to be low during construction of the new facilities. Radiological accident risks will be low (i.e., probabilities of less than one latent cancer fatality) at all sites. The CMRR–NF and a UPF are expected to reduce the probability and impacts of potential accidents.

Intentional Destructive Acts—Construction of a UPF and CMRR–NF will provide better protection to the activities conducted in these facilities, as it is generally easier and more cost-effective to protect new facilities because modern security features can be incorporated into their design. Although the results of the intentional destructive acts analyses cannot be disclosed, the following general conclusion can be drawn: The potential consequences of intentional destructive acts are highly dependent upon distance to the site boundary and size of the surrounding population—the closer and higher the surrounding population, the higher the potential consequences. Removal of SNM from LLNL will reduce the potential impacts of intentional destructive acts at that site.

Waste Management—Waste generation will remain within existing and planned management capabilities at all sites. Existing waste management facilities are sufficient to manage these wastes and maintain compliance with regulatory requirements.

Cumulative Impacts—The cumulative environmental impacts of the alternatives are analyzed in Chapter 6 of the SPEIS. The impacts of the alternatives when added to past, present, and reasonably foreseeable future actions will be within all regulatory standards and not result in significant new impacts.

Mitigation Measures

As described in the SPEIS, NNSA operates in compliance with environmental laws, regulations, and policies within a framework of contractual requirements; many of these requirements mandate actions to control and mitigate potential adverse environmental effects. Examples include site security and threat protection plans, emergency plans, Integrated Safety Management Systems, pollution prevention and waste minimization programs, cultural resource and protected species programs, and energy and water conservation programs (e.g., the Leadership in Energy and Environmental Design (LEED) Program). Any additional site-specific mitigation actions would be identified in site-specific NEPA documents.

Comments Received on the Final SPEIS Related to the Programmatic Alternatives

During the 30-day period following the EPA's notice of availability for the Final SPEIS (73 FR 63460; Oct. 24, 2008), NNSA received written comments from the following groups: Alliance for Nuclear Accountability, Project on Government Oversight, National Radical Women, Physicians for Social Responsibility, Oak Ridge Environmental Peace Alliance, Tri-Valley CAREs, the Union of Concerned Scientists, Nuclear Watch New Mexico, the Arms and Security Initiative of the New America Foundation, Concerned Citizens for Nuclear Safety, Embudo Valley Environmental Group, Ecology Ministry, Loretto Community, Aqua es Vida Action Team, Citizens for Alternatives to Radioactive Dumping, and Tewa Women United. Written comments were also received from approximately 30 individuals. The comments NNSA received related to the programmatic alternatives and NNSA's responses follow.

Some commenters substantively reiterated comments that they had provided earlier on the Draft SPEIS, including comments that suggested:

1. NNSA should make no decisions on Complex Transformation until a new Nuclear Posture Review has been completed by the newly elected administration and the report issued by the Congressional Commission on the Strategic Posture of the United States.

Response: NNSA believes the SPEIS analysis is consistent with and supports national security requirements and policies. It is unreasonable to assume that nuclear weapons would not be a part of this nation's security requirements over the time period analyzed in the SPEIS and beyond. The range of alternatives analyzed in the SPEIS covers the range of national security requirements that NNSA believes could reasonably evolve from any changes to national policy with regard to the size and number of nuclear weapons in the foreseeable future. Accordingly, there is no reason to delay the decisions announced in this ROD on complex transformation pending a new Nuclear Posture Review or the recommendations of the Bipartisan Panel reevaluating the United States' Nuclear Strategic Posture (see Comment Response 1.C, Volume III, Chapter III of the SPEIS). This ROD fully explains why NNSA is making these programmatic decisions, why it is appropriate to make these decisions at this time, and the flexibility NNSA has to adapt to any changes in national security requirements that may occur in the near term.

2. The United States does not need nuclear weapons or the infrastructure that produces and maintains them and should pursue disarmament consistent with the Nuclear Non-Proliferation Treaty.

Response: Decisions on whether the United States should possess nuclear weapons and the type and number of those weapons are made by the President and the Congress. As long as this nation has nuclear weapons, a Complex must exist to ensure their safety, security and reliability. NNSA believes the SPEIS analysis is consistent with and supports national security requirements and policies (see Comment Responses 1.0, 2.K.12, and 3.0, Volume III, Chapter III of the SPEIS).

3. There is no need to produce new pits (or no need for certain production rates).

Response: While pits may have extremely long lifetimes and there may ultimately be no need to produce many additional ones, prudence requires that the nation have the capability to produce pits should the need arise. NNSA is not proposing to manufacture any pits unless they are needed to meet national security requirements. A need to produce pits could arise due to the effects of aging on existing pits or changes to our national security policies that could require more pits than the few NNSA is currently manufacturing for stockpile surveillance (see Comment Responses 2.K.16, 2.K.22, and 5.C.1, Volume III, Chapter III of the SPEIS). Until completion of a new Nuclear Posture Review in 2009 or later, the net production at LANL will be limited to a maximum of 20 pits per year.

4. NNSA should undertake further efforts at compliance with Article VI of the Nuclear Non-proliferation Treaty (NPT) (or, Complex Transformation violates this treaty).

Response: The United States has made significant progress toward achieving the nuclear disarmament goals set forth in the NPT, and is in compliance with its Article VI obligations. The NPT does not mandate disarmament or specific stockpile reductions by nuclear states, and it does not address actions they take to maintain their stockpiles. NNSA disagrees with the assertion that Complex Transformation violates the NPT (see Comment Response 1.F, Volume III, Chapter III of the SPEIS).

5. NNSA should have included Stockpile Curatorship as a reasonable alternative fully considered in the SPEIS.

Response: The Curatorship Alternative as proposed by comments on the Draft SPEIS would have required NNSA to give up the capabilities to design and develop replacement nuclear components and weapons, forcing it to rely solely on the surveillance and non-nuclear testing program to maintain weapons and identify when they need repairs. NNSA believes it is unreasonable to give up these capabilities in light of the uncertainties concerning the aging of weapons and changing national security requirements. As explained in the SPEIS in Section 3.15, this would impair NNSA's ability to assess and, if necessary, address issues regarding the safety, security, and reliability of nuclear weapons (see Comment

Responses 2.H.2, 5.H.2, and 7.O, Volume III, Chapter III of the SPEIS).

6. The transformed complex should not support design or production of new design or modified nuclear weapons.

Response: NNSA is required to maintain nuclear weapons capabilities, including the capability to design, develop, produce, and certify new warheads. Maintenance of the capability to certify weapons' safety and reliability requires an inherent capability to design and develop new weapons. NNSA has not been directed to produce newly designed weapons (see Comment Responses 1.B, Volume III, Chapter III of the SPEIS).

7. NNSA should provide additional information on epidemiological studies of radiation health of workers and communities.

Response: Many of the workers at DOE's 20 major sites have been studied epidemiologically, some for decades. The National Institute for Occupational Safety and Health continues to update these studies as warranted by public health and scientific considerations. As more powerful epidemiological study designs become available, new studies of these workers may provide better information about health risks associated with radiation exposure (see Comment Responses 14.K.5 and 14.K.6, Volume III, Chapter III of the SPEIS). Many of the epidemiological studies and other related studies are available at *http://cedr.lbl.gov.*

8. NNSA should focus on clean-up of its sites rather than building new facilities to make weapons.

Response: DOE has a large remediation program and is aggressively addressing past contamination issues at each of its sites. This program is conducted in accordance with federal and state regulatory requirements and includes administrative and engineered controls to minimize releases, as well as surveillance monitoring of the environment and reporting of exposure assessments. These remediation activities are directed by federal and state regulators, have their own schedule and funding, and are separate from actions proposed in the SPEIS (see Comment Responses 7.J and 9.B, Volume III, Chapter III of the SPEIS). It is inaccurate to suggest that cleanup and transformation are mutually exclusive.

9. NNSA should consolidate special nuclear material from LLNL faster than its current schedule.

Response: NNSA has begun the removal of Category I/II SNM from LLNL, and plans to complete it by 2012. NNSA will continue to give this action the high priority requested by the commenter. Safety, security, and logistical issues associated with preparing SNM for shipment; shipping the materials; and storage at the receiving sites determine the schedule for completing this removal (see Comment Response 5.N.4, Volume III, Chapter III of the SPEIS).

10. The modernization of the Kansas City Plant should have been included in the SPEIS.

Response: The activities of the Kansas City Plant were not included in the SPEIS because NNSA concluded that decisions regarding the consolidation and modernization of the Kansas City Plant's activities (the production and procurement of electrical and mechanical non-nuclear components) would not affect or limit the programmatic alternatives analyzed in the SPEIS, or the decisions NNSA makes regarding these alternatives (see Comment Response 12.0, Volume III, Chapter III of the SPEIS).

11. The SPEIS is not written in plain language and lacks a clear format.

Response: NNSA prepared the SPEIS in accordance with the requirements of NEPA and the DOE and CEQ NEPA regulations. NNSA believes that the SPEIS is clearly written and organized in light of the highly technical subject matter and complex nature of the alternatives (see Comment Response 2.A, Volume III, Chapter III of the SPEIS).

12. NNSA inadequately addressed the environmental impacts of intentional destructive acts. NNSA must disclose the potential impacts of successfully executed credible terrorist attack scenarios at sites in the nuclear weapons complex and make this information available to the public.

Response: A classified appendix to the Complex Transformation SPEIS evaluates the potential environmental impacts of credible terrorist attacks that NNSA assumed (for purposes of analysis pursuant to NEPA) were successful at specific existing and proposed facilities. The appendix is classified both because the scenarios evaluated contain classified information and because there is a risk that these scenarios and their potential impacts could be exploited by terrorists or others contemplating harmful acts. Therefore, the SPEIS provides limited information about these acts and their potential consequences (see "Potential Environmental Impacts" above and Comment Responses 13.B and 13.D, Volume III, Chapter III of the SPEIS).

13. NNSA failed to consider long-acting consequences of nuclear weapons production, including the impacts that result from every year of operation. NNSA also failed to consider the deployment or potential use of the nation's nuclear arsenal.

Response: The SPEIS assesses the direct, indirect, and cumulative environmental impacts of the No Action Alternative and reasonable alternatives for the proposed action. Impacts are assessed for both construction and operations. For operations, the SPEIS focuses on the steady-state impacts of operations. Those annual operational impacts are assumed to occur year-after-year. Now that NNSA has made decisions regarding programmatic alternatives, it may need to prepare additional NEPA documents such as site- or facility-level analyses (e.g., the ongoing Y–12 SWEIS for a UPF now that NNSA has decided to locate it at Y–12) (see Comment Response 11.0, Volume III, Chapter III of the SPEIS). NNSA does not make decisions concerning the size, deployment or potential use of the nation's nuclear arsenal, and therefore the consequences of these decisions are not appropriate for analysis in the SPEIS.

14. NNSA inadequately addressed the cumulative impacts of the alternatives, including a detailed and careful analysis of the cumulative impacts of major nuclear-related facilities in New Mexico. Additionally, Comment Response 14.J.4 incorrectly states that Appendix C and D include information about an analysis of cumulative impacts with an extended region of influence of 100 miles.

Response: NNSA addressed potential cumulative impacts resulting from Complex Transformation and ongoing and reasonably anticipated actions of NNSA, other agencies and private developers. In response to public comments, NNSA added a detailed analysis of the cumulative impacts of major nuclear-related facilities in New Mexico. NNSA thinks that analysis is appropriately detailed. The assessment of cumulative impacts is in Chapter 6 of Volume II of the SPEIS (see Comment Responses 2.I and 14.O, Volume III, Chapter III of the SPEIS). With respect to the analysis of cumulative impacts with an extended region of influence of 100 miles, NNSA agrees that the Final SPEIS incorrectly referred the reader to Appendix C and D. NNSA intended to refer the reader to the LANL SWEIS, which shows that extending the region of influence out another 50 miles increases the affected population by 300 percent, while the population dose increases by only 13 percent. NNSA regrets this error.

15. NNSA inadequately addressed Environmental Justice, including a more detailed analysis of transportation impacts and waste disposal.

Response: Under Executive Order 12898, NNSA is responsible for identifying and addressing potential disproportionately high and adverse human health and environmental impacts on minority or low-income populations. Based on the SPEIS's analyses, NNSA concluded that there would not be any disproportionately high and adverse human health and environmental impacts on minority or low-income populations. In response to public comments received, NNSA also included information regarding a "special pathways analysis" for operations at LANL for the purpose of assessing how impacts would change compared to standard modeling results. The special pathway analysis is identified in Volume II, Chapter 5, Section 5.1.10 of the SPEIS, and the results of that analysis are presented in Comment Response 14.J, Volume III, Chapter III of the SPEIS.

16. NNSA inadequately addressed the impacts associated with design and production of Reliable Replacement Warheads.

Response: The continuing transformation of the complex is independent of decisions regarding Reliable Replacement Warheads that the Congress and President may make. At present, the Congress has declined to provide additional funding for development of these warheads (see Comment Responses 2.K.19 and 8.0, Volume III, Chapter III of the SPEIS).

17. NNSA has provided an inadequate basis to decide to locate a UPF at Oak Ridge and there is insufficient information in the SPEIS to select a site for a UPF.

Response: Programmatic alternatives regarding a UPF are analyzed in the SPEIS. The SPEIS is the appropriate document to analyze and support programmatic decisions related to major uranium missions and facilities. The Y–12 SWEIS, currently under preparation, will evaluate site-specific issues associated with continued production operations at Y–12, including issues related to construction and operation of a UPF such as its location and size. NNSA will make decisions regarding the specific location and size based on the more detailed analysis that will be in the Y–12 SWEIS (see Comment Response 5.C.2, Volume III, Chapter III of the SPEIS).

18. Commenters said that NNSA should accelerate consolidation of excess SNM and down-blend hundreds of metric tons of excess HEU, which is highly desirable to nuclear terrorists who could use it to quickly and easily create a crude nuclear device.

Response: Disposal of excess SNM is addressed by the Material Disposition Program. NNSA has an ongoing program to down-blend HEU for disposition, as described in the ROD (61 FR 40619; August 5, 1996) for the *Disposition of Surplus Highly Enriched Uranium Environmental Impact Statement* (DOE/EIS–0240, 1996). The potential environmental impacts of an intentional destructive act, such as terrorism or sabotage, are addressed in a classified appendix to the SPEIS (see Comment Responses 5.M, 5.N, and 13.0, Volume III, Chapter III of the SPEIS).

19. NNSA should not move forward with the construction of the CMRR–NF at LANL because of problems with NNSA construction projects, the federal government's limited economic resources, and adequate existing space at the LANL PF–4. Another commenter asked why the CMRR–NF is needed.

Response: As explained in detail in this ROD, the CMRR–NF is a needed modernization of LANL's plutonium capabilities. Continued use of the existing CMR facility is inefficient and poses ES&H and security concerns that cannot be addressed by modifying the CMR. The CMRR–NF will be safer, seismically robust, and easier to defend from potential terrorist attacks (see Comment Responses 3.0, 5.C.1, 5.C.6, and 9.0, Volume III, Chapter III of the SPEIS).

20. The potential environmental impacts of postulated accidents are not adequately addressed in the SPEIS, including the potential impacts to air, land, and water resulting from postulated accidents.

Response: Accidents are addressed in the Health and Safety Sections for each site and include analyses for a full spectrum of accidents with both high and low probabilities (see Comment Response 14.N, Volume III, Chapter III of the SPEIS). The accident analysis focused on human health impacts, which NNSA decided was a reasonable metric for comparing the programmatic alternatives.

21. A new, more thorough, more transparent cost analysis needs to be done before Complex Transformation plans are allowed to proceed.

Response: The purpose and need for complex transformation result from NNSA's need for a nuclear weapons complex that can be operated less expensively. NNSA prepared business case analyses to provide cost information on the alternatives considered in the SPEIS. NNSA considered these studies, the analyses in the SPEIS, and other information to make these decisions regarding transforming the complex. The business case analyses are available to the public on the project Web site: *http://www.ComplexTransformationSPEIS.com* (see Comment Response 9.0, Volume III, Chapter III of the SPEIS). NNSA believes these studies are adequate for making programmatic and project-specific decisions.

22. NNSA failed to consider an alternative that truly consolidates the nuclear weapons complex.

Response: The SPEIS analyzes alternatives that would make the complex more efficient and responsive than it would be under the No Action Alternative. Consolidation alternatives were formulated with that purpose and need in mind. The SPEIS assesses a range of reasonable alternatives for the future weapons complex that includes alternatives that, if they had been selected, would have eliminated one or more nuclear weapons complex sites (see Comment Responses 7.A.5, 7.A.6, and 7.A.7, Volume III, Chapter III of the SPEIS). As this ROD explains, relocating uranium, plutonium, and A/D/HE capabilities would be too expensive and risky.

23. Complex Transformation endangers human health.

Response: New facilities would be designed and operated to minimize risk to both workers and the general public during normal operations and in the event of an accident. Benefiting from decades of experience, NNSA employs modern processes; manufacturing technologies; and safety, environmental, security, and management procedures to protect against adverse health impacts (see Comment Response 14.K, Volume III, Chapter III of the SPEIS).

24. NNSA has not adequately addressed public comments about water usage, radioactive and toxic air emissions, impacts to humans, and impacts to agricultural lands or prime farmlands surrounding LANL resulting from past, current, and future operations of LANL.

Response: The environmental impacts of operating LANL are described in Chapter 4, Section 4.1 of Volume 1 of the SPEIS. The analysis examined surrounding land uses, water availability and usage, air quality and airborne emissions, surface and groundwater quality and discharges, human health, waste management, visual resources, noise, and other impacts of operating LANL. Chapter 5, Section 5.1 of Volume II of the SPEIS analyzes the potential environmental impacts of the alternatives evaluated in the SPEIS in the same media areas. See Comment Responses 14.E.11 through 14.E.14, Volume III, Chapter III of the SPEIS. For example, comment response

14.E.11 states that "due to concern expressed for the quality of agriculture in the LANL region, NMED (New Mexico Environment Department) collects and analyzes foodstuff samples as part of its surveillance program to ensure quality standards are met." The 2008 LANL SWEIS (DOE/EIS–0380), and the ROD (73 FR 55833; Sept. 26, 2008) based on the analyses in it, presented NNSA's responses to similar comments in more detail. NNSA based its programmatic decisions affecting LANL on both the SPEIS and the SWEIS.

25. Albuquerque will begin drinking water from the Rio Grande on December 5, 2008. The Albuquerque Water Utility Authority (WUA), which oversees the project, has detected long-lived alpha-emitting radionuclides in the river. Although the levels of these radionuclides are below regulatory concern, the research shows that the current EPA standards for long-lived alpha-emitting radionuclides are not protective of the fetus and the young child. The WUA has asked LANL to reveal the extent of the radiation on the plateau and canyons that contribute to the river to no avail.

Response: Water quality and use at LANL are addressed in the SPEIS at Section 4.1.5 of Volume I. Impacts of complex transformation on water resources at LANL are addressed in Section 5.1.5 of Volume II. There is no indication that contamination from LANL is affecting Albuquerque's drinking water supply. According to a 2007 water quality report, gross alpha particle activity, radium-228, radium-226, and uranium were among regulated substances that were monitored but not detected (Albuquerque Bernilillo County Water Utility Authority, 2007 Drinking Water Quality Report). The 2007 water quality report may be accessed at *http://www.abcwua.org/content/view/280/484/* (see Comment Response 14.E, Volume III, Chapter III of the SPEIS).

26. NNSA failed to address comments concerning elevated levels of radionuclides in the Rio Embudo Watershed.

Response: The levels of radionuclides from the fallout produced by atmospheric testing of nuclear weapons (e.g., cesium-137, strontium-90, and plutonium-239) are expected to be elevated at Trampas Lake and in the Sangre de Cristo Mountains in which the Embudo Valley lies. The Trampas Lake data agree with expectations for global fallout at this location and are not a result of LANL activities (see Comment Response 14.K.8, Volume III, Chapter III of the SPEIS).

27. Seismic fasteners, ties, and other protections should be used in the construction of the Radiological Laboratory, Utility, and Office Building (RLUOB) within the CMRR project.

Response: NNSA is building the RLUOB to the highest applicable seismic standards. Even though the structure is a radiological laboratory and would not normally be constructed to the same standards as a high hazard nuclear facility, NNSA is nevertheless constructing it to those higher standards (see Comment Response 14.K.7, Chapter III, Volume III of the SPEIS).

28. NNSA did not respond to the comment that it must expand air monitoring in downwind communities and should no longer hide under the grandfather clause for air emissions from its old facilities at LANL.

Response: Operating permits issued pursuant to Title V of the Clean Air Act at NNSA sites include requirements for monitoring emissions from sources and keeping records concerning those sources and their emissions. Monitoring of the environment in and around NNSA sites generally includes air, water, soil, and foodstuffs, and monitoring results are reported in annual environmental surveillance reports. Chapter 10 of Volume II of the SPEIS describes permits issued by regulatory authorities for NNSA facilities and operations. At LANL, NNSA complies with the Clean Air Act and its emissions are regulated by the New Mexico Environment Department (see Comment Response 14.D.2, Chapter III, Volume III of the SPEIS).

29. Will LANL become the second Waste Isolation Pilot Plant (WIPP) site in New Mexico under the Complex Transformation proposal?

Response: This comment concerns the disposal path for newly generated transuranic waste that could result from decisions made on complex transformation. The alternatives analyzed in the SPEIS could generate transuranic waste after WIPP's scheduled closure in 2035. At this time, DOE is not considering any legislative changes to extend WIPP's operation or to develop a second repository for transuranic waste. Any transuranic waste that is generated without a disposal pathway would be safely stored until disposal capacity becomes available (see Comment Response 14.M.4, Chapter III, Volume III of the SPEIS).

30. LANL has failed to install a reliable network of monitoring wells at the laboratory.

Response: LANL's groundwater monitoring program was discussed in the 2008 LANL SWEIS. Groundwater monitoring at LANL is conducted in compliance with the "Order on Consent for Los Alamos National Laboratory" (Consent Order), and consistent with the Interim Facility-wide Groundwater Monitoring Plan that was approved by the New Mexico Environment Department in June 2006. Some of the groundwater data at LANL are being reassessed due to potential residual drilling fluid effects. Drilling fluid effects are quantitatively assessed in LANL's Well-Screen Analysis Report, Rev. 2 (LA–UR–07–2852; May 2007). Fifty-two percent of the well screens evaluated in this report produce samples that are not significantly impacted by drilling fluids. LANL has initiated a program to better evaluate the wells and to rehabilitate wells that may be producing suspect results. LANL is using the results of a pilot study to develop a proposed course of action for approval by the New Mexico Environment Department. The process is established by and in compliance with the Consent Order (see Comment Responses 14.E.2 and 14.E.1, Chapter III, Volume III of the SPEIS).

31. The existing CMR facility is not safe and the seismic hazards at LANL are uncertain. The commenters assert that many of their specific comments concerning seismic issues at LANL were not properly addressed. The commenters also state that due to seismic risks, all plutonium operations at LANL should immediately cease.

Response: Section 4.1.6 of Volume I of the SPEIS addresses seismic issues at LANL and Comment Responses 7.0, 14.F.1, 14.K.12, 14.N.8 and 19.E provide additional information on the seismic issues at LANL and the Justification for Continued Operation under which the laboratory's facilities operate. NNSA decided to construct the CMRR–NF largely because the CMR facility cannot be modified to safely operate for many more years (see the basis for decision for plutonium research and development and operations above).

In addition to the comments that were essentially identical to ones submitted on the Draft SPEIS and to which NNSA responded to in the Final SPEIS, NNSA received the following new comments.

1. Some commenters stated they were unable to identify responses in the Final SPEIS to some of their comments.

Response: NNSA reviewed the comments it received to ensure that responses had been included in the Final SPEIS. Based on this review, NNSA concluded that it had provided appropriate responses for all comments and that responses to these commenters' submissions were included in the Final SPEIS.

2. The April 9, 2008, comments of the New Mexico Conference of Catholic Bishops, in a letter signed by Most Rev. Michael J. Sheehan, Archbishop of Santa Fe, and Most Rev. Ricardo Ramirez, CSB, Bishop of Las Cruces, were omitted from the SPEIS's text and compact disc (CD).

Response: NNSA does not have any record of receiving the letter identified above prior to issuing the Final SPEIS. However, NNSA contacted the commenter and requested a copy of the letter. That letter raised questions and issues related to: Potential violations of treaties; an international arms race; whether transformation of LANL will result in a more responsive infrastructure; whether the proposed transformation of the complex is based on a Nuclear Posture Review conducted before or after September 11, 2001; the type of Congressional support that has been received; and the costs and funding source for decontamination and decommissioning. NNSA reviewed these comments and concluded that the Final SPEIS addresses each of them.

3. A commenter asserted that the Scarboro community, within 5 miles of the Y–12 facility, is disproportionately impacted, historically and currently, by the pollutants released on the Oak Ridge Reservation. This commenter also urged NNSA to refrain from issuing a ROD for the SPEIS until it commissions and receives an independent study of canned subassembly/secondary reliability, indicating whether a UPF is actually necessary; and until NNSA prepares a supplemental EIS considering the nonproliferation impacts of the proposed action.

Response: NNSA conducted its Environmental Justice analysis consistent with the requirements of the applicable Executive Order and related guidance. Section 14.J of Volume III, Chapter III, addresses the Environmental Justice comments received during the comment period. The Scarboro community is identified as the closest developed area to Y–12 (see Volume II, Chapter 4, Section 4.9.2 of the SPEIS). The analysis in the SPEIS did not result in any disproportionately high and adverse impacts on any minority or low-income populations at Y–12 (see Volume II, Chapter 5, Sections 5.9.10, 5.9.11, and 5.9.12 of the SPEIS). The reasons for NNSA's decision to proceed with a UPF are set forth above in the discussion of uranium manufacturing and research and development. Comment Response 1.F, Volume III, Chapter III, addresses the nonproliferation impacts of Complex Transformation.

4. The Comment Response Document does not include several public petitions, including one from members of Santa Clara Pueblo supporting the comments made by the Tribal Council of Santa Clara Pueblo. Another petition circulated by youth in the Espanola Valley by the Community Service Organization del Norte (CSO del Norte) is also omitted. Many of the individual comment letters from people living in the Rio Embudo Watershed are missing as well. There is no listing of the names of these commenters in Tables 1.3–3, 1.3–4, 1.3–5 or 1.3–6. The listing of the "Campaign Comment Documents" fails to give any indication of the leaders of the campaigns or any geographic reference, unless one flips through that section of the document.

Response: NNSA received approximately 100,000 comment documents on the Draft SPEIS from federal agencies; state, local, and tribal governments; public and private organizations; and individuals. In addition, during the 20 public hearings that NNSA held, more than 600 speakers made oral comments. NNSA made every effort to include all comment documents in the SPEIS and to identify and to address every comment. Because it would be impractical to list the names of all commenters who submitted campaign e-mails, letters, and postcards, those names are provided electronically in the CD version of the SPEIS and on the project Web site (*http://www.ComplexTransformationSPEIS.com*). In addition, the CD contains additional information on the public comment period and includes meeting transcripts and signatories for campaign documents and petitions. With regard to the petition from members of the Santa Clara Pueblo, NNSA believes this petition was submitted as a comment on the 2008 LANL SWEIS and not as a comment on the SPEIS. NNSA responded to the petition in the ROD it issued in September that was based on the SWEIS. If any comment documents or petitions were omitted from the SPEIS, NNSA regrets that.

5. In Comment Response 14.K.11, Chapter III, Volume III of the SPEIS, NNSA, in response to a comment related to under-reported historic radiation emissions, stated that it was "unaware of any published CDC [Centers for Disease Control and Prevention] study with findings as described by the commenter." The commenter had provided a reference to a Los Alamos Historical Document Retrieval and Assessment Project report for documentation of their claim that "DOE has grossly under-reported historic radiation emissions by nearly 60-fold."

Response: NNSA reviewed the Los Alamos Historical Document Retrieval and Assessment Project report, and NNSA stands by Comment Response 14.K.11, Chapter III, Volume III of the SPEIS, which states that, "Chapter 4, Section 4.6.1, of the LANL SWEIS (LANL 2008) shows the radiation doses received over the past 10 years from LANL operations by the surrounding population and hypothetical maximally exposed individual (MEI). The annual dose to the hypothetical MEI has consistently been smaller than the annual 10-millirem radiation dose limit established for airborne emissions by the U.S. Environmental Protection Agency. The final LANL Public Health Assessment, by the Agency for Toxic Substances and Disease Registry, reports that "there is no evidence of contamination from LANL that might be expected to result in ill health to the community," and that "overall, cancer rates in the Los Alamos area are similar to cancer rates found in other communities" (Agency for Toxic Substances and Disease Registry, *Public Health Assessment, Final, Los Alamos National Laboratory,* 2006).

6. A commenter noted that Comment Response 14.J.4, Chapter III, Volume III, of the SPEIS incorrectly refers the reader to Appendix D for a description of the accident analysis.

Response: The reference to Appendix D is incorrect. The correct reference should have been to Appendix C. NNSA regrets the confusion caused by this error.

7. A commenter stated that NNSA made a commitment to refrain from making a siting decision on the UPF until the Y–12 SWEIS is completed.

Response: NNSA did not make such a commitment. This ROD explains NNSA's decision to construct a UPF at Y–12 based on the analysis contained in the SPEIS and other factors. This decision is not a decision as to where at Y–12 the new facility would be located or its size. Those decisions will be made based on the more detailed analysis in the Y–12 SWEIS. Additionally, the Y–12 SWEIS will include one or more alternatives that do not include a UPF. The public will have the opportunity to review and comment on the Draft SWEIS when it is prepared.

8. With respect to the new section (Section 6.4) that NNSA added to the Final SPEIS to provide more information on the potential cumulative impacts of nuclear activities in New Mexico, one commenter stated that Pantex should be added to that cumulative assessment because it is just

as close to WIPP and to LANL as WIPP and LANL are to each other. Another commenter stated that the impacts of the WSMR should be included in that assessment.

Response: NNSA added Section 6.4 in response to public comments on the Draft SPEIS that requested an analysis of cumulative impacts for the three DOE nuclear Facilities in New Mexico, as well as other major planned or proposed nuclear facilities in the state. In part, these comments stated that the regions of influence for LANL and SNL/NM overlap and that all three DOE sites are along the Rio Grande corridor in New Mexico. NNSA believes that Section 6.4 is adequate and responsive to public comments received regarding the cumulative impact assessment of nuclear activities in New Mexico. As Pantex is not located in New Mexico, and its region of influence does not extend into New Mexico, it was not included in Section 6.4. Also, because the WSMR does not conduct nuclear activities, it was not included in Section 6.4.

9. A commenter stated that the socioeconomic impacts described in the SPEIS are "incomplete and vague," and asked for an explanation regarding the economic multiplier used in the analysis.

Response: NNSA reviewed this comment and believes that the socioeconomic analyses contained in the SPEIS are appropriate and comply with NEPA's requirements. The economic multipliers used in the SPEIS vary by location and are consistent with the multipliers estimated by the U.S. Bureau of Labor Statistics and multipliers used in other NEPA documents.

10. The SPEIS failed to address impacts on global warming.

Response: The SPEIS assesses the direct, indirect, and cumulative environmental impacts of the No Action Alternative and reasonable alternatives for the proposed action. The assessment of impacts includes, where appropriate, the direct and indirect contributions to the emission of greenhouse gases resulting from operation and transformation of the nuclear weapons complex. As to the programmatic alternatives analyzed in the SPEIS, the direct impacts would result from the construction and operation of major facilities involved in operations using SNM (e.g., a CPC, CNPC, CMRR–NF, UPF), and from the transportation of components, materials and waste. The emissions of carbon dioxide (CO_2) from construction and operation of proposed major facilities are estimated in Chapter 5 (see Tables 5.1.4–1 and 5.1.4–3 in Section 5.1.4 of Chapter 5, Volume II of the SPEIS). The potential emissions from transportation are a direct function of numbers of trips and their distances. The significant differences among the various programmatic alternatives as to transportation also appear in Chapter 5 (see Section 5.10 of Chapter 5, Volume II of the SPEIS).

The indirect impacts of the programmatic alternatives would result primarily from the use of electricity that is generated from the mix of generating capacities (gas, coal, nuclear, wind, geothermal, etc.) operated by the utilities NNSA purchases power from; these utilities may alter that mix in the future regardless of the decisions NNSA makes regarding transformation of the complex. The use of electricity under the programmatic alternatives is shown in Chapter 5 (see Tables 5.1.3–1 and 5.1.3–2 in Section 5.1.3 of Chapter 5, Volume II of the SPEIS).

Overall, the release of greenhouse gases from the nuclear weapons complex constitutes a miniscule contribution to the release of these gases in the United States and the world. Overall U.S. greenhouse gas emissions in 2007 totaled about 7,282 million metric tons of CO_2 equivalents, including about 6,022 million metric tons of CO_2. These emissions resulted primarily from fossil fuel combustion and industrial processes. About 40 percent of CO_2 emissions come from the generation of electrical power (Energy Information Administration, "Emissions of Greenhouse Gases in the United States 2007," DOE/EIA–0573 [2007]).

As the impacts of greenhouse gas releases on climate change are inherently cumulative, NNSA, and the DOE as a whole, strive to reduce their contributions to this cumulatively significant impact in making decisions regarding their ongoing and proposed actions. DOE's efforts to reduce emissions of greenhouse gases extend from research on carbon sequestration and new energy efficient technologies to making its own operations more efficient in order to reduce energy consumption and thereby decrease its contributions to greenhouse gases.

NNSA considers the potential cumulative impact of climate change in making decisions regarding its activities, including decisions regarding continuing the transformation of the nuclear weapons complex. Many of these decisions are applicable to the broad array of NNSA's activities, and therefore are independent of decisions regarding complex transformation. For example, NNSA (and other elements of the Department) are entering into energy savings performance contracts at its sites, under which a contractor examines all aspects of a site's operation for ways to improve energy use and efficiency. Also, NNSA seeks to reduce its contribution to climate change through decisions regarding individual actions, such as pursuing LEED certification for its new construction and refurbishment of its aging infrastructure. Examples of these decisions include projects that replace aging boilers and chillers with equipment that is more energy efficient. Such projects are underway at Y–12, SNL/NM, and LANL ("DOE Announces Contracts to Achieve $140 Million in Energy Efficiency Improvements to DOE Facilities," August 4, 2008, available at: *http://www.energy.gov/6449.htm*).

NNSA considered its contributions to the cumulative impacts that may lead to climate change in making the programmatic decisions announced in this ROD. These decisions will allow NNSA to reduce its greenhouse gas emissions by consolidating operations, modernizing its heating, cooling and production equipment, and replacing old facilities with ones that are more energy efficient. Many of these actions would not be feasible if NNSA had selected the No Action Alternative, which would have required it to maintain the Complex's outdated infrastructure. Federal regulations and DOE Orders require the Department of Energy to follow energy-efficient and sustainable principles in its siting, design, construction, and operation of new facilities, and in major renovations of existing facilities. These principles, which will apply to construction and operation of a UPF at Y–12 and the CMRR–NF at LANL, as well as to other facilities, include features that conserve energy and reduce greenhouse gas emissions.

Issued at Washington, DC, this 15th day of December 2008.

Thomas P. D'Agostino,

Administrator, National Nuclear Administration.

[FR Doc. E8–30193 Filed 12–18–08; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

National Nuclear Security Administration

Record of Decision: Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory, Los Alamos, NM

AGENCY: Department of Energy, National Nuclear Security Administration.

ACTION: Record of decision.

SUMMARY: The National Nuclear Security Administration (NNSA) of the U.S. Department of Energy (DOE) is issuing this Record of Decision (ROD) for the continued operation of the Los Alamos National Laboratory (LANL) in Los Alamos, New Mexico. This ROD is based on information and analyses contained in the *Final Site-Wide Environmental Impact Statement for the Continued Operation of Los Alamos National Laboratory, Los Alamos, New Mexico,* DOE/EIS–0380 (Final SWEIS or 2008 SWEIS) issued on May 16, 2008; comments on the SWEIS; and other factors, including costs, security considerations and the missions of NNSA.

In the 2008 SWEIS, NNSA assessed three alternatives for the continued operation of LANL: (1) No Action, (2) Reduced Operations, and (3) Expanded Operations. The No Action Alternative analyzed in this SWEIS consists of NNSA and LANL continuing to implement earlier decisions based on previous National Environmental Policy Act (NEPA) reviews, including the 1999 LANL SWEIS (DOE/EIS–0238) and its ROD (64 FR 50797, Sept. 20, 1999). The 2008 SWEIS identified the Expanded Operations Alternative as NNSA's Preferred Alternative. The SWEIS includes a classified appendix that assesses the potential environmental

impacts of a representative set of credible terrorist scenarios.

Because NNSA is continuing to evaluate significant technical and national security issues that could affect the operation and missions of LANL, NNSA is making only a few decisions at this time regarding the continued operation of the laboratory. NNSA will not make any decisions regarding nuclear weapons production and other actions analyzed in the Complex Transformation Supplemental Programmatic Environmental Impact Statement (DOE/EIS–0236–S4) (Complex Transformation SPEIS or SPEIS) prior to the completion of the SPEIS. However, NNSA must make some decisions now regarding LANL to support the safe and successful execution of the laboratory's current missions. It is likely that NNSA will issue other RODs regarding the continued operation of LANL based on the 2008 SWEIS, the SPEIS and other NEPA analyses.

NNSA has decided to continue to implement the No Action Alternative with the addition of some elements of the Expanded Operations Alternative. These elements include increases in operation of some existing facilities and new facility projects needed for ongoing programs and protection of workers and the environment. For the most part, NNSA will continue the missions conducted at LANL at current levels at this time. NNSA will also continue to implement actions necessary to comply with the March 2005 Compliance Order on Consent (Consent Order), which requires investigation and remediation of environmental contamination at LANL. NNSA will not change pit production at LANL at this time; the 1999 ROD set pit production at LANL at 20 per year.

FOR FURTHER INFORMATION CONTACT: For further information on the 2008 LANL SWEIS or this ROD, or to receive a copy of this SWEIS or ROD, contact: Ms. Elizabeth Withers, Document Manager, U.S. Department of Energy, National Nuclear Security Administration Service Center, Post Office Box 5400, Albuquerque, NM 87185, (505) 845–4984. Questions about the SWEIS, ROD and other issues regarding the Los Alamos Site Office's NEPA compliance program may also be addressed to Mr. George J. Rael, Assistant Manager Environmental Operations, NEPA Compliance Officer, U.S. Department of Energy, National Nuclear Security Administration, Los Alamos Site Office, 3747 West Jemez Road, Los Alamos, NM 87544. Mr. Rael may be contacted by telephone at (505) 665–0308, or by e-mail at: *LASO.SWEIS@doeal.gov*. For information on the DOE NEPA process, contact: Ms. Carol M. Borgstrom, Director, Office of NEPA Policy and Compliance (GC–20), U.S. Department of Energy, 1000 Independence Avenue, SW., Washington, DC 20585, (202) 586–4600, or leave a message at (800) 472–2756. Additional information regarding DOE NEPA activities and access to many DOE NEPA documents are available on the Internet through the DOE NEPA Web site at: *http://www.gc.energy.gov/nepa/*.

SUPPLEMENTARY INFORMATION:

Background

NNSA prepared this ROD pursuant to the regulations of the Council on Environmental Quality (CEQ) for implementing NEPA (40 CFR Parts 1500–1508) and DOE's NEPA Implementing Procedures (10 CFR Part 1021). DOE last issued a SWEIS and ROD for the continued operation of LANL in 1999. DOE's NEPA regulations require that the Department evaluate site-wide NEPA analyses every five years to determine their continued applicability; NNSA initiated such an evaluation of the 1999 SWEIS in 2004. It subsequently decided to prepare a new SWEIS. NNSA issued a Draft SWEIS in July 2006 for public review and comment during a 75-day period. It considered the comments received on the Draft SWEIS in preparing the Final SWEIS, which it issued on May 16, 2008.

LANL is a multidisciplinary, multipurpose research institution in north-central New Mexico, about 60 miles (97 kilometers) north-northeast of Albuquerque, and about 25 miles (40 kilometers) northwest of Santa Fe. LANL occupies approximately 25,600 acres (10,360 hectares), or 40 square miles (104 square kilometers). About 2,000 structures, with a total of approximately 8.6 million square feet under roof, house LANL operations and activities, with about one half of the area used as laboratory or production space, and the remainder used for administrative, storage, services, and other purposes.

LANL is one of NNSA's three national security laboratories. Facilities and expertise at LANL are used to perform science and engineering research; the laboratory also manufactures some nuclear weapons components such as plutonium pits. In addition to weapons component manufacturing, LANL performs weapons testing, stockpile assurance, component replacement, surveillance, and maintenance. LANL's research and development activities include high explosives processing, chemical research, nuclear physics research, materials science research, systems analysis and engineering, human genome mapping, biotechnology applications, and remote sensing technologies. The main role of LANL in the fulfillment of NNSA and DOE missions is scientific and technological work that supports nuclear materials handling, processing, and fabrication; stockpile management; materials and manufacturing technologies; nonproliferation programs; and waste management activities. Work at LANL is also conducted for other Federal agencies such as the Departments of Defense and Homeland Security, as well as universities, institutions, and private entities.

Alternatives Considered

The alternatives NNSA evaluated in the SWEIS span a range of operations from minimum levels that would maintain essential mission capabilities (Reduced Operations Alternative) through the highest reasonably foreseeable levels that could be supported by current or new facilities (Expanded Operations Alternative). The No Action Alternative evaluated in the SWEIS consists of the continued implementation of decisions announced in the 1999 SWEIS ROD and decisions based on other completed NEPA reviews. The Reduced Operations Alternative assumes a reduction in the levels of certain operations and activities from the levels evaluated in the No Action Alternative. The Expanded Operations Alternative includes activities evaluated in the No Action Alternative, increases in overall operational levels, and new projects that fall into three categories: (1) Projects to maintain existing operations and capabilities (such as projects to replace aging structures with modern ones, and projects to consolidate operations and eliminate unneeded structures); (2) projects that support environmental remediation at LANL and compliance with the Consent Order, including demolition of excess buildings; and (3) projects that add new infrastructure and expand existing capabilities.

Compliance With the Consent Order

NNSA and LANL will continue to implement actions necessary to comply with the Consent Order, which requires the investigation and remediation of environmental contamination at LANL, regardless of the alternative it selects for the continued operation of the laboratory. The 2008 SWEIS analyzes the environmental impacts of actions required under the Consent Order,[1] and actions proposed by NNSA to facilitate its compliance with the Order (such as replacement of waste management structures, and establishment of waste examination and staging areas) under the Expanded Operations Alternative so that the impacts of these actions can be distinguished from the impacts of other proposed actions.

Preferred Alternative

The preferred alternative is the alternative that NNSA believes would best fulfill its statutory mission responsibilities while giving consideration to economic, budget, environmental, schedule, policy, technical and other information. In both the Draft and the Final SWEIS, NNSA identified the Expanded Operations Alternative as its preferred alternative.

Environmentally Preferable Alternative

NEPA's Section 101 (42 U.S.C. 4331) establishes a policy of federal agencies having a continuing responsibility to improve and coordinate their plans, functions, programs and resources so that, among other goals, the nation may fulfill its responsibilities as a trustee of the environment for succeeding generations. The Council on Environmental Quality (CEQ), in its "Forty Most Asked Questions Concerning CEQ's NEPA Regulations" (46 FR 18026, Feb. 23, 1981), defines the "environmentally preferable alternative" as the alternative "that will promote the national environmental policy expressed in NEPA's Section 101."

The analyses in the SWEIS of the environmental impacts associated with operating LANL identified only minor differences among the three alternatives across natural and cultural resource areas. Within each of the alternatives there are actions that could result in negative impacts, as well as those that would produce positive environmental effects. Considering the many environmental facets of the alternatives analyzed in the SWEIS, and looking out over the long term, NNSA believes that implementation of the Expanded Operations Alternative would allow it to best achieve its environmental trustee responsibilities under Section 101 of NEPA. Facilitating the cleanup of the site with new or expanded waste management facilities, and replacing older laboratory and production facilities with new buildings that incorporate modern safety, security and efficiency standards, would improve LANL's ability to protect human health and the environment while allowing LANL to continue to fulfill its national security missions. Increasing operational levels and performing various demolition activities would use additional resources and generate additional waste, but NNSA would also undertake actions to modernize and replace older facilities with more energy efficient and environmentally-protective facilities and to implement waste control and environmental practices to minimize impacts. Many of these types of actions are not feasible with the outdated infrastructure currently at LANL. Under this alternative, NNSA would be better positioned to minimize the use of electricity and water, streamline operations through consolidation, reduce the "footprint" of LANL as a whole, and allow some areas to return to a natural state.

NNSA's Responsibilities to Tribal Governments

NNSA recognizes that the operation of LANL over the last 65 years has affected the people of neighboring communities in northern New Mexico, including Tribal communities. These effects, which vary in nature across communities, include alterations of lifestyles, community, and individual practices. With respect to Tribal communities, NNSA adheres to federal statutes such as the Native American Graves Protection and Repatriation Act, the Archaeological Resources Protection Act, the American Indian Religious Freedom Act, and the National Historic Preservation Act. NNSA follows Executive Order 13175, *Consultation and Coordination with Indian Tribal Governments*; Executive Order 13007, *Indian Sacred Sites*; Executive Order 13021, *Tribal Colleges and Universities*; and Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. NNSA also follows the 2004 Presidential Memorandum regarding Government-to-Government Relationships with Native American Tribal Governments, DOE's American Indian and Alaska Native Tribal Government Policy, DOE Order 1230.2 and DOE Notice 144.1, which establish principles and policies for the Department's relations with Tribes. NNSA has established cooperative agreements with Tribal nations that are located near NNSA sites to enhance their involvement in environmental restoration while protecting Tribal rights and resources.

Four Pueblo governments in the vicinity of LANL have signed individual Accord Agreements with NNSA (Santa Clara, San Ildefonso, Cochiti, and Jemez). The Accord Agreements, together with the recently established Environmental Management/NNSA tribal framework, provide a basis for conducting government-to-government relations and serve as a foundation for addressing issues of mutual concern between the Department and the Pueblos. In furtherance of these Accord Agreements, and specifically to address concerns and issues raised by the Santa Clara Pueblo, the implementation of the decisions in this ROD will be undertaken in conjunction with a Mitigation Action Plan (MAP), which will be updated as needed to address specific concerns and issues raised by the Santa Clara and other Tribal communities.

Environmental Impacts of Alternatives

NNSA analyzed the potential impacts of each alternative on land use; visual resources; site infrastructure; air quality; noise; geology and soils; surface and groundwater quality; ecological resources; cultural and paleontological resources; socioeconomics; human health impacts; environmental justice; and waste management and pollution prevention. NNSA also evaluated the impacts of each alternative as to irreversible or irretrievable commitments of resources, and the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity. In addition, it evaluated impacts of potential accidents at LANL on workers and surrounding populations. In a classified appendix, NNSA also evaluated the potential impacts of intentional destructive acts that might occur at LANL.

The 2008 SWEIS's impact analyses for normal operations (i.e., operations without accidents or intentional destructive acts) identified the most notable differences in potential environmental impacts among the alternatives in the following resource areas: *geology and soils; radiological air quality; human health; site infrastructure (electric power use, natural gas demand, potable water demand, and waste management demands); and transportation*. It also identified minor differences in potential environmental impacts among the alternatives under normal operations for: *land use; visual environment; surface water resources; groundwater resources; non-radiological air quality; noise levels; ecological resources; cultural resources; and socioeconomics.*

[1] The Consent Order was issued by the New Mexico Environment Department (NMED). As NMED makes the decisions regarding the requirements of the Order, these decisions are not subject to NEPA because they are not "federal actions."

These findings are described in the Summary and Chapters 4 and 5 of the SWEIS.

Environmental justice was an impact area of particular concern among those who commented on the SWEIS. NNSA recognizes that the operation of LANL over the last 65 years has affected the people of neighboring communities, including minority and low-income households. These effects, which vary in nature across communities, include alterations of lifestyles, community, and individual practices. Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires every Federal agency to analyze whether its proposed actions and alternatives would have disproportionately high and adverse impacts on minority or low-income populations. Based on the impacts analysis, NNSA expects no disproportionately high and adverse impacts on minority or low-income populations from the continued operation of LANL under any of the alternatives. From the analysis conducted of the alternatives, the radiological dose from emissions from normal operations are slightly lower for members of Hispanic, Native American, total minority, and low-income populations than for members of the population that are not in these groups, mainly because of the locations of these populations relative to the operations at LANL that produce these emissions. The maximum annual dose for the average member of any of the minority or low-income populations is estimated to be 0.092 millirem compared to a dose of 0.10 millirem for a member of the general population, and a dose of 0.11 millirem for a member of the population that does not belong to a minority or low-income group.

NNSA also analyzed human health impacts from exposure through special pathways, including subsistence consumption of native vegetation (piñon nuts and Indian Tea [Cota]), locally grown produce and farm products, groundwater, surface waters, fish (game and nongame), game animals, other foodstuffs and incidental consumption of soils and sediments (on produce, in surface water, and from ingestion of inhaled dust). These special pathways can be important to the environmental justice analyses because some of them may be more important or prevalent as to the traditional and cultural practices of members of minority populations in the area. The analyses conducted for the 2008 SWEIS, however, show that the health impacts associated with these special pathways do not result in disproportionately high and adverse impacts to minority or low-income populations.

The SWEIS analyzed potential accidents at LANL. Bounding accidents for both nuclear materials handling and waste management operations and for chemical handling and waste management operations, were identified as those with the highest potential consequences to the offsite population under median site meteorological conditions. Chemicals of concern were selected from a database based on quantities, chemical properties, and human health effects. In making the decisions announced in this ROD, NNSA considered the potential accidents analyzed in the SWEIS for each of the three alternative levels of LANL operations. For the most part, there are few differences among the alternatives for the maximum potential wildfire, seismic, or facility operational accident at LANL because actions under each alternative do not, for the most part, affect the location, frequency, or material at risk of the analyzed accident scenarios. Potential accidents that could occur under the No Action Alternative could also occur under both the Reduced Operations and the Expanded Operations Alternatives. In general, TA–54 waste management operations dominate the potential radiological accident risks and consequences at LANL under all three alternatives.

Under both the No Action and the Reduced Operations Alternatives, the accident with the highest estimated consequences to offsite populations involving radioactive material or wastes is a lightning-initiated fire at the Radioassay and Nondestructive Testing Facility in TA–54. Such an accident could result in up to 6 additional latent cancer fatalities (LCFs) in the offsite population. A fire at the Plutonium Facility's material staging area located within TA–55 could result in up to 5 additional LCFs in the offsite population. The potential accident expected to result in the highest estimated consequences to the hypothetical maximally exposed individual (MEI) and a non-involved nearby worker would be a fire in a waste storage dome at TA–54. If that accident were to occur, a single LCF to a noninvolved worker located 110 yards (100 meters) away from the site of the accident would be likely, and there could also be a 1 in 2 likelihood (0.50) of a LCF to the MEI, who is assumed to be located at the nearest site boundary for the duration of the accident. The lightning-initiated fire accident at the Radioassay and Nondestructive Testing Facility could also result in a single LCF to a noninvolved worker located 110 yards (100 meters) away from the site of the accident, and could also result in about the same 1 in 2 likelihood (0.49) of a LCF to the MEI assumed to be located at the nearest boundary for the duration of the accident.

Under the Expanded Operations Alternative, there is a potential for a radiological accident unique to this alternative. The radiological accident most likely to result in the highest estimated consequences to the offsite population is a building fire involving radioactive sealed sources stored at the Chemistry and Metallurgy Research Building. Such an accident could result in up to 7 additional LCFs in the offsite population. The potential accident expected to result in the highest estimated consequences to the hypothetical MEI and a non-involved nearby worker would be the same as for the No Action Alternative, namely, a fire in a waste storage dome at TA–54.

DOE evaluates the exposure risks associated with chemicals of concern and the requirements for crisis response personnel to use personal protection to avoid potentially dangerous exposures through its system of Emergency Response Planning Guidelines (ERPG). Chemicals of concern in the analyzed accidents at LANL under both the No Action and Reduced Operations Alternatives include selenium hexafluoride and sulfur dioxide, both from waste cylinder storage at TA–54, and chlorine and helium gases located at TA–55. Annual risks of worker and public exposure in the event of chemical releases are greatest from chlorine and helium gases. The annual risk is estimated to be about one chance in 15 years for workers within 1,181 yards (1,080 meters) of the facility receiving exposures in excess of the ERPG limits for chlorine gas, with the nearest public access located at 1,111 yards (1,016 meters). The annual risk is estimated to be about one chance in 15 years for workers within 203 yards (186 meters) of the facility receiving exposures in excess of ERPG limits for helium gas, with the nearest public access at 1,146 yards (1,048 meters).

Cleanup activities of Material Disposal Areas (MDAs) are analyzed under the Expanded Operations Alternative. These activities pose a risk of accidental releases of toxic chemicals, as there is a degree of uncertainty about how much and what chemicals were disposed of in the MDAs. MDA B is the closest disposal area to the boundary of LANL that will require remediation; remediation by waste removal was assumed for the analysis of a bounding accidental chemical release. Sulfur dioxide gas and beryllium powder were chosen as the bounding chemicals of concern for this area based on their ERPG values. If present at MDA B in the quantities assumed, both of these chemicals would likely dissipate to safe levels very close to the point of their release. However, there is a potential risk to the public due to the short distance between MDA B and the nearest point where a member of the public might be.

Comments on the Final Site-Wide Environmental Impact Statement

NNSA distributed more than 1,030 copies of the Final SWEIS to Congressional members and committees, the State of New Mexico, Tribal governments and organizations, local governments, other Federal agencies, non-governmental organizations, and individuals. NNSA received comments on the Final SWEIS from the Santa Clara Indian Pueblo; the Members and Residents of Santa Clara Pueblo; Concerned Citizens for Nuclear Safety, together with Robert H. Gilkeson and the Embudo Valley Environmental Monitoring Group; Citizen Action New Mexico; Nuclear Watch New Mexico; Citizens for Alternatives to Radioactive Dumping, and from nearby farmers.

Comments on the Final SWEIS included issues already raised during the comment period for the Draft SWEIS. Volume 3 of the Final SWEIS contains all comments received on the Draft SWEIS and NNSA's responses to them; this chapter also describes how these comments resulted in changes to the SWEIS.

The Santa Clara Indian Pueblo identified three main areas of concern: (1) Government-to-government consultation should have taken place before the issuance of the Final SWEIS; (2) environmental justice issues (including cumulative impacts) were not analyzed properly in the Final SWEIS; and (3) going forward with an increase in plutonium pit production at this time would be premature and violate NEPA. In a letter signed by 226 individuals, the Members and Residents of the Santa Clara Pueblo stated their support for comments on the SWEIS submitted by the tribal leaders. They also stated their opposition to increased plutonium pit production and specifically asked "that (1) proper analysis of environmental justice and accumulative impacts be completed and circulated to the public for comments; (2) that NNSA/DOE honor government-to-government consultation and the process as a trust to Indian Tribes (Santa Clara Pueblo); and (3) that no decision about increasing plutonium pit production be made until review of this issue mandated in a new law (the National Defense Authorization Act for Fiscal Year 2008) is completed."

To the extent that Santa Clara Pueblo perceived NNSA's action in delaying government-to-government consultation until after the issuance of the Final SWEIS and before the issuance of this ROD to be inconsistent with appropriate protocol for such consultations, this was not intended. NNSA believes that it followed the requirements of DOE Order 1230.2, *U.S. Department of Energy American Indian and Alaska Native Tribal Government Policy*, in consulting through the formal government-to-government process with Santa Clara Pueblo prior to making the decisions announced in this ROD. However, given the two-year time period between the issuance of the Draft SWEIS in 2006 and the issuance of the Final SWEIS in 2008, NNSA acknowledges that it could have been more prompt in engaging in government-to-government consultation with the Santa Clara Pueblo. NNSA will work to improve its consultation process.

With regard to the impact analysis of environmental justice issues (including cumulative impacts) in the Final SWEIS, NNSA believes that it appropriately analyzed the potential for disproportionately high and adverse impacts to minority and low-income populations located within a 50-mile radius of LANL under all alternatives, and that it also appropriately analyzed cumulative impacts to the extent that future actions are known or foreseeable. However, NNSA recognizes that many of the concerns the Santa Clara expressed are rooted in protected cultural and religious practices of its people. With this in mind, NNSA will undertake implementation of the decisions announced in this ROD in conjunction with a MAP. The MAP will be updated as the need arises to identify actions that would address specific concerns and issues raised by the Santa Clara as well as those of other tribal entities in the area of LANL.

NNSA agrees that decisions at this time on proposed actions analyzed in the Complex Transformation SPEIS, including decisions regarding the number of plutonium pits LANL will produce, would be premature. NNSA will not make any decisions on pit production until after it completes the SPEIS.

Concerned Citizens for Nuclear Safety, together with Robert H. Gilkeson and the Embudo Valley Environmental Monitoring Group, raised several concerns with the Final SWEIS: issuance of the Final SWEIS is premature because there could be a future Congressional change in the purpose and need to operate LANL; there is an uncertain seismic hazard at LANL; the Final SWEIS does not comply with NEPA because it omitted an analysis of prime farmland; LANL does not have a reliable network of monitoring wells; radionuclides have been found in the drinking water wells of Los Alamos County, San Ildefonso Pueblo, and Santa Fe; and storm flow and sediment transport are primary mechanisms for potential contaminant transport beyond LANL's boundaries.

NNSA does not agree that issuance of the Final SWEIS and a ROD is premature. Should Congress or the President direct changes regarding the purpose and need to operate LANL, NNSA may need to conduct additional NEPA reviews or amend this ROD. Federal agencies always face the possibility that in the future the Congress or the President may direct changes in their missions and responsibilities. At this time, NNSA is making only a limited set of decisions regarding actions that need to be implemented now. These decisions do not limit or prejudice the decisions NNSA may make regarding the programmatic alternatives it is evaluating in the Complex Transformation SPEIS.

New information about seismic risks at LANL (set forth in the report *Update of the Probabilistic Seismic Hazard Analysis and Development of Seismic Design Ground Motions at the Los Alamos National Laboratory, 2007, LA-UR-07-3965*) may change how hazardous materials are stored, operations are conducted, and facilities are constructed or renovated. NNSA is conducting a systematic review of LANL structures and operations in light of this information. This review, expected to be completed in about one year, will identify any necessary changes to address the new seismic information. NNSA will then implement the necessary changes to LANL facilities and operations based on the review's recommendations.

NNSA contacted the U.S. Department of Agriculture regarding prime farmland designations in northern New Mexico and included that information in Chapter 4 of the Final SWEIS. No farmland designated by that agency as "prime farmland" is located within Los Alamos or Santa Fe Counties, and only a limited amount of prime farmland is located within a 50-mile radius of LANL in Sandoval and Rio Arriba Counties. The Farmland Protection Policy Act requires that projects receiving Federal funds that would result in the permanent conversion of prime farmland to non-farmland (or remove its prime rating) must develop and consider alternatives that would not result in the conversion. None of the proposed actions at LANL under any of the alternatives would result in changes to any designated prime farmland or cause it to be re-designated as non-prime farmland.

Information about the network of monitoring wells, including existing and planned wells, is provided in Chapter 4 of the Final SWEIS. NNSA acknowledges that past well installation practices have not produced the desired network, and will continue to install and refurbish wells until adequate information is obtained regarding groundwater conditions and contaminant transport within the aquifers in the LANL area. Contaminants identified in various drinking water wells are being monitored, and drinking water production from these wells may be adjusted or discontinued in compliance with health protection standards. Additional study of aquifer conditions and contaminant transport is needed before long-term corrective actions can be identified and implemented. Contaminant transport via surface water flow and sediment transport is recognized as the primary mechanisms for off-site transport, especially after storms. As the watershed recovers from the effects of the Cerro Grande Fire in 2000, the volumes of storm water runoff are expected to decrease.

Citizen Action New Mexico stated its opposition to the Expanded Operations Alternative, especially expanded nuclear weapons research and production, and asserted that the Final SWEIS did not consider the increased impact of plutonium production on children in compliance with Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks*.

NNSA believes it has complied with this Executive Order in the Final SWEIS. NNSA now uses a more conservative dose-to-risk conversion factor in assessing risks of radiation exposures as a result of this Order. Use of the new dose-to-risk conversion factor is one of the changes noted in NNSA's NEPA process since the issuance of the 1999 SWEIS (Chapter 6 and Appendix C of the SWEIS). As noted previously, NNSA is not making any decisions at this time that would result in expansion of nuclear weapons production.

In comments on the Final SWEIS, Nuclear Watch New Mexico (NWNM) stated that: Expanded plutonium pit production is not necessary; potential impacts of the proposed Radiological Science Institute are not adequately analyzed in the Final SWEIS and that a project-specific EIS is necessary for the institute; waste volumes identified in the Final SWEIS do not reconcile with those in NNSA's Draft Complex Transformation Supplemental Programmatic EIS; there is confusion about whether the proposed Advanced Fuel Cycle Facility, which is the subject of another DOE programmatic EIS, *The Global Nuclear Energy Partnership Programmatic EIS* (the GNEP PEIS), would be used for research and development or for full-scale reprocessing (and the number of associated facilities that could be located at LANL); and the Los Alamos Science Complex should be funded through the traditional Congressional budgetary authorization and appropriation process.

NNSA believes that it appropriately analyzed the potential impacts of the Radiological Science Institute in the Final SWEIS to the extent possible at this stage of the project planning process, and acknowledged in the Final SWEIS that additional NEPA analyses may be necessary if NNSA decides to continue with this proposal. NNSA will reconcile and update waste volumes in the Final Complex Transformation SPEIS. DOE has decided to eliminate the Advanced Fuel Cycle Facility from consideration in the GNEP PEIS (for more information, please visit: *http://www.gnep.energy.gov*). NNSA is considering the use of alternative financing for the Los Alamos Science Complex; this is an appropriate financing approach in certain situations although it has been rarely used at LANL.

NWNM also asked for additional clarification of some of NNSA's responses to its comments on the Draft SWEIS and provided additional information regarding some of their previous comments. Specifically, NWNM asked if all current tests using plutonium at the Dual Axis Radiographic Hydrodynamic Test Facility (DARHT) are conducted inside vessels.

At present, NNSA is not conducting any tests at DARHT that use plutonium, and future tests using plutonium at this facility would be conducted inside vessels.

NWNM asked if the Rendija Canyon Fault is the closest fault to the proposed location of the Radiological Science Institute.

As discussed in the Final SWEIS, it is the closest known fault to that location.

NWNM also requested an unclassified appendix that discusses intentional destructive acts at LANL; asserted there should be a citation to information compiled by the U.S. Department of Commerce's Bureau of Economic Analysis; and asked that the Area G Performance Assessment and Composite Analysis and the geotechnical report recently prepared by LANL be posted on the Internet.

NNSA considered the preparation of an unclassified discussion of the potential environmental impacts of intentional destructive acts at LANL, but concluded that such a discussion posed unacceptable security risks. Information used to prepare the economic impacts analysis was not contained within a discrete study, so a citation is not appropriate in this instance. Unclassified documents prepared by LANL are generally placed on its Internet site when completed and approved for distribution. NWNM may access the LANL Internet site for these specific references.

NWNM correctly pointed out that the Environmental Protection Agency (EPA) had designated the Española Basin as a Sole Source Aquifer in early 2008.

Once EPA designates a sole source aquifer under its Sole Source Aquifer Protection Program, the agency can review proposed projects that are to receive Federal funds and that have a potential to contaminate the aquifer. Under this review, EPA can request changes to a Federally-funded project if it poses a threat to public health by contaminating an aquifer to the point where a safe drinking water standard could be violated. Projects conducted entirely by Federal agencies, or their contractors, at sole source aquifer locations are not subject to EPA's review process. NNSA is not proposing any new projects that would cause the Española Basin aquifer to exceed a safe drinking water standard.

Citizens for Alternatives to Radioactive Dumping also commented on the Final SWEIS. It asserted that expanded pit production is not necessary; that contamination has been found in produce samples; that there is prime farm land in the Embudo Valley; that there are radionuclides in the Rio Grande, which is a threat to its use as drinking water by the city of Santa Fe; and that radioactive cesium has been found in soils at the Trampas Lakes, which drain into the Rio Grande.

As NNSA noted in its response to other comments on the Draft SWEIS, a single "false positive" result was returned from a laboratory analyzing fruit specimens grown near LANL. No uptake of radioactive contamination attributed to LANL operations has been found in produce samples obtained from the Embudo Valley. Drinking water supplies for Santa Fe must meet Safe Drinking Water Act and other state and municipal requirements. Elevated radionuclide concentrations in the soils of alpine lake basins within the Rocky Mountain range have been attributed to global fallout concentrated through snowfall and specific geomorphic conditions.

Decisions

With limited additions, NNSA has decided to continue operation of Los Alamos National Laboratory pursuant to the No Action Alternative analyzed in the 2008 SWEIS. The parameters of this alternative are set by the 1999 ROD and other decisions that NNSA has made previously regarding the continued operation of LANL. The additions to the No Action Alternative NNSA has decided to implement at this time consist of elements of the Expanded Operations Alternative. These elements are of two types: (1) Changes in the level of operations for on-going activities within existing facilities, and (2) new facility projects. The changes in operational levels NNSA has decided to implement at this time are:

• Supporting the Global Threat Reduction Initiative and Off-Site Sources Recovery Project by broadening the types and quantities of radioactive sealed sources (Co-60, Ir-192, Cf-252, Ra-226) that LANL can manage and store prior to their disposal;

• Expanding the capabilities and operational level of the Nicholas C. Metropolis Center for Modeling and Simulation to support the Roadrunner Super Computer platform;

• Performing research to improve beryllium detection and to develop mitigation methods for beryllium dispersion to support industrial health and safety initiatives for beryllium workers; and

• Retrieval and disposition of legacy transuranic waste (approximately 3,100 cubic yards of contact-handled and 130 cubic yards of remote-handled) from belowground storage.

New facility projects involve the design, construction, or renovation of facilities and were analyzed as part of the Expanded Operations Alternative. The facility projects that NNSA has decided to pursue at this time are:

• Planning, design, construction and operation of the Waste Management Facilities Transition projects to facilitate actions required by the Consent Order;

• Repair and replacement of mission critical cooling system components for buildings in TA–55 to enable the continued operation of these buildings and to comply with current environmental standards; and

• Final design of a new Radioactive Liquid Waste Treatment Facility, and design and construction of the Zero Liquid Discharge Facility component of this new treatment facility to enable LANL to continue to treat radioactive liquid wastes.

These projects and actions are needed on an immediate basis to maintain existing capabilities, support existing programs, and provide a safe and environmentally protective work environment at LANL. The need for these increases in operations and new facility projects exists regardless of any decisions NNSA may make regarding the programmatic and project-specific alternatives analyzed in the Complex Transformation SPEIS.

In addition, NNSA will continue to implement actions required by the Consent Order, as noted above, these decisions are not subject to NEPA.

Basis for Decision

NNSA's decisions are based on its mission responsibilities and its need to sustain LANL's ability to operate in a manner that allows it to fulfill its existing responsibilities in an environmentally sound, timely and fiscally prudent manner.

National security policies require NNSA to maintain the nation's nuclear weapons stockpile as well as its core competencies in nuclear weapons. Since completion in 1996 of the *Programmatic Environmental Impact Statement for Stockpile Stewardship and Management* (SSM PEIS) and associated ROD, NNSA and its predecessor, DOE's Office of Defense Programs, has implemented these policies through the Stockpile Stewardship Program (SSP). The SSP emphasizes development and application of improved scientific and technical capabilities to assess the safety, security, and reliability of existing nuclear warheads without the use of nuclear testing. LANL's operations support a wide range of scientific and technological capabilities for NNSA's national security missions, including the SSP. Most of NNSA's missions require research and development capabilities that currently reside at the LANL site. The nuclear facilities in LANL's TA–55 must maintain the nation's nuclear stockpile. Programmatic risks would be unacceptable if LANL did not continue to operate, or if it failed to implement the new decisions set forth above.

NNSA believes that, at this time, existing national security requirements can be met by continuing to conduct operations at current levels with only a limited number of increases in levels of operations and new facility projects. These increases in operations and new projects are needed because of changes in the SSP program and NNSA's nuclear non-proliferation program. They are also needed to meet new responsibilities that have arisen as a result of changes in our national security requirements since 1999. One of the new facility projects is needed to facilitate NNSA's compliance with the Consent Order. The specific rationales for NNSA's decisions to implement seven elements of the Expanded Operations Alternative are:

1. Supporting the Global Threat Reduction Initiative and Off-Site Sources Recovery Project by broadening the types and quantities of radioactive sealed sources (Co-60, Ir-192, Cf-252, Ra-226) that LANL can manage and store prior to their disposal—This decision will allow NNSA to retrieve and store more of these sources, which, if not adequately secured, could be used in a radiation dispersion device (a "dirty bomb").

2. Expanding the capabilities and operational level of the Nicholas C. Metropolis Center for Modeling and Simulation to support the Roadrunner Super Computer platform—This decision will allow NNSA to perform calculations that improve its ability to certify that the nuclear weapons stockpile is reliable without conducting underground nuclear tests. It will also allow LANL to conduct research on global energy challenges and other scientific issues.

3. Performing research to improve detection and mitigation methods for beryllium—This research will support the continued development of methods to capture and sequester beryllium and to expedite sample analysis needed to implement exposure controls to ensure worker safety.

4. Retrieval and disposition of legacy transuranic waste (approximately 3,100 cubic yards of contact-handled and 130 cubic yards of remote-handled) from belowground storage—Retrieving and dispositioning this waste will allow LANL to complete closure and remediation of TA–54 Material Disposal Area G under the Consent Order. This action will reduce risk by removing approximately 105,000 plutonium-239 equivalent curies from LANL.

5. Planning, design, construction and operation of the Waste Management Facilities Transition projects—These projects will replace LANL's existing facilities for solid waste management. The existing facilities at TA–54 for transuranic waste, low-level waste, mixed low-level waste and hazardous/

chemical waste are scheduled for closure and remediation under the Consent Order.

6. Repair and replacement of mission critical cooling system components for buildings in TA–55—This decision will allow these facilities to continue to operate and for NNSA to install a new cooling system that meets current standards regarding the phase-out of Class 1 ozone-depleting substances.

7. Final design of a new Radioactive Liquid Waste Treatment Facility, and design and construction of the Zero Liquid Discharge Facility component of this new treatment facility—This decision will allow LANL to continue to treat radioactive liquid wastes by replacing a facility that does not meet current standards and that cannot be acceptably renovated. Regardless of any decisions NNSA may make about complex transformation and LANL's role in it, the laboratory will need to treat liquid radioactive wastes for the foreseeable future.

Mitigation Measures

As described in the SWEIS, LANL operates under environmental laws, regulations, and policies within a framework of contractual requirements; many of these requirements mandate actions intended to control and mitigate potential adverse environmental effects. Examples include the Environment, Safety, and Health Manual, emergency plans, Integrated Safety Management System, pollution prevention and waste minimization programs, protected species programs, and energy and conservation programs. A Mitigation Action Plan for this ROD will be issued that includes: Specific habitat conservation measures recommended by the U.S. Fish and Wildlife Service for mitigating effects to potential habitat areas; site- and action-specific commitments related to the Consent Order once the State of New Mexico decides on specific environmental remediation for LANL MDAs; and traffic flow improvements that could involve such measures as installing turn lanes, installing and coordinating traffic lights, and installing new signage. A summary of all prior mitigation commitments for LANL that are either underway or that have yet to be initiated will be included in the MAP. These prior commitments include such actions as continued forest management efforts, continued trail management measures, and implementation of a variety of sampling and monitoring measures, as well as additional measures to reduce potable water use and conserve resources.

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

Issued at Washington, DC, this 19th day of September 2008.

Thomas P. D'Agostino,

Administrator, National Nuclear Security Administration.

[FR Doc. E8–22678 Filed 9–25–08; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

National Nuclear Security Administration

Record of Decision: Final Environmental Impact Statement for the Chemistry and Metallurgy Research Building Replacement Project, Los Alamos National Laboratory, Los Alamos, NM

AGENCY: National Nuclear Security Administration, Department of Energy.

ACTION: Record of decision.

SUMMARY: The U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA) is issuing this record of decision on the proposed replacement of the existing Chemistry and Metallurgy (CMR) Building at Los Alamos National Laboratory (LANL) in Los Alamos, New Mexico. This record of decision is based upon the information contained in the "Environmental Impact Statement for the Proposed Chemistry and Metallurgy Research Building Replacement Project, Los Alamos National Laboratory, Los Alamos, New Mexico", DOE/EIS–0350 (CMRR EIS), and other factors, including the programmatic and technical risk, construction requirements, and cost. NNSA has decided to implement the preferred alternative, alternative 1, which is the construction of a new CMR Replacement (CMRR) facility at LANL's Technical Area 55 (TA–55). The new CMRR facility would include a single, above-ground, consolidated special nuclear material-capable, Hazard Category 2 laboratory building (construction option 3) with a separate administrative office and support functions building. The existing CMR building at LANL would be decontaminated, decommissioned, and demolished in its entirety (disposition option 3). The preferred alternative includes the construction of the new CMRR facility, and the movement of operations from the existing CMR

building into the new CMRR facility, with operations expected to continue in the new facility over the next 50 years.

FOR FURTHER INFORMATION CONTACT: For further information on the CMRR EIS or record of decision, or to receive a copy of this EIS or record of decision, contact: Elizabeth Withers, Document Manager, U.S. Department of Energy, Los Alamos Site Office, 528 35th Street, Los Alamos, NM 87544, (505) 667–8690. For information on the DOE National Environmental Policy Act (NEPA) process, contact: Carol M. Borgstrom, Director, Office of NEPA Policy and Compliance (EH–42), U.S. Department of Energy, 1000 Independence Avenue, SW., Washington, DC 20585, (202) 586–4600, or leave a message at (800) 472–2756.

SUPPLEMENTARY INFORMATION:

Background

The NNSA prepared this record of decision pursuant to the regulations of the Council on Environmental Quality for implementing NEPA (40 CFR parts 1500–1508) and DOE's NEPA implementing procedures (10 CFR part 1021). This record of decision is based, in part, on information provided in the CMRR EIS.

LANL is located in north-central New Mexico, about 60 miles (97 kilometers) north-northeast of Albuquerque, and about 25 miles (40 kilometers) northwest of Santa Fe. LANL occupies an area of approximately 25,600 acres (10,360 hectares), or approximately 40 square miles (104 square kilometers). NNSA is responsible for the administration of LANL as one of three National Security Laboratories. LANL provides both the NNSA and DOE with mission support capabilities through its activities and operations, particularly in the area of national security.

Work at LANL includes operations that focus on the safety and reliability of the nation's nuclear weapons stockpile and on programs that reduce global nuclear proliferation. LANL's main role in NNSA mission objectives includes a wide range of scientific and technological capabilities that support nuclear materials handling, processing and fabrication; stockpile management; materials and manufacturing technologies; nonproliferation programs; and waste management activities. LANL supports actinide (any of a series of elements with atomic numbers ranging from actinium-89 through lawrencium-103) science missions ranging from the plutonium-238 heat source program undertaken for the National Aeronautics and Space Administration (NASA) to arms control and technology development.

The capabilities needed to execute NNSA mission activities require facilities at LANL that can be used to handle actinide and other radioactive materials in a safe and secure manner. Of primary importance are the facilities located within the CMR building and the plutonium facility (located in TAs 3 and 55, respectively). Most of the LANL mission support functions require analytical chemistry (AC) and materials characterization (MC), and actinide research and development support capabilities and capacities that currently exist within facilities at the CMR building and that are not available elsewhere. Other unique capabilities are located within the plutonium facility. Work is sometimes moved between the CMR building and the plutonium facility to make use of the full suite of capabilities they provide.

The CMR building is over 50 years old and many of its utility systems and structural components are deteriorating. Studies conducted in the late 1990s identified a seismic fault trace located beneath one of the wings of the CMR building that increases the level of structural integrity required to meet current structural seismic code requirements for a Hazard Category 2 nuclear facility (a Hazard Category 2 nuclear facility is one in which the hazard analysis identifies the potential for significant onsite consequences). Correcting the CMR building's defects by performing repairs and upgrades would be difficult and costly. NNSA cannot continue to operate the assigned LANL mission-critical CMR support capabilities in the existing CMR building at an acceptable level of risk to public and worker health and safety without operational restrictions. These operational restrictions preclude the full implementation of the level of operation DOE decided upon through its 1999 record of decision for the "Site-wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory" (DOE/EIS–0238) (LANL SWEIS). Mission-critical CMR capabilities at LANL support NNSA's stockpile stewardship and management strategic objectives; these capabilities are necessary to support the current and future directed stockpile work and campaign activities conducted at LANL. The CMR building is near the end of its useful life and action is required now by NNSA to assess alternatives for continuing these activities for the next 50 years. NNSA needs to act now to provide the physical means for accommodating continuation of the CMR building's functional, mission-critical CMR capabilities beyond 2010 in a safe, secure, and environmentally sound manner.

Alternatives Considered

NNSA evaluated the environmental impacts associated with the proposed relocation of LANL AC and MC, and associated research and development capabilities that currently exist primarily at the CMR building, to a newly constructed facility, and the continued performance of those operations and activities at the new facility for the next 50 years. The CMRR EIS analyzed four action alternatives: (1) The construction and operation of a complete new CMRR facility at TA–55; (2) the construction of the same at a "greenfield" location within TA–6; (3) and a "hybrid" alternative maintaining administrative offices and support functions at the existing CMR building with a new Hazard Category 2 laboratory facility built at TA–55, and, (4) a "hybrid" alternative with the laboratory facility being constructed at TA–6. The CMRR EIS also analyzed the no action alternative. These alternatives are described in greater detail below.

Alternative 1 is to construct a new CMRR facility consisting of two or three new buildings within TA–55 at LANL to house AC and MC capabilities and their attendant support capabilities that currently reside primarily in the existing CMR building, at the operational level identified by the expanded operations alternative for LANL operations in the 1999 LANL SWEIS. Alternative 1 would also involve construction of a parking areas(s), tunnels, vault area(s), and other infrastructure support needs. AC and MC activities would be conducted in either two separate laboratories (constructed either both above ground (construction option 1) or one above and one below ground (construction option 2)) or in one new laboratory (constructed either above ground (construction option 3) or below ground (construction option 4)). An administrative office and support functions building would be constructed separately.

Alternative 2 would construct the same new CMRR facility within TA–6; the TA–6 site is a relatively undeveloped, forested area with some prior disturbance in limited areas that is referred to as a "greenfield" site.

Alternatives 3 and 4 are "hybrid" alternatives in which the existing CMR building would continue to house administrative offices and support functions for AC and MC capabilities (including research and development) and no new administrative support building would be constructed. Structural and systems upgrades and repairs to portions of the existing CMR building would need to be performed and some portions of the building might be dispositioned. New laboratory facilities (as described for alternative 1) would be constructed either at TA–55 (alternative 3) or at TA–6 (alternative 4).

Under any of the alternatives, disposition of the existing CMR building could include a range of options from no demolition (disposition option 1), to partial demolition (disposition option 2), to demolition of the entire building (disposition option 3).

The no action alternative would involve the continued use of the existing CMR building with some minimal necessary structural and systems upgrades and repairs. Under this alternative, AC and MC capabilities (including research and development), as well as administrative offices and support activities, would remain in the existing CMR building. No new building construction would be undertaken. AC and MC operational levels would continue to be restricted and would not meet the level of operations determined necessary for the foreseeable future at LANL in the 1999 SWEIS record of decision.

Preferred Alternative

In both the draft and the final CMRR EIS, the preferred alternative for the replacement of the existing CMR building is identified as alternative 1 (construct a new CMRR facility at TA–55). The preferred construction option would be the construction of a single consolidated special nuclear material (SNM) capable, Hazard Category 2 laboratory with a separate administrative offices and support functions building (construction option 3). (Special nuclear materials include actinides such as plutonium, uranium enriched in the isotope 233 or 235, and any other material that the U.S. Nuclear Regulatory Commission determines to be special nuclear material.) NNSA's preferred option for the disposition of the existing CMR building is to decontaminate, decommission and demolish the entire structure (disposition option 3). Based on the CMRR EIS, the environmental impacts of the preferred alternative, although minimal, would be expected to be greater than those of the no action alternative. Construction option 3 would have less impact on the environment that implementing construction options 1 or 2; and disposition option 3 would have the greatest environmental impact of the disposition options analyzed.

Environmentally Preferable Alternative

The Council on Environmental Quality (CEQ), in its "Forty Most Asked Questions Concerning CEQ's NEPA Regulations" (46 FR 18026, 2/23/81) with regard to 40 CFR 1505.2, defined the "environmentally preferable alternative" as the alternative "that will promote the national environmental policy as expressed in NEPA's section 101". Ordinarily, this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources. The CMRR EIS impact analysis indicates that there would be very little difference in the environmental impacts among the action alternatives analyzed and also that the impacts of these action alternatives would be small. After considering impacts to each resource area by alternative, NNSA has identified the no action alternative as the environmentally preferable alternative. The no action alternative was identified as having the fewest direct impacts to the physical environment and to cultural and historic resources. This is because no construction-related disturbances would exist and none of the CMR building would be demolished, as would be the case under any of the action alternatives analyzed for the proposed action, including the preferred alternative. Therefore, the no action alternative would have the fewest impacts.

Environmental Impacts of Alternatives

NNSA analyzed the potential impacts that might occur if any of the four action alternatives or the no action alternative were implemented for land use and visual resources; site infrastructure; air quality and noise; geology and soils; surface and groundwater quality; ecological resources; cultural and paleontological resources; socioeconomics; human health impacts; environmental justice; waste management and pollution prevention. NNSA considered the impacts that might occur from potential accidents associated with the four action alternatives, and the no action alternative as well, on LANL worker and area residential populations. NNSA considered the impacts of each alternative regarding the irreversible or irretrievable commitments of resources, and the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity. The CMRR EIS analyses identified minor differences in potential environmental impacts among the action alternatives including: Differences in the amount of land disturbed long term for construction and operations, ranging between about 27 and 23 acres disturbed during construction and between 10 and 15 acres disturbed permanently during operations; and differences in the potential to indirectly affect (but not adversely affect) potential habitat for a federally-listed threatened species and the potential to have no affect on sensitive habitat areas; differences in the potential to affect human health during normal operations and during accident events; differences in waste volumes generated and managed; and differences in transportation accident dose possibilities. A comparison of impacts is discussed in the following paragraphs.

Construction Impacts

Alternative 1 (Construct New CMRR Facility at TA–55; Preferred Alternative): The construction of a new SNM-capable Hazard Category 2 laboratory, an administrative offices and support functions building, SNM vaults and other utility and security structures, and a parking lot at TA–55 would affect 26.75 acres (10.8 hectares) of mostly disturbed land, but would not change the area's current land use designation. The existing infrastructure resources (natural gas, water, electricity) would adequately support construction activities. Construction activities would result in temporary increases in air quality impacts, but resulting criteria pollutant concentrations would be below ambient air quality standards. Construction activities would not impact water, visual resources, geology and soils, or cultural and paleontological resources. Minor indirect effects on potential Mexican spotted owl habitat could result from the removal of a small amount of habitat area, increased site activities, and night-time lighting near the remaining Mexican spotted owl habitat areas. The socioeconomic impacts associated with construction would not cause any major changes to employment, housing, or public finance in the region of influence. Waste generated during construction would be adequately managed by the existing LANL management and disposal capabilities.

Alternative 2 (TA–6 Greenfield Alternative): The construction of new SNM-capable Hazard Category 2 and 3 buildings, the construction of an administrative offices and support functions facility, SNM vaults and other utility and security structures, and a parking lot at TA–6 would affect 26.75 acres (10.8 hectares) of undisturbed land, and would change the area's current land use designation to nuclear material research and development, similar to that of TA–55. Infrastructure resources (natural gas, water, electricity) would need to be extended or expanded to TA–6 to support construction activities. Construction activities would result in temporary increases in air quality impacts, but resulting criteria pollutant concentrations would be below ambient air quality standards. It would alter the existing visual character of the central portion of TA–6 from that of a largely natural woodland to an industrial site. Once completed, the new CMRR facility would result in a change in the visual resource contrast rating of TA–6 from Class III (undeveloped land where management activities do not dominate the view) to Class IV (developed land where management activities dominate the view). Construction activities would not impact water, biotic resources (including threatened and endangered species), geology and soils, or cultural and paleontological resources. The socioeconomic impacts associated with construction would not cause any major changes to employment, housing, or public finance in the region of influence. Waste generated during construction would be adequately managed by the existing LANL capabilities for handling waste. In addition, a radioactive liquid waste pipeline might also be constructed across Two Mile Canyon to tie in with an existing pipeline to the Radioactive Liquid Waste Treatment Facility (RLWTF) in TA–50.

Alternative 3 (Hybrid Alternative at TA–55): The construction of new Hazard Category 2 and 3 buildings, the construction of SNM vaults and utility and security structures, and the construction of a parking lot at TA–55 would affect 22.75 acres (9.2 hectares) of mostly disturbed land, but would not change the area's current land use designation. The existing infrastructure would adequately support construction activities. Construction activities would result in temporary increases in air quality impacts, but resulting criteria pollutant concentrations would be below ambient air quality standards. Construction activities would not impact water, visual resources, geology and soils, or cultural and paleontological resources. Minor indirect effects on Mexican spotted owl habitat could result from the removal of a small amount of habitat area, increased site activities, and night-time lighting near the remaining Mexican spotted owl habitat areas. The socioeconomic impacts associated with construction would not cause any major changes to employment, housing, or public finance in the region of influence. Waste generated during construction would be adequately managed by the existing LANL capabilities for handling waste.

Alternative 4 (Hybrid Alternative at TA–6): The construction of new Hazard Category 2 and 3 buildings, the construction of SNM vaults and utility and security structures, and the construction of a parking lot at TA–6 would affect 22.75 acres (9.2 hectares) of undisturbed land, and would change the area's current land use designation to nuclear material research and development, similar to that of TA–55. Infrastructure resources (natural gas, water, electricity) would need to be extended or expanded at TA–6 to support construction activities. Construction activities would result in temporary increases in air quality impacts, but would be below ambient air quality standards. The existing visual character of the central portion of TA–6 would be altered from that of a largely natural woodland to that of an industrial site. Once completed, the new CMRR facility would result in a change in the visual resource contrast rating of TA–6 from Class III to Class IV. Construction activities would not impact water, visual resources, biotic resources (including threatened and endangered species), geology and soils, or cultural and paleontological resources. The socioeconomic impacts associated with construction would not cause any major changes to employment, housing, or public finance in the socioeconomic region of influence. Waste generated during construction would be adequately managed by the existing LANL capabilities for handling waste. In addition, a radioactive liquid waste pipeline may also be constructed across Two Mile Canyon to tie in with an existing pipeline to the RLWTF at TA–50.

Impacts During the Transition From the CMR Building to the New CMRR Facility Under the Action Alternatives

During a 4-year transition period, CMR operations at the existing CMR building would be moved to the new CMRR facility. During this time, both CMR facilities would be operating, although at reduced levels. At the existing CMR building, where restrictions would remain in effect, operations would decrease as CMR operations move to the new CMRR facility. At the new CMRR facility, levels of CMR operations would increase as the facility becomes fully operational. In addition, the transport of routine onsite shipment of AC and MC samples would continue to take place while both facilities are operating. With both facilities operating at reduced levels at the same time, the combined demand for electricity, and manpower to support transition activities during this period might be higher than would be required by the separate facilities. Nevertheless, the combined total impacts during this transition phase from both these facilities would be expected to be less than the impacts attributed to the expanded operations alternative and the level of CMR operations analyzed in the LANL SWEIS.

Also during the transition phase, the risk of accidents would be changing at both the existing CMR building and the new CMRR facility. At the existing CMR building, the radiological material at risk and associated operations and storage would decline as material and equipment are transferred to the new CMRR facility. This material movement would have the positive effect of reducing the risk of accidents at the CMR building. Conversely, at the new CMRR facility, as the amount of radioactive material at risk and associated operations increases to full operations, the risk of accidents would also increase. However, the improvements in design and technology at the new CMRR facility would also have a positive effect of reducing overall accident risks when compared to the accident risks at the existing CMR building. The expected net effect of both of these facilities operating at the same time during the transition period would be for the risk of accidents to be lower than the accident risks at either the existing CMR building or the fully operational new CMRR facility.

Action Alternatives—Operations Impacts

Relocating CMR operations to a new CMRR facility located at either TA–55 or TA–6 within LANL would require similar facilities, infrastructure support procedures, resources, and numbers of workers during operations. For most environmental areas of concern, operational differences would be minor. There would not be any perceivable differences in impact between the action alternatives for land use and visual resources, air and water quality, biotic resources (including threatened and endangered species), geology and soils, cultural and paleontological resources, power usage, and socioeconomics. Additionally, the new CMRR facility would use existing waste management facilities to treat, store, and dispose of waste materials generated by CMR operations. All impacts would be within regulated limits and would comply with Federal, State, and local laws and regulations. Any transuranic (TRU) waste generated by CMRR facility operations would be treated and packaged in accordance with the Waste Isolation Pilot Plant (WIPP) waste acceptance criteria and transported to WIPP or a similar type facility for disposition by DOE.

Routine operations for each of the action alternatives would increase the amount of radiological releases as compared to current restricted CMR building operations. Current operations at the CMR building do not support the levels of activity described for the expanded operations alternative in the LANL SWEIS. There would be small differences in potential radiological impacts to the public, depending on the location of the new CMRR facility. However, radiation exposure to the public would be small and well below regulatory limits and limits imposed by DOE Orders. The maximally exposed offsite individual would receive a dose of less than or equal to 0.35 millirem per year, which translates to 2.1×10^{-7} latent cancer fatalities per year from routine operational activities at the new CMRR facility. Statistically, this translates into a risk of one chance in 5 million of a fatal cancer for the maximally exposed offsite individual due to these operations. The total dose to the population within 50 miles (80 kilometers) would be a maximum of 2.0 person-rem per year, which translates to 0.0012 latent cancer fatalities per year in the entire population from routine operations at the new CMRR facility. Statistically, this would equate to a chance of one additional fatal cancer among the exposed population every 1,000 years.

Using DOE-approved computer models and analysis techniques, estimates were made of worker and public health and safety risks that could result from potential accidents for each alternative. For all CMRR facility alternatives, the results indicate that statistically there would be no chance of a latent cancer fatality for a worker or member of the public. The CMRR facility accident with the highest risk is a facility-wide spill of radioactive material caused by a severe earthquake that exceeds the design capability of the CMRR facility under Alternative 1. The risk for the entire population for this accident was estimated to be 0.0005 latent cancer fatalities per year.

This value is statistically equivalent to stating that there would be no chance of a latent cancer fatality for an average individual in the population during the lifetime of the facility. Continued operation of the CMR building under the no action alternative would carry a higher risk because of the building's location and greater vulnerability to earthquakes. The risk for the entire population associated with an earthquake at the CMR building would be 0.0024 latent cancer fatalities per year, which is also statistically equivalent to no chance of a latent cancer fatality for an average individual during the lifetime of the facility.

As previously noted, overall CMR operational characteristics at LANL would not change regardless of the ultimate location of the replacement facility and the action alternative implemented. Sampling methods and mission operations in support of AC and MC would not change and, therefore, would not result in any additional environmental or health and safety impacts to LANL. Each of the action alternatives would generally have the same amount of operational impacts. All of the action alternatives would produce equivalent amounts of emissions and radioactive releases into the environment, infrastructure requirements would be the same, and each action alternative would generate the same amount of radioactive and non-radioactive waste, regardless of the ultimate location of the new CMRR facility at LANL. Other impacts that would be common to each of the action alternatives include transportation impacts and CMR building and CMRR facility disposition impacts. Transportation impacts could result from: (1) The one-time movement of SNM, equipment, and other materials during the transition from the existing CMR building to the new CMRR facility; and (2) the routine onsite shipment of AC and MC samples between the plutonium facility at TA–55 and the new CMRR facility. Impacts from the disposition of the existing CMR building and the CMRR facility would result from the decontamination and demolition of the buildings and the transport and disposal of radiological and non-radiological waste materials. All action alternatives would require the relocation and one-time transport of SNM equipment and materials. Transport of SNM, equipment, and other materials currently located at the CMR building to the new CMRR facility at TA–55 or TA–6 would occur over a period of two to four years. The public would not be expected to receive any measurable exposure from the one-time movement of radiological materials associated with this action. Impacts of potential handling and transport accidents during the one-time movement of SNM, equipment, and other materials during the transition from the existing CMR building to the new CMRR facility would be bounded by other facility accidents for each alternative. For all alternatives, the environmental impacts and potential risks of transportation would be small.

Under each action alternative, routine onsite shipments of AC and MC samples consisting of small quantities of radioactive materials and SNM samples would be shipped from the plutonium facility at TA–55 to the new CMRR facility at either TA–55 or TA–6. The public would not be expected to receive any additional measurable exposure from the normal movement of small quantities of radioactive materials and SNM samples between these facilities. The potential risk to a maximally exposed individual (MEI) member of the public from a transportation accident involving routine onsite shipments of AC and MC samples between the plutonium facility and CMRR facility was estimated to be very small (3.7x10–10), or approximately 1 chance in 3 billion. For all action alternatives, the overall environmental impacts and potential risks of transporting AC and MC samples would be small.

Action Alternatives—CMR Building and CMRR Facility Disposition Impacts

All action alternatives would require some level of decontamination and demolition of the existing CMR building. Operations experience at the CMR building indicates some surface contamination has resulted from the conduct of various activities over the last 50 years. Impacts associated with decontamination and demolition of the CMR building are expected to be limited to the creation of waste within LANL site waste management capabilities. This would not be a discriminating factor among the alternatives.

Decontamination, and demolition of the new CMRR facility would also be considered at the end of its designed lifetime operation of at least 50 years. Impacts from the disposition of the CMRR facility would be expected to be similar to those for the existing CMR building.

No Action Alternative: Under the no action alternative there would be no new construction and minimal necessary structural and systems upgrades and repairs. Accordingly, there would be no potential environmental impacts resulting from new construction for this alternative. Operational impacts of continuing CMR operations at the CMR building would be less than those identified under the expanded operations alterative analyzed in the 1999 LANL SWEIS due to the operating constraints imposed on radiological operations at the CMR building.

Comments on the Final Environmental Impact Statement

NNSA distributed approximately 400 copies of the final EIS to Congressional members and committees, the State of New Mexico, various American Indian tribal governments and organizations, local governments, other Federal agencies, and the general public. NNSA received one comment letter from the Pueblo of San Ildefonso regarding NNSA's responses to Pueblo concerns related to the draft CMRR EIS that focused primarily on the spread of contamination present in the canyons around LANL onto land owned by the Pueblo. This issue is beyond the scope of the CMRR EIS but will be addressed by NNSA through other means already established for LANL, such as the environmental restoration project, rather than through the NEPA compliance process.

Decision Factors

NNSA's decisions are based on its mission responsibilities and the ability to continue to perform mission-critical AC and MC operations at LANL in an environmentally sound, timely and fiscally prudent manner. Other key factors in the decision-making process include programmatic impacts and overall program risk, and construction and operational costs.

LANL's CMR operations support a wide range of scientific and technological capabilities that support, in turn, NNSA's national security mission assignments. Most of the LANL mission support functions require AC and MC, and actinide research and development support capabilities and capacities that currently exist within the CMR building. NNSA will continue to need CMR capabilities now and into the foreseeable future, much as these capabilities have been needed at LANL over the past 60 years. Programmatic risks are high if LANL CMR operations continue at the curtailed operational level now appropriate at the aging CMR building. CMR operations at LANL need to continue seamlessly in an uninterrupted fashion, and the level of overall CMR operations needs to be flexible enough to accommodate the work load variations inherent in NNSA's mission support assignments and the general increase in the level of operations currently seen as necessary to support future national security requirements.

The CMR building was initially designed and constructed to comply with the Uniform Buildings Codes in effect at the time. The CMR building's wing 4 location over a seismic trace would require very extensive and costly structural changes that would be of marginal operational return. Construction costs are estimated to be less for building and operating a new CMRR facility over the long term than the cost estimated for making changes to the aging CMR building so that the building could be operated as a nuclear facility at the level of operations required by the expanded operations alternative selected for LANL in the 1999 LANL SWEIS ROD over the next 50 years. Life cycle costs of operating a new CMRR facility at TA–55 are less than the costs would be of operating a totally upgraded CMR building over the next 50 years. Reduced general occupation costs of maintaining the new CMRR facility (such as heating and cooling the building to maintain comfortable personnel working conditions) given the reduction in occupied building square footage over that of the existing CMR building, and reduced security costs (for maintaining Perimeter Intrusion Detection Alarm Systems (PIDAS) and guard personnel) due to the co-location of the CMRR facility within the existing security perimeter of the plutonium facility thereby eliminating the need for maintaining a separate duplicative security system at the CMR building both would significantly reduce general operating costs for the new facility.

Mitigation Measures

Based on the analyses of impacts provided in the CMRR EIS, no mitigation measures were identified as being necessary since all potential environmental impacts would be substantially below acceptable levels of promulgated standards. Activities associated with the proposed construction of the new CMRR facility would follow standard procedures for minimizing construction impacts, as would demolition activities.

Decisions

NNSA has decided to implement the preferred alternative, alternative 1, which is the construction and operation of a new CMRR facility within TA–55 at LANL. The new CMRR facility would include two buildings (one building for administrative and support functions, and one building for Hazard Category 2 SNM laboratory operations), both of which would be constructed at above ground locations (construction option 3). The existing CMR building would be decontaminated, decommissioned and demolished in its entirety (disposition option 3). However, the actual implementation of these decisions is dependent on DOE funding levels and allocations of the DOE budget across competing priorities.

Issued in Washington, DC, this 3rd day of February, 2004.

Linton Brooks,

Administrator, National Nuclear Security Administration.

[FR Doc. 04–3096 Filed 2–11–04; 8:45 am]

BILLING CODE 6450–01–P

APPENDIX B
ENVIRONMENTAL IMPACTS METHODOLOGIES

APPENDIX B
ENVIRONMENTAL IMPACTS METHODOLOGIES

This appendix briefly describes the methods used to assess the potential direct, indirect, and cumulative effects of the alternatives in this *Draft Supplemental Environmental Impact Statement for the Nuclear Facility Portion of the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, New Mexico (CMRR-NF SEIS).* Included are impact assessment methods for land use and visual resources, site infrastructure, air quality, noise, geology and soils, surface and groundwater quality, ecological resources, cultural and paleontological resources, socioeconomics, environmental justice, human health, waste management and pollution prevention, transportation and traffic, and cumulative impacts. Each section includes descriptions of the affected resources, region of influence (ROI), and impact assessment methods.

The methods described in this appendix are also used to assess the effects of operating the Radiological Laboratory/Utility/Office Building (RLUOB). RLUOB is complete and was built to provide administrative and support functions to the Chemistry and Metallurgy Research Replacement (CMRR) Nuclear Facility (CMRR-NF).

Impact analyses vary for each resource area. For air quality, for example, estimated pollutant emissions from the candidate facilities were compared with appropriate regulatory standards or guidelines. Comparison with regulatory standards is a commonly used method for benchmarking environmental impacts, and is done here to provide perspective on the magnitude of identified impacts. For waste management, waste generation rates were compared with the capacities of waste management facilities. Impacts within each resource area were analyzed consistently; that is, the impact values were estimated using a consistent set of input variables and computations. Moreover, calculations in all resource areas used accepted protocols and up-to-date models.

The baseline conditions assessed in this *CMRR-NF SEIS* are consistent with conditions under the No Action Alternative described in the 2008 *Final Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory, Los Alamos, New Mexico* (*LANL SWEIS*) (DOE 2008), and updated in the SWEIS Yearbooks and site environmental reports. These decisions include the programmatic level of operations at Los Alamos National Laboratory (LANL) facilities (including the CMRR Facility) for at least the next 5 years, as well as project-specific decisions for individual projects at LANL, including those at Technical Area 55 and within surrounding and nearby technical areas along the Pajarito Road corridor. The No Action Alternative was used as the basis for the comparison of impacts that would occur under implementation of the other alternatives.

B.1 Land Use and Visual Resources

B.1.1 Land Use

B.1.1.1 Description of Affected Resources and Region of Influence

Land use is defined in terms of the kinds of anthropogenic activities (for example, agriculture, residential, industrial) for which land is developed (EPA 2006). Natural resources and other environmentally characteristic attributes make a site more suitable for some land uses than for others. Changes in land use may have beneficial or adverse ecological, cultural, geologic, and atmospheric effects on other resources. The ROI for land use varies due to the extent of land ownership, adjacent land use patterns and trends, and other geographic or safety considerations, but generally includes the site and areas immediately adjacent to the site.

B.1.1.2 Description of Impact Assessment

The amount of land disturbed and conformity with existing land use were considered for the purpose of evaluating the impacts of construction and operation at each candidate site (see **Table B–1**). Both factors were considered for each of the action alternatives. However, because new construction would not take place under the Continued Use of CMR Building Alternative, only conformity with existing land use was evaluated under this alternative. Land use impacts could vary considerably from site to site, depending on the extent of construction activities and the location(s) (that is, undeveloped or developed land) where they would take place.

Table B–1 Impact Assessment Protocol for Land Resources

	Required Data		
Resource	***Affected Environment***	***Alternative***	***Measure of Impact***
Land area used	Site acreage	CMRR Project activity location and acreage requirement	Acreage converted to CMRR Project use
Compatibility with existing or future land use	Existing land use configurations	Location of CMRR Project activity on the site and expected modifications of current activities and missions to accommodate the alternatives	Incompatibility with existing or future land use
Visual resources	Current Visual Resource Management classification	Location of CMRR Project activity on the site and activity dimensions and appearance	Change in Visual Resource Management classification

CMRR = Chemistry and Metallurgy Research Building Replacement.

B.1.2 Visual Resources

B.1.2.1 Description of Affected Resources and Region of Influence

Visual resources are the natural and manmade features that give a particular landscape its character and aesthetic quality. Landscape character is determined by the visual elements of form, line, color, and texture. All four elements are present in every landscape; however, they exert varying degrees of influence. The stronger the influence exerted by these elements in a landscape, the more interesting the landscape. The ROI for visual resources includes the geographic area from which the candidate facilities may be seen.

B.1.2.2 Description of Impact Assessment

Impacts on visual resources from construction of the CMRR-NF and operation of the CMRR-NF and RLUOB at LANL may be determined by evaluating whether the U.S. Bureau of Land Management Visual Resource Management classifications of the candidate sites would change as a result of the proposed alternatives (DOI 1986) (see Table B–1). Existing classifications were derived from an inventory of scenic qualities, sensitivity levels, and distance zones for particular areas. For those alternatives involving existing facilities at LANL, alterations to visual features may be readily evaluated and the impact on the current Visual Resource Management classification may be determined. To determine the range of potential visual effects from new CMRR Project activities, the analysis considered the potential impacts of construction and operation on the aesthetic quality of surrounding areas, as well as the visibility of such activities from public vantage points.

B.2 Site Infrastructure

B.2.1 Description of Affected Resources and Region of Influence

Site infrastructure includes the utility systems required to support construction and/or modification and operation of the candidate facility. It includes the capacities of the electric power transmission and distribution system, natural gas and liquid fuel (fuel oil, diesel fuel, and gasoline) supply systems, and the water supply system. The ROI for utility infrastructure resources includes the LANL site, including the affected technical areas and the individual facilities, and the surrounding area to include non-LANL users who rely on the same utility systems (electric power, natural gas, and water) that serve LANL.

B.2.2 Description of Impact Assessment

In general, infrastructure impacts were assessed by evaluating the requirements under each alternative against the site capacity and/or the system capacity. An impact assessment was made for each resource (electricity, fuel, and water) under the various alternatives (see **Table B–2**). Tables reflecting site availability and infrastructure requirements were developed for each alternative. Data for these tables were obtained from reports describing the existing site and regional infrastructure and from the data reports for each alternative. If necessary, design mitigation considerations conducive to reduction of the infrastructure demand were also identified.

Table B–2 Impact Assessment Protocol for Infrastructure

Resource	*Required Data*		*Measure of Impact*
	Affected Environment	*Alternative*	
Electricity			
Energy consumption (megawatt-hours per year) Peak load (megawatts)	Site and system capacity and current usage	Facility requirements	Additional requirement (with added facilities) exceeding site/system capacity
Fuel			
Natural gas (cubic meters per year)	System capacity and current usage	Facility requirements	Additional requirement (with added facilities) exceeding system capacity
Water (liters per year)	Site and system capacity and current usage	Facility requirements	Additional requirement (with added facilities) exceeding site/system capacity

Any projected demand for infrastructure resources exceeding site or system availability can be regarded as an indicator of environmental impact. Whenever projected demand approaches or exceeds capacity, further analysis of that resource is warranted. Often, design changes can mitigate the impact of additional demand for a given resource. For example, substituting fuel oil for natural gas (or vice versa) for heating or industrial processes can be accomplished at little cost during the design of a facility if the potential for impact is identified early. Similarly, a dramatic spike or surge in peak demand for electricity can sometimes be mitigated by upgrading the existing infrastructure.

B.2.3 Sustainable Building

Executive Orders 13423 and 13514 require Federal agencies to meet specific sustainability goals in terms of conserving non-renewable resources and reducing emissions of pollutants. Several U.S. Department of Energy (DOE) orders define requirements to meet these goals. DOE Order 413.3B addresses the internal management processes for acquisition of high-performing facilities. This order also lays out a series of critical decision points that develop project goals and objectives and refine project parameters, including goals for sustainability. Through this process, design development progresses in tandem with decisions about cost, and budget during the project life cycle. DOE Order 430.2B defines the specific benchmarks for measuring progress toward achieving the sustainability goals, including reductions in greenhouse gas emissions and energy and water use, established in Executive Order 13423. DOE Order 450.1A has the broader purpose of improving sound stewardship practices to protect air, water, land, and other natural and cultural resources. It also makes it necessary for sites (such as LANL) to include site-wide objectives and targets in the environmental management system that align with DOE Order 430.2B. These orders pave the way toward making sustainability an active principle for DOE sites and facilities. For additional information on applicable laws, regulations, and other requirements, see Chapter 5.

Sustainability requires implementation of a comprehensive plan of action. One strategy is to design, construct, and operate more-efficient and environmentally responsible buildings. To this end, the U.S. Green Building Council developed the Leadership in Energy and Environmental Design® (LEED) building certification system to provide independent, third-party verification that a building or community is designed and built using strategies aimed at improving performance across metrics such as energy savings, water efficiency, carbon dioxide emissions reduction, improved indoor environmental quality, resource stewardship, and sensitivity to the impacts of construction and operation. The LEED system certifies building performance via a voluntary rating system based on a consensus-based national standard derived from technical criteria and professional knowledge.

The LEED system uses various rating criteria for new construction (including homes, schools, commercial and industrial facilities), renovations to existing buildings (residential, commercial, and industrial), and neighborhood design. The LEED system uses the following six areas to rate a project's sustainable design proficiency:

- Sustainable sites
- Water efficiency and quality
- Energy and atmosphere
- Materials and resources
- Indoor environmental quality
- Innovative design

Within these areas, a project is scored on specific measures to earn "credits." The sum of the earned credits determines the total score and certification level achieved by the project (Certified, Silver, Gold, or Platinum levels). The advantage of project certification is not only demonstrable energy and environmental consideration, but also recognition and status in a value-driven market (for commercial endeavors) and long-term cost savings for operating and maintaining a sustainable facility.

The LEED certification process starts in the design phase and drives decisions regarding the six key areas above. LEED rating criteria, for example, address material and product selection, construction methods, and waste management, as well as post-construction commissioning of the building to ensure lifetime optimal performance. DOE Order 430.2B[1] now requires all DOE projects to incorporate LEED certification measures into the design/build process. DOE Order 430.2B specifies that LEED Gold certification applies to all new buildings and major renovations that were in the Critical Decision-1

[1] *LEED requirement from DOE Order 430.2B: "The installation of sustainable building materials and practices throughout the Department's existing building assets and the attainment of the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Gold certification for all new construction and major building renovations in excess of $5 million. All buildings falling below this threshold are required to comply with the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings (Guiding Principles)."*

(CD-1) stage or lower (CD-0) of project development on October 1, 2008. Because the CD-1 decision for the CMRR-NF was made on May 18, 2005, this level of certification was not yet a formulating criterion for this project. Notwithstanding, other DOE orders and directives made sustainability and high building performance a key factor.

The LEED system assessment for this *CMRR-NF SEIS* considers whether proposed construction projects incorporate LEED strategies to minimize potential use of energy and water. Because LEED offers six areas of achievement, certification may result from a combination of factors, not just reduced energy and water use. LEED construction is one method for DOE to achieve the sustainable goals required under Executive Orders 13423 and 13514. Implementation of the proposed project, in combination with other actions and sustainability initiatives at LANL, is considered in the cumulative impacts analysis in this *CMRR-NF SEIS*. The assessment describes qualitatively how LEED certification of the CMRR-NF would factor into site-wide progress toward meeting sustainability goals (see Chapter 4, Section 4.6).

RLUOB, which has already been built and will provide administrative and support functions to the CMRR-NF, is anticipated to be awarded LEED Silver Certification for new construction.

B.3 Air Quality

B.3.1 Description of Affected Resources and Region of Influence

Air pollution refers to the direct or indirect introduction of any substance into the air that could endanger human health, harm living resources and ecosystems, damage material property, or impair or interfere with the comfortable enjoyment of life and other legitimate uses of the environment.

For the purpose of this *CMRR-NF SEIS*, only outdoor air pollutants were addressed. These outdoor air pollutants may be in the form of solid particles, liquid droplets, gases, or a combination of these forms. Generally, they can be categorized as primary pollutants (those emitted directly from identifiable sources) and secondary pollutants (those produced in the air by interaction between two or more primary pollutants or by reaction with normal atmospheric constituents that may be influenced by sunlight). Air pollutants are transported, dispersed, or concentrated by meteorological and topographical conditions. Thus, air quality is affected by air pollutant emission characteristics, meteorology, and topography.

Ambient air quality in a given location can be described by comparing the concentrations of various pollutants in the atmosphere to the appropriate standards established by Federal and state agencies. These ambient air quality standards allow an adequate margin of safety for the protection of public health and welfare from the adverse effects of pollutants in ambient air. Pollutant concentrations higher than the corresponding standards are considered unhealthy; concentrations below such standards are considered acceptable.

The pollutants of concern are primarily those for which Federal and state ambient air quality standards have been established, including criteria air pollutants, hazardous air pollutants, and other toxic air compounds. Criteria air pollutants are those listed in Title 40 of the *Code of Federal Regulations* (CFR), Part 50 (40 CFR Part 50), "National Primary and Secondary Ambient Air Quality Standards." Hazardous air pollutants and other toxic compounds are those listed in Title I of the Clean Air Act, as amended (40 *United States Code* [U.S.C.] 7401 et seq.), those regulated by the National Emissions Standards for Hazardous Air Pollutants (40 CFR Part 61), and those that have been proposed or adopted for regulation by the applicable states or listed in state guidelines. States may set ambient standards that are more stringent than the National Ambient Air Quality Standards (NAAQS). The more stringent of the Federal or state standards for each site are discussed in this document.

Areas with air quality better than the NAAQS for criteria air pollutants are designated as "attainment," while areas with air quality worse than the NAAQS for such pollutants are designated as "nonattainment." Areas may be designated as "unclassified" when there are insufficient data for attainment status designation. Attainment status designations are assigned by county; metropolitan statistical area; consolidated metropolitan statistical area, or portions thereof; or air quality control regions. Air quality control regions designated by the U.S. Environmental Protection Agency (EPA) are listed in 40 CFR Part 81, "Designation of Areas for Air Quality Planning Purposes." LANL is located in an attainment area (40 CFR 81.332).

For locations that are in an attainment area for criteria air pollutants, Prevention of Significant Deterioration regulations limit pollutant emissions from new or modified sources and establish allowable increments of pollutant concentrations. Three Prevention of Significant Deterioration classifications are specified according to the criteria established in the Clean Air Act. Class I areas include national wilderness areas and memorial parks larger than 5,000 acres (2,020 hectares), national parks larger than 6,000 acres (2,430 hectares), and areas that have been redesignated as Class I. Class II areas are all areas that are not designated as Class I (42 U.S.C. 7472, Title I, Section 162). LANL is in a Class II area; it is adjacent to the Bandelier National Monument and Wilderness Area Class I area (DOE 2008).

The ROI for air quality encompasses the area surrounding a candidate site that is potentially affected by air pollutant emissions caused by the alternatives. The air quality impact area normally evaluated is the area in a Class II area in which concentrations of criteria pollutants would increase more than a significant amount. This determination is based on averaging periods and acceptable concentrations established for specific pollutants: 1 microgram per cubic meter for the annual average for sulfur dioxide, nitrogen dioxide, and particulate matter less than or equal to 10 microns in aerodynamic diameter (PM_{10}); 5 micrograms per cubic meter for the 24-hour average for sulfur dioxide and PM_{10}; 500 micrograms per cubic meter for the 8-hour average for carbon monoxide; 25 micrograms per cubic meter for the 3-hour average for sulfur dioxide; and 2,000 micrograms for the 1-hour average for carbon monoxide (40 CFR 51.165). Averaging periods are the average rate or rates at which a source emits a pollutant during the stated period of 1 hour, 3 hours, 8 hours, 24 hours, or a year. Generally, this area covers a few kilometers downwind from the source. For sources within 60 miles (100 kilometers) of a Class I area, the air quality impact area evaluated would include the Class I area if the increase in concentration were greater than 1 microgram per cubic meter (24-hour average). The area of the ROI depends on the emission source characteristics, pollutant types, emission rates, and meteorological and topographical conditions. For analysis purposes, the impacts were evaluated at the site boundary and along roads within the site to which the public has access, plus any additional area in which contributions to pollutant concentrations are expected to exceed significance levels.

Baseline air quality is typically described in terms of the pollutant concentrations modeled for existing sources at each candidate site and the background air pollutant concentrations measured near the sites. For this analysis, concentration estimates for existing sources were obtained from the 2008 *LANL SWEIS* and from concentrations models using recent emissions inventories and the AERMOD Version 09292 screening model AERSCREEN. The AERSCREEN model produces concentration estimates that are equal to or greater than the estimates produced by AERMOD, which provides a "worst-case" scenario (EPA 2010a). As of December 9, 2006, EPA's promulgated AERMOD package replaced the ISC3 (Industrial Source Complex) dispersion model (EPA 2010b). Thus, the most recent model was used to determine air emissions.

B.3.2 Description of Impact Assessment

Potential air quality impacts of pollutant emissions from construction and normal operations under each alternative were evaluated. This assessment included a comparison of pollutant concentrations under each alternative with applicable Federal and state ambient air quality standards (see **Table B–3**). If both Federal and state standards exist for a given pollutant and averaging period, compliance was evaluated using the more stringent standard. Operational air pollutant emissions data for each alternative were based on conservative engineering analyses.

Table B–3 Impact Assessment Protocol for Air Quality

Resource	*Required Data*		*Measure of Impact*
	Affected Environment	*Alternative*	
Criteria air pollutants and other regulated pollutants [a]	Measured and modeled ambient concentrations (micrograms per cubic meter) from existing sources at the site	Emission rates (kilograms per year) of air pollutants from facility; source characteristics (stack height and diameter, exit temperature and velocity)	Concentration under the alternatives and total site concentration of each pollutant at or beyond the site boundary or within the boundary on public roads, as compared to applicable standards
Toxic and hazardous air pollutants [b]	Measured and modeled ambient concentrations (micrograms per cubic meter) from existing sources at the site	Emission rates (kilograms per year) of pollutants from facility; source characteristics (stack height and diameter, exit temperature and velocity)	Concentration under the alternatives and total site concentration of each pollutant at or beyond the site boundary or within the boundary on public roads, which were used to calculate the hazard quotient or cancer risk

[a] Carbon monoxide; hydrogen fluoride; lead; nitrogen oxides; ozone; particulate matter less than or equal to 10 microns in aerodynamic diameter; sulfur dioxide; total suspended particulates.
[b] Clean Air Act (40 U.S.C. 7401 et seq.), Section 112(d), hazardous air pollutant: pollutants regulated under the National Emissions Standard for Hazardous Air Pollutants and other state-regulated pollutants.

Contributions to offsite air pollutant concentrations under each alternative were modeled based on guidance provided in EPA's "Guidelines on Air Quality Models" (40 CFR Part 51, Appendix W). EPA's recommended model AERSCREEN (EPA 2010a) was selected as an appropriate model for air dispersion modeling because it is designed to support the EPA regulatory modeling program and it predicts conservative, worst-case impacts.

The modeling analysis incorporated conservative assumptions, which tended to overestimate pollutant concentrations. The maximum modeled concentration for each pollutant and averaging period was selected for comparison with the applicable standard. The concentrations evaluated were the maximum concentrations occurring at or beyond the site boundary and at a public access road or other publicly accessible area within the site. Available monitoring data, which reflect both onsite and offsite sources, were also taken into consideration. Concentrations of the criteria air pollutants were presented for each alternative. Concentrations of hazardous and toxic air pollutants were evaluated in the public and occupational health effects analysis. At least 1 year of representative hourly meteorological data was used.

Ozone is typically formed as a secondary pollutant in the ambient air (troposphere). It is formed in the presence of sunlight from the mixing of primary pollutants, such as nitrogen oxides, and volatile organic compounds that emanate from vehicular (mobile) sources and natural and other stationary sources. Ozone is not emitted directly as a pollutant from the candidate sites. Although ozone may be regarded as a regional issue, specific ozone precursors, notably nitrogen dioxide and volatile organic compounds, were analyzed because they are applicable to the alternatives under consideration.

The Clean Air Act, as amended, requires that Federal actions conform to the host state's "state implementation plan." A state implementation plan provides for implementation, maintenance, and enforcement of the NAAQS for the six criteria pollutants: sulfur dioxide, PM_{10}, carbon monoxide, ozone, nitrogen dioxide, and lead. Its purpose is to eliminate or reduce the severity and number of violations of the NAAQS and to expedite attainment of these standards. "No department, agency, or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license or permit, or approve any activity that does not conform to an applicable implementation plan" (42 U.S.C. 7506). The final rule for "Determining Conformity of General Federal Actions to State or Federal Implementation Plans" (58 *Federal Register* [FR] 63214) took effect on January 31, 1994. LANL is within an area currently designated as in attainment for criteria air pollutants. Therefore, the alternatives being considered in this *CMRR-NF SEIS* are not affected by the provisions of the conformity rule.

Emissions of potential stratospheric ozone-depleting compounds, such as chlorofluorocarbons, were not evaluated because no emissions of these pollutants were identified in the conceptual engineering design reports.

B.3.3 Greenhouse Gases

On February 18, 2010, the Council on Environmental Quality released its *Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions* (CEQ 2010), which suggests that proposed alternatives that are reasonably anticipated to emit 25,000 metric tons or more of direct carbon dioxide equivalent air emissions should be evaluated by quantitative and qualitative assessments. This is not a threshold of significance, but a minimum level that should be considered in documentation required by the National Environmental Policy Act (NEPA), as amended (42 USC 4321 et seq.). Quantitative analysis of greenhouse gas emissions (carbon dioxide equivalent air emissions) in this *CMRR-NF SEIS* may be useful in making reasoned choices among the alternatives. Neither the Council on Environmental Quality nor EPA has issued final guidance regarding how to address greenhouse gas/climate change impacts under NEPA.

The greenhouse gas analysis assessed the impacts, where applicable, of the six primary greenhouse gases; carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride, as defined in accordance with Section 19(i) of Executive Order 13514.

The predominant source of anthropogenic carbon dioxide emissions is combustion of fossil fuels. Forest clearing, other biomass burning, and some non-energy-production processes (for example, cement production) also emit notable quantities of carbon dioxide. Another greenhouse gas, methane, comes from landfills, coal mines, oil and gas operations, and agriculture. Anthropogenic sources of nitrous oxide emissions include burning fossil fuels and the use of certain fertilizers and industrial processes. Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are powerful, synthetic greenhouse gases that are released as byproducts of industrial processes and through leakage.

The following section describes the methodology used for the quantitative greenhouse gas analysis in this *CMRR-NF SEIS.*

B.3.3.1 Description of Impact Assessment

The potential impacts of greenhouse gas emissions of carbon dioxide, methane, and nitrous oxide from construction and operation under each alternative were evaluated. The annual and total greenhouse gas emissions that would result from construction and operation of the proposed CMRR-NF, including emissions from onsite construction equipment, construction material transport, worker commutes, and refrigerant usage during operation of the facility were calculated. Cement for construction purposes would be produced at an electric cement batch plant. Emissions from electricity consumption during cement production and the CMRR facility operation are not under the direct control of LANL, and do not occur directly on site, but have been included under environmental consequences. Under the analysis of operations, the impacts from the normal operation of RLUOB were also analyzed.

B.3.3.1.1 Summary of Calculations

All calculations follow the guidance provided by EPA for greenhouse gas inventory calculations (EPA 2008, 2009). Emission factors (**Table B–4**) and global warming potentials (**Table B–5**) were chosen based on this guidance.

Table B–4 Emission Factors Used in the Construction and Operations Analysis of the Alternatives

Emission Factors (diesel) [a]		
Pounds Carbon Dioxide per Gallon	**Pounds Methane per Gallon**	**Pounds Nitrous Oxide per Gallon**
22.4	0.000097354	0.00010344
Emission Factors (gasoline) [a]		
Pounds Carbon Dioxide per Gallon	**Pounds Methane per Gallon**	**Pounds Nitrous Oxide per Gallon**
19.5	0. 0016152	0. 001466
Electricity Generation Emission Factors [b]		
Pounds Carbon Dioxide per Megawatt-Hour	**Pounds Methane per Megawatt-Hour**	**Pounds Nitrous Oxide per Megawatt-Hour**
1,311.05	0.01745	0.01794

[a] EPA 2003.
[b] EPA 2010c.

Table B–5 Global Warming Potential for Major Greenhouse Gases

Chemical Name	*Global Warming Potential* [a]
Carbon dioxide	1
Methane [b]	21
Nitrous oxide	310
Hydrofluorocarbons	1,300

[a] 100-year time horizon.
[b] The global warming potential of methane includes the direct effects and those indirect effects due to the production of tropospheric ozone and stratospheric water vapor. The indirect effect due to the production of carbon dioxide is not included.
Source: IPCC 2007.

Construction Equipment

Construction of the CMRR-NF requires various types of construction equipment or nonroad vehicles. The following data were required to calculate the emissions for contractor-owned (nonroad) highway vehicles:

- Vehicle class
- Vehicle hours of operation
- Fuel type
- Average fuel consumption rate
- Emission factor
- Global warming potentials

Specific data were given on the types of equipment, fuel type, and hours of operation (LANL 2011). Emissions factors and global warming potentials are shown in Table B–4 and Table B–5. A fuel consumption rate of 4 gallons (15 liters) per hour was assumed.

Materials Transport

The following data were required to calculate the emissions for delivery trucks:

- Vehicle class
- Vehicle miles traveled
- Fuel type
- Average fuel efficiency
- Emission factor
- Global warming potentials

Specific information on the type of vehicle class for the delivery trucks was not available; therefore, it was assumed that they are hybrid diesel vehicles with an average fuel efficiency of 7.8 miles per gallon (3.3 kilometers per liter) (EPA 2003). Section B.14 describes the methodology used to estimate the number of trips made and distance traveled by each truck evaluated in this analysis.

Privately Owned Vehicles

Greenhouse gas emissions from privately owned vehicles (POVs) were calculated assuming one vehicle per construction worker. Data similar to those used for delivery trucks emissions were used to calculate emissions from construction worker commutes. Specific information on the type of vehicle classes was not available; therefore, it was assumed that light-duty gasoline vehicles with an average fuel efficiency of 22.1 miles per gallon (9.4 kilometers per liter) are the only POVs used. This is an average of the fuel efficiency of light-duty gasoline cars (24.1 miles per gallon [10.2 kilometers per liter]) and light-duty trucks (16.4 miles per gallon [7.0 kilometers per liter]) (EPA 2003). It was also assumed that workers had a 30-mile (48-kilometer) round-trip commute to the central parking area, where they board transport buses. This section also includes the bus transport to the construction site from the parking area and back.

Electricity Consumption

Greenhouse gas emissions from cement batch plant electricity use were calculated using the electricity consumption data given in Section B.2, "Site Infrastructure." The electricity generation emission factors are shown in Table B–4. Emissions of greenhouse gases were calculated by taking the amount of electricity consumed and multiply it by the emissions factor and the appropriate global warming potential.

Operations

Emissions of greenhouse gases (carbon dioxide, methane, nitrous oxide, and fluorinated gases) that would be associated with normal operation of the proposed CMRR-NF and RLUOB were quantified. This included offsite emissions associated with production of the electricity used on site.

The only direct greenhouse gas emissions from operation of the CMRR-NF and RLUOB are from refrigerants used on site to cool the buildings.

Refrigerants

Emissions from the refrigerants were calculated by taking the amount of material used multiplied by the appropriate global warming potential (Table B–5). Data on the refrigerants used in the CMR Building (which would also be used in the proposed CMRR-NF and RLUOB) show that HFC-134a [1,1,1,2-tetrafluoroethane] is the only refrigerant currently in use (LANL 2011).

Electricity Consumption

Greenhouse gas emissions from electricity generation were calculated using the electricity consumption data given in Section B.2, "Site Infrastructure." The electricity generation emission factors are shown in Table B–4. Emissions of greenhouse gases were calculated by taking the amount of electricity consumed and multiplying it by the emissions factor and the appropriate global warming potential.

The various greenhouse gas emissions were added together and are presented as carbon dioxide equivalent emissions—a sum that describes the quantity of each greenhouse gas weighted by a factor of its effectiveness as a greenhouse gas, using carbon dioxide as a reference. This is achieved by multiplying the quantity of each greenhouse gas emitted by a factor called the global warming potential. The global warming potential accounts for the lifetime and the radiative forcing of each gas over a period of 100 years (for example, carbon dioxide has a much shorter atmospheric lifetime than sulfur hexafluoride; therefore, it has a much lower global warming potential). The global warming potentials for the main greenhouse gases discussed are presented in Table B–5.

B.4 Noise

B.4.1 Description of Affected Resources and Region of Influence

Sound results from the compression and expansion of air or some other medium when an impulse is transmitted through it. Sound requires a source of energy and a medium for transmitting the sound wave. Propagation of sound is affected by various factors, including meteorology, topography, and barriers. Noise is undesirable sound that interferes or interacts negatively with the human or natural environment. Noise may disrupt normal activities (hearing and sleep), damage hearing, or diminish the quality of the environment.

Sound-level measurements used to evaluate the effects of nonimpulsive sound on humans are compensated by an A-weighting scale that accounts for the hearing response characteristics (frequency) of the human ear. Sound levels are expressed in decibels, or in the case of A-weighted measurements, decibels A-weighted. EPA has developed noise level guidelines for different land use classifications. Some states and localities have established noise control regulations or zoning ordinances that specify acceptable noise levels by land use category.

Noise from facility operations and associated traffic could affect human and animal populations. The ROI for each candidate site includes the site, nearby offsite areas, and transportation corridors where proposed activities might increase noise levels. Transportation corridors most likely to experience increased noise levels are those roads within a few miles of the site boundary that carry most of the site's employee and shipping traffic.

Sound-level data representative of site environs were obtained from existing reports. The acoustic environment was further described in terms of existing noise sources for each candidate site.

B.4.2 Description of Impact Assessment

Construction noise was evaluated using the Roadway Construction Noise Model, version 1.00, the U.S. Federal Highway Administration's standard model for prediction of construction noise (DOT 2006). The Roadway Construction Noise Model has the capability to model the types of construction equipment that are expected to be the dominant construction-related noise sources associated with this action. All construction noise analyses were assumed to make use of a standard set of construction equipment.

Noise impacts associated with the alternatives may result from construction and operation of facilities and increased traffic (see **Table B–6**). The impacts of facility construction and operation were assessed according to the types of noise sources and the locations of the candidate facilities relative to the site boundary. Potential traffic noise impacts were based on the likely increase in traffic volume. Possible impacts on wildlife were evaluated based on the possibility of sudden loud noises occurring during facility construction or modification and operation.

Table B–6 Impact Assessment Protocol for Noise

Resource	*Required Data*		*Measure of Impact*
	Affected Environment	*Alternative*	
Noise	Identification of sensitive offsite receptors (nearby residences); description of sound levels in the vicinity of the technical area/site	Description of major construction, modification, and operational noise sources; shipment and workforce traffic estimates	Increase in day–night average sound level at sensitive receptors

B.5 Geology and Soils

B.5.1 Description of Affected Resources and Region of Influence

Geologic resources include consolidated and unconsolidated earth materials, including mineral assets such as ore and aggregate materials and fossil fuels such as coal, oil, and natural gas. Geologic conditions include hazards such as earthquakes, faults, volcanoes, landslides, sinkholes, and other conditions leading to land subsidence and unstable soils. Soil resources include the loose surface materials of the earth in which plants grow, usually consisting of mineral particles from disintegrating rock, organic matter, and soluble salts. Certain soils are considered important to farmlands, as designated by the U.S. Department of Agriculture Natural Resources Conservation Service. Important farmlands include prime farmland, unique farmland, and other farmland of statewide or local importance, as defined in 7 CFR 657.5, and may be subject to the Farmland Protection Policy Act (7 U.S.C. 4201 et seq.).

Geology and soils were considered with respect to those attributes that could be affected under the alternatives, as well as those geologic and soil conditions that could affect each alternative. Thus, the ROI for geology and soils includes the CMRR Project site and nearby offsite areas that would be subject to disturbance by facility construction, modification, and operations under the alternatives, as well as those areas beneath existing or new facilities that would remain inaccessible for the life of the facilities. Geologic conditions that could affect the integrity and safety of facilities under the alternatives include large-scale geologic hazards (for example, earthquakes, volcanic activity, landslides, and land subsidence) and local hazards associated with the site-specific attributes of the soil and bedrock beneath site facilities.

B.5.2 Description of Impact Assessment

Facility construction and operations under the alternatives in this *CMRR-NF SEIS* were considered from the perspective of impacts on specific geologic resources and soil attributes. Construction and facility modification activities were the focus of the impacts assessment for geologic and soil resources; hence, one of the key factors considered in the analysis was the land area that would be disturbed during construction and occupied during operations (see **Table B–7**). The assessment included an analysis of the constraints on siting the proposed CMRR-NF over unstable soils that are prone to subsidence, liquefaction, shrink-swell, or erosion.

Table B–7 Impact Assessment Protocol for Geology and Soils

Resource	*Required Data*		*Measure of Impact*
	Affected Environment	*Alternative*	
Geologic hazards	Presence of geologic hazards within the ROI	Location of facility on the site	Potential for damage to facilities
Valuable mineral and energy resources	Presence of any valuable mineral or energy resources within the ROI	Location of facility on the site	Potential to destroy or render resources inaccessible
Important farmland soils	Presence of prime or other important farmland soils within the ROI	Location of facility on the site	Conversion of important farmland soils to nonagricultural use

ROI = region of influence.

The geology and soils impact analysis (see Table B–7) also considered the risks to existing and new facilities from large-scale geologic hazards, such as faulting and earthquakes, lava extrusions and other volcanic activity, landslides, and sinkholes (conditions that tend to affect broad expanses of land). This element of the assessment included collection of site-specific information concerning the potential for impacts on site facilities from local and large-scale geologic conditions. Historical seismicity within a given radius of each facility site was reviewed as a means of assessing the potential for future earthquake activity. In this *CMRR-NF SEIS*, earthquakes are described in terms of the parameters presented in **Table B–8**.

Probabilistic earthquake ground motions, expressed in terms of peak ground acceleration and spectral (response) acceleration, were determined to provide a comparative assessment of seismic hazards. The U.S. Geological Survey National Seismic Mapping Project uses both parameters. The U.S. Geological Survey's latest National Earthquake Hazards Reduction Program maps are based on spectral acceleration and have been adapted for use in the International Building Code (ICC 2000). These maps depict anticipated peak ground accelerations at 0.2- and 1.0-second spectral acceleration, based on a 2 percent probability of exceedance in 50 years (corresponding to an annual probability of occurrence of about 1 in 2,500 in 50 years). Available site-specific seismic hazard analyses were also reviewed and compared.

An evaluation also determined whether construction or operation of proposed facilities at a specific site could destroy or preclude the use of valuable mineral or energy resources.

Pursuant to the Farmland Protection Policy Act of 1981 (7 U.S.C. 4201 et seq.) and its implementing regulations (7 CFR Part 658), the presence of important farmland, including prime farmland, was also evaluated. This act requires agencies to make Farmland Protection Policy Act evaluations part of their NEPA process, primarily to reduce the conversion of farmland to nonagricultural uses by Federal projects and programs. However, otherwise qualifying farmlands in or already committed to urban development, land acquired for a project on or prior to August 4, 1984, and lands acquired or used by a Federal agency for national defense purposes are exempt from the act's provisions (7 CFR 658.2 and 658.3).

Table B–8 The Modified Mercalli Intensity Scale of 1931, with Generalized Correlations to Magnitude and Peak Ground Acceleration

Modified Mercalli Intensity [a]	*Observed Effects of Earthquake*	*Approximate Magnitude* [b]	*Peak Ground Acceleration* [c] *(g)*
I	Usually not felt, except by a very few under very favorable conditions.	Less than 3	Less than 0.0017
II	Felt only by a few persons at rest, especially on the upper floors of buildings.	3 to 3.9	0.0017 to 0.014
III	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck.		
IV	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy object striking building. Standing motor cars rock noticeably.	4 to 4.9	0.014 to 0.039
V	Felt by nearly everyone; at night, many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.		0.039 to 0.092
VI	Felt by all; many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.	5 to 5.9	0.092 to 0.18
VII	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.	6 to 6.9	0.18 to 0.34
VIII	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings, with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.	7 to 7.9	0.34 to 0.65
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.		0.65 to 1.24
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.		1.24 and higher
XI	Few, if any, (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.	8 and higher	
XII	Damage total. Lines of sight and level are distorted. Objects thrown into the air.		

[a] Intensity is a unitless expression of observed effects from earthquake-produced ground-shaking. Effects may vary greatly between locations based on earthquake magnitude, distance from the earthquake, and local subsurface geology. The descriptions given are abbreviated from the Modified Mercalli Intensity scale of 1931.

[b] Magnitude is an exponential function of seismic wave amplitude that is related to the energy released. There are several "magnitude" scales in common use, including local "Richter" magnitude, body-wave magnitude, surface-wave magnitude, and moment magnitude. Each has applicability for measuring particular aspects of seismic signals and may be considered equivalent within each scale's respective range of validity.

[c] Acceleration is expressed as a percent relative to Earth's gravitational acceleration (*g*) ($g = 980$ centimeters per second

Modified Mercalli Intensity [a]	*Observed Effects of Earthquake*	*Approximate Magnitude* [b]	*Peak Ground Acceleration* [c] *(g)*

squared). Given values are correlated to Modified Mercalli Intensity based on measurements of California earthquakes only (Wald et al. 1999).

Source: Wald et al. 1999; USGS 2002.

B.6 Surface and Groundwater Quality

B.6.1 Description of Affected Resources and Region of Influence

Water resources are surface water and groundwater suitable for human consumption, traditional and ceremonial uses by Native Americans, aquatic or wildlife propagation, agricultural purposes, irrigation, or industrial/commercial purposes. The ROI used for water resources encompasses those onsite and adjacent surface-water and groundwater systems that could be affected by effluent discharges, and releases (that is, spills) or stormwater runoff associated with facility construction and operational activities under the proposed CMRR Project alternatives and the operation of the CMRR-NF and RLUOB. Water use is addressed in Section B.2.

B.6.2 Description of Impact Assessment

Assessment of the impacts of the proposed CMRR Project alternatives on surface-water and groundwater quality consisted of a comparison of site-generated data and professional estimates regarding effluent discharge with applicable regulatory standards, design parameters, and standards commonly used in the water and wastewater engineering fields, as well as recognized measures of environmental impacts. Certain assumptions were made to facilitate the impacts assessment: (1) all effluent treatment facilities would be approved by the appropriate permitting authority; (2) the effluent treatment facilities would meet effluent limitations imposed by the relevant National Pollutant Discharge Elimination System permits; (3) any stormwater runoff from construction and operation activities would be handled in accordance with the regulations of the appropriate permitting authority; (4) during construction, sediment fencing or other erosion control devices would be used to mitigate the short-term adverse impacts of sedimentation; and (5) as appropriate, stormwater holding ponds would be constructed to reduce the impacts of runoff on surface-water quality.

B.6.2.1 Water Quality

The water quality impacts assessment analyzed how effluent discharges to surface water, as well as discharges reaching groundwater, from facilities under each alternative would directly affect current water quality. The determination of the impacts of the alternatives (summarized in **Table B–9)** consisted of a comparison of the projected effluent quality with relevant regulatory standards and implementing regulations under the Clean Water Act (33 U.S.C. 1251 et seq.), Safe Drinking Water Act (42 U.S.C. 300 (f) et seq.), state laws, and existing site permit conditions. The impacts analysis evaluated the potential for contaminants to affect receiving waters as a result of spills, stormwater discharges, and other releases under the alternatives. Separate analyses were conducted for surface-water and groundwater impacts.

Table B–9 Impact Assessment Protocol for Water Quality

Resource	*Required Data*		*Measure of Impact*
	Affected Environment	*Facility Design*	
Surface-water quality	Surface water near the facilities in terms of stream classifications and changes in water quality	Expected contaminants and contaminant concentrations in discharges to surface water	Exceedance of relevant surface-water quality criteria or standards established in accordance with the Clean Water Act or state regulations and existing permits
Groundwater quality	Groundwater near the facilities in terms of classification, presence of designated sole-source aquifers, and changes in groundwater quality	Expected contaminants and contaminant concentrations in discharges that could reach groundwater	Contaminant concentrations in groundwater exceeding relevant standards or criteria established in accordance with the Safe Drinking Water Act or state regulations and existing permits

Surface-Water Quality—The evaluation of impacts on surface-water quality focused on the quality and quantity of any effluents (including stormwater) that would be discharged and the quality of the receiving stream resulting from the discharges. The evaluation of effluent quality featured a review of the expected parameters, such as the design average and maximum flows, as well as the effluent parameters reflected in the existing (or expected) National Pollutant Discharge Elimination System permits or applicable state discharge permits. Parameters of concern include total suspended solids, metals, organic and inorganic chemicals, and any other constituents that could affect the local environment. Proposed water quality management practices were reviewed to ensure that any applicable permit limitations and conditions would be met. Factors that currently degrade water quality were also identified.

During facility construction, ground-disturbing activities could affect surface water through increased runoff and sedimentation. Such impacts relate to the amount of land disturbed, type of soil at the site, topography, and weather conditions. These impacts would be minimized by applying standard best management practices for stormwater and erosion control (for example, construction of sediment fences and mulching of disturbed areas).

During operations, surface water could be affected by increased sheet flow runoff from parking lots, buildings, or other cleared areas. Stormwater from these areas could be contaminated with materials deposited by airborne pollutants, automobile exhaust and residues, materials handling releases such as spills, and process effluents. Impacts of stormwater discharges could be highly variable and site-specific, and mitigation would depend on best management practices, holding facility designs, topography, and adjacent land use. Data from existing water quality monitoring sampling results were compared with expected discharges from the facilities to determine the potential impacts on surface water.

Groundwater Quality—Potential groundwater quality impacts associated with any effluent discharges and other contaminant releases during facility construction and operation activities were examined. Available engineering estimates of contaminant concentrations were weighed against applicable Federal and state groundwater quality standards, effluent limitations, and drinking water standards to determine the impacts under each alternative. The consequences of groundwater use and effluent discharge on groundwater conditions were also evaluated.

B.6.2.2 Waterways and Floodplains

The locations of waterways (that is, ponds, lakes, and streams) and the delineated floodplains were identified from maps and other existing documents to assess the potential impacts of facility construction and operations activities, including direct effects on hydrologic characteristics or secondary effects such as sedimentation (see the discussion above on surface water quality). All activities would be conducted to avoid delineated floodplains and to ensure compliance with Executive Order 11988, *Floodplain Management.*

B.7 Ecological Resources

B.7.1 Description of Affected Resources and Region of Influence

Ecological resources include terrestrial resources, wetlands, aquatic resources, and threatened and endangered species. The ROI for the ecological resource analysis encompassed the site and adjacent areas potentially affected by construction and operation activities associated with the proposed alternatives.

Terrestrial resources are defined as those plant and animal species and communities that are most closely associated with the land, or for aquatic resources, a water environment. Wetlands are defined by the U.S. Army Corps of Engineers and EPA as "… those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (33 CFR 328.3).

Federally endangered species are defined under the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.) as those in danger of extinction throughout all or a large portion of their range. Threatened species are defined as those species likely to become endangered within the foreseeable future. The U.S. Fish and Wildlife Service and the National Marine Fisheries Service propose species to be added to the lists of federally threatened and federally endangered species. These agencies also maintain a list of "candidate" species for which they have evidence that listing may be warranted, but are currently precluded by the need to list species that are more in need of Endangered Species Act protection. Such candidate species do not receive legal protection under the Endangered Species Act, but should be considered in project planning in case they are listed in the future. The LANL *Threatened and Endangered Species Habitat Management Plan* (LANL 2000) identifies areas of environmental interest for various federally listed threatened or endangered species for the purpose of managing and protecting these areas because of their significance to biological or other resources. In general, an area of environmental interest consists of a core area that contains important breeding or wintering habitat for a specific species, as well as a buffer area around the core area to protect it from disturbances that would degrade its value. The *Threatened and Endangered Species Habitat Management Plan* defines the types and levels of activities that may be conducted within these areas. The State of New Mexico also designates species as endangered, threatened, or sensitive. The state law is not applicable on Federal lands and potential impacts on the state-protected species are not assessed; however, when staff perform surveys at LANL, they look for and record the occurrence of these species.

B.7.2 Description of Impact Assessment

Impacts on ecological resources may occur as a result of land disturbance, water use, air and water emissions, human activity, and noise associated with CMRR Project implementation (see **Table B–10**). Each of these factors was considered when evaluating the potential impacts of the proposed alternatives. For those activities involving the construction of a new facility or placement of laydown or spoils disposal areas, assessment of direct impacts on ecological resources was based on the acreage of land disturbed by construction. The indirect impacts of factors such as human disturbance and noise were evaluated qualitatively. Indirect impacts on ecological resources due to erosion and sedimentation also were evaluated qualitatively, recognizing that standard erosion and sediment control practices would be followed. Impacts on terrestrial and aquatic ecosystems and wetlands from water use and air and water emissions were evaluated based on the results of the analyses conducted for air quality and water resources. Determination of the impacts on threatened and endangered species was based on factors similar to those noted above for terrestrial resources, wetlands, and aquatic resources, in addition to biological assessments and annual species surveys conducted for this project.

Table B–10 Impact Assessment Protocol for Ecological Resources

Resource	*Required Data*		*Measure of Impact*
	Affected Environment	*Alternative*	
Terrestrial resources	Vegetation and wildlife within the vicinity of CMRR Project activity	CMRR Project activity location and acreage requirements, air and water emissions, and noise	Loss or disturbance of terrestrial habitat, emissions and noise values above levels shown to cause impacts on terrestrial resources
Wetlands	Wetlands within the vicinity of CMRR Project activity	CMRR Project activity location and acreage requirements, air and water emissions, and wastewater discharge quantity and location	Loss or disturbance of wetlands, discharge to wetlands
Aquatic resources	Aquatic resources within the vicinity of CMRR Project activity	CMRR Project activity air and water emissions, water source and quantity, and wastewater discharge location and quantity	Discharges above levels shown to cause impacts on aquatic resources, changes in water withdrawals and discharges
Threatened and endangered species	Threatened and endangered species and areas of environmental interest within the vicinity of CMRR Project activity	CMRR Project activity location and acreage requirements, air and water emissions, noise, water source and quantity, and wastewater discharge location and quantity	Measures similar to those noted above for terrestrial and aquatic resources

CMRR = Chemistry and Metallurgy Research Building Replacement.

B.8 Cultural and Paleontological Resources

B.8.1 Description of Affected Resources and Region of Influence

Cultural resources are indications of human occupation and use of the landscape as defined and protected by a series of Federal laws, regulations, and guidelines. For this *CMRR-NF SEIS*, potential impacts were assessed separately for each of the three general categories of cultural resources: archaeological resources, historic buildings and structures, and traditional cultural properties. Paleontological resources are the physical remains, impressions, or traces of plants or animals from a former geological age, and may be sources of information on ancient environments and the evolutionary development of plants and animals. Although not governed by the same historic preservation laws as cultural resources, they could be affected by the proposed alternatives in much the same manner.

Archaeological resources include any material remains of past human life or activities that are of archaeological interest, including items such as pottery, basketry, bottles, weapons, rock art and carvings, graves, and human skeletal materials. The term also applies to sites that can provide information about past human lifeways. Historic buildings and structures include buildings or other structures constructed after 1942 that have been evaluated for eligibility for the National Register of Historic Places. Traditional cultural properties are defined as a place of special heritage value to contemporary communities (often, but not necessarily, Native American groups) because of their association with the cultural practices or beliefs that are rooted in the histories of those communities and their importance in maintaining the cultural identity of those communities (LANL 2006).

B.8.2 Description of Impact Assessment

The analysis of impacts on cultural and paleontological resources addressed potential direct and indirect impacts at each candidate site from construction and operation (see **Table B–11**). Direct impacts include those resulting from groundbreaking activities associated with new construction and spoils disposal. Indirect impacts include those associated with reduced access to a resource site, as well as impacts associated with increased stormwater runoff, increased traffic, and visitation to sensitive areas.

Table B–11 Impact Assessment Protocol for Cultural and Paleontological Resources

Resource	*Required Data*		*Measure of Impact*
	Affected Environment	*Alternative*	
Archaeological resources	Archaeological resources within the vicinity of CMRR Project activities	CMRR Project activity location and acreage requirement	Potential for loss, isolation, or alteration of the character of archaeological resources; introduction of visual, audible, or atmospheric elements out of character
Historic buildings and structures	Buildings and structures within the vicinity of CMRR Project activities	CMRR Project activity location and acreage requirement	Potential for loss, isolation, or alteration of the character of historic buildings and structures; introduction of visual, audible, or atmospheric elements out of character
Traditional cultural properties	Traditional cultural properties within the vicinity of CMRR Project activities	CMRR Project activity location and acreage requirement	Potential for loss, isolation, or alteration of the character of traditional cultural properties; introduction of visual, audible, or atmospheric elements out of character
Paleontological resources	Paleontological resources within the vicinity of CMRR Project activities	CMRR Project activity location and acreage requirement	Potential for loss, isolation, or alteration of paleontological resources

CMRR = Chemistry and Metallurgy Research Building Replacement.

B.9 Socioeconomics

B.9.1 Description of Affected Resources and Region of Influence

Socioeconomic impacts are defined in terms of changes to the demographic and economic characteristics of a region. The number of jobs created by the proposed alternatives could affect regional employment, income, and expenditures. Job creation is characterized by two types: (1) construction-related jobs, which are transient in nature and short in duration, and, thus, less likely to affect public services; and (2) operation-related jobs, which would last for the duration of the proposed CMRR Project and, thus, could create additional service requirements within the ROI.

The ROI for the socioeconomic environment represents a geographic area where site employees and their families reside, spend their income, and use their benefits, thereby affecting the economic conditions of the region. Site-specific ROIs were identified as those counties in which approximately 90 percent or more of the site's workforce resides. This distribution reflects an existing residential preference for people currently employed at LANL and was used to estimate the distribution of workers associated with facility construction and operation under the proposed alternatives.

B.9.2 Description of Impact Assessment

Data were compiled on the current socioeconomic conditions near LANL, including unemployment rates, economic area industrial and service sector activities, and the civilian labor force. The workforce requirements of each alternative were determined to measure their possible effect on these socioeconomic conditions. Although workforce requirements might be met by employees already working at LANL, it was assumed that new employees would be hired to ensure assessment of the maximum impact. Census statistics were also compiled on the local population and housing demand. U.S. Census Bureau population forecasts for the ROI were combined with overall projected workforce requirements for each of the alternatives being considered to determine the extent of the potential impacts on the local economy, population, and housing demand (see **Table B–12**).

Table B–12 Impact Assessment Protocol for Socioeconomics

Resource	*Required Data*		*Measure of Impact*
	Affected Environment	*Alternative*	
Regional Economic Characteristics			
Workforce requirements	Site workforce projections	Estimated construction and operating staff requirements and timeframes	Workforce requirements added to site workforce projections
Region of influence civilian labor force	Labor force estimates	Estimated construction and operating staff requirements and timeframes	Workforce requirements as a percentage of the civilian labor force
Employment	Latest available employment estimates in counties surrounding the site	Estimated construction and operating staff requirements	Potential change in employment
Demographic Characteristics			
Population and demographics of race, ethnicity, and income	Latest available estimates by county from the U.S. Census Bureau	Estimated effect on population	Potential effects on population
Housing Characteristics			
Housing – home owner and renter vacancy rates	Latest available data from the U.S. Census Bureau	Estimated housing unit requirements	Potential change in housing unit availability

B.10 Environmental Justice

B.10.1 Description of Affected Resources and Region of Influence

Environmental justice requires assessment of the potential for disproportionately high and adverse human health or environmental impacts on minority and low-income populations as a result of implementing any of the alternatives analyzed in this *CMRR-NF SEIS*. In assessing these impacts, the following definitions of minority individuals and populations and low-income population were used:

- *Minority individuals:* These individuals are members of one or more of the following population groups: Hispanic or Latino, American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, or two or more races.

- *Minority populations:* Minority populations are identified where either (1) the minority population of the affected area exceeds 50 percent or (2) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. "Meaningfully greater" is defined here as 20 percentage points.

- *Low-income population:* Low-income populations in an affected area should be identified with the annual statistical poverty thresholds from the Census Bureau's Current Population Reports, Series P-60 on Income and Poverty. In identifying low-income populations, agencies may consider as a community either a group of individuals living in geographic proximity to one another, or a set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect (CEQ 1997). The most recent poverty estimates were supplied from the 2005–2009 *American Community Survey 5-Year Estimates*.

Consistent with the impact analysis for the public and occupational health and safety, the affected populations are defined as those minority and low-income populations that reside within 50 miles (80 kilometers) of Technical Area 55.

B.10.2 Description of Impact Assessment

Adverse impacts on offsite populations were measured using the methods presented for the various resource areas described in this appendix and analyzed throughout Chapter 4 of this *CMRR-NF SEIS*. Disproportionately high and adverse impacts occur when the risk or rate of exposure to an environmental hazard for a minority or low-income population is significant and exceeds the risk or exposure rate for the general population or another appropriate comparison group. Therefore, estimates of environmental justice impacts were determined using the impacts analysis presented throughout Chapter 4 for the various resource areas to assess the potential for a minority or low-income population to disproportionately bear any adverse impacts.

B.11 Human Health

B.11.1 Description of Affected Resources

Public and occupational health and safety analysis examines the potential adverse human health effects of exposure to ionizing radiation and hazardous chemicals from facility operation. In addition, occupational health and safety analysis examines work-related industrial safety issues that determine potential death, illness, or injury resulting from construction and operation activities. Human health effects for transportation of radioactive materials are discussed in Section B.13.

B.11.1.1 Facility Operation

For facility operation, health effects were determined by identifying the types and quantities of additional radioactive materials and toxic chemicals to which individuals may be exposed and estimating the doses or exposures and resulting indicators of health effects (latent cancer fatalities [LCFs]). The impacts of various releases during both normal activities (facility operations and disposition) and postulated accidents on the health of workers and the public residing within an ROI of 50 miles (80 kilometers) were assessed using site-specific factors such as meteorology, population distribution, and distance to nearby receptors.

B.11.1.2 Industrial Safety

Work-related accidents were evaluated in terms of total recordable cases (TRCs), injuries, and deaths resulting from facility construction, operation, and disposition using LANL, other DOE facility, and Bureau of Labor Statistics historical accidents databases. Two categories of industrial safety impacts, TRCs and fatalities, were analyzed. In addition to fatalities, TRCs include work-related illnesses or injuries that result in loss of consciousness, restriction of work or motion, or transfer to another job, as well as injuries that require medical treatment beyond first aid.

B.11.2 Description of Impact Assessment

B.11.2.1 Facility Operation

Health effects, in terms of incremental doses or exposures and related risks (LCFs), were assessed based on the types and quantities of materials released. Impacts on involved workers were estimated based on operational experience, engineering estimates, and administrative control levels. Models were used to estimate impacts on the health of noninvolved workers and the public resulting from releases during both normal (incident-free) operations and accident conditions. The models used were GENII [Hanford Environmental Radiation Dosimetry Software System (Generation II)] for radioactive air emissions during normal operation (PNNL 2007), MACCS2 [MELCOR Accident Consequences Code System] for accidental releases of radioactive materials (NRC 1998).

B.11.2.2 Industrial Safety

DOE and contractor TRC and fatality incident rates were obtained from DOE's Computerized Accident/Incident Reporting System database. The database was used to collect and analyze DOE and DOE contractor reports of injuries, illnesses, and other accidents that have occurred during DOE operations. General industry data were obtained from information maintained by the Bureau of Labor Statistics. In addition, LANL site-specific TRCs were obtained from the 2008 *LANL SWEIS* and the SWEIS Yearbooks.

A number of occupational incidence rates are available for use in estimating the industrial safety impacts. The rates vary between 1.6 and 4.0 incidents per 200,000 labor hours (see **Table B–13**). This table provides the three most relevant sources of data for this *CMRR-NF SEIS*: LANL site-specific data, DOE and contractor data, and private industry data maintained by the Bureau of Labor Statistics.

The LANL site-specific injury and illness data are summarized in the 2008 *LANL SWEIS* (DOE 2008) as follows: 2.40 and 1.18 for TRCs and days away, restricted, or transferred (DART) rates, respectively. In addition, the similar information for the activities at DOE facilities is projected to result in 1.6 TRCs and 0.7 DARTs, based on the accident cases from 2004 through 2008 (DOE 2011). These rates are well below industry averages, which in 2006 through 2009 were 4.0 TRCs and 2.0 DARTs cases as a result of an occupational injury or illness (BLS 2010).

Table B–13 Total Recordable Cases and Fatality Incident Rates

	Total Recordable Cases (rate [a])	*Fatalities (rate [b])*	*DART (rate [a])*
DOE and contractor	1.6	0.0008	0.7
LANL site-specific	2.4	0.0	1.18
Private industry (BLS)	4.0	0.0038	2.0

BLS = Bureau of Labor Statistics; DART = days away, restricted, or transferred; LANL = Los Alamos National Laboratory.

[a] Average illness and injury cases per 200,000 labor hours from 2004 through 2008 for DOE and 2006 through 2009 for BLS. Days away, restricted, or transferred –DART rate per 200,000 labor hours.

[b] Average fatality rate per 200,000 labor hours from 2004 through 2008 for DOE and 2006 through 2009 for BLS.

Source: BLS 2010a, 2010b; DOE 2011.

B.12 Waste Management and Pollution Prevention

B.12.1 Description of Affected Resources and Region of Influence

Construction of the CMRR-NF is expected to principally generate nonhazardous waste, such as construction and disposition debris. However, because some of the activities associated with construction could occur in the vicinity of potential release sites that require or could potentially require remediation, it is possible that small quantities of other wastes could be generated, including low-level radioactive waste and mixed low-level radioactive waste and/or chemical waste. Operation of the CMRR-NF and RLUOB is expected to generate transuranic and mixed transuranic wastes, low-level radioactive waste, mixed low-level radioactive waste, chemical waste, and nonhazardous waste. Decommissioning, decontamination, and demolition of the CMRR-NF are expected to generate transuranic and mixed transuranic waste, low-level radioactive waste, mixed low-level radioactive waste, chemical waste, and nonhazardous waste.

All of these wastes are defined as follows:

- *Transuranic waste:* Radioactive waste not classified as high-level radioactive waste and containing more than 100 nanocuries per gram of alpha-emitting transuranic isotopes with half-lives greater than 20 years.

- *Mixed transuranic waste:* transuranic waste that also contains hazardous components regulated under the Resource Conservation and Recovery Act (42 U.S.C. 6901 et seq.).

- *Low-level radioactive waste:* Waste that contains radioactive material and is not classified as high-level radioactive waste, transuranic waste, or spent nuclear fuel, or the tailings or wastes produced by extraction or concentration of uranium or thorium from ore processed primarily for its source material. Test specimens of fissionable material irradiated for research and development purposes only (not for the production of power or plutonium) may be classified as low-level radioactive waste, provided the transuranic concentration is less than 100 nanocuries per gram of waste.

- *Mixed low-level radioactive waste:* low-level radioactive waste that also contains hazardous components regulated under the Resource Conservation and Recovery Act.

- *Chemical waste:* Defined as hazardous waste under Resource Conservation and Recovery Act regulations; toxic waste (asbestos and polychlorinated biphenyls) under the Toxic Substances Control Act; and special waste (including industrial waste, infectious waste, and petroleum contaminated soils) under New Mexico's Solid Waste Regulations.

- *Nonhazardous waste:* Discarded material including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations or from community activities. This category does not include source, special nuclear, or byproduct material as defined by the Atomic Energy Act (42 U.S.C. 2011 et. seq.).

Waste management activities in support of the proposed alternatives would be contingent on Records of Decision (RODs) issued for the *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (DOE 1997a). In its ROD for transuranic waste (63 FR 3629) and subsequent revisions to this ROD (65 FR 82985, 66 FR 38646, and 67 FR 56989), DOE decided (with one exception) that each DOE site that currently has or will generate transuranic waste would prepare its transuranic waste for disposal and store the waste on site until it could be shipped to the Waste Isolation Pilot Plant in Carlsbad, New Mexico, for disposal. In the ROD for hazardous waste released on August 5, 1998 (63 FR 41810), DOE decided that DOE sites will continue to use offsite facilities for treatment and disposal of major portions of their nonwastewater hazardous waste. Based on the ROD for low-level radioactive waste and mixed low-level radioactive waste issued on February 18, 2000 (65 FR 10061), minimal treatment of low-level radioactive waste will be performed and, to the extent practicable, onsite disposal of low-level radioactive waste will continue. DOE's Hanford Site and Nevada National Security Site (formerly called the Nevada Test Site) will be made available to all DOE sites for disposal of low-level radioactive waste. Mixed low-level radioactive waste analyzed in the *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* will be treated at the Hanford Site, Idaho National Laboratory, the Oak Ridge Reservation, and the Savannah River Site and will be disposed of at the Hanford Site and the Nevada National Security Site. This decision does not preclude use of a commercial capability for treatment and/or disposal of low-level radioactive waste and mixed low-level radioactive waste.

B.12.2 Description of Waste Management Impacts Assessment

Waste management impacts were assessed by comparing projected waste stream volumes generated from the proposed activities with LANL's waste management capacities and generation rates (see **Table B–14**). Only impacts relative to the capacities of waste management facilities are considered here; other environmental impacts of waste management facility operations (for example, human health effects) are evaluated in other sections of this *CMRR-NF SEIS* or in other facility-specific or site-wide NEPA documents. Projected waste generation rates for the proposed activities were compared with the site processing rates and capacities of those storage, treatment, and disposal facilities likely to be involved in managing the additional waste.

Table B–14 Impact Assessment Protocol for Waste Management

Resource	*Required Data*		*Measure of Impact*
	Affected Environment	*Alternative*	
Waste management capacity - Transuranic waste - Mixed transuranic waste - Low-level radioactive waste - Mixed low-level radioactive waste - Chemical waste - Nonhazardous waste	Site generation rates for each waste type Management capabilities of potentially affected storage, treatment, and disposal facilities for each waste type	Generation rates from facility construction, operations, and DD&D for each waste type	Waste generation rates in comparison to the capabilities of applicable waste management facilities

DD&D = decommissioning, decontamination, and demolition.

B.13 Transportation

B.13.1 Description of Affected Resources and Region of Influence

Transportation of any commodity involves a risk to both transportation crewmembers and members of the public. This risk results directly from transportation-related accidents and indirectly from increased levels of pollution from vehicle emissions, regardless of the cargo. Transportation of certain materials, such as hazardous or radioactive waste, can pose an additional risk due to the unique nature of the materials themselves. Two types of transportation impacts were analyzed: the impacts of incident-free (routine) transportation and the impacts of transportation accidents. The impacts of incident-free transportation and transportation accidents may be either nonradiological or radiological, or both. Incident-free transportation impacts include radiological impacts on the public and the workers due to the radiation field surrounding the transportation package. Nonradiological impacts of potential transportation accidents include traffic accident fatalities.

For incident-free transportation, the ROI for the affected population includes individuals living within 0.5 miles (800 meters) of each side of the road or rail. For transportation accidents, the ROI for the affected population includes individuals residing within 50 miles (80 kilometers) of the accident; the maximally exposed individual would be an individual located 330 feet (100 meters) directly downwind from the accident.

B.13.2 Impact Assessment

The impact of a specific radiological accident is expressed in terms of probabilistic risk, which is defined as the accident probability (that is, accident frequency) multiplied by the accident consequences. The overall risk is obtained by summing the individual risks from all reasonably conceivable accidents. In addition to calculating the radiological risks that would result from all reasonably conceivable accidents during transportation of radioactive waste, the consequences of maximum reasonably foreseeable accidents (events with a probability greater than 1×10^{-7} [1 chance in 10 million] per year) were assessed. The models used to estimate impacts on the health of the general public resulting from releases during transportation accidents were the Transportation Routing Analysis Geographic Information System (TRAGIS) computer program for route selection and population estimates along the routes, the RADTRAN 6 [Radioactive Material Transportation] risk assessment computer code for incident-free and accident conditions, and the RISKIND [Risks and Consequences of Radioactive Material Transport] computer code for maximum reasonably foreseeable accidents.

The risk from transportation of radioactive materials can be affected by a number of factors. These factors are predominantly categorized as either radiological or nonradiological impacts. Radiological impacts are those associated with the accidental release of radioactive materials and the effects of low levels of radiation emitted during normal, or incident-free, transportation. Nonradiological impacts are those associated with transportation, regardless of the nature of the cargo, such as accidents resulting in death or injury when there is no release of radioactive material.

Shipping packages containing radioactive materials emit low levels of radiation during incident-free transportation. The amount of radiation emitted depends on the kind and amount of material being transported. U.S. Department of Transportation regulations require that shipping packages containing radioactive materials have sufficient radiation shielding to limit the radiation to an acceptable level of 10 millirem per hour at 6.6 feet (2 meters) from the transporter. For incident-free transportation, the potential human health impacts from the radiation field surrounding the transportation packages were estimated for transportation workers and the general population along the route (off traffic, or off-link), people sharing the route (in traffic or on-link), people at rest areas, and at stops along the route.

RADTRAN 6 (SNL 2009) was used to estimate the impacts for transportation workers and populations, as well as the impact on a maximally exposed individual (a person stuck in traffic, a gas station attendee, an inspector, etc.) who could be a worker or a member of the public.

Transportation accidents involving radioactive materials present both nonradiological and radiological risks to workers and the public. Nonradiological impacts of potential transportation accidents include traffic accident fatalities. A release of radioactive material during transportation accidents would occur only when the package carrying the material is subjected to accident forces that exceed the package design standard. The impact of a specific radiological accident is expressed in terms of probabilistic risk, which is defined as the accident probability (that is, accident frequency) multiplied by the accident consequences. The overall risk is obtained by summing the individual risks from all reasonably conceivable accidents. The analysis of accident risks takes into account a spectrum of accident severities ranging from high-probability accidents of low severity (for example, a fender bender) to hypothetical high-severity accidents that have a correspondingly low probability of occurrence. Only as a result of a severe fire and/or a powerful collision, which are of extremely low probability, could a transportation package of the type used to transport radioactive material under the alternatives of this *CMRR-NF SEIS* be damaged to the extent that there could be a release of radioactivity to the environment with significant consequences.

In addition to calculating the radiological risks that would result from all reasonably conceivable accidents during transportation of radioactive wastes, DOE assessed the highest consequences of a maximum reasonably foreseeable accident with a radioactive release frequency greater than 1×10^{-7} (1 chance in 10 million) per year along the route. The latter consequences were determined for atmospheric conditions that would prevail during accidents. The analysis used RISKIND to estimate doses to individuals and populations (Yuan et al. 1995).

Incident-free health impacts are expressed in terms of additional LCFs. Radiological accident health impacts are also expressed as additional LCFs, and nonradiological accident risk as additional immediate (traffic) fatalities. LCFs associated with radiological exposure were estimated by multiplying the occupational (worker) and public dose by 6.0×10^{-4} LCFs per person-rem of exposure (DOE 2003a).

To determine transportation risks, per-shipment risk factors were calculated for the incident-free and accident conditions using RADTRAN 6 (SNL 2009) in conjunction with TRAGIS (Johnson and Michelhaugh 2003) to choose transportation routes in accordance with U.S. Department of Transportation regulations. TRAGIS calculates transportation routes in terms of distances traveled in rural, urban, and suburban areas. It provides population density estimates based on the 2000 Census for each area along the routes to determine population radiological risk factors. For incident-free operations, the affected population includes individuals living within 0.5 miles (800 meters) of each side of the road or rail line. For accident conditions, the affected population includes individuals living within 50 miles (80 kilometers) of the accident, and the maximally exposed individual is assumed to be an individual located 330 feet (100 meters) directly downwind from the accident.

For determining traffic accident fatalities from offsite commercial truck transportation, separate accident rates and accident fatality risks were used for rural, suburban, and urban population zones. These accident and fatality rates were taken from data provided in *State-Level Accident Rates for Surface Freight Transportation: A Reexamination (Accident Rates Report)*, (Saricks and Tompkins 1999). The values selected were the mean accident and fatality rates given in the *Accident Rates Report* for "interstate," "total," and "primary." These values were assigned to rural, suburban, and urban population zones, respectively. Accident rates are generically defined as the number of accident involvements (or fatalities) in a given year per unit of travel in that same year. Therefore, the rate is a fractional value, with accident involvement count as the numerator of the fraction and vehicular activity (total travel distance in truck-kilometers) as its denominator. The accident rates for rural, suburban, and urban zones were 3.15, 3.52, and 3.66 per 10 million truck-kilometers, respectively; and the fatality rates were 0.88, 1.49, and 2.32 per 100 million truck-kilometers, respectively.

A review of the truck accidents and fatalities reports by the Federal Carrier Safety Administration indicated that state-level accidents and fatalities were underreported. For the years 1994 through 1996, which were the basis for the analysis in the *Accident Rates Report*, the review found that accidents were underreported by about 39 percent and fatalities were underreported by about 36 percent (UMTRI 2003). Therefore, truck accident and fatality rates in the *Accident Rates Report* were increased by factors of 1.64 and 1.57, respectively, to account for the underreporting.

For determining traffic accident fatalities from local and regional transportation of industrial and hazardous waste, New Mexico state accident and fatality rates, which are also given in the *Accident Rates Report*, were used. The rates used were 1.13 accidents per 10 million truck-kilometers and 1.18 fatalities per 100 million truck-kilometers. For assessment purposes, the total number of expected accidents or fatalities was calculated by multiplying the total shipment distance for a specific waste by the accident or fatality rate.

Radiological consequences were calculated by assigning radionuclide release fractions on the basis of the type of waste, the type of shipping container, and the accident severity category. The release fraction is defined as the fraction of the radioactivity in the container that could be released to the atmosphere in an accident with a given level of severity. Release fractions vary according to waste type and the physical or chemical properties of the radioisotopes. Most solid radionuclides are nonvolatile and are, therefore, relatively nondispersible.

Representative release fractions were developed for each waste and container type on the basis of DOE and U.S. Nuclear Regulatory Commission reports (DOE 1994, 1997b, 2002, 2003b; NRC 1977, 2000). The severity categories and corresponding release fractions provided in these documents cover a range of accidents from no impact (zero speed) to impacts with speeds in excess of 120 miles (193 kilometers) per hour onto an unyielding surface. Traffic accidents that could occur at the site would be of minor impact due to lower local speed, with no release potential.

As stated earlier, offsite route characteristics were determined using TRAGIS, which determines routes for shipment of radioactive materials that conform to U.S. Department of Transportation regulations as specified in 49 CFR Part 397. The TRAGIS-generated population densities along the routes were extrapolated to the year 2030, based on state population growths from the 2000 Census and 2010 Census. The specific route selected determines both the total potentially exposed population and the expected frequency of transportation-related accidents. Route characteristics are expressed in terms of travel distances and population densities in rural, suburban, and urban areas according to the following breakdown:

- Rural population densities range from 0 to 139 persons per square mile (0 to 54 persons per square kilometer).
- Suburban population densities range from 140 to 3,326 persons per square mile (55 to 1,284 persons per square kilometer).
- Urban population densities include all population densities greater than 3,326 persons per square mile (1,284 persons per square kilometer).

Route characteristics were determined for offsite shipments from the LANL site to the following sites:

- Nevada National Security Site in Mercury, Nevada
- Energy Solution Site in Clive, Utah, as a representative of a commercial disposal site
- Waste Isolation Pilot Plant in Carlsbad, New Mexico

In addition, route characteristics for local routes, that is, LANL to Pojoaque (along Route 502), and Pojoaque to Interstate 25 (south of Santa Fe), were also determined. **Table B–15** summarizes the route characteristics for these sites.

Table B–15 Offsite Transport Truck Route Characteristics

Origin	*Destination*	*Nominal Distance (miles)*	*Distance Traveled in Zones (miles)*			*Population Density in Zone (persons per square mile)*			*Number of Affected Persons* [a]
			Rural	*Suburban*	*Urban*	*Rural*	*Suburban*	*Urban*	
Truck Routes									
LANL	NNSS	777	664	88	25	37.0	1,541.6	10,951.0	427,304
	Commercial [b]	669	583	70	16	30.8	1,790.4	11,743.8	333,612
	WIPP	376	353	22	1.2	22.3	943.5	7,106.7	37,050
Truck Routes (local from Interstate 25 to LANL)									
LANL to Pojoaque		19	17	2.4	0.1	21.8	1,362.3	9,048.9	4,681.0
Pojoaque to Santa Fe [c]		32	27	5	0	71.0	670.3	0	5,169.0

LANL = Los Alamos National Laboratory, NNSS = Nevada National Security Site, WIPP = Waste Isolation Pilot Plant.
[a] The estimated number of persons residing within 0.5 miles along the transportation route.
[b] Energy Solution is a representative commercial disposal facility.
[c] Pass through Santa Fe bypass (New Mexico 599) to Interstate 25.
Note: To convert miles to kilometers multiply by 1.6093; persons per square mile to persons per square kilometer, multiply by 0.3861.

Figure B–1 shows the analyzed truck routes for shipments of radioactive waste materials in this *CMRR-NF SEIS*.

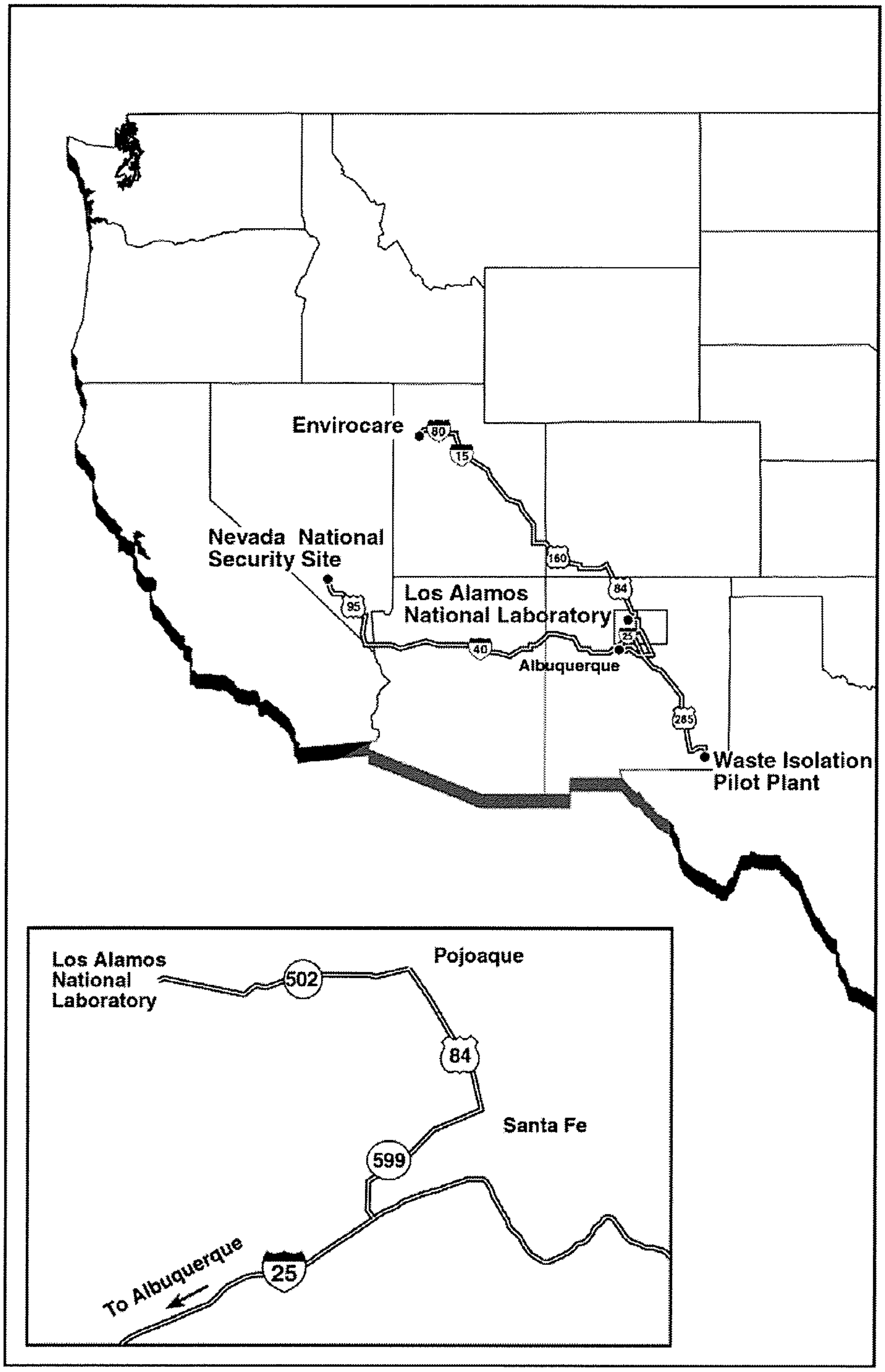

Figure B–1 Analyzed Truck Routes

B.14 Traffic

B.14.1 Description of Affected Resources

This analysis involved a review of engineering estimates or the calculation of engineering estimates of transportation and traffic associated with construction of the CMRR-NF and operation of the CMRR-NF and RLUOB. The impacts of the proposed alternatives were evaluated with respect to internal LANL roadways, access control points, and public roadway network near LANL under both existing and future conditions. Potential shifts in traffic created by the proposed alternatives and corresponding trip generation were estimated. The expected trips were then assigned to road segments. Based on these assumptions, net changes in vehicle volumes were developed and analyzed for each alternative.

The traffic generated by the proposed CMRR-NF construction and operation of the CMRR-NF and RLUOB was estimated, and the impact of that traffic was evaluated for the affected roadway segments. That traffic was added to the expected traffic volume on the respective roadways and the level of service (LOS) was determined for each segment. The LOSs determined for the proposed alternatives were then compared to determine the impacts on the roadways in question.

Increases in peak hour traffic of fewer than 100 vehicles per hour are generally considered not to be significant by transportation engineers in determining LOSs. The operation of the CMRR-NF and RLUOB is not anticipated to generate more trips than the existing facilities. The impacts of the construction of the proposed CMRR-NF are addressed separately. In addition to the impacts on traffic volume, the possible impacts on the existing roadways of the construction traffic are evaluated.

B.14.2 Methodology Used to Analyze Traffic Volume Impacts

Analysis of traffic volume impacts focused on assessing the ability of the existing roadway system to accommodate increased utilization of particular road segments. The number of trips that would be generated by the proposed alternatives was estimated. The level of traffic on each roadway analyzed was estimated using publicly available information from the New Mexico Department of Transportation (Valencia 2010) and from prior traffic studies on LANL. The level of traffic was escalated by an assumed rate of growth on public roadways. Traffic impacts were evaluated for the year construction is expected to begin and for the year construction is expected to be completed. The LOSs for selected roadways were then determined using the methods and tables contained in the 2000 *Highway Capacity Manual* (National Research Council 2000). Construction was considered to occur between 2010 through 2014 under the No Action Alternative, between 2010 and 2022 under the Modified CMRR-NF Alternative Deep Excavation Option, and between 2010 and 2020 under the Shallow Excavation Option.

Traffic volumes are typically based on the number of expected vehicles in a 1-hour period, also called the peak hourly volume, which is defined by traffic engineers as the 30th highest traffic volume expected in any 60-minute period of a calendar year. To understand the function of the roadway under its peak traffic loading, the LOS is determined based on the peak hourly volume.

The number of peak-hour trips expected to be gained or lost due to CMRR-NF construction was estimated using methods contained in *Trip Generation, 7th Edition* (ITE 2003). For each alternative, the expected traffic was added to the traffic volumes forecast for the affected roadway for the year when construction begins and the year when construction is anticipated to end. The expected change in LOS under each alternative was then determined using the 2000 *Highway Capacity Manual* (National Research Council 2000).

According to the traffic-count information provided by the New Mexico Department of Transportation, the roadways surrounding LANL have experienced an annual average growth in total vehicles/trips of between 0 percent and 0.8 percent (Valencia 2010). This analysis assumed the transportation growth rates for the road segments analyzed would continue at the same rates as those of past years.

Traffic on roadways is measured by their LOS, as generally defined below.

- **LOS A** describes the highest quality of traffic service, with drivers able to travel at their desired speed. Drivers find driving on LOS A roadways to be stress-free.
- **LOS B** describes a condition where drivers have some restrictions on their speed of travel. Most drivers find LOS B roadways slightly stressful.
- **LOS C** describes a condition of stable traffic flow, but with significant restrictions on drivers' ability to travel at desired speeds. Most drivers find LOS C roadways somewhat stressful.
- **LOS D** describes unstable traffic flow. Drivers are restricted into slow-moving platoons, and disruptions in the traffic flow can cause significant congestion. There is little or no opportunity to pass slower-moving traffic. Most drivers find LOS D roadways stressful.
- **LOS E** represents the highest volume of traffic that can move on the roadway without a complete shutdown. Most drivers find LOS E roadways very stressful.
- **LOS F** represents heavily congested flow with traffic demand exceeding capacity. Traffic flows are slow and discontinuous. Most drivers find LOS F roadways extremely stressful.

Traffic volumes on existing roadways are expected to increase over time and the LOSs of those roadways are expected to decrease unless roadway improvements are made. As LOSs deteriorate, roadway improvements become more likely. Significant impacts on traffic LOSs are generally considered to occur when the LOSs on the studied roadway segments fall below the acceptable LOS for those roadways. Each roadway segment has an acceptable LOS determined by local authorities responsible for that segment. Generally, in urban areas, an acceptable LOS is LOS D, or sometimes LOS E. In rural areas, an acceptable LOS is LOS C or better. It is significant if the LOS falls below the expected LOS at an earlier time. For example, it would be significant if a roadway segment were projected to reach LOS E in 2020 and impacts under the proposed alternatives were to cause the LOS to fall to LOS E in 2015.

LOS changes that are not considered significant typically include any LOS changes caused by changes in peak-hour trips of less than 100 vehicles per hour. The LOS designations are a continuum based on motorists perceptions, and it is unlikely that changes of less than 100 vehicles per hour would greatly inconvenience motorists even if that change results in a change in the LOS letter assignment. It is also not considered a significant change if the LOS changes from one acceptable LOS to another acceptable LOS. For example, if LOS changes from LOS A to LOS B this would not be considered a significant change. Any changes that are not significant would be considered acceptable changes.

B.14.3 Vehicle Control Points

A Vehicle Control Point (VCP) is a facility entrance/exit where the identities of vehicle occupants are verified prior to their being allowed to proceed inside or outside the bounds of the secured facility. Typical security checks include inspections of vehicle decals, driver and passenger identifications, and the contents of vehicles. The capacity of a VCP is limited and depends on the type of security check being used. If the volume of traffic attempting to utilize a VCP exceeds the capacity of the VCP to process that traffic, roadway backups will occur. Traffic impacts on VCPs were determined by estimating the number of trips generated, using the methodology found in the Institute of Transportation Engineers *Trip Generation* 2003 report (similar to the methodology used to analyze impacts on roadways). The abilities of VCPs to function adequately at the levels of traffic estimated were evaluated using the methods contained in *Traffic and Safety Engineering for Better Entry Control Facilities* (SDDCTEA 2006).

B.14.4 Structural Impacts on Internal Roadways at Los Alamos National Laboratory

Some of the material deliveries would need to pass over internal LANL roadways. The existing roadways at LANL are constructed using asphaltic concrete. These roadways were originally constructed as part of an industrial facility, so it is expected that they were constructed for some level of truck traffic. However, the trucks in common usage today are much heavier than those anticipated for use in the 1950s and 1960s, the timeframe of the LANL roadways' construction.

Analysis using methods contained in the *American Association of State Highway and Transportation Officials Guide for Design of Pavement Structures* (AASHTO 1993), and assuming "fair" soil conditions, indicates that an asphaltic concrete pavement structure would need to have a minimum pavement structure of a 2-inch (5-centimeter) asphaltic concrete surface course, a 4-inch (10-centimeter) asphaltic concrete base course, and a 6-inch (15-centimeter) aggregate base over a prepared subgrade to support the expected truck traffic without significant damage to the roadways. If the LANL roadways are of a lesser thickness, or are already significantly deteriorated, then the expected construction traffic is expected to affect the roadways. Any public roadways utilized by construction traffic are expected to be substantially thicker than the minimum described above and structural impacts are not anticipated.

B.15 Cumulative Impacts

Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time (40 CFR 1508.7). The cumulative impact analysis for this *CMRR-NF SEIS* involved combining the impacts of the alternatives with the impacts of other past, present, and reasonably foreseeable activities in the ROI. The key resources are identified in **Table B–16**.

Table B–16 Key Resources and Associated Regions of Influence

Resources	*Region of Influence*
Infrastructure use	The site and Los Alamos County
Air quality	The site, nearby offsite areas within local air quality control regions where significant air quality impacts may occur, and Class I areas within 62 miles
Transportation	Transportation corridors to offsite disposal locations and population centers along the transportation routes
Radiological	Persons residing within 50 miles of Los Alamos National Laboratory
Waste management	The site

Note: To convert miles to kilometers, multiply by 1.6093.

In general, the cumulative impacts were determined by collectively considering the baseline affected environment (conditions attributable to present actions by DOE and other public and private entities), the proposed alternatives, and other future actions. Quantifiable information was incorporated to the degree it was available. Factors were weighed against the appropriate impact indicators (site capacity or number of fatalities) to determine the potential for impacts (see **Table B–17**).

Table B–17 Selected Indicators of Cumulative Impact

Category	*Indicator*
Infrastructure use	- Electricity use compared with site and county capacity - Water use compared with site and county capacity - Natural gas use compared with site and county capacity
Air quality	Criteria pollutant concentrations and comparisons with standards or guidelines
Transportation	Accidents
Radiological	Radiological emissions and exposure compared with standards or guidelines
Waste management	Waste generated compared to previous site estimates

The analysis focused on the potential for cumulative impacts at LANL from DOE actions under detailed consideration at the time of this *CMRR-NF SEIS*, as well as cumulative impacts associated with transportation. The 2008 *LANL SWEIS* was used to establish the baseline conditions against which the incremental cumulative impacts were assessed and later information was collected on future actions where available.

B.16 References

AASHTO (American Association of State Highway and Transportation Officials), 1993, *Guide for Design of Pavement Structures*, ISBN 1-56051-055-2, Washington, DC.

BLS (Bureau of Labor Statistics), 2010a, *Workplace Injuries and Illnesses-2009*, Chart 1 Total recordable nonfatal occupational injury and illness incident rates by case type, private industry, 2003-2009 (available at http://www.bls.gov/iif/oshsum.htm), November 18.

BLS (Bureau of Labor Statistics), 2010b, Census of Fatal Occupational Injuries (CFO1) Charts; 1992-2009," (available at http://www.bls.gov/iif/oshcfoil.htm#charts), November 18.

CEQ (Council on Environmental Quality), 1997, E*nvironmental Justice Guidance Under the National Environmental Policy Act*, Executive Office of the President, Washington, DC, December 10.

CEQ (Council on Environmental Quality), 2010, *Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions*, February 18.

DOE (U.S. Department of Energy), 1994, *DOE Handbook – Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facility*, DOE-HDBK-3010-94 (Change Notice No. 1, March 2000), Washington, DC, December.

DOE (U.S. Department of Energy), 1997a, *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste,* DOE/EIS-0200-F, Office of Environmental Management, Washington, DC, May.

DOE (U.S. Department of Energy), 1997b, *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement*, DOE/EIS-0026-S-2, Carlsbad Area Office, Carlsbad, New Mexico, September.

DOE (U.S. Department of Energy), 2002, *A Resource Handbook on DOE Transportation Risk Assessment*, DOE/EM/NTP/HB-01, Office of Environmental Management, National Transportation Program, Albuquerque, New Mexico (available at http://www.ntp.doe.gov/readnews21.shtml), July.

DOE (U.S. Department of Energy), 2003a, *Recommended Radiation Risk Factors Updated*, National Environmental Policy Act Lessons Learned, Office of NEPA Policy and Compliance, Quarterly Report, Issue No. 34, Washington, DC, March 3.

DOE (U.S. Department of Energy), 2003b, *West Valley Demonstration Project Waste Management Environmental Impact Statement*, Final, DOE/EIS-0337F, West Valley Area Office, West Valley, New York, December.

DOE (U.S. Department of Energy), 2008, *Final Site-wide Environmental Impact Statement for Continued Operation of los Alamos National Laboratory, Los Alamos, New Mexico*, National Nuclear Security Administration, Los Alamos Site Office, Los Alamos, New Mexico, May.

DOE (U.S. Department of Energy), 2011, *Computerized Accident Incident Reporting and Recordkeeping system (CAIRS)*, "DOE and Contractor Injury and Illness Experience by Year by Quarter, 2002 through 2009, 4th Quarter," Office of Health, Safety and Security (available at http://www.hss.energy.gov/CSA/Analysis/ cairs/cairs/summary/oipds094/tl.html), February 4.

DOI (U.S. Department of the Interior), 1986, *Visual Resource Contrast Rating,* BLM Manual Handbook H-8431-1, Bureau of Land Management, Washington, DC, January 17.

DOT (U.S. Department of Transportation), 2006, *FHWA Roadway Construction Noise Model User's Guide.* Prepared for the U.S. Department of Transportation Federal Highway Administration Office of Environment Planning, Washington, DC, January.

EPA (U.S. Environmental Protection Agency), 2003, *Mobile Source Emission Factor Model (MOBILE6.2).* Office of Mobile Sources, Ann Arbor, Michigan.

EPA (U.S. Environmental Protection Agency), 2006, *Mid-Atlantic Integrated Assessment: Mid-Atlantic Highlands Streams Assessment*, Appendix C, "Glossary" (available at http://www.epa.gov/maia/thml/mah-apc.html), March 3.

EPA (U.S. Environmental Protection Agency), 2008, Greenhouse Gas Inventory Protocol Core Module Guidance, Direct Emissions from stationary combustion sources, May 2008.

EPA (U.S. Environmental Protection Agency), 2009, *Federal Register,* 40 Code of Federal Regulation (CFR) Parts 86, 87, 89, 98, Mandatory Reporting of Greenhouse Gases, Final Rule, EPA-HQ-OAR-2008-0508-2278, October 30.

EPA (U.S. Environmental Protection Agency), 2010a, *Screening* Models, Technology Transfer Network Support Center for Regulatory Atmospheric Modeling (available at http://www.epa.gov/ttn/scram/dispersion_screening.htm#aerscreen), November 15.

EPA (U.S. Environmental Protection Agency), 2010b, *Alternative Models*, Technology Transfer Network Support Center for Regulatory Atmospheric Modeling (available at http://www.epa.gov/scram001/dispersion_alt.htm), November 15.

EPA (U.S. Environmental Protection Agency), 2010c, USEPA eGRIDweb Version 1.1, eGRID2007 Subregion AZNM—WECC Southwest (available at http://cfpub.epa.gov/egridweb/), December 15.

Executive Order 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, October 5, 2009.

ICC (International Code Council, Inc.), 2000, *International Building Code*, Falls Church, Virginia, March.

IPCC (Intergovernmental Panel on Climate Change), 2007, *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, United Kingdom and New York, New York, pp. 996.

ITE (Institute of Transportation Engineers), 2003, *Trip Generation, 7th Edition*, ISBN No:0.935403-79-5, Washington, DC.

Johnson, P. E., and R. D. Michelhaugh, 2003, *Transportation Routing Analysis Geographic Information System (TRAGIS)–User's Manual*, ORNL/NTRC-006, Rev. 0 (available at http://apps.ntp.doe.gov/tragis/tragis.htm), U.S. Department of Energy, Oak Ridge National Laboratory, Oak Ridge, Tennessee, June.

LANL (Los Alamos National Laboratory), 2000, *Threatened and Endangered Species Habitat Management Plan*, LA-UR-00-4747, Los Alamos, New Mexico, April.

LANL (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, March.

LANL (Los Alamos National Laboratory), 2011, "Supplemental Environmental Impact Statement for the Nuclear Facility Portion of the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, New Mexico," Data Call Response.

National Research Council, 2000, *National Research Council Highway Capacity Manual*, HCM2000, ISBN 0-309-06746-4, Transportation Research Board, Washington, DC.

NRC (U.S. Nuclear Regulatory Commission), 1977, Final Environmental Impact Statement on the Transportation of Radioactive Materials by Air and Other Modes, NUREG-0170, Washington, DC, December.

NRC (U.S. Nuclear Regulatory Commission), 1998, *Code Manual for MACCS2, Volume 1, User's Guide*, NUREG/CR-6613, Washington DC, May.

NRC (U.S. Nuclear Regulatory Commission), 2000, *Reexamination of Spent Fuel Shipping Risk Estimates*, NUREG/CR-6672, SAND2000-0234 (available at http://ttd.sandia.gov/nrc/docs.htm), Washington, DC, March.

PNNL (Pacific Northwest National Laboratory), 2007, *GENII Version 2 Users' Guide*, PNLL-14583, REV. 2, Richland, Washington, March.

Saricks, C., and M. M. Tompkins, 1999, *State-Level Accident Rates for Surface Freight Transportation: A Reexamination*, ANL/ESD/TM-150, Center for Transportation Research, Argonne National Laboratory, U.S. Department of Energy, Argonne, Illinois, April.

SDDCTEA (Military Surface Deployment and Distribution Command Transportation Engineering Agency), 2006, *Traffic and Safety Engineering for Better Entry Control Facilities*, Pamphlet 55-16, Newport News, Virginia.

SNL (Sandia National Laboratories), 2009, RadCat 3.0 User Guide, SAND2009-5129P, Albuquerque, New Mexico, and Livermore, California, May.

UMTRI (University of Michigan Transportation Research Institute), 2003, "Evaluation of the Motor Carrier Management Information System Crash File, Phase One," UMTRI-2003-06, Center for National Truck Statistics, Ann Arbor, Michigan, March.

USGS (U.S. Geological Survey), 2002, *General Earthquake Information*, Magnitude and Intensity, Modified Mercalli Intensity Scale, Magnitude/Intensity Comparison, Frequently Asked Questions (available at http://neic.usgs.gov/neis/general/handouts/), December 27.

Valencia, B., 2010, Management Analyst, New Mexico Department of Transportation, Santa Fe, New Mexico, Personal communication (email) to M. Smith, Science Applications International Corporation, St. Louis, Missouri, "Looking for Traffic Count Information in Los Alamos County" November 4.

Wald, D. J., V. Quitoriano, T. H. Heaton, and H. Kanamori, 1999, "Relationships Between Peak Ground Acceleration, Peak Ground Velocity and Modified Mercalli Intensity in California," *Earthquake Spectra*, Vol. 15 (3), pp. 557-564 (available at http://www-socal.wr.usgs.gov/ shake/pubs/regress/regress.html).

Yuan, Y. C., S. Y. Chen, B. M. Biwer, and D. J. LePoire, 1995, *RISKIND - A Computer Program for Calculating Radiological Consequences and Health Risks from Transportation of Spent Nuclear Fuel*, ANL/EAD-1, Argonne National Laboratory, Argonne, Illinois, November.

APPENDIX C
EVALUATION OF HUMAN HEALTH IMPACTS FROM FACILITY ACCIDENTS

APPENDIX C
EVALUATION OF HUMAN HEALTH IMPACTS FROM FACILITY ACCIDENTS

C.1 Introduction

Accident analyses were performed to estimate the impacts on workers and the public from reasonably foreseeable accidents for the alternatives in this *Draft Supplemental Environmental Impact Statement for the Nuclear Facility Portion of the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, New Mexico (CMRR-NF SEIS).* The analyses were performed in accordance with U.S. Department of Energy (DOE) National Environmental Policy Act (NEPA) guidelines, including the process followed for the selection of accidents, definition of accident scenarios, and estimation of potential impacts. The sections that follow describe the methodology and assumptions, accident selection process, selected accident scenarios, and consequences and risks of the accidents evaluated.

C.2 Overview of Methodology and Basic Assumptions

The radiological impacts from accidental releases from the facilities used to perform chemistry and metallurgy research (CMR) operations were calculated using the MACCS [MELCOR Accident Consequences Code System] computer code, Version 1.13.1 (MACCS2). A detailed description of the MACCS model is provided in NUREG/CR-6613 (NRC 1990). The enhancements incorporated in MACCS2 are described in the *MACCS2 Users Guide* (Chanin and Young 1998). This section presents the MACCS2 data specific to the accident analyses. Additional information on the MACCS2 code is provided in Section C.7.

As implemented, the MACCS2 model evaluates doses due to inhalation of airborne material, as well as external exposure to the passing plume. This represents the major portion of the dose that an individual would receive because of a facility accident. The longer-term effects of radioactive material deposited on the ground after a postulated accident, including the resuspension and subsequent inhalation of radioactive material and the ingestion of contaminated crops, were not modeled for this *CMRR-NF SEIS.* These pathways have been studied and found to contribute less significantly to the radiation dose than the inhalation of radioactive material in the passing plume; they are also controllable through interdiction. Instead, the deposition velocity of the radioactive material was set to zero, so that material that might otherwise be deposited on surfaces remained airborne and available for inhalation. Thus, the method used in this *CMRR-NF SEIS* is conservative compared with dose results that would be obtained if deposition and resuspension were taken into account.

The impacts were assessed for the offsite populations surrounding the proposed site of the Chemistry and Metallurgy Research Building Replacement (CMRR) Nuclear Facility (CMRR-NF) and the existing CMR Building, as well as a maximally exposed individual (MEI), and noninvolved worker at each of these locations. The impacts on involved workers, those working in the facility where the accident occurs, were addressed qualitatively because no adequate method exists for calculating meaningful consequences at or near the location where the accident could occur. Involved workers are also fully trained in emergency procedures, including evacuation and personal protective actions in the event of an accident.

The offsite population is defined as the general public residing within 50 miles (80 kilometers) of each site. The population distribution for each proposed site is based on U.S. Department of Commerce (Census Bureau) population data at the block group level (DOC 2000, 2010). These data were fitted to a polar coordinate grid with 16 angular sectors aligned with the 16 compass directions, with radial intervals that extend outward to 50 miles (80 kilometers). The population data were extrapolated based on the population growth over the 1990–2010 period to estimate the projected population for the year 2030. The offsite population within 50 miles (80 kilometers) was estimated to be about 545,000 persons for Technical Area 55 (TA-55) (for the No Action Alternative and Modified CMRR-NF Alternative) and about 536,000 persons for TA-3 (for the Continued Use of CMR Building Alternative). For this analysis, no credit was taken for emergency response evacuations and other mitigative actions, such as temporary relocation of the public.

The MEI is defined as a hypothetical individual member of the public who would receive the maximum dose from an accident. This individual is usually assumed to be located at a site boundary. The MEI location was determined for each alternative. The MEI location can vary at LANL based on accident conditions. For this analysis, the MEI was located 0.75 miles (1.2 kilometers) north-northeast of TA-55, and 0.42 miles (0.7 kilometers) north-northeast of TA-3.

A noninvolved worker is defined as an onsite worker who is not directly involved in facility activities where the accident occurs. The noninvolved worker was conservatively assumed to be exposed to the full release, without any protection, located at the technical area boundaries, a distance of about 300 yards (about 280 meters) for TA-3, and about 240 yards (about 220 meters) for TA-55. Workers would respond to a site emergency alarm and evacuate to a designated shelter area, reducing their exposure potential. For purposes of the analyses, however, no credit was taken for any reduced impacts afforded by evacuation.

Doses to the offsite population, the MEI, and a noninvolved worker were calculated based on site-specific meteorological conditions. Site-specific meteorology is described by 1 year of hourly windspeed, atmospheric stability, and rainfall recorded at the site. The MACCS2 calculations produce distributions based on the meteorological conditions. For these analyses, the results presented are based on mean meteorological conditions. The mean produces more-realistic consequences than a 95^{th} percentile condition, which is sometimes used in safety analysis reports. The 95^{th} percentile condition represents low-probability meteorological conditions that are not exceeded more than 5 percent of the time.

The probability coefficient for determining the likelihood of a latent cancer fatality (LCF) for low doses or dose rates is 0.0006 fatal cancers per person-rem or, when applied to individual workers and the MEI, 0.0006 fatal cancers per rem (DOE 2003a). For high doses or dose rates, the probability coefficient is 0.0012 fatal cancers per rem applied to any individual. The higher-probability coefficients apply where individual doses are above 20 rem (NCRP 1993).

The preceding discussion focuses on radiological accidents. Chemical accident scenarios were not evaluated, since inventories of hazardous chemicals to support CMR operations do not exceed the Threshold Planning Quantities as stipulated on the Extremely Hazardous Substances List provided in Section 3.02 of the Emergency Planning and Community Right-to-Know Act (EPA 1998).

C.3 Accident Scenario Selection Process

In accordance with DOE NEPA guidelines, this *CMRR-NF SEIS* considers a representative set of accidents that includes various types, such as fire, explosion, mechanical impact, criticality, spill, human error, natural phenomena, and external events. DOE's Office of NEPA Policy and Compliance, in the *Recommendations for Analyzing Accidents under the National Environmental Policy Act* (DOE 2002), provides guidance for preparing accident analyses in environmental impact statements. The guidance supplements *Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements, Second Edition* (DOE 2004).

The accident scenario selection was based on evaluation of accidents reported in the hazards analysis documentation provided for the CMR Building (LANS 2011a) and the CMRR-NF (LANS 2011b). The selection and evaluation of accidents was based on a process described in the *DOE Standard: Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses (Nonreactor SAR Preparation Guide)* (DOE 2006). The accident selection process for this *CMRR-NF SEIS* is described in Sections C.3.1 and C.3.2 for Steps 1 and 2, respectively. For additional details on this process, see the documents referenced above.

C.3.1 Hazard Identification – Step 1

Hazard identification, or hazards analysis, is the process of identifying the material, system, process, and plant characteristics that can potentially endanger the health and safety of workers and the public and analyzing the potential human health and safety consequences of accidents associated with the identified hazards. The hazards analysis examines the complete spectrum of accidents that could expose members of the public, onsite workers, facility workers, and the environment to hazardous materials. Hazards that could be present in the CMRR Facility were identified by reviewing data in source documents, assessing their applicability to the CMR Building and the proposed CMRR-NF, and identifying the potential hazards posed by the CMR activities that would be carried out in these facilities.

C.3.2 Accidents Selected for this Evaluation – Step 2

Major hazards were reviewed using a hazards analysis process based on guidance provided by the *Nonreactor SAR Preparation Guide* (DOE 2006). The process ranks the risk of each hazard based on estimated frequency of occurrence and potential consequences to screen out low-risk hazards. Based on this process, a spectrum of accidents was selected. The selection process included, but was not limited to: (1) consideration of the impacts on the public and workers of high-frequency/low-consequence accidents and low-frequency/high-consequence accidents; (2) selection of the highest-impact accident in each accident category to envelope the impacts of all potential accidents; and (3) consideration of only reasonably foreseeable accidents. In addition, hazards and accident analyses for the alternatives were reviewed to determine the potential for accidents initiated by external events (for example, aircraft crash, and explosions in collocated facilities) and natural phenomena (for example, external flooding, earthquake, extreme winds, and missiles). Accident scenarios initiated by human error were also evaluated.

The results of the Step 2 selection process are presented below.

Fire—Fires that occur in the facility could lead to the release of radioactive materials with potential impacts on workers and the public. Initiating events may include internal process and human error events; natural phenomena, such as an earthquake; or external events, such as an airplane crash into the facility. Combustibles near an ignition source could be ignited in a laboratory room containing the largest amounts of radioactive material. The fire may be confined to the laboratory room, propagate uncontrolled and without suppression to adjacent laboratory areas, or lead to a facility-wide fire. A fire or deflagration in a high-efficiency particulate air (HEPA) filter could also occur due to an exothermic reaction involving reactive salts and other materials.

Explosion—Explosions that could occur in the facility could lead to the release of radioactive materials with potential impacts on workers and the public. Initiating events may include internal process and human error events; natural phenomena, such as an earthquake; or external events, such as an explosive gas transportation accident. Explosions could disperse nuclear material as well as initiate fires that could propagate throughout the facility. An explosion of methane gas followed by a fire in a laboratory area could potentially propagate to other laboratory areas and affect the entire facility.

Spills—Spills of radioactive and/or chemical materials could be initiated by failure of process equipment and/or human error, natural phenomena, or external events. Radioactive and chemical material spills typically involve laboratory room quantities of materials that are relatively small compared to releases caused by fires and explosions. Laboratory room spills could affect members of the public, but may be a more serious risk to the laboratory room workers. Larger spills involving vault-size quantities are also possible.

Criticality—The potential for a criticality exists whenever there is a sufficient quantity of nuclear material in an unsafe configuration. Although a criticality could affect the public, its effects are primarily associated with workers near the accident.

Operations at the CMR Building and the proposed CMRR-NF would mostly involve fissile material handling below the minimum critical mass. Only a few operations would involve fissile materials in excess of critical masses. These operations have been reviewed by NNSA and the LANL contractor and it was concluded that existing procedures, limits, and controls would make a criticality accident an incredible event (an event with an annual likelihood of occurrence less than 1 in 1 million). Even for a beyond-design-basis accident, an extreme earthquake-driven accident with sufficient reflector material (water), whereby the entire vault inventory ends up on the floor, DOE's evaluations concluded that the size and volume of the vault would maintain subcriticality. If a criticality accident were assumed to occur, its consequences and risks to the public and workers would be small in comparison to the consequences and risks from the low-frequency accidents analyzed in this *CMRR-NF SEIS*. Since a criticality accident was found to be a low-consequence and low-frequency event, it was not included among the accidents analyzed in detail.

Natural Phenomena—The potential accidents associated with natural phenomena include earthquakes, high winds, flooding, and similar naturally occurring events. For *CMRR-NF SEIS* alternatives, a severe earthquake could lead to the release of radioactive materials and exposure of workers and the public. A severe earthquake could cause the collapse of facility structures, falling debris, and failure of gloveboxes and nuclear materials storage facilities. An earthquake could also initiate a fire that propagates throughout the facility and results in an unfiltered release of radioactive material to the environment. In addition to the potential exposure of workers and the public to radioactive and chemical materials, an accident could also cause human injuries and fatalities from the force of the event, such as falling debris during an earthquake or the thermal effects of a fire.

Chemical—The quantities of regulated chemicals used and stored in the facility are well below the threshold quantities set by the U.S. Environmental Protection Agency (40 CFR 68), and pose minimal potential hazards to public health and the environment in an accident condition. Accidents involving small laboratory quantities of chemicals would primarily present a risk to the involved worker in the immediate vicinity of the accident. There would be no bulk quantities of chemicals stored at the CMR Building or the proposed CMRR-NF.

Airplane Crash—The potential exists for an airplane crash into a building. The probability of an airplane crash during overflight is less than 10^{-6} and, under DOE NEPA guidelines, does not need to be considered in this *CMRR-NF SEIS*. During landing and takeoff operations at the local Los Alamos airport, there is a reasonable probability of a small commercial or military airplane crashing into the facility. However, the impacts of a small airplane crash into the facility are bounded by other accidents addressed in this *CMRR-NF SEIS*.

C.4 Accident Scenario Descriptions and Source Terms

This section describes the accident scenarios and corresponding source terms developed for the *CMRR-NF SEIS* alternatives. The spectrum of accidents described in this section was used to determine, for workers and the public, the consequences and associated risks of each alternative. Assumptions were made when further information was required to clarify the accident condition, update parameters, or facilitate the evaluation process; these are referenced in each accident description.

The source term is the amount of respirable radioactive material released to the air, in terms of curies or grams, assuming the occurrence of a postulated accident. The airborne source term is typically estimated by the following equation:

$$\text{Source term (ST)} = \text{MAR} \times \text{DR} \times \text{ARF} \times \text{RF} \times \text{LPF}$$

where:

MAR	=	material at risk
DR	=	damage ratio
ARF	=	airborne release fraction
RF	=	respirable fraction
LPF	=	leak path factor

The material at risk is the amount of radionuclides (in curies of activity or grams of each radionuclide) available for release when acted upon by a given physical stress or accident. The material at risk is specific to a given process in the facility of interest. It is not necessarily the total quantity of material present, but is that amount of material in the scenario of interest postulated to be available for release.

The damage ratio is the fraction of material exposed to the effects of the energy, force, or stress generated by the postulated event. For the accident scenarios discussed in this analysis, the value of the damage ratio varies from 0.1 to 1.0.

The airborne release fraction is the fraction of material that becomes airborne due to the accident. In this analysis, airborne release fractions were obtained from the hazard analysis information for the CMR Building and CMRR-NF (LANS 2011a, 2011b), or the *DOE Handbook* on airborne release fractions (DOE 1994).

The respirable fraction is the fraction of the particulate matter with an aerodynamic diameter of 10 microns (0.0004 inches) or less that could be retained in the respiratory system following inhalation. The respirable fraction values are also taken from the hazard analysis information for the CMR Building and CMRR-NF (LANS 2011a, 2011b), or the *DOE Handbook* on airborne release fractions (DOE 1994).

The leak path factor accounts for the action of removal mechanisms, for example, containment systems, filtration, and deposition, to reduce the amount of airborne radioactivity ultimately released to occupied spaces in the facility or the environment. A leak path factor of 1.0 (no reduction) is assigned in accident scenarios involving a major failure of confinement barriers. Leak path factors were obtained from the hazard analysis information for the CMR Building and CMRR-NF (LANS 2011a, 2011b) and site-specific evaluations.

Since the isotopic composition and shape of some of the nuclear materials are classified, the material inventory has been converted to equivalent amounts of plutonium-239. The conversion was on a constant-consequence basis, so that the consequences calculated in the accident analyses are equivalent to what they would be if actual material inventories were used. The following sections describe the selected accident scenarios and corresponding source terms for the alternatives.

Four accidents are included in this *CMRR-NF SEIS* to represent a wide range of possible accidents and risks. The four accident scenarios are common to all three alternatives being analyzed in this *CMRR-NF SEIS*. They are a facility-wide fire, a loading dock spill/fire, a seismically induced spill, and a seismically induced fire.

C.4.1 New CMRR Facility Alternatives

C.4.1.1 No Action Alternative (2004 CMRR-NF)

The accident analysis performed for this *CMRR-NF SEIS* incorporates current knowledge of the threat associated with a design-basis earthquake at LANL and is new compared to the analysis presented in the *Final Environmental Impact Statement for the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, New Mexico (CMRR EIS)* (DOE 2003b). The accidents described in this section pertain to the 2004 CMRR-NF at TA-55. For these accidents, two sets of source terms are presented. First, the conservative, bounding source term estimates developed in the safety-basis process at LANL for the purposes of identifying the controls necessary to protect the public are presented. In general, these source term estimates take little if any credit for the integrity of containers or building confinement under severe accidents and assume a damage ratio of 1, meaning that all similar containers or other material at risk would be subjected to the similar, near-worst-case conditions. Furthermore, these safety evaluations generally assume a leak path factor of 1, meaning that all of the material that is made airborne and respirable within the building or process enclosure is released to the environment.

For purposes of this *CMRR-NF SEIS*, a second set of source terms has been developed that attempts to present reasonable, but still conservative, estimates of source terms. These source terms take into account a range of responses of facility features and materials containers and typical operating practices at plutonium facilities at LANL and elsewhere. Therefore, for design-basis-type accidents, a damage ratio of 1 would not normally be realistic if the containers, process enclosures, limits on combustibles, and similar types of safety systems were expected to function during the accident. Similarly, the building confinement, including HEPA filters, is expected to continue functioning, although perhaps at a degraded level, during and after the accident.

Facility-Wide Fire—The accident scenario postulates that combustible materials near an ignition source are ignited in a laboratory area. This fire is a widespread fire involving the entire laboratory area. The fire could be initiated by natural phenomena, human error, or equipment failure.

Safety-Basis Scenario: The fire is assumed to propagate uncontrolled and without suppression to adjacent laboratory areas and the entire facility. The material at risk is estimated to be approximately 660 pounds (300 kilograms) of plutonium-239 equivalent in the form of metal (90 percent), oxide (8.3 percent), and liquid (1.7 percent). The scenario conservatively assumes the damage ratio and leak path factors are 1.0. No credit is taken for equipment and facility features and mitigating factors that could cause the damage ratio and leak path factors to be less than 1.0. The released respirable fraction (airborne release fraction times respirable fraction) is estimated to be 0.00025 for metal, 0.00006 for oxide, and 0.002 for liquid. The source term for radioactive material released to the environment is about 2.8 ounces (80 grams). The frequency of the accident is estimated to range from 0.000001 to 0.0001 or once every 10,000 to 1,000,000 years. The frequency is conservatively assumed to be 0.0001 per year for risk calculation purposes.

SEIS Scenario: Typical building construction for a reinforced concrete structure and normal limits on combustible materials would make a fire that propagates beyond the immediate vicinity of a glovebox or a room extremely unlikely without an additional source of fuel to support a propagating fire. Normal design standards for plutonium facilities would ensure that rooms were isolated with appropriate fire walls and barriers. Thus, a fire that propagates to the extent that it becomes a facility-wide fire would be considered a beyond-design-basis fire and the estimated frequency would be less than once every 1,000,000 years. The frequency is conservatively assumed to be 1×10^{-6} per year for risk calculation purposes.

The fire is assumed to propagate uncontrolled and without suppression to adjacent laboratory areas and the entire facility. The materials at risk and release mechanisms are conservatively assumed to be the same as those for the Safety-Basis Scenario. Thus, the material at risk is estimated to be approximately 660 pounds (300 kilograms) of plutonium-239 equivalent in the form of metal (90 percent), oxide (8.3 percent), and liquid (1.7 percent). The scenario conservatively assumes the damage ratio is 0.1, taking credit for equipment and facility features and mitigating factors that should prevent most of the material from being out and vulnerable even in a facility-wide fire. The released respirable fraction (airborne release fraction times respirable fraction) is estimated to be 0.00025 for metal, 0.00006 for oxide, and 0.002 for liquid. The building leak path factor is unknown, but it is expected that in an event this severe, the performance of the HEPA filters would be degraded. For a design-basis fire, the efficiency of a bank of HEPA filters in an air-handling system is expected to be 99 to 99.5 percent. For this beyond-design-basis, facility-wide fire, the filters are assumed to be partially bypassed and a leak path factor of 0.1 is assumed. The source term for radioactive material released to the environment is about 0.028 ounces (0.80 grams).

Loading Dock Spill/Fire—This accident scenario was selected to represent a wide range of spills and fires that might occur outside the CMRR-NF associated with the loading dock. This scenario is postulated to involve waste containers being shipped from the loading dock or a large vessel being delivered to the facility for processing or cleanup. Many engineered controls should prevent or mitigate both the likelihood of this type of accident or the damage that might occur, including design of the loading dock to prevent or minimize the risk of impacts to multiple containers and use of shipping packages designed to withstand shipping accidents. It is very conservatively assumed that a vehicle impacts waste drums containing the entire material at risk of 13.2 pounds (6.0 kilograms) of plutonium-239 equivalent with a subsequent spill or fire involving the containers. Since this accident would occur outside, any material would be released directly to the environment. For safety basis purposes, it is assumed that the damage ratio is 0.1 for mechanical insults associated with vehicles moving in and around a loading dock per DOE-STD-5506-2007 (DOE 2007).

Safety Basis Scenario: The leak path factor is assumed to be 1.0. The released respirable fraction (airborne release fraction times respirable fraction) is very conservatively estimated at 0.001 for the spill. The resulting source term of radioactive material released to the environment is estimated at 0.0212 ounces (0.60 grams). The frequency of the initiating accident is estimated to range from 0.0001 to 0.01 or once every 100 to 10,000 years. The frequency of a spill accident of this magnitude is conservatively assumed to be 0.01 per year for risk calculation purposes. A loading dock spill and subsequent fire was also considered but found, with reasonable assumptions regarding the airborne release fraction, respirable fraction, and the source term, that the consequences would not be higher than those predicted with the spill source term. (With a damage ratio of 0.1 and a leak path factor of 1.0, and assuming that some of the drum contents are ejected and subject to unconfined burning and some are subject to confined burning, a source term of 0.0198 ounces (0.56 grams) was estimated.)

SEIS Scenario: The descriptions of the scenario and releases fractions are the same as those described under the safety basis scenario. For this scenario, the initiating accident is estimated to range from

0.000001 to 0.0001 or once every 10,000 to 1,000,000 years. The frequency for this scenario is conservatively assumed to be 0.0001 per year for risk calculation purposes.

Seismically Induced Events—Subsequent to the issuance of the *CMRR EIS*, it was concluded that the proposed 2004 CMRR-NF structure would not perform as originally intended during a LANL design-basis earthquake. Based on an updated probabilistic seismic hazards analysis, it was concluded that a design-basis earthquake, with a return interval of about 2,500 years and an estimated horizontal peak ground acceleration of 0.52 *g* (URS 2007) could cause the structure to fail and confinement could not be ensured. The 2004 CMRR-NF confinement function was estimated to fail with a peak horizontal ground acceleration exceeding 0.30 *g*, which has a revised estimated return interval of about 1,000 years. For earthquakes less severe than that, the building structure and confinement systems would be expected to continue to provide their safety functions. Many other safety systems that are not directly dependent on the complete integrity of the building structure for their safety function, such as process containers, would also be expected to remain intact during this lower magnitude earthquake, as well as during more-severe earthquakes.

Seismically Induced Spill—This accident scenario postulates an earthquake that causes internal enclosures to topple and become damaged by falling debris.

<u>Safety-Basis Scenario</u>: The material at risk is estimated to be 6.6 tons (6.0 metric tons) of plutonium-239 equivalent (all of the material at risk in the facility) in powder form. The scenario conservatively assumes the damage ratio and leak path factors are 1.0 indicating that the building structure has failed and is providing an open pathway to the environment. No credit is taken for equipment and facility features and mitigating factors that could cause the damage ratio and leak path factors to be less than 1.0. The released respirable fraction (airborne release fraction times respirable fraction) is estimated at 0.002 for powder. The source term for radioactive material released to the environment is about 26 pounds (12 kilograms). The frequency of the accident is estimated to be in the range of 0.0001 to 0.01 per year or once every 100 to 10,000 years. The frequency is conservatively assumed to be 0.01 per year for risk calculation purposes.

<u>SEIS Scenario</u>: This accident scenario postulates an earthquake that causes many of the internal enclosures to topple and become damaged by falling debris. Much of the material in strong containers and in the vault is expected to survive the vibrations and impacts from falling equipment and falling debris. The materials at risk and release mechanisms are conservatively assumed to be similar to those for the Safety-Basis Scenario. Thus, the material at risk is estimated to be 6.6 tons (6.0 metric tons) of plutonium-239 equivalent in powder form. The scenario assumes the damage ratio is 0.01, taking credit for equipment and facility features and mitigating factors that should prevent most of the material from being out and vulnerable to release due to impacts, vibrations, or pressurized venting from cans. It is very conservatively assumed that all of this material is powder and subject to pressurized release. The released respirable fraction (airborne release fraction times respirable fraction) for the material at risk is estimated to be conservatively represented by an airborne release fraction of 0.005 and respirable fraction of 0.4, or 0.002 for the venting of powders or confinement failure to pressures of approximately 25 pounds per square inch or less (DOE 1994).

The building leak path factor is unknown, but it is expected that in an event this severe, building confinement would fail and pathways would exist for the material that becomes airborne to be released directly to the environment. Thus, a leak path factor of 1.0 is assumed. The source term for radioactive material released to the environment is about 0.26 pounds (120 grams). The frequency of the accident is estimated to be on the order of once in 1,000 years, based on the seismic studies that indicate that this 2004 CMRR-NF design would not perform its structural and safety confinement functions adequately in the event of an earthquake of the intensity currently estimated for a LANL design-basis earthquake. This frequency is a factor of 10 higher than that expected for a similar but more seismically resistant facility, such as the Modified CMRR-NF, that would meet current design standards. The frequency is conservatively assumed to be 0.001 per year for risk calculation purposes.

Seismically Induced Fire—This accident scenario postulates an earthquake that causes internal enclosures to topple and become damaged by falling debris. Combustibles in the facility are ignited and the fire engulfs radioactive material.

Safety-Basis Scenario: The material at risk is estimated to be 6.6 tons (6.0 metric tons) of plutonium-239 equivalent (all of the material in the facility) in powder form. The scenario conservatively assumes the damage ratio and leak path factors are 1.0. No credit is taken for equipment and facility features and mitigating factors that could cause the damage ratio and leak path factors to be less than 1.0. The released respirable fraction (airborne release fraction times respirable fraction) is estimated at 0.07 for powder, which is a highly conservative estimate for a very high pressurized release from a storage can subjected to a long-burning fire. The source term for radioactive material released to the environment is about 926 pounds (420 kilograms). The frequency of the accident is estimated to be in the range of 0.000001 to 0.0001 per year or once every 10,000 to 1,000,000 years. The frequency is conservatively assumed to be 0.0001 per year for risk calculation purposes.

SEIS Scenario: This accident scenario postulates an earthquake that causes many of the internal enclosures to topple and become damaged by falling debris. Much of the material in strong containers and in the vault is expected to survive the vibrations and impacts from falling equipment and falling debris. Multiple local fires are assumed to occur within the debris. Material that is out and close to the fires is expected to be vulnerable to release. Material away from the fires and in strong containers is not expected to be released by the fires. Normal limits on combustible materials in a facility such as the CMRR-NF would make a fire that propagates beyond the immediate vicinity of the localized fires extremely unlikely without an additional source of fuel to support a propagating fire.

The material at risk and release mechanisms are conservatively assumed to be similar to those for the Safety-Basis Scenario. Thus, the material at risk is estimated to be 6.6 tons (6.0 metric tons) of plutonium-239 equivalent in powder form and to include that stored in the vaults. The scenario conservatively assumes the damage ratio is 0.01, taking credit for equipment and facility features and mitigating factors that should prevent most of the material from being out and vulnerable. It is likely that even with a collapse scenario, material in the vaults would not be subject to release either through impacts or the thermal stress of fires. The released respirable fraction (airborne release fraction times respirable fraction) for the material at risk is estimated to be conservatively represented by an airborne release fraction of 0.005 and respirable fraction of 0.4, or 0.002, for the venting of powders or confinement failure to pressures of approximately 25 pounds per square inch or less (DOE 1994).

In addition to the release due to spills, some of the material is also vulnerable to release due to fires as with the facility-wide fire scenario. As with that scenario, it is conservatively assumed that the material at risk in the fire is estimated to be approximately 660 pounds (300 kilograms) of plutonium-239 equivalent in the form of metal (90 percent), oxide (8.3 percent), and liquid (1.7 percent). The fire release portion of the scenario conservatively assumes the damage ratio is 1.0, taking no credit for equipment and facility features and mitigating factors that should prevent most of the material from being out and vulnerable even in a seismically initiated facility-wide fire. The released respirable fraction (airborne release fraction times respirable fraction) is estimated to be 0.00025 for metal, 0.00006 for oxide, and 0.002 for liquid. The overall effective released respirable fraction for the fire release is 0.000267.

The building leak path factor is unknown, but it is expected that in an event this severe, building confinement would fail and pathways would exist for the material that does become airborne to be released directly to the environment. Thus, a leak path factor of 1.0 is assumed. The source term for radioactive material released to the environment is about 4.2 ounces (120 grams) from the spill release and 2.8 ounces (80 grams) from the fire, for a total of about 7.0 ounces (200 grams). The frequency of the earthquake that results in wide-scale damage and loss of confinement for the building (on the order of once in 10,000 years), coupled with a widespread seismically initiated fire, is estimated to be in the range of 0.000001 to 0.0001 per year or once every 10,000 to 1,000,000 years. The frequency is conservatively assumed to be 0.0001 per year for risk calculation purposes.

C.4.1.2 Modified CMRR-NF Alternative

The accidents described in this section pertain to the Modified CMRR-NF at TA-55. These accidents apply to the Modified CMRR-NF regardless of whether it was constructed under the Deep or Shallow Excavation Option. The two construction options would not affect the performance of the building once it was constructed. Under either construction option, the resulting building would meet the current standards required for a Performance Category 3 facility so it would perform the same in the event of a seismic accident.

The four accident scenarios analyzed for the 2004 CMRR-NF as described in Section C.4.1.1 would be applicable to the Modified CMRR-NF. Both the facility-wide fire and loading dock spill/fire accidents associated with the 2004 CMRR-NF would be directly applicable to the Modified CMRR-NF and accident scenarios and source terms should be similar. Because the Modified CMRR-NF would be stronger and could withstand higher peak ground accelerations than the 2004 CMRR-NF, the seismically induced spill and fire scenario would have a lower likelihood (would require higher seismic accelerations to fail, for example), and would likely release lower quantities of radioactive material to the environment. These safety-basis and NEPA accidents have been included for the Modified CMRR-NF because this facility is being designed to survive a design-basis earthquake accident (expected to occur once every 2,500 years), with an estimated horizontal peak ground acceleration of 0.52 *g*, and thus, the releases from such an earthquake would be mitigated, whereas the 2004 CMRR-NF is predicted to fail in an earthquake exceeding 0.3 *g* horizontal peak ground accelerations. The Modified CMRR-NF would be a stronger structure and would include safety-class and safety-significant structures, systems, and components, collectively known as safety structures, systems, and components. As a result, mitigated releases were evaluated for the seismically induced spill accident and seismically induced fire accident, as described below:

Seismically Induced Spill—This accident scenario postulates an earthquake, of the intensity of the LANL design-basis earthquake, causes internal enclosures to topple and become damaged by falling debris.

<u>Safety-Basis Scenario</u>: The material at risk is reduced from 6.6 tons (6.0 metric tons) to 660 pounds (300 kilograms) of plutonium-239 equivalent in powder form because it is assumed that the vaults would survive this earthquake in the Modified CMRR-NF. The scenario assumes that the damage ratio and leak path factors are 1.0. Credit is taken for equipment and facility features and mitigating factors that could cause the airborne release fraction and respirable fraction to be reduced from those assumed for the 2004 CMRR-NF (unmitigated) accident. The released respirable fraction (airborne release fraction times respirable fraction) is estimated at 0.0001, compared to 0.002 for the 2004 CMRR-NF accident. The source term for radioactive material released to the environment is about 1.1 ounces (30 grams) compared to 26 pounds (12 kilograms) for the 2004 CMRR-NF accident. The frequency of the accident is estimated to be in the range of 0.000001 to 0.0001 per year or once every 10,000 to 1,000,000 years. The frequency is conservatively assumed to be 0.0001 per year, or once in 10,000 years, for risk calculation purposes.

<u>SEIS Scenario</u>: This accident scenario postulates an earthquake that causes many of the internal enclosures to topple and become damaged by falling debris. Much of the material in strong containers and

in the vault is expected to survive the vibrations and impacts from falling equipment and falling debris. The materials at risk and release mechanisms are conservatively assumed to be similar to those for the Safety-Basis Scenario. The material at risk is reduced from 6.6 tons (6.0 metric tons) to 660 pounds (300 kilograms) of plutonium-239 equivalent in powder form because it is assumed that the vaults in the Modified CMRR-NF would survive this earthquake. The scenario assumes the damage ratio is 0.01, taking credit for equipment and facility features and mitigating factors that should prevent most of the material from being out and vulnerable to release due to impacts, vibrations, or pressurized venting from cans. It is very conservatively assumed that all of this material is powder and subject to pressurized release. The released respirable fraction (airborne release fraction times respirable fraction) for the material at risk is estimated to be conservatively represented by an airborne release fraction of 0.005 and respirable fraction of 0.4, or 0.002, for the venting of powders or confinement failure to pressures of approximately 25 psig or less (DOE 1994).

The building leak path factor is unknown, but it is expected that in an event this severe, building confinement would fail and pathways would exist for the material that becomes airborne to be released directly to the environment. Thus, a leak path factor of 1.0 is assumed. The source term for radioactive material released to the environment is about 0.21 ounces (6.0 grams). The frequency of the accident is estimated to be on the order of once in 10,000 years, based on the fact that this facility would be designed to meet current seismic standards and would perform its structural and safety confinement functions adequately in the LANL design-basis earthquake (an estimated horizontal peak ground acceleration of 0.52 *g* with a return interval of about 2,500 year). This frequency is a factor of 10 lower than is expected for a similar but less seismically robust-type facility, such as the original 2004 CMRR-NF design that would not meet current design standards. The frequency is conservatively assumed to be 0.0001 per year for risk calculation purposes.

Seismically Induced Fire—This accident scenario postulates that an earthquake, of the intensity of the LANL design-basis earthquake, causes internal enclosures to topple and become damaged by falling debris. Combustibles in the facility are ignited and the fire engulfs radioactive material.

<u>Safety-Basis Scenario</u>: The material at risk is 6.6 tons (6.0 metric tons) of plutonium-239 equivalent including metal, oxides, contained waste, and unconfined waste, in the form of contaminated combustible paper and trash located in the long-term vault, short-term vault, or in use in gloveboxes. Credit is taken for equipment and facility features and mitigating factors that could cause the damage ratio, airborne release fraction, and respirable fraction to be reduced from those assumed for an unmitigated accident. A range of released respirable fractions (airborne release fraction times respirable fraction) are estimated depending on the form of the material at risk. The source term for radioactive material released to the environment is about 1.9 ounces (53 grams) compared to 926 pounds (420 kilograms) for the unmitigated accident. The frequency of the accident is estimated to be in the range of 0.000001 to 0.0001 per year or once every 10,000 to 1,000,000 years. The frequency is conservatively assumed to be 0.0001 per year for risk calculation purposes.

<u>SEIS Scenario</u>: This accident scenario postulates an earthquake that causes many of the internal enclosures to topple and become damaged by falling debris. Much of the material in strong containers and in the vault is expected to survive the vibrations and impacts from falling equipment and falling debris. Multiple, local fires are assumed to occur within the debris. Material that is out and close to the fires is expected to be vulnerable to release. Material away from the fires and in strong containers is not expected to be released by the fires. Normal limits on combustible materials would make a fire that propagates beyond the immediate vicinity of the localized fires extremely unlikely without an additional source of fuel to support a propagating fire.

The release mechanisms are assumed to be similar to those for the Safety-Basis Scenario. The material at risk is reduced from 6.6 tons (6.0 metric tons) to 660 pounds (300 kilograms) of plutonium-239 equivalent in powder form because it is assumed that the vaults in the Modified CMRR-NF would survive this earthquake. The scenario conservatively assumes the damage ratio is 0.01, taking credit for equipment and facility features and mitigating factors that should prevent most of the material from being out and vulnerable. It is likely that even with a collapse scenario, material in the vaults would not be subject to release either through impacts or the thermal stress of fires. The released respirable fraction (airborne release fraction times respirable fraction) for the material at risk is estimated to be conservatively represented by an airborne release fraction of 0.005 and respirable fraction of 0.4, or 0.002, for the venting of powders or confinement failure to pressures of approximately 25 pounds per square inch or less (DOE 1994).

In addition to the release due to spills, some of the material is also vulnerable to release due to fires as with the facility-wide fire scenario. As with that scenario, it is conservatively assumed that the material at risk in the fire is estimated to be approximately 660 pounds (300 kilograms) of plutonium-239 equivalent in the form of metal (90 percent), oxide (8.3 percent), and liquid (1.7 percent). The fire release portion of the scenario conservatively assumes the damage ratio is 1.0, taking no credit for equipment and facility features and mitigating factors that should prevent most of the material from being out and vulnerable even in a seismically initiated facility-wide fire. The released respirable fraction (airborne release fraction times respirable fraction) is estimated to be 0.00025 for metal, 0.00006 for oxide, and 0.002 for liquid. The overall effective released respirable fraction for the fire release is 0.000267.

The building leak path factor is unknown, but it is expected that in an event this severe, building confinement would fail and pathways would exist for the material that does become airborne to be released directly to the environment. Thus, a leak path factor of 1.0 is assumed. The source term for radioactive material released to the environment is about 0.21 ounces (6.0 grams) from the spill release and 2.82 ounces (80 grams) from the fire, for a total of about 3.03 ounces (86 grams). The frequency of the earthquake that results in wide-scale damage and loss of confinement for the building (on the order of once in 100,000 years), coupled with a widespread seismically initiated fire, is estimated to be in the range of 0.000001 to 0.00001 per year or once every 100,000 to 1,000,000 years. The frequency is conservatively assumed to be 0.00001 per year for risk calculation purposes.

C.4.2 Continued Use of CMR Building Alternative

The accidents described in this section pertain to the CMR Building. For this existing building, the safety-basis scenarios and the NEPA scenarios are similar since they are based on the existing facility and the existing safety analyses. The principal differences in the safety-basis approach and the NEPA approach is the degree of conservatism in the estimation of the material at risk, release mechanisms, damage ratios, fractions made airborne and respirable, and leak path factors. The safety-basis scenarios assume damage ratios of 1.0. The fractions made airborne and respirable by the real-world stresses implied by these scenarios are also conservative. Because of the age and construction of the building, the NEPA scenarios would assume similar damage ratios and leak path factors as the safety-basis scenarios and no separate analyses are provided. It is estimated that real-world releases for any of these CMR Building accident scenarios would be somewhat lower than these conservative safety-basis estimates. Operational practices and limits at the CMR Building limit the potential consequences of these accidents by limiting the material at risk within the building.

Wing-Wide Fire—This accident scenario postulates that combustible materials near an ignition source are ignited in a laboratory area and the fire spreads to a second wing, engulfing both wings. The fire could be initiated by natural phenomena, human error, or equipment failure. The fire is assumed to propagate uncontrolled and without suppression to adjacent laboratory areas. The material at risk is estimated to be approximately 22 pounds (10 kilograms) of plutonium-239 equivalent in any form (for example, metals, solutions, oxides, powders). The scenario conservatively assumes the damage ratio and leak path factors are 1.0. No credit is taken for equipment and facility features and mitigating factors that could cause the damage ratio and leak path factors to be less than 1.0. A range of released respirable fractions (airborne release fraction times respirable fraction) are estimated depending on the form of the material at risk. The source term for radioactive material released to the environment is about 0.4 ounces (12 grams). The frequency of the accident is estimated to range from 0.0001 to 0.01 or once every 100 to 10,000 years. The frequency is conservatively assumed to be 0.01 per year for risk calculation purposes.

Loading Dock Spill/Fire—This scenario was selected to represent a wide range of spills and fires that might occur outside the CMR Building associated with the loading dock. This scenario is postulated to involve waste containers being shipped from the loading dock or a large vessel being delivered to the facility for processing or cleanup. Many engineered controls should prevent or mitigate both the likelihood of this type of accident or the damage that might occur, including design of the loading dock to minimize the risk of impacts to multiple containers and use of shipping packages designed to withstand shipping accidents. It is very conservatively assumed that a vehicle impacts waste drums containing the entire material at risk of 13.2 pounds (6.0 kilograms) of plutonium-239 equivalent with a subsequent spill or fire involving the containers. Since this would occur outside, any release would be directly to the environment. For safety basis purposes, it is assumed that the damage ratio is 0.1 for mechanical insults associated with vehicles moving in and around a loading dock per DOE-STD-5506-2007 (DOE 2007).

The leak path factor is assumed to be 1.0. The released respirable fraction (airborne release fraction times respirable fraction) is very conservatively estimated at 0.001 for the spill. The resulting source term of radioactive material released to the environment is estimated at 0.0212 ounces (0.60 grams). The frequency of the initiating accident is estimated to range from 0.0001 to 0.01 or once every 100 to 10,000 years. The frequency of a spill accident of this magnitude is conservatively assumed to be 0.01 per year for risk calculation purposes. A loading dock spill and subsequent fire was also considered but found to be with reasonable assumptions, ARFs, and RF, the source term and consequences would not be higher than those predicted with the bounding spill source term. With a damage ratio of 0.1 and a leak path factor of 1.0, and assuming that some of the drum contents are ejected and subject to unconfined burning, and some subject to confined burning, a source term of 0.0198 ounces (0.56 grams) was estimated.

Seismically Induced Spill—This accident scenario postulates that an earthquake causes internal enclosures to topple and become damaged by falling debris. The material at risk is estimated to be about 33 pounds (15 kilograms) of plutonium-239 equivalent. The reduced material at risk in this scenario compared to the CMRR-NF accident scenarios is a result of changes made in CMR operations due to safety concerns associated with the performance of the CMR Building in an earthquake such as the one postulated in this accident scenario. Material at risk that is released as a result of the seismic event may be in any form, including powders, solutions, and metals. The scenario conservatively assumes the damage ratio and leak path factors are 1.0 indicating that the building structure has failed and is providing an open pathway to the environment. No credit is taken for equipment and facility features and mitigating factors that could cause the damage ratio and leak path factors to be less than 1.0. A range of released respirable fractions (airborne release fraction times respirable fraction) are estimated depending on the form of the material at risk. The source term for radioactive material released to the environment is about 1.1 ounces (30 grams). The frequency of the accident is estimated to be in the range of 0.0001 to 0.01 per year or once every 100 to 10,000 years. The frequency is conservatively assumed to be 0.01 per year for risk calculation purposes.

Seismically Induced Fire—This accident scenario postulates an earthquake causes internal enclosures to topple and become damaged by falling debris. Combustibles in the facility are ignited and the fire engulfs radioactive material. The material at risk is estimated to be about 33 pounds (15 kilograms) of plutonium-239 equivalent. The reduced material at risk for this scenario compared to the CMRR-NF accident scenarios is a result of changes made in CMR operations due to safety concerns associated with the performance of the CMR Building in an earthquake such as the one postulated in this accident scenario. Material at risk that is released as a result of the seismic event may be in any form, including powders, solutions, and metals. The scenario conservatively assumes the damage ratio and leak path factors are 1.0. No credit is taken for equipment and facility features and mitigating factors that could cause the damage ratio and leak path factors to be less than 1.0. A range of released respirable fractions (airborne release fraction times respirable fraction) are estimated depending on the form of the material at risk. The source term for radioactive material released to the environment is about 2.1 ounces (61 grams). The frequency of the accident is estimated to be in the range of 0.000001 to 0.0001 per year or once every 10,000 to 1,000,000 years. The frequency is conservatively assumed to be 0.0001 per year for risk calculation purposes.

C.5 Accident Analyses Consequences and Risk Results

The potential impacts of a radiological accident on workers and the public can be measured in a number of ways depending on the application. Three measures are used in this *CMRR-NF SEIS*. The first measure of consequences is individual dose, expressed in terms of rem or millirem for a member of the public or worker, and collective dose, expressed in terms of person-rem for members of the public or a population of workers. The second measure is a post-exposure effect that reflects the likelihood of an LCF for an exposed individual or the expected number of LCFs in a population of exposed individuals. Individual or public exposure to radiation can only occur if there is an accident involving radioactive materials, which leads to the third measure. The third measure of potential accident impacts is referred to as risk that takes into account the probability (or frequency) of the accident's occurrence. Risk is the mathematical product of the probability or frequency of accident occurrence and the LCF consequences. Risk is calculated as follows:

For an individual

$R_i = D_i \times F \times P$ where:

R_i is the risk of an LCF for an individual receiving a dose D_i in LCFs per year
D_i is the dose in rem to an individual
F is the dose-to-LCF conversion factor, which is 0.0006 LCFs per rem for individuals.
P is the probability or frequency of the accident, usually expressed on a per-year basis.

For a population

$R_p = D_p \times F \times P$ where:

R_p is the risk for a population receiving a dose D_p in LCFs per year
D_p is the dose in person-rem to a population
F is the dose-to-LCF conversion factor, which is 0.0006 LCFs per person-rem for a population of workers for members of the public.
P is the probability or frequency of the accident, usually expressed on a per-year basis.

Once the source term, the amount of radioactive material released to the environment for each accident scenario, is determined, the radiological consequences are calculated. The calculations and resulting impacts vary depending on how the radioactive material release is dispersed, what materials are involved, and which receptors are being considered.

For example, if the dose to an individual (the MEI or a noninvolved worker) is 10 rem, the probability of an LCF for an individual is 10 × 0.0006 = 0.006, where 0.0006 is the dose-to-LCF conversion factor. If the individual receives a dose exceeding 20 rem, the dose-to-LCF conversion factor is doubled, to 0.0012. Thus, if the MEI receives a dose of 30 rem, the probability of an LCF is 30 × 0.0012 = 0.036. For an individual, the calculated probability of an LCF is in addition to the probability of cancer from all other causes.

For the population, the same dose-to-LCF conversion factors are used to determine the estimated number of LCFs. The calculated number of LCFs in the population is in addition to the number of cancer fatalities that would result from all other causes. The MACCS2 computer code calculates the dose to each individual in the exposed population and applies the appropriate dose-to-LCF conversion factor to estimate the LCF consequences, 0.0006 for doses less than 20 rem or 0.0012 for doses greater than or equal to 20 rem. Therefore, for some accidents, the estimated number of LCFs will involve both dose-to-LCF conversion factors. This indicates that some members of the population are estimated to receive doses in excess of 20 rem.

Tables C–1 through **C–6** present the facility accident impacts under the alternatives. For each alternative, there are two tables showing the impacts. The first table presents the consequences (doses and LCFs) assuming the accident occurs, that is, not reflecting the frequency of accident occurrence. The second table shows the accident risks that are obtained by multiplying the LCF values in the first table by the frequency of each accident listed in the first table.

Table C–1 Accident Frequency and Consequences under the No Action Alternative

		Maximally Exposed Individual		*Offsite Population* [a]		*Noninvolved Worker at Technical Area Boundary*	
Accident	*Frequency (per year)*	*Dose (rem)*	*Latent Cancer Fatality* [b]	*Dose (person-rem)*	*Latent Cancer Fatalities* [c]	*Dose (rem)*	*Latent Cancer Fatality* [b]
Safety-Basis Scenarios							
Facility-wide fire	0.0001	1.1	0.0007	710	0 (0.4)	5.9	0.004
Seismically induced spill	0.01	600	0.7	140,000	80	20,000	1
Seismically induced fire	0.0001	5,000	1	3,800,000	2,000	27,000	1
Loading dock spill/fire	0.01	0.028	0.00002	6.4	0 (0.004)	1.0	0.0006
SEIS Scenarios							
Facility-wide fire	0.000001	0.011	0.000007	7.2	0 (0.004)	0.059	0.00004
Seismically induced spill	0.001	6.0	0.004	1,400	1 (0.8)	200	0.2
Seismically induced fire	0.0001	2.4	0.001	1,800	1	13	0.008
Loading dock spill/fire	0.0001	0.028	0.00002	6.4	0 (0.004)	1.0	0.0006

SEIS = supplemental environmental impact statement.

[a] Based on a projected 2030 population estimate of 545,000 persons residing within 50 miles (80 kilometers) of TA-55.

[b] Increased likelihood of an LCF for an individual, assuming the accident occurs.

[c] Increased number of LCFs in the offsite population, assuming the accident occurs (results rounded to one significant figure). When the reported value is zero, the result calculated by multiplying the collective dose to the population by the risk factor (0.0006 LCFs per person-rem) is shown in parentheses.

Table C–2 Annual Accident Risks under the No Action Alternative

Accident	Risk of Latent Cancer Fatality: Maximally Exposed Individual [a]	Risk of Latent Cancer Fatality: Offsite Population [b, c]	Risk of Latent Cancer Fatality: Noninvolved Worker at Technical Area Boundary [a]
Safety-Basis Scenarios			
Facility-wide fire	7×10^{-8}	4×10^{-5}	4×10^{-7}
Seismically induced spill	7×10^{-3}	8×10^{-1}	1×10^{-2}
Seismically induced fire	1×10^{-4}	2×10^{-1}	1×10^{-4}
Loading dock spill/fire	2×10^{-7}	4×10^{-5}	6×10^{-6}
SEIS Scenarios			
Facility-wide fire	7×10^{-12}	4×10^{-9}	4×10^{-11}
Seismically induced spill	4×10^{-6}	8×10^{-4}	2×10^{-4}
Seismically induced fire	1×10^{-7}	1×10^{-4}	8×10^{-7}
Loading dock spill/fire	2×10^{-9}	4×10^{-7}	6×10^{-8}

SEIS = supplemental environmental impact statement.
[a] Risk of a LCF to the individual.
[b] Risk of an additional LCF in the offsite population.
[c] Based on a projected 2030 population estimate of 545,000 persons residing within 50 miles (80 kilometers) of TA-55.

Table C–3 Accident Frequency and Consequences under the Modified CMRR-NF Alternative

Accident	Frequency (per year)	Maximally Exposed Individual: Dose (rem)	Maximally Exposed Individual: Latent Cancer Fatality [b]	Offsite Population [a]: Dose (person-rem)	Offsite Population [a]: Latent Cancer Fatalities [c]	Noninvolved Worker at Technical Area Boundary: Dose (rem)	Noninvolved Worker at Technical Area Boundary: Latent Cancer Fatality [b]
Safety-Basis Scenarios							
Facility-wide fire	0.0001	1.1	0.0007	720	0 (0.4)	5.9	0.004
Seismically induced spill with mitigation	0.0001	1.5	0.0009	350	0 (0.2)	51	0.06
Seismically induced fire with mitigation	0.0001	0.6	0.0004	480	0 (0.3)	3.4	0.002
Loading dock spill/fire	0.01	0.028	0.00002	6.4	0 (0.004)	1.0	0.0006
SEIS Scenarios							
Facility-wide fire	0.000001	0.011	0.000007	7.2	0 (0.004)	0.059	0.00004
Seismically induced spill with mitigation	0.0001	0.3	0.0002	69	0 (0.04))	10	0.006
Seismically induced fire with mitigation	0.00001	1.0	0.0006	770	0 (0.5)	5.5	0.003
Loading dock spill/fire	0.0001	0.028	0.00002	6.4	0 (0.004)	1.0	0.0006

CMRR-NF = Chemistry and Metallurgy Research Building Replacement Nuclear Facility, SEIS = supplemental environmental impact statement.
[a] Based on a projected 2030 population estimate of 545,000 persons residing within 50 miles (80 kilometers) of TA-55.
[b] Increased likelihood of an LCF for an individual, assuming the accident occurs.
[c] Increased number of LCFs in the offsite population, assuming the accident occurs (results rounded to one significant figure). When the reported value is zero, the result calculated by multiplying the collective dose to the population by the risk factor (0.0006 LCFs per person-rem) is shown in parentheses.

Table C–4 Annual Accident Risks under the Modified CMRR-NF Alternative

Accident	*Risk of Latent Cancer Fatality*		
	Maximally Exposed Individual [a]	*Offsite Population* [b, c]	*Noninvolved Worker at Technical Area Boundary* [a]
Safety-Basis Scenarios			
Facility-wide fire	7×10^{-8}	4×10^{-5}	4×10^{-7}
Seismically induced spill with mitigation	9×10^{-8}	2×10^{-5}	6×10^{-6}
Seismically induced fire with mitigation	4×10^{-8}	3×10^{-5}	2×10^{-7}
Loading dock spill/fire	2×10^{-7}	4×10^{-5}	6×10^{-6}
SEIS Scenarios			
Facility-wide fire	7×10^{-12}	4×10^{-9}	4×10^{-11}
Seismically induced spill with mitigation	2×10^{-8}	4×10^{-6}	6×10^{-7}
Seismically induced fire with mitigation	6×10^{-9}	5×10^{-6}	3×10^{-8}
Loading dock spill/fire	2×10^{-9}	4×10^{-7}	6×10^{-8}

CMRR-NF = Chemistry and Metallurgy Research Building Replacement Nuclear Facility, SEIS = supplemental environmental impact statement.
[a] Risk of a LCF to the individual.
[b] Risk of an additional LCF in the offsite population.
[c] Based on a projected 2030 population estimate of 545,000 persons residing within 50 miles (80 kilometers) of TA-55.

Table C–5 Accident Frequency and Consequences under the Continued Use of CMR Building Alternative

Accident	Frequency (per year)	*Maximally Exposed Individual*		*Offsite Population* [a]		*Noninvolved Worker at Technical Area Boundary*	
		Dose (rem)	*Latent Cancer Fatality* [b]	*Dose (person-rem)*	*Latent Cancer Fatalities* [c]	*Dose (rem)*	*Latent Cancer Fatality* [b]
Wing-wide fire [d]	0.01	0.26	0.0002	130	0 (0.08)	0.65	0.0004
Seismically induced spill	0.01	2.2	0.001	450	0 (0.3)	21	0.03
Seismically induced fire	0.0001	4.3	0.003	900	1 (0.5)	42	0.05
Loading dock spill/fire	0.01	0.07	0.00004	8.5	0 (0.005)	0.7	0.0004

CMR = chemistry and metallurgy research.
[a] Based on a projected 2030 population estimate of 536,000 persons residing within 50 miles (80 kilometers) of TA-3.
[b] Increased likelihood of an LCF for an individual, assuming the accident occurs.
[c] Increased number of LCFs for the offsite population, assuming the accident occurs (results rounded to one significant figure). When the reported value is zero, the result calculated by multiplying the collective dose to the population by the risk factor (0.0006 LCFs per person-rem) is shown in parentheses.
[d] A major fire was assumed to involve two wings.

Table C–6 Annual Accident Risks under the Continued Use of CMR Building Alternative

Accident	*Risk of Latent Cancer Fatality*		
	Maximally Exposed Individual [a]	*Offsite Population* [b, c]	*Noninvolved Worker at Technical Area Boundary* [a]
Wing-wide fire	2×10^{-6}	8×10^{-4}	4×10^{-6}
Seismically induced spill	1×10^{-5}	3×10^{-3}	3×10^{-4}
Seismically induced fire	3×10^{-7}	5×10^{-5}	5×10^{-6}
Loading dock spill/fire	4×10^{-7}	5×10^{-5}	4×10^{-6}

CMR = chemistry and metallurgy research.
[a] Risk of a LCF to the individual.
[b] Risk of an additional LCF in the offsite population.
[c] Based on a projected 2030 population estimate of 536,000 persons residing within 50 miles (80 kilometers) of TA-3.

C.6 Analysis Conservatism and Uncertainty

The analysis of accidents is based on calculations relevant to postulated sequences of accident events and models used to calculate the accident's consequences. The models provide estimates of the frequencies, source terms, pathways for dispersion, exposures, and the effects on human health and the environment that are as realistic as possible within the scope of the analysis. In many cases, the rare occurrence of postulated accidents leads to uncertainty in the calculation of the consequences and frequencies. This fact has promoted the use of models or input values that yield conservative estimates of consequences and frequency.

Due to the layers of conservatism built into the accident analysis for the spectrum of postulated accidents, the estimated consequences and risks to the public represent the upper limit for the individual classes of accidents. The uncertainties associated with the accident frequency estimates are enveloped by the conservatism in the analysis.

The numerical estimates of LCFs presented in this *CMRR-NF SEIS* were obtained using a linear extrapolation from the nominal risk estimated for lifetime total cancer mortality that results from a dose of 10 rad. Other methods of extrapolation to the low-dose region could yield higher or lower numerical estimates of LCFs. Studies of human populations exposed to low doses are inadequate to demonstrate the actual level of risk. There is scientific uncertainty about cancer risk in the low-dose region below the range of epidemiologic observation. However, comprehensive review of available biological and biophysical data supports a "linear-no-threshold" risk model—in which the risk of cancer proceeds in a linear fashion at lower doses without a threshold—and that the smallest dose has the potential to cause a small increase in risk to humans (National Research Council 2006). Because the health risk estimators are multiplied by conservatively calculated radiological doses to predict fatal cancer risks, the fatal cancer values presented in this *CMRR-NF SEIS* are expected to be conservative estimates.

C.7 MACCS2 Code Description

The MACCS2 computer code is used to estimate the radiological doses and health effects that could result from postulated accidental releases of radioactive materials to the atmosphere. The specification of the release characteristics, designated a "source term," can consist of up to four Gaussian plumes that are often referred to simply as "plumes."

The radioactive materials released are modeled as being dispersed in the atmosphere while being transported by the prevailing wind. During transport, whether or not there is precipitation, particulate material can be modeled as being deposited on the ground. If contamination levels exceed a user-specified criterion, mitigating actions can be triggered to limit radiation exposures.

There are two aspects of the code's structure basic to understanding its calculations: (1) the calculations are divided into modules and phases, and (2) the region surrounding the facility is divided into a polar-coordinate grid. These concepts are described in the following sections.

MACCS is divided into three primary modules: ATMOS, EARLY, and CHRONC. The three modules correspond to three phases of exposure from an accident, defined as the emergency, intermediate, and long-term phases. The relationship among the code's three modules and the three phases of exposure are summarized below.

The ATMOS module performs all of the calculations pertaining to atmospheric transport, dispersion, and deposition, as well as the radioactive decay that occurs before release and while the material is in the atmosphere. It uses a Gaussian plume model with Pasquill-Gifford dispersion parameters. The phenomena treated include building wake effects, buoyant plume rise, plume dispersion during transport, wet and dry deposition, and radioactive decay and in-growth. The results of the calculations are stored for use by EARLY and CHRONC. In addition to the air and ground concentrations, ATMOS stores information on wind direction, plume arrival and departure times, and plume dimensions.

The EARLY module models the period immediately following a radioactive release. This period is commonly referred to as the "emergency phase." The emergency phase begins at each successive downwind distance point when the first plume of the release arrives. The duration of the emergency phase is specified by the user and can range between 1 and 7 days. The exposure pathways considered during this period are direct external exposure to radioactive material in the plume (cloud shine); exposure from inhalation of radionuclides in the plume (cloud inhalation); exposure to radioactive material deposited on the ground (ground shine); inhalation of resuspended material (resuspension inhalation); and skin dose from material deposited on the skin. Mitigating actions that can be specified for the emergency phase include evacuation, sheltering, and dose-dependent relocation.

The CHRONC module performs all of the calculations pertaining to the intermediate and long-term phases (not used in the current analysis). CHRONC calculates the individual health effects that result from both direct exposure to contaminated ground and from inhalation of resuspended materials, as well as indirect health effects caused by the consumption of contaminated food and water by individuals who could reside both on and off the computational grid.

The intermediate phase begins at each successive downwind distance point upon the conclusion of the emergency phase. The user can configure the calculations with an intermediate phase that has a duration as short as zero or as long as 1 year. In the zero-duration case, there is essentially no intermediate phase and a long-term phase begins immediately upon conclusion of the emergency phase.

Intermediate models are implemented on the assumption that the radioactive plume has passed and the only exposure sources (ground shine and resuspension inhalation) are from ground-deposited material. It is for this reason that MACCS2 requires the total duration of a radioactive release be limited to no more than four days. Potential doses from food and water during this period are not considered.

The mitigating action model for the intermediate phase is very simple. If the intermediate phase dose criterion is satisfied, the resident population is assumed to be present and subject to radiation exposure from ground shine and resuspension for the entire intermediate phase. If the intermediate phase exposure exceeds the dose criterion, then the population is assumed to be relocated to uncontaminated areas for the entire intermediate phase.

The long-term phase begins at each successive downwind distance point upon the conclusion of the intermediate phase. The exposure pathways considered during this period are ground shine, resuspension inhalation, and food and water ingestion.

The exposure pathways considered are those resulting from ground-deposited material. A number of protective measures, such as decontamination, temporary interdiction, and condemnation, can be modeled in the long-term phase to reduce doses to user-specified levels. The decisions on mitigating action in the long-term phase are based on two sets of independent actions: (1) decisions relating to whether land at a specific location and time is suitable for human habitation (habitability), and (2) decisions relating to whether land at a specific location and time is suitable for agricultural production (ability to farm).

All of the calculations of MACCS2 are stored based on a polar-coordinate spatial grid with a treatment that differs somewhat between calculations of the emergency phase and calculations of the intermediate and long-term phases. The region potentially affected by a release is represented with a (r, θ) grid system centered on the location of the release. The radius, r, represents downwind distance. The angle, θ, is the angular offset from north, going clockwise.

The user specifies the number of radial divisions as well as their endpoint distances. The angular divisions used to define the spatial grid are fixed in the code. They correspond to the 16 points of the compass, each being 22.5 degrees wide. The 16 points of the compass are used in the United States to express wind direction. The compass sectors are referred to as the "coarse grid."

Since emergency phase calculations use dose-response models for early fatalities and early injuries that can be highly nonlinear, these calculations are performed on a finer grid basis than the calculations of the intermediate and long-term phases. For this reason, the calculations of the emergency phase are performed with the 16 compass sectors divided into three, five, or seven equal, angular subdivisions. The subdivided compass sectors are referred to as the "fine grid."

Two types of doses may be calculated by the code, "acute" and "lifetime." Acute doses are calculated to estimate deterministic health effects that can result from high doses delivered at high dose rates. Such conditions may occur in the immediate vicinity of a nuclear facility following hypothetical severe accidents where confinement and/or containment failure has been assumed to occur. Examples of the health effects based on acute doses are early fatality, prodromal vomiting, and hypothyroidism.

Lifetime doses are the conventional measure of detriment used for radiological protection. These are 50-year dose commitments to either specific tissues (for example, red marrow and lungs) or a weighted sum of tissue doses defined by the International Commission on Radiological Protection and referred to as "effective dose." Lifetime doses may be used to calculate the stochastic health effect risk resulting from exposure to radiation. MACCS2 uses the calculated lifetime dose in cancer risk calculations.

C.8 References

Chanin, D. and M. L. Young, 1998, *Code Manual for MACCS2: Volume 1, User's Guide*, NUREG/CR-6613, SAND97-0594, Vol. 1, Washington, DC, May.

DOC (U.S. Department of Commerce), 2000, Census Bureau, 2000 Decennial Census (accessed at http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=DEC&_submenuId=1776 datasets_2&_lang=en&_ts=).

DOC (U.S. Department of Commerce), 2010, Census Bureau, 2005-2009 American Community Survey 5-Year Estimates (accessed at http://factfinder.census.gov/servlet/DatasetMainPage Servlet?_program=ACS&_submenuId=datasets_2&_lang=en), December 14.

DOE (U.S. Department of Energy), 1994, *DOE Handbook: Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facilities*, Vol. 1, *Analysis of Experimental Data*, DOE-HDBK-3010-94 (available at http://tis.eh.doe.gov/techstds/standard/ standard.html), October.

DOE (U.S. Department of Energy), 2002, *Recommendations for Analyzing Accidents under the National Environmental Policy Act*, Office of NEPA Policy and Compliance, Washington, DC, July.

DOE (U.S. Department of Energy), 2003a, "Estimating Radiation Risk from Total Effective Dose Equivalents (TEDEs)," ISCORS Technical Report No. 1, DOE/EH-412/0015/0802, Rev. 1, Office of Environmental Policy and Guidance, Washington, DC, January.

DOE (U.S. Department of Energy), 2003b, *Final Environmental Impact Statement for the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, New Mexico*, DOE/EIS-0350, National Nuclear Security Administration, Los Alamos Site Office, Los Alamos, New Mexico, November.

DOE (U.S. Department of Energy), 2004, *Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements, Second Edition*, Office of NEPA Policy and Compliance, Washington, DC, December.

DOE (U.S. Department of Energy), 2006, *DOE Standard: Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports*, DOE-STD-3009-94, Chg 3 (available at http://www.hss.doe.gov/nuclearsafety/ns/techstds/), March.

DOE (U.S. Department of Energy), 2007, *DOE Standard: Preparation of Safety Basis Documents for Transuranic (TRU) Waste Facilities*, DOE-STD-5506-2007, Washington DC, April.

EPA (U.S. Environmental Protection Agency), 1998, *Title III List of Lists, Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-to-Know Act (EPCRA) and Section 112 (r) of the Clean Air Act, as Amended*, EPA 550-B-98-017, Office of Solid Waste and Emergency Response, Washington, DC, November.

LANS (Los Alamos National Security), 2011a, *CMR Building Hazards Analysis Information.*

LANS (Los Alamos National Security), 2011b, *CMRR-NF Hazards Analysis Information.*

National Research Council, 2006, *Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII Phase 2*, Committee to Assess Health Risks from Exposure to Low Levels of Ionizing Radiation, Board on Radiation Effects Research, Division on Earth and Life Sciences, National Academies Press, Washington, DC.

NCRP (National Council on Radiation Protection and Measurements), 1993, *Risk Estimates for Radiation Protection*, NCRP Report No. 115, Bethesda, Maryland, December 31.

NRC (U.S. Nuclear Regulatory Commission), 1990, *MELCOR Accident Consequences Code System (MACCS)*, NUREG/CR-4691, Washington, DC, February.

URS (URS Corporation), 2007, *Update of the Probabilistic Seismic Hazard Analysis and Development of Seismic Design Ground Motions at the Los Alamos National Laboratory*, Oakland California, May.

APPENDIX D
CONTRACTOR DISCLOSURE STATEMENTS

NEPA DISCLOSURE STATEMENT FOR PREPARATION OF A SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR THE NUCLEAR FACILITY PORTION OF THE CHEMISTRY AND METALLURGY RESEARCH BUILDING REPLACEMENT PROJECT AT LOS ALAMOS NATIONAL LABORATORY, LOS ALAMOS, NEW MEXICO (CMRR-NF SEIS)

CEQ regulations at 40 CFR 1506.5(c), which have been adopted by DOE (10 CFR 1021), require contractors who will prepare an EIS to execute a disclosure specifying that they have no financial or other interest in the outcome of the project. The term "financial interest or other interest in the outcome of the project," for the purposes of this disclosure, is defined in the March 23, 1981 guidance "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations," 46 FR 18026-18038 at Question 17a and b.

"Financial or other interest in the outcome of the project 'includes' any financial benefit such as a promise of future construction or design work in the project, as well as indirect benefits the contractor is aware of (e.g., if the project would aid proposals sponsored by the firm's other clients)," 46 FR 18026-18038 at 18031.

In accordance with these requirements, the offeror and any proposed subcontractors hereby certify as follows: (check either (a) or (b))

(a) __X__ Offeror and any proposed subcontractor have no financial interest in the outcome of the project.

(b) ______ Offeror and any proposed subcontractor have the following financial or other interest in the outcome of the project and hereby agree to divest themselves of such interest prior to award of this contract.

Financial or Other Interests:

1.
2.
3.

Certified by:

Science Applications International Corporation

Signature

Patricia Garcia

Patricia Garcia, Contracts Representative

10 Feb 2011

Date

W91278-09-D-0099, Task Order No. 0009

NEPA DISCLOSURE STATEMENT FOR PREPARATION OF A SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR THE NUCLEAR FACILITY PORTION OF THE CHEMISTRY AND METALLURGY RESEARCH BUILDING REPLACEMENT PROJECT AT LOS ALAMOS NATIONAL LABORATORY, LOS ALAMOS, NEW MEXICO (CMRR-NF SEIS)

CEQ regulations at 40 CFR 1506.5(c), which have been adopted by DOE (10 CFR 1021), require contractors who will prepare an EIS to execute a disclosure specifying that they have no financial or other interest in the outcome of the project. The term "financial interest or other interest in the outcome of the project," for the purposes of this disclosure, is defined in the March 23, 1981 guidance "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations," 46 FR 18026-18038 at Question 17a and b.

"Financial or other interest in the outcome of the project 'includes' any financial benefit such as a promise of future construction or design work in the project, as well as indirect benefits the contractor is aware of (e.g., if the project would aid proposals sponsored by the firm's other clients)," 46 FR 18026-18038 at 18031.

In accordance with these requirements, the offeror and any proposed subcontractors hereby certify as follows: (check either (a) or (b))

(a) ___X___ Offeror and any proposed subcontractor have no financial interest in the outcome of the project.

(b) ________ Offeror and any proposed subcontractor have the following financial or other interest in the outcome of the project and hereby agree to divest themselves of such interest prior to award of this contract.

Financial or Other Interests:

1.
2.
3.

Certified by: Los Alamos Technical Associates, Inc.

Daniel B. Carlson
Executive Vice President

Signature
____
Name

2/11/11
Date