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Draft Environmental Impact Statement for the Proposed Relocation of Technical Area 18 Capabilities and Materials at the Los Alamos National Laboratory

United States Department of Energy
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COVER SHEET

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Title: Draft Environmental Impact Statement for the Proposed Relocation of Technical Area 18 Capabilities and Materials at the Los Alamos National Laboratory (TA-18 Relocation EIS)

Locations: New Mexico, Nevada, Idaho

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***Abstract*:** The National Nuclear Security Administration, a separately organized agency within DOE, is responsible for providing the Nation with nuclear weapons, ensuring the safety and reliability of those nuclear weapons, and supporting programs that reduce global nuclear proliferation. These missions are accomplished through the use of DOE's core team of highly trained nuclear experts. One of the major training facilities for DOE personnel is located at Technical Area 18 (TA-18), within the Los Alamos National Laboratory (LANL), Los Alamos, New Mexico. Principal TA-18 operational activities involve research in and the design, development, construction, and application of experiments on nuclear criticality.

Though TA-18 is judged to be secure by DOE's independent inspection office, its buildings and infrastructure are from 30 to more than 50 years old and are increasingly expensive to maintain and operate. Additionally, the TA-18 operations are located in a relatively isolated area, resulting in increasingly high costs to maintain a security Category I infrastructure. DOE wishes to maintain the important capabilities currently provided at TA-18 in a manner that reduces the long-term costs for safeguards and security. DOE proposes to accomplish this by relocating the TA-18 security Category I/II capabilities and materials to new locations.

The *TA-18 Relocation EIS* evaluates the potential direct, indirect, and cumulative environmental impacts associated with this proposed action at the following DOE sites: (1) a different site at LANL (the Preferred Alternative) at Los Alamos, New Mexico; (2) the Sandia National Laboratories/New Mexico at Albuquerque, New Mexico; (3) the Nevada Test Site near Las Vegas, Nevada; and (4) the Argonne National Laboratory-West near Idaho Falls, Idaho. The EIS also analyzes upgrading of the TA-18 facilities at LANL. As required by Council on Environmental Quality regulations, the *TA-18 Relocation EIS* also evaluates the No Action Alternative of maintaining the operations at the current TA-18 location.

Public Comments: In preparing this draft EIS, DOE considered comments received from the public during the scoping period (May 2, 2000, through June 15, 2000). Comments on this draft EIS may be submitted during the 45-day comment period. Public meetings on this EIS will be held during the comment period. The dates, times, and locations of these meetings will be published in the *Federal Register* notice announcing the availability of this draft EIS.

SUMMARY

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Acronyms, Abbreviations, and Conversion Charts

ACRONYMS, ABBREVIATIONS, AND CONVERSION CHARTS

ANL-W	Argonne National Laboratory-West
CASA	Critical Assembly Storage Area
CFR	*Code of Federal Regulations*
DAF	Device Assembly Facility
DOE	U.S. Department of Energy
EBR-II	Experimental Breeder Reactor-II
EIS	environmental impact statement
FMF	Fuel Manufacturing Facility
FR	*Federal Register*
GPEB	general-purpose experimental building
INEEL	Idaho National Engineering and Environmental Laboratory
LACEF	Los Alamos Critical Experiments Facility
LANL	Los Alamos National Laboratory
NEPA	National Environmental Policy Act
NMSF	Nuclear Material Storage Facility
NNSA	National Nuclear Security Administration
NTS	Nevada Test Site
PIDAS	Perimeter Intrusion Detection and Assessment System
SHEBA	Solution High-Energy Burst Assembly
SNL/NM	Sandia National Laboratories/New Mexico
SNM	special nuclear material(s)
SWEIS	sitewide environmental impact statement
TA	technical area
TA-18	Technical Area 18
TREAT	Transient Reactor Test Facility
ZPPR	Zero Power Physics Reactor

Metric Conversion Chart

To Convert Into Metric			*To Convert From Metric*		
If You Know	**Multiply By**	**To Get**	**If You Know**	**Multiply By**	**To Get**
Length					
inches	2.54	centimeters	centimeters	0.3937	inches
feet	30.48	centimeters	centimeters	0.0328	feet
feet	0.3048	meters	meters	3.281	feet
yards	0.9144	meters	meters	1.0936	yards
miles	1.60934	kilometers	kilometers	0.6214	miles
Area					
square inches	6.4516	square centimeters	square centimeters	0.155	square inches
square feet	0.092903	square meters	square meters	10.7639	square feet
square yards	0.8361	square meters	square meters	1.196	square yards
acres	0.40469	hectares	hectares	2.471	acres
square miles	2.58999	square kilometers	square kilometers	0.3861	square miles
Volume					
fluid ounces	29.574	milliliters	milliliters	0.0338	fluid ounces
gallons	3.7854	liters	liters	0.26417	gallons
cubic feet	0.028317	cubic meters	cubic meters	35.315	cubic feet
cubic yards	0.76455	cubic meters	cubic meters	1.308	cubic yards
Weight					
ounces	28.3495	grams	grams	0.03527	ounces
pounds	0.4536	kilograms	kilograms	2.2046	pounds
short tons	0.90718	metric tons	metric tons	1.1023	short tons
Temperature					
Fahrenheit	Subtract 32, then multiply by 0.55556	Celsius	Celsius	Multiply by 1.8, then add 32	Fahrenheit

Metric Prefixes

Prefix	*Symbol*	*Multiplication Factor*
exa-	E	1 000 000 000 000 000 000 = 10^{18}
peta-	P	1 000 000 000 000 000 = 10^{15}
tera-	T	1 000 000 000 000 = 10^{12}
giga-	G	1 000 000 000 = 10^{9}
mega-	M	1 000 000 = 10^{6}
kilo-	k	1 000 = 10^{3}
hecto-	h	100 = 10^{2}
deka-	da	10 = 10^{1}
deci-	d	0.1 = 10^{-1}
centi-	c	0.01 = 10^{-2}
milli-	m	0.001 = 10^{-3}
micro-	μ	0.000 001 = 10^{-6}
nano-	n	0.000 000 001 = 10^{-9}
pico-	p	0.000 000 000 001 = 10^{-12}
femto-	f	0.000 000 000 000 001 = 10^{-15}
atto-	a	0.000 000 000 000 000 001 = 10^{-18}

SUMMARY

This document summarizes the U.S. Department of Energy's *Environmental Impact Statement for the Proposed Relocation of Technical Area 18 Capabilities and Materials at the Los Alamos National Laboratory* (*TA-18 Relocation EIS*). In addition to information concerning the background, purpose and need for the proposed action, and the National Environmental Policy Act process, this summary includes the requirements for current and future Technical Area 18 missions, the alternatives and proposed relocation facilities, the Department of Energy's identified Preferred Alternative, and a comparison of environmental impacts among alternatives.

S.1 INTRODUCTION AND BACKGROUND

The National Nuclear Security Administration (NNSA), a separately organized agency within the U.S. Department of Energy (DOE), is responsible for providing the Nation with nuclear weapons, ensuring the safety and reliability of those nuclear weapons, and supporting programs that reduce global nuclear proliferation. These mission responsibilities are accomplished through the use of DOE's core team of highly trained nuclear experts. One of the major training facilities for DOE personnel is located at Technical Area 18 (TA-18) at the Los Alamos National Laboratory (LANL), Los Alamos, New Mexico. The principal TA-18 operation is the research in and the design, development, construction, and application of experiments on nuclear criticality.

TA-18 supports important defense, nuclear safety, and other national security mission responsibilities. The operations at TA-18 enable DOE personnel to gain knowledge and expertise in advanced nuclear technologies that support the following: (1) nuclear materials management and criticality safety; (2) emergency response in support of counterterrorism activities; (3) safeguards and arms control in support of domestic and international programs to control excess nuclear materials; and (4) criticality experiments in support of Stockpile Stewardship and other programs. The TA-18 facilities are the Nation's only facilities capable of performing general-purpose nuclear materials handling for a variety of experiments, measurements (to determine the presence of nuclear materials), and training. TA-18 also houses the Western Hemisphere's largest collection of machines for conducting nuclear safety evaluations and establishing limits for operations.

The primary operation at TA-18 is the performance of criticality experiments. Criticality experiments involve systems of fissile material(s), called critical assemblies, which are designed to reach a condition of nuclear criticality. The capability to conduct criticality experiments also includes development of nuclear instruments, measurement and evaluation of integral cross sections, accident simulation, dosimetry, and the detection and characterization of nuclear material. A critical assembly is a machine used to manipulate a mass of fissile material in a specific geometry and composition. The movement or addition of fissile material in the critical assembly can allow it to reach the condition of nuclear criticality and control the reactivity. A critical assembly is a small version (i.e., from several inches to several feet) of a nuclear power plant core. Fissile materials that can be used in a critical assembly typically consist of one of the following five main isotopes: uranium-233, uranium-235, neptunium-237, plutonium-239, or plutonium-241, in a specific composition and shape. A neutron source may be placed near the assembly to ensure that the fission rate of the critical assembly can be readily observed as it approaches and reaches criticality. The quantity of fissile material capable of sustaining such a reaction is called the critical mass for that assembly. Critical mass is

SPECIAL NUCLEAR MATERIALS SAFEGUARDS AND SECURITY
(DOE Order 474.17-1A)

Special nuclear materials (SNM) are defined in the Atomic Energy Act of 1954 as (1) plutonium, uranium enriched in the isotope 233 or 235, or any other material designated as SNM; or (2) any material artificially enriched by any of the above.

DOE's policy is to protect national security and the health and safety of DOE and contractor employees, the public, and the environment by protecting and controlling SNM. This is done by designing specific safeguards and security strategies to prevent or minimize both unauthorized access to SNM and unauthorized disclosure, loss, destruction, modification, theft, compromise, or misuse of SNM as a result of terrorism, sabotage, or events such as disasters and civil disorders.

DOE uses a cost-effective, graded approach to providing SNM safeguards and security. Quantities of SNM stored at each DOE site are categorized into security Categories I, II, III, and IV, with the greatest quantities included under security Category I and lesser quantities included in descending order under security Categories II through IV.

a function of many factors including the mass and enrichment of the fissile material; the geometry, or shape, of the assembly; and the presence of reflectors or neutron absorbers.

Since 1948, thousands of experiments with several fissile materials (uranium-235 and uranium-233, isotopes of plutonium, and neptunium-237) have been conducted at TA-18. These experiments have been performed with metal or compounds, both bare and reflected, as solid, liquid, and gas throughout the entire range of fast, intermediate, and thermal neutron spectra. Critical assemblies at TA-18 are designed to operate at low-to-average power and at temperatures well below the fissile material temperature operating limits (which sets them apart from normal reactors), with low fission-product production and minimal fission-product inventory. (See text box below for a discussion of a typical critical assembly.) SNM is stored in either Critical Assembly Storage Areas (CASAs) or in the Hillside vault. The onsite TA-18 nuclear material inventory is relatively stable and consists primarily of isotopes of plutonium and uranium. The bulk of the plutonium is metal and is either clad or encapsulated. The use of toxic and hazardous materials is limited.

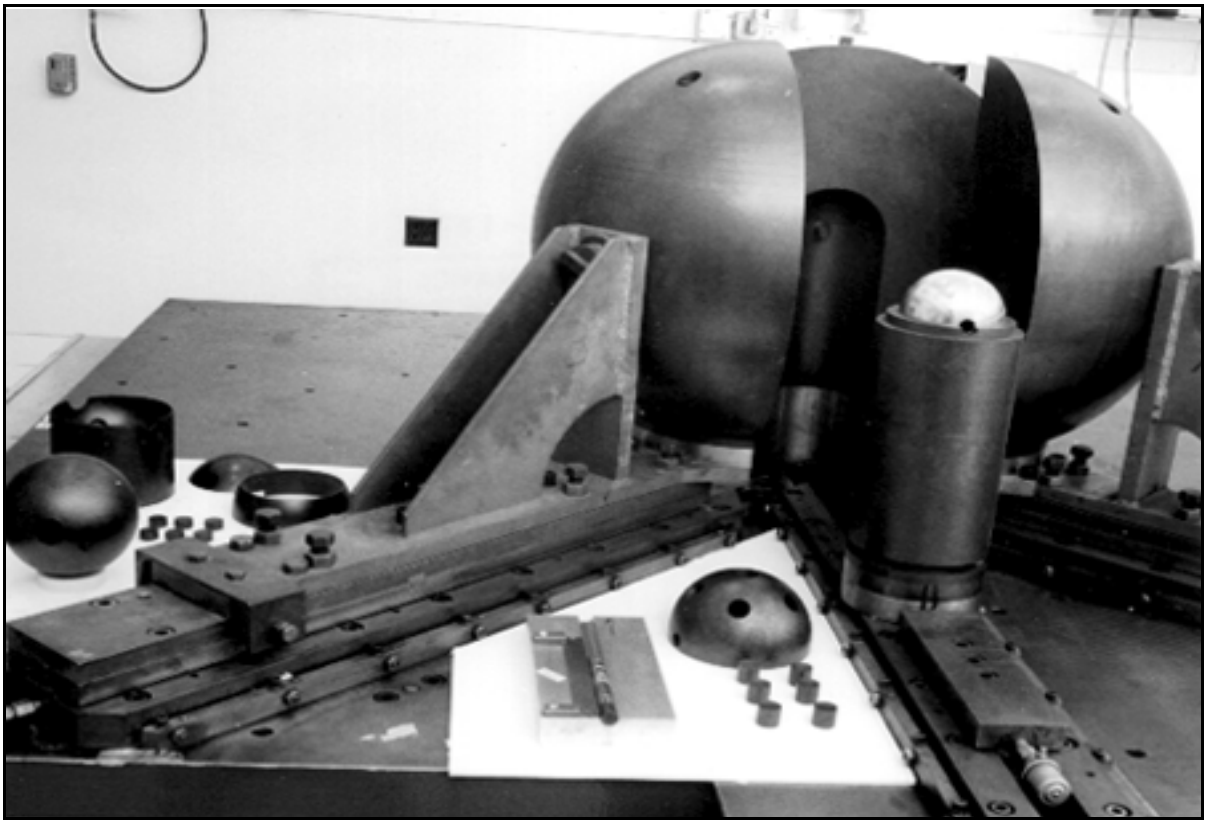
DOE proposes to relocate the TA-18 mission operational capabilities and materials to a new location and continue to perform those mission operations at the new location for the foreseeable future (for purposes of the environmental impact statement (EIS), the operations are assessed for a 25-year operating period). As described below, the EIS evaluates four alternative locations for the proposed action as well as a TA-18 Upgrade Alternative and the No Action Alternative. The proposed action includes: transport of critical assembly machines and support equipment to a new location; modification of existing facilities to support the TA-18 missions; or construction and operation of "new" facilities for 25 years to support the TA-18 missions. Relocation of TA-18 mission operations would also include transport of up to approximately 2.4 metric tons (2.6 tons) of SNM associated with the TA-18 missions and a range of disposition options associated with the existing TA-18 facilities that would be vacated if the mission operations are relocated.

The *Environmental Impact Statement for the Proposed Relocation of Technical Area 18 Capabilities and Materials at the Los Alamos National Laboratory (TA-18 Relocation EIS)* evaluates the potential direct, indirect, and cumulative environmental impacts associated with this proposed action at the following DOE sites: (1) a different site at LANL (the Preferred Alternative) at Los Alamos, New Mexico; (2) Sandia National Laboratories/New Mexico (SNL/NM) at Albuquerque, New Mexico; (3) the Nevada Test Site (NTS) near Las Vegas, Nevada; and (4) Argonne National Laboratory-West (ANL-W) near Idaho Falls, Idaho. These site alternatives were developed by a DOE-wide Option Study Group (Group) chartered to

develop reasonable alternatives for the relocation of TA-18 mission operations. The Group developed criteria that screened for sites with existing security Category I infrastructure; nuclear environmental, safety, and health infrastructure; and compatibility between the site and TA-18 mission operations. The EIS also analyzes the upgrading of TA-18 facilities at LANL and the No Action Alternative.

TYPICAL CRITICAL ASSEMBLY

Critical assembly designs at TA-18 use different methods to reach a criticality condition. In some cases, additional fissile material is added in discrete quantities to an existing configuration. Other criticality assembly designs allow for a constant mass of fissile material, in two or more separate components, to be moved closer together in small increments. Some critical assembly systems incorporate movable neutron-absorbing components, which can be moved into and out of the fissile material mass to control the fission reaction. Critical assemblies can be composed of fissile materials in either solid or liquid form. For example, a critical assembly could range from a small 15-centimeter (6-inch) sphere of plutonium-239 metal with a mass of about 6 kilograms (13.2 pounds) to larger quantities of enriched uranium-235 in various shapes. An example of a critical assembly used in the TA-18 facility is the Flattop assembly, shown below. This assembly, including all of its structure, has a base of approximately 2.4 × 1.8 meters (8 × 6 feet) and a height of 1.5 meters (5 feet). The fissile material is a 15-centimeter (6-inch) sphere of enriched uranium (93 percent uranium-235) metal or plutonium-239 metal, reflected by the natural uranium hemisphere blocks.



Flattop Critical Assembly

Based on the analytical results of the EIS, as well as cost, schedule, safeguards and security issues, and other programmatic considerations which are not part of this EIS, DOE intends to make the following decisions concerning the security Category I/II, the Solution High-Energy Burst Assembly (SHEBA), and other security Category III/IV activities currently being conducted at LANL's TA-18 facilities:

- Whether to relocate the security Category I/II activities from TA-18 to a new location, or maintain these mission support operations at their current location with or without upgraded facilities. If a decision is made to relocate the security Category I/II activities, to select one of four proposed relocation sites (i.e., TA-55 at LANL, TA-V at SNL/NM, the Device Assembly Facility (DAF) at NTS, or ANL-W)

- Whether to relocate all or some of the TA-18 security Category III/IV activities to new and/or other locations at LANL (SHEBA activities to TA-39; other security Category III/IV activities to TA-55), or maintain these operations at their current location with or without upgraded facilities

The analysis in this EIS will support decision making related to eventual site-specific construction and operation activities for any alternative selected.

S.1.1 Purpose and Need for Action

Nuclear materials management is a fundamental responsibility of DOE, as its operations routinely involve the use of nuclear materials. The nuclear criticality safety, research, and training at TA-18 play a key role in ensuring that DOE handles nuclear materials in a safe manner.

The National Nuclear Security Administration is responsible for a number of activities involving the use of nuclear materials. DOE's Office of Defense Programs is responsible for maintaining the Nation's nuclear weapons program. Activities associated with this mission include handling and processing fissile materials for use in nuclear weapons and storage of special nuclear material. DOE's Emergency Response Program directly supports weapons-of-mass-destruction initiatives stemming from Executive Order 12938 and Presidential Decision Directives 39 and 62. This program is responsible for developing detection and diagnostic equipment to protect the United States against terrorist devices of unknown design and origin. Additionally, DOE's Nuclear Nonproliferation Program is responsible for developing nuclear measurement methods to verify treaty agreements with foreign nations, protect the United States against nuclear smuggling activities, and support domestic and international safeguards.

In other areas of DOE, the Environmental Management Program is responsible for cleaning up former weapons complex facilities that house surplus fissile materials in various storage arrays. The Civilian Radioactive Waste Management Program is responsible for identifying a long-term repository for high-level nuclear waste from commercial power plants. In both cases, specific information is needed on nuclear materials to determine safe storage configurations to prevent criticality events.

To carry out these missions in a safe manner, DOE needs to maintain the capability to conduct general-purpose criticality experiments and detector development with various types and configurations of special nuclear material. Additionally, DOE needs to maintain the capability to train its Federal and contractor employees to handle nuclear materials in a manner that will prevent inadvertent criticality. In 1993, and again in 1997, the Defense Nuclear Facilities Safety Board recommended that DOE continue to maintain the capability to support the TA-18 criticality experiments program.

Currently, the criticality experiments activities are conducted at a collection of facilities located at TA-18 in Los Alamos, New Mexico. TA-18 at LANL is the only DOE facility where criticality experiments routinely are performed. This collection of facilities is near the end of its useful life, and action is required by DOE to assess alternatives for continuing these activities for the next 25 years.

This EIS identifies siting options to assist DOE in determining a long-term strategy for maintaining nuclear criticality missions, infrastructure, and expertise presently residing at TA-18.

S.1.2 Scoping Process

Scoping is a process in which the public and stakeholders provide comments directly to the Federal agency on the scope of the EIS. This process is initiated by the publication of the Notice of Intent in the *Federal Register*.

On May 2, 2000, DOE published a Notice of Intent to prepare the *TA-18 Relocation EIS* (65 FR 25472). In this Notice of Intent, DOE invited public comment on the *TA-18 Relocation EIS* proposal. Subsequent to this notice, DOE held public scoping meetings in the vicinity of all sites that might be affected by the proposed action. Public scoping meetings were held as follows: (1) May 18–Albuquerque, New Mexico; (2) May 23–North Las Vegas, Nevada; (3) May 25–Idaho Falls, Idaho; and (4) May 30–Española, New Mexico (note: this public meeting was originally scheduled for May 17 at Los Alamos, New Mexico, but was rescheduled and relocated due to the Cerro Grande Fire).

All comments received, orally and in writing at these meetings, via mail, fax, the Internet, and the toll-free phone line, were reviewed for consideration by DOE in preparing the EIS.

S.1.2.1 Issues Identified During the Scoping Period

Many of the verbal and written comments received during the public scoping period identified the need for DOE to describe in detail the existing TA-18 capabilities and processes, as well as the specific requirements associated with the alternatives for fulfilling DOE's mission support needs. In particular, comments addressed the suitability of other sites to perform these mission support needs, the design of any buildings to be constructed or modified, construction and operation timelines, and controls to limit releases to the environment.

A significant number of comments also expressed concern about the costs associated with operating TA-18 criticality experiments facilities or relocating these capabilities elsewhere. These comments suggested that detailed cost analyses be conducted to analyze the construction, operation, security, and transportation needs of the various alternatives.

Many comments also addressed both the SNM needed to support, and the waste streams resulting from, TA-18 operations. Clarification was requested as to the amount of SNM that would be required under each alternative, the manner and routes of its transport, and the availability of suitable shipping containers. Waste management concerns addressed the need to identify the types and volumes of waste resulting from the proposed action; the available facilities at each site to treat, store, or dispose of the waste; the associated transportation requirements; and compatibility of the proposed action with state and Federal regulations.

Several commentors expressed concern over the environmental, health, and safety risks associated with TA-18 operations. DOE representatives were urged to thoroughly evaluate the potential consequences of the proposed action on local wildlife, water resources, and the health and safety of area residents, and to take into account the Cerro Grande Fire at LANL. Comments also suggested that the EIS quantify all radionuclide and chemical emissions resulting from the proposed action. Concerns were raised about the safety and security of the existing TA-18 facilities and how safety and security would be addressed at each of the potential relocation sites. Commentors expressed favor or opposition for a particular relocation alternative, reasons for which included security, cost, and workforce advantages.

Major issues identified through both internal DOE and public scoping are addressed in the EIS by analyses in the following areas:

- Land resources, including land use and visual resources
- Site infrastructure
- Air quality and acoustics
- Water resources, including surface water and groundwater
- Geology and soils
- Biotic resources, including terrestrial resources, wetlands, aquatic resources, and threatened and endangered species
- Cultural and paleontological resources, including prehistoric resources, historic resources, and Native American resources
- Socioeconomics, including regional economic characteristics, demographic characteristics, housing and community services, and local transportation
- Radiological and hazardous chemical impacts during normal operations and accidents
- Waste management
- Transportation of nuclear materials

In addition to analyses in these areas, the EIS also addresses monitoring and mitigation, unavoidable impacts and irreversible and irretrievable commitment of resources, and impacts of long-term productivity.

S.1.2.2 Relationships to Other Actions and Programs

This section explains the relationship between the *TA-18 Relocation EIS* and other relevant National Environmental Policy Act (NEPA) documents and DOE programs. Completed NEPA compliance actions are addressed in Section S.1.2.2.1; ongoing actions are discussed in Section S.1.2.2.2.

S.1.2.2.1 Completed NEPA Compliance Actions

Final Environmental Assessment for Device Assembly Facility Operations (DOE/EA-0971)—The *Final Environmental Assessment for Device Assembly Operations* was issued in May 1995 and evaluates the proposed action to operate DAF at NTS. DAF is one of the facilities considered under the proposed action to receive relocated TA-18 activities.

Environmental Assessment for Consolidation of Certain Materials and Machines for Nuclear Criticality Experiments and Training – Los Alamos National Laboratory, Los Alamos, New Mexico (DOE/EA-1104)—In May 1996, DOE issued the Environmental Assessment and Finding of No Significant Impact for *Consolidation of Certain Materials and Machines for Nuclear Criticality Experiments and Training – Los Alamos National Laboratory*. This environmental assessment compared the effects of consolidating nuclear criticality experiments machines and materials at the Los Alamos Critical Experiments Facility (LACEF) at LANL's TA-18. Actions consolidated through this environmental assessment resulted in the program which exists today and form the basis for the No Action Alternative presented in the *TA-18 Relocation EIS*.

Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement (DOE/EIS-0240)—the *Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement* was issued in June 1996. DOE prepared this EIS because of the need to move rapidly to neutralize the proliferation threat of surplus highly enriched uranium and to demonstrate the United States' commitment to nonproliferation. It evaluated management alternatives for materials used by TA-18 activities.

Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada (DOE/EIS-0243)—The *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* was issued in August 1996. The Record of Decision was published in December 1996. The proposed action to relocate the TA-18 capabilities and materials is consistent with the decisions documented in the Record of Decision.

Final Programmatic Environmental Impact Statement for Stockpile Stewardship and Management (DOE/EIS-0236)—In September 1996, DOE issued the *Final Programmatic Environmental Impact Statement for Stockpile Stewardship and Management*. This programmatic EIS evaluated the potential environmental impacts resulting from activities associated with nuclear weapons' research, design, development, and testing, as well as the assessment and certification of the weapons' safety and reliability. The Record of Decision was published in December 1996. Criticality experiments at TA-18 support the stockpile stewardship mission addressed in this programmatic EIS.

Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory (DOE/EIS-0238)—The *Final Site-Wide EIS for Continued Operation of LANL* (*LANL SWEIS*) was issued in January 1999. In the September 1999 Record of Decision, DOE selected the Expanded Operations Alternative. The No Action Alternative assessed in the *TA-18 Relocation EIS* is consistent with the Preferred Alternative chosen through the *LANL SWEIS* Record of Decision.

Idaho National Engineering and Environmental Laboratory Advanced Mixed Waste Treatment Project Final Environmental Impact Statement (DOE/EIS-0290)—The *Idaho National Engineering and Environmental Laboratory Advanced Mixed Waste Treatment Project Final Environmental Impact Statement* was issued in March 1999. The Record of Decision was published in the *Federal Register* on April, 1999 (64 FR 16948). The impacts of the action DOE decided to implement are factored into the assessment of potential cumulative impacts discussed in the *TA-18 Relocation EIS* proposed action.

Final Site-Wide Environmental Impact Statement for Sandia National Laboratories/New Mexico (DOE/EIS-0281)—The *Final Site-Wide Environmental Impact Statement for Sandia National Laboratories/New Mexico* (*SNL/NM SWEIS*) was issued in October 1999. The Record of Decision for the *SNL/NM SWEIS* was published in the *Federal Register* on December 15, 1999 (64 FR 69996). The proposed action to relocate the TA-18 capabilities and materials is consistent with the decision documented in the *SNL/NM SWEIS* Record of Decision.

Surplus Plutonium Disposition Final Environmental Impact Statement (DOE/EIS-0283)—The *Surplus Plutonium Disposition Final Environmental Impact Statement* was issued in November 1999. The Record of Decision for the programmatic EIS, published in the *Federal Register* on January 14, 1997 (62 FR 3014), outlined DOE's approach to plutonium disposition and established the groundwork for the *Surplus Plutonium Disposition EIS*. In the Record of Decision, published in the *Federal Register* on January 11, 2000 (65 FR 1608), DOE decided to provide for the safe and secure disposition of up to 50 metric tons of surplus plutonium as mixed oxide fuel and through immobilization. Plutonium used in support of TA-18 activities could be dispositioned, when necessary, using material management methods described in the *Surplus Plutonium Disposition EIS*.

Final Environmental Impact Statement for the Treatment and Management of Sodium-Bonded Spent Nuclear Fuel (DOE/EIS-0306)—The *Final Environmental Impact Statement for the Treatment and Management of Sodium-Bonded Spent Nuclear Fuel* was issued in July 2000. The Record of Decision was published in the *Federal Register* on September 19, 2000 (65 FR 56565). The proposed action under this EIS contributes to the cumulative impacts at the site discussed in the *TA-18 Relocation EIS*.

Special Environmental Analysis for the Department of Energy, National Nuclear Security Administration: Actions Taken in Response to the Cerro Grande Fire at Los Alamos National Laboratory, Los Alamos, New Mexico (DOE/SEA-03)—In September 2000, DOE and NNSA issued this special environmental analysis to document their assessment of impacts associated with emergency activities conducted at LANL, Los Alamos County, New Mexico, in response to major disaster conditions caused by the recent Cerro Grande Fire. These emergency activities included activities taken at TA-18 that altered the TA-18 setting as discussed in the *TA-18 Relocation EIS*.

Environmental Assessment for the Microsystems and Engineering Sciences Applications Complex (DOE/EA-1335)—The *Environmental Assessment for the Microsystems and Engineering Sciences Applications Complex* was issued in September 2000 and analyzed the potential effects of constructing several new facilities and upgrading existing facilities at SNL/NM. A Finding of No Significant Impact was signed on October 16, 2000. The impacts of this action are factored into the assessment of potential cumulative impacts at SNL/NM in the *TA-18 Relocation EIS*.

Final Programmatic Environmental Impact Statement for Accomplishing Expanded Civilian Nuclear Energy Research and Development and Isotope Production Missions in the United States, Including the Role of the Fast Flux Test Facility (Nuclear Infrastructure Programmatic EIS) (DOE/EIS-0310)—The *Final Nuclear Infrastructure Programmatic EIS* was issued in December 2000. The Record of Decision was published in the *Federal Register* on January 26, 2001 (66 FR 7877). Through the Record of Decision, DOE selected the Preferred Alternative, under which DOE will reestablish domestic production of plutonium-238, as needed, using the Advanced Test Reactor at the Idaho National Engineering and Environmental Laboratory (INEEL) in Idaho and the High Flux Isotope Reactor at Oak Ridge National Laboratory in Tennessee. The impacts of this action are factored into the assessment of potential cumulative impacts at INEEL in the *TA-18 Relocation EIS*.

Final Environmental Assessment for Atlas Relocation and Operation at the Nevada Test Site (DOE/EA-1381)—In May 2001, DOE issued the *Final Environmental Assessment for Atlas Relocation and Operation at the Nevada Test Site*. This document assesses the environmental impacts of DOE's proposed action to disassemble the Atlas pulsed-power machine at LANL and transport it to NTS, where it would be reassembled in a new building in Area 6 north of DAF. The potential effects of this action are factored into the assessment of potential cumulative impacts resulting from the *TA-18 Relocation EIS* proposed action.

S.1.2.2.2 Ongoing NEPA Compliance Actions

Draft Idaho High-Level Waste and Facilities Disposition Environmental Impact Statement (DOE/EIS-0287)—The *Draft Idaho High-Level Waste and Facilities Disposition Environmental Impact Statement* was issued in December 1999. It evaluates alternatives for managing the high-level radioactive waste and associated radioactive waste and facilities at INEEL. The proposed action under this EIS contributes to the cumulative impacts at INEEL discussed in the *TA-18 Relocation EIS*.

Sandia Underground Reactor Facility Environmental Assessment—DOE is in the process of preparing an environmental assessment for construction and operation of the Sandia Underground Reactor Facility an

underground facility designed for housing the Sandia Pulsed Reactor and other possible missions at TA-V[1], should they be relocated to SNL/NM. If implemented, the construction and operation of this facility would parallel the construction and operation of the facility proposed for the TA-18 missions.

Relationships to Other LANL Projects—DOE routinely conducts planning activities at its sites to identify long-term strategies and options for maintaining infrastructure in support of various missions. As part of these efforts, potential projects or actions are identified as options for future consideration. Many of these projects never go beyond the initial planning phases due to various factors such as insufficient justification or inadequate funding.

DOE has initiated a planning effort that focuses on the long-term strategy for conducting security Category I nuclear operations at LANL. Security Category I nuclear operations at TA-18 are discussed in Section S.1. While proposals regarding TA-18 activities may fall within the scope of this plan, along with other activities such as analytical chemistry, security, and pit manufacturing, DOE has determined that the TA-18 Relocation proposal must move forward independent of this broader planning effort to ensure continuous mission support. Many of the activities in this planning effort are in the preliminary phase of consideration and the effort is too speculative at the present time for NEPA analysis. To the extent sufficient information is available, this draft EIS discusses the potential cumulative impacts from other reasonably foreseeable activities at LANL.

S.2 PROJECT OPERATIONS AND REQUIREMENTS

DOE intends to continue to perform TA-18 mission operations. The mission operations, therefore, as well as the requirements to fulfill them at a new location, are those identified by current activities at TA-18 and are described below.

S.2.1 Operations

TA-18 personnel perform general-purpose nuclear materials handling, experiments, and training, including the construction and operation of high-multiplication devices, delayed critical devices, and prompt critical devices. The operational capabilities located at TA-18 enable DOE personnel to gain knowledge and expertise in advanced nuclear technologies that support the following areas:

- Nuclear Materials Management and Criticality Safety
- Emergency Response
- Nonproliferation and Safeguards and Arms Control
- Stewardship Science

Nuclear Materials Management and Criticality Safety

The objective of nuclear materials management and criticality safety activities is to ensure that fissile material is handled so that it remains subcritical under both normal and credible abnormal conditions to protect workers, the public, and the environment. This objective is relevant to all DOE programs that are responsible for safely managing SNM. The following activities would be required to support nuclear materials management and criticality safety:

- performance of experiments to support safety evaluations for nuclear material process operations

[1] *Technical areas at SNL/NM are designated using roman numerals rather than the arabic numerals used at LANL.*

- testing and qualifying equipment and systems used to ensure nuclear criticality safety
- conducting experiments to better understand criticality impacts of nuclear materials in new physical situations
- maintaining the capability and expertise of DOE's nuclear criticality safety engineers and those who have criticality-safety-related responsibilities

Emergency Response

The Emergency Response Program elements conducted at TA-18 would include the following activities:

- training, drills, experiments, and technology development activities for emergency response personnel
- constructing mock-ups of realistic weapons designs to test, develop, and validate detection equipment and methods to maintain emergency response capabilities
- using nuclear material to conduct criticality experiments to avoid technological surprises

Nonproliferation and Safeguards and Arms Control

Operations at TA-18 have already played a pivotal role in the development of verification technology for the Strategic Arms Reduction Treaty I and Intermediate-Range Nuclear Forces Agreements. Additionally, TA-18 operational capabilities provide ongoing training of inspectors and development of safeguards technology for the International Atomic Energy Agency. The following activities would be performed to support the nuclear nonproliferation and safeguards and arms control:

- supporting development and testing of technologies for conducting nuclear measurements for verification or transparency of declarations concerning nuclear weapons
- developing and evaluating new technologies for conducting nuclear measurements to determine the presence of nuclear materials
- conducting training of law enforcement and emergency response personnel using nuclear materials in realistic settings
- providing independent assessment of other Federal agencies' technologies to assist in the selection of emergency response capabilities.

Stewardship Science

Stockpile stewardship is a principal mission responsibility of the NNSA, pursuant to national policy, presidential directives, and public law. A major element of this mission responsibility is the development and application of scientific and technical capabilities to assure the continued safety and reliability of U.S. nuclear weapons in the absence of underground nuclear testing.

S.2.2 Facilities, Personnel, and Materials Requirements

A diverse team sponsored by the DOE Office of Defense Programs was selected to review DOE's mission requirements presently supported at LANL's TA-18. This review encompassed all past, current, and any

envisioned mission requirements, including all of the operational capabilities identified above. The team was tasked with recommending needed facilities, as well as requirements for special experimental equipment, personnel, and materials to support the operational capabilities and materials supported at TA-18.

Three subteams for the major mission requirements (Nuclear Materials Management and Criticality Safety, Emergency Response, and Nonproliferation and Safeguards and Arms Control) were established. The subteams were responsible for providing input for the report that delineates the facility, equipment, personnel, and material requirements to support planned and projected mission requirement workloads.

The TA-18 mission requirements review team reached consensus on the required facilities, equipment, personnel, and materials necessary to support the operational capabilities deemed necessary. The requirements are detailed in the project's *Functional and Operational Requirements Document* and are briefly discussed below.

Facilities and Equipment

The facilities needed to support current and future DOE mission requirements and TA-18 operational capabilities would consist of security Category I SNM experimental bays with control rooms for critical assembly machines, SNM storage vaults, waste storage areas, SNM shipping and receiving areas, a low-scatter facility, a radiography bay, office space, conference rooms, training facilities, access control areas, change-room facilities, a machine shop, an electronics fabrication shop, and other facilities necessary to meet the requirements for the safe handling of nuclear materials.

Four security Category I/II SNM critical assembly machines are required to support ongoing TA-18 operational capability requirements. These machines, discussed below, would be refurbished or replaced and relocated from TA-18 if a relocation alternative is selected.

- A general-purpose vertical-lift table machine for training and initial assembly of new experiments. Vertical-lift machines are ideal for this purpose because the stored energy for disassembly is provided by gravity. At the present time, the Planet machine provides this function.

- A fast-neutron-spectrum benchmarked assembly for validation of calculational methods, basic measurements of nuclear data of interest to defense and nuclear nonproliferation programs, and training. At the present time, the Flattop assembly serves this purpose.

- A pulse assembly to validate dynamic weapons models, verify the function of criticality alarm systems to a fast transient, calibrate detectors, and validate radiation dosimetry. The Godiva assembly provides this function at the present time. The Godiva assembly is particularly appropriate for the validation of dosimetry.

- A large-capacity, general-purpose vertical table machine to accommodate benchmark experiments designed to explore unknowns. The Comet machine at TA-18 is currently used for this purpose. It is presently stacked with a massive assembly to evaluate intermediate neutron spectra for the first time.

The current operations at TA-18 are also supported by SHEBA, a low-enriched uranium-solution critical assembly security Category IV SNM machine. It provides capabilities for free-field irradiation of criticality alarm systems and dosimetry validation. The SHEBA activities relocation under the various alternatives is discussed in detail in the EIS.

Personnel

Technical staff are needed (including physicists, engineers, and technicians) to perform existing TA-18 and new-facility mission support functions. These personnel require significant unique experience in nuclear criticality safety experiments and nuclear materials handling; neutron, gamma, and x-ray measurements; nuclear instrumentation design; and real-time radiography. Additionally, the personnel need significant experience in hazard Category 2, security Category I/II SNM nuclear facility operations, authorization-basis development and maintenance, and quality assurance. Also, a number of other support personnel, including safeguards-and-security-knowledgeable personnel, are needed to implement the security requirements for the protection of SNM.

Materials

The current inventory of nuclear material at TA-18 consists of approximately 2.8 metric tons (3.1 tons) of security Category I SNM and 18.5 metric tons (20 tons) of depleted and natural uranium and thorium. However, as a result of a concerted effort to reduce unnecessary site inventory, the forecasted mission support need would be to accommodate approximately 2.4 metric tons (2.6 tons) of security Category I SNM and 10 metric tons (11 tons) of depleted natural uranium and thorium (which do not require special security arrangements). The SNM inventory would consist of uranium in various forms and enrichments and plutonium (mostly metals, double-encapsulated or clad), with a wide variety of contents including plutonium-240, uranium-233, neptunium-237, thorium, and other isotopic sources.

S.3 Development of Reasonable Alternatives

The *TA-18 Relocation EIS* evaluates the environmental impacts associated with the proposed action of relocating TA-18 capabilities and materials associated with security Category I/II activities to a new location. Location alternatives include the following DOE sites: (1) a different site at LANL at Los Alamos, New Mexico; (2) SNL/NM at Albuquerque, New Mexico; (3) NTS near Las Vegas, Nevada; and (4) ANL-W near Idaho Falls, Idaho. These site alternatives were developed by a Department-wide Option Study Group chartered to develop reasonable alternatives for the relocation of TA-18 operations. Criteria were developed that screened for sites with existing security Category I/II infrastructure; nuclear environmental, safety, and health infrastructure; and compatibility between the site and TA-18 operational capabilities. In conjunction with the relocation of security Category I/II activities the EIS also evaluates the environmental impacts associated with the relocation of TA-18 security Category III/IV activities within LANL. The alternatives evaluated in the EIS are as follows:

TA-18 Upgrade Alternative—This alternative would involve upgrading the buildings, infrastructure and security infrastructure of the existing TA-18 facilities to continue housing these TA-18 operations at their present location at LANL. Under this alternative, some construction activities would be necessary.

LANL New Facility Alternative—This alternative would involve housing the security Category I/II activities in a new building to be constructed near the Plutonium Facility 4 at TA-55. Under this alternative, a portion of the security Category III/IV activities (the SHEBA activities) would either be relocated to a new structure at TA-39 or remain at TA-18; the rest of the security Category III/IV activities would either be relocated to a new structure at TA-55 or remain at TA-18.

SNL/NM Alternative—This alternative would involve the housing of the security Category I/II TA-18 operations within a new security Category I/II facility within TA-V at SNL/NM. Currently, SNL/NM operates a variety of research-oriented nuclear facilities at TA-V. A new underground facility and modifications to existing buildings would be required. Under this alternative, a portion of the security

Category III/IV activities (the SHEBA activities) would either be relocated to a new structure at LANL's TA-39 or remain at TA-18; the rest of the security Category III/IV activities would remain at TA-18.

NTS Alternative—This alternative would involve the housing of the security Category I/II TA-18 operations in and around the existing DAF. Currently, DAF is used for the assembly of subcritical assemblies, as well as other miscellaneous national security missions. Under this alternative, a portion of the security Category III/IV activities (the SHEBA activities) would either be relocated to a new structure at LANL's TA-39 or remain at TA-18; the rest of the security Category III/IV activities would remain at TA-18.

ANL-W Alternative—This alternative would involve the housing of the security Category I/II TA-18 operations in the existing Fuel Manufacturing Facility (FMF) and other existing buildings at ANL-W. New construction to expand the existing FMF would be required to accommodate the TA-18 operations. Security upgrades would also be necessary. Under this alternative, a portion of the security Category III/IV activities (the SHEBA activities) would either be relocated to a new structure at LANL's TA-39 or remain at TA-18; the rest of the security Category III/IV activities would remain at TA-18.

No Action Alternative—As required by Council on Environmental Quality regulations, the *TA-18 Relocation EIS* includes the No Action Alternative of maintaining the TA-18 operations at the current location. This alternative would maintain the current missions at TA-18 as described in the Expanded Operations Alternative of the *Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory (LANL SWEIS)* and the associated Record of Decision (64 FR 50797). No upgrades or alternatives of either building, infrastructure or security infrastructure would occur.

Table S–1 illustrates the proposed relocation sites for the TA-18 capabilities and materials.

Table S–1 Proposed Relocation Sites for TA-18 Capabilities and Materials

Activities	*No Action Alternative*	*TA-18 Upgrade Alternative*	*LANL New Facility Alternative*	*SNL/NM Alternative*	*NTS Alternative*	*ANL-W Alternative*
Security Category I/II	TA-18	TA-18	TA-55	TA-V	DAF	FMF/ZPPR
SHEBA (Security Category IV)	TA-18	TA-18	TA-39 or TA-18	TA-39 or TA-18	TA-39 or TA-18	TA-39 or TA-18
Other Security Category III/IV	TA-18	TA-18	TA-55 or TA-18	TA-18	TA-18	TA-18

ZPPR = Zero Power Physics Reactor.

S.3.1 Planning Assumptions and Basis for Analysis

For the *TA-18 Relocation EIS* alternatives, the EIS evaluates relocating the operations currently performed at LANL's TA-18 to one of four alternative locations. The EIS evaluates the direct, indirect, and cumulative impacts associated with (1) the relocation of criticality operational capabilities and support equipment to each of the four alternative locations; (2) the relocation of some of the inventory of nuclear materials currently stored at TA-18 to each of the four alternative locations; (3) the construction of new or the modification of existing facilities to accommodate the security Category I/II activities at each of the alternative locations; and (4) the operation of the new or existing facility(s) for a 25-year duration. The EIS also discusses in a generic and qualitative manner the eventual decontamination and decommissioning of any new facility proposed for construction and the disposition of TA-18 buildings, infrastructure, and surplus equipment after the proposed relocation. In addition, the EIS evaluates the environmental impacts associated with the continuation of the operations at TA-18 by upgrading the existing TA-18 facilities (TA-18 Upgrade Alternative) and the relocation of SHEBA and other security Category III/IV activities, currently performed

at TA-18, to another location(s) within LANL. Some of the more specific assumptions and considerations that form the bases of the analyses and impact assessments that are the subject of the EIS are presented below.

- As required by the Council on Environmental Quality regulations, the *TA-18 Relocation EIS* evaluates a No Action Alternative for comparison purposes. The No Action Alternative, which currently supports mission requirements at TA-18, may limit DOE's ability to support future DOE mission requirements unless significant upgrades to TA-18 infrastructure are accomplished.

- TA-18 operations consist of security Category I/II activities, as well as security Category III/IV activities. Security concerns regarding the relocation of TA-18 mission operations primarily involve security Category I/II activities. Relocating the TA-18 security Category I/II activities to a new location within an existing security Category I/II area has the potential to reduce life-cycle costs and improve safeguards and security. While there are no similar security concerns involving security Category III/IV activities, existing infrastructure problems at TA-18 necessitate addressing the relocation of these activities in conjunction with the relocation of security Category I/II activities. The separate treatment of the relocation of TA-18 activities in terms of security categories is reflected in the presentation of the alternatives as discussed in Section S.3.2.

- The projected start dates and estimated duration of modifications and construction for each alternative vary with each site. The periods fall in the range of 2 to 3 years. For the purpose of the analysis, it was assumed that construction under any of the alternatives would start sometime in 2004 to 2005 and would be completed by sometime in 2007 to 2008, for a construction period of 3 years. Operations would start in 2008. In accordance with the *Functional and Operational Requirements Document*, the TA-18 replacement facility subsystems and components (including criticality experiments machines) would be designed for a service life of at least 25 years. Therefore, the EIS assesses the environmental impacts associated with the operation of the existing or new facilities for a period of 25 years, at which time the structures would undergo decontamination and decommissioning.

- The new buildings proposed for the relocation of the TA-18 capabilities and materials are in a preliminary design stage. Therefore, they are not described in detail in the EIS. However, for the purpose of the environmental impact analysis, conservative assumptions have been used such that construction requirements and operational characteristics of these buildings would maximize the environmental impacts. Thus, the potential impacts from the implementation of the finalized-design alternatives would be less severe than those analyzed in this EIS.

- Of the critical assembly machines proposed for relocation, Comet, Planet, and Flattop are over 40 years old, and extensive refurbishment or replacement of these machines would be required before continuing their missions. Godiva is slightly more modern, and many of its subsystems have been recently upgraded.

  Flattop would be rebuilt using the original uranium parts; all other parts would be new. A new smaller table would be built with separated hydraulics and electrical components, simplified and more accessible control rod drives, and a modern control system. The refurbishment is expected to have minimal environmental impacts, and its operational characteristics would remain the same. The old table, electrical racks, and hydraulic systems would be disposed of as low-level radioactive waste. The waste stream would be less than 4.6 metric tons (5 tons) of low-level radioactive waste. There is a potential that lead-based paint may have been used on the table, which would result in part of the waste stream being characterized as mixed radioactive waste.

The two general assembly machines (Comet and Planet) would be moved, one at a time, to the new facility in a staged transition. This would require building a new machine stand and control assembly. A second control cartridge and stand would be manufactured, and the second machine would then be moved and brought into service. The waste stream would include two control cartridges and two machine stands and would be less than 0.9 metric tons (1 ton) of low-level radioactive waste each. The machine stands may potentially have lead-based paint on them due to the formulation of most paints at the time the stands were painted.

The Godiva stand would be used as is. It would be defueled before shipment and reassembled at the final destination. Most of the hydraulic and air systems have been refurbished recently. The 110-volt alternating-current control system would be replaced by a 24-volt direct-current control system. Some of the limit switches and wiring would be refurbished. The waste stream would be minimal and would be mostly low-level radioactive waste.

- Unique technical knowledge and experience in nuclear criticality is necessary to maintain TA-18 operational capabilities and to fulfill programmatic requirements. The expertise required to perform each mission set overlaps certain key skills such that many of the technical experts work in two or more major programmatic areas and, therefore, cannot easily be separated. Additionally, TA-18 technical personnel interact routinely with multiple organizations in LANL to collaborate on research and development issues involving weapon design and detector technology.

  To capitalize on this synergy, DOE has determined that LANL will retain responsibility for the TA-18 missions, regardless of the final location for security Category I/II operations. If a location other than LANL were selected for security Category I/II operations, LANL personnel will continue to maintain responsibility for those missions. Under this scenario, it is likely that security Category I/II operations would be conducted in a campaign mode with LANL personnel traveling to the new location on a temporary basis to conduct experiments. In addition, up to 20 support and operations personnel may be permanently relocated. To minimize programmatic impacts to TA-18 missions, DOE proposes that security Category III/IV operations remain at LANL so that TA-18 personnel can continue to routinely collaborate with other experts in a research and development environment.

- Proven technology is used as a baseline. No credit is taken for emerging technology improvements.

- The core set of accident scenarios selected from the LANL *Basis for Interim Operations for the Los Alamos Critical Experiments Facility (LACEF) and Hillside Vault (PL-26)* are applicable to each relocation alternative with adjustments to certain parameter values (e.g., leak path factors and materials at risk) to reflect site-specific features. Added to the core set of accidents are other site-specific accidents, if any, caused by natural phenomena or accidents at collocated facilities, that have the potential for initiating accidents at the relocated TA-18 facilities. The impacts of accidents analyzed for each alternative reflect and bound the impacts of all reasonably foreseeable accidents that could occur if the alternative were implemented.

- Decontamination and decommissioning of facilities as a result of the proposed action pertains to two distinct areas: (1) decontamination and decommissioning of the existing TA-18 facilities if all current operations and materials are relocated and no other program support personnel use the vacated facilities, and (2) decontamination and decommissioning of existing or new relocation facilities at the end of the 25-year proposed operation period. At the present time, the ultimate disposition of either the existing TA-18 structures or the proposed equipment for relocation and its associated new structures is not known. However, the current condition and contamination history of the TA-18 facilities and the projected use

of the alternative facilities allows a qualitative assessment of the nature and extent of decontamination that would be required to allow the facilities to be released for unrestricted use.

- The relocation of the operational capabilities associated with security Category I/II activities from TA-18 would require transportation of the critical assembly machines as well as the security Category I SNM currently stored at TA-18 to the relocation site. This includes the transportation of up to approximately 2.4 metric tons (2.6 tons) of SNM to the relocation sites. Any nuclear material currently at TA-18 not deemed needed for future missions would be dispositioned through normal channels by DOE and LANL in accordance with previously prepared or future NEPA documents.

- The current operational characteristics of the critical assembly machines form the basis for the impact analysis at all other locations. These characteristics, based on the current operation of TA-18 facilities as described in the *LANL SWEIS*, are presented in **Table S–2** and discussed briefly below.

Table S–2 Operational Characteristics at TA-18

Electricity usage	2,836 megawatt-hours per year
Water usage	14.6 million liters per year
Nonradiological gaseous effluent	None
Radiological gaseous effluent	10 curies per year, argon-41 (Godiva); 100 curies per year, argon-41 (SHEBA)
Nonradiological liquid effluent	None
Radiological liquid effluent	None
Chemical effluent	None
Workforce	212 workers
Worker dose	21 person-rem per year, based on 212 workers
Waste generation	
- High-level radioactive waste	None
- Transuranic waste	None
- Low-level radioactive waste	145 cubic meters per year
- Mixed low-level radioactive waste	Less than 2 cubic meters per year
- Chemical waste (RCRA/TSCA waste)	4,000 kilograms per year
- Sanitary waste	14.6 million liters per year

RCRA = Resource Conservation and Recovery Act; TSCA = Toxic Substances Control Act.

Infrastructure Parameters—Activities associated with the operations at TA-18 are not energy- or water-use intensive. Electricity and water use at TA-18 are a small fraction of the site-wide use and would continue to be small fractions in all proposed relocation sites. There is limited use of natural gas and propane at TA-18.

Nonradiological Effluent—Criticality experiments and supporting activities do not involve nonradiological effluent in either gaseous or liquid form. However, diesel generators may be used as a source of emergency power at new locations. Emissions from diesel generator operation are included in the environmental analysis.

Radiological Effluent—The critical assemblies are designed to operate at low power and at temperatures well below phase-change transition temperatures. They do not generate significant radiological inventory of long-lived fission products and do not require forced convection cooling. Therefore, air-activation products, produced by interactions with the air outside of critical assemblies, are the primary source of air emissions.

Among the critical assemblies in TA-18, those intended for prompt critical operation, namely the Godiva assembly and SHEBA, are the major source of air-activation products. The Godiva assembly, in the past, was frequently operated outside of the remote-controlled CASA that houses it. This practice would not be continued if the activities are relocated. SHEBA, which is housed in a small weather-proof building that provides no shielding, is the major contributor to the air-activation products. The Planet, Comet, and Flattop assemblies run at lower-power levels (low fission rates) and operate inside the building, which reduces the air-activation products.

The air-activation products are generated from neutron interaction with air molecules containing argon, nitrogen, and oxygen. The radionuclide of greatest concern is argon-41, due to its 1.82-hour half-life and relatively large neutron-absorption cross section.

Air-activation products from neutron interaction generated during the operation of SHEBA and the Godiva assembly (assumed to be operating outside of CASA 3) were estimated assuming a 120-meter (394-foot) hemisphere of air surrounding each critical assembly. Although future operations of Godiva would not take place outside, if relocated, argon-41 generation from the Godiva assembly operations is conservatively assumed to be 10 curies per year. Argon-41 generation from SHEBA operations is assumed to be 100 curies per year. There is no argon-41 generation from the operation of the other critical assemblies.

Chemical Effluent—Criticality experiments and supporting activities do not involve the normal release of any chemicals in a gaseous or liquid form.

Worker Dose—The total annual dose to workers at TA-18 was estimated to be 21 person-rem for 212 workers. This corresponds to an average of 0.1 rem per worker per year, which was assumed to be the single worker annual dose from routine operations.

Workforce—The workforce at TA-18 is approximately 200. For the purpose of estimating total worker dose, the workforce at sites other than TA-18 was assumed to be 100 (excludes personnel for security Category III/IV activities). For the purpose of assessing socioeconomic effects, it was assumed that up to 20 persons would relocate permanently away from LANL, should a site other than LANL be selected.

Waste Generation—Criticality experiments and supporting activities involve some generation of low-level radioactive waste, primarily consisting of personnel protective equipment, wipes and rags. They also involve the generation of small quantities of mixed low-level radioactive waste consisting of machine shop scraps, solvents, and wipes. No high-level radioactive or transuranic waste is generated. The operations involve the generation of about 4,000 kilograms (8,800 pounds) of hazardous chemical solids annually from chemicals and solvents used during support activities. Also, nonhazardous wastes are generated (such as office paper and other debris).

S.3.2 Alternatives Evaluated

S.3.2.1 No Action Alternative

As required by Council on Environmental Quality regulations, the *TA-18 Relocation EIS* evaluates the No Action Alternative of maintaining the operations and materials at the current TA-18 location. Under the No Action Alternative, current operational capabilities and materials at TA-18 would be maintained as described in the Expanded Operations Alternative of the *LANL SWEIS* and associated Record of Decision (64 FR 50797). The No Action Alternative may limit DOE's ability to support future DOE mission support requirements unless significant upgrades to the TA-18 infrastructure are accomplished.