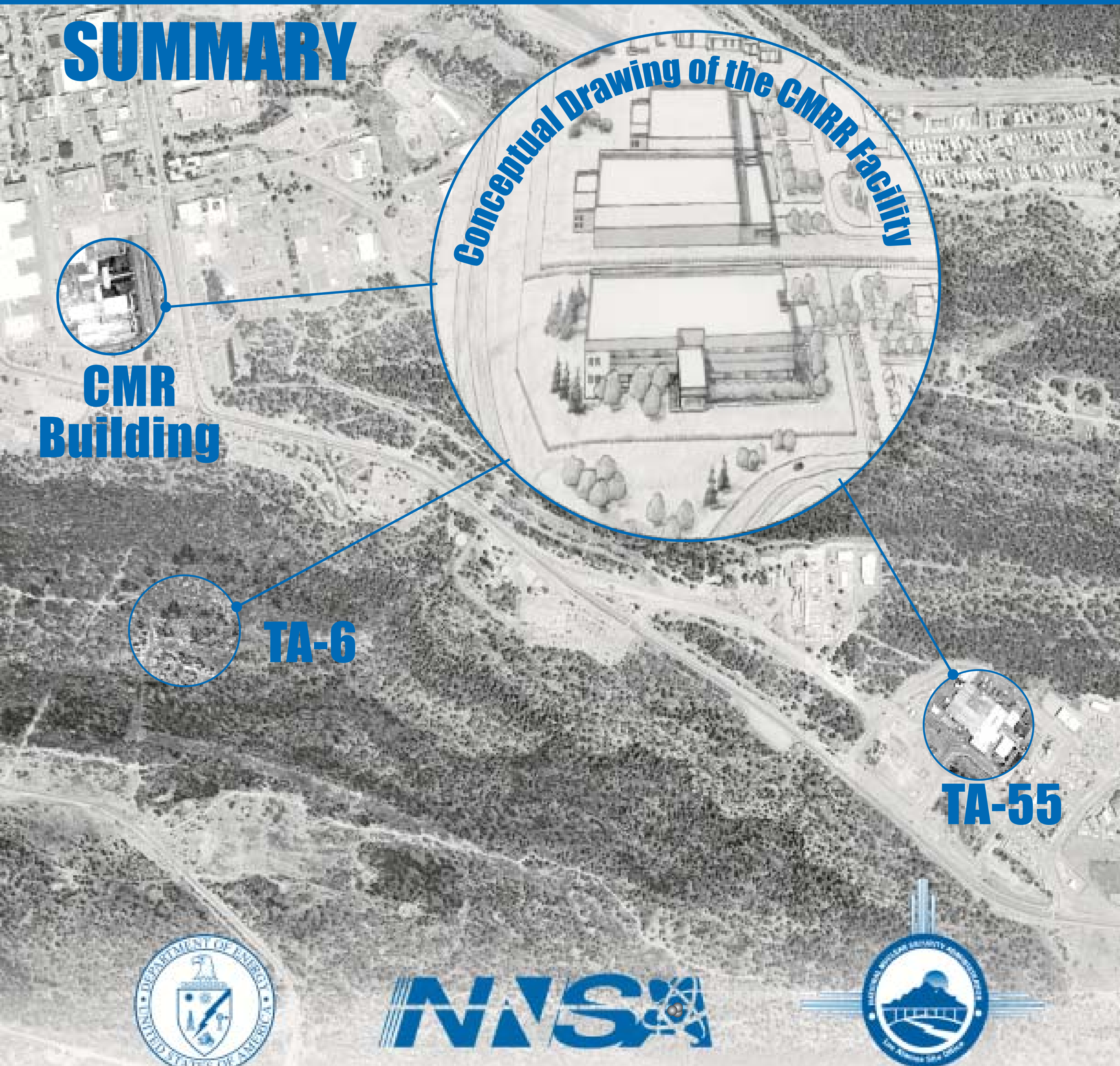
Draft Environmental Impact Statement For the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, New Mexico

DOE/EIS-0350D
May 2003

SUMMARY



U.S. Department of Energy

National Nuclear Security Administration

Los Alamos Site Office

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COVER SHEET

Responsible Agency: United States Department of Energy (DOE), National Nuclear Security Administration (NNSA)

Title: *Draft Environmental Impact Statement for the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory (CMRR EIS)*

Location: Los Alamos, New Mexico

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***Abstract*:** NNSA, an agency within DOE, proposes to replace the Chemistry and Metallurgy Research (CMR) Building at Los Alamos National Laboratory (LANL). The *CMRR EIS* will examine the potential environmental impacts associated with the proposed action of consolidating and relocating the mission-critical CMR capabilities from a degraded building to a new modern building(s).

The existing CMR Building, constructed in the early 1950s, houses most of LANL's analytical chemistry and materials characterization capabilities (AC and MC). Other capabilities at the CMR Building include actinide processing, waste characterization, and nondestructive analysis that support a variety of NNSA and DOE nuclear materials management programs. In 1992, DOE initiated planning and implementation of CMR Building upgrades to address specific safety, reliability, consolidation, and security and safeguards issues. Later, in 1997 and 1998, a series of operational, safety, and seismic issues surfaced regarding the long-term viability of the CMR Building. Because of these issues, DOE determined that the extensive upgrades originally planned would be much more expensive and time consuming and of only marginal effectiveness. As a result, DOE decided to perform only the upgrades necessary to ensure the safe and reliable operation of the CMR Building through 2010 and to seek an alternative path for long-term reliability.

The *CMRR EIS* evaluates the potential direct, indirect, and cumulative environmental impacts associated with the proposed action. The Proposed Action is to replace the CMR Building. The Preferred Alternative is to construct a new CMRR Facility at Technical Area (TA) 55, consisting of two or three buildings. One of the new buildings would provide space for administrative offices and support functions. The other building(s) would provide secure laboratory spaces for

research and analytical support activities. The buildings would be expected to operate for a minimum of 50 years. Tunnels may be constructed to connect the buildings. Alternative 2 would be to construct the new CMRR Facility within an undeveloped "greenfield" area near TA-55 at TA-6. Alternatives 3 and 4 would be to continue using the existing CMR Building for administrative offices and support functions with the implementation of minimal necessary structural and system upgrades and repairs, together with the construction of new nuclear laboratory building(s) at either TA-55 or TA-6. The EIS also presents an analysis of impacts associated with the dispositioning of all or portions of the existing CMR Building.

Public Comments: In preparing this draft EIS, NNSA considered comments received from the public during the scoping period (July 23, 2002 to August 31, 2002). Locations and times of public hearings on this document will be announced in the *Federal Register* in May 2003. Comments on this draft EIS will be accepted at the address listed above for a period of 45 days following its issuance and will be considered for the preparation of the final EIS. Any comments received after the 45-day period will be considered to the extent practicable for the preparation of the final EIS.

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ACRONYMS, ABBREVIATIONS, AND CONVERSION CHARTS

AC	analytical chemistry
CMR	Chemistry and Metallurgy Research
CMRR EIS	*Environmental Impact Statement for the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory*
DOE	U.S. Department of Energy
DSW	Directed Stockpile Work
EIS	environmental impact statement
INP	Integrated Nuclear Planning
LANL	Los Alamos National Laboratory
LANL SWEIS	*Site-Wide Environmental Impact Statement for the Continued Operation of the Los Alamos National Laboratory*
MC	materials characterization
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NNSA	National Nuclear Security Administration
RLWTF	Radioactive Liquid Waste Treatment Facility
SNM	special nuclear material
TA	Technical Area
UC at LANL	University of California, current LANL Management and Operating Contractor
WR	War Reserve

CONVERSIONS

METRIC TO ENGLISH			ENGLISH TO METRIC		
Multiply	**by**	**To get**	**Multiply**	**by**	**To get**
Area					
Square meters	10.764	Square feet	Square feet	0.092903	Square meters
Square kilometers	247.1	Acres	Acres	0.0040469	Square kilometers
Square kilometers	0.3861	Square miles	Square miles	2.59	Square kilometers
Hectares	2.471	Acres	Acres	0.40469	Hectares
Concentration					
Kilograms/square meter	0.16667	Tons/acre	Tons/acre	0.5999	Kilograms/square meter
Milligrams/liter	1[a]	Parts/million	Parts/million	1[a]	Milligrams/liter
Micrograms/liter	1[a]	Parts/billion	Parts/billion	1[a]	Micrograms/liter
Micrograms/cubic meter	1[a]	Parts/trillion	Parts/trillion	1[a]	Micrograms/cubic meter
Density					
Grams/cubic centimeter	62.428	Pounds/cubic feet	Pounds/cubic feet	0.016018	Grams/cubic centimeter
Grams/cubic meter	0.0000624	Pounds/cubic feet	Pounds/cubic feet	16,025.6	Grams/cubic meter
Length					
Centimeters	0.3937	Inches	Inches	2.54	Centimeters
Meters	3.2808	Feet	Feet	0.3048	Meters
Kilometers	0.62137	Miles	Miles	1.6093	Kilometers
Temperature					
Absolute					
Degrees C + 17.78	1.8	Degrees F	Degrees F - 32	0.55556	Degrees C
Relative					
Degrees C	1.8	Degrees F	Degrees F	0.55556	Degrees C
Velocity/Rate					
Cubic meters/second	2118.9	Cubic feet/minute	Cubic feet/minute	0.00047195	Cubic meters/second
Grams/second	7.9366	Pounds/hour	Pounds/hour	0.126	Grams/second
Meters/second	2.237	Miles/hour	Miles/hour	0.44704	Meters/second
Volume					
Liters	0.26418	Gallons	Gallons	3.78533	Liters
Liters	0.035316	Cubic feet	Cubic feet	28.316	Liters
Liters	0.001308	Cubic yards	Cubic yards	764.54	Liters
Cubic meters	264.17	Gallons	Gallons	0.0037854	Cubic meters
Cubic meters	35.314	Cubic feet	Cubic feet	0.028317	Cubic meters
Cubic meters	1.3079	Cubic yards	Cubic yards	0.76456	Cubic meters
Cubic meters	0.0008107	Acre-feet	Acre-feet	1233.49	Cubic meters
Weight/Mass					
Grams	0.035274	Ounces	Ounces	28.35	Grams
Kilograms	2.2046	Pounds	Pounds	0.45359	Kilograms
Kilograms	0.0011023	Tons (short)	Tons (short)	907.18	Kilograms
Metric tons	1.1023	Tons (short)	Tons (short)	0.90718	Metric tons
ENGLISH TO ENGLISH					
Acre-feet	325,850.7	Gallons	Gallons	0.000003046	Acre-feet
Acres	43,560	Square feet	Square feet	0.000022957	Acres
Square miles	640	Acres	Acres	0.0015625	Square miles

a. This conversion is only valid for concentrations of contaminants (or other materials) in water.

METRIC PREFIXES

Prefix	Symbol	Multiplication factor
exa-	E	1,000,000,000,000,000,000 = 10^{18}
peta-	P	1,000,000,000,000,000 = 10^{15}
tera-	T	1,000,000,000,000 = 10^{12}
giga-	G	1,000,000,000 = 10^{9}
mega-	M	1,000,000 = 10^{6}
kilo-	k	1,000 = 10^{3}
deca-	D	10 = 10^{1}
deci-	d	0.1 = 10^{-1}
centi-	c	0.01 = 10^{-2}
milli-	m	0.001 = 10^{-3}
micro-	μ	0.000 001 = 10^{-6}
nano-	n	0.000 000 001 = 10^{-9}
pico-	p	0.000 000 000 001 = 10^{-12}

SUMMARY

This summarizes the U.S. Department of Energy (DOE), National Nuclear Security Administration's (NNSA's) *Draft Environmental Impact Statement for the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory* (*CMRR EIS*). It describes the background, purpose of, and need for the Proposed Action; results of the scoping process; alternatives considered; and results of the analysis of environmental consequences. It also provides a comparison of potential environmental impacts among the alternatives.

S.1 Introduction and Background

NNSA, a separately organized agency within DOE, is responsible for providing the nation with nuclear weapons, ensuring the safety and reliability of those nuclear weapons, and supporting programs that reduce global nuclear proliferation. The NNSA mission is to: "(1) enhance U.S. national security through the military application of nuclear energy; (2) maintain and enhance the safety, reliability, and performance of the U.S. nuclear weapons stockpile, including the ability to design, produce, and test, in order to meet national security requirements; (3) provide the U.S. Navy with safe, militarily effective nuclear propulsion plants and ensure the safe and reliable operation of those plants; (4) promote international nuclear safety and nonproliferation; (5) reduce global danger from weapons of mass destruction; and (6) support U.S. leadership in science and technology" (50 USC Chapter 41, § 2401(b)). NNSA is also responsible for administration of the Los Alamos National Laboratory (LANL) in Los Alamos, New Mexico. The University of California (UC) is the current LANL Management and Operating Contractor and has served in this capacity since the laboratory's inception.

In the mid-1990s, in response to direction from the President and Congress, DOE developed the Stockpile Stewardship and Management Program to provide a single, highly integrated technical program for maintaining the continued safety and reliability of the nuclear weapons stockpile. Stockpile stewardship comprises the activities associated with research, design, development, and testing of nuclear weapons, and the assessment and certification of their safety and reliability. Stockpile management comprises operations associated with production, maintenance, refurbishment, surveillance, and dismantlement of the nuclear weapons stockpile. Work conducted at LANL provides science, research and development, and production support to these NNSA missions.

Under the direction of DOE, UC at LANL has developed facilities, capabilities, and expertise at LANL in the following:

- Theoretical research, including analysis, mathematical modeling, and high-performance computing; experimental science and engineering ranging from bench-scale to multi-site, multi-technology facilities (including accelerators and radiographic facilities); and

CMRR EIS Terminology

Missions: In this EIS, "missions" refers to the major responsibilities assigned to DOE and NNSA. DOE and NNSA accomplish their missions by assigning groups or types of activities to their national laboratories, production facilities, and other sites.

Programs: DOE and NNSA have program offices, each of which has primary responsibilities within the set of Administration and Department missions. Funding and direction for activities at DOE and NNSA facilities are provided through these program offices, and similar or coordinated sets of activities conducted to meet the mission responsibilities are often referred to as "programs." Programs generally are long-term efforts with broad goals or requirements.

Capabilities: "Capabilities" refers to the combination of facilities, equipment, infrastructure, and expertise necessary to undertake types or groups of activities and to implement mission assignments. Capabilities at LANL have been established over time, principally through mission-support work assignments and activities directed by program offices.

Projects: The term "projects" is used to describe activities with a clear beginning and end that are undertaken to meet a specific goal or need. Projects are usually relatively short-term efforts, and they can cross multiple programs and missions. Projects can range from very small efforts to major undertakings.

Campaign: "Campaigns" are composed of activities focused on science and engineering that address critical capabilities, tools, computations, and experiments needed to achieve certification, manufacturing, and refurbishment.

- Advanced nuclear materials research, development, and applications, including weapons components testing, fabrication, stockpile assurance, replacement, surveillance, and maintenance (including theoretical and experimental activities).

These capabilities developed under DOE (or its predecessor agencies) now allow UC at LANL to conduct research and development assignments for the new NNSA that include continued production of War-Reserve (WR) products, assessment and certification of the nuclear weapons stockpile, surveillance of the WR components and weapon systems, safe and secure storage of strategic materials, and management of excess plutonium inventories. These LANL assignments are all conducted in support of the NNSA Stockpile Stewardship Program and funded as either Directed Stockpile Work (DSW), campaigns, or Readiness in Technical Base Facilities work activities. In addition, LANL also supports actinide[1] 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.

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. Additional information regarding DOE and NNSA work assignments at LANL is presented in the 1999 LANL *Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory (LANL SWEIS)* (DOE/EIS-0238). This document and other related documents can be found in the DOE Reading Rooms in Albuquerque, New Mexico (at the Government Information Department, Zimmerman Library, University of New Mexico), and in Los Alamos (at the Community Relations Office located at 1619 Central Avenue).

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 Chemistry and Metallurgy Research (CMR) Building and the Plutonium Facility (located at Technical Areas

[1] *Actinides are any of a series of elements with atomic numbers ranging from actinium-89 through lawrencium-103.*

[TAs] 3 and 55, respectively), which are used for processing, characterizing, and storing special nuclear material (SNM).[2] Most of the LANL mission support functions require analytical chemistry, material characterization, and actinide research and development support capabilities and capacities that currently exist at facilities within the CMR Building and are not available elsewhere. Other unique capabilities are located at 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.

CMR Building

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[3] nuclear facility. 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 Record of Decision for the *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.

S.1.1 Purpose of and Need for Agency Action

Analytical chemistry and materials characterization (AC and MC) are fundamental capabilities required for the research and development support of DOE and NNSA mission assignments at LANL. CMR capabilities have been present at LANL for the entire history of the site and are critical for future work conducted there.

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[2] *Special nuclear material: plutonium, uranium enriched in the isotope 233 or in the isotope 235, and any other material that the U.S. Nuclear Regulatory Commission determines to be special nuclear material.*

[3] *A Hazard Category 2 nuclear facility is one in which the hazard analysis identifies the potential for significant onsite consequences. See text box on Nuclear Facilities Hazards Classification for additional information.*

Nuclear Facilities Hazards Classification (DOE Order 411.1)

Hazard Category 1: Hazard analysis shows the potential for significant offsite consequences.

Hazard Category 2: Hazard analysis shows the potential for significant onsite consequences.

Hazard Category 3: Hazard analysis shows the potential for only significant localized consequences.

SNM Safeguards and Security (DOE Order 474.1-1A)

DOE uses a cost-effective, graded approach to provide SNM safeguards and security. Quantities of SNM stored at each DOE site are categorized into Security Categories I, II, III, and 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 SNM are further categorized alphabetically by their "attractiveness" to saboteurs, with the most attractive materials for conversion into nuclear explosive devices being identified by the letter "A," and lesser attractive materials being designated progressively by the letters "B" through "E."

CMR Building operations and capabilities are currently being restricted in scope due to safety constraints; the building is not being operated to the full extent needed to meet the DOE NNSA operational requirements established in 1999 for the foreseeable future. In addition, continued support of LANL's existing and evolving missions is anticipated to require modification of some capabilities such as the ability to physically handle larger containment vessels (as compared to existing capabilities) in support of dynamic experimentation and subsequent clean out. The facilitation and consolidation of like activities at LANL would enhance operational efficiency in terms of security, support, and risk reduction in handling and transportation of nuclear materials.

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. At the same time, NNSA should also take advantage of the opportunity to consolidate like activities for the purpose of operational efficiency, and it may be prudent to provide extra space for future modifications or additions to existing capabilities.

S.1.2 Proposed Action and Scope of the *CMRR EIS*

NNSA proposes to relocate LANL AC and MC, and associated research and development capabilities that currently exist primarily at the CMR Building, to a newly constructed facility, and to continue to perform those operations and activities at the new facility for the reasonably foreseeable future (for the purposes of this environmental impact statement [EIS], the operations are assessed for a 50-year operating period). The *CMRR EIS* evaluates construction of a new CMRR Facility at TA-55, a "Greenfield" Site Alternative at TA-6, two "Hybrid" Alternatives, and the No Action Alternative.

Alternative 1 is to construct two to three new buildings within TA-55 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 area(s); tunnels, vault area(s), and other infrastructure support needs. AC and MC activities would be conducted in either two separate laboratories (either both above ground or one above and one below ground) or in one new laboratory (either above or below ground). The configuration of the laboratories has not been determined at this stage of the project but will be driven by safety, security, cost, and operational efficiency parameters to be evaluated during the conceptual design.

An alternative site for the new CMRR Facility will also be analyzed in the *CMRR EIS* – namely, constructing the new CMRR Facility (as described in Alternative 1) within TA-6; this alternative is referred to as the "Greenfield" Site Alternative (Alternative 2). The TA-6 site is a relatively undeveloped, forested area with some prior disturbance in limited areas. The above ground or below ground construction options are the same as those described for Alternative 1.

Two "Hybrid" Alternatives are analyzed in the *CMRR EIS*, 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 decommissioned, decontaminated, or demolished. New laboratory facilities (as described for Alternative 1) would be constructed in either TA-55 (Hybrid Alternative 3) or TA-6 (Hybrid Alternative 4) with the same above ground and below ground construction options.

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.

The *CMRR EIS* provides an evaluation of potential direct, indirect, and cumulative environmental impacts that could result from relocating existing AC and MC capabilities currently residing in the CMR Building to TA-55 (the Proposed Action). The *CMRR EIS* also analyzes potential direct and indirect impacts that could result from implementing the various other action alternatives and the No Action Alternative. In addition, the *CMRR EIS* addresses monitoring and mitigation, unavoidable impacts and irreversible and irretrievable commitment of resources, and impacts of long-term productivity.

The alternatives analyzed in the *CMRR EIS* were developed by a team of NNSA and LANL staff who evaluated various criteria and site locations at LANL. The selection criteria for siting considered security issues, infrastructure availability, environmental issues, safety and health infrastructure, and compatibility between sites and CMR capabilities. The alternatives analyzed in this *CMRR EIS* are described in greater detail in Section S.2.1.

S.1.3 Decisions to be Supported by the *CMRR EIS*

The analyses of environmental impacts that could occur if NNSA implemented the Proposed Action described in this *CMRR EIS* will provide NNSA's decision maker (in this case the Administrator of NNSA) with important environmental information for use in the overall decision-making process. The decisions to be made by the NNSA decision maker regarding the CMRR project are:

- Whether to construct a new CMRR Facility to house AC and MC capabilities at LANL

- Whether to construct a new building to house administrative offices and support functions in conjunction with the new laboratory facilities

- Whether to locate the new CMRR Facility building(s) at TA-55 next to the existing structures that house LANL plutonium capabilities, or to locate the CMRR Facility building(s) within TA-6 at LANL, which is a “greenfield” site

- Whether to construct the new CMRR Facility with one large laboratory that would serve to house both the Hazard Category 2 and 3 capabilities, or with two separate laboratory buildings, one to house Hazard Category 2 capabilities and one to house Hazard Category 3 capabilities

- Whether to construct the new Hazard Category 2 laboratory as an above ground structure or a below ground structure

- What to do with the existing CMR Building if new CMRR Facility laboratories are constructed

Other considerations, in addition to the environmental impact information provided by this *CMRR EIS*, that are not evaluated in this EIS, will also influence NNSA’s final CMRR project decisions. These considerations include cost estimate information, schedule considerations, safeguards and security concerns, and programmatic considerations. In accordance with the Council on Environmental Quality’s regulations for implementing the National Environmental Policy Act (NEPA) (40 CFR 1500 through 1508): “1500.1 Purpose. …(c) Ultimately, of course, it is not better documents but better decisions that count. NEPA's purpose is not to generate paperwork – even excellent paperwork – but to foster excellent action. The NEPA process is intended to help public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment. These regulations provide the direction to achieve this purpose.”

There are decisions related to the CMR capabilities and activities at LANL that the NNSA Administrator will not make based on the Final *CMRR EIS* analysis. These include the following:

NNSA will not make a decision to remove mission support assignments of CMR capabilities from LANL or to alter the operational level of these capabilities. CMR capabilities were a fundamental component of Project Y during the Manhattan Project era, and the decision to facilitate these capabilities at the Los Alamos site was made originally by the U.S. Army Corps of Engineers, Manhattan District. DOE’s predecessor agency, the Atomic Energy Commission, made the decision to continue supporting and to expand CMR capabilities at LANL after World War II and the CMR Building was constructed to house these needed capabilities. DOE considered the issue of maintaining CMR capabilities (along with other capabilities) at LANL in 1996 as part of its review of the Stockpile Stewardship and Management Program and made programmatic decisions at that time that required the retention of CMR capabilities at LANL. In

1999, DOE, through its *LANL SWEIS* analyses, concluded that specific decisions regarding the replacement of the CMR Building for its continued operations and capabilities support were not then ready to be made because of lack of information regarding the proposal(s). With the support of the *LANL SWEIS* impact analyses, however, DOE made a decision on the level of operations at LANL that included the level of operational capabilities housed by the CMR Building. Having made these critical decisions within the past 7 years, NNSA will not revisit decisions at this time related to the maintenance of CMR capabilities at LANL to support critical NNSA missions.

NNSA will not make a decision on other elements or activities that have been recently undertaken associated with the LANL "Integrated Nuclear Planning" initiative. During 2000 to 2001, NNSA initiated planning activities associated with the CMRR project to address long-term AC and MC mission support beyond the year 2010, consistent with the strategy for managing the operation of the CMR Building. During this same time frame, UC at LANL was implementing or initiating other activities, including identification of potential upgrades to the existing Plutonium Facility, campaigns for pit[4] manufacturing and certification, planned safeguards and security system upgrades, and the proposed relocation of TA-18 capabilities. Such actions were undertaken to address safeguards and security upgrades, operational inefficiencies, and long-term facilities infrastructure requirements related to or affecting LANL nuclear facilities. Recognizing the need for CMRR to be integrated with other contemplated actions, near and long term, affecting the nuclear mission capabilities at LANL, NNSA and UC at LANL developed the Integrated Nuclear Planning (INP) process. INP is intended to provide an integrated, coordinated plan for the consolidation of LANL nuclear facility construction, refurbishment and upgrade, and retirement activities. As such, INP is a planning process, not an overarching construction project, and is a tool used by NNSA and UC at LANL to ensure effective, efficient integration of multiple, distinct stand-alone projects and activities related to or affecting LANL nuclear facilities capabilities. As individual elements or activities associated with INP become mature for decision and implementation, each element and activity moves ahead in the planning, budgeting, and NEPA compliance process on its own merits.

NNSA's overall concept for TA-55 would have it contain all or at least most of the Security Category I nuclear operations needed for LANL operations. To that end, however, are the following considerations: the various potential LANL Security Category I nuclear facilities are independent of one another in terms of their programmatic utility to DOE and NNSA; these Security Category I nuclear facilities are also independent of one another in terms of their individual operations and the capabilities they house; the existing structures are of differing ages and therefore replacement of the aging structures would become necessary at different times; the construction of major facilities within a relatively tight area would require they be staggered so that the area can physically accommodate the necessary construction laydown sites and needed storage areas; the additional security elements required for the construction and startup of operations in Hazard Category 2 nuclear facilities predicates the need for their separate construction in terms of scheduling.

NNSA recently completed an EIS for relocating LANL's TA-18 capabilities and materials and made a decision to move Security Category I and II capabilities and materials to another DOE

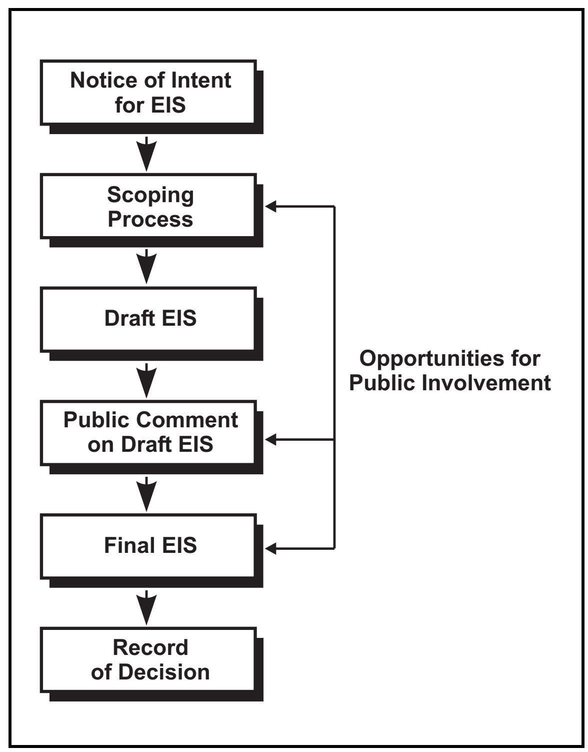
[4] *The central core of a primary assembly in a nuclear weapon typically composed of plutonium-239 and/or highly enriched uranium and other materials.*

site away from LANL (the *Final Environmental Impact Statement for the Proposed Relocation of Technical Area 18 Capabilities and Materials at the Los Alamos National Laboratory*). The Record of Decision was published in the *Federal Register* on December 31, 2002 (67 FR 251). NNSA is separately considering the construction and operation of a pit manufacturing facility on a scale greater than can currently be accommodated by LANL's existing facilities and is considering LANL's TA-55 as a possible site (though it is not currently identified as the preferred site location).

S.1.4 The Scoping Process and Issues of Public Concern

On July 23, 2002, NNSA published a Notice of Intent to prepare the *CMRR EIS* (67 FR 48160). In this Notice of Intent, NNSA invited public comment on the *CMRR EIS* proposal. The Notice of Intent informed the public that comments on the proposed action could be communicated via the U.S. Postal Service, a special DOE website on the Internet, a toll-free phone line, a toll-free fax line, or in person at public meetings to be held in the vicinity of LANL.

Public scoping meetings were held on August 13, 2002 in Pojoaque, New Mexico and on August 15, 2002 in Los Alamos, New Mexico. As a result of previous experience and positive responses from attendees of other DOE NEPA public meetings and hearings, NNSA chose an interactive format for the scoping meetings. Each meeting began with a presentation by NNSA representatives who explained the proposed CMRR Facility project. Afterwards, the floor was opened to questions, comments, and concerns from the audience. NNSA representatives were available to respond to questions and comments. The proceedings and formal comments presented at each meeting were recorded verbatim, and a transcript for each meeting was produced. The public was also encouraged to submit written or verbal comments during the meetings, or to submit comments via letters, the DOE Internet website, toll-free phone line, or toll-free fax line, until the end of the scoping period. All comments received during the scoping period were reviewed for consideration by NNSA in preparing the *CMRR EIS*.



NEPA Process

Summary of Scoping Comments

Approximately 75 comments were received during the public scoping period from citizens, interested groups, and local officials. Many of the verbal and written comments received addressed the need to identify decontamination and decommissioning of the existing CMR Building, including expected waste streams and volumes, its impact upon the Low-Level

Radioactive Solid Waste Disposal Facility (TA-54), and the transportation and security risks that would be associated with transferring any existing inventories of SNM. Additional waste management concerns expressed by commentors included the need to identify the types and volumes of waste generated by the proposed action; the facilities available at each site to treat, store, or dispose of the waste; and compatibility of the proposed action with state and Federal regulations.

Many of the comments also addressed the need for NNSA to describe in detail the existing CMR Building capabilities and processes versus those of the proposed replacement building, as well as the specific NNSA mission requirements supporting the purpose and need for the proposed action. Several comments addressed the need for NNSA to describe the relationship of the proposed action to the Stockpile Stewardship Program, other existing DOE NEPA documentation, and proposed new plutonium pit production facilities.

Major issues identified by NNSA during the scoping process were addressed in the *CMRR EIS* in the following areas:

- Land use and visual resources
- Site infrastructure
- Air quality and noise
- Water resources
- Geology and soils
- Ecological resources
- Cultural and paleontological resources
- Socioeconomics
- Environmental justice
- Radiological and hazardous chemical impacts
- Waste management and pollution prevention
- Emergency preparedness and security

Commentors also expressed concern about environmental, health, and safety risks associated with the new CMRR Facility operations, and requested that NNSA evaluate the potential consequences of the proposed action on the health and safety of area residents and address environmental justice issues, including the potential impacts to environmental, aesthetic, and cultural resources of adjacent Pueblo lands. Other comments suggested that the *CMRR EIS* quantify all radionuclides and chemicals used and emitted from the proposed replacement building. Concerns were also raised about safety and security at the facilities.

S.1.5 Relationships to Other Actions and Programs

There are a number of NEPA and other DOE program planning documents that are related to the *CMRR EIS*. These documents were important in developing the *CMRR EIS* proposed action and alternatives and the assumptions for analyses, as well as providing input into the descriptions of affected environments. These documents are listed in the text box below in two categories: completed NEPA compliance analyses and ongoing NEPA compliance analyses. A detailed description of these documents and their relationship to the *CMRR EIS* can be found in Section 1.6 of the *CMRR EIS*. Two NEPA actions closely related to the CMRR EIS are the *Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory (LANL SWEIS)* and the *Supplemental Programmatic Environmental Impact Statement on Stockpile Stewardship and Management for a Modern Pit Facility (Modern Pit EIS)*. They are summarized below.

Completed NEPA Compliance Analyses

- *Environmental Assessment for the Proposed CMR Building Upgrades at the Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE/EA-1101)
- *Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement* (DOE/EIS-0240)
- *Final Programmatic Environmental Impact Statement for Stockpile Stewardship and Management* (DOE/EIS-0236)
- *Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (DOE/EIS-0200-F)
- *Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory* (DOE/EIS-0238)
- *Surplus Plutonium Disposition Final Environmental Impact Statement* (DOE/EIS-0283)
- *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)
- *Environmental Assessment for the Proposed Construction and Operation of a New Interagency Emergency Operations Center at Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE/EA-1376)
- *Environmental Assessment of the Proposed Disposition of the Omega West Facility at Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE/EA-1410)
- *Environmental Assessment for the Proposed Future Disposition of Certain Cerro Grande Fire Flood and Sediment Retention Structures at Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE/EA-1408)
- *Environmental Assessment for Proposed Access Control and Traffic Improvements at Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE/EA-1429)
- *Environmental Impact Statement for the Proposed Relocation of Technical Area 18 Capabilities and Materials at the Los Alamos National Laboratory* (DOE/EIS-319)
- *Environmental Assessment for the Installation and Operation of Combustion Turbine Generators at Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE/EA-1430)

Ongoing NEPA Compliance Actions

- *Supplemental Programmatic Environmental Impact Statement on Stockpile Stewardship and Management for a Modern Pit Facility* (DOE/EIS-0236-S2)
- *Environmental Assessment for the Proposed Issuance of a Special Use Permit to the Incorporated County of Los Alamos for the Development and Operation of a New Solid Waste Landfill at Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE/EA-1460)
- *Environmental Assessment for Conversion of an Existing Building into a Proposed Radiography Facility at TA-55 at Los Alamos National Laboratory, Los Alamos, New Mexico*

Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory **(DOE/EIS-0238)**

In January 1999, DOE issued the *LANL SWEIS* (DOE 1999b). This document assessed four alternatives for the operation of LANL: (1) No Action, (2) Expanded Operations, (3) Reduced Operations, and (4) Greener Alternative. The Record of Decision for the *LANL SWEIS* was published in the *Federal Register* on September 20, 1999 (64 FR 50797). In the Record of Decision, DOE selected the Expanded Operations Alternative with reductions to certain weapons-related work. The Expanded Operations Alternative described in the *LANL SWEIS* analyzed the impacts from the continuation of all activities presently undertaken at LANL, at the highest level of activity. In the Record of Decision, operations at the CMR Building would continue, and activities would increase by approximately 25 percent over past No Action operational levels. The effects from the Expanded Operations Alternative level of activity at LANL are discussed in Chapter 4, Environmental Consequences of the *LANL SWEIS*, and have been included in the assessment of baseline conditions at LANL for the proposed action alternatives presented in this EIS.

The No Action Alternative assessed in this EIS is consistent with the Preferred Alternative identified through the *LANL SWEIS* and its associated Record of Decision. However, as a result of continued reductions in the CMR Building's operational capacity due to the structural deterioration as a result of aging and the need to ensure compliance with safety requirements for that building, the No Action Alternative no longer allows UC at LANL to fully meet NNSA's CMR mission requirements at LANL. The No Action Alternative analyzed in the *CMRR EIS* reflects the current reduced level of operations at the CMR Building.

***Supplemental Programmatic Environmental Impact Statement on Stockpile Stewardship and Management for a Modern Pit Facility* (DOE/EIS-0236-S2)**

In September 2002, NNSA issued a Notice of Intent on September 23, 2002 in the *Federal Register* (67 FR 59577) to prepare a *Supplemental Programmatic Environmental Impact Statement on Stockpile Stewardship and Management for a Modern Pit Facility* (MPF) in order to decide: (1) whether to proceed with the MPF; and (2) if so, where to locate the MPF.

Consistent with the 1996 *SSM PEIS* Record of Decision (61 FR 68014) and the 1999 *LANL SWEIS* Record of Decision (64 FR 50797), NNSA has been reestablishing a small pit manufacturing capability at LANL. The establishment of the interim pit production capacity is expected to be completed in 2007. However, classified analyses indicate that the capability being established at LANL will not support either the projected capacity requirements (number of pits to be produced over a period of time), or the agility (ability to rapidly change from production of one pit type to another, ability to simultaneously produce multiple pit types, or the flexibility to produce pits of a new design in a timely manner) necessary for long-term support of the stockpile. In particular, any systemic problems that might be identified in an existing pit type or class of pits (particularly any aging phenomenon) could not be adequately addressed today, nor could it be with the capability being established at LANL. Although no such problems have been identified, the potential for such problems increases as pits age.

The CMRR Facility would provide AC and MC capabilities for existing mission support assignments at LANL that are expected to continue for the long-term. Such AC and MC capabilities are needed independent of the proposed action that will be analyzed in the Modern Pit Facility (MPF) EIS for constructing and operating a new MPF at one of five DOE and NNSA sites across the county. The CMRR Facility could provide AC and MC support capabilities for pit manufacturing at LANL if a decision were made to not construct a new MPF and, instead, to continue to use LANL’s existing capabilities and facilities for pit manufacturing (this possibility for pit manufacturing was explicitly analyzed in the *LANL SWEIS* Expanded Operations Alternative and is implicitly analyzed in this *CMRR EIS*). However, should a decision be made to construct a new MPF at LANL, the level of AC and MC support capabilities required for pit production capacities associated with the new MPF would be beyond LANL’s pit production level capacity as described in the LANL SWEIS Expanded Operations Alternative and would also be beyond the level of pit manufacturing AC and MC support that would be provided by the new CMRR Facility. The conceptual design for a new MPF includes locating necessary support capabilities for AC and MC work within the MPF itself – the MPF would be a self-contained facility in that respect. The MPF EIS will, accordingly, analyze the direct environmental impacts of AC and MC capabilities for pit manufacturing associated with a new MPF for the various operational level options under consideration for that facility. The cumulative impact section (Section 4.8 of the *CMRR EIS*) provides an assessment of the environmental impacts of constructing and operating both the CMRR Facility and a new MPF at LANL to the extent those impacts are known or can be currently estimated.

S.2 DESCRIPTION OF THE ALTERNATIVES

S.2.1 Alternatives Evaluated

The *CMRR EIS* analyzes five main alternatives for the CMRR project, as shown in **Figure S–1**. While the No Action Alternative does not meet the NNSA's purpose and need for actions, the other four action alternatives analyzed were identified as reasonable alternatives for NNSA's proposed action.

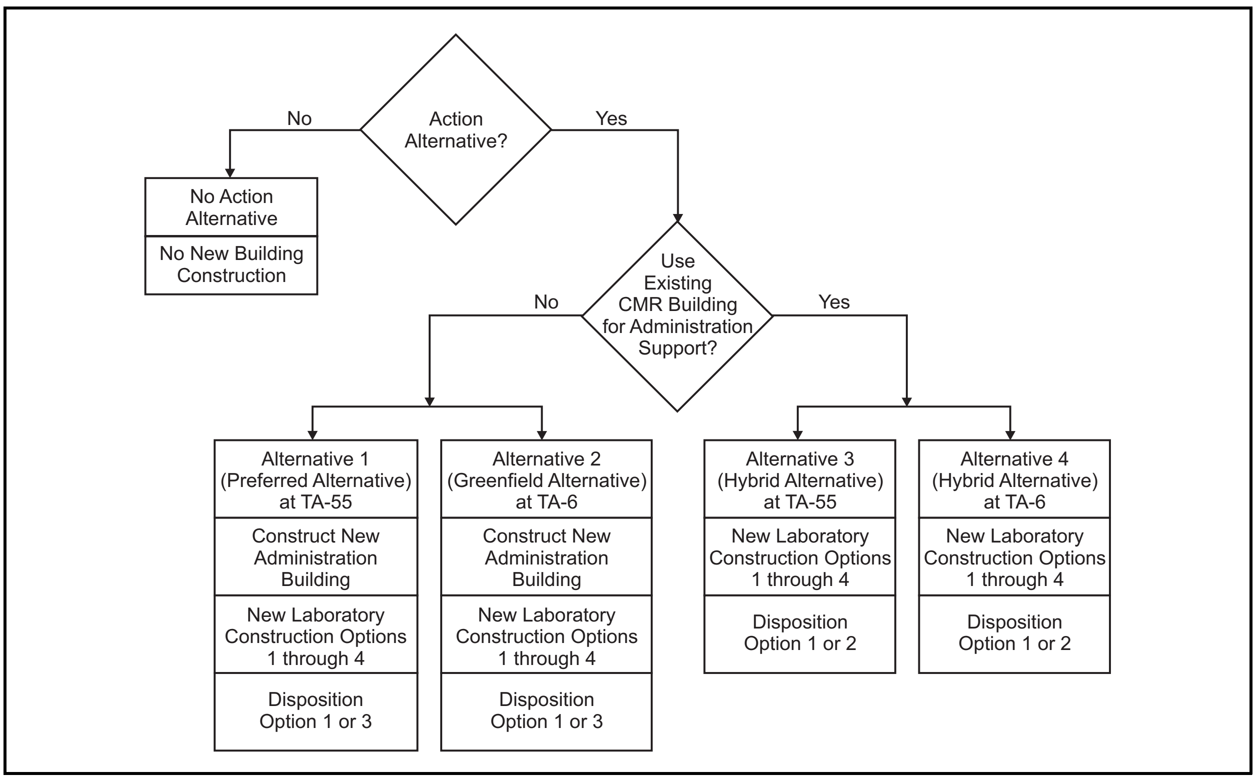
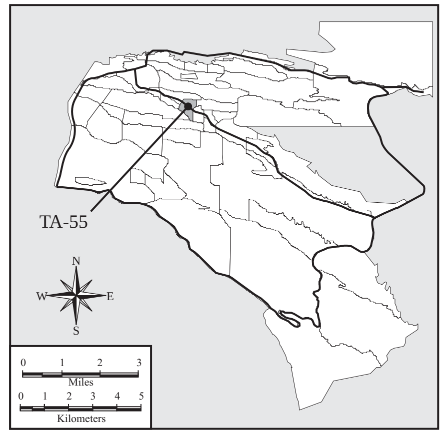


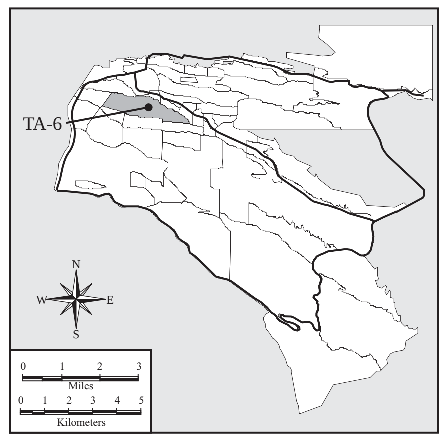
Figure S–1 Alternatives and Options Evaluated in Detail in the *CMRR EIS*

No Action Alternative: Continue use of the existing CMR Building at TA-3 with minimal routine maintenance and component replacements and repairs to allow continued operations, although CMR operations would be restricted. No new buildings to support LANL AC and MC capabilities would be constructed.

Alternative 1 (NNSA's Preferred Alternative): Construct two or three buildings at the LANL TA-55 site for the new CMRR Facility. AC and MC capabilities would be moved from the existing CMR Building into the new building(s) using a phased approach and operations would resume there in a staged manner (there would be a period of operational overlap between the old CMR Building and the new CMRR Facility), and the existing CMR Building would be dispositioned. One of the new buildings in TA-55 would provide administrative offices and support activities and would include cafeteria space and lite[5] laboratory space used for such activities as glovebox mockup, process testing, chemical experimentation, training, and general research and development. The lite laboratory area(s) would contain only small quantities of nuclear materials.



TA-55 Site



TA-6 Site

Alternative 2: Construct two or three buildings for the new CMRR Facility (as described for Alternative 1) within a "greenfield" site at LANL TA-6. While laboratory space requirements would be the same as in Alternative 1, under this alternative, facility support space requirements such as shipping and receiving capabilities would be larger by about one percent of the total square footage due to the physical separation between the Plutonium Facility at TA-55 and the TA-6 proposed CMRR Facility site location. The transfer of CMR operations to the new CMRR Facility would be the same as for Alternative 1, as would the disposition of the existing CMR Building.

Alternative 3: Hybrid Alternative involving construction of a new CMRR Facility for SNM Laboratory(s) at LANL TA-55 with continued use of the existing CMR Building at TA-3 for administrative offices and support functions (including lite laboratories and other general activities). Repairs and upgrades to the existing CMR Building would be required to meet minimal structural and life safety code requirements.

Alternative 4: Hybrid Alternative involving construction of a new CMRR Facility for SNM Laboratory(s) at LANL TA-6 with continued use of existing CMR Building at TA-3 for

[5] *The term "lite" is an informal, simplified spelling of the word "light." In this context the term "light" refers to occurring in small amounts, force, or intensity; specifically, the CMRR Facility lite laboratories would contain very small amounts of radioactive materials and nonradioactive materials and chemicals.*

administrative offices and support functions (including lite laboratories and other general activities). Repairs and upgrades to the existing CMR Building would be required to meet minimal structural and life safety code requirements.

For each of the alternatives involving new construction, there are four different construction options considered with respect to the CMRR Facility. These construction options are driven by the Security and Hazard Categorization for the portion of CMRR facilities that would house operations involving SNM.

Operations that use relatively large amounts (several grams per sample) of SNM, such as sample management and plutonium assay, require a designated Hazard Category 2 facility(ies), which has structures, systems, and components appropriate for such operations. Operations that use smaller amounts of SNM (gram to microgram per sample) require designated Hazard Category 3 facility(ies), which use structures, systems and components appropriate for this kind of facility. Safeguards and security issues may require that any building designated as a Hazard Category 2 facility be located below ground (specifically, below the elevation level of the surrounding land). These facility hazard categorization and safeguards and security requirements drivers have resulted in the identification of the following construction options for the four action alternatives listed above:

Construction Option 1: Construct a separate nuclear SNM-capable Hazard Category 2 laboratory building and a separate Hazard Category 3 laboratory building above ground with a separate building to house administrative offices and support functions (total of three buildings).

Disposition Analyses for the existing CMR Building under each of the action alternatives would include:

Disposition Option 1: reuse of the Building for administrative and other activities appropriate to the physical conditions of the structure with the performance of necessary structural and systems upgrades and repairs.

Disposition Option 2: decontamination, decommissioning, and demolition of selected parts of the existing CMR Building with some portions of the Building being reused.

Disposition Option 3: decontamination, decommissioning, and demolition of the entire existing CMR Building.

Construction Option 2: Construct a separate nuclear SNM-capable Hazard Category 2 laboratory building below ground, construct a Hazard Category 3 laboratory building above ground with a separate building to house administrative offices and support functions (total of three buildings).

Construction Option 3: Construct a consolidated nuclear SNM-capable Hazard Category 2 laboratory above ground with a separate building to house administrative offices and support functions (total of two buildings).

Construction Option 4: Construct a consolidated nuclear SNM-capable Hazard Category 2 laboratory below ground with a separate building to house administrative offices and support functions (total of two buildings).

S.2.2 Alternatives Considered but Not Analyzed in Detail

A number of alternatives were considered but were not analyzed in detail in the *CMRR EIS*. As required in the Council on Environmental Quality's NEPA regulations (40 CFR 1502.14[a]), the reasons for elimination from detailed study are discussed in this section. Alternatives may have been eliminated from further consideration because of technical immaturity, prohibitive cost, regulatory unacceptability, failure to meet siting criteria, or because they do not support the purpose and need of the EIS.

Removing CMR Capabilities from LANL or Altering the Operational Level of Capabilities: The alternative of removing CMR capabilities from LANL or altering the operational level of these capabilities was considered and dismissed. DOE considered maintaining CMR capabilities (along with other capabilities at LANL) in 1996 as part of the review of the Stockpile Stewardship and Management Program and made programmatic decisions at that time that required the retention of CMR capabilities at LANL. In 1999, DOE, through its *LANL SWEIS* analyses, concluded that specific decisions regarding the replacement of the CMR Building for its continued operations and capabilities support were not then mature because of lack of information regarding the proposal(s). With the support of the *LANL SWEIS* impact analysis, however, DOE made a decision on the level of operations at LANL that included the level of operational capabilities housed by the CMR Building. Having made these critical decisions related to the maintenance of CMR capabilities at LANL to support critical NNSA missions within the past 7 years, NNSA will not revisit them.

Considering the CMRR Project as Part of the "Integrated Nuclear Planning" Initiative at TA-55: The option of including the CMRR project environmental review as part of the INP initiative for TA-55 was considered and dismissed. The various potential LANL Security Category I nuclear facilities are independent of one another in terms of their individual operations and the capabilities they house; the existing structures are of differing ages and therefore replacement of the aging structures would become necessary at different times; the construction of major facilities within a relatively tight geographic area would require that they be staggered so that the area can physically accommodate the necessary construction laydown sites and storage areas needed; and the additional security elements required for the construction and startup of operations in Hazard Category 2 nuclear facilities also predicates the need for their separate construction in terms of schedule. Based on the recent TA-18 EIS, NNSA has made a decision to move the TA-18 capabilities and materials to another DOE site away from LANL and TA-55. NNSA is separately considering the construction and operation of a pit manufacturing facility on a scale greater than can currently be accommodated at LANL in its existing facilities and is considering TA-55 as a possible site. In the future, NNSA will eventually need to consider decisions on relocating or upgrading the aging TA-55 LANL Plutonium Facility, which is about 30 years old; however, any proposal for such a project is very speculative and not ready for decision at this time.

Alternative LANL Sites: The sites at TA-55 reflect NNSA's goal to bring all nuclear facilities within a nuclear core area. Siting of the CMRR Facility at TA-55 would co-locate the AC and MC capabilities near the existing Plutonium Facility where the programs operations that require these capabilities are located.

The greenfield site at TA-6 was chosen using data and maps from the *2000 Comprehensive Site Plan*, the *Core Area Development Plan* and the *Anchor Ranch Area Development Plan*. These documents contain detailed development opportunity maps, which were developed using a set of siting criteria, or constraints. Using geographical information system (GIS) processing software, a set of physical constraints and operational constraints were scored, combined, and used to identify sitewide development opportunities. The physical constraints contained information regarding various topographic features, seismic fault lines, Federally-protected threatened and endangered species habitat information, floodplains, and wetlands locations. Also considered were surface hydrology, cultural resources, climate, vegetation, soils, and geology of LANL. The operational constraints considered locations of radiological sources, the White Rock Canyon Reserve, solid waste landfill, hazardous waste sites, range of radio frequencies, and airspace and blast buffer zones. The screening results are documented on a set of sitewide development opportunities maps found within these three documents. These documents also contain summary planning maps that reflect existing land uses as well as undeveloped (so called "greenfield") lands. Combining the development opportunities maps and summary maps allows identification of potential greenfield sites that would be suitable for siting CMRR Facility building(s). The final siting step for locating the CMRR Facility outside of TA-55 was to consider NNSA's desire to bring all nuclear facilities within a nuclear core area; TA-6 is the only greenfield site available for consideration in the general area of TA-55.

Extensive Major Upgrade to the Existing CMR Building for Use Beyond 2010: The proposal to complete upgrades to the existing CMR Building's structural and safety systems necessary to meet current mission support requirements for the suite of capabilities that exist in the building today for another 20 to 30 years of operations was considered and evaluated by DOE and UC at LANL in the 1998 to 1999 timeframe. This approach to maintaining these mission-critical nuclear support capabilities would require a capital investment in excess of several hundred million dollars for just two of the eight CMR Building's wings. The costs of upgrading the entire structure would be the same or more for constructing the proposed CMRR Facility. Implementing this alternative would not reduce the overall footprint of the CMR Building, which is costly to maintain and operate in part due to the amount of wasted space incorporated into its design, nor would it change the underpinning seismic condition of the CMR Building. Additionally, implementing this alternative would not allow for the consolidation of like activities presently located within the Plutonium Facility into one facility. This alternative was not considered to be reasonable to meet the NNSA's purpose and need for action.

S.3 THE PREFERRED ALTERNATIVE

The Council on Environmental Quality NEPA regulations require an agency to identify its preferred alternative, if one or more exists, in the draft EIS (40 CFR 1502.14(e)). The preferred alternative is the alternative that the agency believes would fulfill its statutory mission, giving consideration to environmental, economic, technical, and other factors. In the draft stage of this *CMRR EIS*, Alternative 1, as described in Section S.2.1, is NNSA's preferred alternative for the replacement of the CMR capabilities. At the draft stage, NNSA has not identified a preferred construction option or a preferred option for the disposition of the CMR Building.

S.4 AFFECTED ENVIRONMENT

LANL is located on approximately 25,600 acres (10,360 hectares) of land in north central New Mexico (see **Figure S–2**). The site is located 60 miles (97 kilometers) north-northeast of Albuquerque, 25 miles (40 kilometers) northwest of Santa Fe, and 20 miles (32 kilometers) southwest of Española. Portions of LANL are located in Los Alamos and Santa Fe Counties. LANL is owned by the Federal Government and administered by NNSA. It is operated by UC under contract to DOE.

LANL is divided into 49 separate TA's (with locations and spacing that reflect the site's historical development patterns, regional topography, and functional relationships (see **Figure S–3**). While the exact number of structures changes somewhat with time (for example, as a result of large fires such as the Cerro Grande Fire), in 1999 there were 944 permanent structures, 512 temporary structures, and 806 miscellaneous buildings with approximately 5 million square feet (465,000 square meters) that could be occupied. In addition to onsite office space, 213,262 square feet (19,833 square meters) of space was leased within the Los Alamos town site and White Rock community.

TA-3 is situated in the west-central portion of LANL. It is separated from the Los Alamos townsite by Los Alamos Canyon. TA-3 is LANL's main technical area that houses approximately one-half of LANL's employees and total floor space. It covers 357 acres (144 hectares) of which 69 percent has been developed. Site facilities are located on the top of a mesa between the upper reaches of Sandia and Mortandad Canyons. It is the administration complex within LANL and contains the Director's office, administrative offices, and support facilities. Major facilities within the area include the existing CMR Building, the Sigma Complex, the Main Shops, and the Materials Science Laboratory. Other buildings house central computing facilities, chemistry and materials science laboratories, earth and space science laboratories, physics laboratories, technical shops, cryogenics laboratories, the main cafeteria, badge office, and the study center.

TA-6 is a candidate site for the CMRR Facility. It is adjacent to and south of TA-3 and is located on a mesa between Two Mile and Pajarito Canyons. TA-6 is situated about 0.6 miles (1 kilometer) south of the Los Alamos townsite. It covers 500 acres (202 hectares), of which 1 percent has been developed. It contains gas-cylinder-staging and vacant buildings pending authorization for disposal. A meteorological tower was recently erected in TA-6. None of the buildings currently located in TA-6 are categorized as nuclear hazard facilities.

TA-55 is also a candidate location for the CMRR Facility. It is situated in the west-central portion of LANL approximately 1.1 miles (1.8 kilometers) south of the Los Alamos townsite. TA-55 encompasses 40 acres (16 hectares) of which 43 percent is developed. The main complex has five connected buildings including the Administration Building, Support Office Building, Support Building, Plutonium Facility, and Warehouse. The Nuclear Materials Storage Facility is separate from the main complex. TA-55 facilities provide research and applications in chemical and metallurgical processes of recovering, purifying, and converting plutonium and other actinides into many compounds and forms, as well as research into material properties and

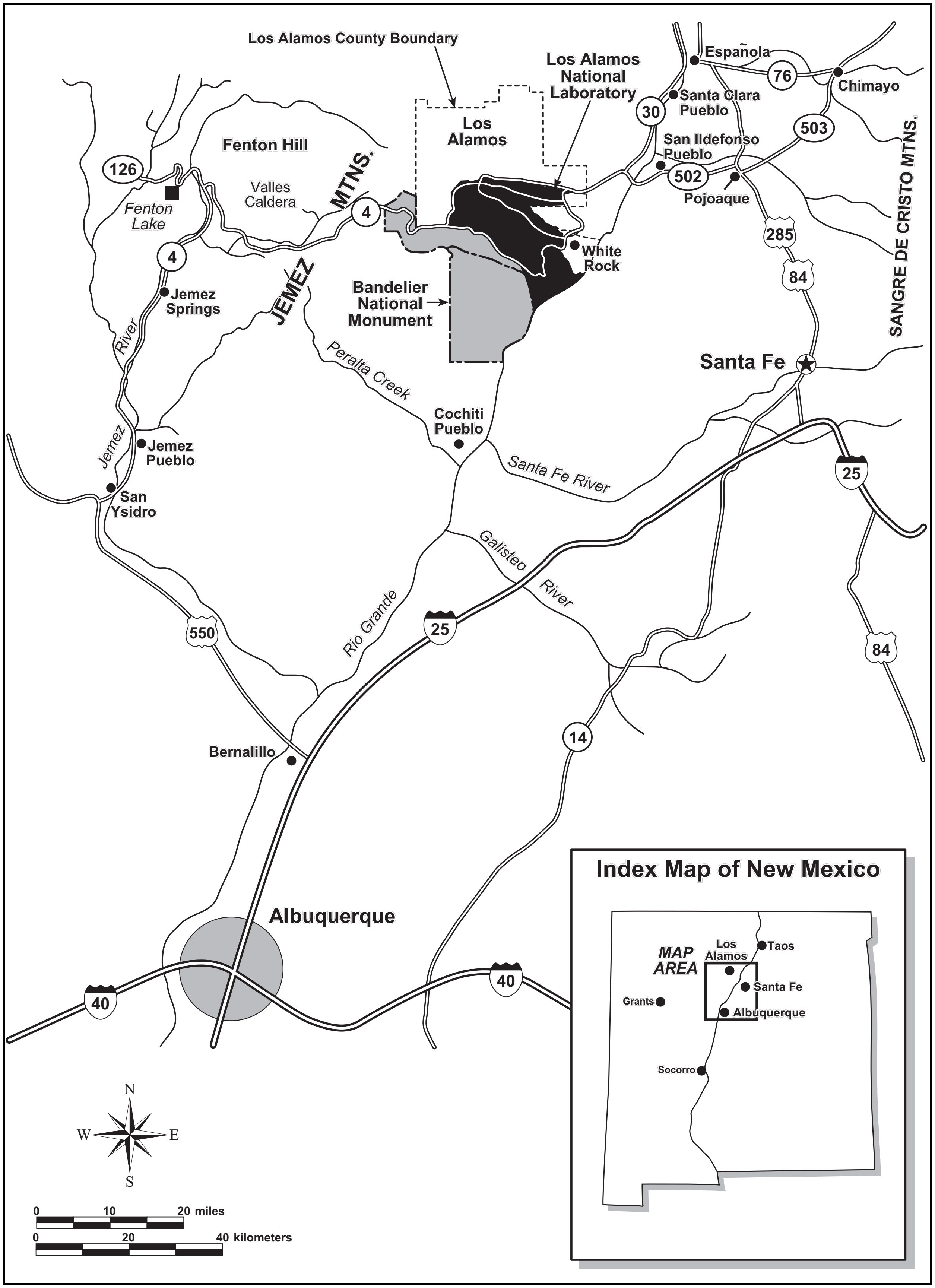


Figure S–2 Location of LANL

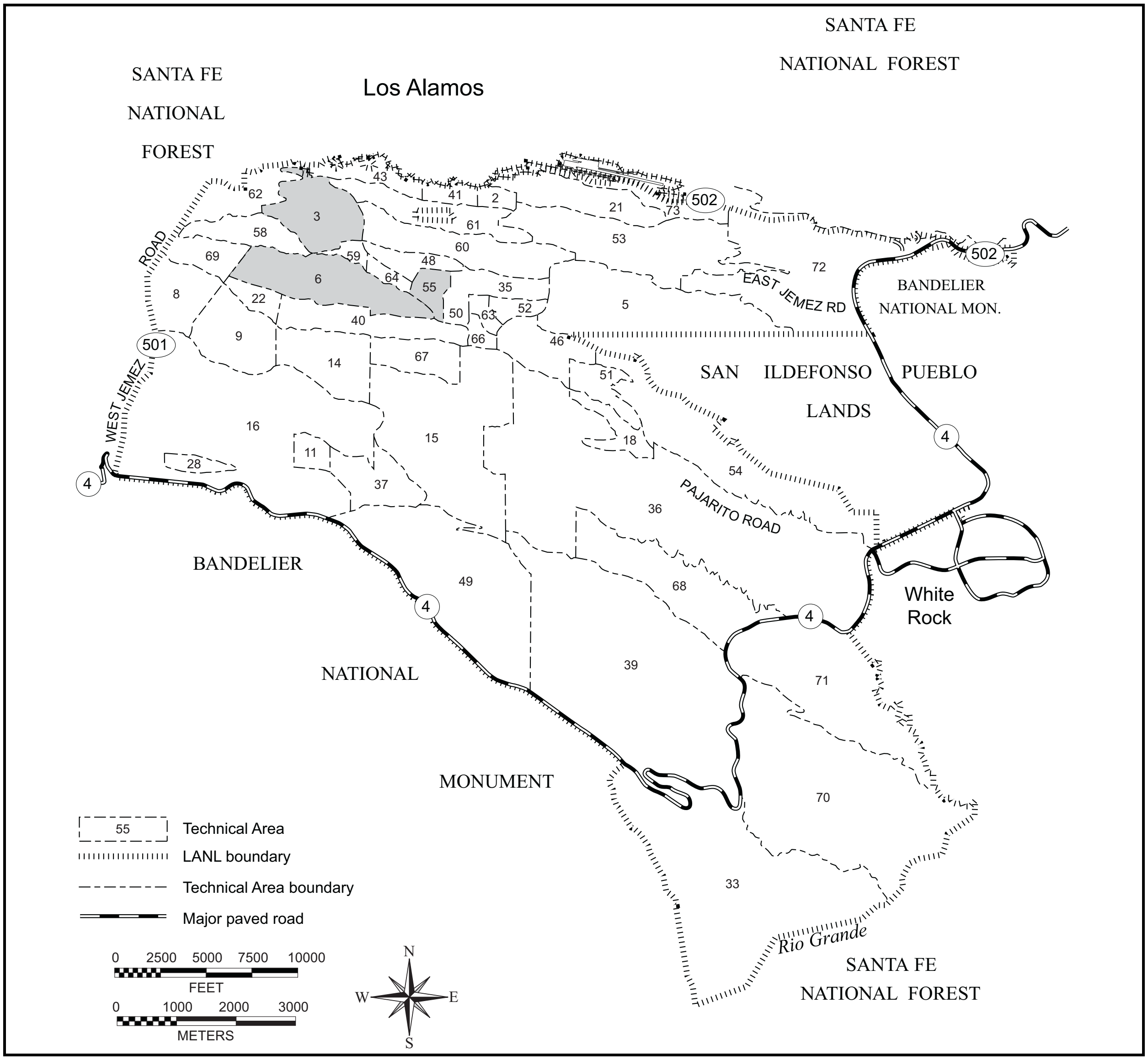


Figure S–3 Technical Areas of LANL

fabrication of parts for research and stockpile applications. A security fence bounds all nuclear hazard facilities in TA-55.

S.5 PROJECT FACILITIES AND CAPABILITIES

S.5.1 The Existing CMR Building and Capabilities

Description of the Existing CMR Building

The CMR Building (Building 3-29) was designed and built within TA-3 as an actinide chemistry and metallurgy research facility (see **Figure S–4**). The main corridor with seven wings was constructed between 1949 and 1952. In 1960, a new wing (Wing 9) was added for activities that

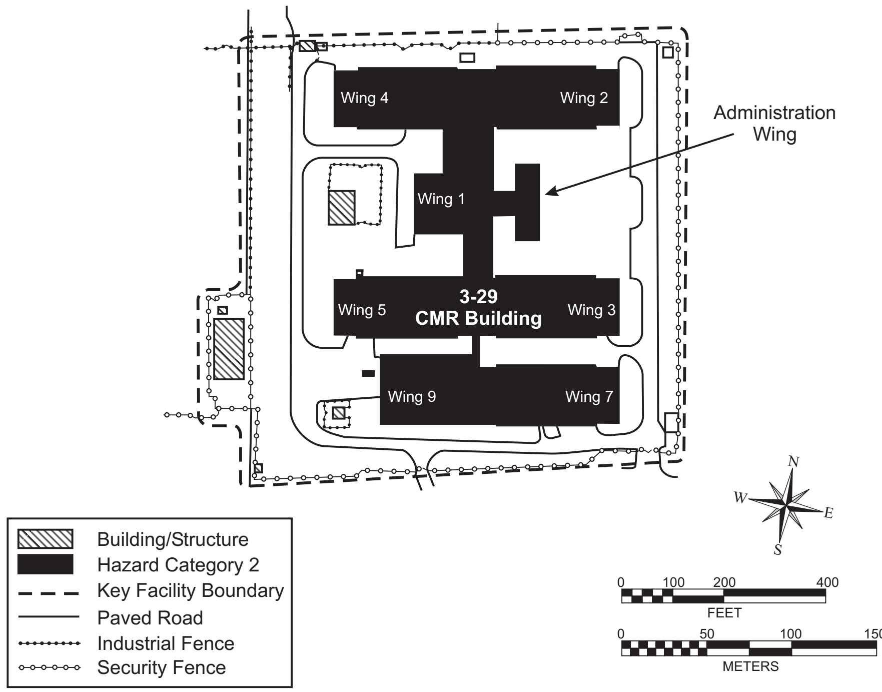


Figure S–4 TA-3 Chemistry and Metallurgy Research Building

must be performed in hot cells. The planned Wings 6 and 8 were never constructed. In July 1986, an SNM storage vault was added underground. The three-story building now has eight wings connected by a spinal corridor and contains a total of 550,000 square feet (51,097 square meters) of space. It is a multiple-user facility in which specific wings are associated with different activities. It is now the only LANL facility with full capabilities for performing SNM analytical chemistry and materials science. The Plutonium Facility at TA-55 provides support to CMR in the areas of materials control and accountability, waste management, and SNM storage.

Waste treatment and pretreatment conducted within the CMR Building is sufficient to meet waste acceptance criteria for receiving waste management and disposal facilities, onsite or offsite. The aqueous waste from radioactive activities and other nonhazardous aqueous chemical wastes from the CMR Building are discharged into a network of drains from each wing specifically designated to transport waste solutions to the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50 for treatment and disposal. The primary sources of radioactive inorganic waste at the CMR Building include laboratory sinks, duct washdown systems, and overflows and blowdowns from circulating chilled water systems.

The CMR Building infrastructure is designed with air, temperature, and power systems that are operational nearly 100 percent of the time. Power to these systems is backed up with an uninterruptible power supply.

Existing CMR Capabilities

Analytical Chemistry and Materials Characterization: Analytical chemistry and materials characterization capabilities in the CMR Building involve the study, evaluation, and analysis of radioactive materials. In general terms, analytical chemistry is that branch of chemistry that deals with the separation, identification, and determination of the components in a sample. Materials characterization relates to the measurement of basic material properties and the change in those properties as a function of temperature, pressure, or other factors. These activities support research and development associated with various nuclear materials programs, many of which are performed at other LANL locations on behalf of or in support of other sites across the DOE, NNSA complex (such as the Hanford Reservation, Savannah River Site, and Sandia National Laboratories). Sample characterization activities include assay and determination of isotopic ratios of plutonium, uranium, and other radioactive elements; identification of major and trace elements in materials; the content of gases; constituents at the surface of various materials; and methods to characterize waste constituents in hazardous and radioactive materials.

Destructive and Nondestructive Analysis: Destructive and nondestructive analysis employs analytical chemistry, metallographic analysis, measurement on the basis of neutron or gamma radiation from an item, and other measurement techniques. These activities are used in support of weapons quality, component surveillance, nuclear materials control and accountability, SNM standards development, research and development, environmental restoration, and waste treatment and disposal.

Actinide Research and Processing: Actinide research and processing at the CMR Building typically involves small quantities of solid and aqueous solutions. However, any research involving highly radioactive materials or remote handling may use the hot cells in Wing 9 of the CMR Building to minimize personnel exposure to radiation or other hazardous materials. CMR actinide research and processing may include separation of medical isotopes from targets, processing of neutron sources, and research into the characteristics of materials, including the behavior or characteristics of materials in extreme environments such as high temperature or pressure.

Fabrication and Metallography: Fabrication and metallography at the CMR Building involves a variety of materials, including hazardous and nuclear materials. Much of this work is done with metallic uranium. A variety of parts, including targets, weapons components, and parts used for research and experimental tasks are fabricated and analyzed.

S.5.2 Proposed CMRR Capabilities

Analytical Chemistry and Materials Characterization Capabilities: These capabilities include the facility space and equipment needed to support nuclear operations; spectroscopic and analytical instrumentation; nonnuclear space and offices; and “cold” laboratory space for staging and testing equipment and experimental work with stable (nonradioactive) materials. Most of these capabilities currently are found at the existing CMR Building, although a subset of AC and MC capabilities currently resides in the Plutonium Facility and other locations at LANL. This proposed project element includes relocating all mission-essential CMR AC and MC capabilities and consolidation of AC and MC capabilities where possible to provide efficient mission support.

AC and MC Capabilities Consolidated From the Plutonium Facility into the CMRR Facility: An appropriate amount of space and equipment for the purpose of relocating AC and MC research capabilities currently located within the Plutonium Facility at TA-55 into the new CMRR Facility would be provided as part of the proposed action. These capabilities would be sized consistent with the mission capacity requirements. At the present time, a set of these capabilities is provided within the Plutonium Facility to streamline material processes associated with pit fabrication and pit surveillance programs and to minimize security costs and lost time associated with shipping large SNM items to the CMR Building from the Plutonium Facility.

Special Nuclear Materials Storage Capability: An SNM storage capability would be provided and sized to support operations at the CMRR Facility. The CMRR Facility storage capability would be designed to replace the current storage vault at the CMR Building. The SNM storage requirements would be developed in conjunction with, and integrated into, a long-term LANL SNM storage strategy.

Large Containment Vessel Handling Capability: The CMRR Facility would provide large containment vessel support for the Dynamic Experiments Program, including vessel loading and unloading operations, material recovery, and purification of materials. These capabilities would be selected to complement the AC and MC capabilities that already exist at the CMR Building, and the floor space occupied by these capabilities would be sized consistent with the mission capacity requirements.

Mission Contingency Space: The CMRR Facility would be sized to include mission contingency space of approximately 30 percent net floor space for AC and MC operations. This mission contingency space would be available to accommodate future growth, expansion, or changes to existing capabilities. Hazard Category 2 or 3 nuclear facility construction typically requires large, long-duration, high-cost projects that are not conducted on a regular, routine basis by NNSA. Because new nuclear facility construction is not a routine process, mission contingency space is planned for CMRR to address minor changes in requirements that may occur over the duration of design and construction and to accommodate future growth. Mission contingency space would not be equipped and made operational until required and would be subject to additional NEPA review.

Nuclear Materials Operational Capabilities and Space for non-LANL Users: This capability would provide research laboratory space for non-LANL users to allow other NNSA and DOE nuclear sites to support Defense Program related missions at LANL. Of particular interest are options for relocating and consolidating some of the Lawrence Livermore National Laboratory Hazard Category 2 operations to LANL to support long-term Defense Program missions.

S.5.3 Existing CMR Capabilities and Activities Not Proposed for Inclusion within the New CMRR Facility

Not all capabilities either previously or currently performed within the existing CMR Building at LANL would be transferred into the new CMRR Facility. Such capabilities include the Wing 9 Hot Cell operations, medical isotope production, uranium production and surveillance activities, nonproliferation training, and other capabilities that are available elsewhere at DOE sites other than LANL. These capabilities would cease to exist at LANL.

S.6 COMPARISON OF ALTERNATIVES

S.6.1 Planning Information and Basis for Analysis

The *CMRR EIS* evaluates the potential direct, indirect, and cumulative environmental impacts that could result from relocating existing AC and MC capabilities currently residing in the CMR Building to new facilities at different locations at LANL. This involves: (1) construction of new facilities with several construction options, (2) relocation of materials and equipment from the existing CMR Building to the new facilities, (3) operation of the new facilities for the design lifetime of the new facilities, following a transition period during which operations would be gradually transferred to the new facilities, (4) transportation of SNM (namely samples coming in and residues/wastes returning) between the Plutonium Facility at TA-55 and the new Facilities, and (5) the disposition of the existing CMR Building. The operational characteristics for the CMRR Facility are based on the level of CMR Building operations identified by the Expanded Operations Alternative in the 1999 *LANL SWEIS*. Some of the information and considerations that form the basis of the analyses and impact assessments in the *CMRR EIS* are presented below.

No Action Alternative: The No Action Alternative reflects the decisions reached by DOE for operations within the CMR Building described in the Record of Decision for the *LANL SWEIS*.

Construction Options: The new building(s) proposed for the CMRR Facility are currently in the conceptual design stage and, as a result, are not described in great detail in the *CMRR EIS*. However, to support the EIS analysis, conservative assumptions have been used such that construction requirements and operational characteristics of these buildings bound the environmental impacts. For each alternative involving new construction, four different construction options were considered. These options are driven by facility hazard and security categorizations for the portion of CMRR Facilities that will conduct operations involving SNM. Construction Option 1, as described in Section S.2.1, was considered to potentially have the most severe impacts and was chosen as the reference case for analysis in the *CMRR EIS*.

Construction methods and materials employed on the CMRR project would be typical conventional light[6] industrial for the administrative offices and support functions building, and heavy-industrial, nuclear facility construction for the CMRR nuclear laboratory elements. **Table S–1** provides a summary of construction requirements.

[6] *Light industry refers to the use of small-scale construction machinery.*

Table S–1 Summary of CMRR Construction Requirements

Building/Material Usage	*Hazard Category 2 Building*	*Hazard Category 3 Building*	*Administrative Offices and Support Functions Building*	*Other Construction Elements*
Land (acres)	2.5	2.25	4.0	18 [a]
Water (gallons)	757,300	670,500	1,354,500	963,000
Electricity (megawatt-hours)	88.75	88.75	135	Not applicable
Concrete (cubic meters)	1,375	1,067	2,340	Not applicable
Steel (metric tons)	136	106	265	Not applicable
Peak construction workers	300			
Waste (non-hazardous) (metric tons)	130	99	295	10
Construction period (months)	17	17	26	6

[a] The land affected by other construction elements would include: parking (5 acres), laydown area (2 acres), concrete batch plant (5 acres) at either TA-55 or TA-6. Additionally 6 acres of land would be affected at TA-55 due to road realignment. An equal area (6 acres) at TA-6 would be affected for extensive trenching for utilities (1.5 acres), radioactive liquid waste pipeline (3 acres), and new road (1.5 acres).

Project Schedule: For the purpose of the analysis in the *CMRR EIS*, it was estimated that construction under any of the alternatives would start late in 2004 and would last approximately 5 years. The new facilities would be designed for a lifetime performance of 50 years; therefore, operations are projected to range from 2010 to 2060. It is also anticipated that simultaneous operation of the existing CMR Building and the new CMRR Facility would last a maximum of 4 years, between about 2010 and 2014.

Operational Characteristics: The operational characteristics of the CMRR Facility are based on the level of operations identified by the Expanded Operations Alternative in the 1999 *LANL SWEIS* and are presented in **Table S–2**.

Transportation: Radioactive and SNM shipments would be conducted within the LANL site. Transport distances would vary across alternatives, from a very short distance [about 100 to 300 feet (30 to 90 meters)] in Alternative 1, at TA-55, to about 3 to 5 miles (5 to 8 kilometers) in Alternative 2, at TA-6. Movement of materials would occur on DOE-controlled roads. DOE procedures and U.S. Nuclear Regulatory Commission regulations would not require the use of certified Type B casks within DOE sites. However, DOE procedures require closing the roads and stopping traffic for shipment of material (fissile or SNM) in noncertified packages. Shipment using certified packages, or smaller quantities of radioactive materials and SNM, could be performed while site roads are open. As part of current security implementation at LANL, the roads to be used to transport the radioactive and SNM materials under the *CMRR EIS* would have limited public access capabilities. Material transport under the proposed action would include a one-time transport of some or all of the equipment at the CMR Building to the new CMRR Facility at TA-55 or TA-6. This movement would occur over a period of 2 to 4 years over open or closed roads.

Table S–2 Operational Characteristics of the CMRR Facility (per year)

Electricity usage (megawatt hours)	19,272
Water usage (million gallons)	10.4
Nonradiological gaseous effluent	very small [a]
Radiological gaseous/airborne effluent (curies)	Pu-239 = 0.00076; Kr-85 = 100; Xe-131m = 45; Xe-133 = 1500; H-3 (water vapor) = 750; and H-3 (elemental) = 250
Nonradiological liquid effluent (gallons)	530,000
Radiological liquid effluent	None[b]
Workforce	550
Worker average dose and cumulative dose	100 millirem, and 30 person-rem
Waste generation:	
Transuranic waste (cubic yards)	61
Low-level radioactive waste (cubic yards)	2,433
Mixed low-level radioactive waste (cubic yards)	25.6
Mixed transuranic waste (cubic yards)	26.7
Chemical waste (RCRA/TSCA) (pounds)	24,700
Sanitary waste (million gallons)	7.15 [c]

Pu = plutonium; Kr = krypton; Xe = xenon; H-3 = tritium; RCRA = Resource Conservation and Recovery Act; TSCA = Toxic Substance Control Act.

[a] The chemical effluents through the facility stack is very small, well below the screening levels used to determine the need for additional analysis.

[b] No direct discharge to the environment. Radiological liquid waste would be collected and transported to TA-50 for treatment.

[c] This estimate is based on the assumption of 300 workers generating 50 gallons per day and 260 working days per year.

Disposition of the CMR Building

The disposition options for the existing CMR Building include:

Disposition Option 1: Reuse of the Building for administrative and other activities appropriate to the physical conditions of the structure with the performance of necessary structural and systems upgrades and repairs.

Disposition Option 2: Decontamination, decommission, and demolition of selected parts of the existing CMR Building with some portions of the Building being reused.

Disposition Option 3: Decontamination, decommission, and demolition of the entire existing CMR Building.

Over the past 50 years of operation, certain areas within the existing CMR Building, pieces of equipment, and building systems have become contaminated with radioactive material and by operations involving SNM. These areas include about 3,100 square feet (290 square meters) of contaminated conveyors, gloveboxes, hoods and other equipment items; 760 cubic feet (20 cubic meters) of contaminated ducts; 580 square feet (50 square meters) of contaminated hot cell floor space; and 40,320 square feet (3,750 square meters) of laboratory floor space.

At this time, the existing CMR Building has not been completely characterized with regard to types and locations of contamination. In addition, project-specific work plans have not been prepared that would define the actual methods, timing, or workforce to be used for the decontamination and demolition of the Building. Additional NEPA compliance would be required when the disposition of the CMR Building actually becomes mature for decision in about 15 years.

Detailed project-specific work plans for the decontamination and demolition of the CMR Building would be developed and approved by NNSA before any actual work began. These plans would include those required for environmental compliance (such as a Storm Water Pollution Prevention Plan) and monitoring activities (such as using a real-time gamma radiation monitor). Some of the work could involve technologies and equipment that have been used in similar operations, and some could use newly developed technologies and equipment. All work would be carefully planned in accordance with established state and Federal laws and regulations (such as National Emissions Standards for Hazardous Air Pollutants [NESHAPs]), DOE Orders, and LANL procedures and best management practices.

S.6.2 Summary of Environmental Consequences for the CMR Building Replacement Project

This section comparatively summarizes the alternatives analyzed in this EIS in terms of their expected environmental impacts and other possible decision factors. The following subsections summarize the environmental consequences and risks by construction and operations impacts for each alternative. In addition, environmental impacts common to all alternatives are also summarized. These include transportation risks and CMR Building and CMRR Facility disposition impacts.

Table S–3 presents a comparison of the environmental impacts for each of the alternatives discussed in detail in Chapter 4, including facility construction and operations impacts. For the most part, environmental impacts would be small and would be similar among the alternatives analyzed.

S.6.2.1 Construction Impacts

In evaluating construction impacts, Construction Option 1 was considered to be the option that would bound the potential environmental impacts from construction activities. The results therefore, in Table S–3 represent Construction Option 1 for all alternatives.

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 construction for this alternative.

Alternative 1 (Preferred Alternative): The construction of new Hazard Category 2 and 3 buildings, the construction of 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 adverse effects to 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 socioeconomic region of influence. Waste generated during construction would be adequately managed by the existing LANL management and disposal capabilities.

Alternative 2 (Greenfield Alternative): The construction of new 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 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 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 adverse effects to 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 socioeconomic 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. 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 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.

S.6.2.2 Operations Impacts

Relocating CMR operations to either TA-55 or TA-6 at LANL would require similar facilities, infrastructure support procedures, resources, and numbers of workers during operations. For most environmental areas of concern, differences would be minor. There would not be any perceivable differences in impact between the 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 TRU waste generated by CMRR Facility operations would be treated and packaged in accordance with the WIPP Waste Acceptance Criteria and transported to WIPP or a similar type facility for DOE disposition.

Routine normal operations for each of the action alternatives would increase the amount of radiological releases as compared to current CMR Building operations. Current operations at the CMR Building are restricted, and 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 0.3 millirem per year which translates to 1.5×10^{-7} latent cancer fatalities per year from routine normal 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 0.001 latent cancer fatalities per year in the entire population from routine normal operational at the new

CMRR Facility. Statistically, this would equate to a chance of one additional fatal cancer among the exposed population in 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 there would statistically 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 0.00042 latent cancer fatalities per year. This 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 0.002 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.

S.6.2.3 Environmental Impacts Common to All Alternatives

As previously noted, overall CMR operational characteristics at LANL would not change regardless of the ultimate location of the replacement facility and the alternative implemented. Sampling methods and mission operations in support of analytical chemistry and materials characterization (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 alternatives would generally have the same amount of operational impacts. In other words, all of the alternatives would produce equivalent amounts of emissions and radioactive releases into the environment, infrastructure requirements would be the same, and each alternative would generate the same amount of radioactive and nonradioactive 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 special nuclear material(s) (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 CMRR Facility would result from the decontamination and demolition of the building and the transport and disposal of radiological and nonradiological waste materials.

Transportation Risks

All alternatives except the No Action Alternative, would require the relocation and one-time transport of SNM equipment and materials. Transport of SNM, equipment, and other materials currently located at CMR Building to the new CMRR Facility at TA-55 or TA-6 would occur over a period of 2 to 4 years. The public would not be expected to receive any measurable

Radiological Health Effects Risk Factors Used in This EIS

Radiation can cause a variety of adverse health effects in people. Whether from external or internal sources, health impacts of radiation exposure can be "somatic" (affecting the exposed individual) or "genetic" (affecting descendants of the exposed individual). Somatic effects include the inducement of both fatal and nonfatal cancers. It may take years after the radiation exposure for a fatal cancer to develop, so these are referred to as "latent" cancers.

The International Commission on Radiological Protection has developed estimates of the risk of somatic and genetic effects as shown below.

Risk of Health Effects from Exposure to 1 Rem of Radiation [a]

Individual [b]	*Latent Cancer Fatalities*	*Nonfatal Cancers*	*Genetic Effects*	*Total Detriment*
Worker	0.0004	0.00008	0.00008	0.00056
Public	0.0005	0.0001	0.00013	0.00073

[a] When applied to an individual, units are lifetime probability of a latent cancer fatality per rem (1,000 millirem) radiation dose. When applied to a population, units are the excess number of cancers per person-rem of radiation dose. Genetic effects as used here apply to populations, not individuals.
[b] The general public risk is greater than the worker risk due to the presence in the general public of individuals less than 18 years old who are more sensitive to radiation effects.

These risk factors represent the probability that an individual would incur the indicated health effect during his or her lifetime as a result of being exposed to a unit of radiation dose (1 rem). For purposes of comparison, this EIS presents estimated doses and the associated potential latent cancer fatalities. The risk factors used are 0.0004 potential latent cancer fatalities per rem for workers and 0.0005 potential latent cancer fatalities per rem for individuals in the general public. The risk factor for the general public is slightly higher because the public includes children who are more sensitive to radiation than adults.

Examples:

The latent cancer fatality risk for an individual (nonworker) receiving a dose of 0.1 rem would be 0.00005 (0.1 rem × 0.0005 latent cancer fatalities per rem). This risk can also be expressed as 0.005 percent chance or 1 chance in 20,000 of developing a latent cancer.

The same concept is used to calculate the latent cancer fatality risk from exposing a group of individuals to radiation. The latent cancer fatality risk for individuals in a group of 100,000, each receiving a dose of 0.1 rem, would be 0.00005, as indicated above. This individual risk, multiplied by the number of individuals in the group, expresses the number of potential latent cancer fatalities that could occur among the individuals in the group as a result of the radiation dose. In this example, the number would be 5 potential latent cancer fatalities (100,000 × 0.00005).

A number of potential latent cancer fatalities less than 1 means that the radiation exposure is not sufficient to conclude that a latent cancer fatality is likely to occur among the members of the group. In this case, the risk is expressed as a probability that a single latent cancer fatality would occur among the members of the group. For example, 0.05 potential latent cancer fatalities can be stated as a 5 percent chance or 1 chance in 20 that 1 latent cancer fatality would occur among the members of the group.

The EIS provides estimates of the probability of a latent cancer fatality occurring for the general population, an average individual, the maximally exposed offsite individual, involved, and noninvolved workers. These categories are defined as follows:

Population—Members of the public residing within a 50-mile (80-kilometer) radius of the facility

Average individual—A member of the public receiving an average dose of radiation or exposure to hazardous chemicals

Maximally exposed offsite individual—A hypothetical member of the public residing at the site boundary who could receive the maximum dose of radiation or exposure to hazardous chemicals

Involved worker—An individual worker participating in the operation of the facilities

Noninvolved worker—An individual worker at the site other than the involved worker 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 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 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 (3.1×10^{-10}). For all alternatives, the overall environmental impacts and potential risks of transporting AC and MC samples would be small.

Impacts During the Transition from the CMR Building to the New CMRR Facility

During a four-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, water, and manpower to support transition activities during this period may be higher than what 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 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.

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 that 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.

Table S–3 Summary of Environmental Consequences for the CMR Replacement Project

Resource/Material Categories	***No Action Alternative***		***Alternative 1 (relocate CMR AC and MC operations to TA-55)*** [a]		***Alternative 2 (relocate CMR AC and MC operations to TA-6)*** [a]		***Alternative 3 (relocate CMR AC and MC operations to TA-55)*** [b]		***Alternative 4 (relocate CMR AC and MC operations to TA-6)*** [b]	
Land Resource										
Construction [c]/ Operations [d]	No impact		26.75 acres/ 13.75 acres		26.75 acres/ 15.25 acres		22.75 acres/ 9.75 acres		22.75 acres/ 11.25 acres	
Air Quality										
Construction [c]	No impact		Small temporary impact		Small temporary impact		Small temporary impact		Small temporary impact	
Operations	0.00003 curies of actinides		- 0.00076 curies of actinides - 2,645 curies of tritium and noble fission gases		- 0.00076 curies of actinides - 2,645 curies of tritium and noble fission gases		- 0.00076 curies of actinides - 2,645 curies of tritium and noble fission gases		- 0.00076 curies of actinides - 2,645 curies of tritium and noble fission gases	
Water Resource										
Construction [c]	No impact		Small temporary impact		Small temporary impact		Small temporary impact		Small temporary impact	
Operations	Small impact		Small impact		Small impact		Small impact		Small impact	
Ecological Resources										
Construction [c]	No impact		Indirect adverse effect to Mexican spotted owl habitat		No impact		Indirect adverse effect to Mexican spotted owl habitat		No impact	
Operations	No impact		Indirect adverse effect to Mexican spotted owl habitat		No impact		Indirect adverse effect to Mexican spotted owl habitat		No impact	
Socioeconomics										
Construction [c]	No impact		No noticeable changes; 300 workers (peak) 1,152 jobs		No noticeable changes; 300 workers (peak), 1,152 jobs		No noticeable changes; 300 workers (peak); 1,152 jobs		No noticeable changes; 300 workers (peak), 152 jobs	
Operations	No impact		No increase in workforce [e]		No increase in workforce [e]		No increase in workforce [e]		No increase in workforce [e]	
Public and Occupational Health and Safety										
Normal Operations	***Dose***	***LCF***	***Dose***	***LCF***	***Dose***	***LCF***	***Dose***	***LCF***	***Dose***	***LCF***
Population dose (person-rem per year)	0.04	0.00002	1.9	0.001	2.0	0.001	1.9	0.001	2.0	0.001
MEI (millirem per year)	0.006	3.0×10^{-9}	0.33	1.7×10^{-7}	0.35	1.8×10^{-7}	0.33	1.7×10^{-7}	0.35	1.8×10^{-7}
Average individual dose (millirem per year)	0.0001	6.6×10^{-11}	0.006	3.1×10^{-9}	0.006	3.2×10^{-9}	0.006	3.1×10^{-9}	0.006	3.2×10^{-9}
Total worker dose (person-rem per year)	22	0.009	61	0.02	61	0.02	61	0.02	61	0.02
Average worker dose (millirem per year)	110	0.00004	110	0.00004	110	0.00004	110	0.00004	110	0.00004
Hazardous chemicals	None		None		None		None		None	
Accidents (Maximum Annual Cancer Risk, LCF)										
Population	0.002		0.00042		0.0004		0.00042		0.0004	
MEI	3.5×10^{-6}		1.2×10^{-6}		5.6×10^{-7}		1.2×10^{-6}		5.6×10^{-7}	
Noninvolved worker	0.00013		3.8×10^{-5}		3.6×10^{-5}		3.8×10^{-5}		3.6×10^{-5}	

Resource/Material Categories	*No Action Alternative*	*Alternative 1 (relocate CMR AC and MC operations to TA-55)* [a]	*Alternative 2 (relocate CMR AC and MC operations to TA-6)* [a]	*Alternative 3 (relocate CMR AC and MC operations to TA-55)* [b]	*Alternative 4 (relocate CMR AC and MC operations to TA-6)* [b]
Environmental Justice	No disproportionally high and adverse impacts on minority or low-income populations				
Waste Management (cubic yards of solid waste per year unless otherwise indicated): Waste would be disposed of properly with small impact					
Transuranic waste	19.5	61	61	61	61
Mixed transuranic waste	8.5	27	27	27	27
Low-level radioactive waste	1,021	2,433	2,433	2,433	2,433
Mixed low-level radioactive waste	6.7	26	26	26	26
Hazardous waste (pounds per year)	10,494	24,692	24,692	24,692	24,692
Transportation					
Accidents [f]	***Dose***	***Dose***	***Dose***	***Dose***	***Dose***
MEI (rem per year)	7.7×10^{-7}	0	0.00015	0	0.00015

LCF = latent cancer fatality; MEI = maximally exposed individual member of the public.

[a] Relocate CMR AC and MC and actinide research and development activities to a new CMRR Facility consisting of an administrative offices and support functions building and Hazard Category 2 and 3 buildings.

[b] Relocate CMR AC and MC and actinide research and development activities to a new CMRR Facility consisting of only Hazard Category 2 and 3 buildings.

[c] Construction impacts are based on Construction Option 1 which is bounding.

[d] Acreage reflects building footprints, parking lot, and new roads as applicable.

[e] CMR operations would require no additional workers beyond what was projected by the Expanded Operations Alternative analyzed in the *LANL SWEIS*. Increased CMRR Facility operations at LANL would require up to 550 workers. This would be an increase of 346 workers over current requirements. The Expanded Operations Alternative presented in the *LANL SWEIS* addressed the impact of this increase in employment.

[f] Population transportation impacts would be bounded by the normal operation and accident impacts evaluated for the various alternatives.

S.7 GLOSSARY

***absorbed dose* —** For ionizing radiation, the energy imparted to matter by ionizing radiation per unit mass of the irradiated material (e.g., biological tissue). The units of absorbed dose are the rad and the gray. (See *rad* and *gray*.)

***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.

***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.

***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 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.

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

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

***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.

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

***cell* —** See *hot cell*.

***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.

***committed effective dose equivalent* —** The dose value obtained by (1) multiplying the committed dose equivalents for the organs or tissues that are irradiated and the weighting factors applicable to those organs or tissues, and (2) summing all the resulting products. Committed effective dose equivalent is expressed in units of rem or sieverts. (See *committed dose equivalent* and *weighting factor*.)

***committed equivalent dose* —** The committed dose in a particular organ or tissue accumulated in a specific period after intake of a radionuclide.

***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 are exposed to industry that stimulates unwanted noise, smell, industrial traffic, particulate matter, or other nonaesthetic impacts.

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

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

***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.

***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.

***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.

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

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. (See *committed dose equivalent* and *committed effective dose equivalent*.)

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.

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 424).

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*, *natural uranium*, and *highly enriched uranium.*)

environmental impact statement (EIS) — The detailed written statement required by Section 102(2)(C) of the National Environmental Policy Act for a proposed major Federal action significantly affecting the quality of the human environment. A DOE EIS is prepared in accordance with applicable requirements of the Council on Environmental Quality National Environmental Policy Act regulations in 40 CFR 1500–1508 and the DOE National Environmental Policy Act regulations in 10 CFR 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.

***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.

***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.

***hazardous chemical* —** Under 29 CFR 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 employees. 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, which poses a risk to health, safety, and property when transported or handled.

***hazardous waste* —** A category of waste regulated under the Resource Conservation and Recovery Act. To be considered hazardous, a waste must be a solid waste under the Resource Conservation and Recovery Act and must exhibit at least one of four characteristics described in 40 CFR 261.20 through 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.

***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 *natural uranium*, *enriched uranium*, and *depleted uranium*.)

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

***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.

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

***low-income population* —** Low-income populations, defined in terms of U.S. Bureau of the Census 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 waste, transuranic waste, spent nuclear fuel, or by-product tailings from processing of uranium or thorium ore. Low-level waste is generated in many physical and chemical forms and levels of contamination.

***material 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 (transportation analysis)* —** A hypothetical (transportation analysis) 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.

***maximally exposed offsite 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).

***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.

***millirem* —** One-thousandth of 1 rem.

***natural uranium* —** Uranium with the naturally occurring distribution of uranium isotopes (approximately 0.7-weight percent uranium-235 with the remainder essentially uranium-238). (See *uranium*, *depleted uranium, enriched uranium, highly enriched uranium*, and *low-enriched uranium*.)

***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.

***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.

***nonproliferation* —** Preventing the spread of nuclear weapons, nuclear weapons materials, and nuclear weapons 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 will be prepared and considered. The notice is intended to briefly: (1) describe the proposed action and possible alternatives; (2) describe the agency's proposed scoping process including whether, when, and where any scoping meeting will be held; and (3) state the name and address of a person within the agency who can answer questions about the proposed action and the environmental impact statement.

***nuclear facility* —** A facility subject to requirements intended to control potential nuclear hazards. Defined in DOE 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 to the employees or the general public.

***nuclear material* —** Composite term applied to: (1) special nuclear material; (2) source material such as uranium, thorium, or ores containing uranium or thorium; and (3) 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, either fission, fusion, or both.

***Nuclear Regulatory Commission* —** The Federal agency that regulates the civilian nuclear power industry in the United States.

***offsite* —** The term denotes a location, facility, or activity occurring outside of the boundary of a DOE complex site.

***onsite* —** The term denotes a location or activity occurring within the boundary of a DOE complex site.

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

***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.

***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 (Sv).

***pit* —** The central core of a primary assembly in a nuclear weapon typically composed of plutonium-239 and/or highly-enriched uranium and other materials.

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

***population dose* —** See *collective dose*.

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

***rad* —** See *radiation absorbed dose*.

***radiation absorbed dose (rad)* —** The basic unit of absorbed dose equal to the absorption of 0.01 joules per kilogram (100 ergs per gram) of absorbing material.

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

***Record of Decision* —** A document prepared in accordance with the requirements of 40 CFR 1505.2 and 10 CFR 1021.315 that provides a concise public record of DOE's decision on a proposed action for which an EIS was prepared. A Record of Decision identifies the alternatives considered in reaching the decision; the environmentally preferable alternative; factors balanced by DOE in making the decision; and whether all practicable means to avoid or minimize environmental harm have been adopted, and, if not, the reasons they were not.

***region of influence* —** 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 *absorbed dose* and *dose equivalent*.)

***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.

***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.

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

***scope* —** In a document prepared pursuant to the National Environmental Policy Act of 1969, 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 EIS 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. The public scoping process is that portion of the process where the public is invited to participate, and includes holding at least one public meeting and requesting written comments on issues and environmental concerns that an EIS should address. DOE also conducts an early internal scoping process for environmental assessments or EISs. For EISs, 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 DOE contractor facilities, property, and equipment.

***seismic* —** Earth vibration caused by an earthquake or an explosion.

***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.

***special nuclear materials* —** 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 Nuclear Regulatory Commission determines to be special nuclear material, but it does not include source material.

***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 by the appropriate balance of surveillance, experiments, and simulations.

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

***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.

***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 424). (See *endangered species*.)

***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 require Type B packaging for shipping highly radioactive material. Type B packagings 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 U.S. Nuclear Regulatory Commission testing criteria for Type B packaging designs (10 CFR 71) are intended to simulate severe accident conditions, including impact, puncture, fire, and immersion in water. The most widely recognized Type B packagings 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; one of the heaviest naturally occurring elements. 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 *natural uranium, enriched uranium, highly enriched uranium*, and *depleted uranium*.)

***vault (special nuclear material)* —** A penetration-resistant, windowless enclosure having an intrusion alarm system activated by opening the door and which also has: (1) walls, floor, and ceiling substantially constructed of materials that afford forced-penetration resistance at least equivalent to that of 20-centimeter- (8-inch-) thick reinforced concrete; and (2) 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.

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