

Atlas Relocation and Operation At the Nevada Test Site

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Environmental Assessment

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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
2
3 **1.0 INTRODUCTION**

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

17 **1.1 BACKGROUND**

18
19 In August 1996, DOE published a *Final Environmental Impact Statement for the Nevada*
20 *Test Site and Off-Site Locations in the State of Nevada* (NTS EIS). The Record of
21 Decision (ROD) for the NTS EIS stated, "Defense Program activities at the Nevada Test
22 Site will emphasize stockpile stewardship experiments and operations to maintain
23 confidence in the safety and reliability of the stockpile without underground nuclear
24 testing. These stockpile stewardship activities will include exercises, operations,
25 experiments (including subcritical experiments involving special nuclear material), and
26 other hydrodynamic tests." Further, the ROD indicates that DOE plans to conduct a wide
27 variety of Stockpile Stewardship experiments at the NTS, including dynamic
28 experiments, subcritical experiments, dynamic experiments to generate electrical pulses,
29 and other experiment types. These experiments would be conducted within the
30 appropriately zoned areas of the NTS. In addition, the ROD states, "the DOE will also
31 reserve land and infrastructure on the Nevada Test Site to support the current test
32 readiness and national security missions and to support future defense program
33 activities."

34
35 The term "stockpile stewardship" refers to core competencies in activities associated with
36 research, design, development, and testing of nuclear weapons, and the assessment and
37 certification of their safety and reliability under a Comprehensive Test Ban Treaty.
38 Historically, these activities have been performed at three weapons laboratories (Los
39 Alamos National Laboratory [LANL] in New Mexico, Lawrence Livermore National
40 Laboratory [LLNL] in California, and Sandia National Laboratories [SNL] in New
41 Mexico and California) and the NTS.

42
43 In March 2000 the National Nuclear Security Administration (NNSA) was created to
44 carry out the national nuclear security responsibilities of the DOE including maintenance

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

12
13 One outcome of the Stockpile Stewardship and Management Programmatic
14 Environmental Impact Statement (SSM PEIS) and its associated ROD, also issued in
15 1996, was the siting and construction of the Atlas facility at LANL. More specifically,
16 Atlas was located at LANL so that it could make use of an existing 1,430 megawatt
17 (MW) rotating generator to charge the Atlas high energy density capacitors very rapidly.
18 At that time, rapid (<1 second) charging of the capacitors and switches in the energy
19 storage section of the Atlas machine was the only way to achieve the high reliability
20 required for Stockpile Stewardship Program experiments (a more detailed description of
21 this requirement is in Appendix K of the SSM PEIS). Since then, a combination of
22 charging, energy storage, and high voltage switching technology has been demonstrated
23 that can operate with a high degree of reliability in a more conventional regime of charge
24 time (i.e., <30 seconds) using commercial power supplies. Consequently, operation of
25 Atlas is no longer dependent upon the existing LANL generator.

26
27 In 1999 and 2000, Congress appropriated funds in the Energy and Water Appropriation
28 FY00 Conference Report 106-536 and FY01 Conference Report 106-988 for proof of
29 concept experiments and completion of facility operational capability for the Atlas pulsed
30 power machine at the NTS. On September 11, 2000, the Deputy Administrator for
31 Defense Programs directed the managers of the Albuquerque and Nevada Operations
32 Offices to prepare a plan to estimate the cost and schedule to move and reassemble Atlas
33 in Nevada and have it jointly operated by LANL and Bechtel Nevada in support of the
34 Stockpile Stewardship Program. The relocation plan was prepared and presented to the
35 Deputy Administrator for Defense Programs on October 27, 2000. On December 8,
36 2000, the Deputy Administrator for Defense Programs authorized the use of appropriated
37 funds to develop a performance baseline for the project and to complete the NEPA
38 analysis for the relocation.

39
40 Recent evaluation shows that several substantial benefits to the Stockpile Stewardship
41 program would accrue from the proposed relocation:

- 42
43 • The NNSA Defense Programs investment in NTS activities would be optimized by
44 engaging Bechtel Nevada (BN) experimental and diagnostic scientists in advanced

1 experiments on Atlas that contribute to Stockpile Stewardship Program data needs and
2 that develop and refine capabilities needed for Atlas, Sub-Critical Experiments (SCE),
3 and nuclear test readiness.

4
5 • A net cost reduction would be realized by applying BN's demonstrated expertise in
6 facility operations and project management to Atlas operations. NTS operational
7 effectiveness would be improved by load leveling with subcritical experiments and by
8 improving utilization of the NTS physical plant.

9
10 • Some LANL personnel resources (specifically in the area of facility operations) would
11 be freed for other weapon program tasks.

12 13 **1.2 PURPOSE AND NEED FOR THE PROPOSED ACTION**

14
15 U.S. National Security Policy requires the NNSA to maintain core intellectual and
16 technical competencies in nuclear weapons and to maintain a safe and reliable U.S.
17 nuclear weapons stockpile. The NNSA fulfills its nuclear weapons responsibilities
18 through the Stockpile Stewardship Program, which involves the integrated activities of
19 three national laboratories (LANL, LLNL, and SNL), four industrial plants, and the NTS.
20 Together these sites make up the nuclear weapons complex. Efficient implementation of
21 the Stockpile Stewardship Program without nuclear testing requires NNSA to maintain
22 the safety, security, and reliability of the U.S. nuclear weapons stockpile through
23 enhanced experimental capability at its facilities.

24
25 NNSA has a continuing need to improve the experimental capability and the efficiency of
26 the Stockpile Stewardship Program and to broaden and strengthen its intellectual and
27 technical capability at the NTS. In order to maintain the historical core competencies and
28 capabilities of the NTS, NNSA needs to focus on issues associated with strong and
29 efficient implementation of the Stockpile Stewardship Program, engage the technical
30 involvement of Nevada Operations Office (NV) personnel and contractors with the
31 technical expertise held by the national laboratories and enhance the scientific and
32 engineering competencies and capabilities at the NTS. The NTS plays an important role
33 in the integrated activities required to maintain a safe and reliable nuclear weapons
34 stockpile. To ensure the continued appropriate levels of capability and readiness of the
35 NTS to fulfill its role in the Stockpile Stewardship Program, NNSA needs the capability
36 of doing large-volume hydrodynamic experiments at high energy density at the NTS. In
37 order to achieve these enhancements at the NTS into the future, NNSA also needs to
38 create higher education opportunities in high energy density physics in Nevada through
39 collaboration with the University and Community College system of Nevada.

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1 **2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES**

2
3 This section describes the proposed action to relocate the Atlas pulsed-power machine to
4 the NTS and to operate it. This section also discusses alternatives to the proposed action
5 and describes the no-action alternative under which the Atlas Facility would remain in
6 Los Alamos, New Mexico and continue to be operated at that site.

7
8 **2.1 PROPOSED ACTION**

9
10 NNSA proposes to disassemble the Atlas Facility at LANL and transport it to the NTS
11 (Figure 1). The proposed action of moving the Atlas machine to the NTS does not
12 represent a major change to the stockpile stewardship program but rather a relocation of
13 an asset within the stockpile stewardship complex. At the NTS, Atlas would be
14 reassembled in a new building within an existing Area 6 Industrial, Research, and
15 Support Site (Figure 2). After Atlas is reassembled at the NTS, it would be
16 recommissioned to ensure proper operation and then used to conduct approximately 40
17 pulsed power experiments each year, with a potential to increase to approximately 100
18 experiments per year, should the Stockpile Stewardship Program require it and if
19 appropriate additional funding were to become available. At full operation, the Atlas
20 facility is estimated to employ 15 people, the majority being engineers and scientists.
21 The building that would be constructed to house the Atlas Facility at NTS is discussed in
22 the following paragraphs. Operation of the Atlas facility would be the same as that
23 described in the 1996 SSM PEIS, which has been summarized herein, except as noted
24 with regard to the use of specialized capacitors that are operated via a commercial power
25 supply.

26
27 **2.1.1 Facility Description**

28
29 At the NTS, the Atlas facility would be housed in a newly constructed, pre-engineered
30 building estimated to be 100 ft x 140 ft x 35 ft high with a bridge crane (Figure 3). The
31 Atlas system requires a heavy industrial, high-bay building equipped with a heavy-duty
32 gantry crane to house the capacitor bank and user support facilities. The building would
33 be designed to the requirements for a low-hazard, non-nuclear facility. Atlas would
34 require electromagnetically shielded rooms for classified and unclassified data
35 acquisition and rooms for machine control. The capacitors in the Atlas capacitor bank
36 use dielectric mineral oil (Diala-AX). A 150,000-liter (40,000-gallon) aboveground
37 mineral oil storage tank would be located adjacent to the facility. Water and sewer lines
38 would be extended from the existing main lines to the new facility. An asphalt parking
39 lot would also be constructed. A temporary machine component staging structure
40 utilizing tension-fabric or air inflation technology might also be constructed next to the
41 new high bay to accommodate piecepart and hardware receiving and assembly of
42 materials prior to installation in the high bay.

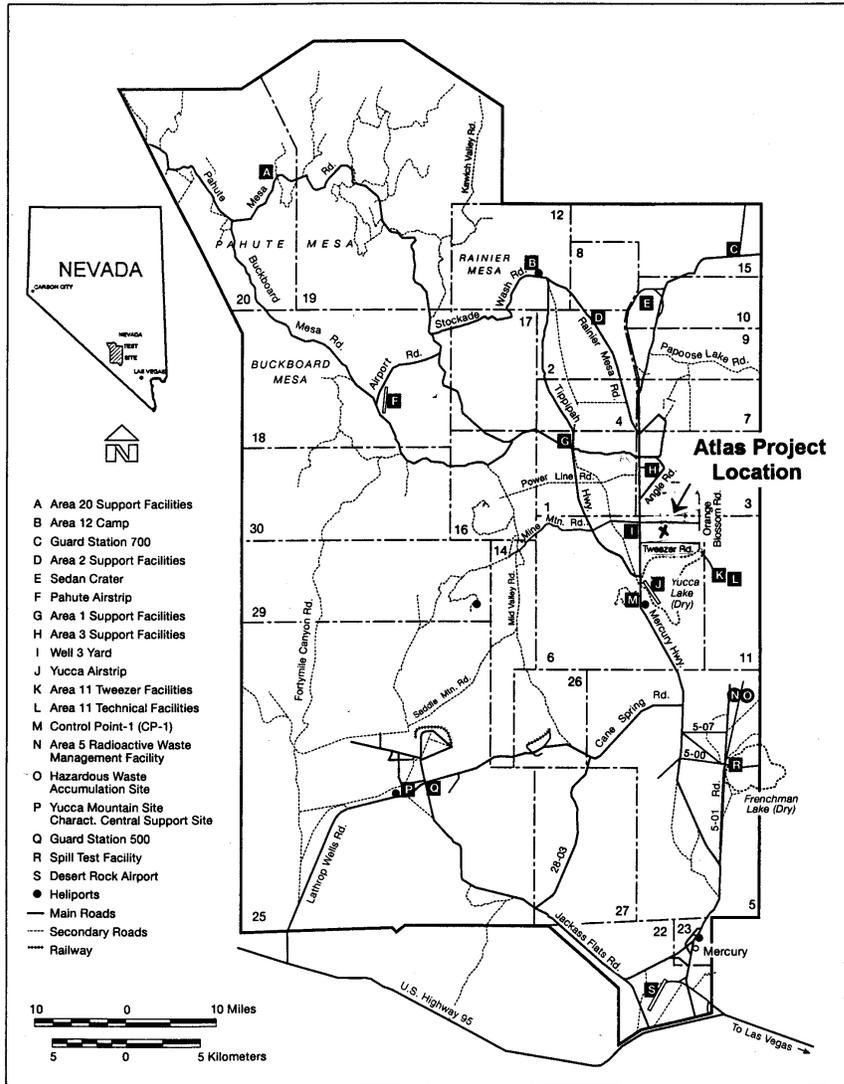


Figure 1 Map of NTS

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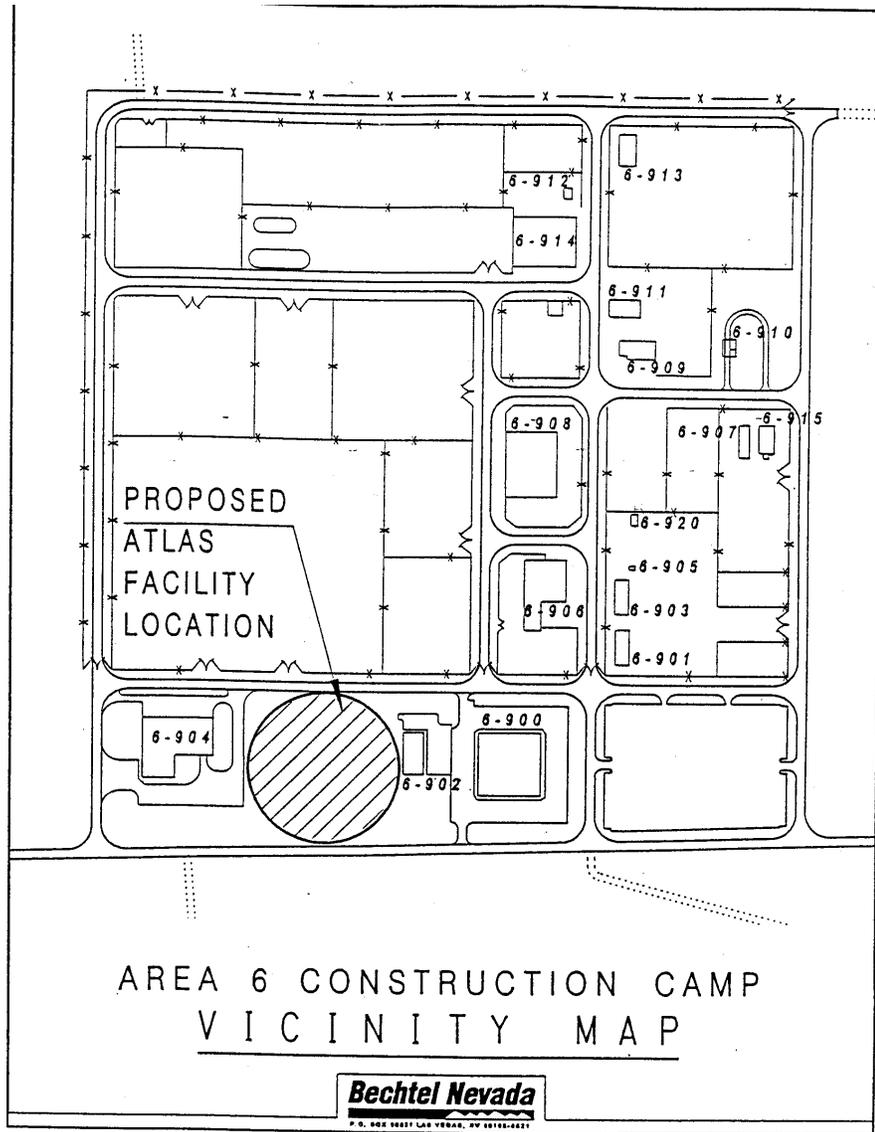


Figure 2 Vicinity Map of the Area 6 Construction Camp and Atlas Facility

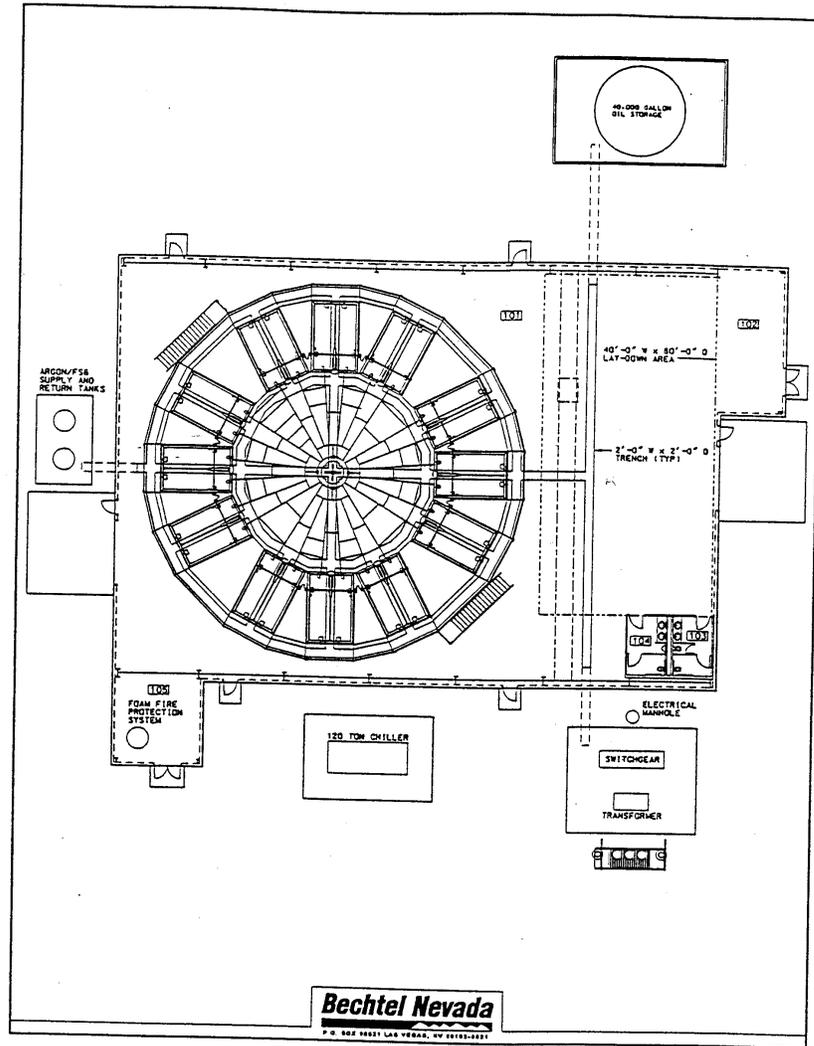


Figure 3 Site Layout of the Atlas Facility

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

8
9 Primary components of the Atlas Facility would include:

- 10
- 11 • Target chamber containing imploding liner assembly
- 12 • Capacitor bank
- 13 • Target assembly clean room
- 14 • Laser diagnostic systems
- 15 • X-ray diagnostic systems
- 16 • Control room
- 17 • Diagnostic screen rooms
- 18 • Radial and Axial experimental access for imaging diagnostics
- 19 • Spare capacitor module
- 20 • Vacuum pumps
- 21 • Structural platforms and stairwells
- 22 • Vertical tri-plate radial transmission line
- 23 • 150,000 liter (40,000 gallon) mineral oil storage and transfer system
- 24 • Transmission line ballast
- 25 • Argon/Sulfur Hexafluoride (SF6) gas system to supply switches with dielectric gas
- 26 • Heating, ventilation, and air conditioning systems
- 27 • Chilled water, nitrogen, and compressed air systems
- 28 • 300 liter (80 gallon) liquid nitrogen storage tank
- 29 • Diagnostic data center
- 30 • Project management office
- 31 • Visitor center/experimentalist/staff office building

32
33 The expected lifetime of the Atlas Facility at NTS is 10 years without major refurbishing.
34 At that time, the facility could be refurbished for continued operation or the facility could
35 be cleaned and decommissioned. If decommissioned, the Atlas machine and support
36 equipment could then be made available for other uses or excessed, as appropriate.

37 38 **2.1.2 Operations**

39
40 The Atlas Facility is designed to perform pulsed power experiments on macroscopic
41 targets, i.e., targets that are larger than those possible when using lasers and other
42 currently available equipment. Larger targets, on the order of a cubic centimeter in size,
43 improve the ease of measurement and allow the investigation of physical phenomena that
44 cannot be scaled down to smaller sizes without affecting parameters of importance.

1 The Atlas pulsed powered system is designed to deliver a pulse of very high electrical
2 current through a high precision cylindrical metal liner that surrounds the sample of
3 interest. The current produces a brief but powerful magnetic force on the liner, which
4 implodes upon the sample. For hydrodynamic experiments, Atlas would deliver 25 to 30
5 megamperes to an imploding liner, which would reach velocities of over 15
6 cm/microsecond with final kinetic energies of 2 to 5 megajoules (MJ). Pressures of up to
7 20 megabars would be achieved, depending on the design of the experiment. At this
8 energy density, the target and liner would reach an energy density necessary for
9 understanding the physics of the late stages of primary and secondary implosion.

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

25
26 Atlas at the NTS would support many related types of experiments. In a typical
27 experiment, a hollow cylindrical piece of metal, perhaps fabricated with known cracks,
28 voids, or other defects, would be placed inside the initially cylindrical liner. A heavy
29 target, e.g., 30 grams (1.1 ounce), would be used to study the hydrodynamic effects of
30 such defects in aging weapons. The magnetically driven liners would compress sample
31 materials to high pressures and could produce partial ionization of the sample. In another
32 family of experiments, a light target, e.g., 50 milligram (0.002 ounce) would be imploded
33 upon itself to produce a dense plasma to study the properties of strongly coupled plasmas
34 pertinent to stockpile stewardship. Solid shrapnel and particulate metal dust would be
35 generated but would be stopped by the walls of the target chamber.

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1 The following target materials are characteristic of those that may be used in Atlas
2 experiments:

<u>Metal</u>	<u>Symbol</u>	<u>Atomic No.</u>
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

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

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

35 **2.2 Discussion of Alternatives Considered**

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

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

10
 11 Table 1 contains information from the various EIS's, resource management plans, and
 12 site development plans. This representation is meant to compare the relative impact or
 13 requirements of Atlas at each of the stockpile stewardship sites. Table 1 identifies the
 14 current land area, employment, power and water consumption and waste and wastewater
 15 generation of the NTS, LANL, SNL, and LLNL. Also included in the table are the Atlas
 16 facility requirements for these same indicators for comparison.

17
 18 **Table 1. Comparison of Stockpile Stewardship Sites**
 19

	<u>NTS^a</u>	<u>LANL^b</u>	<u>SNL^c</u>	<u>LLNL^d</u> 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)	203,000¹	600,000	760,000	3500¹	525
Power demand, Electrical (MW/yr)	100,000	372,000	197,000	390,000	500
Waste Generation					
Solid (m³/yr)	575	10,100			7
Hazardous (kg/yr)	380,101	860,000	40,000	15,000	200
Employment	1,304	9,977	7500	350²	15

20
 21 ¹ Does not include discharges to septic tanks and leachfields.

22 ² LLNL total population is approximately 7925 career or post doctor.

23 ^a DOE, 2000a.

24 ^b DOE, 1999b

25 ^c DOE, 1999c

26 ^d DOE, 2000b

27

1 The action of constructing and operating Atlas at sites in the Stockpile Stewardship
2 complex would involve virtually the same impacts. That is the land, water, and power
3 demands as well as the generation of waste at the facility is not site dependent. Site
4 alternatives such as LLNL or SNL would not avoid or minimize adverse effects to the
5 human environment beyond those identified at the NTS. The degree to which the
6 resource demands, including waste generation, add to the site operations total would vary
7 from site to site. For example, the land area requirement of 1 acre for the Atlas Facility
8 represents 0.0001 percent of the total land area at the NTS and, for comparison, 0.01
9 percent of the land area at LLNL Site 300. The power requirement for Atlas represents
10 0.5 percent of the current NTS total, 0.25 percent of the SNL total, and 0.13 percent of
11 the LLNL Site 300 total. These variances are due to the relative differences in the current
12 resource or resource demand. Quantitatively, the environmental impacts of construction
13 and operation of Atlas at any of the Stockpile Stewardship sites would be localized and
14 minor.

15
16 For the remainder of this assessment the SNL and LLNL site 300 alternatives are not
17 evaluated further. These sites alternatives would not meet the need to enhance the
18 scientific and engineering stockpile stewardship competencies and capabilities at the NTS
19 nor would they meet the Legislative intent expressed in the Military Construction FY
20 2001 Appropriations Bill, Public Law 106-246, as stated in section 1.2 of this assessment.
21 Alternative sites at the University of Nevada, Las Vegas, and the NNSA North Las Vegas
22 Facility were also initially considered. These alternative sites also would not meet the
23 need for enhanced capabilities at the NTS and have minimal security, adjacent residential
24 neighborhoods, and little room for potential growth. These attributes coupled with higher
25 projected costs for construction and operation made them unreasonable for detailed
26 consideration.

27

28 **2.3 NO ACTION ALTERNATIVE**

29

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

35

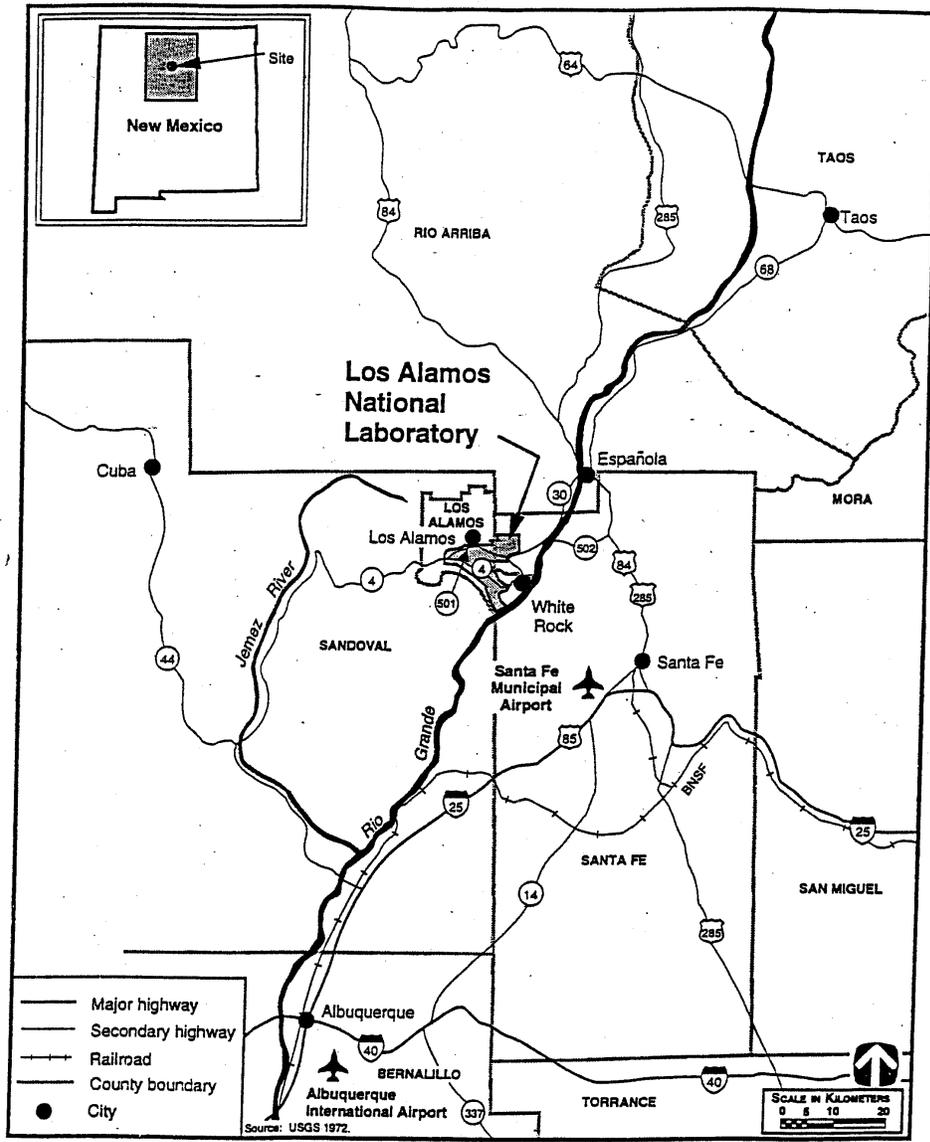


Figure 4 Location Map of LANL, New Mexico and the Region

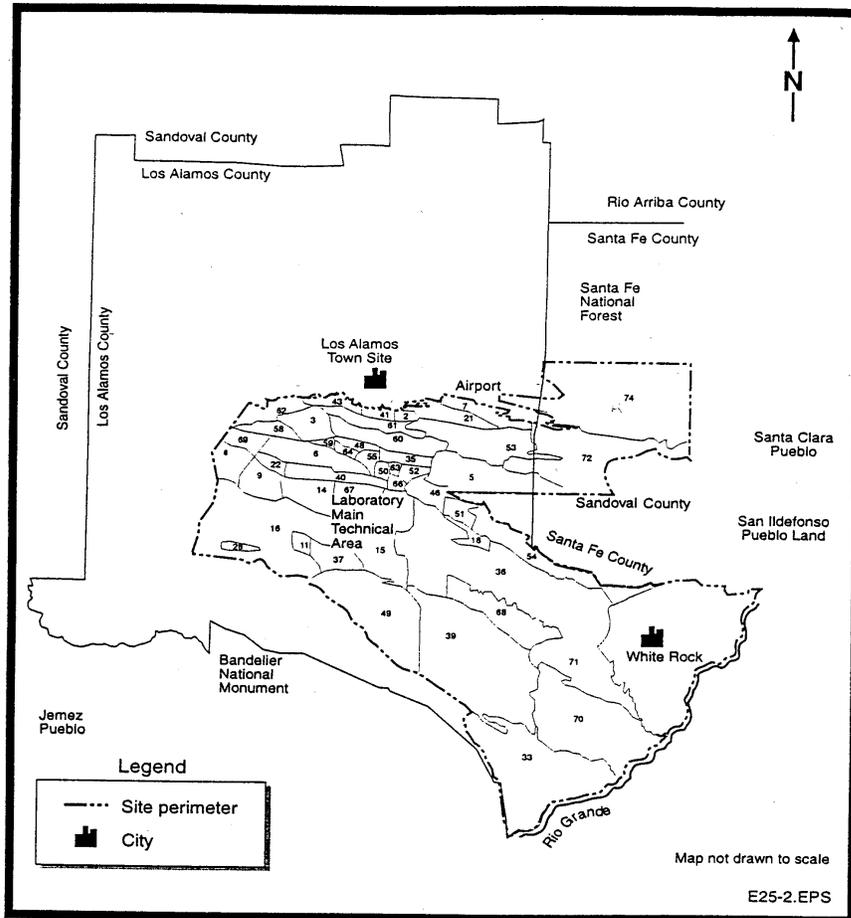


Figure 5 Map of LANL

1 3.1.1.2 Infrastructure and Utilities

2
3 The utilities at the NTS include water distribution, wastewater management and electrical
4 systems.

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

10
11 Wastewater Management Systems – Wastewater on the NTS is disposed of either by a
12 combination septic tank and leach field system or by permitted lagoon systems.

13
14 A sewage disposal system serves the Area 6 Construction Camp and would also include
15 service to the Atlas facility. Piping and manholes collect all influent in a single sewer
16 line discharging into a distribution box. The system includes two primary sewage
17 lagoons and two secondary lagoons, with a combined capacity of 8,100,606 liters
18 (2,140,000 gallons). The primary lagoons are lined with bentonite to prevent percolation.

19
20 Electrical System – The Atlas facility would receive electrical power from the NTS
21 electrical system. The electric power is delivered to the NTS at the Mercury switching
22 center in Areas 23 by a primary 138-kilovolt (kV) supply line.

23
24 3.1.1.3 Transportation

25
26 The main access to Area 6 is the Mercury Highway, which originates at U.S. Highway
27 95, 105 kilometers (km) [65 miles (mi)] northwest of Las Vegas, Nevada, and accesses
28 the main gate in Mercury. Mercury Highway, a paved two-lane road, is the primary route
29 from the interchange at U.S. Highway 95. Most of this road is 8 m (26 ft) wide;
30 however, the shoulders vary from 1 to 2 m (4 to 6 ft) wide. Traffic consists of light- and
31 heavy-duty trucks and cars, security vehicles, and emergency vehicles. The Mercury
32 Bypass is also a paved, two-lane road, 8 m (26 ft) wide, that was built to divert traffic
33 around the Mercury base camp to outlying areas of the NTS.

34
35 In the northern portion of Area 6, Mercury Highway is intersected by Tweezer Road,
36 which runs due east to Orange Blossom Road. Tweezer Road provides access to the Area
37 6 Construction Camp and to the proposed site of the Atlas facility. Tweezer and Orange
38 Blossom Roads are narrow, secondary, oil-and-chip roads with no shoulders.

39
40 **3.1.2 Topography and Physiographic Setting**

41
42 The NTS is located within the Basin and Range Physiographic Province, and the
43 proposed facility would be located in an area that is on the floor of Yucca Flat. Yucca

1 Flat, a topographically closed basin, contains a playa, Yucca Lake, in its lowest portion.
2 Yucca Flat is an intermontane basin typical of basin-and-range structure.

3 4 **3.1.3 Geology and Soils**

5
6 The Area 6 Construction Camp is located on an area of thick alluvial deposits within
7 Yucca Flat. The alluvium- and tuff-filled valley is rimmed mainly by Precambrian and
8 Paleozoic sedimentary rocks and Cenozoic volcanic rocks. The youngest sediments in
9 the valley are sand and gravel, derived from the volcanic and sedimentary rocks in the
10 surrounding highlands. Area 6 is within Seismic Zone 2B, defined by the Uniform
11 Building Code as an area with moderate damage potential. Soils in the region have not
12 been mapped extensively, and although not reported as problematic, site-specific
13 evaluation for soil and ground stability would be necessary before building a facility.

14
15 One atmospheric and five underground nuclear weapons tests were conducted in the
16 northwestern portion of Area 6. Residual surface contamination greater than 10 pCi/g of
17 plutonium in soil is detectable in this small area.

18 19 **3.1.4 Hydrology**

20 21 3.1.4.1 Surface Water

22
23 Consistent with the Great Basin, hydrographic basins of the region have internal drainage
24 controlled by topography. Streams in the region are ephemeral. Runoff results from
25 snowmelt and from precipitation during storms that occur most commonly in winter and
26 occasionally in fall and spring, and during thunderstorms that occur primarily in the
27 summer. Much of the runoff quickly infiltrates into rock fractures or into the dry soils,
28 some is carried down alluvial fans in arroyos, and some drains onto playas where it may
29 stand for weeks as a lake. The Control Point and nearby News Knob arroyos have been
30 assessed for flood hazard (Miller et al, 1994). There is no known human consumption of
31 surface water on the NTS.

32
33 Throughout the region, springs and manmade impoundments are the only sources of
34 perennial surface water. There are no known springs in the vicinity of the proposed Atlas
35 facility site.

36
37 All water discharges at the NTS are regulated by the state of Nevada. The NTS
38 maintains compliance with required permits. Water pollution control permits issued by
39 the State are obtained for industrial and domestic wastewater discharges. Discharge and
40 monitoring requirements imposed by the State serve to prevent degradation of the surface
41 waters (and groundwater) at the NTS.

1 3.1.4.2 Groundwater

2
3 The depth to groundwater in Yucca Flat is about 160 m (525 ft) below land surface.
4 Groundwater flows generally south and southwest. Groundwater quality within aquifers
5 is generally acceptable for drinking water and industrial and agricultural uses. There are
6 four water supply wells in Area 6: United States Geological Survey Water Well C, Water
7 Well C1, Water Well 4, and Water Well 4A, all located in the southeast portion of Area
8 6. The wells closest to the proposed Atlas facility site include characterization well
9 ER6-1, located about 2.3 miles east of the Area 6 Construction Facility, and well UE6e,
10 located just to the northeast. Depth to groundwater at Well ER6-1 was measured in 1998
11 at 1,473 ft (447 m) and in 1988 at UE6e it was measured at 1,508 ft (457 m).

12
13 Water-resource use in support of the missions of the NTS is not subject to state water
14 appropriation laws. The NTS, under the Federal Reserved Water Rights doctrine, is
15 entitled to withdraw the quantity of water necessary to support the NTS missions. Water
16 used for other actions that are determined to be outside the mission will require the
17 appropriation of the water in accordance with Nevada's water law.

18
19 **3.1.5 Biological Resources**

20
21 The NTS is located along the transition zone between the Mojave Desert, to the south,
22 and the Great Basin, to the north. The proposed project location is in the east-central
23 portion of the NTS with plant and animal biotic communities typical of the Mojave
24 Desert in the region.

25
26 3.1.5.1 Flora

27
28 The most abundant shrubs in the bottom of Yucca Flat are hopsage and three species of
29 wolfberry. Winterfat also is common in silty soils. Shadscale, four-winged saltbush, and
30 horsebrush also can be found in certain regions of the enclosed basin. Little or no
31 vegetation grows on the playa. Plant communities that colonize areas disturbed by
32 construction are native plants normally found in washes such as cheesebush and punctate
33 rabbitbrush. However, most species found on disturbed sites are ephemeral, introduced
34 plants such as red brome, cheatgrass, Russian thistle, and red-stemmed filaree. Two plant
35 species that may occur on the NTS are candidates for listing under the Endangered
36 Species Act: Clokey's egg-vetch and the Blue Diamond cholla; however, neither of these
37 has been observed in Area 6 or adjacent Areas. No listed or candidate plants are known
38 to exist in Area 6.

39
40 3.1.5.2 Fauna

41
42 Approximately 279 vertebrate species have been observed on the NTS, including 54
43 species of mammals, 190 species of birds, 33 species of reptiles, and 2 species of
44 introduced fish. Eighty-six percent of the bird species are transients. Many of the birds

1 on the NTS, including almost all of the waterfowl and shorebirds, use the playas in
2 Frenchman and Yucca Flats, artificial ponds at springs, and sewage lagoons during their
3 migration and/or during winter.

4
5 The Mojave Desert population of the desert tortoise is listed under the Endangered
6 Species Act as threatened. The State of Nevada also classifies the desert tortoise as a
7 threatened species under its state laws protecting sensitive species. The proposed project
8 area is outside of known desert tortoise habitat.

9 10 **3.1.6 Air Quality**

11
12 The climate at the NTS is characterized by limited precipitation, low humidity, and large
13 diurnal temperature ranges. The lower elevations receive approximately 15 centimeters
14 (cm) [(6 inches (in)] of precipitation annually, with occasional snow accumulations
15 lasting only a few days. In the Yucca Flat basin at an elevation of 1,195 m (3,920 ft), the
16 average daily maximum and minimum temperatures are 11⁰ Centigrade (C) to -6⁰ C (51⁰
17 Fahrenheit (F) to 21⁰ F) in January, and 36⁰ C to 14⁰C (96⁰ F to 57⁰ F) in July. The
18 average annual wind speed is 11 kilometers per hour (kph) [7 miles per hour (mph)]. The
19 prevailing wind direction during the winter months is north-northwesterly, and during the
20 summer months, south-southwesterly. Severe thunderstorms may produce high
21 precipitation that continues for approximately one hour and may create a potential for
22 flash flooding.

23
24 The NTS is located in Nevada Intrastate Air Quality Control Region 147, which is
25 designated as an attainment area with respect to the National Ambient Air Quality
26 Standards. Ambient air quality at the NTS is not currently monitored for criteria
27 pollutants or hazardous air pollutants, with the exception of radionuclides. Elevated
28 levels of ozone or particulate matter may occasionally occur because of pollutants
29 transported into the area or because of local sources of fugitive particulates. There are no
30 large sources of other pollutants nearby. The present air quality on the NTS is good.

31 32 **3.1.7 Noise**

33
34 The major noise sources at the NTS include equipment and machines (e.g., cooling
35 towers, transformers, engines, pumps, boilers, steam vents, paging systems, construction
36 and material-handling equipment, and vehicles), blasting and explosives testing, and
37 aircraft operations. No NTS environmental noise survey data are available. A
38 background sound level for rural desert areas of 30 A-weighted decibels (dBA) is a
39 reasonable estimate. Ambient noise levels in the vicinity of the Area 6 Construction
40 Camp are relatively low.

1 **3.1.8 Visual Resources**

2
3 Criteria used for the analysis of visual resources in the NTS EIS included scenic quality,
4 visual sensitivity, and distance and/or visibility zones from key public viewpoints. Area
5 6 is not visible from any public viewpoint.
6

7 **3.1.9 Cultural Resources**

8
9 Archeological research indicates the existence of important cultural resources at the NTS.
10 Resources range from prehistoric sites to structures associated with the development of
11 nuclear testing. To date, over 40,400 acres on the NTS have been surveyed for cultural
12 resources. Within the Yucca Flat Basin, over 7,780 acres of land have been surveyed as
13 part of over 120 cultural resources surveys. These surveys have resulted in over 340 sites
14 being recorded, 130 of which are considered to be eligible for listing on the National
15 Register of Historic Places. There are a number of historic structures associated with
16 nuclear testing located within Yucca Flat Basin but most have not been recorded and
17 evaluated.
18

19 **3.1.10 Occupational and Public Health and Safety**

20
21 The potential for activities at the NTS to impact the health and safety of the general
22 public is minimized due to factors such as the remote location of the NTS and the sparse
23 population surrounding it, and a comprehensive program of administrative and design
24 controls. Potential impacts to the health and safety of NTS workers are minimized by
25 adherence to federal and state regulations, to DOE orders, and to the plans and
26 procedures of each organization performing work on the NTS. Worker exposures to
27 radioactive or chemical pollutants are minimized through training, monitoring, the use of
28 personal protective equipment and the use of administrative controls.
29

30 The types of work expected during construction and assembly of the Atlas Facility, such
31 as forklift operation, maintenance, welding, and handling of hazardous materials, would
32 be similar to those types encountered throughout the NTS.
33

34 External gamma radiation exposure data produced by the on-site thermoluminescent
35 dosimeter network indicate that statistically lower gamma exposure rates were recorded
36 for 1994 than were recorded for 1993. On the NTS, recorded exposure rates ranged from
37 54 mrem/yr in Mercury to 3,679 mrem/yr for a radioactive material storage area in Area
38 5. The sitewide average for boundary and control stations averaged 111 mrem/yr in 1994,
39 which is comparable to the dose from a typical background exposure rate. The 1994
40 average was approximately 23 percent lower than 1993 (DOE, 1996a).
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1 **3.1.11 Socioeconomics**

2
3 The region of influence for the NTS consists of Nye and Clark counties, Nevada. The
4 NTS EIS cites a 1994 survey of NTS worker residential distributions that found that 90
5 percent of the work force live in Clark County and 7 percent live in Nye County. The
6 remaining 3 percent reside in other counties or states. Within Clark County, most of the
7 employees live in Las Vegas. In 1994, the NTS accounted for 1 percent of total Clark
8 County employment, as contrasted with 6 percent of total Nye County employment. The
9 NTS employs approximately 1,200 personnel, and annual funding is about \$380 million
10 (DOE, 1999a).

11
12 Approximately 15 workers would be employed at the Atlas Facility; up to three LANL
13 personnel may relocate to Nevada, but such a move is not a requirement for the program.
14

15 **3.1.12 Environmental Justice**

16
17 As required by Executive Order 12898, the NTS EIS analyzed the issue of adverse affects
18 of federal programs, policies, and activities on minority populations and low-income
19 populations. The percentages of minority and low-income populations within census
20 block groups for Clark, Nye, and Lincoln counties were plotted by using a geographic
21 information system and the impacts to off-site populations from activities on the NTS
22 were identified. While low-income and minority populations do exist, it was found that
23 no populations existed that had disproportionately high adverse effects.
24

25 **3.1.13 Waste Management**

26
27 At the NTS, Waste Management Program activities include disposal, storage, treatment
28 and closure operations as well as the activities of the Waste Minimization/Pollution
29 Prevention Program. Five types of wastes are managed at the NTS, including low-level
30 wastes, mixed wastes (transuranic and low-level), Toxic Substances Control Act (TSCA)
31 wastes, and non-hazardous solid wastes.

32
33 Nonhazardous, nonradioactive sanitary, and industrial wastes are disposed of in several
34 industrial landfills, sewage treatment systems, and septic tank systems located throughout
35 the NTS. There are two Radioactive Waste Management Sites (RWMS) used for the
36 disposal of low-level waste, located in Areas 3 and 5. Mixed waste generated on the NTS
37 is disposed of in the Area 5 RWMS. Transuranic, transuranic mixed wastes, and mixed
38 wastes are stored on the Area 5 transuranic waste storage pad in accordance with a
39 Settlement Agreement and Mutual Consent Agreement with the state of Nevada. TSCA-
40 regulated wastes are shipped off-site to a commercial permitted facility for disposal.

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42
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44

1 **3.2 LOS ALAMOS NATIONAL LABORATORY**

2
3 The following environmental issues were not discussed as part of the Affected
4 Environment either because the Atlas facility is located in an existing building at LANL
5 or because they do not exist in the proposed action site vicinity:

- 6
7 • Topography and Physiographic Setting
8 • Hydrology
9 • Biological Resources
10 • Visual Resources
11 • Cultural Resources

12
13 **3.2.1 Land Use and Transportation**

14
15 3.2.1.1 Facilities

16
17 LANL and the associated residential and commercial areas of Los Alamos and White
18 Rock are located in Los Alamos County in north-central New Mexico (Figure 4). LANL
19 facilities cover approximately 11,076 hectares (27,690) acres) of federal land managed by
20 NNSA in Los Alamos County. The LANL developed area is divided into 47 active
21 Technical Areas (TAs) for administrative purposes (Figure 5). Unoccupied land
22 surrounds LANL buildings, providing security, safety buffer zones, and a reserve for
23 future development.

24
25 TA-35, the current location of the Atlas facility, is surrounded by adjacent Technical
26 Areas 63, 50, 55, 48, 60, and 52. These TAs include facilities that may involve use of
27 chemicals and radioactive materials. The site is generally considered highly developed.
28 RCRA-regulated hazardous chemical waste management is conducted at TA-54, Area L.
29 TA-54, Area J, has a landfill dedicated to administratively controlled sanitary, non-
30 hazardous wastes. All other sanitary waste is disposed of in the Los Alamos County
31 Landfill located near TA-3.

32
33 3.2.1.2 Infrastructure and Utilities

34
35 The utilities at the LANL include water distribution, wastewater treatment management
36 and electrical systems. The systems are described in significant detail in the LANL EIS
37 (DOE, 1999). Minimal modifications would be done to the existing infrastructure system
38 in support of the Atlas Facility.

39
40 3.2.1.3 Transportation

41
42 TA-35 is located near the center of Pajarito Mesa, immediately north and east of Pajarito
43 Canyon in Los Alamos County. Pajarito Road bounds the current Atlas Facility site less
44 than 0.8 km (0.5 mi) to the south, and Pecos Drive bounds the site directly to the north.

1 Although the general public is currently allowed free access to these roads, and Pajarito
2 Road has heavy public traffic, access to all roads in the general site area is controlled by
3 NNSA. They can be closed as needed.
4

5 **3.2.2 Geology and Soils**

6
7 LANL is located on the Pajarito Plateau. The surface of the plateau is dissected by deep,
8 southeast-trending canyons separated by long, narrow mesas. The plateau is capped by
9 the Bandelier Tuff, comprised of a massive pumiceous tuff breccia of ash-flow origin and
10 a succession of cliff-forming welded ash flows. The tuff caps sedimentary and volcanic
11 rocks of the Santa Fe Group (DOE, 1996c).
12

13 LANL lies within seismic Zone 2. The strongest earthquake in the last 100 years within
14 an 80-km (50-mi) radius was estimated to have a magnitude of 5.5 to 6 on the Richter
15 Scale. Studies indicate that several faults may have produced seismic events with a
16 magnitude of 6.5 to 7.8 as measured on the Richter Scale in the last 500,000 years.
17 Seismicity at LANL is monitored through a seismic network. Major faults at LANL
18 include the Pajarito, Rendija Canyon, and Guaje Mountain faults. There is no evidence
19 of movement along the Pajarito fault system during historical times.
20

21 **3.2.3 Air Quality**

22
23 Prevailing winds at LANL are affected by several factors, including large-scale
24 atmospheric wind patterns, regional weather disturbance, complex surface terrain, and
25 local cold-air drainage across the Pajarito Plateau. Winds in Los Alamos consist of light
26 westerly surface winds that average 3 m/s (7 mph). The strongest winds typically occur
27 from March through June, when intense seasonal storms and cold fronts move through
28 the region. During this season, sustained winds blow from the southwest to the northeast
29 and can exceed 11 m/s (25 mph), with peak gusts exceeding 22 m/s (50 mph). The
30 highest recorded wind in Los Alamos County had a speed of 34 m/s (77 mph) at lower
31 elevations in the area. The irregular terrain at Los Alamos affects wind motion and
32 spreading. Localized wind gusts may not be in the same direction as average wind
33 patterns. The wind behavior over this rough terrain results in greater dilution of air
34 contaminants than might occur over a smoother surface.
35

36 Air quality in the LANL area is typical of arid-climate clean air. Median visibility ranges
37 between approximately 106 and 161 km (66 and 100 mi). The U.S. Environmental
38 Protection Agency has designated the LANL area as being in attainment for all National
39 Ambient Air Quality Standards (NMEIB, 1981). Current emissions from operations
40 around the proposed Atlas site are within the permitted thresholds for LANL.
41
42
43
44

1 **3.2.4 Noise**

2
3 Publicly detectable noise levels emanating from activities at LANL are generated by a
4 variety of sources, including truck and automobile movements to and from LANL TAs,
5 high explosives testing, and security guard firearm practice. Nonspecific background
6 ambient noise in the LANL area has been measured in two locations near LANL
7 boundaries next to public roadways. Background noise levels were found to range from
8 31 to 51 dBA (DOE 1995b). Noise levels that affect residential areas are limited by
9 county ordinance to a maximum of 65 dBA during daytime hours (or 75 dBA if limited to
10 10 minutes in any 1 hour) and 53 dBA during nighttime hours between 9 p.m. and 7 a.m.
11 Activities that do not meet these limits require a permit (LANL 1994a).

12
13 The occupational exposure limit for steady-state noise, defined in terms of accumulated
14 daily (8-hour) noise exposure dose that allows for both exposure level and duration, is 84
15 dBA (29 CFR 1910.95). Excessive exposure to noise in the work place is minimized at
16 LANL through hearing protection, alternative operating conditions, and engineering
17 designs or modifications of noise producing equipment.

18
19 **3.2.5 Occupational and Public Health and Safety**

20
21 As part of ongoing operations at LANL, several Technical Areas, including TA-35 and
22 those in close proximity to it, have facilities that conduct experiments involving electrical
23 hazards and the generation of magnetic fields and x-rays. Ongoing experiments and
24 operations are conducted according to strict guidelines established by existing LANL
25 standard operating procedures. Under these standard operating procedures, engineering
26 and administrative controls are implemented to minimize worker and public exposure to
27 electrical hazards, magnetic fields, and x-rays. The magnitude of electrical hazards and
28 x-rays present from these experiments is regulated by Occupational Safety and Health
29 Administration (OSHA) standards implemented under specific DOE orders. In addition,
30 magnetic field threshold limit values have been developed as guidelines by the American
31 Conference of Governmental Industrial Hygienists.

32
33 Generation and potential exposure to x-rays are closely monitored under the
34 implementation of existing health and safety requirements for maintaining worker
35 exposure to as low as reasonably achievable not to exceed the current threshold for 5 rem
36 per year. Magnetic fields are generated by the National High Magnetic Field Laboratory
37 at TA-35. The public exposure to static magnetic fields in the TA-35 area is much less
38 than the current pacemaker warning limit of 10 Gauss (G). Members of the public
39 receive less than 0.1 rem from x-rays generated by sources in the TA-35 area, the
40 admissible dose under DOE orders regulating public exposure to ionizing radiation
41 (DOE, 1996c).

1 **3.2.6 Socioeconomics**

2
3 Los Alamos County has an estimated population of approximately 18,115 (U.S. Census,
4 1994); the Los Alamos town site has an estimated population of 11,400, and White
5 Rock has an estimated population of 6,800. There is a small, privately owned trailer
6 park, surrounded by LANL property, situated approximately 1.6 km (1 mi) northwest of
7 the proposed project area with an estimated population of 500 (DOE, 1996c). The
8 principal population centers with a combined approximate population of 214,707, are
9 Santa Fe, Espanola, and the Pojoaque Valley, all located within an 80-km (50-mi) radius
10 of LANL. Approximate populations of the four closest pueblos are as follows: the San
11 Ildefonso Pueblos has a population of 1,500; the Santa Clara Pueblo has a population of
12 3,000; the Cochiti Pueblo has a population of 1,340; and the Jemez Pueblo has a
13 population of 1,750 (DOC, 1991). LANL employs approximately 12,250 persons
14 (LANL, 1994b) principally living within 80 km (50 mi) of LANL.

15
16 **3.2.7 Environmental Justice**

17
18 Under Executive Order 12898, federal agencies are responsible for identifying and
19 addressing the possibility of disproportionately high and adverse health and
20 environmental impact of programs and activities on minority and low-income
21 populations. Within a 16-km (10-mi) radius of the TA-35 Atlas site, about 14 percent of
22 the population is of minority status. Within an 80-km (50-mi) radius, about 54 percent of
23 the population is of minority status. Economically, 15 percent of the households within a
24 16-km (10-mi) radius have annual incomes below the defined poverty level of \$12,674.
25 Within an 80 km (50-mi) radius of the site, 24 percent of the households have annual
26 incomes below \$15,000. Detailed environmental justice information for the Los Alamos
27 area is contained in the Site-Wide Environmental Impact Statement for Continued
28 Operation of the Los Alamos National Laboratory (DOE, 1999b).

29
30 **3.2.8 Waste Management**

31
32 Through its research activities, LANL manages a small quantity of spent nuclear fuel as
33 well as five other types of wastes, including transuranic, low-level, mixed, hazardous,
34 and non-hazardous wastes.

35
36 LANL produces a wide variety of hazardous wastes, which are regulated under RCRA
37 and the Toxic Substances Control Act (TSCA). LANL holds a RCRA permit for the
38 offsite disposal of RCRA-hazardous wastes. An EPA Letter of Authorization grants
39 LANL permission to dispose of solid PCB-contaminated articles on site. Other PCB
40 waste and liquid PCB-contaminated articles are sent offsite to TSCA-regulated disposal
41 facilities.

42
43 Solid sanitary wastes that consist of general facility refuse are generated routinely and
44 taken to the Los Alamos County sanitary landfill located within LANL via a commercial

1 waste disposal firm. Liquid sanitary wastes are routed to a sanitary wastewater treatment
2 plant and collection system at TA-46, and there are 36 septic systems located at remote
3 facilities in 16 TAs throughout LANL. The plant and collection system complies with
4 the requirements of LANL's Federal Facility Compliance Agreement.
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4.0 ENVIRONMENTAL CONSEQUENCES

This section identifies the direct and indirect environmental consequences of the alternatives considered. The level of each 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 the 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 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

1 the roads other than impacts normally incurred by trucking transport. Upon completing
2 construction of the new building and assembly of the Atlas facility, transportation would
3 mainly consist of the daily commute by approximately 15 personnel employed at the
4 Atlas facility and occasional shipments of materials used in operations. Existing roads to
5 the facility would be sufficient to handle transportation of Atlas and the vehicles that
6 would be used to carry personnel and material to the facility.

7 8 **4.1.2 Topography and Physiographic Setting**

9
10 The proposed facility would be located in an area that is on the floor of Yucca Flat.
11 Excavation and grading would be facilitated by flat or gently sloping terrain. The project
12 area would encompass approximately 1 acre and would not impact the topography or
13 physiographic setting.

14 15 **4.1.3 Geology and Soils**

16
17 The geology of the site is generally favorable for construction of the proposed Atlas
18 Facility. Soils are typically fined grained and caliche is generally not present in amounts
19 that will complicate excavation or grading. Maintenance of natural drainage will require
20 some engineering in the forms of ditches or culverts, or both. Although Area 6 is within
21 Seismic Zone 2b for natural seismicity, the potential for conducting underground nuclear
22 tests in the vicinity requires that the Atlas Facility be designed to a greater seismic zone
23 to preclude damage. Structures built in areas of past nuclear weapons testing were
24 typically designed to Seismic Zone 3 or 4 criteria, and sometimes additional means of
25 protection, such as shock mounts, were employed to preclude damage from ground
26 motion. Design of the Atlas Facility will take into account the potential yields of any
27 underground nuclear testing, the distance of such testing from the facility, and the
28 potential ground motion.

29 30 **4.1.4 Hydrology**

31
32 Water requirements for construction and operation of the Atlas Facility would be serviced
33 by existing water supply wells and public water system. The main use of water during
34 the construction phase would be for dust suppression, and the quantity of water is within
35 the quantity analyzed in the NTS EIS (DOE, 1996a). The water usage at the facility after
36 completion of construction would be limited to routine domestic use and, based upon
37 estimated occupancy levels, would amount to less than 110,000 gallons per year.
38 Extension of the existing water and sewer lines to incorporate the new facility would
39 most likely require a design review and approval by the State, plus modification of the
40 existing public water system permit and wastewater discharge permit.

41
42 The NTS EIS (DOE, 1996a) assesses the impact of water withdrawal at the NTS.
43 Groundwater use at the NTS is now less than one-fifth of the historic peak. Water
44 requirements for construction and operation of the proposed Atlas Facility would be

1 insignificant when compared to previous usage at the NTS and would not be likely to
2 require additional water appropriation for the public waters of the state of Nevada.

3
4 No deterioration of surface water quality or quantity is expected to result from the
5 proposed action. Any spills of contaminants would be cleaned up expeditiously to
6 prevent contamination of runoff water and groundwater.

7 8 **4.1.5 Biological Resources**

9
10 The development of the Atlas Facility would result in the disturbance of approximately 1
11 acre of previously disturbed habitat. A survey would be conducted to determine the
12 presence of the western burrowing owl, which has been known to inhabit disturbed areas,
13 and any other sensitive species. If any sensitive species were found, project activities
14 would be planned to minimize disturbance to the species.

15 16 **4.1.6 Air Quality**

17
18 Fugitive dust would be generated during construction of the Atlas facility. Standard dust
19 suppression techniques, such as watering, would be used as needed. Other potential
20 impacts to air quality from construction of the Atlas facility include emissions from fuel-
21 burning construction equipment such as scrapers and front-end loaders, and from gasoline
22 and diesel powered vehicles and trucks.

23
24 Emissions generated during facility operations would result primarily from conducting
25 experiments and from the use of solvents as cleaning agents. Minute quantities of the
26 metal targets used during experiments would vaporize and be deposited onto the inside
27 surface of the target chamber. Other portions of the target would be liquefied or
28 shattered. Liquefied portions would resolidify moments after the experiment was
29 completed. Only minute quantities of metals would stay volatilized. The contents of the
30 target chamber would be exposed to the atmosphere only during reentry for cleanup. The
31 quantity of emissions generated from each experiment would be small, and therefore
32 would require no facility air filtration or scrubbers. The majority of solvents used during
33 cleaning operations would evaporate. Hazardous chemicals such as isopropyl alcohol,
34 trichlorethylene and 1,1,2-trichloroethane would be used occasionally and in small
35 amounts, so that the quantity of emissions generated would not harm workers, collocated
36 workers or members of the public. Ethanol, which would be used in larger quantities,
37 i.e., approximately 42 gallons per year, is not considered a hazardous air pollutant (HAP)
38 under the Clean Air Act. However, ethanol is highly flammable and vapor/air mixtures
39 are explosive. The majority of the ethanol used for cleaning would evaporate. Adequate
40 ventilation would be provided. The argon/SF₆ system that would be used to supply
41 railgap switches with pressurized dielectric gas is non-hazardous albeit an asphyxiant;
42 however, some of the decomposition products, in particular sulfur tetrafluoride (SF₄) and
43 also hydrofluoric acid (HF), are toxic or corrosive. Four exhaust fans, each 30,000 cubic
44 feet per minute (cfm) would be used to vent the shot products, including SF₄, to the

1 ambient air. Ceiling limits defined by the American Conference of Governmental
2 Industrial Hygienists (ACGIH) for concentrations of SF4 are discussed in Section 4.1.6,
3 Occupational and Public Health and Safety.

4
5 Some of the metal targets (including lead) and the solvents are classified as HAPS and
6 are regulated by the State of Nevada. Emissions limits for HAPS and toxics in the State
7 of Nevada (and under the Clean Air Act) are 10 tons per year of any one HAP or toxic, or
8 25 tons per year for any combination of HAPS or toxics. Emissions from the metal
9 targets used during experiments were calculated to be less than 1 gram (g) [0.0022
10 pounds (lb)] per experiment. Emissions from use of the solvents were calculated to be
11 less than 30 g (0.066 lb) per experiment (DOE, 1996c).

12
13 The number of experiments to be conducted is estimated at 40 per year, with no more
14 than 1-2 per week. Engineering considerations for Atlas limit the maximum shot rate to
15 approximately 100 per year. Assuming the maximum 100 experiments per year, annual
16 emissions from the metal targets would be approximately 100 g (0.22 lb). Annual
17 emissions from each of the solvents would be approximately 3000 g (6.6 lb). Combined
18 emissions, assuming the use of one metal per target twice a week and use of 3 different
19 solvents, would be approximately 20 lbs, i.e., much less than one ton/yr.

20
21 Beryllium is one of 7 HAPS for which there are national emission standards, and it is
22 regulated by the United States Environmental Protection Agency under the National
23 Emissions Standards for Hazardous Air Pollutants (NESHAP). The emissions from use
24 of beryllium as a target material would be similar to the emissions from the metals
25 discussed in the previous paragraph, and would fall well below the NESHAP emissions
26 limit of 10 grams per 24-hour period (40 CFR 61.32). Emissions of HAPS would be
27 considered an insignificant source by the State of Nevada.

28
29 The quantity of fugitive dust emissions generated by vehicles and equipment during
30 construction would affect air quality in the project area, but these impacts would be
31 minor and short term in nature. The construction site would be watered, as necessary, to
32 help reduce fugitive dust due to equipment activity.

33 34 **4.1.7 Noise**

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

42
43

1 **4.1.8 Visual Resources**

2
3 The proposed Atlas Facility would not be visible from public lands, including U.S.
4 Highway 95. The construction of any additional structures within the industrial area
5 would not result in a notable change to the view of the Yucca Dry Lake area.
6

7 **4.1.9 Cultural Resources**

8
9 The proposed site for the Atlas facility is within a previously cleared and developed
10 industrial, research support site. Because the proposed project would be located within
11 this already developed area, it is very unlikely that any cultural resources would be found
12 there. If, during construction, significant cultural resources were found, attempts would
13 be made to avoid them or if they were unavoidable, NNSA would consult with the
14 Nevada State Historic Preservation Officer to identify mitigation measures sufficient to
15 achieve a status of no adverse effect.
16

17 **4.1.10 Occupational and Public Health and Safety**

18
19 The potential for activities at the NTS to impact the health and safety of the general
20 public is minimized by a combination of the remote location of the NTS, the sparse
21 population surrounding it, and a comprehensive program of administrative and design
22 controls. Visitors to the NTS are subject to essentially the same safety and health
23 requirements as workers. Access to areas of the NTS where working conditions require
24 special hazard controls is restricted through the use of signs, fences, and barricades. The
25 health and safety of NTS workers is protected by adherence to the requirements of federal
26 and state law, DOE orders, and the plans and procedures of each organization performing
27 work on the NTS.
28

29 Small amounts of lead, DU or other similar heavy metals might deposit or be released as
30 particulate metal dust from the target chamber following certain experiments.
31 Toxic/hazardous emissions would be generated by the Atlas Facility following each
32 experiment due to the evaporation of solvents used to clean the inside of the target
33 chamber. The quantity of air emissions generated from each experiment would be small
34 and therefore would require no facility air filtration or scrubbers (DOE, 1996c).
35 Exposure to the metals and solvents used during operations would be minimized through
36 wearing proper protective clothing and following established health and safety
37 procedures. Beryllium, which would also be used in the target chamber in small
38 amounts, can be highly toxic if inhaled and can cause lung fibrosis (Homburger, 1983).
39 Particulate metal dust from DU in targets also poses a modest radiological hazard if
40 inhaled. Respiratory protection would be provided when working with targets and in
41 cleanup of the target chamber.
42

43 The Argon/SF6 system, which supplies railgap switches in the Atlas machine with a
44 pressurized dielectric gas mixture, would be composed of 85% Argon and 15% SF6. As

1 mentioned previously in Section 4.1.6, this is a non-hazardous system, although argon is
2 a simple asphyxiant and the SF₆ can decompose to toxic products, such as SF₄.

3 The current Atlas facility uses 4 exhaust fans that vent shot products, including sulfur
4 tetrafluoride (SF₄), to the ambient air. Calculations for emissions of SF₄, indicated that
5 0.0004 parts per million (ppm) SF₄ could be generated (Stafford, 2000). This is worst
6 case and assumes complete mixing with the air in the high bay. This is well below the
7 Ceiling limit of 0.01 ppm established by the American Conference of Governmental
8 Industrial Hygienists (ACGIH).

9
10 The majority of solvents used during cleaning operations would evaporate. Exposure to
11 ethanol, which would be used in larger quantities, can result in dizziness, headaches,
12 burning eyes and other hazards including unconsciousness. Exposure would be
13 minimized by providing adequate ventilation and/or breathing protection, protective
14 gloves, and safety goggles.

15
16 Potential health hazards to site workers, collocated workers, and the general public during
17 experiments conducted as part of the normal operations of the Atlas Facility may include
18 electrical hazards, strong magnetic fields, and x-rays.

19 20 4.1.10.1 Electrical Hazards

21
22 Electrical hazards would be present at the Atlas Facility while conducting experiments
23 because the capacitors associated with Atlas would be charged to a high voltage. The
24 Atlas capacitor bank could deliver an instantaneous lethal current if special operating
25 precautions were not taken.

26
27 To minimize electrical risks associated with Atlas experiments, all applicable electrical
28 codes specified by DOE Order 6430.1A (such as adequate grounding and lightning
29 protection) would be incorporated into the Atlas capacitor bank, facility, and related
30 electrical components. In conjunction with meeting local electrical codes and DOE
31 Order requirements, the Atlas capacitor bank would be isolated in an interlocked
32 personnel containment area with controlled access. Other engineering safety features
33 would include making all switches fail safe, providing a direct cut-off to the Atlas
34 Facility systems in event of a computer malfunction, and utilizing interlocks to control
35 operation of switches.

36
37 These Atlas Facility engineering controls, as well as administrative controls, such as
38 personnel training and standard operating procedures, would significantly decrease the
39 probability of an electrical accident occurring during normal operations.

40 41 4.1.10.2 Magnetic Fields

42
43 By employing advanced capacitor design and because of developments in high voltage
44 switching, there is no longer a need to charge the capacitors in a fraction of a second as

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

13
14 All Atlas Facility workers and nearby collocated workers would be informed of the
15 magnetic hazards associated with individual proposed experiments and those with
16 pacemakers, etc., would be moved to a safe location. Administrative and engineering
17 controls would be in place during experiments to keep magnetic field exposure as low as
18 reasonably achievable. Magnetic fields would be monitored at various locations at and
19 near the Atlas Facility during experiments to ensure that these levels are not exceeded.

20 21 4.1.10.3 X-Rays

22
23 The Atlas Facility experiments would utilize a target chamber that would have walls of
24 stainless steel 2.54-cm (1-inch) thick, twice the thickness of the Pegasus II Facility's
25 target chamber walls. An individual target implosion would produce an estimated one to
26 four Megajoules (MJ) of 100 to 200 electron volt (eV) x-rays at the time of the
27 experiment. These low-energy x-rays are not expected to penetrate the stainless steel
28 target chamber; the energy would be converted to heat and dissipated into the target
29 chamber walls. Standard NTS radiological protection procedures would be followed and
30 additional procedures specifically developed for the Atlas Facility as needed.

31
32 Diagnostic x-ray apparatus used to take radiographs of the events occurring during
33 experiments within the target chamber would be located outside the chamber and would
34 use high-energy x-rays, similar to medical x-rays. The diagnostic x-ray apparatus
35 operation would be interlocked with the entrances to the target area such that the
36 apparatus would not operate if an exterior door were opened. Existing standard operating
37 procedures and facility shielding would be used to protect workers. In addition,
38 personnel protection staff would conduct surveys in and around the target area to measure
39 radiation produced by the diagnostic x-ray apparatus when in operation. Additional
40 shielding would be added if needed.

41
42 Collocated workers or members of the public, either on site or off site, would not be
43 exposed to high-energy x-rays. These x-rays would be shielded and contained within the
44 interlocking room housing the capacitor bank.

1 **4.1.11 Socioeconomics**

2
3 At full operation, the Atlas Facility is estimated to employ about 15 personnel, the
4 majority being engineers and scientists. It is not expected that the small number of new
5 employees would generate noticeable additional secondary jobs related to purchases of
6 goods and services in either Clark or Nye Counties.
7

8 **4.1.12 Environmental Justice**

9
10 Due to the relatively small size of this project and limited number of employees, there
11 would be no impacts to public health and no subsection of the population, including
12 minority or low-income population, would receive disproportionate impact.
13

14 **4.1.13 Waste Management**

15
16 It is assumed that a small amount (less than 1 m³ annually) of liquid or solid hazardous
17 waste, and an even smaller amount (less than 0.1 m³ annually) of low level or low level
18 mixed waste would be generated by occasional experiments involving lead and/or DU.
19 This waste would be staged in on-site waste accumulation areas and shipped to offsite
20 commercial permitted treatment, storage, and disposal facilities or disposed on site as
21 appropriate. Solid non-hazardous waste such as paper and dielectric insulation would be
22 disposed of on site in a permitted landfill; the amount of non-hazardous solid waste
23 would not be expected to exceed 7 m³ (240 ft³) (DOE, 1996c) per year, resulting in
24 minimal impacts from the Atlas operation.
25

26 **4.2 NO ACTION**

27
28 This section describes the environmental consequences expected to occur if the Atlas
29 facility were to remain at LANL. As stated earlier in Section 3.2, several environmental
30 issues were not evaluated and so have not been included in the Affected Environment or
31 this section.
32

33 **4.2.1 Land Use and Transportation**

34
35 TA-35, the current location of the Atlas facility, is surrounded by adjacent Technical
36 Areas 63, 50, 55, 48, 60, and 52 and as such is in a highly developed area. The addition
37 of the Atlas facility at LANL is consistent with current land use. Generation of any
38 hazardous and sanitary wastes from the operation of the Atlas facility is not sufficient to
39 affect waste-handling and disposal activities.
40

41 It is anticipated that the Atlas facility, including the machine and the buildings, would
42 consume approximately 500,000 kilowatt hours/year.
43

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

3
4 Transportation mainly consists of the daily commute by approximately 15 personnel
5 employed at the Atlas facility and occasional shipments of materials used in operations.
6 Operation of the Atlas Facility would not be expected to have any effects on
7 transportation.

8 9 **4.2.2 Geology and Soils**

10
11 The major faults identified at LANL are not known to have had any movement more
12 recently than between 4,000 and 6,000 years ago. The estimated 100-year return
13 earthquake at Los Alamos is regarded as having a magnitude of 5 on the Richter scale,
14 with an event of magnitude 7 being the maximum credible earthquake. These values are
15 currently used in design considerations at LANL (DOE, 1996c). The building that
16 houses the Atlas facility meets all seismic requirements for zone 2B, as do the Atlas
17 machine structures.

18 19 **4.2.3 Air Quality**

20
21 Emissions from the Atlas facility are limited to those generated during operation, since
22 the facility uses an existing building that has been modified. Operational emissions are
23 identical to those that would be generated if the facility were located at the NTS (see
24 Section 4.1.4). Emissions are well below the standards set by the New Mexico Air
25 Quality Control Regulation (AQCR) 702.

26 27 **4.2.4 Noise**

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

34 35 **4.2.5 Occupational and Public Health and Safety**

36
37 Because the Atlas facility already exists at LANL, discussion of health and safety
38 concerns generally encountered during construction is not appropriate.

39
40 Potential health hazards to site workers, collocated workers, and the general public during
41 experiments conducted as part of the normal operations of the Atlas Facility are identical
42 to those discussed in the corresponding Occupational and Public Health and Safety
43 section (Section 4.1.10) for the NTS. Because LANL is in a more developed area, the

1 potential for off-site exposure to the public is greater. Additional administrative controls,
2 such as roadblocks during experiments, have been put in place to prevent exposure to the
3 hazards discussed in Section 4.1.10.

4 5 **4.2.6 Socioeconomics**

6
7 The Atlas Facility employs about 15 personnel, the majority being engineers and
8 scientists. It is not expected that the small number of employees will generate noticeable
9 additional secondary jobs related to purchases of goods and services in Los Alamos
10 County.

11 12 **4.2.7 Environmental Justice**

13
14 Due to the relatively small size of this project and limited number of employees, there are
15 no anticipated impacts to public health and no subsection of the population, including
16 minority or low-income population, would receive disproportionate impact.

17 18 **4.2.8 Waste Management**

19
20 It is assumed that a small amount (less than 1 m³ annually) of liquid or solid hazardous
21 waste, and an even smaller amount (less than 0.1 m³ annually) of low level or low level
22 mixed waste would be generated by occasional experiments involving lead and/or DU.
23 This waste would be staged in on-site waste accumulation areas and shipped to offsite
24 commercial permitted treatment, storage, and disposal facilities or disposed on site as
25 appropriate. Minimal impacts would result from the generation of liquid sanitary waste,
26 and existing facilities would be adequate to handle the increase. Solid non-hazardous
27 waste such as paper and dielectric insulation would be disposed of in a permitted landfill;
28 the amount of non-hazardous solid waste would not be expected to exceed 7 m³ (240 ft³)
29 (DOE, 1996c) per year, resulting in minimal impacts from the Atlas operation. Solid
30 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 the Industrial Research 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 would be 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 Camp. 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.

1 **5.1.4 Hydrology**

2
3 Naturally occurring surface waters at the NTS are limited to ephemeral streams resulting
4 from snowmelt and precipitation runoff and drainage into playas to form temporary lakes.
5 There would be no cumulative impacts to surface waters from construction and operation
6 of the proposed Atlas Facility.

7
8 Groundwater use at the NTS is now less than one-fifth of the historic peak (DOE, 1996).
9 Withdrawal of groundwater for construction and operation of the proposed Atlas Facility
10 would add incrementally to the amount currently used; however, this additional water use
11 combined with currently used and anticipated uses would be well within the quantity
12 analyzed in the NTS EIS (DOE, 1996) and would not represent a cumulative increase in
13 impacts over those previously addressed.

14
15 **5.1.5 Biological Resources**

16
17 Approximately 1 acre would be utilized for construction of facilities associated with the
18 Atlas Facility. All of the land that would be used for the Atlas Facility is within an
19 existing industrial complex and no new land would be disturbed. Therefore, wildlife
20 habitat and existing plant communities would not be affected by construction or operation
21 of the Atlas Facility. Noise generated by operation of Atlas may elicit a startle response
22 from wildlife in the immediate vicinity of the facility but this would be intermittent and
23 transitory and would not adversely impact the local fauna. There would be no cumulative
24 impact to wildlife habitat or plant communities and noise generated by the operation of
25 Atlas when combined with noises from existing industrial operations in the area would
26 result in a negligible cumulative impact on wildlife.

27
28 Because the existing Atlas Facility at LANL is within an existing developed area and
29 reclamation of the site is not planned, relocation of the facility would not result in any
30 cumulative impacts to biological resources.

31
32 **5.1.6 Air Quality**

33
34 Construction activities would take less than one year for the Atlas Facility and
35 calculations have shown that less than one ton of fugitive dust (PM¹⁰) would be
36 generated. This quantity of fugitive dust would comprise less than one percent of the
37 total of 177,660 tons associated with land disturbance activities throughout the region
38 represented by the Stateline and Tonopah resource areas and the Las Vegas Valley (DOE,
39 1996a). Emissions generated as a result of operations would be small enough to be
40 exempt from permitting and would not result in a degradation of air quality. The
41 cumulative effect on air quality of constructing and operating the Atlas Facility would be
42 minimal.

1 **5.1.7 Noise**

2
3 Noise impacts associated with activities at the Atlas Facility would be restricted to the
4 immediate vicinity and would not affect persons or residents in adjacent areas or add
5 measurably to regional noise levels. Relocation of Atlas from LANL would result in a
6 net decrease in noise at that location but the reduction would be so slight as to be
7 unnoticeable cumulatively.

8
9 **5.1.8 Visual Resources**

10
11 The visual character of the region would change only slightly with the addition of one
12 new building and minor appurtenances such as trailers, an oil storage tank, and parking
13 lot. The new facility would be erected in an already developed area, not visible from off-
14 site, so that there would be no impact to the general public. The cumulative visual impact
15 of the Atlas Facility at the NTS would be negligible.

16
17 **5.1.9 Cultural Resources**

18
19 The site of the proposed project has been previously disturbed. Hence, there would be no
20 cumulative impacts to cultural resources.

21
22 **5.1.10 Occupational and Public Safety and Health**

23
24 Based on occupational injury rates for construction and other industrial activities cited in
25 the NTS EIS (DOE, 1996a), Atlas Facility activities would result in only one or two
26 potential injury cases per year, with a similar estimated number of lost workdays. The
27 Atlas Facility activities would not affect the regional rate. Atlas Facility activities would
28 be conducted within the proposed project boundaries and would not affect the public.

29
30 Hazards posed to workers, collocated workers and the public during operations would be
31 minimized by following established procedures that included various administrative
32 controls and ensuring that Atlas personnel were properly trained in dealing with the
33 potential hazards. Cumulative impacts from operation of the facility would be minimal.

34
35 **5.1.11 Socioeconomics**

36
37 There would be no measurable effect on the number of jobs, average wages and
38 household earnings, and tax revenues in Nye County from the addition of the Atlas
39 Facility. Similarly, because there are relatively few employees at the Atlas facility, there
40 would be little effect on the number of jobs, household income and tax revenues in Los
41 Alamos County if the facility were moved to the NTS.

42
43
44

1 **5.1.12 Environmental Justice**

2
3 There would be no impacts to minority and low-income populations in the region of
4 influence from the development of the Atlas Facility. Thus, there is no contribution to
5 the cumulative impact.

6
7 **5.1.13 Waste Management**

8
9 Small amounts of hazardous wastes could be generated from Atlas operations. Solid and
10 liquid non-hazardous wastes would be generated in greater quantities but would only
11 result in minimal impacts. The additional waste streams resulting from operation of Atlas
12 would represent a very minor increase in waste volumes currently generated at the NTS.
13 There would be little cumulative impact from the generation of these wastes.

14
15 **5.2 NO ACTION ALTERNATIVE**

16
17 This section describes cumulative impacts expected to occur if the Atlas facility were to
18 remain at LANL. As stated earlier in Section 3.2, several environmental issues were not
19 evaluated and so have not been included in the Affected Environment or this section.

20
21 **5.2.1 Land Use and Transportation**

22
23 Atlas occupies an existing building at LANL, which was modified slightly to
24 accommodate the Atlas Facility. Because the majority of Atlas personnel are comprised
25 of the existing workforce, the addition of several vehicles and occasional truck traffic is
26 very minor considering existing traffic. There is little effect, if any, on cumulative land
27 uses and transportation impacts.

28
29 **5.2.2 Geology and Soils**

30
31 Existing facilities are used to house the Atlas machine. There are no cumulative impacts
32 to geology and soils from operation of the Atlas facility.

33
34 **5.2.3 Air Quality**

35
36 Emissions generated during operations are small enough to be exempt from permitting
37 and do not degrade the air quality. The cumulative effect on air quality of operating the
38 Atlas Facility is minimal.

39
40 **5.2.4 Noise**

41
42 Noise impacts associated with activities at the Atlas Facility are restricted to the
43 geographical area contained therein and do not affect persons or residents in adjacent
44 areas or add measurably to regional noise levels.

1 **5.2.5 Occupational and Public Safety and Health**

2

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

7

8 **5.2.6 Socioeconomics**

9

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

13

14 **5.2.7 Environmental Justice**

15

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

19

20 **5.2.8 Waste Management**

21

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

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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.

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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.

Accidents with the highest consequence to workers have the likelihood of occurring once in 100 years. Accidents with the highest consequence to collocated workers, the public, and the environment have the likelihood of occurring once in 10,000 years. Additional accident scenarios are contained in the *Preliminary Hazard Analysis for the Atlas Project* (LANL, 1995).

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 likelihood of occurrence is less than once in 100 years of operation.

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; however the likelihood of occurrence is less than once in 10, 000 years of operation. 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 likelihood of occurrence is less than once in 10, 000 years of operation. 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.

1 **7.4 ENVIRONMENT**

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

12

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

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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

1
2
3 **Ambient air.** That portion of the atmosphere, outside of buildings, to which the general
4 public is exposed.

5
6 **Decibel (dB).** A standard unit for measuring sound-pressure levels based on a reference
7 sound pressure of 0.0002 dynes per square centimeter. This is the smallest sound a
8 human can hear.

9
10 **Decibel, A-weighted (dBA).** Adjusted unit of sound measurement that corresponds to
11 the relative sensitivity of the human ear at specified frequency levels. This represents the
12 loudness as perceived by humans.

13
14 **Dielectric.** A nonconductor of electric current.

15
16 **Endangered Species.** A species of possible management concern due to their restricted
17 distribution or the potential for habitat disturbance.

18
19 **Effluent.** A gas or fluid discharged into the environment.

20
21 **Electron Volt (eV).** The energy equivalent of an electron passing through a voltage
22 differential of 1 volt; 1.60×10^{-19} Joules.

23
24 **Environmental Impact Statement.** A document required by the *National*
25 *Environmental Policy Act* of 1969, as amended, for proposed major Federal actions
26 involving potentially significant environmental impacts.

27
28 **Fugitive Dust.** Particulate matter composed of soil. Fugitive dust may include
29 emissions from haul roads, wind erosion of exposed soil surfaces, and other activities in
30 which soil is either removed or redistributed.

31
32 **Gauss (G).** Unit of magnetic induction in the electromagnetic and Gaussian systems of
33 units.

34
35 **Groundwater.** Subsurface water within the zone of saturation.

36
37 **Hazardous Waste.** Wastes that are designated as hazardous by the Environmental
38 Protection Agency or State of Nevada regulations. Hazardous waste, defined under the
39 Resource Conservation and Recovery Act, is waste from production or operation
40 activities that pose a potential hazard to human health or the environment when
41 improperly treated, stored, or disposed.

42

1 **High-energy pulsed power.** A technique used in compressing electrical energy in time
2 and space and storing it at high levels and then releasing it to a target in a very short time
3 period.
4

5 **Infrastructure.** Utilities and other physical support systems needed to operate a
6 laboratory or test facility.
7

8 **Joule.** Unit of energy equivalent to one watt-second.
9

10 **Megajoule (MJ).** One million joules, which is a measure of energy or work in the meter-
11 kilogram-second system of units, equal to 1 Newton.
12

13 **Mitigation.** Actions and decisions that (1) avoid impacts altogether by not taking a
14 certain action or parts of an action, (2) minimize impacts by limiting the degree or
15 magnitude of an action, (3) rectify the impact by repairing, rehabilitating, or restoring the
16 affected environment, (4) reduce or eliminate the impact over time by preservation and
17 maintenance operation during the life of the action, or (5) compensate for an impact by
18 replacing or providing substitute resources or environments.
19

20 **Nonattainment Area.** An area that has been designated by the U.S. Environmental
21 Protection Agency or the appropriate site air quality agency as exceeding one or more
22 national or state Ambient Air Quality Standards.
23

24 **Particulate.** Fine liquid or solid particles such as dust, smoke, mist, fumes, or smog
25 found in air or emissions.
26

27 **Pegasus II.** A pulsed power system to demonstrate feasibility of magnetic implosion.
28

29 **Playa.** A dry, vegetation-free, flat area at the lowest point of an undrained basin.
30

31 **Record of Decision (ROD).** A public document that explains which cleanup alternative
32 would be selected for the area of concern.
33

34 **Runoff.** The discharge of water through surface streams.
35

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