DOE/EA–1381

Atlas Relocation and Operation At the Nevada Test Site

Final
Environmental Assessment

May 2001

U. S. Department of Energy
National Nuclear Security Administration
Nevada Operations Office
Las Vegas, Nevada

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U.S. DEPARTMENT OF ENERGY
NATIONAL NUCLEAR SECURITY ADMINISTRATION
FINDING OF NO SIGNIFICANT IMPACT

ATLAS RELOCATION AND OPERATION AT THE NEVADA TEST SITE

The National Nuclear Security Administration (NNSA) prepared an Environmental Assessment (EA) (DOE/EA-1381) to analyze the proposed action to relocate the Atlas pulse power machine from Los Alamos National Laboratory (LANL) to the Nevada Test Site (NTS). At the NTS, Atlas would be reassembled in a newly constructed building within a designated Industrial, Research, and Support site in Area 6. After reassembly, Atlas would be commissioned to ensure proper operation and then used to conduct approximately 40 pulsed power experiments per year, with a potential to increase to approximately 100 experiments per year, should the Stockpile Stewardship Program require it. The EA also addresses alternatives to the proposed action and analyzes the no-action alternative wherein the Atlas pulse power machine would remain in Los Alamos, New Mexico and continue to be operated at the LANL site.

The purpose and need of the NNSA is described in Section 1.0 of the EA. A detailed description of the proposed action and alternatives is presented in Section 2.0. Section 3.0 describes the affected environment. Section 4.0 describes the environmental consequences of the proposed action and no-action alternative. Cumulative effects are addressed in Section 5.0. The proposed action of moving the Atlas machine to the NTS does not represent a major change to the stockpile stewardship program but rather a relocation of an asset within the stockpile stewardship complex.

FINDING:

Based on the information and analysis contained in the EA, the DOE finds that neither the proposed action nor the alternative would constitute a major federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq*.). Thus, an environmental impact statement is not required.

Original signed by Kenneth W. Powers
for
Kathleen A. Carlson, Manager
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Date:__5/30/01_________________

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List of Acronyms

BN	Bechtel Nevada
C	Centigrade
CAA	Clean Air Act
Cfm	Cubic Feet per Minute
CFR	Code of Federal Regulations
DAF	Device Assembly Facility
DARHT	Dual Axis Radiographic Hydrodynamic Test Facility
dB	Decibels
dBA	A-weighted decibels
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DU	Depleted Uranium
EA	Environmental Assessment
EIS	Environmental Impact Statement
eV	Electron Volts
F	Fahrenheit
ft	Foot
G	Gauss
km	Kilometers
kph	Kilometers per Hour
LANL	Los Alamos National Laboratory
LLNL	Lawrence Livermore National Laboratory
m	Meters
m/s	Meters/second
mi	Miles
MJ	Megajoule
MW	Megawatt
mph	Miles per Hour
mrem	Millirem
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NNSA	National Nuclear Security Administration
NTS	Nevada Test Site
NTS EIS	Nevada Test Site Environmental Impact Statement
NV	Nevada Operations Office
PCi/g	Picocuries/gram
PEIS	Programmatic Environmental Impact Statement
PM10	Particulate Matter less than 10 microns in diameter
ppm	Parts per Million
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RWMS	Radioactive Waste Management Site
SCE	Subcritical Experiments
SF4	Sulfur Tetrafluoride
SF6	Sulfur Hexafluoride
SSM	Stockpile Stewardship and Management
TA	Technical Area
TSCA	Toxic Substances Control Act
VOCs	Volatile Organic Compounds

1.0 INTRODUCTION

The National Environmental Policy Act of 1969 (NEPA) requires Federal agency officials to consider the environmental consequences of proposed actions before decisions are made. In complying with NEPA, the National Nuclear Security Administration (NNSA) follows the Council on Environmental Quality regulations (40 Code of Federal Regulations [CFR] 1500-1508) and the Department of Energy's (DOE's) NEPA implementing procedures (10 CFR 1021). The purpose of an Environmental Assessment (EA) is to provide Federal decision makers with sufficient evidence and analysis to determine whether to prepare an Environmental Impact Statement (EIS) or issue a Finding of No Significant Impact. This EA has been prepared to assess environmental consequences resulting from the implementation of a proposal to relocate a hydrodynamic test machine, the Atlas pulsed power machine, from Los Alamos National Laboratory (LANL) to the Nevada Test Site (NTS), where it would then be set up and operated.

1.1 BACKGROUND

In August 1996, DOE published a *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (NTS EIS). The Record of Decision (ROD) for the NTS EIS stated, "Defense Program activities at the Nevada Test Site will emphasize stockpile stewardship experiments and operations to maintain confidence in the safety and reliability of the stockpile without underground nuclear testing. These stockpile stewardship activities will include exercises, operations, experiments (including subcritical experiments involving special nuclear material), and other hydrodynamic tests." Further, the ROD indicates that DOE plans to conduct a wide variety of Stockpile Stewardship experiments at the NTS, including dynamic experiments, subcritical experiments, dynamic experiments to generate electrical pulses, and other experiment types. These experiments would be conducted within the appropriately zoned areas of the NTS. In addition, the ROD states, "the DOE will also reserve land and infrastructure on the Nevada Test Site to support the current test readiness and national security missions and to support future defense program activities."

The term "stockpile stewardship" refers to core competencies in activities associated with research, design, development, and testing of nuclear weapons, and the assessment and certification of their safety and reliability under a Comprehensive Test Ban Treaty. Historically, these activities have been performed at three weapons laboratories (Los Alamos National Laboratory [LANL] in New Mexico, Lawrence Livermore National Laboratory [LLNL] in California, and Sandia National Laboratories [SNL] in New Mexico and California) and the NTS.

In March 2000 the National Nuclear Security Administration (NNSA) was created to carry out the national nuclear security responsibilities of the DOE including maintenance of a safe, secure and reliable stockpile of nuclear weapons and associated materials capabilities and technologies. NNSA manages a science-based stockpile stewardship program that uses a variety of technologies including lasers and pulsed power to maintain and enhance the safety, reliability, and performance of the United States nuclear weapons stockpile, including the ability to design, produce, and test, in order to meet national security requirements. The Atlas facility, classified as a low hazard, non-nuclear facility, provides significantly enhanced capability to the stockpile stewardship program by extending the pressures and energy densities achievable in large experimental volumes (cubic centimeter size) and in converging geometries for benchmarking and validating models used to evaluate effects of aging (such as high aspect ratio cracks) or changes due to remanufacturing on weapon performance and reliability (DOE, 1996b).

One outcome of the Stockpile Stewardship and Management Programmatic Environmental Impact Statement (SSM PEIS) and its associated ROD, also issued in 1996, was the siting and construction of the Atlas facility at LANL. More specifically, Atlas was located at LANL so that it could make use of an existing 1,430 megawatt (MW) rotating generator to charge the Atlas high energy density capacitors very rapidly. At that time, rapid (<1 second) charging of the capacitors and switches in the energy storage section of the Atlas machine was the only way to achieve the high reliability required for Stockpile Stewardship Program experiments (a more detailed description of this requirement is in Appendix K of the SSM PEIS). Since then, a combination of charging, energy storage, and high voltage switching technology has been demonstrated that can operate with a high degree of reliability in a more conventional regime of charge time (i.e., <30 seconds) using commercial power supplies. Consequently, operation of Atlas is no longer dependent upon the existing LANL generator. Full-scale assembly of the machine began in November, 1999 and construction was completed in August, 2000. Following successful completion of acceptance testing, Atlas is scheduled to begin physics experiments in June, 2001.

In 1999 and 2000, Congress appropriated funds in the Energy and Water Appropriation FY00 Conference Report 106-536 and FY01 Conference Report 106-988 for proof of concept experiments and completion of facility operational capability for the Atlas pulsed power machine at the NTS. On September 11, 2000, the Deputy Administrator for Defense Programs directed the managers of the Albuquerque and Nevada Operations Offices to prepare a plan to estimate the cost and schedule to move and reassemble Atlas in Nevada and have it jointly operated by LANL and Bechtel Nevada in support of the Stockpile Stewardship Program. The relocation plan was prepared and presented to the Deputy Administrator for Defense Programs on October 27, 2000. On December 8, 2000, the Deputy Administrator for Defense Programs authorized the use of appropriated funds to develop a performance baseline for the project and to complete the NEPA analysis for the relocation.

In February, 2001, the U.S. Department of Energy Office of Inspector General issued an audit report on “The Need for Atlas Pulsed Power Experimental Facility” (DOE/IG-0495, February, 2001) which listed three recommendations for the Deputy Administrator for Defense Programs, National Nuclear Security Administration. These recommendations were:

1. Establish a formal prioritization process to help ensure that funds are available to operate Stockpile Stewardship projects based on detailed cost information;
2. Ensure that prior to construction, projects have operating funding requirements identified and that request for operating funds are made in a timely manner; and,

3. Notify Congress if there is any change in plan to operate Atlas once it is moved to the NTS.

NNSA concurred with recommendations 2 and 3. Recommendation 1 recommends a new prioritization process that was considered counter-productive to the existing budget and planning structure.

1.2 PURPOSE AND NEED FOR THE PROPOSED ACTION

U.S. National Security Policy requires the NNSA to maintain core intellectual and technical competencies in nuclear weapons and to maintain a safe and reliable U.S. nuclear weapons stockpile. The NNSA fulfills its nuclear weapons responsibilities through the Stockpile Stewardship Program, which involves the integrated activities of three national laboratories (LANL, LLNL, and SNL), four industrial plants, and the NTS. Together these sites make up the nuclear weapons complex. Efficient implementation of the Stockpile Stewardship Program without nuclear testing requires NNSA to maintain the safety, security, and reliability of the U.S. nuclear weapons stockpile through enhanced experimental capability at its facilities.

NNSA has a continuing need to improve the experimental capability and the efficiency of the Stockpile Stewardship Program and to broaden and strengthen its intellectual and technical capability at the NTS. In order to maintain the historical core competencies and capabilities of the NTS, NNSA needs to focus on issues associated with strong and efficient implementation of the Stockpile Stewardship Program, engage the technical involvement of Nevada Operations Office (NV) personnel and contractors with the technical expertise held by the national laboratories and enhance the scientific and engineering competencies and capabilities at the NTS. The NNSA Defense Programs investment in NTS activities need to be optimized by engaging Bechtel Nevada (BN) experimental and diagnostic scientists in advanced experiments on Atlas that contribute to Stockpile Stewardship Program data needs and that develop and refine capabilities needed for Atlas, subcritical experiments, and nuclear test readiness. Cost reduction would be realized by applying BN's capabilities in facility operations and project management. NTS operational effectiveness needs to be improved by load leveling with subcritical experiments and by improving utilization of the NTS physical plant. BN, in supporting the Laboratory subcritical experiment activities and other activities at the NTS, has increased staffing in technically skilled personnel (e.g., diagnostics development, fielding, data acquisition, technical management) and in other areas (e.g., assets control, instrumentation) as well. Because of the extended and complex nature of the subcritical schedule, the program does not require nor can it employ all these resources on a full-time basis. The Atlas experimental schedule, (approximately 40, nominally weekly, experiments per year) is highly flexible and can adjust to use the skills of technically skilled professionals during times while they await subcritical experiment critical path items. Similarly the Atlas experimental schedule could be structured to avoid operation during times when demands of the subcritical program are high, and personnel nominally assigned to Atlas can assist in a short response time should a time-critical need arise in sub-critical activities (e.g., a surge capacity).

The NTS plays an important role in the integrated activities required to maintain a safe and reliable nuclear weapons stockpile. To ensure the continued appropriate levels of capability and readiness of the NTS to fulfill its role in the Stockpile Stewardship Program, NNSA needs the capability of doing large-volume hydrodynamic experiments at high energy density at the NTS. In order to achieve these enhancements at the NTS into the future, NNSA also needs to create higher education opportunities in high energy density physics in Nevada through collaboration with the University and Community College system of Nevada.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

This section describes the proposed action to relocate the Atlas pulsed-power machine to the NTS and to operate it. This section also discusses alternatives to the proposed action and describes the no-action alternative under which the Atlas facility would remain in Los Alamos, New Mexico and continue to be operated at that site.

2.1 PROPOSED ACTION

NNSA proposes to disassemble the Atlas pulsed power machine at LANL and transport it to the NTS (Figure 1). The proposed action of moving the Atlas machine to the NTS does not represent a major change to the stockpile stewardship program but rather a relocation of an asset within the stockpile stewardship complex. At the NTS, Atlas would be reassembled in a new building within a designated Area 6 Industrial, Research, and Support site (Figure 2). After Atlas is reassembled at the NTS, it would be recommissioned to ensure proper operation and then used to conduct approximately 40 pulsed power experiments each year, with a potential to increase to approximately 100 experiments per year should the Stockpile Stewardship Program require it, and if appropriate funding were available. At full operation, the Atlas facility is estimated to employ 15 people. The majority of the approximate 15-person Atlas operations crew is expected to be engineers and scientists. The building that would be constructed to house the Atlas facility at NTS is discussed in the following paragraphs.

The development of university participation in Atlas experiments will be a high priority effort. Collaboration in Atlas activities could take the form of a faculty-student team responsible for addressing an experimental topic on Atlas or it may take the form of a faculty/student team working on the development and implementation of a diagnostic capability on Atlas applied to a variety of experiments. For example, the topic of detailed metal equation-of-state measurements at pressures above 10 Mbar in converging geometry might be a suitable thesis topic and is very important to the Stockpile Stewardship Program. Similarly, the topic of diagnosing the state of material undergoing high strain rate deformation (melt diagnostic) would also comprise a challenging thesis topic and a successful diagnostic would be applicable to several Atlas experiments in the next 3-5 years as well as subcritical experiments.

2.1.1 Facility Description

At the NTS, the Atlas facility would be housed in a newly constructed, pre-engineered building estimated to be 20,000 ft^2 (Figure 3). The Atlas system requires a heavy industrial, high-bay building equipped with a heavy-duty gantry crane to house the capacitor bank and user support facilities. The building would be designed to the requirements for a low-hazard, non-nuclear facility. Atlas would require electromagnetically shielded rooms for classified and unclassified data acquisition and rooms for machine control. The capacitors in the Atlas capacitor bank use dielectric mineral oil (Diala-AX). A 150,000-liter (40,000-gallon) aboveground mineral oil storage tank would be located adjacent to the facility. Water and

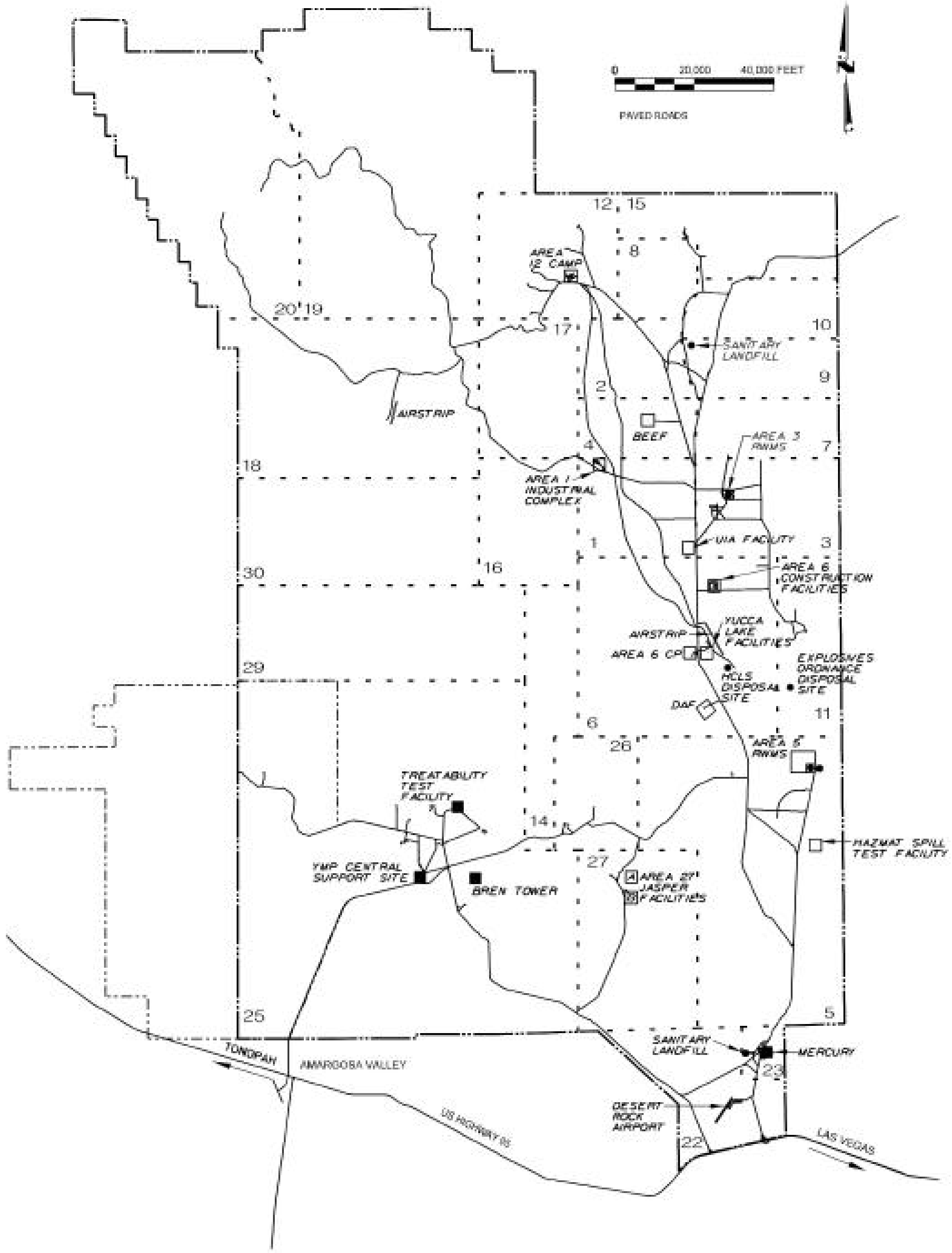

Figure 1 Map of NTS

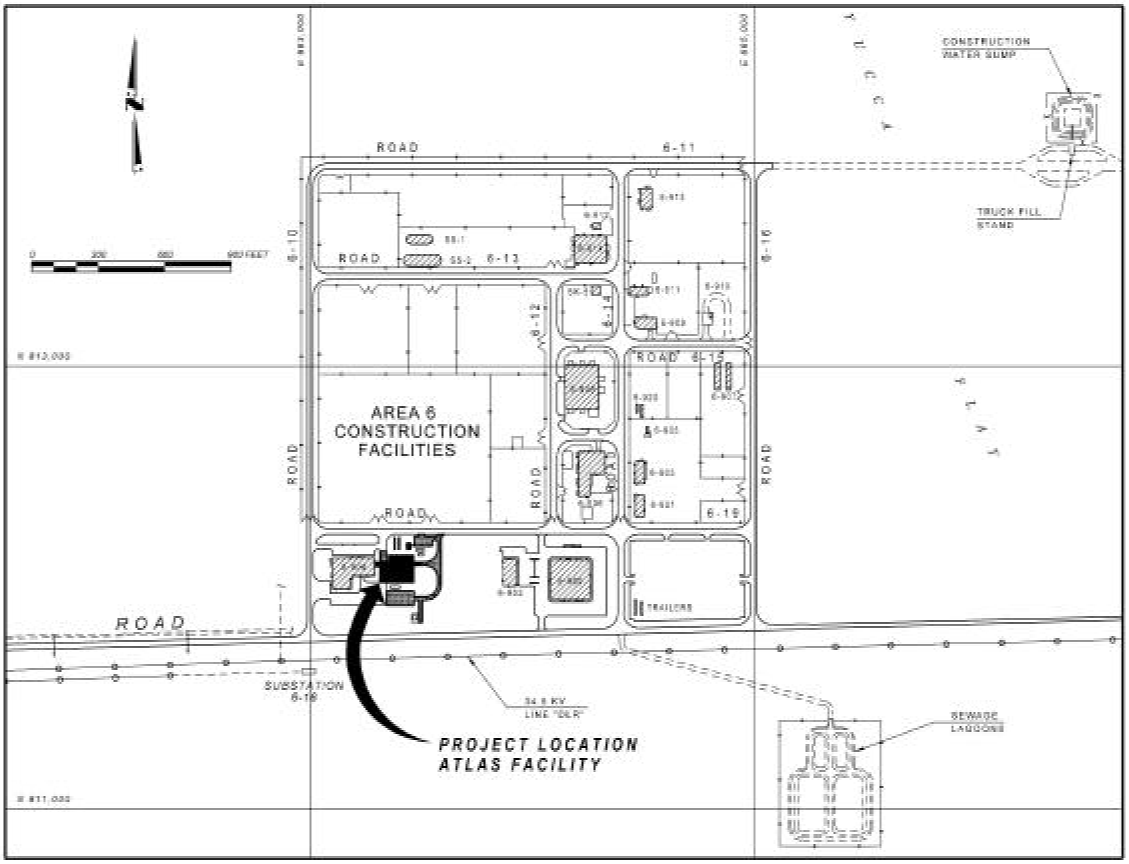

Figure 2 Vicinity Map of the Area 6 Construction Facilities and Atlas Facility

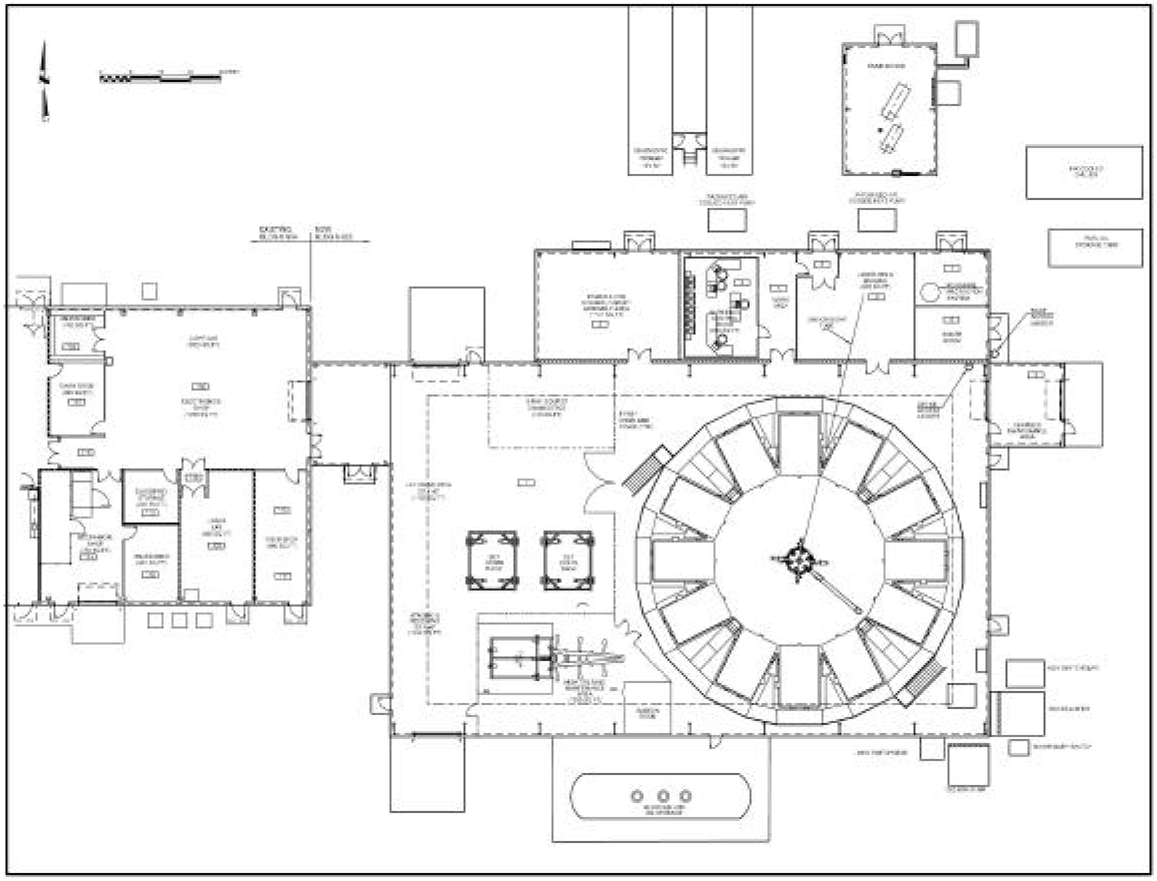

Figure 3 Site Layout of the Atlas Facility

sewer lines would be extended from the existing main lines to the new facility. An asphalt parking lot would also be constructed. A temporary machine component staging structure utilizing tension-fabric or air inflation technology might also be constructed next to the new high bay to accommodate piecepart and hardware receiving and assembly of materials prior to installation in the high bay.

Buildings located adjacent to the facility might be modified to provide support services or Atlas. These services include, but are not limited to: vacuum, electronics and machine shops; a laser backlighter area; pulse generator maintenance shop; an optics shop; darkrooms; and, a diagnostics shop and trailers. A security system would include a guard station, fencing, gates, communication equipment and lighting. Security configuration would allow both classified operations and unclassified experiments to be performed by uncleared university and foreign visiting scientists.

Primary components of the Atlas facility would include:

- Target chamber containing imploding liner assembly
- Capacitor bank
- Target assembly clean room
- Laser diagnostic systems
- X-ray diagnostic systems
- Control room
- Diagnostic screen rooms
- Radial and Axial experimental access for imaging diagnostics
- Spare capacitor module
- Vacuum pumps
- Structural platforms and stairwells
- Vertical tri-plate radial transmission line
- 150,000 liter (40,000 gallon) mineral oil storage and transfer system
- Transmission line ballast
- Argon/Sulfur Hexafluoride (SF6) gas system to supply switches with dielectric gas
- Heating, ventilation, and air conditioning systems
- Chilled water, nitrogen, and compressed air systems
- 300 liter (80 gallon) liquid nitrogen storage tank
- Diagnostic data center
- Project management office
- Visitor center/experimentalist/staff office building

The expected lifetime of the Atlas facility at NTS, assuming a maximum shot rate of 100 shots per year, is 10 years without major refurbishing. Assuming an average shot rate of 50 shots per year the expected lifetime of the facility would be 20 years. After approximately 1,000 shots, the facility could be refurbished for continued operation or the facility could be cleaned and decommissioned. If decommissioned, the Atlas machine and support equipment could then be made available for other uses or excessed, as appropriate. The term "excessed" refers to a process to disposition government property that implies the possible reuse of components, subsystems or whole systems first within the government and then by state and local government entities, educational institutions and the private sector.

2.1.2 Operations

The Atlas facility is designed to perform pulsed power experiments on macroscopic targets, i.e., targets that are larger than those possible when using lasers and other currently available equipment. Larger targets, on the order of a cubic centimeter in size, improve the ease of measurement and allow the investigation of physical phenomena that cannot be scaled down to smaller sizes without affecting parameters of importance.
The Atlas pulsed powered system is designed to deliver a pulse of very high electrical current through a high precision cylindrical metal liner that surrounds the sample of interest. The current produces a brief but powerful magnetic force on the liner, which implodes upon the sample. For hydrodynamic experiments, Atlas would deliver 25 to 30 megamperes to an imploding liner, which would reach velocities of over 15 cm/microsecond with final kinetic energies of 2 to 5 megajoules (MJ). Pressures of up to 20 megabars would be achieved, depending on the design of the experiment. At this energy density, the target and liner would reach an energy density necessary for understanding the physics of the late stages of primary and secondary implosion.

Pulsed-power systems deliver intense bursts of electrical energy by charging a large capacitor bank to a high voltage, then releasing the stored electrical energy in a short, single cycle, pulse of current through the target liner. During an experiment, electromagnetic energy would go sequentially from the supply source to the ac-dc-converter, through the inductor (optional), to the capacitors, and would finally be delivered to the target. The scenario described here is for an experiment requiring the maximum possible currents and magnetic fields. The Atlas capacitors would be charged with commercial electrical power by way of an alternating current (ac) to direct current (dc) converter (dc power supply) and would be arranged in multiples to form a capacitor bank. The Atlas capacitor bank has the capability to deliver energy in various quantities and within a range of time intervals. The Atlas capacitor bank would store up to 24 MJ of energy. Through a switching system, the capacitor modules would be placed in series to raise the voltage to nominally one/quarter megavolt just before being discharged through the target liner. The discharge takes approximately 10 microseconds.

Atlas at the NTS would support many related types of experiments. In a typical experiment, a hollow cylindrical piece of metal, perhaps fabricated with known cracks, voids, or other defects, would be placed inside the initially cylindrical liner. A heavy target, e.g., 30 grams (1.1 ounce), would be used to study the hydrodynamic effects of such defects in aging weapons. The magnetically driven liners would compress sample materials to high pressures and could produce partial ionization of the sample. In another family of experiments, a light target, e.g., 50 milligram (0.002 ounce) would be imploded upon itself to produce dense plasma to study the properties of strongly coupled plasmas pertinent to stockpile stewardship. Solid shrapnel and particulate metal dust would be generated but would be stopped by the walls of the target chamber.

The following target materials may be used in Atlas experiments:

Metal	Symbol	Atomic No.
Beryllium	Be	4
Aluminum	Al	13
Stainless Steel	**	**
Copper	Cu	29
Tin (white)	Sn	50
Tantalum	Ta	73
Tungsten	W	74
Lead	Pb	82
Depleted Uranium	DU	92

The behavior of the target material would be observed by the use of diagnostic x-rays and lasers beamed through line-of-sight, evacuated tubes that connect to ports on the target chamber. Diagnostic equipment would include air-monitoring devices, voltage probes, current probes, magnetic field measuring instruments, and various types of imaging (light, X-ray, laser) diagnostics. Data acquisition equipment would consist of cameras, lasers, x-ray detectors, and other similar equipment. Experiments would yield laser holographic images and x-ray radiographs of the implosion, which would be captured and recorded to determine the hydrodynamic behavior of the experiment.

After each experiment, workers would clean the target chamber of metallic debris and deformed metallic targets. Up to 150 liters (42 gallons) of ethanol would be used per year for cleaning purposes. Discarded materials following each experiment would consist mostly of small amounts of one of the metals listed above. Any metal target pieces recovered would be excellent candidates for post shot (recovery) evaluation and analysis. Ordinary hardware may be salvaged or reused if appropriate. Personnel also would perform routine maintenance such as replacement of worn dielectric insulation. All waste would be sampled and analyzed in accordance with DOE/NV procedures to determine its characteristics (i.e., nonhazardous, hazardous, low level, low level mixed waste).

2.2 Discussion of Alternatives Considered

The Council on Environmental Quality regulations, Section 1500.2 (e), states that federal agencies shall to the fullest extent possible use the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse affects of their actions upon the quality of the human environment. Reasonable alternatives would be those alternatives to the proposed action that meet the purpose and need of the agency. The purpose and need of the NNSA in this instance is, as stated in section 1.2, to enhance the NTS scientific and engineering capabilities and establish a capability for large-volume hydrodynamic experiments at the NTS.

It is reasonable to review and compare alternatives to the proposed action to better understand whether other stockpile stewardship site alternatives would avoid or minimize adverse affects on the human environment. Stockpile Stewardship activities are conducted at the three weapons laboratories (LANL, LLNL, SNL) and the NTS. Operation of Atlas at LANL is considered under the No Action Alternative of this assessment. LLNL and SNL could be considered as possible location for the Atlas facility. Both LLNL and SNL have recently completed site-wide Environmental Impact Statement (EIS) processes. These EIS's coupled with resource management plans and site development plans form the basis for which to consider impacts at these locations.

Table 1 contains information from the various EIS's, resource management plans, and site development plans. This representation is meant to compare the relative impact or requirements of Atlas at each of the stockpile stewardship sites. Table 1 identifies the current land area, employment, power and water consumption and waste and wastewater generation of the NTS, LANL, SNL, and LLNL. Also included in the table are the Atlas facility requirements for these same indicators for comparison.

Table 1. Comparison of Stockpile Stewardship Sites

	NTS[a]	LANL[b]	SNL[c]	LLNL[d] Site 300	Atlas Facility
Land Area (acres)	880,000	27,832	8,800	6,893	1
Water Use (mgy)	293	712	440	200	0.11
Wastewater (gpd)	203,000 [1]	600,000	760,000	3500 [1]	525
Energy Consumption, (MWh/yr)	100,000	372,000	197,000	390,000	500
Waste Generation					
Solid (m^3/yr)	575	10,100			7
Hazardous (kg/yr)	380,101	860,000	40,000	15,000	200
Employment	1,304	9,977	7500	350[2]	15

[1] Does not include discharges to septic tanks and leachfields.
[2] LLNL total population is approximately 7925 career or post doctor.
[a] DOE, 2000a.
[b] DOE, 1999b
[c] DOE, 1999c
[d] DOE, 2000b

The action of constructing and operating Atlas at sites in the Stockpile Stewardship complex would involve virtually the same impacts. That is the land, water, and power demands as well as the generation of waste at the facility are not site dependent. Site alternatives such as LLNL or SNL would not avoid or minimize adverse effects to the human environment beyond those identified at the NTS. The degree to which the resource demands, including waste generation, add to the site operations total would vary from site to site. For example, the land area requirement of 1 acre for the Atlas facility represents 0.0001 percent of the total land area at the NTS and, for comparison, 0.01 percent of the land area at LLNL Site 300. The energy requirement for Atlas represents 0.5 percent of the current NTS total, 0.25 percent of the SNL total, and 0.13 percent of the LLNL Site 300 total. These variances are due to the relative differences in the current resource or resource demand. Quantitatively, the environmental impacts of construction and operation of Atlas at any of the Stockpile Stewardship sites would be localized and minor.

For the remainder of this assessment the SNL and LLNL site 300 alternatives are not evaluated further. These sites alternatives would not meet the need to enhance the scientific and engineering stockpile stewardship competencies, capabilities, and efficiencies at the NTS nor would they meet the Legislative intent expressed in the Military Construction FY 2001 Appropriations Bill, Public Law 106-246, as stated in section 1.1 of this assessment. Alternative sites at the University of Nevada, Las Vegas, and the NNSA North Las Vegas Facility were also initially considered. These alternative sites also would not meet the need for enhanced capabilities at the NTS and have minimal security, adjacent residential neighborhoods, and little room for potential growth. These attributes coupled with higher projected costs for construction and operation made them unreasonable for detailed consideration.

2.3 NO ACTION ALTERNATIVE

Under the no action alternative, the Atlas facility would remain at LANL and would continue to be operated there, as described in Section 2.1.2 of the Proposed Action and in Appendix K of the SSM PEIS (Figures 4 and 5). Assessment of the no action alternative is required by DOE NEPA Implementing Procedures (10 CFR 1021.321). The potential impacts of the no action alternative are presented in Section 4.2 of this assessment.

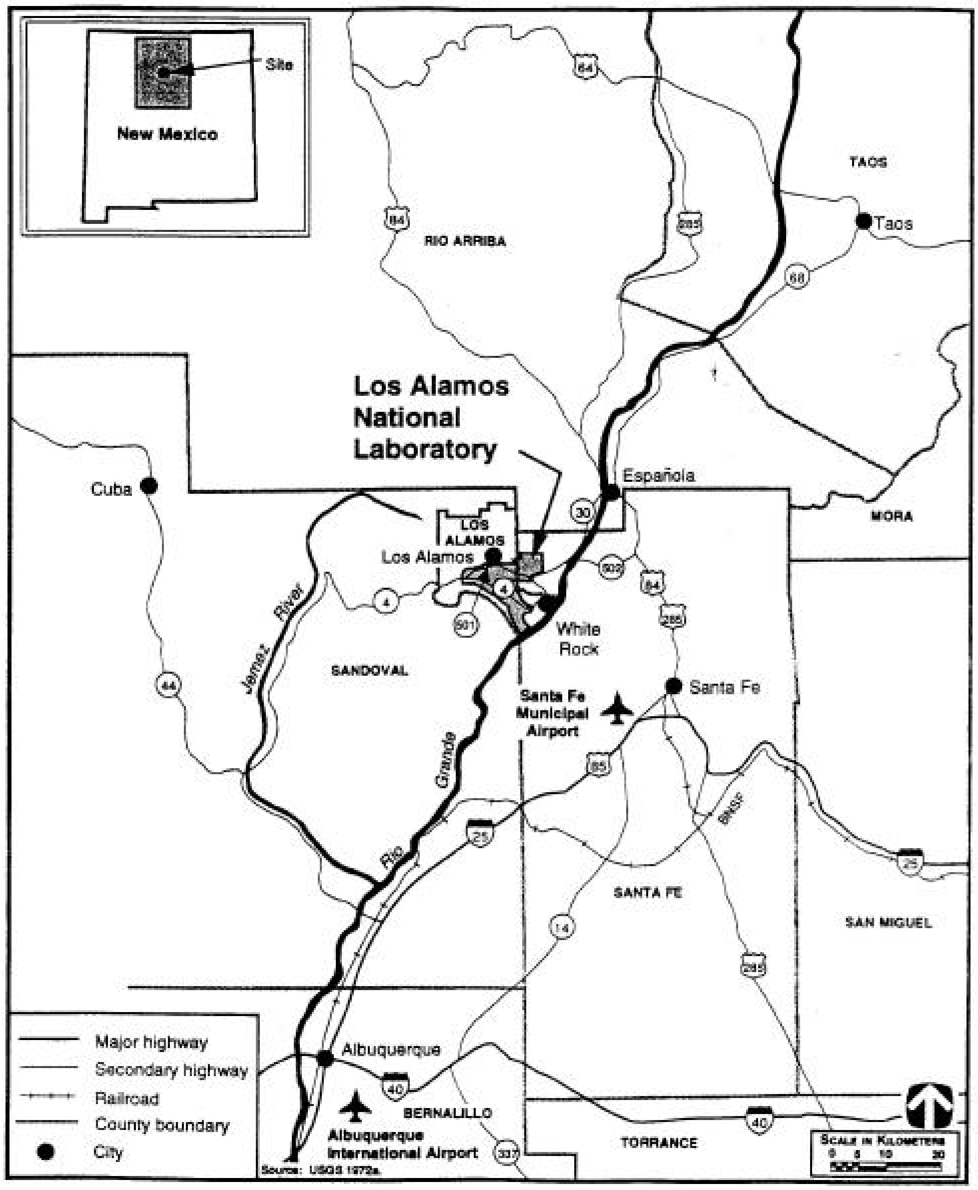

Figure 4 Location Map of LANL, NM and the Region

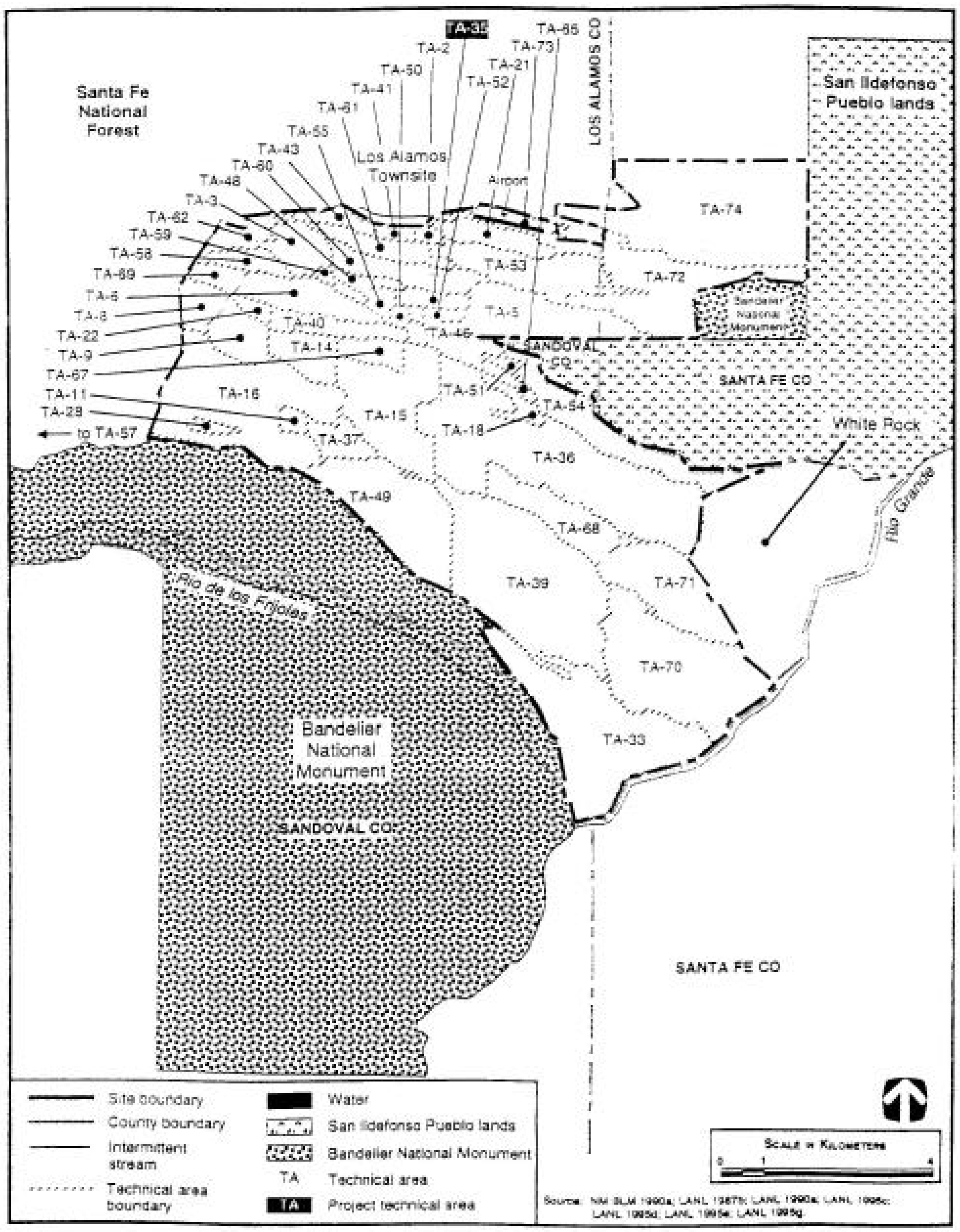

Figure 5 Map of LANL

3.0 AFFECTED ENVIRONMENT

The affected environment, as described in this Section, is summarized from *the Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (DOE, 1996a) and the *Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory* (DOE, 1999b), respectively. Updated information has been added where appropriate. In addition, waste management operations at the NTS and LANL are described.

3.1 NEVADA TEST SITE, AREA 6

3.1.1 Land Use and Transportation

3.1.1.1 Facilities

Area 6 occupies 212 km^2 (82 mi^2) between Yucca Flat and Frenchman Flat, straddling Frenchman Mountain. The Area 6 Construction Facilities and the proposed site of the Atlas facility are located in the northeast corner of Area 6. The proposed Atlas site is within a designated industrial, research and support site located within a land-use zone reserved for dynamic experiments, hydrodynamic tests, and underground nuclear weapons and weapons effects tests. Area 6 lies within the land withdrawn under Public Land Order 805. This Public Land Order, dated February 12, 1952, reserved land for use by the United States Atomic Energy Commission as a weapons testing site.

The Control Point complex, located centrally in Area 6, serves as the command center as well as the air operations and timing and firing center for the Yucca Flat weapons test basin, Frenchman Flat, Pahute Mesa, and surrounding areas. Augmenting facilities near the secured compound include a communications building, several radiological sciences and technical services buildings, a fire and first aid station, and various maintenance and warehouse structures.

The Yucca Lake Facilities, located east of the Control Point complex, provide craft and logistical support to all areas of the NTS. Those elements comprising the Yucca Lake facilities include a variety of equipment storage facilities, a heavy-duty maintenance and equipment repair facility, and decontamination facilities. A 3,353-meter (m) [11,000-foot (ft)] airstrip (currently not in use) and nearby weather station also are located on the Yucca Lake bed.

The Hydrocarbon Contaminated Soils Disposal Site, located south of the Yucca Lake Facilities, is an existing, Class III landfill, approved by the state of Nevada. All non-Resource Conservation and Recovery Act-regulated hydrocarbon contaminated soils and materials generated on the NTS are disposed of at this landfill.

The Device Assembly Facility is located in the south-central portion of Area 6 and is the primary location of all nuclear explosive operations at the NTS. Nuclear explosive operations include assembly, disassembly or modification, staging, transportation, testing, maintenance, repair, retrofit, and surveillance.

3.1.1.2 Infrastructure and Utilities

The utilities at the NTS include water distribution, wastewater management and electrical systems.

Water Distribution Systems – Water for fire protection and domestic use would be provided to Atlas through service connections to the main NTS public water system. This system covers Areas 5, 6, 22, and 23 with six active wells. The distribution system uses 4-, 6-, and 8-inch underground pipelines to service the areas.

Wastewater Management Systems – Wastewater on the NTS is disposed of either by a combination septic tank and leach field system or by permitted lagoon systems.

A sewage disposal system serves the Area 6 Construction Facilities and would also include service to the Atlas facility. Piping and manholes collect all influent in a single sewer line discharging into a distribution box. The system includes two primary sewage lagoons and two secondary lagoons, with a combined capacity of 8,100,606 liters (2,140,000 gallons). The primary lagoons are lined with bentonite to prevent percolation.

Planning is underway for a project that will divert the Area 6 sewage lagoon flow to a 5,000-gallon septic tank and leach field. The project is planned for construction in 2002.

Electrical System – The Atlas facility would receive electrical power from the NTS electrical system. The electric power is delivered to the NTS at the Mercury switching center in Area 23 by a primary 138-kilovolt (kV) supply line.

3.1.1.3 Transportation

The main access to Area 6 is the Mercury Highway, which originates at U.S. Highway 95, 105 kilometers (km) [65 miles (mi)] northwest of Las Vegas, Nevada, and accesses the main gate in Mercury. Mercury Highway, a paved two-lane road, is the primary route from the interchange at U.S. Highway 95. Most of this road is 8 m (26 ft) wide; however, the shoulders vary from 1 to 2 m (4 to 6 ft) wide. Traffic consists of light- and heavy-duty trucks and cars, security vehicles, and emergency vehicles. The Mercury Bypass is a also a paved, two-lane road, 8 m (26 ft) wide, that was built to divert traffic around the Mercury base camp to outlying areas of the NTS.

In the northern portion of Area 6, Mercury Highway is intersected by Tweezer Road, which runs due east to Orange Blossom Road. Tweezer Road provides access to the Area 6 Construction Facilities and to the proposed site of the Atlas facility. Tweezer and Orange Blossom Roads are narrow, secondary, and oil-and-chip roads with no shoulders.

3.1.2 Topography and Physiographic Setting

The NTS is located within the Basin and Range Physiographic Province, and the proposed facility would be located in an area that is on the floor of Yucca Flat. Yucca Flat, a topographically closed basin, contains a playa, Yucca Lake, in its lowest portion. Yucca Flat is an intermontane basin typical of basin-and-range structure.

3.1.3 Geology and Soils

The Area 6 Construction Facilities are located on an area of thick alluvial deposits within Yucca Flat. The alluvium- and tuff-filled valley is rimmed mainly by Precambrian and Paleozoic sedimentary rocks and Cenozoic volcanic rocks. The youngest sediments in the valley are sand and gravel, derived from the volcanic and sedimentary rocks in the surrounding highlands. Area 6 is within Seismic Zone 2B, defined by the Uniform Building Code as an area with moderate damage potential. Soils in the region have not been mapped extensively, and although not reported as problematic, site-specific evaluation for soil and ground stability would be necessary before building a facility. Consideration was given to ground motion from underground nuclear testing in the structural design of the facility.

One atmospheric and five underground nuclear weapons tests were conducted in the northwestern portion of Area 6. Residual surface contamination greater than 10 pCi/g of plutonium in soil is detectable in this relatively small area in Area 6.

3.1.4 Hydrology

3.1.4.1 Surface Water

Consistent with the Great Basin, hydrographic basins of the region have internal drainage controlled by topography. Streams in the region are ephemeral. Runoff results from snowmelt and from precipitation during storms that occur most commonly in winter and occasionally in fall and spring, and during thunderstorms that occur primarily in the summer. Much of the runoff quickly infiltrates into rock fractures or into the dry soils, some is carried down alluvial fans in arroyos, and some drains onto playas where it may stand for weeks as a lake. The Control Point and nearby News Knob arroyos have been assessed for flood hazard (Miller et al, 1994). There is no known human consumption of surface water on the NTS.

Throughout the region, springs and manmade impoundments are the only sources of perennial surface water. There are no known springs in the vicinity of the proposed Atlas facility site. All water discharges at the NTS are regulated by the state of Nevada. The NTS maintains compliance with required permits. Water pollution control permits issued by the State are obtained for industrial and domestic wastewater discharges. Discharge and monitoring requirements imposed by the State serve to prevent degradation of the surface waters (and groundwater) at the NTS.

3.1.4.2 Groundwater

The depth to groundwater in Yucca Flat is about 160 m (525 ft) below land surface. Groundwater flows generally south and southwest. Groundwater quality within aquifers is generally acceptable for drinking water and industrial and agricultural uses. There are four water supply wells in Area 6: United States Geological Survey Water Well C, Water Well C1, Water Well 4, and Water Well 4A, all located in the southeast portion of Area 6. The wells closest to the proposed Atlas facility site include characterization well ER6-1, located about 2.3 miles east of the Area 6 Construction Facilities, and well UE6e, located just to the northeast. Depth to groundwater at Well ER6-1 was measured in 1998 at 1,473 ft (447 m) and in 1988 at UE6e it was measured at 1,508 ft (457 m).

Water-resource use in support of the missions of the NTS is not subject to state water appropriation laws. The NTS, under the Federal Reserved Water Rights doctrine, is entitled to withdraw the quantity of water necessary to support the NTS missions.

3.1.5 Biological Resources

The NTS is located along the transition zone between the Mojave Desert, to the south, and the Great Basin, to the north. The proposed project location is in the east-central portion of the NTS with plant and animal biotic communities typical of the Mojave Desert in the region.

3.1.5.1 Flora

The most abundant shrubs in the bottom of Yucca Flat are hopsage and three species of wolfberry. Winterfat also is common in silty soils. Shadscale, four-winged saltbush, and horsebrush also can be found in certain regions of the enclosed basin. Little or no vegetation grows on the playa. Plant communities that colonize areas disturbed by construction are native plants normally found in washes such as cheesebush and punctate rabbitbrush. However, most species found on disturbed sites are ephemeral, introduced plants such as red brome, cheatgrass, Russian thistle, and red-stemmed filaree. Two plant species that may occur on the NTS are candidates for listing under the Endangered Species Act: Clokey's egg-vetch and the Blue Diamond cholla; however, neither of these has been observed in Area 6 or adjacent Areas. No listed or candidate plants are known to exist in Area 6.

3.1.5.2 Fauna

Approximately 279 vertebrate species have been observed on the NTS, including 54 species of mammals, 190 species of birds, 33 species of reptiles, and 2 species of introduced fish. Eighty-six percent of the bird species are transients. Many of the birds on the NTS, including almost all of the waterfowl and shorebirds, use the playas in Frenchman and Yucca Flats, artificial ponds at springs, and sewage lagoons during their migration and/or during winter.

The Mojave Desert population of the desert tortoise is listed under the Endangered Species Act as threatened. The State of Nevada also classifies the desert tortoise as a threatened species under its state laws protecting sensitive species. The proposed project area is outside of known desert tortoise habitat.

3.1.6 Air Quality

The climate at the NTS is characterized by limited precipitation, low humidity, and large diurnal temperature ranges. The lower elevations receive approximately 15 centimeters (cm) [(6 inches (in)] of precipitation annually, with occasional snow accumulations lasting only a few days. In the Yucca Flat basin at an elevation of 1,195 m (3,920 ft), the average daily maximum and minimum temperatures are 11^0 Centigrade (C) to -6 ^{0} C (51^0 Fahrenheit (F) to 21^0 F) in January, and 36^0 C to 14^0C (96^0 F to 57^0 F) in July. The average annual wind speed is 11 kilometers per hour (kph) [7 miles per hour (mph)]. The prevailing wind direction during the winter months is north northwesterly, and during the summer months, south southwesterly. Severe thunderstorms may produce high precipitation that continues for approximately one hour and may create a potential for flash flooding.

The NTS is located in Nevada Intrastate Air Quality Control Region 147, which is designated as an attainment area with respect to the National Ambient Air Quality Standards. Ambient air quality at the NTS is not currently monitored for criteria pollutants or hazardous air pollutants, with the exception of radionuclides. Elevated levels of ozone or particulate matter may occasionally occur because of pollutants transported into the area or because of local sources of fugitive particulates. There are no large sources of other pollutants nearby. The present air quality on the NTS is good.

3.1.7 Noise

The major noise sources at the NTS include equipment and machines (e.g., cooling towers, transformers, engines, pumps, boilers, steam vents, paging systems, construction and material-handling equipment, and vehicles), blasting and explosives testing, and aircraft operations. No NTS environmental noise survey data are available. A background sound level for rural desert areas of 30 A-weighted decibels (dBA) is a

reasonable estimate. Ambient noise levels in the vicinity of the Area 6 Construction Facilities are relatively low.

3.1.8 Visual Resources

Criteria used for the analysis of visual resources in the NTS EIS included scenic quality, visual sensitivity, and distance and/or visibility zones from key public viewpoints. Area 6 is not visible from any public viewpoint.

3.1.9 Cultural Resources

Archeological research indicates the existence of important cultural resources at the NTS. Resources range from prehistoric sites to structures associated with the development of nuclear testing. To date, over 40,400 acres on the NTS have been surveyed for cultural resources. Within the Yucca Flat Basin, over 7,780 acres of land have been surveyed as part of over 120 cultural resources surveys. These surveys have resulted in over 340 sites being recorded, 130 of which are considered to be eligible for listing on the National Register of Historic Places. There are a number of historic structures associated with nuclear testing located within Yucca Flat Basin but most have not been recorded and evaluated.

3.1.10 Occupational and Public Health and Safety

The potential for activities at the NTS to impact the health and safety of the general public is minimized due to factors such as the remote location of the NTS and the sparse population surrounding it, and a comprehensive program of administrative and design controls. Potential impacts to the health and safety of NTS workers are minimized by adherence to federal and state regulations, to DOE orders, and to the plans and procedures of each organization performing work on the NTS. Worker exposures to radioactive or chemical pollutants are minimized through training, monitoring, the use of personal protective equipment and the use of administrative controls.

The types of work expected during construction and assembly of the Atlas facility, such as forklift operation, maintenance, welding, and handling of hazardous materials, would be similar to those types encountered throughout the NTS.

At the NTS, radiological effluents may originate from tunnels, underground test sites, radiological waste disposal sites, resuspension of surface deposits, and facilities where radioactive materials are either used or processed. External gamma radiation exposure data measured by the on-site thermoluminescent dosimeter network indicate that the average gamma radiation exposure rate for 1999 was 0.25 mrem/day (91 mrem/yr). Results indicate the data measured by these stations is consistent with the measurements for the past five years. The boundary and control stations averaged 0.32 mrem/day (119 mrem/yr) in 1999, which is comparable to the dose from a typical background exposure rate (DOE, 2000c).

3.1.11 Socioeconomics

The region of influence for the NTS consists of Nye and Clark counties, Nevada. The NTS EIS cites a 1994 survey of NTS worker residential distributions that found that 90 percent of the work force live in Clark County and 7 percent live in Nye County. The remaining 3 percent reside in other counties or states. Within Clark County, most of the employees live in Las Vegas. In 1994, the NTS accounted for 1 percent of total Clark County employment, as contrasted with 6 percent of total Nye County employment. The NTS employs approximately 1,200 personnel, and annual funding is about $380 million (DOE, 1999a).

At full operation, approximately 15 workers would be employed at the Atlas facility; up to three LANL personnel may relocate to Nevada, but such a move is not a requirement for the program.

3.1.12 Environmental Justice

As required by Executive Order 12898, the NTS EIS analyzed the issue of adverse affects of federal programs, policies, and activities on minority populations and low-income populations. The percentages of minority and low-income populations within census block groups for Clark, Nye, and Lincoln counties were plotted by using a geographic information system and the impacts to off-site populations from activities on the NTS were identified. While low-income and minority populations do exist, it was found that no populations existed that had disproportionately high adverse effects.

3.1.13 Waste Management

At the NTS, Waste Management Program activities include disposal, storage, treatment and closure operations as well as the activities of the Waste Minimization/Pollution Prevention Program. Five types of wastes are managed at the NTS, including low-level wastes, mixed wastes (transuranic and low-level), Toxic Substances Control Act (TSCA) wastes, and non-hazardous solid wastes.

Nonhazardous, nonradioactive sanitary, and industrial wastes are disposed of in several industrial landfills, sewage treatment systems, and septic tank systems located throughout the NTS. There are two Radioactive Waste Management Sites (RWMS) used for the disposal of low-level waste, located in Areas 3 and 5. Mixed waste generated on the NTS is disposed of in the Area 5 RWMS. Transuranic, transuranic mixed wastes, and mixed wastes are stored on the Area 5 transuranic waste storage pad in accordance with a Settlement Agreement and Mutual Consent Agreement with the state of Nevada. TSCA-regulated wastes are shipped off-site to a commercial permitted facility for disposal.

3.2 LOS ALAMOS NATIONAL LABORATORY

The following environmental issues were not discussed as part of the Affected Environment either because the Atlas facility is located in an existing building at LANL or because they do not exist in the proposed action site vicinity:

- Topography and Physiographic Setting
- Hydrology
- Biological Resources
- Visual Resources
- Cultural Resources

3.2.1 Land Use and Transportation

3.2.1.1 Facilities

LANL and the associated residential and commercial areas of Los Alamos and White Rock are located in Los Alamos County in north-central New Mexico (Figure 4). LANL facilities cover approximately 11,076 hectares (27,690) acres) of federal land managed by NNSA in Los Alamos County. The LANL developed area is divided into 47 active Technical Areas (TAs) for administrative purposes (Figure 5). Unoccupied land surrounds LANL buildings, providing security, safety buffer zones, and a reserve for future development.

TA-35, the current location of the Atlas facility, is surrounded by adjacent Technical Areas 63, 50, 55, 48, 60, and 52. These TAs include facilities that may involve use of chemicals and radioactive materials. The site is generally considered highly developed. RCRA-regulated hazardous chemical waste management is conducted at TA-54, Area L. TA-54, Area J, has a landfill dedicated to administratively controlled sanitary, non-hazardous wastes. All other sanitary waste is disposed of in the Los Alamos County Landfill located near TA-3.

3.2.1.2 Infrastructure and Utilities

The utilities at the LANL include water distribution, wastewater treatment management and electrical systems. The systems are described in significant detail in the LANL EIS (DOE, 1999). Minimal modifications would be done to the existing infrastructure system in support of the Atlas facility.

3.2.1.3 Transportation

TA-35 is located near the center of Pajarito Mesa, immediately north and east of Pajarito Canyon in Los Alamos County. Pajarito Road bounds the current Atlas facility site less than 0.8 km (0.5 mi) to the south, and Pecos Drive bounds the site directly to the north. Although the general public is currently allowed free access to these roads, and Pajarito Road has heavy public traffic, access to all roads in the general site area is controlled by NNSA. They can be closed as needed.

3.2.2 Geology and Soils

LANL is located on the Pajarito Plateau. The surface of the plateau is dissected by deep, southeast-trending canyons separated by long, narrow mesas. The plateau is capped by the Bandelier Tuff, comprised of a massive pumiceous tuff breccia of ash-flow origin and a succession of cliff-forming welded ash flows. The tuff caps sedimentary and volcanic rocks of the Santa Fe Group (DOE, 1996c).

LANL lies within seismic Zone 2. The strongest earthquake in the last 100 years within an 80-km (50-mi) radius was estimated to have a magnitude of 5.5 to 6 on the Richter Scale. Studies indicate that several faults may have produced seismic events with a magnitude of 6.5 to 7.8 as measured on the Richter Scale in the last 500,000 years. Seismicity at LANL is monitored through a seismic network. Major faults at LANL include the Pajarito, Rendija Canyon, and Guaje Mountain faults. There is no evidence of movement along the Pajarito fault system during historical times.

3.2.3 Air Quality

Prevailing winds at LANL are affected by several factors, including large-scale atmospheric wind patterns, regional weather disturbance, complex surface terrain, and local cold-air drainage across the Pajarito Plateau. Winds in Los Alamos consist of light westerly surface winds that average 3 m/s (7 mph). The strongest winds typically occur from March through June, when intense seasonal storms and cold fronts move through the region. During this season, sustained winds blow from the southwest to the northeast and can exceed 11 m/s (25 mph), with peak gusts exceeding 22 m/s (50 mph). The highest recorded wind in Los Alamos County had a speed of 34 m/s (77 mph) at lower elevations in the area. The irregular terrain at Los Alamos affects wind motion and spreading. Localized wind gusts may not be in the same direction as average wind patterns. The wind behavior over this rough terrain results in greater dilution of air contaminants than might occur over a smoother surface.

Air quality in the LANL area is typical of arid-climate clean air. Median visibility ranges between approximately 106 and 161 km (66 and 100 mi). The U.S. Environmental Protection Agency has designated the LANL area as being in attainment for all National Ambient Air Quality Standards (NMEIB, 1981). Current emissions from operations around the proposed Atlas site are within the permitted thresholds for LANL.

3.2.4 Noise

Publicly detectable noise levels emanating from activities at LANL are generated by a variety of sources, including truck and automobile movements to and from LANL TAs, high explosives testing, and security guard firearm practice. Nonspecific background ambient noise in the LANL area has been measured in two locations near LANL boundaries next to public roadways. Background noise levels were found to range from 31 to 51 dBA (DOE 1995b). Noise levels that affect residential areas are limited by county ordinance to a maximum of 65 dBA during daytime hours (or 75 dBA if limited to 10 minutes in any 1 hour) and 53 dBA during nighttime hours between 9 p.m. and 7 a.m. Activities that do not meet these limits require a permit (LANL 1994a).

The occupational exposure limit for steady-state noise, defined in terms of accumulated daily (8-hour) noise exposure dose that allows for both exposure level and duration, is 84 dBA (29 CFR 1910.95). Excessive exposure to noise in the work place is minimized at LANL through hearing protection, alternative operating conditions, and engineering designs or modifications of noise producing equipment.

3.2.5 Occupational and Public Health and Safety

As part of ongoing operations at LANL, several Technical Areas, including TA-35 and those in close proximity to it, have facilities that conduct experiments involving electrical hazards and the generation of magnetic fields and x-rays. Ongoing experiments and operations are conducted according to strict guidelines established by existing LANL standard operating procedures. Under these standard operating procedures, engineering and administrative controls are implemented to minimize worker and public exposure to electrical hazards, magnetic fields, and x-rays. The magnitude of electrical hazards and x-rays present from these experiments is regulated by Occupational Safety and Health Administration (OSHA) standards implemented under specific DOE orders. In addition, magnetic field threshold limit values have been developed as guidelines by the American Conference of Governmental Industrial Hygienists.

Generation and potential exposure to x-rays are closely monitored under the implementation of existing health and safety requirements for maintaining worker exposure to as low as reasonably achievable not to exceed the current threshold for 5 rem per year. Magnetic fields are generated by the National High Magnetic Field Laboratory at TA-35. The public exposure to static magnetic fields in the TA-35 area is much less than the current pacemaker warning limit of 10 Gauss (G). Members of the public receive less than 0.1 rem from x-rays generated by sources in the TA-35 area, the admissible dose under DOE orders regulating public exposure to ionizing radiation (DOE, 1996c).

3.2.6 Socioeconomics

Los Alamos County has an estimated population of approximately 18,115 (U.S. Census, 1994); the Los Alamos town site has and estimated population of 11,400, and White Rock has an estimated population of 6,800. There is a small, privately owned trailer park, surrounded by LANL property, situated approximately 1.6 km (1 mi) northwest of the proposed project area with an estimated population of 500 (DOE, 1996c). The principal population centers with a combined approximate population of 214,707, are Santa Fe, Espanola, and the Pojoaque Valley, all located within an 80-km (50-mi) radius of LANL. Approximate populations of the four closest pueblos are as follows: the San Ildefonso Pueblos has a population of 1,500; the Santa Clara Pueblo has a population of 3,000; the Cochiti Pueblo has a population of 1,340; and the Jemez Pueblo has a population of 1,750 (DOC, 1991). LANL employs approximately 12,250 persons (LANL, 1994b) principally living within 80 km (50 mi) of LANL.

3.2.7 Environmental Justice

Under Executive Order 12898, federal agencies are responsible for identifying and addressing the possibility of disproportionately high and adverse health and environmental impact of programs and activities on minority and low-income populations. Within a 16-km (10-mi) radius of the TA-35 Atlas site, about 14 percent of the population is of minority status. Within an 80-km (50-mi) radius, about 54 percent of the population is of minority status. Economically, 15 percent of the households within a 16-km (10-mi) radius have annual incomes below the defined poverty level of $12,674. Within an 80 km (50-mi) radius of the site, 24 percent of the households have annual incomes below $15,000. Detailed environmental justice information for the Los Alamos area is contained in the Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory (DOE, 1999b).

3.2.8 Waste Management

Through its research activities, LANL manages a small quantity of spent nuclear fuel as well as five other types of wastes, including transuranic, low-level, mixed, hazardous, and non-hazardous wastes.

LANL produces a wide variety of hazardous wastes, which are regulated under RCRA and the Toxic Substances Control Act (TSCA). LANL holds a RCRA permit for the offsite disposal of RCRA-hazardous wastes. An EPA Letter of Authorization grants LANL permission to dispose of solid PCB-contaminated articles on site. Other PCB waste and liquid PCB-contaminated articles are sent offsite to TSCA-regulated disposal facilities.

Solid sanitary wastes that consist of general facility refuse are generated routinely and taken to the Los Alamos County sanitary landfill located within LANL via a commercial waste disposal firm. Liquid sanitary wastes are routed to a sanitary wastewater treatment plant and collection system at TA-46, and there are 36 septic systems located at remote facilities in 16 TAs throughout LANL. The plant and collection system complies with the requirements of LANL's Federal Facility Compliance Agreement.

4.0 ENVIRONMENTAL CONSEQUENCES

This section identifies the direct and indirect environmental consequences of the alternatives considered. The level of analysis for each resource area is based upon the potential magnitude of the environmental effect.

4.1 PROPOSED ACTION

This section describes the environmental consequences expected to occur if the Atlas facility were to be relocated and operated at the NTS.

4.1.1 Land Use and Transportation

4.1.1.1 Facilities

The proposed Atlas facility would be within an area designated in the NTS EIS as an Industrial, Research and Support site. The development of the Atlas facility would result in the disturbance of approximately 1 acre of land. Use of the proposed facility within this area is consistent with the NTS land use and the NTS EIS ROD. There would be no conflicts with land uses in areas surrounding the NTS.

4.1.1.2 Infrastructure and Utilities

The proposed action would require construction of the Atlas facility and parking lot as described in Chapter 2.1.1. As identified in Chapter 3 the existing utility infrastructure would support all activities with minor upgrades to the infrastructure as drops from utility lines and water mains and wastewater systems.

At the NTS, it is anticipated that the Atlas facility, including the machine and the buildings, would consume approximately 500,000 kilowatt hours/year.

Assuming an average use of 35 gal/day per person, water usage and wastewater produced by 15 people would be approximately 525 gal/day. The existing wastewater sewage lagoon system located in Area 6 and the planned 5,000 gallon septic tank and leach field would provide adequate wastewater disposal capacity for all activities conducted at the Atlas facility.

The existing NTS potable water distribution system would be connected to the Atlas facility. In order to protect the main water distribution system, the facility would have appropriate backflow prevention devices installed and periodically checked.

4.1.1.3 Transportation

Transportation of the Atlas machine from LANL to the NTS would be via commercial trucks over established roads. This is not expected to result in any impacts on land use or the roads other than impacts normally incurred by trucking transport. Upon completing construction of the new building and assembly of the Atlas facility, transportation would mainly consist of the daily commute by approximately 15 personnel employed at the Atlas facility and occasional shipments of materials used in operations. Existing roads to the facility would be sufficient to handle transportation of Atlas and the vehicles that would be used to carry personnel and material to the facility.

4.1.2 Topography and Physiographic Setting

The proposed facility would be located in an area that is on the floor of Yucca Flat. Excavation and grading would be facilitated by flat or gently sloping terrain. The project area would encompass approximately 1 acre and would not impact the topography or physiographic setting.

4.1.3 Geology and Soils

The geology of the site is generally favorable for construction of the proposed Atlas facility. Soils are typically fined grained and caliche is generally not present in amounts that will complicate excavation or grading. Maintenance of natural drainage will require some engineering in the forms of ditches or culverts, or both. Although Area 6 is within Seismic Zone 2b for natural seismicity, the potential for conducting underground nuclear tests in the vicinity requires that the Atlas facility be designed to a greater seismic zone to preclude damage. Structures built in areas of past nuclear weapons testing were typically designed to Seismic Zone 3 or 4 criteria, and sometimes additional means of protection, such as shock mounts, were employed to preclude damage from ground motion. Seismic Zone 4 criteria would be used for the design of the Atlas facility with consideration for potential ground motion from underground nuclear testing.

4.1.4 Hydrology

Water requirements for construction and operation of the Atlas facility would be serviced by existing water supply wells and public water system. The main use of water during the construction phase would be for dust suppression, and the quantity of water is within the quantity analyzed in the NTS EIS (DOE, 1996a). The water usage at the facility after completion of construction would be limited to routine domestic use and, based upon estimated occupancy levels, would amount to less than 110,000 gallons per year. Extension of the existing water and sewer lines to incorporate the new facility would most likely require a design review and approval by the State, plus modification of the existing public water system permit and wastewater discharge permit.

The NTS EIS (DOE, 1996a) assesses the impact of water withdrawal at the NTS. Groundwater use at the NTS is now less than one-fifth of the historic peak. Water requirements for construction and operation of the proposed Atlas facility would be insignificant when compared to previous usage at the NTS and would not be likely to require additional water appropriation for the public waters of the state of Nevada.

No deterioration of surface water quality or quantity is expected to result from the proposed action. Any spills of contaminants would be cleaned up expeditiously to prevent contamination of runoff water and groundwater.

4.1.5 Biological Resources

The development of the Atlas facility would result in the disturbance of approximately 1 acre of previously disturbed habitat. A survey would be conducted to determine the presence of the western burrowing owl, which has been known to inhabit disturbed areas, and any other sensitive species. If any sensitive species were found, project activities would be planned to minimize disturbance to the species.

4.1.6 Air Quality

Fugitive dust would be generated during construction of the Atlas facility. Standard dust suppression techniques, such as watering, would be used as needed. Other potential impacts to air quality from construction of the Atlas facility include emissions from fuel-burning construction equipment such as scrapers and front-end loaders, and from gasoline and diesel powered vehicles and trucks.

Emissions generated during facility operations would result primarily from conducting experiments and from the use of solvents as cleaning agents. Minute quantities of the metal targets used during experiments would vaporize and be deposited onto the inside surface of the target chamber. Other portions of the target would be liquefied or shattered. Liquefied portions would resolidify moments after the experiment was completed. Only minute quantities of metals would stay volatilized**.** The contents of the target chamber would be exposed to the atmosphere only during reentry for cleanup. The quantity of emissions generated from each experiment would be small, and therefore would require no facility air filtration or scrubbers. The majority of solvents used during cleaning operations would evaporate. Hazardous chemicals such as isopropyl alcohol, trichlorethylene and 1,1,2-trichloroethane would be used occasionally and in small amounts, so that the quantity of emissions generated would not harm workers, collocated workers or members of the public. Ethanol, which would be used in larger quantities, i.e., approximately 42 gallons per year, is not considered a hazardous air pollutant (HAP) under the Clean Air Act. However, ethanol is highly flammable and vapor/air mixtures are explosive. The majority of the ethanol used for cleaning would evaporate. Adequate ventilation would be provided. The argon/SF6 system that would be used to supply railgap switches with pressurized dielectric gas is non-hazardous albeit an asphyxiant; however, some of the decomposition products, in particular sulfur tetrafluoride (SF4) and also hydrofluoric acid (HF), are toxic or corrosive. Four exhaust fans, each 30,000 cubic feet per minute (cfm) would be used to vent the shot products, including SF4, to the ambient air. Ceiling limits defined by the American Conference of Governmental Industrial Hygienists (ACGIH) for concentrations of SF4 are discussed in Section 4.1.10, Occupational and Public Health and Safety.

Some of the metal targets (including lead) and the solvents are classified as HAPS and are regulated by the State of Nevada. Emissions limits for HAPS and toxics in the State of Nevada (and under the Clean Air Act) are 10 tons per year of any one HAP or toxic, or 25 tons per year for any combination of HAPS or toxics. Emissions from the metal targets used during experiments were calculated to be less than 1 gram (g) [0.0022 pounds (lb)] per experiment. Emissions from use of the solvents were calculated to be less than 30 g (0.066 lb) per experiment (DOE, 1996c).

The number of experiments to be conducted is estimated at 40 per year, with no more than 1-2 per week. Engineering considerations for Atlas limit the maximum shot rate to approximately 100 per year. Assuming the maximum100 experiments per year, annual emissions from the metal targets would be approximately 100 g (0.22 lb). Annual emissions from each of the solvents would be approximately 3000 g (6.6 lb). Combined emissions, assuming the use of one metal per target twice a week and use of 3 different solvents, would be approximately 20 lbs, i.e., much less than one ton/yr.

Beryllium is one of 7 HAPS for which there are national emission standards, and it is regulated by the United States Environmental Protection Agency under the National Emissions Standards for Hazardous Air Pollutants (NESHAP). The emissions from use of beryllium as a target material would be similar to the emissions from the metals discussed in the previous paragraph, and would fall well below the NESHAP emissions limit of 10 grams per 24-hour period (40 CFR 61.32). Emissions of HAPS would be considered an insignificant source by the State of Nevada.

Depleted uranium (DU) is regulated under Subpart H of NESHAP. In accordance with Subpart H, potential DU emissions would be evaluated using an EPA-approved computer model, such as CAP-88, to determine whether monitoring would be required. Emissions from use of DU as a target material would be similar to the emissions from the metals discussed previously, and would fall well below the NESHAP dose limit of 10 mrem per year (40 CFR 61.92).

The quantity of fugitive dust emissions generated by vehicles and equipment during construction would affect air quality in the project area, but these impacts would be minor and short term in nature. The construction site would be watered, as necessary, to help reduce fugitive dust due to equipment activity.

4.1.7 Noise

Construction of the Atlas facility would create some elevated noise levels but these would likely not be discerned above the ambient noise levels in the area. Operation of the Atlas facility would probably result in periodic sudden and short-term noises, which could be heard at some distance. Hearing protection would be required of all workers that could be potentially adversely affected by increased noise levels. Operational noise from the Atlas facility may create short term startle reactions in some species of wildlife but would not be expected to have any other effects.

4.1.8 Visual Resources

The proposed Atlas facility would not be visible from accessible public lands, including U.S. Highway 95. The construction of any additional structures within the industrial area would not result in a notable change to the view of the Yucca Dry Lake area.

4.1.9 Cultural Resources

The proposed site for the Atlas facility is within a previously cleared and developed industrial, research support site. Because the proposed project would be located within this already developed area, it is very unlikely that any cultural resources would be found there. If, during construction, significant cultural resources were found, attempts would be made to avoid them or if they were unavoidable, NNSA would consult with the Nevada State Historic Preservation Officer to identify mitigation measures sufficient to achieve a status of no adverse effect.

4.1.10 Occupational and Public Health and Safety

The potential for activities at the NTS to impact the health and safety of the general public is minimized by a combination of the remote location of the NTS, the sparse population surrounding it, and a comprehensive program of administrative and design controls. Visitors to the NTS are subject to essentially the same safety and health requirements as workers. Access to areas of the NTS where working conditions require special hazard controls is restricted through the use of signs, fences, and barricades. The health and safety of NTS workers is protected by adherence to the requirements of federal and state law, DOE orders, and the plans and procedures of each organization performing work on the NTS.

Small amounts of lead, DU or other similar heavy metals might deposit or be released as particulate metal dust from the target chamber following certain experiments. Toxic/hazardous emissions would be generated by the Atlas facility following each experiment due to the evaporation of solvents used to clean the inside of the target chamber. The quantity of air emissions generated from each experiment would be small and therefore would require no facility air filtration or scrubbers (DOE, 1996c). Exposure to the metals and solvents used during operations would be minimized through wearing proper protective clothing and following established health and safety procedures. Beryllium**,** which would also be used in the target chamber in small amounts, can be highly toxic if inhaled and can cause lung fibrosis (Homberger, 1983). Particulate metal dust from DU in targets also poses a modest radiological hazard if inhaled. Respiratory protection would be used when working with target debris and in cleanup of the target chamber.

The Argon/SF6 system, which supplies railgap switches in the Atlas machine with a pressurized dielectric gas mixture, would be composed of 85% Argon and 15% SF6. As mentioned previously in Section 4.1.6, this is a non-hazardous system, although argon is a simple asphyxiant and the SF6 can decompose to toxic products, such as SF4.

The current Atlas facility uses 4 exhaust fans that vent shot products, including sulfur tetrafluoride (SF_4), to the ambient air. Calculations for emissions of SF_4, indicated that 0.0004 parts per million (ppm) SF_4 could be generated (Stafford, 2000). This is worst case and assumes complete mixing with the air in the high bay. This is well below the Ceiling limit of 0.01 ppm established by the American Conference of Governmental Industrial Hygienists (ACGIH).

The majority of solvents used during cleaning operations would evaporate. Exposure to ethanol, which would be used in larger quantities, can result in dizziness, headaches, burning eyes and other hazards including unconsciousness. Exposure would be minimized by providing adequate ventilation and/or breathing protection, protective gloves, and safety goggles.

Potential health hazards to site workers, collocated workers, and the general public during experiments conducted as part of the normal operations of the Atlas facility may include electrical hazards, strong magnetic fields, and x-rays.

4.1.10.1 Electrical Hazards

Electrical hazards would be present at the Atlas facility while conducting experiments because the capacitors associated with Atlas would be charged to a high voltage. The Atlas capacitor bank could deliver an instantaneous lethal current if special operating precautions were not taken.

To minimize electrical risks associated with Atlas experiments, all applicable electrical codes specified by DOE Order 6430.1A (such as adequate grounding and lightning protection) would be incorporated into the Atlas capacitor bank, facility, and related electrical components. In conjunction with meeting local electrical codes and DOE Order requirements, the Atlas capacitor bank would be isolated in an interlocked personnel containment area with controlled access. Other engineering safety features would include making all switches fail safe, providing a direct cut-off to the Atlas facility systems in event of a computer malfunction, and utilizing interlocks to control operation of switches.

These Atlas facility engineering controls, as well as administrative controls, such as personnel training and standard operating procedures, would significantly decrease the probability of an electrical accident occurring during normal operations.

4.1.10.2 Magnetic Fields

By employing advanced capacitor design and because of developments in high voltage switching, there is no longer a need to charge the capacitors in a fraction of a second as described previously in Appendix K of the *Programmatic EIS for Stockpile Stewardship and Management* (DOE, 1996c). Because the Atlas system can be charged by conventional power supplies over a longer time period, there is no need for the inductor or the high voltage generator as originally planned for installation in Los Alamos. Thus there will be minimal magnetic fields being generated by the charging system. The large magnetic field that is generated by the pulse of electric current in the target liner material will be confined to the region between the target and the return conductor which are both housed inside the vacuum vessel. The return current basically cancels out a magnetic field existing beyond the vacuum vessel. Fringing magnetic fields from the vertical transmission lines are confined to the VTL tanks by metal covers. Any measurable magnetic field outside this volume would be very small, and the room that houses the Atlas machine would be an exclusion area.

All Atlas facility workers and nearby collocated workers would be informed of the magnetic hazards associated with individual proposed experiments and those with pacemakers, etc., would be moved to a safe location. Administrative and engineering controls would be in place during experiments to keep magnetic field exposure as low as reasonably achievable. Magnetic fields would be monitored at various locations at and near the Atlas facility during experiments.

4.1.10.3 X-Rays

The Atlas facility experiments would utilize a target chamber that would have walls of stainless steel 2.54-cm (1-inch) thick, twice the thickness of the Pegasus II facility's target chamber walls. An individual target implosion would produce an estimated one to four Megajoules (MJ) of 100 to 200 electron volt (eV) x-rays at the time of the experiment. These low-energy x-rays are not expected to penetrate the stainless steel target chamber; the energy would be converted to heat and dissipated into the target chamber walls. Standard NTS radiological protection procedures would be followed and additional procedures specifically developed for the Atlas facility as needed.

Diagnostic x-ray apparatus used to take radiographs of the events occurring during experiments within the target chamber would be located outside the chamber and would use high-energy x-rays, similar to medical x-rays. The diagnostic x-ray apparatus operation would be interlocked with the entrances to the target area such that the apparatus would not operate if an exterior door were opened. Existing standard operating procedures and facility shielding would be used to protect workers. In addition, personnel protection staff would conduct surveys in and around the target area to measure radiation produced by the diagnostic x-ray apparatus when in operation. Additional shielding would be added if needed.

Collocated workers or members of the public, either on site or off site, would not be exposed to high-energy x-rays. These x-rays would be shielded and contained within the interlocking room housing the capacitor bank.

4.1.11 Socioeconomics

At full operation, the Atlas facility operations crew is estimated to consist of about 15 personnel, the majority being engineers and scientists. It is not expected that the small number of new employees would generate noticeable additional secondary jobs related to purchases of goods and services in either Clark or Nye Counties.

4.1.12 Environmental Justice

Due to the relatively small size of this project and limited number of employees, there would be no impacts to public health and no subsection of the population, including minority or low-income population, would receive disproportionate impact.

4.1.13 Waste Management

It is assumed that a small amount (less than 1 m^3 annually) of liquid or solid hazardous waste, and an even smaller amount (less than 0.1 m^3 annually) of low level or low level mixed waste would be generated by occasional experiments involving lead and/or DU. This waste would be staged in on-site waste accumulation areas and shipped to offsite commercial permitted treatment, storage, and disposal facilities or disposed on site as appropriate. Solid non-hazardous waste such as paper and dielectric insulation would be disposed of on site in a permitted landfill; the amount of non-hazardous solid waste would not be expected to exceed 7 m^3 (240 ft^3) (DOE, 1996c) per year, resulting in minimal impacts from the Atlas operation.

4.2 NO ACTION ALTERNATIVE

This section describes the environmental consequences expected to occur if the Atlas facility were to remain at LANL. As stated earlier in Section 3.2, several environmental topics were not evaluated because the Atlas facility is located in an existing building at LANL and so have not been included in the Affected Environment or this section.

4.2.1 Land Use and Transportation

TA-35, the current location of the Atlas facility, is surrounded by adjacent Technical Areas 63, 50, 55, 48, 60, and 52 and as such is in a highly developed area. The addition of the Atlas facility at LANL is consistent with current land use. Generation of any hazardous and sanitary wastes from the operation of the Atlas facility is not sufficient to affect waste-handling and disposal activities.

It is anticipated that the Atlas facility, including the machine and the buildings, would consume approximately 500,000 kilowatt hours/year.

Assuming an average use of 35 gal/day per person, water usage and wastewater produced by 15 people would be approximately 525 gal/day.

Transportation mainly consists of the daily commute by approximately 15 personnel employed at the Atlas facility and occasional shipments of materials used in operations. Operation of the Atlas facility would not be expected to have any effects on transportation.

4.2.2 Geology and Soils

The major faults identified at LANL are not known to have had any movement more recently than between 4,000 and 6,000 years ago. The estimated 100-year return earthquake at Los Alamos is regarded as having a magnitude of 5 on the Richter scale, with an event of magnitude 7 being the maximum credible earthquake. These values are currently used in design considerations at LANL (DOE, 1996c). The building that houses the Atlas facility meets all seismic requirements for zone 2B, as do the Atlas machine structures.

4.2.3 Air Quality

Emissions from the Atlas facility are limited to those generated during operation, since the facility uses an existing building that has been modified. Operational emissions are identical to those that would be generated if the facility were located at the NTS (see Section 4.1.4). Emissions are well below the standards set forth in section 20.2.72 of the New Mexico Administrative Code.

4.2.4 Noise

Firing the Atlas machine makes a slight audible sound. The structure of the machine is designed to minimize motion for diagnostic instruments, and the impact to the environment by sound or motion is expected to be minor or nonexistent during all anticipated experiments. In the event that increased noise levels did occur during future operations, hearing protection would be provided for all workers that could be potentially adversely affected by the increased audible sounds.

4.2.5 Occupational and Public Health and Safety

Because the Atlas facility already exists at LANL, discussion of health and safety concerns generally encountered during construction is not appropriate.

Potential health hazards to site workers, collocated workers, and the general public during experiments conducted as part of the normal operations of the Atlas facility are identical to those discussed in the corresponding Occupational and Public Health and Safety section (Section 4.1.10) for the NTS. Because LANL is in a more developed area, the potential for off-site exposure to the public is greater. Additional administrative controls, such as roadblocks during experiments, have been put in place to prevent exposure to the hazards discussed in Section 4.1.10.

4.2.6 Socioeconomics

The Atlas facility employs about 15 personnel, the majority being engineers and scientists. It is not expected that the small number of employees will generate noticeable additional secondary jobs related to purchases of goods and services in Los Alamos County.

4.2.7 Environmental Justice

Due to the relatively small size of this project and limited number of employees, there are no anticipated impacts to public health and no subsection of the population, including minority or low-income population, would receive disproportionate impact.

4.2.8 Waste Management

It is assumed that a small amount (less than 1 m^3 annually) of liquid or solid hazardous waste, and an even smaller amount (less than 0.1 m^3 annually) of low level or low level mixed waste would be generated by occasional experiments involving lead and/or DU. This waste would be staged in on-site waste accumulation areas and shipped to offsite commercial permitted treatment, storage, and disposal facilities or disposed on site as appropriate. Minimal impacts would result from the generation of liquid sanitary waste, and existing facilities would be adequate to handle the increase. Solid non-hazardous waste such as paper and dielectric insulation would be disposed of in a permitted landfill; the amount of non-hazardous solid waste would not be expected to exceed 7 m^3 (240 ft^3) (DOE, 1996c) per year, resulting in minimal impacts from the Atlas operation. Solid non-hazardous waste would be disposed of at the Los Alamos County Landfill.

5.0 CUMULATIVE IMPACTS

The following sections summarize the potential incremental contribution to cumulative impacts that would be expected from the proposed action and the no action alternative.

5.1 PROPOSED ACTION

5.1.1 Land Use and Transportation

The Atlas facility fits within the expected land use of an Industrial, Research, and Support site, as identified in the NTS EIS (DOE, 1996a). Use of the land for activities planned under the Atlas project would not be expected to adversely impact activities at surrounding NTS or off-site facilities.

Relocation of Atlas from the existing location at LANL would provide space within an industrial/research facility that could be used for other appropriate activities. Combined with other land uses at LANL, relocation of Atlas would not result in adverse cumulative impacts on laboratory or other land uses.

An increase of approximately 30 one-way vehicle trips daily, generated by an additional 15 workers employed at the Atlas facility, would contribute only slightly to the total annual mileage on U.S. Highway 95 and the NTS. This slight increase in mileage is well within the daily vehicle trips projected for the year 2005 by the Regional Transportation Plan. There would be no noticeable impact to traffic or transportation on public highways or on the NTS.

There would be a slight net decrease in vehicle trips at LANL if Atlas were moved to the NTS. The decrease in traffic would be beneficial but virtually unnoticeable cumulatively.

5.1.2 Topography and Physiographic Setting

The Atlas facility would be constructed in a previously disturbed area within the Area 6 Construction Facilities. The existing Atlas facility at LANL is within a previously developed area, which would not be demolished or removed. There would be no cumulative effects on topography or the physiographic setting at either location.

5.1.3 Geology and Soils

During the construction phase, grubbing and grading activities, as well as excavation, would be minor. The amount of aggregate used during construction would be minor and would not result in any impacts to regional aggregate mining. The existing Atlas facility is within a previously developed area, which would not be demolished or removed. The cumulative impact on geology and soils at both locations would be negligible.

5.1.4 Hydrology

Naturally occurring surface waters at the NTS are limited to ephemeral streams resulting from snowmelt and precipitation runoff and drainage into playas to form temporary lakes. There would be no cumulative impacts to surface waters from construction and operation of the proposed Atlas facility.

Groundwater use at the NTS is now less than one-fifth of the historic peak (DOE, 1996). Withdrawal of groundwater for construction and operation of the proposed Atlas facility would add incrementally to the amount currently used; however, this additional water use combined with currently used and anticipated uses would be well within the quantity analyzed in the NTS EIS (DOE, 1996) and would not represent a cumulative increase in impacts over those previously addressed.

5.1.5 Biological Resources

Approximately 1 acre would be utilized for construction of facilities associated with the Atlas facility. All of the land that would be used for the Atlas facility is within an existing industrial complex and no new land would be disturbed. Therefore, wildlife habitat and existing plant communities would not be affected by construction or operation of the Atlas facility. Noise generated by operation of Atlas may elicit a startle response from wildlife in the immediate vicinity of the facility but this would be intermittent and transitory and would not adversely impact the local fauna. There would be no cumulative impact to wildlife habitat or plant communities and noise generated by the operation of Atlas when combined with noises from existing industrial operations in the area would result in a negligible cumulative impact on wildlife.

Because the existing Atlas facility at LANL is within an existing developed area and reclamation of the site is not planned, relocation of the facility would not result in any cumulative impacts to biological resources.

5.1.6 Air Quality

Construction activities would take less than one year for the Atlas facility and calculations have shown that less than one ton of fugitive dust (PM^{10}) would be generated. This quantity of fugitive dust would comprise less than one percent of the total of 177,660 tons associated with land disturbance activities throughout the region represented by the Stateline and Tonopah resource areas and the Las Vegas Valley (DOE, 1996a). Emissions generated as a result of operations would be small enough to be exempt from permitting and would not result in a degradation of air quality. The cumulative effect on air quality of constructing and operating the Atlas facility would be minimal.

5.1.7 Noise

Noise impacts associated with activities at the Atlas facility would be restricted to the immediate vicinity and would not affect persons or residents in adjacent areas or add measurably to regional noise levels. Relocation of Atlas from LANL would result in a net decrease in noise at that location but unnoticeable cumulatively.

5.1.8 Visual Resources

The visual character of the region would change only slightly with the addition of one new building and minor appurtenances such as trailers, an oil storage tank, and parking lot. The new facility would be erected in an already developed area, not visible from off-site, so that there would be no impact to the general public. The cumulative visual impact of the Atlas facility at the NTS would be negligible.

5.1.9 Cultural Resources

The site of the proposed project has been previously disturbed. Hence, there would be no cumulative impacts to cultural resources.

5.1.10 Occupational and Public Safety and Health

Based on occupational injury rates for construction and other industrial activities cited in the NTS EIS (DOE, 1996a), Atlas facility activities would result in only one or two potential injury cases per year, with a similar estimated number of lost workdays. The Atlas facility activities would not affect the regional rate. Atlas facility activities would be conducted within the proposed project boundaries and would not affect the public.

Hazards posed to workers, collocated workers and the public during operations would be minimized by following established procedures that included various administrative controls and ensuring that Atlas personnel were properly trained in dealing with the potential hazards. Cumulative impacts from operation of the facility would be minimal.

5.1.11 Socioeconomics

There would be no measurable effect on the number of jobs, average wages and household earnings, and tax revenues in Nye County from the addition of the Atlas facility. Similarly, because there are relatively few employees at the Atlas facility, there would be little effect on the number of jobs, household income and tax revenues in Los Alamos County if the facility were moved to the NTS.

5.1.12 Environmental Justice

There would be no impacts to minority and low-income populations in the region of influence from the development of the Atlas facility. Thus, there is no contribution to the cumulative impact.

5.1.13 Waste Management

Small amounts of hazardous wastes could be generated from Atlas operations. Solid and liquid non-hazardous wastes would be generated in greater quantities but would only result in minimal impacts. The additional waste streams resulting from operation of Atlas would represent a very minor increase in waste volumes currently generated at the NTS. There would be little cumulative impact from the generation of these wastes.

5.2 NO ACTION ALTERNATIVE

This section describes cumulative impacts expected to occur if the Atlas facility were to remain at LANL. As stated earlier in Section 3.2, several environmental issues were not evaluated and so have not been included in the Affected Environment or this section.

5.2.1 Land Use and Transportation

Atlas occupies an existing building at LANL, which was modified slightly to accommodate the Atlas facility. Because the majority of Atlas personnel are comprised of the existing workforce, the addition of several vehicles and occasional truck traffic is very minor considering existing traffic. There is little effect, if any, on cumulative land uses and transportation impacts.

5.2.2 Geology and Soils

Existing facilities are used to house the Atlas machine. There are no cumulative impacts to geology and soils from operation of the Atlas facility.

5.2.3 Air Quality

Emissions generated during operations are small enough to be exempt from permitting and do not degrade the air quality. The cumulative effect on air quality of operating the Atlas facility is minimal.

5.2.4 Noise

Noise impacts associated with activities at the Atlas facility are restricted to the geographical area contained therein and do not affect persons or residents in adjacent areas or add measurably to regional noise levels.

5.2.5 Occupational and Public Safety and Health

Hazards posed to workers, collocated workers and the public during operations are minimized by following established procedures that include various administrative controls and ensuring that Atlas personnel are properly trained in dealing with the potential hazards. Cumulative impacts from operation of the facility are minimal.

5.2.6 Socioeconomics

Socioeconomic impacts related to the Atlas facility are minimal, since the facility employs approximately 15 people. There is no measurable effect on the number of jobs, average wages and household earnings, and tax revenues in Los Alamos County.

5.2.7 Environmental Justice

No impacts to minority and low-income populations in the region of influence from the development of the Atlas facility have been known to occur. Thus, there is no contribution to the cumulative impact.

5.2.8 Waste Management

Small amounts of hazardous wastes are generated from Atlas operations. Solid and liquid non-hazardous wastes are generated in greater quantities but have only resulted in minimal impacts. There are little or no cumulative impacts from the generation of these wastes.

6.0 MITIGATION MEASURES

Mitigation measures are required for resources that would have major adverse impacts as a result of the proposed action or alternative action. All of the impacts to resource areas analyzed throughout this EA were determined to be minor for either the Proposed Action or No Action Alternative.

7.0 ACCIDENT SCENARIOS

The probability of a major accident occurring at the proposed Atlas facility during its construction and operation is low. Scenarios of accidents that would be more likely to occur are described below. Accidents that could occur under the No Action Alternative during operation of the Atlas facility are identical to those of the proposed action and have been included in this section.

Standard method of fault hazards analysis were used in the *Preliminary Hazard Analysis for the Atlas Project* (LANL, 1995) and the *Facility Safety Plan* (LANL, 2000) to identify the specific ways in which facilities, processes, or equipment might fail to perform their intended function. This systematic engineering procedure also attempts to determine the key causative factors, effects, mitigative measures, and the expected risk that such a failure might impose. The analysis of processes yielded a set of events, which bound the realm of possible events at the Atlas facility. No event has been found which results in off-site impacts. This section identifies the most likely scenario or bounding case accident that could involve a site worker, collocated worker and the public. The following and additional accident scenarios are contained in the *Preliminary Hazard Analysis for the Atlas Project* (LANL, 1995) and the *Facility Safety Analysis* (LANL, 2000). Prior to operations at NTS an additional safety analysis would be required.

7.1 SITE WORKER

The bounding case accidents for a site worker involve either electrocution from a high-energy power source or injury from the mechanical collapse of the overhead crane. Of these scenarios, both have an equal likelihood of occurrence. The impact to a site worker in these scenarios could be death; however the frequency is less than 0.01 or the likelihood of occurrence is less than once in 100 years of operation or once in 100 similar facilities operated for one year.

7.2 COLLOCATED WORKER

The most likely accident scenario that could result in an impact to collocated workers involves exposure to emissions and effluents from a capacitor bank fire. In this scenario, a collocated worker would receive minimal exposure to smoke and sprinkler system water containing mineral oil spilled from a failed capacitor module. The impact to a collocated worker in this scenario would be temporary irritation and discomfort. This scenario would have a frequency of 0.001 (very unlikely) or the likelihood of occurrence is less than once in 10, 000 years of operation or once in 10,000 similar facilities operated for one year. In the event of a fire, all site and collocated workers would be evacuated immediately.

7.3 PUBLIC

The most likely accident scenario that could result in an impact to the public involves exposure to emissions and effluents from a capacitor bank fire. In this scenario, a member of the public would receive minimal exposure to smoke. The impact to a member of the public in this scenario would be less than that experienced by a collocated worker. Exposure to smoke could result in very mild and temporary irritation and discomfort. The frequency is 0.001 or the likelihood of occurrence is less than once in 10, 000 years of operation or once for 10,000 similar facilities operated for one year. In the event of a fire, all workers and members of the public would be evacuated immediately, and road closures and exclusion zones would be implemented, as appropriate. Based on the accident scenario and impact analysis summarized above, there are no probable accidents that would result in an adverse impact to the public.

7.4 ENVIRONMENT

At the NTS, the bounding case accident scenario that could result in an impact to the environment involves the release of emissions and effluents from a capacitor bank fire. In this scenario, smoke and sprinkler water containing spilled mineral oil could be released to the environment. The impact to the environment in this scenario would be temporary and minimal. Smoke from a fire in this scenario would disperse quickly, and the sprinkler water containing mineral oil would be contained by site soils and controlled drainage systems. Water containing mineral oil does not present a serious environmental concern given the non-hazardous nature of mineral oil, and in the event of a fire, spill prevention control measures would be implemented immediately.

The accidental release of oil from one of the Atlas Marx/VTL tanks either as a result of an operational fault (breakdown) or a diaphragm failure could release up to 20,000 gallons of dielectric oil into the 45,000 gallons secondary containment designed into the proposed building at NTS. The modular nature of the system makes it unlikely that more than the oil contained in the common volume (top of tanks that communicate) and one Marx/VTL tank would be released on any occasion. The inventory of oil in the storage system is likewise less than the secondary containment capacity of the building proposed for the NTS.

8.0 REGULATORY REQUIREMENTS

This section briefly describes the major laws, regulations, executive orders, and DOE Orders that may apply to the proposed action and alternative.

Clean Air Act of 1970 (CAA), as amended. The Clean Air Act, as amended, is intended to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population.

Clean Water Act. The Clean Water Act was enacted to "restore and maintain the chemical, physical, and biological integrity of the Nation's water."

National Environmental Policy Act of 1969 (NEPA). NEPA established the policy of promoting awareness of the consequences of major federal activities on the quality of the human environment, and consideration of the environmental impacts during the planning and decision-making stages of a project.

Federal Land Policy and Management Act of 1976. This act governs the use of federal lands that may be overseen by various agencies, and establishes procedures for obtaining land withdrawals and rights of way.

Hazardous and Radioactive Materials Transportation Regulations of the Department of Transportation (DOT*).* U.S. DOT Regulations at Title 49 Parts 100 through 178 of the Code of Federal Regulations (CFR) contain requirements for the identification of material as hazardous or radioactive. DOT regulations at 49 CFR 397 provide guidance to motor carriers for route selection.

Noise Control Act of 1972. The Noise Control Act, as amended, directs all federal agencies to carry out, "to the fullest extent within their authority," programs within their jurisdictions in a manner that furthers a national policy of promoting an environment free from noise that jeopardizes health and welfare.

National Emissions Standards for Hazardous Air Pollutants (NESHAP). Emissions standards set by EPA for an air pollutant not covered by the National Ambient Air Quality Standards that may cause an increase in deaths or in serious, irreversible or incapacitating illness.

Resource Conservation and Recovery Act (RCRA), as amended. This act, and its implementing regulations at 40 CFR 260 through 273, provide the regulatory framework for "cradle-to-grave" control of hazardous wastes by imposing strict management requirements on generators, transporters, and owners and operators of hazardous waste treatment, storage, and disposal facilities.

9.0 GLOSSARY

Ambient air. That portion of the atmosphere, outside of buildings, to which the general public is exposed.

Decibel (dB). A standard unit for measuring sound-pressure levels based on a reference sound pressure of 0.0002 dynes per square centimeter. This is the smallest sound a human can hear.

Decibel, A-weighted (dBA). Adjusted unit of sound measurement that corresponds to the relative sensitivity of the human ear at specified frequency levels. This represents the loudness as perceived by humans.

Dielectric. A nonconductor of electric current.

Endangered Species. A species of possible management concern due to their restricted distribution or the potential for habitat disturbance.

Effluent. A gas or fluid discharged into the environment.

Electron Volt (eV). The energy equivalent of an electron passing through a voltage differential of 1 volt; 1.60×10^{-19} Joules.

Environmental Impact Statement. A document required by the *National Environmental Policy Act* of 1969, as amended, for proposed major Federal actions involving potentially significant environmental impacts.

Fugitive Dust. Particulate matter composed of soil. Fugitive dust may include emissions from haul roads, wind erosion of exposed soil surfaces, and other activities in which soil is either removed or redistributed.

Gauss (G). Unit of magnetic induction in the electromagnetic and Gaussian systems of units.

Groundwater. Subsurface water within the zone of saturation.

Hazardous Waste. Wastes that are designated as hazardous by the Environmental Protection Agency or State of Nevada regulations. Hazardous waste, defined under the Resource Conservation and Recovery Act, is waste from production or operation activities that pose a potential hazard to human health or the environment when improperly treated, stored, or disposed.

High-energy pulsed power. A technique used in compressing electrical energy in time and space and storing it at high levels and then releasing it to a target in a very short time period.

Infrastructure. Utilities and other physical support systems needed to operate a laboratory or test facility.

Joule. Unit of energy equivalent to one watt-second.

Megajoule (MJ). One million joules, which is a measure of energy or work in the meter-kilogram-second system of units, equal to 1 Newton.

Mitigation. Actions and decisions that (1) avoid impacts altogether by not taking a certain action or parts of an action, (2) minimize impacts by limiting the degree or magnitude of an action, (3) rectify the impact by repairing, rehabilitating, or restoring the affected environment, (4) reduce or eliminate the impact over time by preservation and maintenance operation during the life of the action, or (5) compensate for an impact by replacing or providing substitute resources or environments.

Nonattainment Area. An area that has been designated by the U.S. Environmental Protection Agency or the appropriate site air quality agency as exceeding one or more national or state Ambient Air Quality Standards.

Particulate. Fine liquid or solid particles such as dust, smoke, mist, fumes, or smog found in air or emissions.

Pegasus II. A pulsed power system to demonstrate feasibility of magnetic implosion.

Playa. A dry, vegetation-free, flat area at the lowest point of an undrained basin.

Record of Decision (ROD). A public document that explains which cleanup alternative would be selected for the area of concern.

Runoff. The discharge of water through surface streams.

Significant. The common meaning of significant is; "having or likely to have considerable influence or effect." As it pertains to the National Environmental Policy Act, "significant" requires that both context and intensity be considered in evaluating impacts (40 CFR Part 1508).

10.0 REFERENCES

Regulations, Orders, and Laws

10 CFR Part 1021	U.S. Department of Energy, " National Environmental Policy Act; Implementing Procedures and Guidelines Revocation; Final Rule and Notice," *Code of Federal Regulations*, Office of Federal Register, National Archives and Records Administration, U.S. Government Printing Office, Washington, D.C., 1992.
29 CFR Part 1910	U.S. Department of Labor "Labor: Occupational Safety and Health Standards," *Code of Federal Regulations*, Office of the Federal Register, National Archives and Records Administration, U.S. Government Printing Office, Washington, D.C., 1993.
40 CFR Part 61	U.S. Environmental Protection Agency, Subpart C, National Emission Standard for Beryllium, 1998.
40 CFR Part 1500-1508	Council on Environmental Quality (CEQ), "Protection of the Environment: Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act," *Code of Federal Regulations*, Office of the Federal Register, National Archives and Records Administration, U.S. Government Printing Office, Washington, D.C., 1993.
49 CFR Parts 100-178	U.S. Department of Transportation, Transportation of Hazardous Materials, Code of Federal Regulations, Office of the Federal Register, National Archives and records Administration, U.S. Government Printing Office, Washington, D.C., 1995.
NEPA	National Environmental Policy Act, Public Law 91-190, 42 U.S.C. 4341 et seq., amended by Public Law 94-52 and 9483, 1969.

General

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