

CHAPTER 1.0

INTRODUCTION AND PURPOSE AND NEED FOR AGENCY ACTION

This chapter provides an introduction to the Los Alamos National Laboratory's role in supporting the U.S. Department of Energy's missions, a statement of the purpose and need for DOE's action, and an overview of the alternatives analyzed in this Site-Wide Environmental Impact Statement. In addition, this chapter explains DOE decisions that this SWEIS is intended to support and the relationship of this document to other environmental documentation prepared by DOE. At the conclusion of the chapter is an introduction to the objectives of the SWEIS and the approaches used in its preparation, along with a brief summary of the remaining chapters of the document.

The Los Alamos National Laboratory (LANL) is one of several national laboratories that support the U.S. Department of Energy's (DOE's) responsibilities for national security, energy resources, environmental quality, and science. LANL occupies approximately 43 square miles (111 square kilometers) of land owned by the U.S. Government and under the administrative control of DOE; it is located in north-central New Mexico, 60 miles (97 kilometers) north-northeast of Albuquerque and 25 miles (40 kilometers) northwest of Santa Fe (see Figure 1-1). An in-depth description of LANL's facilities and capabilities is contained in chapter 2 of this document.

DOE has prepared this Site-Wide Environmental Impact Statement (SWEIS) in accordance with the *National Environmental Policy Act* (NEPA) (42 United States Code [U.S.C.] §4321) to examine the environmental impacts associated with four alternatives for the continued operation of LANL. (Section 1.3 and chapter 3 provide additional detail regarding the alternatives analyzed.) In this SWEIS, DOE describes consequences (both on the site and off the site) of ongoing LANL operations, and compares the potential consequences of alternative levels of future operations.

1.1 LANL SUPPORT FOR DOE MISSIONS

Based on responsibilities described in the *Atomic Energy Act of 1954* (42 U.S.C. §2011) and the *Energy Reorganization Act of 1974* (42 U.S.C. §5801), DOE's principal missions are:

- *National Security*—This DOE mission includes the safety and reliability of the nuclear weapons in the stockpile, maintenance of the nuclear weapons stockpile in accordance with executive directives, stemming the international spread of nuclear weapons materials and technologies, and production of nuclear propulsion plants for the U.S. Navy.
- *Energy Resources*—This DOE mission includes research and development for energy efficiency, renewable energy, fossil energy, and nuclear energy.
- *Environmental Quality*—This DOE mission includes treatment, storage, and disposal of DOE wastes; cleanup of nuclear weapons sites; pollution prevention; storage and disposal of civilian radioactive waste; and development of technologies to reduce risks and reduce cleanup costs for DOE activities.
- *Science*—This DOE mission includes fundamental research in physics, materials

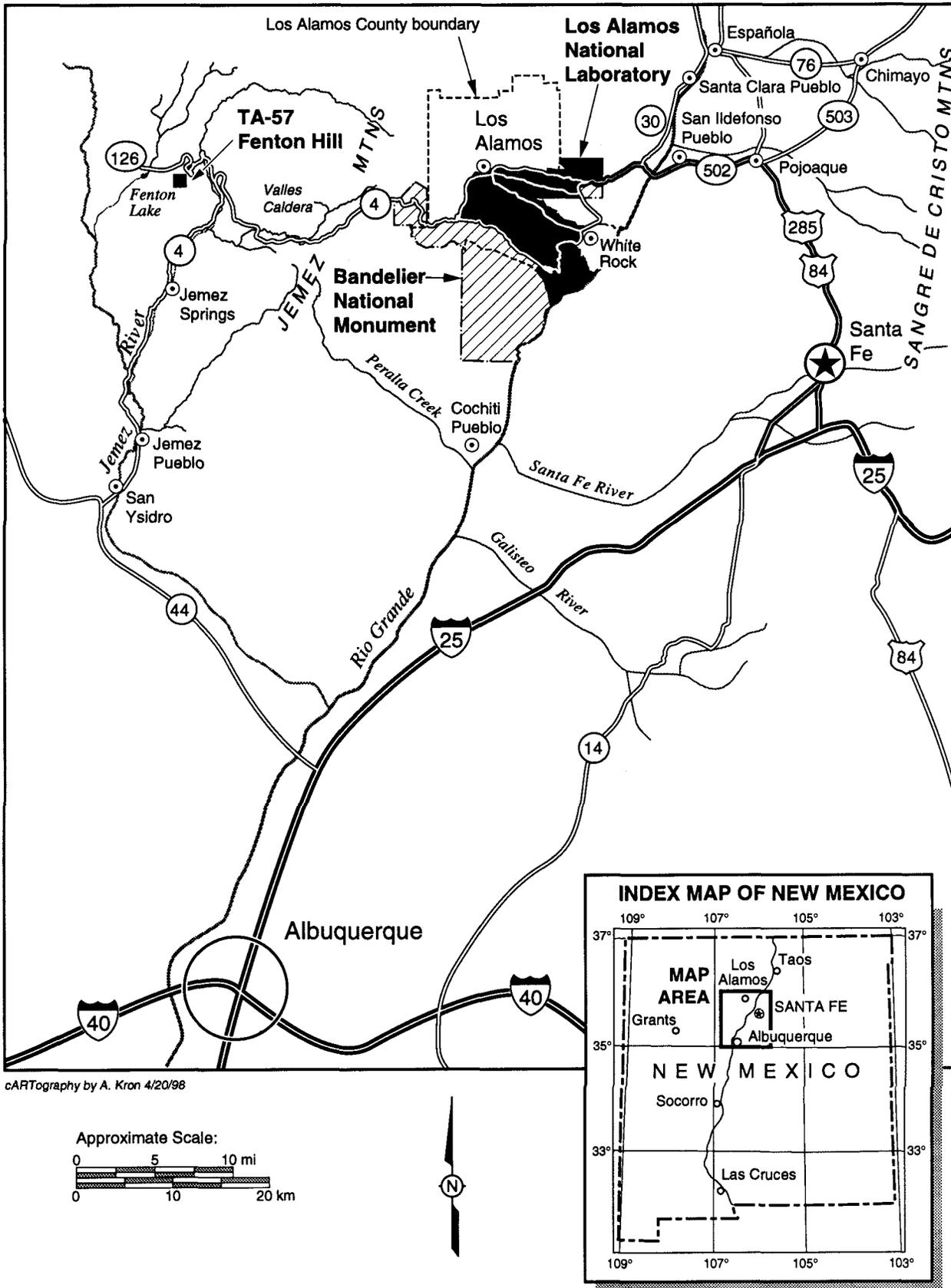


FIGURE 1-1.—Location of the Los Alamos National Laboratory.

science, chemistry, nuclear medicine, basic energy sciences, computational sciences, environmental sciences, and biological sciences. Work related to this mission often contributes to the other three DOE missions.

LANL provides support to each of these departmental missions, with a special focus on national security¹. DOE assigns mission elements to LANL based on the facilities and expertise of the staff located there. Such assignments are made within the context of national security needs as expressed, for example, in Presidential Decision Directives; the *National Defense Authorization Act for Fiscal Year 1994* (Public Law [PL] 103-160) and other congressional actions; the U.S. Department of Defense (DoD) Nuclear Posture Review; treaties in force, such as the Nuclear Nonproliferation Treaty and the Strategic Arms Reduction Treaty (START) I, and treaties signed but not yet entered into force, such as the START II and the Comprehensive Test Ban Treaty (CTBT).

The existing facilities and areas of expertise at LANL have evolved since its inception in the early 1940's. In particular, LANL has developed facilities and expertise to perform:

- 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)
- Advanced and nuclear materials research, development, and applications, including weapons *components* testing, fabrication,

¹ While LANL supports each of these four missions, LANL does not undertake work in all elements of the missions described. For example, LANL supports DOE's national security mission but LANL does not undertake production of nuclear propulsion plants for the U.S. Navy.

SWEIS Terminology

Mission. In this SWEIS, “missions” refer to the major responsibilities assigned to DOE (described in this section). DOE accomplishes its major responsibilities by assigning groups or types of activities (referred to in this SWEIS as mission elements) to its system of national laboratories, production facilities, and other sites.

Programs. DOE is organized into Program Offices, each of which have primary responsibilities within the set of DOE missions. Funding and direction for activities at DOE facilities are provided through these Program Offices, and similar/coordinated sets of activities to meet Program Office responsibilities are often referred to as programs. Programs are usually long-term efforts with broad goals or requirements.

Capabilities. This 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 assignments and activities directed by Program Offices. Once capabilities are established to support a specific mission assignment or program activity, they are often used to meet other mission or program requirements (e.g., the capability for advanced/complex computation and modeling that was established to support DOE's national security mission requirements may also be used to address needs under DOE's science mission).

Projects. This is used to describe activities with a clear beginning and end that are undertaken to meet a specific goal or need. Projects can vary in scale from very small (such as a project to undertake one experiment or a series of small experiments) to major (e.g., a project to construct and start up a new nuclear facility). Projects are usually relatively short-term efforts, and they can cross multiple programs and missions, although they are usually “sponsored” by a primary Program Office. In this SWEIS, this term is usually used more narrowly to describe construction (including facility modification) activities (e.g., a project to build a new office building or a project to establish and demonstrate a new capability). Construction projects considered reasonably foreseeable at LANL over the next 10 years are discussed and analyzed in this SWEIS (section 1.6.3)

stockpile assurance, replacement, surveillance, and maintenance (including theoretical and experimental activities)

These capabilities allow LANL to conduct research and development activities such as high explosives processing, chemical research, nuclear physics research, materials science research, systems analysis and engineering, human genome “mapping,” biotechnology applications, and remote sensing technologies applied to resource exploration and environmental surveillance.

Below is a description of LANL’s assignments to support DOE’s missions (with a focus on recent developments in these mission areas) and a description of how LANL fits within the DOE national laboratory system. In addition, the *Final Programmatic Environmental Impact Statement for Stockpile Stewardship and Management* (SSM PEIS) (DOE 1996a) lists the major mission elements at LANL, including the primary DOE program offices that sponsor efforts under each of the mission elements listed (Table 3.2.6–1 of the SSM PEIS).

1.1.1 National Security Assignments to LANL

The following sections highlight LANL’s principal assignments under the national security mission, including: stockpile stewardship and management², accelerator production of tritium, stabilization of commercial nuclear materials, nonproliferation, and other national security assignments.

² DOE has recently adopted the name “stockpile stewardship” to encompass all activities within the program recently referred to as “stockpile stewardship and management.” However, stockpile stewardship and management is used in this SWEIS.

1.1.1.1 Stockpile Stewardship Assignments

DOE’s nuclear weapons research, development, and testing has evolved into a program referred to as “stockpile stewardship.” Under this program, LANL is responsible (along with Lawrence Livermore National Laboratory and Sandia National Laboratories) for ensuring the safety and reliability of weapons systems in the stockpile for the foreseeable future, in the absence of underground testing. LANL has additional specific responsibilities for weapons of LANL design. Stockpile stewardship remains LANL’s central responsibility, and this is the focus of much of the research and development throughout LANL.

DOE examined the environmental impacts of implementing this program at LANL and other DOE sites in the SSM PEIS (DOE 1996a). In the SSM PEIS, DOE identified a need for certain nuclear weapons experimental capabilities in addition to those that currently exist at DOE sites. In its Record of Decision (ROD) for the SSM PEIS (61 *Federal Register* [FR] 68014), DOE stated its intention to construct and operate *Atlas*, a research pulse-power facility at LANL, to assist in fulfilling this need. In addition, DOE decided that this facility will be installed in an existing building at LANL.

1.1.1.2 Stockpile Management Assignments

In addition to its responsibilities for stockpile stewardship, LANL also has been assigned responsibilities for stockpile management, which address DOE’s production and maintenance of nuclear weapons, including component production and weapon disassembly, as well as stockpile surveillance and process development. Stockpile stewardship and stockpile management are parts of an integrated DOE program. LANL’s nuclear weapons production capabilities were

National Security Context for LANL Nuclear Weapons-Related Mission Assignments

LANL performs activities in support of DOE's national security mission, including assessment and certification of nuclear weapon safety and reliability, weapons-related research and development, some nonnuclear component production, pit fabrication, and surveillance of plutonium pits. DOE is obligated to conduct these activities in the context of presidential and congressional actions, and international treaties, including the following:

START I, 1988—Ratified in 1988, the START I negotiations between the U.S. and Russia aimed at limiting and reducing nuclear arms. One of DOE's missions is national security; LANL has a role in several elements of that mission, including arms control and nonproliferation via treaty verification programs.

Presidential Decision Directive (PDD), November 1993—Presidential document that provided for the establishment of a program to maintain the U.S. nuclear stockpile (stockpile stewardship), preservation of a nuclear deterrent force without nuclear tests, and preservation of the technical and intellectual ability to design and maintain nuclear weapons. LANL and other weapons laboratories would preserve these abilities.

National Defense Authorization Act of 1994 (PL 103-160), November 1993—Passed by Congress, PL 103-160 directed DOE to “establish a stewardship program to ensure the preservation of the core intellectual and technical competencies of the U.S. in nuclear weapons, including weapons design, system integration, manufacturing, security, use control, reliability assessment, and certification.” Subsequent congressional actions have provided similar guidance and direction.

DoD Nuclear Posture Review, September 1994—A report prepared by the DoD and approved by the President that addressed possible changes in U.S. nuclear policy. The report reaffirmed that nuclear weapons remain essential even though stockpiles will be reduced. It commits the U.S. to maintaining a safe and reliable nuclear deterrent and the core competencies of the U.S. in nuclear weapons without nuclear testing.

Nonproliferation Treaty, May 1995—On May 11, 1995, 178 nations agreed to permanently extend the expiring Nuclear Nonproliferation Treaty that controls the spread of nuclear weapons technologies, limits the number of nuclear weapons states, and commits to the long-term goal of disarmament. The five nuclear states also agreed to work toward a comprehensive test ban and rapid negotiation of a treaty to end production of nuclear bomb material.

Presidential Announcement on the CTBT and Safeguards, August 1995—The President announced the U.S. intent to seek a zero-yield CTBT, the requirement for a new annual certification procedure, and the establishment of safeguards for U.S. entry into a CTBT.

PDD, September 1995—After an administration review of the laboratory systems of DOE, the President determined that “the continued vitality of all three DOE nuclear weapons laboratories will be essential: for the purpose of ensuring confidence in the safety and reliability of the nuclear weapons stockpile in the absence of nuclear testing.” (DOE 1995a)

START II, January 1996—The START II protocol, ratified by the U.S. Senate in January 1996, further reduces the limits of nuclear systems. Within DOE's national security mission, LANL has a substantial role in arms control and nonproliferation through intelligence analysis, technology research and development, treaty verification, fissile material control, and counterproliferation analysis.

CTBT, September 1996—The CTBT, approved in September 1996 but not yet ratified, would prohibit nuclear tests of all magnitudes. DOE, with the assistance of the weapons laboratories, must meet the challenge of maintaining the nation's nuclear stockpile without underground testing and develop the verification technologies that will ensure compliance with the treaty.

Note: For additional information, see the SSM PEIS (DOE 1996a), chapter 2, Purpose and Need.

developed in the 1940's as part of the Manhattan Project when LANL produced the first weapons components for the early nuclear weapons stockpile. Over time, most of the production activities were reassigned to other DOE facilities, and LANL's national security focus became nuclear weapons research, development, and testing (which has evolved into the Stockpile Stewardship Program).

In the early 1990's, DOE recognized that its responsibilities for the reduced nuclear weapons stockpile did not require the extensive complex of production facilities that was being maintained. Thus, DOE undertook a study to reconfigure this complex to a smaller, less expensive form. As a first step, DOE prepared the *Nonnuclear Consolidation Environmental Assessment for the Nuclear Weapons Complex Reconfiguration Program* (DOE 1993), focusing on consolidation arrangements for the nonnuclear operations associated with nuclear weapons production. As a result of that assessment, LANL received several new assignments that were complementary to work already being performed at LANL:

- Detonator production and calorimetry work was transferred from the Mound Plant in Ohio.
- Neutron tube target loading work was transferred from the Pinellas Plant in Florida.
- Beryllium technology work and production of nonnuclear pit components (a pit is a component of a nuclear weapon, as discussed in the text box on this page) were transferred from the Rocky Flats Plant (now known as the Rocky Flats Environmental Technology Site [RFETS]) in Colorado.

The next step was to reconfigure nuclear facilities in the weapons complex. In 1994, DOE defined its ongoing Stockpile Stewardship and Management Program; the SSM PEIS analyzed the environmental impacts of implementing this integrated program

Operation of a Nuclear Weapon

Nuclear explosions are produced by initiating and sustaining nuclear chain reactions in highly compressed material that can undergo both fission and fusion reactions. Modern strategic, and most tactical, nuclear weapons use a nuclear package with two assemblies: the primary assembly, which is used as the initial source of energy, and the secondary assembly, which provides additional explosive energy release. The primary assembly contains a central core, called the "pit," which is surrounded by a layer of high explosive. The "pit" is typically composed of plutonium-239 and/or highly enriched uranium (HEU) and other materials. HEU contains large fractions of the isotope uranium-235.

(DOE 1996a). The SSM PEIS studied options for consolidating nuclear weapons work at a smaller number of facilities and downsizing the remaining complex, as well as reestablishing plutonium pit production. Under the ROD for the SSM PEIS (61 FR 68014), DOE assigned LANL new work within both the Stockpile Stewardship Program (section 1.1.1.1) and the Stockpile Management Program. Specific to stockpile management, DOE decided to reestablish its pit production capability at LANL at a capacity significantly reduced from that of the Rocky Flats Plant at the height of the Cold War. (The pit production capability at the Rocky Flats plant had previously been shut down.)

1.1.1.3 Accelerator Production of Tritium Assignment

DOE's work to reconfigure the nation's nuclear weapons complex also addressed the supply and recycling of tritium. Tritium is one of the materials used in modern nuclear weapons. However, tritium has a half-life of 12.26 years; that is, about 5.5 percent is lost every year, and

the tritium in a nuclear weapon must be replaced periodically if the weapon is to remain reliable. In the past, DOE produced tritium in some of its nuclear reactors; at present, however, none of the DOE reactors that had been capable of producing tritium is in operation. As the number of nuclear weapons in the U.S. stockpile is decreased, tritium from retired weapons can be purified and repackaged. However, at some time in the near future, there will be insufficient tritium to meet DOE's mission requirements.

In the *Final Programmatic Environmental Impact Statement for Tritium Supply and Recycling* (Tritium PEIS) (DOE 1995b), DOE examined the environmental impacts of tritium production by means of both an accelerator and a commercial nuclear reactor. In the ROD for the Tritium PEIS (60 FR 63878), DOE decided on a dual-track approach that pursues production by both an accelerator and a commercial nuclear reactor for about 3 years. At the completion of this additional development work, DOE expects to make a final decision regarding which technology to pursue as the primary source of tritium.

Also in the Tritium PEIS ROD, DOE assigned to LANL the task of investigating the feasibility and consequences of designing, building, and testing the front-end, low-energy prototype for an accelerator that could produce tritium. DOE prepared the *Low-Energy Demonstration Accelerator (LEDA) Environmental Assessment* (DOE 1996b) to examine the site-specific environmental impacts of locating this research activity at LANL.

1.1.1.4 *Stabilization of Commercial Nuclear Materials Assignment*

Radioactive sealed sources are used in research and commerce for applications such as measuring the thickness of materials. These sources usually contain radionuclides such as plutonium or americium, packaged within

multiple stainless steel jackets. Sealed radioactive sources for federal and commercial use were produced from materials supplied by the U.S. Atomic Energy Commission (AEC) and successor agencies (including DOE), beginning about 1950. Licensing was taken over by the U.S. Nuclear Regulatory Commission (NRC) when some AEC functions were reassigned to NRC in 1974.

These sealed sources have a finite life because the welds begin to fail after several years. Because the NRC has no facilities for managing unwanted and excess sources, owners of sealed sources who want to dispose of them have had no option for doing so. DOE addressed some of the health and safety concerns associated with unmanaged or abandoned sealed sources by reactivating a program to accept and manage plutonium-239 sources on an emergency basis. In the case of these sealed sources, management means chemically stabilizing, repackaging, or storing nuclear materials from the sources.

As more needs became apparent and after DOE prepared the *Radioactive Source Recovery Program Environmental Assessment* (DOE 1995c), DOE assigned the Radioactive Source Recovery Program to LANL building on the existing ability to manage these materials. In order to reduce the risk of personal injury resulting from unmanaged or abandoned sealed sources, the program now includes the proactive search for such sealed sources so that they can be brought to LANL and managed safely.

1.1.1.5 *Nonproliferation and Counter-Proliferation Assignments*

DOE has responsibility for national programs to reduce and counter threats from weapons of mass destruction (nuclear, biological, and chemical weapons). Activities conducted in this area include assisting with control of nuclear materials in states of the former Soviet Union, developing technologies for verification of the

CTBT, countering nuclear smuggling, safeguarding nuclear materials and weapons, and countering threats involving chemical and biological agents. These programs also include supporting continuation of the START process to further reduce nuclear weapons stockpiles.

LANL has been assigned research and development activities in support of these DOE responsibilities, including development of detection systems and technologies, assessment of foreign nuclear weapons capabilities, and responding to nuclear-related emergencies. In support of this assignment, LANL has:

- Provided much of the technology and expertise needed to verify treaties and implement various safeguards to ensure compliance with terms and conditions of treaties and agreements
- Undertaken satellite and remote sensing research to provide the technology to detect clandestine nuclear tests and other indicators of nuclear proliferation
- Undertaken research in personnel and vehicle monitoring and other nuclear safeguards technologies, which has helped to improve the security of many tons of plutonium and highly enriched uranium located in more than 50 facilities in the former Soviet Union
- Begun research aimed at countering nuclear smuggling and proliferation of chemical and biological weapons
- Assisted in the establishment, training, and technology development for DOE's Nuclear Emergency Search Team and Accident Response Group, which provide vital emergency response capabilities

1.1.1.6 Other National Security Assignments

LANL also measures and controls nuclear materials on the site and conducts research and development for such activities throughout

DOE, including analytical chemistry and other destructive and nondestructive measurement techniques. LANL also performs research and demonstration activities regarding the disposition of surplus plutonium under DOE's Fissile Materials Disposition Program. While many of these activities support multiple mission elements, they are funded and managed under the national security mission.

1.1.2 Energy Resources Assignments

LANL's activities in this arena generally include: research to improve the safety and effectiveness of reactor operations; production of components for the radioisotopic power systems used in space exploration; geophysics and geothermal energy research; modeling and other support for the efficient use of fossil fuels; research and development related to the use of radioisotopes in industry, research, and healthcare; and research and development in the areas of global change, energy efficiency, and nuclear power.

After issuance of the *Medical Isotope Production Project: Molybdenum-99 and Related Isotopes, Environmental Impact Statement* (DOE 1996c), the related ROD assigned to LANL the fabrication of targets³ for use in the production of molybdenum-99 for medical use (60 FR 48921). The fabricated targets are sent from LANL to Sandia National Laboratories in Albuquerque, New Mexico, where this medical isotope is actually produced.

1.1.3 Environmental Quality Assignments

LANL's support for this DOE mission includes:

³. A target, in this context, is material placed in a nuclear reactor to be bombarded with neutrons in order to produce radioactive materials.

- Development of environmental technologies to destroy explosives and propellants associated with DOE and DoD activities
- Research regarding appropriate treatment and handling of radioactive waste at the DOE sites at RFETS and Hanford
- Research on the coexistence of technology and the environment under the National Environmental Research Park Program
- Analytical and measurement support to characterize sites and materials in support of safe and effective waste disposal (e.g., the Waste Isolation Pilot Plant [WIPP])
- Operations to ensure the safe and effective treatment, handling, and disposal of waste generated at LANL

1.1.4 Science Assignments

LANL's facilities and expertise are utilized for research and development in the areas of theory, modeling and computation, engineering and experimentation, and advanced and nuclear materials. Recent examples of such research and development activities at LANL include:

- Application of high-energy protons to make high-resolution radiographs of rapid events in high-density material
- Application of experimentation and theory to predict how changes in polymer chemical structure, physical structure, and state of stress affect the mechanical properties of the materials
- Development of the high-performance parallel interface, which supports fast data-transfer network technology
- Development of a rapid, one-step method for making complex metal parts by fusing metal powder in the focal zone of a laser beam without the use of a mold, pattern, or forming die
- Measurements to study fundamental properties of neutrinos (a type of elementary particle)

- Studies of the human genome sequence and the structure of other biomolecules
- Development and fielding of sensors in support of nonproliferation, including detectors on Earth-orbiting satellites
- Research on the properties of actinide material that can affect their behavior where they are present in the environment
- Development of techniques to remotely detect atmospheric pollutants

In addition, LANL conducts nuclear criticality studies, performs reimbursable work for other federal agencies and for other sponsors (including the private sector), and allows university researchers to utilize its facilities. Each of these aspects of LANL's support for DOE's science mission are described below.

1.1.4.1 *Nuclear Criticality Studies*

DOE's science mission includes research intended to result in the avoidance of nuclear criticality accidents through understanding the processes of criticality and criticality control, continuing the research on criticality, and continuing to train individuals who will implement policies regarding criticality safety. At present, the only U.S. general criticality research program is at the Los Alamos Critical Experiments Facility (LACEF). In 1993, the Defense Nuclear Facilities Safety Board, an oversight organization, recommended to DOE that it continue the capability to carry on research in criticality. DOE has consolidated certain nuclear materials and machines used for criticality experiments at LANL to be maintained for the purposes of criticality experimentation and training (DOE 1996e).

1.1.4.2 *Reimbursable Work*

This work, sometimes termed "work for others," must be compatible with the DOE mission work conducted at LANL, and must be work that cannot reasonably be performed by

the private sector. The nature of the Work for Others Program ranges from long-term work for other agencies to short-term work for industrial clients. Examples of such work for other agencies include:

- DoD development of conventional weapons technology, command and control detection systems, systems analysis and risk assessment, and environmental remediation of hazardous materials
- NRC analysis of reactor safety systems
- National Institutes of Health investigations into biological processes and genetic material

A small but growing amount of work performed by LANL is for industrial sponsors. These partnerships are often shorter-term projects such as modeling work on computer systems, applications of previous research, and new industrial product lines.

1.1.4.3 *University Research and Development*

LANL facilities may be used by universities and others to conduct research that could not otherwise be supported. For example, the Los Alamos Neutron Science Center (LANSCE) allows for university research into condensed matter science and subatomic physics, the results of which may be applicable to DOE missions or to commercial enterprise.

DOE also provides opportunities for university faculty and student training and research visits to LANL. Such programs allow DOE to combine scientific research with practical applications.

1.1.5 DOE National Laboratory System

LANL is part of the DOE national laboratory system that supports DOE's responsibilities and

those of other federal agencies, government groups, utilities, and industry. DOE assigns mission elements or tasks to each of its national laboratories based on a variety of factors, including their existing areas of research and experimental capabilities. Table 1.1.5-1 shows the primary laboratory performers for each of the primary DOE missions.

1.2 PURPOSE AND NEED FOR AGENCY ACTION

The purpose of continued operation of LANL is to provide support for DOE's core missions as directed by Congress and the President. DOE's core missions and LANL's support of each of these missions are described in section 1.1.

DOE's need to continue to operate LANL is focused on its obligation to ensure a safe and reliable nuclear stockpile. The key capabilities of LANL that respond directly to this need include:

- Science-based performance safety and reliability evaluations and computer-based modeling of nuclear weapons components, particularly primaries and secondaries
- High-performance computing and computational science
- Weapons-related engineering
- Nuclear materials technology involving transuranic (TRU) materials
- Materials science, including behavior of materials under high temperature and pressure
- Engineering and high-energy physics, supporting activities such as accelerator production of tritium
- High explosives research and development and testing, including detonator development and production
- Tritium gas process development and applications, including neutron target tube loading
- Criticality studies

TABLE 1.1.5-1.—Primary Laboratory Performers for DOE Missions^a

MISSION	PRIMARY LABORATORY PERFORMERS
National Security	Bettis Atomic Power Laboratory, Knolls Atomic Power Laboratory, Lawrence Livermore National Laboratory, Los Alamos National Laboratory , Sandia National Laboratories
Energy Resources	Argonne National Laboratory, Federal Energy Technology Center ^b , National Renewable Energy Laboratory, Oak Ridge National Laboratory, Pacific Northwest National Laboratory
Environmental Quality	Federal Energy Technology Center ^b , Idaho National Engineering and Environmental Laboratory, Lawrence Livermore National Laboratory, Los Alamos National Laboratory , Oak Ridge National Laboratory, Pacific Northwest National Laboratory, Sandia National Laboratories, Savannah River Technology Center
Science	Argonne National Laboratory, Brookhaven National Laboratory, Fermi National Accelerator Laboratory, Lawrence Berkeley National Laboratory, Lawrence Livermore National Laboratory, Los Alamos National Laboratory , Oak Ridge National Laboratory, Pacific Northwest National Laboratory, Princeton Plasma Physics Laboratory, Stanford Linear Accelerator Center, Thomas Jefferson National Accelerator Facility

^a Based on Table 2 of the *Strategic Laboratory Missions Plan—Phase 1*, Volume 1, July 1996, which was prepared by the DOE Laboratory Operations Board (DOE 1996f).

^b Formerly referred to as the Morgantown Energy Technology Center/Pittsburgh Energy Technology Center.

- Specialty isotope production
- Neutron scattering experimentation for materials science and other purposes, including enhancing surveillance technologies
- Science and technology associated with nonproliferation and threat reduction
- Measurements to study fundamental nuclear and subatomic physics
- Studies of the structure of biomolecules
- Research on properties of actinide materials, including properties that can affect their behavior when they are present in the environment
- Development of techniques to remotely detect atmospheric pollutants

The continuing need for LANL to support the DOE's national security mission elements was recently confirmed by President Clinton, who stated, "to meet the challenge of ensuring confidence in the safety and reliability of our stockpile, I have concluded that the continued

vitality of all three DOE nuclear weapons laboratories will be essential" (DOE 1995a). (LANL, Lawrence Livermore National Laboratory and Sandia National Laboratories are often referred to as the three "DOE nuclear weapons laboratories.")

For the foreseeable future, DOE, on behalf of the U.S. Government, will need to continue its nuclear weapons research and development, surveillance, computational analyses, components manufacturing, and nonnuclear aboveground experimentation. Currently, many of these activities are conducted solely at LANL. For example, LANL designed the nuclear components for the majority of the nuclear weapons that are expected to comprise the U.S. stockpile under current arms control agreements and treaties, and will continue to be responsible for assessing the safety and reliability of these weapons (Lawrence Livermore National Laboratory designed the others). Ceasing these activities would run

counter to national security policy as established by Congress and the President.

DOE has evaluated and continues to evaluate its mission element assignments, including those at LANL, in other programmatic NEPA documents. LANL's mission element assignments are not under evaluation in the SWEIS.

1.3 OVERVIEW OF THE ALTERNATIVES CONSIDERED

Four alternatives were identified that would meet DOE's purpose and need. The alternatives analyzed in the SWEIS are:

- *No Action Alternative.* Under this alternative, LANL operations would continue at their currently planned levels.
- *Expanded Operations Alternative.* Under this alternative, LANL's level of operations would allow full implementation of earlier DOE decisions and current programs. This alternative represents the highest foreseeable level of future activities that could be supported by the LANL infrastructure.
- *Reduced Operations Alternative.* Under this alternative, LANL's operations would be reduced to the minimum levels that would maintain (for the near term) the capabilities necessary to support the mission elements currently assigned to LANL.
- *Greener Alternative.* Under this alternative, LANL's support for DOE nonproliferation, materials recovery stabilization, and basic science would be maximized. This alternative would also emphasize the use of LANL capabilities for energy and other nonweapons research, including waste treatment technology research and development. LANL's current support to

DOE defense and nuclear weapons programs would be minimized.

The first three alternatives present differing operational levels of the same types of activities. The fourth, the "Greener" Alternative, was suggested and titled by stakeholders. This alternative would emphasize the use of LANL capabilities in nonweapons mission elements, as discussed above. In some cases, levels of operations in the Greener Alternative would be higher than in the No Action Alternative (but no higher than the levels reflected in the Expanded Operations Alternative). In other cases, operations under the Greener Alternative would be the same or less than those under the No Action Alternative (but not less than those reflected in the Reduced Operations Alternative).

In the draft SWEIS, the DOE's Preferred Alternative was the Expanded Operations Alternative. In this final SWEIS, the Expanded Operations Alternative remains the Preferred Alternative with one modification, as noted below. The modification to the Preferred Alternative involves the level at which pit manufacturing will be implemented at LANL. Under the Expanded Operations Alternative, DOE would implement pit manufacturing up to the capacity of 50 pits per year under single-shift operations (80 pits per year using multiple shifts). However, as a result of delays in the implementation of the Capability Maintenance and Improvement Project (CMIP) and recent additional controls and operational constraints in the Chemistry and Metallurgy Research (CMR) Building (instituted to ensure that the risks associated with the CMR Building operations are maintained at an acceptable level), the DOE has determined that additional study of methods for implementing the 50 pits per year production capacity is warranted. In effect, because DOE has postponed any decision to expand pit manufacturing beyond a level of 20 pits per year in the near future, the

revised Preferred Alternative would only implement pit manufacturing at this level. This postponement does not modify the long-term goal announced in the ROD for the SSM PEIS (up to 80 pits per year using multiple shifts).

1.4 DECISIONS TO BE SUPPORTED BY THE SWEIS

The decisions that DOE expects to make as a result of the alternatives analyzed in this SWEIS would satisfy the purpose and need discussed in section 1.2. The decisions to be reached include the level of operation for LANL and specific decisions regarding facility construction or modification projects discussed across the alternatives, including: (1) the site-specific implementation of the plutonium pit production capacity assigned in the SSM PEIS ROD (61 FR 68014) and (2) the disposition of low-level radioactive waste, given the waste volumes associated with the decisions made regarding the level of operation of LANL. In addition, DOE will select mitigating actions presented in the SWEIS for implementation at LANL. These decisions will be announced in a ROD no sooner than 30 days after the issuance of the final SWEIS Notice of Availability (NOA) by the U.S. Environmental Protection Agency (EPA).

1.4.1 Public Comment Process on the Draft SWEIS

The draft SWEIS was developed after a series of public pre-scoping and scoping hearings to provide opportunities for stakeholders to identify the issues, environmental concerns, and alternatives that should be analyzed in the SWEIS. The scoping process and issues raised during the scoping phase are described in the SWEIS Implementation Plan (November 1995). DOE released the draft SWEIS on May 15, 1998, for review and comment by the State of New Mexico, Indian tribes, local governments, other federal agencies, and the general public.

The formal public comment period lasted 60 days, ending on July 15, 1998. Comments received after close of the comment period were considered in the preparation of the final SWEIS to the extent practical.

DOE considered all comments to evaluate the accuracy and adequacy of the draft SWEIS and to determine when the SWEIS text needed to be corrected, clarified, or otherwise revised. DOE gave equal weight to spoken and written comments, comments received at the public hearings, and comments received in other ways. Comments were reviewed for content and relevance to the environmental analysis contained in the SWEIS. Each comment is addressed individually in volume IV, chapter 3 of the SWEIS.

Commentors raised several common topics during the SWEIS public comment process that the DOE has attempted to address in the Major Issues section located in chapter 2 of volume IV. In some cases, commentors raised issues that were not within the scope of this SWEIS, such as comments regarding opposition to nuclear weapons. To the extent practical, DOE addressed these comments in the Major Issues section and in the individual responses.

1.5 RELATIONSHIP TO OTHER DOE NEPA DOCUMENTS

In this SWEIS, DOE examines the environmental consequences of alternative levels of operation to meet the ongoing mission elements assigned to LANL. However, other DOE NEPA reviews recently completed or currently being conducted could affect LANL operations. Below, these DOE NEPA documents are summarized and their relationships to the SWEIS alternatives are identified.

DOE Waste Types

DOE is responsible for managing inventories of several types of wastes. These wastes are defined as follows:

Low-level radioactive waste (LLW) includes all radioactive waste that is not classified as high-level waste (HLW), spent nuclear fuel (fuel discharged from nuclear reactors), TRU, uranium and thorium mill tailings, or waste from processed ore. LLW does not contain hazardous constituents that are regulated under the Resource Conservation and Recovery Act (RCRA) (42 U.S.C. §6901)

Low-level radioactive mixed waste (LLMW) contains both hazardous and low-level radioactive components. The hazardous component in LLMW is subject to regulation under RCRA.

Transuranic waste contains more than 100 nanocuries of alpha-emitting TRU isotopes per gram of waste, with half-lives greater than 20 years, and an atomic number greater than that of uranium (92). TRU waste has radioactive components such as plutonium.

TRU mixed waste is TRU waste that also has hazardous components, and thus, is mixed waste regulated under RCRA.

High-level waste is the highly radioactive waste that results from reprocessing spent nuclear fuel and irradiated targets from reactors. LANL has no HLW in its inventory.

Hazardous waste (HW) is defined as a solid waste that, because of its characteristics, may significantly contribute to an increase in mortality, or may pose a potential hazard to human health or the environment when improperly treated, stored, or disposed. RCRA defines a "solid" waste to include solid, liquid, semisolid, or contained gaseous material (42 U.S.C. §6901 et seq.). By definition, HW has no radioactive components.

1.5.1 Waste Management Programmatic Environmental Impact Statement (DOE/EIS-0200)

NEPA Analysis

The *Waste Management Final Programmatic Environmental Impact Statement* (DOE 1997a) (WM PEIS) is a nationwide study examining the potential environmental impacts of managing five types of radioactive and hazardous wastes that result primarily from nuclear defense activities. The ROD for treatment and storage of TRU waste was issued on January 20, 1998 (63 FR 3629), and the ROD for nonwastewater hazardous waste was issued on August 5, 1998 (63 FR 41810). DOE plans to issue other RODs for other waste types at a later time. DOE will use the WM PEIS in deciding how to configure needed treatment, storage, and disposal capacity, depending on waste type. However, the specific location of a facility at a selected site may not be decided until completion of a subsequent site-wide or project-specific NEPA review.

Relationship to LANL

LANL currently generates and manages four types of waste analyzed in the WM PEIS: LLW, LLMW, TRU waste, and HW. The WM PEIS includes preferred alternatives for locations of treatment, storage, and/or disposal of each of the waste types analyzed. The following list briefly describes how LANL could be affected by the respective WM PEIS preferred alternatives.

- **LLW and LLMW Treatment.** Under the WM PEIS Preferred Alternative, LANL would treat its own LLW and LLMW on the site and would not receive LLW or LLMW from off-site locations for treatment.
- **LLW and LLMW Disposal.** Under the WM PEIS Preferred Alternative, LANL is one of six sites from which DOE would select two

or three preferred regional disposal sites, after further consultations with regulatory agencies, state and tribal governments, and other interested stakeholders; that is, LANL would either be a regional disposal site for LLW and LLMW or would ship these wastes off the site for disposal.

- *TRU Waste Treatment and Storage.* Under the TRU waste ROD (63 FR 3629), LANL will treat its own TRU waste on site and receive small amounts of TRU waste from Sandia National Laboratories in Albuquerque, New Mexico, for treatment and storage, pending its disposal.
- *HW Treatment.* Under the nonwastewater HW ROD, LANL will continue to use commercial facilities to treat most of its nonwastewater HW.

SWEIS Inclusion

The SWEIS analyzes on-site treatment of all of LANL's radioactive waste and the use of commercial facilities to treat most of its nonwastewater HW. The TRU waste inventory analyzed in the SWEIS includes the small amounts of such waste that would come to LANL from Sandia National Laboratories (in Albuquerque, New Mexico) under the WM PEIS ROD for TRU waste. The SWEIS also addresses the range of decisions (i.e., regional disposal at LANL or shipment off the site) that could be made concerning disposal of LLW and LLMW. If LANL is chosen as a regional disposal site for LLW and LLMW, the site-specific impacts of that decision would be addressed in further NEPA review tiered from the WM PEIS and this SWEIS.

1.5.2 Stockpile Stewardship and Management Programmatic Environmental Impact Statement (DOE/EIS-0236)

NEPA Analysis

The SSM PEIS addressed the facilities and missions to support the stewardship and management of the U.S. nuclear stockpile (DOE 1996a). The ROD was issued December 19, 1996 (61 FR 68014). The purpose of stockpile stewardship is to ensure the continued reliability and safety of U.S. nuclear weapons and the preservation of the U.S. core intellectual and technical competencies in nuclear weapons in the absence of underground nuclear testing. In order to accomplish this goal, it is necessary to provide the facilities and expert judgment to predict, identify, and provide solutions to problems that might affect the safety and reliability of nuclear weapons.

A primary goal of stockpile management is to provide an effective and efficient production capability for a smaller stockpile by downsizing and/or consolidating functions where appropriate. Stockpile management activities include dismantlement, surveillance, maintenance, evaluation, production, and repair or replacement of nuclear weapons and weapons components.

Relationship to LANL

LANL was one of the sites analyzed for several potential assignments in the SSM PEIS. Based on the SSM PEIS, DOE decided to reestablish DOE's plutonium pit production capability, as well as to construct and operate Atlas at LANL. Atlas is a pulse-powered experimental facility that will aid in studying the physics of secondaries of nuclear weapons. (It should be noted that the data for the SSM PEIS were provided at a level that supported mission element assignment decisions, except in the case of Atlas at LANL and two projects at other

sites that were the subject of a complete project-level NEPA analysis. More extensive data were developed to analyze implementation of potential mission element assignments as part of the SWEIS process.)

The SSM PEIS also examined alternatives for assigning the production of high explosives components and the production of secondary assemblies to LANL. Thus, the SWEIS Notice of Intent (NOI) (60 FR 25697) included consideration of these mission element assignments in the Expanded Operations Alternative. Since that time, the SSM PEIS ROD assigned the high explosives component production to the Pantex Plant in Amarillo, Texas, and secondary assembly production to the Y-12 Plant in Oak Ridge, Tennessee. Because LANL was not assigned these mission elements, the SWEIS Expanded Operations Alternative no longer includes them⁴.

SWEIS Inclusion

Because DOE has decided to proceed with Atlas, this project is included in all alternatives in the SWEIS. In addition, different levels of plutonium pit manufacturing operations are addressed in the different alternatives in the SWEIS.

4. The scope of the SWEIS was developed prior to the issuance of the SSM PEIS ROD. Thus, the Expanded Operations Alternative was originally defined to include the high explosives component production and the secondary assembly production mission elements. Accordingly, the environmental consequences of the Expanded Operations Alternative (described in chapter 5) include the impacts associated with these mission elements. However, because these activities do not contribute substantially to air quality, water resources, land use, socioeconomic, or other impact projections regarding LANL operations, the environmental consequences of the Expanded Operations Alternative, with or without these mission elements, are substantially the same. Therefore, DOE determined that it was not cost effective to restructure and reanalyze the alternative. To the extent that this affects the impact analyses, the environmental consequences of the Expanded Operations Alternative can be expected to be somewhat less than those identified in chapter 5.

Even though the SSM PEIS has assigned the pit production mission element to LANL at a higher rate of production (up to 80 pits per year using multiple shifts), than can be supported with the existing fabrication capacity, production at this level would not begin until an implementation decision is reached based on the SWEIS and until completion of a construction project to establish the higher level of production. At this time, DOE is evaluating its options for achieving this pit fabrication rate (tiered from the SSM PEIS). The Expanded Operations Alternative reflects the proposed construction of a project to enhance the existing manufacturing capability and operations to the level of 80 pits per year with multiple shift operations. However, it is possible that, over the next 10 years (the period of evaluation in the SWEIS), DOE could operate at the No Action Alternative level of pit fabrication operations (up to 14 pits per year), or slightly above that level (up to 20 pits per year, the DOE's Preferred Alternative) for some period of time, and later provide the full capacity. It is also reasonable that DOE could operate at Reduced Operations or Greener Alternatives levels of pit manufacturing (6 to 12 pits per year) for a period of time, while still maintaining a pit fabrication capability and the ability to return later to a higher capacity. Thus, the SWEIS analyzes all levels of operations that could reasonably occur over the next 10 years regarding the manufacturing of pits, given the recent assignment of pit production to LANL.

This approach is discussed further in volume II, section II.2, in the discussion on enhancement of pit manufacturing.

In May 1997, 39 organizations challenged the adequacy of the SSM PEIS by filing a complaint in the U.S. District Court for the District of Columbia, citing a total of 13 claims to support this allegation. In January 1998, these organizations amended their complaint, replacing the original 13 claims with two new claims that alleged that DOE is required to prepare a Supplemental PEIS because of new

information made available since the SSM PEIS was issued. One of the two new claims involved information concerning pit manufacturing at LANL. Pursuant to its regulations implementing NEPA, DOE prepared a supplement analysis of the pit manufacturing information contained in the amended complaint. Based on this supplement analysis DOE determined that a Supplemental PEIS was not required. The supplement analysis and the memorandum documenting DOE determination are included in this SWEIS as appendix H.

In an opinion and order issued on August 19, 1998, the court agreed that a supplemental PEIS is not required at this time and dismissed that part of the lawsuit involving the SSM PEIS. As part of the settlement, DOE agreed to prepare an additional Supplement Analysis of pit production based on (1) the results of several pending peer-reviewed seismic reports due to be issued by March 1999, and (2) technical analysis of the plausibility of a building-wide fire at Technical Area (TA)-55 under glove-box propagation or seismic or sabotage initiation. The Supplement Analysis is under preparation. A summary of the methodology used in the preparation of the Supplement Analysis is included in chapter 5, section 5.1.11.12. Information from the seismic reports published by the end of December 1998 have been incorporated into the SWEIS accident analyses.

1.5.3 Waste Isolation Pilot Plant Disposal Phase Supplemental Environmental Impact Statement (DOE/EIS-0026-S2)

NEPA Analysis

WIPP is the proposed repository for retrievably stored defense TRU waste. In October 1980, DOE issued an EIS on proposed development of WIPP (DOE 1980). The January 1981 ROD (46 FR 9162) called for phased development of

WIPP, beginning with construction of the WIPP facility. In 1990, DOE issued a supplemental EIS that considered previously unavailable information (DOE 1990). Based on this supplemental EIS, DOE decided to continue phased development.

DOE has issued a second supplemental EIS (SEIS-II) to analyze the impacts of TRU waste disposal at WIPP or continued storage at the generating sites (DOE 1997b). The SEIS-II updates the information contained in the previous EIS and supplemental EIS, analyzes various treatment alternatives for TRU waste, and examines any changes in environmental impacts due to new information or changed circumstances. Based on this analysis, DOE has decided (63 FR 3623, January 23, 1998) to dispose of defense-related TRU waste at WIPP up to legal limits, once the waste is treated to the WIPP waste acceptance criteria (WAC). DOE will transport TRU waste to WIPP by truck.

Relationship to LANL

The WIPP SEIS-II analyzes the impacts of LANL TRU waste treatment and subsequent transportation to WIPP, in accordance with current DOE planning schedules.

SWEIS Inclusion

The treatment of TRU waste to the WIPP WAC and transportation to WIPP is included in all SWEIS alternatives. The SWEIS transportation analyses address the use of the proposed route that would bypass the City of Santa Fe.

1.5.4 Medical Isotopes Production Project: Molybdenum-99 and Related Isotopes Environmental Impact Statement (DOE/EIS-0249)

NEPA Analysis

In the Molybdenum-99 EIS, DOE analyzed alternatives to establish, as soon as practical, a domestic capacity to produce molybdenum-99 and related medical isotopes for use by the U.S. healthcare community using the U.S. Food and Drug Administration-approved Molybdenum-99 production process (DOE 1996c).

Relationship to LANL

The ROD associated with the Molybdenum-99 and Related Isotopes EIS (60 FR 48921) states that DOE will use the facilities of Sandia National Laboratories, New Mexico, and LANL. Under this approach, DOE uses the CMR Building at LANL to fabricate the targets containing HEU. Molybdenum-99 is produced at Sandia National Laboratories. LLW from target fabrication at LANL is disposed of on the site, pending decisions based on the WM PEIS and this SWEIS.

SWEIS Inclusion

The modifications required to fabricate targets at LANL's CMR Building are relatively minor. Some interior walls will be removed, doors will be relocated, and gloveboxes with filtered exhaust systems will be installed. These activities and the target fabrication operations are included in all alternatives in the SWEIS.

1.5.5 Storage and Disposition of Weapons-Usable Fissile Materials Programmatic Environmental Impact Statement (DOE/EIS-0229)

NEPA Analysis

After completion of the *Storage and Disposition of Weapons-Usable Fissile Materials Programmatic Environmental Impact Statement* (DOE 1996d), DOE decided in the related ROD how to implement its program to provide for safe and secure storage of weapons-usable fissile materials (plutonium and HEU) and a strategy for the disposition of surplus weapons-usable plutonium (62 FR 3014). The fundamental purposes of the program are to maintain a high standard of security and accounting for these materials while in storage and to ensure that plutonium produced for nuclear weapons and declared excess to national security needs is never again used for nuclear weapons.

Relationship to LANL

LANL participates in the research and development program to develop and demonstrate the technologies necessary for disposition and storage of plutonium. In particular, research and development regarding the conversion of surplus plutonium in weapons components to mixed oxide (MOX) reactor fuel is conducted at LANL.

SWEIS Inclusion

The research and development efforts supporting plutonium pit disassembly and MOX fuels development and demonstration are within the levels of operation addressed in the SWEIS. Specifically, the No Action, Reduced Operations, and Greener Alternatives include the current level of operation, and the Expanded Operations Alternative includes a higher level of these activities.

1.5.6 EIS on Management of Certain Plutonium Residues and Scrub Alloy Stored at the Rocky Flats Environmental Technology Site (DOE/EIS-0277)

NEPA Analysis

DOE has issued an EIS (DOE 1998d) to evaluate the potential environmental impacts associated with management of certain plutonium residues and scrub alloy currently being stored at RFETS in Golden, Colorado. The residues and scrub alloy are materials that were generated during the separation and purification of plutonium or during the manufacture of plutonium-bearing components for nuclear weapons. Alternatives analyzed in the Residues EIS include No Action, process for disposal without plutonium separation, and process for disposal or other disposition with plutonium separation. In its ROD (63 FR 66136) DOE selected processing technologies for these residues, including some that would involve separation of plutonium. In a second ROD, DOE will make a decision about technologies for pyrochemical salt residues. The preferred alternative is to preprocess at RFETS, with plutonium separation to take place at LANL. The impacts of off-site transportation and processing are analyzed in detail for the Savannah River Site and LANL.

Relationship to LANL

LANL participates in the research and development program to develop and demonstrate the technologies necessary for management (including the processing, measuring and storing) of plutonium residues. At times, LANL has processed and is expected to continue to process small quantities of unique or difficult-to-process residues from off-site locations. In addition, as noted above, the Residues EIS analyzed LANL as a possible site

for processing some of RFETS' chloride salt residues.

SWEIS Inclusion

The development and demonstration activities for the processing, measuring, and storing of plutonium residues are within the levels of operation addressed under each of the SWEIS alternatives. The No Action Alternative includes the current level of such operations, and the Reduced Operations Alternative includes a level of operations lower than that in the No Action Alternative. The Expanded Operations and Greener Alternatives include a larger throughput of residue processing than the No Action Alternative, and in addition, include increases in the amount of off-site material that would be processed and transported from RFETS.

1.5.7 Pit Disassembly and Conversion Demonstration Environmental Assessment (DOE/EA-1207)

NEPA Analysis

DOE prepared an environmental assessment (EA) (DOE 1998a) to examine the environmental impacts of the proposed development and demonstration of an integrated pit disassembly and conversion process for fissile material disposition. The demonstration would involve the disassembly of up to 250 weapons components (pits) over 4 years and conversion of the recovered plutonium to plutonium oxide. DOE determined that this proposed action would not significantly affect the quality of the human environment and issued a Finding of No Significant Impact in August, 1998 (63 FR 44851). Because this EA was under preparation, the proposed action of 250 components was part of the Expanded Operations Alternative in the draft SWEIS.

Relationship to LANL

The proposed work would be conducted at LANL's Plutonium Facility at TA-55. No new facilities would need to be constructed to support the demonstration, although internal modifications to the facility would be required. All work would be performed in a series of interconnected gloveboxes using remote handling and computerized control systems.

SWEIS Inclusion

The modifications and conduct of the plutonium pit disassembly and conversion demonstration using up to 40 pits are within the level of operations addressed in the SWEIS No Action, Reduced Operations, and Greener Alternatives. Demonstration activities using up to 250 pits over 4 years is within the level of operations included in the SWEIS Expanded Operations Alternative. The Expanded Operations Alternative also includes continued use of the process equipment for pit disassembly by other programs after this demonstration project has been completed.

1.5.8 Surplus Plutonium Disposition Environmental Impact Statement (DOE/EIS-0283)

NEPA Analysis

DOE is preparing an EIS (DOE 1998b) to evaluate the potential environmental impacts for the proposed siting, construction, and operation of facilities for plutonium disposition. These would include a facility to disassemble and convert plutonium pits into plutonium oxide suitable for disposition, a facility to immobilize surplus plutonium in glass or ceramic form, and a facility to fabricate plutonium oxide into MOX fuel. The EIS also examines the potential impacts of the siting, modification, and operation of existing facilities for the fabrication of lead test assemblies that would be

used in MOX fuel qualification demonstrations. The Draft Surplus Plutonium Disposition EIS was issued in July 1998.

Relationship to LANL

DOE is analyzing LANL as one of five potential sites for the location of the fabrication of MOX fuel lead test assemblies demonstration as part of the surplus plutonium disposition program.

SWEIS Inclusion

The development and fabrication activities for the production of MOX fuel pellets would be a demonstration activity. The SWEIS includes continued development and demonstration activities for ceramic fuels. The impacts of implementing the Lead Test Assembly demonstration activities at LANL are presented in chapter 5, section 5.6. Facility information also is provided in chapter 2 (sections 2.2.2.1 and 2.2.2.15) regarding both operations.

1.5.9 EIS for Siting, Construction, and Operation of the Spallation Neutron Source (DOE/EIS-0247)

NEPA Analysis

DOE is evaluating the siting, construction, and operation of a proposed spallation neutron source (SNS) (DOE 1998c). This facility would consist of a proton accelerator system; a spallation target; and appropriate experimental areas, laboratories, offices, and support facilities to allow ongoing and expanded programs of neutron research. The proposed site for the SNS is the DOE-owned Oak Ridge National Laboratory in Oak Ridge, Tennessee. The alternative sites under consideration are three other DOE-owned laboratories: Argonne National Laboratory, Argonne, Illinois; LANL; and Brookhaven National Laboratory, Upton, New York. The public scoping period for this

EIS was completed in September 1997. A draft EIS was completed in December 1998.

This facility is considered complementary to existing accelerator-based spallation sources at LANL, and would not be intended to replace the existing facility.

Relationship to LANL

LANL is one of four alternatives for the SNS; though not the preferred site. If LANL is selected, the facility would be built on a currently undeveloped site. This project is independent of all current or planned future operations at LANL.

SWEIS Inclusion

The SNS EIS is being coordinated with this SWEIS so that it can make use of the information developed for the SWEIS and to ensure that the SNS EIS considers the LANL alternative in light of the information regarding LANL operations and the corresponding impacts, as described in this SWEIS. Impacts associated with the SNS project, including site development, utilities, and waste management are to be analyzed in the EIS specific to that project and are not included in the SWEIS.

1.5.10 EIS for the Proposed Conveyance and Transfer of Certain Land Tracts Located Within Los Alamos and Santa Fe Counties and Los Alamos National Laboratory

NEPA Analysis

DOE is preparing an EIS to assess the potential environmental impacts of conveying or transferring certain land tracts under the administrative control of DOE located within the Counties of Los Alamos and Santa Fe (the CT EIS). The EIS is evaluating the congressionally mandated action required under PL 105-119 of conveying certain land tracts to

the County of Los Alamos and to the Secretary of the Interior in trust for the Pueblo of San Ildefonso.

Relationship to LANL

LANL is the only DOE site involved in the proposed action. The NEPA review is proceeding separately from the SWEIS.

SWEIS Inclusion

The SWEIS analysis does not include a consideration for changing the size or configuration of the LANL reserve through land conveyance or transfer, such as those to be included in this CT EIS. A draft CT EIS is expected to be released for public review and comment in early 1999. The impacts of implementing the proposed action are summarized in chapter 5, section 5.6 of the SWEIS. The SWEIS does take into account two proposals for land transfer or leasing that have already been analyzed by EAs with Findings of No Significant Impacts (FONSI) (discussed in section 1.6.2), although DOE has not reached a final decision to implement either of these proposals to date.

1.5.11 Environmental Assessment for the Proposed Strategic Computing Complex (DOE/EA-1250)

NEPA Analysis

DOE prepared an environmental assessment to evaluate the environmental impacts of construction and operation of a Strategic Computing Complex (SCC) within LANL's TA-3. The SCC will be a facility designed to house and operate an integrated system of computer processors capable of performing approximately 50 trillion floating point operations per second, as part of the Accelerated Strategic Computing Initiative in support of the Stockpile Stewardship and Management Program.

Relationship to LANL

LANL is the only site under consideration for the SCC. The SCC proposal was an allowable interim action, and the NEPA review proceeded separately from the SWEIS. Based on the EA, DOE determined that the proposed action would not significantly affect the quality of the human environment and issued a Finding of No Significant Impact in December 1998.

SWEIS Inclusion

The major impacts of the operation of the SCC will be on water consumption and use of electric power. The impacts of the construction and operation of the SCC are included in the levels of operation for all of the alternatives in the SWEIS.

1.6 OVERVIEW OF THE LANL SWEIS

General information regarding the NEPA process and the process DOE used in preparation of this SWEIS (including public involvement) are included on the inside covers of volume I of the SWEIS. Additional information specific to the SWEIS is described in this section, including the objectives of the SWEIS, DOE's approaches in preparing the document, the consideration of future projects in the SWEIS alternatives and analyses, the role of the Cooperating Agency, and a preview of the remaining sections of the document.

1.6.1 Objectives of the SWEIS

The environmental impacts of LANL operations have been addressed in the *Final Environmental Impact Statement: Los Alamos Scientific Laboratory Site* (DOE 1979) and in subsequent EISs, EAs, categorical exclusion determinations, and other types of environmental reviews for specific projects and activities. Changes in the world political situation have the potential to alter the role of

LANL and its operations now and during the next 10 years, and this SWEIS is intended to support decision-making regarding LANL's operations. In this SWEIS, DOE is examining the environmental impacts of four alternatives for the continued operation of the laboratory (section 1.3 and chapter 3 provide descriptions of the alternatives analyzed).

Given the decisions DOE intends to make based on this SWEIS (section 1.4), the objectives of the SWEIS are to:

- Describe the current environment, current operations, and the impacts associated with the continued operation of LANL.
- Compare the environmental consequences, including cumulative impacts, of reasonable alternatives for the continued operation of LANL.
- Provide a sufficient level of information to facilitate routine decisions about, and verification of, operational status with respect to the SWEIS analyses.
- Provide the project-specific NEPA analyses for proposed projects (including the expansion of LLW disposal capacity at Area G and the enhancement of plutonium pit manufacturing at LANL) and include them in the overall SWEIS impact assessment.
- Serve as a site-wide document for tiering and reference information for future NEPA analyses at LANL.

1.6.2 SWEIS Approaches

To meet these objectives, DOE used the following approaches:

- The sources of potential impacts analyzed in the SWEIS are those associated with LANL operations within the 43-square-mile (111-square-kilometer) LANL main site and the 0.3-square-mile (0.77-square-kilometer) Fenton Hill site, located about 20 miles (32 kilometers) west of LANL.

- The SWEIS analyzes current and proposed activities that could occur over the next 10 years. DOE chose the 10-year period as one in which future activities could be reasonably anticipated and described. Predicting activities beyond 10 years would have been excessively speculative.
- Those operations that have the most potential for significant environmental and human health impacts, including areas of concern identified by the public during the scoping process, are described in detail by facility. Operations of lesser potential impact are described and analyzed at the site-wide level only.
- Descriptions of the affected environment are based on the geographical area of the potential impact. If the impact would be limited to a canyon or mesa top, the discussion is largely focused at that level. Parameters such as radiological air emissions and the potential consequences to air quality and human health are discussed at the regional level.
- The SWEIS also includes the impacts of a proposed land transfer and a proposed lease action that are currently being finalized. These proposals (Transfer of the DP Road Tract to the County of Los Alamos and Lease of Land for the Development of a Research Park) were analyzed in EAs (DOE 1997c and DOE 1997d). The Secretary of Energy is directed to make additional land transfers in the *Departments of Commerce, Justice, and State, the Judiciary, and Related Agencies Appropriations Act of 1998* (PL 105-119, Section 632), but the actual parcels to be transferred are not sufficiently defined to allow for meaningful analysis in this SWEIS. On May 6, 1998, DOE published an NOI to prepare an EIS for the Proposed Conveyance and Transfer of Certain Land Tracts in the FR (63 FR 25022). (See Section 1.5.10.)
- The SWEIS generally describes the environmental restoration actions planned during the next 10 years to meet the requirements of LANL's Hazardous Waste Operating Permit and the various strategies for managing the resulting wastes. The types of impacts experienced and expected from such activities are described in general and are included with the site-wide impacts of each of the four alternatives analyzed in the SWEIS. These impacts are also analyzed in NEPA reviews and in RCRA documentation prepared using processes that include opportunities for public comment, within the framework agreed upon among DOE, the LANL management and operating contractor (University of California [UC]), and the New Mexico Environment Department (NMED).
- For the cumulative impact analysis, other proposals and plans by both private and government entities in the northern New Mexico area were reviewed, and their effects were considered together with those from LANL operations.

In this SWEIS, DOE also examines mitigation measures for impacts of LANL operations, planning strategies to protect and conserve natural and cultural resources, and waste management (treatment, storage, and disposal) strategies for LANL, including pollution prevention.

1.6.3 Consideration of Future Projects

DOE and researchers at LANL frequently develop new ideas and proposals for which funding and programmatic support are requested. Such proposals vary in terms of size, complexity, and potential environmental impact. Many of these proposals are characterized as projects. These are typically activities or groups of activities within the broad research, development, and applications

activities across LANL. Some of these activities also require construction or modification of facilities or equipment. The discussion in this section focuses on these construction and modification projects.

Construction and facility modification projects being considered by and for LANL are of many sizes and levels of complexity and were identified using a variety of sources. These sources included Capital Assets Management Process (CAMP) Reports (e.g., LANL 1995), LANL Institutional Plans (e.g., LANL 1996), and other DOE NEPA documents and reports. The potential projects identified were reviewed to determine the appropriate level of analysis in the SWEIS. As a result of this process, potential LANL projects were placed into one of these three categories.

- *Projects for which NEPA review has been completed and for which a decision has been made prior to the completion of the SWEIS.* These projects support the DOE mission and DOE's ongoing program requirements and are included in all of the SWEIS alternatives. Any of these projects that are considered major federal actions meet the test for interim actions found in the Council on Environmental Quality's (CEQ's) regulations for implementing NEPA at 40 Code of Federal Regulations (CFR) 1506.1.
- *Site-specific proposed projects that are ripe for decision and are on the same schedule as the SWEIS and its ROD.* Several facility or equipment modification activities are described in the SWEIS (chapters 2 and 3). It is expected that the SWEIS will constitute the NEPA review for these projects. However, if the scope or design for these projects changes substantially in the future, additional NEPA review may be necessary. The construction projects analyzed include the expansion of LLW disposal capacity in Area G and the enhancement of plutonium pit

manufacturing operations (to reestablish DOE's production capability for these weapons components). For these two project-level analyses, a description of the different locations within LANL considered and the environmental impacts of constructing those facilities at the different locations is included in volume II of the SWEIS, Project-Specific Siting and Construction (PSSC) Analyses. These construction activities and subsequent facility operations are included in the Expanded Operations Alternative (chapter 3, section 3.2), and the impacts of these activities are included in the impacts of the Expanded Operations Alternative (chapter 5, section 5.3) in volume I of the SWEIS.

- *Projects that are not reasonably foreseeable within the next 10 years.* Such projects are considered speculative; thus, they are not analyzed in the SWEIS. If such projects were eventually proposed, it is anticipated that they would require NEPA review prior to being undertaken. Such analyses would be tiered from the SWEIS that is in effect at the time.

1.6.3.1 *Emerging Actions at LANL*

Because LANL is a site of ongoing and evolving research and development, there may be potential actions or projects for which concepts are emerging or may emerge during the preparation of this SWEIS. Typically, such projects are still somewhat speculative or not at a sufficient stage of definition to allow for detailed NEPA analysis. These projects are not yet proposed (in the NEPA sense) and are not ripe for analysis in the SWEIS. If and when these projects are sufficiently defined, they would be subject to appropriate NEPA review at that time. For the purposes of public disclosure and to ensure the fullest possible description of site-wide activities, however, the following information is provided on some emerging projects.

- DOE currently is studying a variety of options for the renovation of infrastructure at TA-3 that would include replacing a number of aging structures either individually or as part of a multi-building effort. It is anticipated that one or more building replacements will be needed at TA-3. The construction would be of office and light laboratory buildings to continue housing the existing types of activities currently pursued at this TA. Planning for renovations and/or replacements is still being discussed, and impacts cannot yet be analyzed.
- An additional facility, the Los Alamos Nonproliferation and International Security Center, is also being studied. This building would consolidate about 80 percent of office and light laboratory activities undertaken at LANL for verification and intelligence purposes. The activities are currently undertaken in about 50 separate structures consisting of a variety of transportable facilities and various buildings spread out over five TAs. TA-3 is being considered as a potential site.
- As discussed further in chapter 4 (section 4.9.2.1) and chapter 6 (section 6.1.1) of this SWEIS, DOE and other users of electric power in the area have been working with suppliers to resolve foreseeable power supply and reliability issues. Some specific solutions to these issues are currently being examined for feasibility. In particular, DOE is examining the potential for constructing a power line that would extend from the existing Public Service Company of New Mexico (PNM) Norton substation southeast of LANL to existing LANL substations, and potentially to a new LANL substation (which would be constructed if this is determined to be a feasible solution).

As noted above, these projects would be subject to appropriate NEPA review when they are sufficiently defined for analysis.

1.6.4 Cooperating Agency

In November, 1995, DOE agreed to the request of the Incorporated County of Los Alamos, New Mexico, to be a Cooperating Agency in the preparation of the SWEIS. DOE and the County of Los Alamos believed this status to be appropriate given the interdependence of the county's planning and DOE's planning for LANL. DOE and the County of Los Alamos signed a Memorandum of Agreement that governs interactions with respect to the SWEIS. The county's participation in the SWEIS has included participation in planning meetings, development of analytical methodologies, data projections, and review of analyses for, and predecisional drafts of, the draft SWEIS. The county's participation has been greatest with respect to socioeconomic analyses, including utilities and infrastructure demands associated with LANL activities.

1.6.5 Organization of the SWEIS

The SWEIS is organized into four volumes and a classified appendix. The first volume contains the following parts:

- *Chapter 1* presents a description of LANL's role in supporting DOE's missions, the purpose and need for agency action, and an overview of the SWEIS.
- *Chapter 2* presents a detailed description of LANL's facilities and activities.
- *Chapter 3* describes the alternatives analyzed in the SWEIS and the alternatives not considered in detail, and provides comparison of the potential consequences of the alternatives for continued operations.
- *Chapter 4* presents a description of the affected environment as it exists under current conditions and provides the basis against which impacts resulting from actions under each alternative can be compared.

- *Chapter 5* describes the potential consequences that could result from implementing each of the alternatives.
- *Chapter 6* describes the mitigation measures that could be applied to minimize or reduce potential environmental consequences of the alternatives.
- *Chapter 7* presents a summary of the regulatory requirements and provides information on federal permits and licenses that apply to LANL operations, as well as agencies consulted in the preparation of this SWEIS.
- *Chapter 8* is a list of preparers of the SWEIS.
- *Chapter 9* is a list of individuals and organizations receiving a copy of the SWEIS.
- *Chapter 10* is a glossary of terms used in the SWEIS.
- *Chapter 11* contains copies of statements by contractors who worked on the SWEIS regarding potential conflicts of interest.
- *Chapter 12* is an index of key words or expressions used in this volume of the SWEIS.

The second volume of the SWEIS contains two parts and addresses the siting and construction impacts associated with the Expansion of TA-54/Area G Low-Level Waste Area (part I) and the Enhance of Plutonium Pit Manufacturing (part II).

The third volume of the SWEIS contains nine appendixes that present detailed information to support the analyses presented in chapter 5 of the SWEIS.

- Appendix A, Water Resources
- Appendix B, Air Quality
- Appendix C, Contaminant Data Sets Supporting Ecological and Human Health Consequence Analysis
- Appendix D, Human Health
- Appendix E, Cultural Resources

- Appendix F, Transportation Risk Analysis
- Appendix G, Accident Analysis
- Appendix H, Supplement Analysis for the Enhancement of Pit Manufacturing at Los Alamos National Laboratory, Stockpile Stewardship and Management Programmatic Environmental Impact Statement
- Appendix I, Report on the Status and Implications of Seismic Hazard Studies at LANL

The fourth volume of the SWEIS contains the public comments received on the draft SWEIS and DOE's responses. The volume contains three chapters.

- *Chapter 1* describes the public comment process for the draft SWEIS.
- *Chapter 2* discusses several topics associated with the comments received on the draft SWEIS that were of broad interest or concern. These topics were categorized as "Major Issues." This chapter reflects how these broad issues were considered.
- *Chapter 3* presents the comments received on the draft SWEIS and DOE's response to each individual comment.

The discussions in this SWEIS are augmented by a classified supplement to the SWEIS. This supplement contains certain classified information and data related to the activities at LANL that, though important to support understanding of certain details underlying the SWEIS and its analyses, must be protected in accordance with the *Atomic Energy Act of 1954* (42 U.S.C. §2011). This information includes details associated with some operations, experiments, processes, or source terms. DOE presents as much information as possible in this unclassified document. Furthermore, the environmental impacts are fully contained in the results presented to the public in this unclassified document.

DOE invited the EPA, the DoD, the Accord Pueblos, and the State of New Mexico to review the classified supplement. Only those individuals with appropriate clearances and a need to know were given access to the classified information.

References used for the preparation of this SWEIS are, to the extent practical, publicly available. To request assistance in obtaining or accessing any of these references, please contact Mr. Corey Cruz of DOE by the mechanisms described on the cover sheet for this volume.

1.7 CHANGES TO THE DRAFT SWEIS

DOE revised the draft SWEIS in response to comments received from other federal agencies; tribal, state, and local governments; nongovernmental organizations; the general public; and DOE reviews. The text was changed to provide additional environmental baseline information, to correct inaccuracies and make editorial corrections, and provide additional discussion of technical considerations to respond to comments and clarify text. In addition, DOE updated information due to events or decisions made in other documents since the draft SWEIS was provided for public comment in May 1998.

1.7.1 Summary of Significant Changes

1.7.1.1 *Revised Preferred Alternative*

In the draft SWEIS, the DOE's Preferred Alternative was the Expanded Operations Alternative. In this final SWEIS, the Expanded Operations Alternative remains the Preferred Alternative with one modification, as noted below. The modification to the Preferred

Alternative involves the level at which pit manufacturing will be implemented at LANL. Under the Expanded Operations Alternative, DOE would expand operations at LANL, as the need arises, to increase the level of existing operations to the highest reasonably foreseeable levels, including the full implementation of pit manufacturing up to the capacity of 50 pits per year under single-shift operations (80 pits per year using multiple shifts). However, as a result of delays in the implementation of the CMIP and recent additional controls and operational constraints in the CMR Building (instituted to ensure that the risks associated with the CMR Building operations are maintained at an acceptable level), the DOE has determined that additional study of methods for implementing the 50 pits per year production capacity is warranted. In effect, because DOE has postponed any decision to expand pit manufacturing beyond a level of 20 pits per year in the near future, the revised Preferred Alternative would only implement pit manufacturing at this level. This postponement does not modify the long-term goal announced in the ROD for the SSM PEIS (up to 80 pits per year using multiple shifts).

1.7.1.2 *Enhanced Pit Manufacturing*

As described above, as a result of delays in the implementation of the CMIP and recent additional controls and operational constraints in the CMR Building (section 2.2.2.3), DOE has postponed any decision to implement the pit manufacturing capability beyond a level of 20 pits per year (14 pits is the No Action level). DOE believes it can expand the pit manufacturing capability to 20 pits at TA-55 without significant infrastructure upgrades and still meet its near-term mission requirements. When the additional studies are completed, DOE will provide the appropriate NEPA review, tiered from this SWEIS, to implement

the pit manufacturing capability beyond the 20 pits per year capacity. The PSSC analysis for the Enhancement of Plutonium Pit Manufacturing (in volume II of this SWEIS) no longer states a “Preferred PSSC Alternative.” The Preferred Alternative would only implement pit production at a level of 20 pits per year. However, for completeness and to bound the impacts of implementing pit production at LANL, the “Utilize Existing Unused Space in the CMR Building” Alternative (the Preferred PSSC Alternative in the draft SWEIS) is still included in the Expanded Operations Alternative as the “CMR Building Use” Alternative. The ROD for the SWEIS will only include a decision regarding the operations to implement the pit production mission at LANL for up to 20 pits per year. This change is reflected in volume II, part II of the SWEIS.

1.7.1.3 Wildfire

The scenario that a wildfire could encroach on LANL was analyzed and included in the accident set presented for all the alternatives. The detailed wildfire analysis, referred to as the SITE-04 accident, is presented in appendix G, section G.5.4.4 of volume III of this SWEIS. A summary of the impacts is presented in chapter 5.

1.7.1.4 Comparison Between the Rocky Flats Plant and LANL

An overview of the 1969 plutonium fire at the Rocky Flats site and a comparison of the design and operational differences between the Rocky Flats Plant and LANL are included in appendix G, section G.4.1.2. A summary is included in chapter 5.

1.7.1.5 CMR Building Seismic Upgrades

DOE has decided not to implement the seismic upgrades as part of the CMR Building Upgrades Project, Phase II, as a result of: (1) new seismic studies (chapter 4, section 4.2.2.2, and appendix I) released after the draft SWEIS was issued indicating the additional hazard of a seismic rupture at the CMR Building and (2) DOE’s postponement of any decisions to implement the pit manufacturing capability beyond 20 pits per year in the near future. Although the seismic rupture risk does not have a substantial effect on the overall seismic risk (chapter 2, section 2.2.2.3), it is an aspect of risk that cannot be cost-effectively mitigated through engineered structural upgrades. Given that assessment, the DOE is considering more substantial actions that are not yet ripe for analysis in the SWEIS (e.g., replacement of aging structures). The overall goal of DOE’s evaluation is ultimately to reduce the risk associated with a seismic event, should one occur. In the meantime, DOE is taking actions to mitigate seismic risks through means other than seismic upgrades (e.g., minimizing material-at-risk and putting temporarily inactive material in process into containers). In any event, DOE is presenting the larger and more conservative impacts (no seismic upgrades) for the SITE-01, SITE-02, and SITE-03 accidents. Therefore, SITE-01, SITE-02, and SITE-03 accidents were revised to include new seismic data published after the draft SWEIS was released and to exclude the mitigation of the impacts of implementing the seismic upgrades. The detailed revised analysis is presented in appendix G. A summary of the impacts is presented in chapters 3 and 5.

1.7.1.6 Strategic Computing Complex

The impacts of constructing and operating the proposed SCC project, primarily electric power demand and water usage, were incorporated into

all the alternatives analyzed. Water usage was not increased in these analyses because DOE and LANL committed to no net increase of water as a result of conservation measures and recycling of treated wastewater from the Sanitary Wastewater Systems Consolidation Plant, TA-46, as cooling water for the SCC project.

1.7.1.7 *Conveyance and Transfer of DOE Land*

DOE has begun the preparation of an EIS for the Conveyance and Transfer of Certain Land Tracts at LANL. The CT EIS, scheduled to be released in draft form for public review and comment in early 1999, will analyze the impacts of conveying and transferring certain tracts of land to the County of Los Alamos and the U.S. Department of the Interior in trust for the Pueblo of San Ildefonso. The CT EIS also will present the cumulative impacts of the land being developed by either the County of Los Alamos

or the Pueblo, as well as the impacts of continuing to operate LANL.

1.7.2 Next Steps

The ROD, to be published no sooner than 30 days after NOA for the final SWEIS has been issued, will explain all factors, including environmental impacts, that the DOE considered in reaching its decision. The ROD also will identify the environmentally preferred alternative or alternatives. If mitigation measures, monitoring, or other conditions are adopted as part of DOE's decision, these will be summarized in the ROD, as applicable, and will be included in the Mitigation Action Plan that would be prepared following the issuance of the ROD. The Mitigation Action Plan would explain how and when mitigation measures would be implemented and how the DOE would monitor the mitigation measures over time to judge their effectiveness.

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