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Sandia National Laboratories/New Mexico Existing Environmental Analyses Bounding Environmental Test Facilities

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ABSTRACT

This report identifies current environmental operating parameters for the various test and support facilities at SNL/NM. The intent of this report is solely to provide the limits which bound the facilities' operations. Understanding environmental limits is important to maximizing the capabilities and working within the existing constraints of each facility, and supports the decision-making process in meeting customer requests, cost and schedule planning, modifications to processes, future commitments, and use of resources. Working within environmental limits ensures that mission objectives will be met in a manner that protects human health and the environment. It should be noted that, in addition to adhering to the established limits, other approvals and permits may be required for specific projects.

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ACRONYMS

ACF	Aerial Cable Facility
AST	above ground storage tank
C4	Composition C-4 explosive
CTF	Coyote Test Field
CY	Calendar Year
DETTC	Design, Evaluation, and Test Technology Center
DOE	United States Department of Energy
EA	Environmental Assessment
EAL	Explosives Applications Laboratory
EBS	Environmental Baseline Survey
ECF	Explosive Components Facility
EOA	Expanded Operations Alternative
ER	Environmental Restoration
ES&H	Environment, Safety, and Health
FLAME	Fire Laboratory for Accreditation of Modeling by Experiment
FSID	Facilities and Safety Information Document
H^2O^2	hydrogen peroxide
HMX	Octogen (nitroamine high explosive)
ISMS	Integrated Safety Management System
JP	jet propellant
JTA	joint test assembly
KAFB	Kirtland Air Force Base
LIHE	Light-Initiated High Explosive
N/A	not applicable
NEPA	*National Environmental Policy Act*
NEW	net explosive weight
NG	neutron generator
NNSA	National Nuclear Security Administration
NRHP	National Register of Historic Places
OP	Operating Procedure
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision

SASN	silver acetylide-silver nitrate
SHPO	State Historic Preservation Officer
SNL/NM	Sandia National Laboratories/New Mexico
SSO	Sandia Site Office
STAR	Shock Thermodynamic Applied Research Facility
SWEIS	Site-wide Environmental Impact Statement
TA	Technical Area
TBF	Terminal Ballistics Facility
TCR	Test Capabilities Revitalization
TNT	trinitrotoluene (explosive)
TTC	Thermal Test Complex
TTF	Thermal Treatment Facility
TWD	Technical Work Documents
UNO	United Nations Organization
USAF	United States Air Force
XTF	Cross Flow Fire Test Facility

UNITS

ac	acre
Ci	curie (unit of radioactivity)
ft	feet
ft^3	cubic feet
gal	gallon
in.	inch
kg	kilogram
kWh	kilowatt hour
lb	pound
M	million
psi	pounds per square inch
yr	year
µCi	microcurie

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1 INTRODUCTION

Sandia National Laboratories/New Mexico (SNL/NM) operations include test facilities to achieve its primary mission of ensuring that the nation's nuclear weapons systems meet the highest standards of safety and reliability. These test facilities have been designed and constructed specifically for the validation of analytical modeling and the functional certification of weapons systems. All environmental test facilities identified in this report perform physical testing and simulation of natural and induced environments to support the U.S. Department of Energy's (DOE's) statutory missions and operations (DOE 1999, SNL 2005). For safe functioning of these facilities, the environmental impacts of their operations must be considered. Analyses performed to assess the impacts of the activities that are conducted at each facility are identified and summarized in this report.

1.1 Objective of this Report

This report identifies current environmental operating parameters for the various test and support facilities at SNL/NM. The intent of this report is solely to provide the limits which bound the facilities' operations. Understanding environmental limits is important to maximizing the capabilities and working within the existing constraints of each facility, and supports the decision-making process in meeting customer requests, cost and schedule planning, modifications to processes, future commitments, and use of resources. Working within environmental limits ensures that mission objectives will be met in a manner that protects human health and the environment. It should be noted that in addition to adhering to the established limits, other approvals and permits may be required for specific projects.

1.2 Methodology

Environmental limits and information was obtained from existing sources for each facility. The following documents were used in extracting the appropriate information for purposes of this report:

- *Sandia National Laboratories/New Mexico Final Site-Wide Environmental Impact Statement*, *Albuquerque, New Mexico*, DOE/EIS-0281
- Facilities and Safety Information Document Calendar Year 2003 Update (SAND2005-0125)
- *Final Environmental Assessment for the Test Capabilities Revitalization at Sandia National Laboratories/New Mexico*, DOE/EA-1446
- *Final Environmental Assessment for the Expansion of Permitted Land and Operations at the 9940 Complex and Thunder Range at Sandia National Laboratories/New Mexico, DOE/EA-1603*
- *Final Environmental Assessment of the SNL Design, Evaluation, and Test Technology Center at TA*-III, KAFB, DOE-EA-1195
- *Historic Environmental Baseline Surveys*
- *Historic NEPA Checklists*

Data is compiled in Table 3-1 in alphabetical order by facility.

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2 SNL/NM NEPA PROCESS

The *National Environmental Policy Act* (NEPA) is a federal law that requires federal agencies, and their contractors, to consider environmental aspects and impacts in their decision-making on proposed actions. At Sandia National Laboratories (SNL), consideration of the environment early in proposed project planning is documented through the Integrated Safety Management System (ISMS) electronic NEPA Module. A NEPA review is required for all federally-funded proposed actions, including privately funded actions performed on federal facilities. In effect, NEPA applies to all SNL activities performed on private and government properties. This requirement also applies to SNL projects performed in international settings, where the role of SNL researchers, and potential environmental issues associated with SNL activities, must be documented in a NEPA review.

NEPA documentation varies, depending on the scope and location of the project. Projects that are covered by the Site-Wide Environmental Impact Statement (SWEIS), or other existing document, such as an environmental assessment (EA), may be reviewed by a NEPA Subject Matter Expert (SME) following the internal process approved by DOE/NNSA/Sandia Site Office (SSO). If the project is outside the scope of existing NEPA documentation, takes place at an offsite location, another agency is involved, or is requested to be submitted for review by the SSO, then review by the SSO NEPA Compliance Officer is required. If a more comprehensive analysis is required to assess the environmental impact of a project, DOE could require a supplemental analysis, environmental assessment, or environmental impact statement before making a determination. Table 2-1 shows estimated cost and schedules for each NEPA document. If the project is proposed to take place on U.S. Air Force (USAF) property, additional NEPA review would also be required, including the completion of an Air Force 813 form (AF813, Request for Environmental Impact Analysis).

Table 2-1 - Estimated Costs and Duration for NEPA Documentation

Document Type	Cost	Duration
Checklist (Internal)	Indirect	2-3 days
Checklist (SSO review)	Indirect	5-7 weeks
Checklist (AF review)	Indirect	8-10 weeks
Supplement Analysis	$15,000	11-13 weeks
Environmental Assessment	$150,000	9-12 months
Supplement EIS	$250,000	1-1.5 years
EIS	$500,000+	2 years +

Note: Indirect costs are paid by the SNL/NM NEPA Program. Additional costs for NEPA coverage and analysis beyond indirect costs are passed on to the customer of the proposed project.

Specific SNL requirements for complying with DOE's NEPA regulations are found in Chapter 10, Section B, of the *SNL Environment, Safety & Health* (ES&H) *Manual* (SNL 2009).

2.1 Site-Wide Environmental Impact Statement (SWEIS)

Many of the bounding limits identified in this report were extracted from the analysis performed under the SNL/NM's Site-Wide Environmental Impact Statement (SWEIS) (DOE/EIS-0281). In 1999, the DOE published the SNL/NM SWEIS, examining the environmental impacts of three alternatives for the continued operation of the facility. To complete the NEPA process, DOE issued a Record of Decision (ROD) identifying the Expanded Operations Alternative (EOA) as the Preferred Alternative, assessing environmental impacts for continued operation of SNL/NM (DOE 1999) In 2006, DOE provided additional environmental impact analysis for SNL/NM in the form of a Supplement Analysis (SA).

In the SNL/NM SWEIS, DOE analyzed the potential impacts of continued operations and resource management at SNL/NM to meet evolving DOE missions and to respond to the concerns of affected individuals and agencies. The analysis included three alternatives—reduced operations, no action, and expanded operations (DOE's Preferred Alternative)—that would meet the purpose and need for agency action and would support existing and potential program-related activities at SNL/NM. Under the Reduced Operations Alternative, DOE and interagency programs and activities at SNL/NM were analyzed at the minimum level of operations needed to maintain SNL/NM facilities and equipment in an operational readiness mode. Under the No Action Alternative, ongoing DOE and interagency programs and activities at SNL/NM were analyzed to continue the status quo, that is, operating at planned levels as reflected in current DOE management plans. Under the Preferred Alternative, EOA, DOE and interagency programs and activities at SNL/NM were analyzed as increasing to the highest reasonable activity levels that could be supported by current facilities, including specifically identified potential expansion and construction of new facilities for future actions. Environmental impacts analyzed under this alternative provided a bounding analysis against which to track changes to SNL/NM operations (DOE 2006).

Establishing environmental limits and completion of analyses conducted as part of the SWEIS are required under Section 102(c) of NEPA, which established the basic requirement for federal agencies to prepare environmental impact statements (EISs) for "major Federal actions significantly affecting the quality of the human environment." The law further specified that an EIS shall include detailed information on:

- The environmental impact of the proposed action,
- Any adverse environmental effects that cannot be avoided should the proposal be implemented,
- Alternatives to the proposed action,
- The relationship between local short-term needs of man's environment and the maintenance and enhancement of long-term productivity, and
- Any irreversible and irretrievable commitment of resources which would be involved in the proposed action should it be implemented.

The SNL/NM SWEIS addressed the impacts of SNL/NM operations over a projected time period from 1998 through 2008. The impact analysis in the SWEIS was based on a detailed analysis of major facilities or facility groups, representing the "main activities at

SNL/NM that have the potential to affect the environment, have generated public concern, are critical to SNL/NM's missions, or are anticipated to expand over the next 10 years" (DOE 1999). In 2005, DOE initiated the review of the SWEIS adequacy through the Supplement Analysis (completed in 2006), and it was determined that no additional environmental impact analysis was necessary. The adequacy of the SWEIS impact analysis is required to be reviewed again in the 2010 timeframe, to determine whether the original analysis still covers current and anticipated operations at SNL/NM.

2.2 Bounding Limits

In supporting the preparation of SNL/NM's SWEIS (1999) and Supplement Analysis (2006), SNL/NM provided operational data on their major facilities. Information on hazardous material inventories and generation, air emissions, resource use, level of operations, and more was compiled from data provided by facility representatives, based on existing plans or best-estimate projected activities at the facility (usually 5- and 10-year spans). On the basis of this specific and cumulative facility operations information, DOE performed a comprehensive site-wide environmental impact analysis for operating the sites' various facilities, and determined the potential environmental impacts of this operation. The impact analysis was based on annual baseline and projected levels of anticipated facility operations.

As a result, the SNL/NM's SWEIS establishes environmental operations limits for certain key facilities. These limits, documented in the SWEIS EOA, assume implementation of the highest, reasonably foreseeable, activity levels that could be supported by current facilities, and the potential expansion and construction of new facilities. This alternative included multiple shift operations, some reconfiguration of equipment, and construction to modify existing buildings to support expanded operations. Values for the EOA represent the maximum levels of activities, material inventories, material consumption, waste, emissions, or resource consumption that a facility can support or generate without regard to budget or programmatic constraints. This Preferred Alternative, approved by DOE, is the basis for the limits identified in this report (DOE 1999).

2.3 Importance of Limits

Established environmental limits for SNL/NM test facilities are in place. Any new work activities not addressed, or that exceed these bounding limits (e.g., new construction not identified in the NEPA documents) require review to determine whether additional environmental impact analysis is needed.

SNL/NM continues to evolve, projects use resources, and conservation is an important planning consideration. From an environmental protection standpoint, and from a mission success standpoint, Members of the Workforce must be aware of incremental resource consumption, and of their contributions to site-wide resource consumption. All SNL activities must be covered under NEPA; any increase in the use of resources may delay and/or increase the cost of new or modified projects. High-consumption resources, such as water or electricity, require additional scrutiny. Resource use must be reviewed so that consideration between necessary business objectives and conservation can be effectively balanced. Mission needs, NEPA legal requirements, conservation goals and orders, environmental protection, and public safety and concerns will be considered in

making decisions for resource use. Early planning ensures environmental compliance is considered and achieved, with minimal impact to cost and schedule.

When facility operations are anticipated to exceed bounding environmental limits, it is an indication that a new analysis of the facility environmental impacts may be required. Early in the planning process, before this exceedance is expected to occur, the facility program manager would initiate an electronic NEPA review in the ISMS NEPA Module. The resulting NEPA checklist would then be transmitted to SSO, to determine whether additional environmental impact analysis and documentation would be required to cover changes in the facility's operations.

2.4 Limits Yet to Be Established

In many cases, the environmental limits denote quantities for current or projected operations. Based on these quantities, the operations were evaluated, and environmental impact analyses were conducted. In the SWEIS, some facilities were analyzed comprehensively, and cumulative impacts were assessed, so exact limits were not established for specific operations. Additional NEPA documentation is required to analyze potential environmental impacts for a specific operation under a proposed project at the facility.

While the facility operations as a whole were analyzed cumulatively under the SWEIS, bounding environmental limits may not be directly associated with a specific operation. If a limit is not listed in this report, it does not indicate that operations have no environmental impacts, or that NEPA coverage is not required. The NEPA process may result in limits for the operation being analyzed, thus establishing baseline information for future projects, and streamlining future NEPA reviews.

3 FACILITIES

Environmental limits identified in this report pertain to facilities located in Technical Area (TA)-II, TA-III, and Coyote Test Field (CTF).

TA-II

TA-II is used for explosives storage, testing, and certain waste management activities. The Explosive Components Facility (ECF) is located in TA-II.

TA-III

Environmental test facilities located in TA-III are comprised of numerous principal buildings and structures devoted to the physical testing and simulation of natural and induced environments. Activities in TA-III verify the accuracy and validity of computer models that design and evaluate the performance, operation, safety, and reliability of weapons systems.

CTF

The CTF is a remote area containing physics testing facilities. Activities at CTF include tests that require large land areas or unusual terrain. DOE does not own the land in CTF. Most facilities listed for this area operate under agreements with the USAF. Test operations and activities taking place in the CTF vary widely from facility to facility. However, all CTF capabilities fall into the basic categories of scientific research and development and various types of testing (SNL 2005).

Table 3-1 lists facilities with their corresponding environmental limits. Table 3-2 shows current Thunder Range and 9940 Complex explosive limits analyzed in the recent environmental assessment. Figure 3-1 shows the facility locations.

3.1 Operational Commonalities

For these TA-II, TA-III, and CTF facilities, many test activities use similar instruments and equipment. These facilities commonly use chemicals, lasers, high-speed photography equipment, flash X-Ray, and power tools. Data collection, which includes video and post-firing analysis of tests, is consistent with existing operations for many of the facilities.

All the facilities have hazard control procedures in place to protect personnel. Personnel are required to follow and perform activities in accordance with technical work documents (TWDs), operating procedures (OPs), and the SNL Environment, Safety & Health (ES&H) Manual (SNL 2009). Controls include training, test checklists, access control, control rooms, remote operations, use of personal protective equipment, and other physical and administrative controls to ensure protection of personnel (SNL 2005).

3.2 Additional Review for Operations

Environmental Permits

Limits identified in Tables 3-1 and 3-2 are the existing operating envelope. A NEPA review is required for all proposed projects, even those that fall within these limits.

Required environmental review also includes environmental permitting; e.g., a facility may have an explosive limit of 100 pounds (lb), and an open burn permit for detonations over 20 lb is still required. Similarly, completion of a biological assessment is required prior to the start of outdoor test activities; e.g., a proposed project could impact birds during nesting and breeding season. Surface discharge approvals for a given project must be renewed periodically. For facilities that have existing NEPA documentation in place, changes in scope would require additional approval and separate NEPA documentation.

Cultural Resources

Modifications to a facility or associated structure also require additional NEPA coverage to protect historic buildings and maintain cultural resources compliance. At SNL/NM, cultural resources compliance is coordinated through the NEPA Program. Actions that could adversely affect cultural resources are initially analyzed in a NEPA checklist. Cultural resources are prehistoric or historic archaeological sites, buildings, structures, districts, or other places or objects considered important to a culture or community for scientific, historical, traditional, religious, or other reasons. Cultural resources primarily addressed in the 1999 SNL/NM SWEIS are those that have been determined eligible or potentially eligible for inclusion in the National Register of Historic Places (NRHP). To be eligible for the NRHP, a resource must be associated with events or persons significant in our past, embody distinctive construction characteristics, or yield information important in prehistory or history. In addition to meeting one of these criteria of importance, a resource must also retain integrity for its period of significance.

Historic properties, as defined by NHPA and other implementing regulations, include archaeological sites and historic buildings and structures. Historic buildings and structures may include those over 50 years of age that are historically significant or younger structures of exceptional significance. There are historic buildings on property owned by DOE/NNSA. Planning assists in avoiding potential impacts to these sites, and appropriate historic documentation is undertaken to mitigate effects when necessary. The current status of historic eligibility for the SNL/NM environmental test facilities identified in this report within the technical areas follows:

- Within TA-II boundaries, there are no eligible buildings.
- Eligible properties in TA-III include the Sled Track (the track and six buildings), Centrifuge Complex (two centrifuge facilities and two support structures), Mechanical Shock Facility (one building), and Vibration and Acoustics Facility (two buildings). At the Drop/Impact Complex, the 300-feet (ft) Drop Tower and Water Impact Facility have also been found eligible.

While not all buildings have been surveyed, some SNL/NM environmental test facilities located outside the technical areas have been evaluated for NRHP eligibility, including the Aerial Cable Facility (ACF) Complex and the Lurance Canyon Burn Site. Both these facilities are located within the CTF on USFS-owned land withdrawn to DOE.

The current status of historic eligibility for the SNL/NM environmental test facilities identified in this report outside the technical areas follows:

- At the ACF Complex, 16 buildings have been determined not eligible. Three buildings, and the aerial cables themselves, have been determined eligible.
- Fifteen buildings at the Burn Site, slated for demolition, were evaluated and determined not eligible.
- SNL/NM facilities at Thunder Range have been evaluated, and none of them are eligible.
- A few buildings in the 9940 Complex were similarly surveyed and determined not eligible.

(DOE 2006)

No known archaeological sites have been identified on DOE/NNSA-owned property. However, cultural and historic sites do exist on and in close proximity to DOE/NNSA permitted property and Environmental Restoration (ER) sites. These areas are located on USAF property and on portions of the Cibola National Forest land withdrawn area. SNL/NM's activities are planned to avoid potential impacts to these sites. In support of these efforts, surface disturbance or outdoor testing activities in any vicinity of these known sites could require an archaeological survey and possible site mitigation. This requirement should be noted for cost and schedule planning.

It is DOE/NNSA's responsibility to ensure that impacts to cultural resources are assessed and appropriate actions taken to mitigate any impact. Proposed projects will continue to undergo review by the DOE (and the USAF and USFS, if applicable) to determine whether NRHP-eligible cultural resources could be affected by the undertaking. The DOE and the New Mexico State Historic Preservation Officer (SHPO) will consult on measures that can be implemented to mitigate or avoid any potential adverse effects. The consultation process ensures that these impacts are consistent with, and within the bounds of, those described for the EOA in the SWEIS (SNL 2008).

Changes in Scope

Additional NEPA coverage would also be required if operations change from those initially described and analyzed within the SWEIS. Increases in hazardous or explosive material use, resource consumption increase or decrease, process modifications, or Air Force permit changes (terminations, renewals, modifications) would require a new NEPA review. If existing NEPA documentation does not specifically cover a proposed project, including timeframe, location, test estimates, or modifications; then additional NEPA coverage would be required.

Table 3-1 - Facilities and Bounding Environmental Limits

Site	Description	Source Document	Land Permit	Annual Bounding Limits					
				Test Activities	Annual Explosives Use	Hazard-ous Waste	Process Water	Fuel	Misc Hazards
Aerial Cable Facility (ACF) Complex, Coyote Test Field (CTF)	The ACF mission is to provide a theater to perform destructive and nondestructive testing for a range of test items. The ACF conducts precision mechanical testing of full-scale weapon systems for verification of design, integrity, and performance; and impact tests involving weapon systems and aircraft components.	FSID CY2003, SA Record of Decision (ROD)	AF	5 (JTA drops) 100 (drop/pull-down) 30 (aerial target) 2 (scoring system)	Consumption: 78.8 kg (UNO 1.1 - skeet anti-tank warheads) 22,930 kg (UNO 1.3 - rocket motors, gun propellant, and flares) Total rocket motors = 2,370 packages 2,314 g (UNO 1.4 - cable cutters, explosive bolts)	9 kg	N/A	N/A	Test articles could contain radioactive material or high explosives. The number of tests using these kinds of materials would not exceed five per year (5/yr).
Centrifuge Complex, TA-III, Bldg 6526	The Centrifuge Complex is used for acceleration testing of large tests objects: weapon systems, satellite systems, reentry vehicles, and rocket motors. It is also used to certify designs in	FSID CY2003 SNA08-0113	DOE	120 (centrifuge) 100 (impact)	Consumption: 7 kg UNO 1.1 2,272 kg UNO 1.3 (rocket motors) 890 g UNO 1.4	15 kg	N/A	N/A	N/A

Site	Description	Source Document	Land Permit	Annual Bounding Limits					
				Test Activities	Annual Explosives Use	Hazard-ous Waste	Process Water	Fuel	Misc Hazards
	transportation.								

Table 3–1 - Facilities and Bounding Environmental Limits (Continued)

Site	Description	Source Document	Land Permit	Annual Bounding Limits					
				Test Activities	Annual Explosives Use	Hazard-ous Waste	Process Water	Fuel	Misc Hazards
Drop/Impact Complex, TA-III, Bldg 6510	The Drop/Impact Complex is used for hard-surface impacts, water impacts, and underwater tests of weapon shapes, substructures, and components to verify design integrity, performance, and fuzing functions.	FSID CY2003	DOE	50 (drop) 20 (water impact) 5 (submersion) 10 (underwater blast)	Consumption: 68 kg UNO 1.1 (C4, TNT, HMX) 1,100 kg UNO 1.3 (rocket motors) 1,157 kg UNO 1.4 (cable cutters)	0 kg	N/A	N/A	N/A
Explosive Components Facility (ECF), TA-II, Bldg 905	The ECF consolidates some ongoing SNL/NM activities related to explosive components, neutron generators, and battery research, testing, development, and quality control. The ECF facilitates the coordination of these activities to	FSID CY2003	DOE	500 (neutron generator) 900 (explosive) 1,250 (chemical analyses) 100 (battery)	Consumption: 18 kg UNO 1.1 4 kg UNO 1.2 5 kg UNO 1.3 14 kg UNO 1.4	500 kg (hazardous) 1,000 kg (low-level mixed radioactive) 190 ft3 (low level radioactive)	6.4 M gal (wastewater) 7.0 M gal (water consumption)	N/A	Tritium nuclear material inventory: 49 Ci Annual tritium emissions: 2.0×10^{-3} Process electricity consumption: 3.4 M kWh Process boiler energy

Table 3–1 - Facilities and Bounding Environmental Limits (Continued)

Site	Description	Source Document	Land Permit	Annual Bounding Limits					
				Test Activities	Annual Explosives Use	Hazard-ous Waste	Process Water	Fuel	Misc Hazards
	enhance both safety and productivity.								consumption: 29 M ft^3
Explosive Device Test Facility (historically Large Melt Facility), Coyote Test Field, Bldg 9939	Mostly small-scale explosive testing is performed at this facility. Hydrogen peroxide testing is also performed here.	SNA06-0591 AF06-0029 Land Use Permit: PERM/O-KI-00-0002 2006 EBS SNA08-0181	AF	Activities outside existing operations would require additional NEPA coverage including the testing of items containing high quantities of hazardous substances or explosives.	22.5 kg TNT per test	10 lb/yr: Small amounts (rags, wipes, residue material)	Daily Operations: Water discharge permit for ~3,000 gal/yr of potable water to ground. Test Activities: Surface discharge permit for ~150 gal of potable water and <0.33 gal of H^2O^2 from explosive testing ~75 tests/yr. Up to 67,500 gal potable water/yr may be used for maintenance activities.	Two AST: 1,000-gal propane gas tank 100,000-ft^3 argon gas tank	Activities outside existing operations would require additional NEPA coverage including the testing of items containing high quantities of hazardous substances or explosives.

Table 3–1 - Facilities and Bounding Environmental Limits (Continued)

Site	Description	Source Document	Land Permit	Annual Bounding Limits					
				Test Activities	Annual Explosives Use	Hazard-ous Waste	Process Water	Fuel	Misc Hazards
Explosive Test Facility, Coyote Test Field, Bldg 9920	Explosives testing and training are performed at this site. An explosive chamber and 1,050-lb capacity storage area can also be found in this facility. Additional operations include machining and fabrication.	SNA08-0229 AF08-0011 Land Use Permit: PERM/O-KI-00-0010 SNA08-0305 2003 EBS	AF	Test Types: Aerosol Explosive Combustion/detonation of hydrocarbon fuels Improvised explosive devices (36 tests SNA08-0305)	Indoor aerosol limit: 2.5 lb NEW Outdoor explosive limit: 100 lb NEW	Small amounts (rags, tissues, residue materials)	Small amounts for machining	Hydro-carbon	Activities outside existing operations would require additional NEPA coverage including the testing of items containing high quantities of hazardous substances or explosives.
Explosives Applications Laboratory (EAL), Coyote Test Field, Bldg 9930	The facility is used for the design, assembly, and testing of explosive experiments. The EAL supports field test arming/firing, warhead development, and development of emergency destruct systems.	FSID CY2003 SNA08-0274 AF08-0015	AF	360 (Explosive)	Limit per event: 50 lb Consumption: 263 kg UNO 1.1 1,500 g UNO 1.2 15,000 g UNO 1.3 1,500 g UNO 1.4	2 kg	N/A	N/A	Film developer/ fixer inventory: 20 gal

Table 3–1 - Facilities and Bounding Environmental Limits (Continued)

Site	Description	Source Document	Land Permit	Annual Bounding Limits					
				Test Activities	Annual Explosives Use	Hazard-ous Waste	Process Water	Fuel	Misc Hazards
Explosives Machining Complex, Coyote Test Field, Bldg 9960	Within the facility, raw explosives are machined into various shapes, and complex assembly and disassembly of explosive devices is performed. Explosives machining is done by remotely operated equipment.	SNA08-0151 AF08-0007 Land Use Permit: PERM/O-KI-00-0011 2003 EBS	AF	Activities outside existing operations would require additional NEPA coverage including the radiography of items containing high quantities of hazardous substances or explosives.	There are 4 stations with protective shields for pressing up to 5 g of sensitive powder or 25 g of insensitive powder. Larger quantities may be pressed by remote control on a 25-ton press.	Other than 5 gal to 10 gal of wipes contamin-ated with lubricants and spent solvents, the majority of the waste stream is explosive material. The explosive material, explosive material chips, is typically disposed of by the Air Force Explosives Ordnance Disposal or used in other SNL/NM experi-ments.	Process water from explosives machining operations is filtered and then discharged to a holding tank. Two 5,300-gal polypro-pylene water tanks are used to collect process water from operations at the 9960 Complex.	A 1,000-gal propane tank provides fuel for the building's environ-mental/ comfort control and condi-tioning.	Neutron generator (NG) assemblies are disassembled. This process separates the explosive-containing timer drivers from the NGs. The NGs contain a very small <0.1 microcurie (µCi) of tritium each. The facilities are limited to a maximum of 24 generator assemblies inside at a time.

Table 3–1 - Facilities and Bounding Environmental Limits (Continued)

Site	Description	Source Document	Land Permit	Annual Bounding Limits					
				Test Activities	Annual Explosives Use	Hazard-ous Waste	Process Water	Fuel	Misc Hazards
Light-Initiated High Explosive (LIHE) Facility, TA-III, Bldg 6715	The LIHE Facility is used to prepare and apply a thin coating of silver acetylide-silver nitrate (SASN), a sensitive, high-explosive material, to the surfaces of weapon components, subassemblies, and full assemblies. SASN is detonated by an extremely intense flash of light in a test cell area. Explosive force on a test package is measured to evaluate the effect of an external explosion on a weapons system component, a missile, a re-entry vehicle, or other space vehicle.	FSID CY2003 SNA04-0056	DOE	Activities outside existing operations would require additional NEPA coverage including the radiography of items containing high quantities of hazardous substances or explosives.	Acetonitrile and silver nitrile are mixed with acetylene gas to form SASN (light-sensitive explosive) and then sprayed onto a test package.SASN is insensitive when wet, but becomes sensitive to intense light, impacts, or sparks when dry. The prepared packages are initiated by intense light. The facility would also do impulse testing on small test items using a plastic sheet explosive (Deta sheet) initiated with commercial detonators.	25 ft^3 of wipes, solvents, etc. Explosive waste would handled by the TTF.			1,200 gal of oils for use in a capacitor bank and insulation of other electrical equipment. Strontium-90 (Sr-90) radioactive sources of 5 µCi could be utilized in the spray booths for thickness measurements on the sprayed SASN. Inert process and utility gases would be provided by high-pressure gas cylinders (200 ft^3 capacity at 2,200 pounds per square inch [psi]).

Table 3–1 - Facilities and Bounding Environmental Limits (Continued)

Site	Description	Source Document	Land Permit	Annual Bounding Limits					
				Test Activities	Annual Explosives Use	Hazard-ous Waste	Process Water	Fuel	Misc Hazards
Lurance Canyon Burn Site, Coyote Test Field	The Lurance Canyon Burn Site is used for fire testing weapons, weapon components, and shipping containers in aviation fuel fires, propellant fires, and wood fires for verification of design integrity and performance. The facility is also used for transportation package certification and for verification of designs in transportation technology.	FSID CY2003	AF	55 (certification) 100 (model validation) 50 (user)	Class 1.3 Explosive - 7,500-kg rocket propellant burned	900 kg	25,000 gal (process wastewater) 0 (process water consumption)	25,000 gal JP-8 5,000 kg of wood, open burning	N/A

Table 3–1 - Facilities and Bounding Environmental Limits (Continued)

Site	Description	Source Document	Land Permit	Annual Bounding Limits					
				Test Activities	Annual Explosives Use	Hazard-ous Waste	Process Water	Fuel	Misc Hazards
Mechanical (Dynamic) Shock Test Facility, TA-III, Bldg 6570	The Mechanical Shock Complex conducts mechanical shock tests on small electronic parts to full-sized weapons components using actuators and other shock testing machines. A mechanical shock test is a technique in which a test component is subjected to a controlled acceleration pulse. The purpose is to determine if weapons components are capable of withstanding repeated shock environments.	DETTC-TA-III EA TCR EA SNA08-0112	DOE	100 (shock)	Activities outside existing operations would require additional NEPA coverage, including the shock of items containing high quantities of hazardous substances or explosives.	N/A	N/A	N/A	Activities outside existing operations would require additional NEPA coverage including the shock of items containing high quantities of hazardous substances or explosives.

Table 3–1 - Facilities and Bounding Environmental Limits (Continued)

Site	Description	Source Document	Land Permit	Annual Bounding Limits					
				Test Activities	Annual Explosives Use	Hazard-ous Waste	Process Water	Fuel	Misc Hazards
Radio-graphy Facility, TA-III, Bldgs 6635, 6639	The Radiography Facility would be used by scientists and technicians to check materials, joint assemblies, and subsystems for imperfections using radiography and other nondestructive testing techniques.	FSID CY2003 Appendix A SNA08-0429	DOE	Activities outside existing operations would require additional NEPA coverage including the radiography of items containing high quantities of hazardous substances or explosives.	Item limit: 500 lb	N/A	N/A	N/A	Activities outside existing operations would require additional NEPA coverage including the radiography of items containing high quantities of hazardous substances or explosives.

Table 3–1 - Facilities and Bounding Environmental Limits (Continued)

Site	Description	Source Document	Land Permit	Annual Bounding Limits					
				Test Activities	Annual Explosives Use	Hazard-ous Waste	Process Water	Fuel	Misc Hazards
Shock Thermo-dynamic Applied Research Facility (STAR), Coyote Test Field, Bldgs 9950,9956	This facility is a collection of four research guns within a main gun building and four work areas. The building is situated within a security locked/camera monitored 2-ac fenced-in complex.	SNA05-0508 AF05-0023 2005 EBS	AF	One large-bore, two-stage light gas gun (1.125-inch [in.] bore, also the gun of choice for the Hyper-velocity Launcher) One medium-bore, two-stage, light gas gun (.75-in. bore, referred to as STARFIRE) One small-bore, two-stage light gas gun (.50-in. bore) One powder gun (3.5-in. bore) One gas gun (4.0-in. bore) One oblique gun (4.0-in. bore)	These guns are both propellant and gas (hydrogen/ helium) driven. All testing is done within enclosed and evacuated chambers that are part of the guns themselves. Propellants and primers are stored separately, onsite, in approved storage bunkers. The site is limited to storage of 400 lb of propellants and 1 lb of primer.	Small amounts (rags, wipes, residue materials, filters)	The STAR Facility discharges non-hazardous, non-radioactive sanitary and industrial discharge and wastewater generated from cleaning impact chambers. Wastewater is filtered and discharged through the sanitary sewer system. The filters used are treated as hazardous waste	N/A	Activities outside existing operations would require additional NEPA coverage including the testing of items containing high quantities of hazardous substances or explosives.

Table 3–1 - Facilities and Bounding Environmental Limits (Continued)

Site	Description	Source Document	Land Permit	Annual Bounding Limits					
				Test Activities	Annual Explosives Use	Hazard-ous Waste	Process Water	Fuel	Misc Hazards
Sled Track Complex, TA-III	The Sled Track Complex is a test facility for simulating high-speed impacts of weapon shapes, substructures, and components to verify design integrity, performance, and fuzing functions. Operations include conducting rocket sled, rocket launcher, and explosive tests. Specifically, operations include rocket rail activities, blast tube activities, and open air explosive detonations.	FSID CY2003	DOE/ AF	80 (rocket sled) 239 (explosive) 24 (rocket launcher) 150 (free-flight launch)	Consumption: 2,761 kg UNO 1.1 36,170 kg UNO 1.3 (rocket motors = 1,588 total packages) 214 g UNO 1.4 1,670 kg Open burning of explosives	50 kg	N/A	N/A	N/A

Table 3–1 - Facilities and Bounding Environmental Limits (Continued)

Site	Description	Source Document	Land Permit	Annual Bounding Limits					
				Test Activities	Annual Explosives Use	Hazard-ous Waste	Process Water	Fuel	Misc Hazards
Terminal Ballistics Facility, TA-III, Bldg 6750	The Terminal Ballistics Facility provides test environments for ballistic studies and solid-fuel rocket motor tests.	FSID CY2003	DOE	350 (projectile impact) 100 (propellant)	Consumption: 28 kg UNO 1.1 21 kg UNO 1.2 14 kg UNO 1.3 14 kg UNO 1.4	0.75 kg	N/A	N/A	N/A
Thermal Test Complex (TTC), TA-III, Bldg 6539	Operations at the TTC include thermal testing performed at the XTF Facility and fire analyses conducted at the FLAME-II facility, both of which are indoor facilities. The XTF is used for fire tests of articles that may contain explosives and other materials. The FLAME is used for tests using various fuels to investigate the properties of fire environments in an enclosed, flow-controlled, and temperature controlled structure.	TCR EA FSID CY2003	DOE	320 (fuel)	N/A	4506 kg (hazardous) 955 kg (low-level mixed radioactive) 455 kg (low-level radioactive)	250,300 gal/yr (process wastewater) 1,510,000 gal/yr (process water consumption)	Methanol 26,800 gal/yr, up to 40 tests/yr Acetone 4,000 gal/yr, up to 80 tests/yr Hydrogen 6.4 million ft^3 up to 40 tests/yr Methane 2 million ft^3/yr, up to 40 tests/yr JP-8 25,000 gal/yr up to 120 tests/yr	N/A

Table 3–1 - Facilities and Bounding Environmental Limits (Continued)

Site	Description	Source Document	Land Permit	Annual Bounding Limits					
				Test Activities	Annual Explosives Use	Hazard-ous Waste	Process Water	Fuel	Misc Hazards
Thermal Treatment Facility (TTF) (TA-III - Bldg 6715)	The TTF is used to thermally treat (burn) small quantities of waste explosive substances, waste liquids (e.g., water and solvents) contaminated with explosive substances, and waste items (e.g., rags, wipes, and swabs) contaminated with explosive substances. The TTF is a RCRA permitted facility.	FSID CY2003	DOE	N/A	UNO 1.1 Explosives waste managed: 10,366 g UNO 1.3 Explosives waste managed: 165.7 g	Waste generated: 272 kg Waste treated: 1,200 lb	N/A	Propane: 500-gal tank size Propane open burning: 120 gal/yr	N/A
Thunder Range Complex, Coyote Test Field	Thunder Range currently and has historically been used for explosive testing, and supports increased rapid response energetic testing and specialized training for national security missions.	Thunder Range/9940 EA	AF	1,495 (Explosive events at varying TNT weights (see Table 3-3)	Limit per event: Varies based on location (see Table 3-2)	50 kg (includes 9940 Complex)	150,000 gal (process water consumption)	N/A	N/A

Table 3–1 - Facilities and Bounding Environmental Limits (Continued)

Site	Description	Source Document	Land Permit	Annual Bounding Limits					
				Test Activities	Annual Explosives Use	Hazard-ous Waste	Process Water	Fuel	Misc Hazards
Vibration-Acoustic Complex, TA-III, Bldgs 6560, 6610	Facilities in the Vibration/Acoustic Complex are used to conduct vibration, shock, and acoustic simulations for components and systems such as electronic packages to full-sized weapons components. These simulations serve to determine how test items respond to controlled vibration and acoustic stimuli, define failure levels, prove system integrity, determine modes of vibration, or verify theoretical computer models.	FSID CY2003	DOE	350 (vibration)	Consumption: 700 g UNO 1.1 227.2 kg UNO 1.3 890 g UNO 1.4	1 kg	N/A	N/A	N/A

Table 3–1 - Facilities and Bounding Environmental Limits (Continued)

Site	Description	Source Document	Land Permit	Annual Bounding Limits					
				Test Activities	Annual Explosives Use	Hazard-ous Waste	Process Water	Fuel	Misc Hazards
9940 Complex, Coyote Test Field, Bldg 9940	Historical use of the 9940 site included arming, fusing, and firing of explosives and testing of explosives systems components. Today the area is used for training of the Nuclear Emergency Response community and for research on energetic materials.	Thunder Range/9940 EA	AF	975 (Explosive events at varying TNT weights (see Table 3-3)	Limit per event: Varies based on location (see Table 3-2)	50 kg (includes Thunder Range)	315,000 gal (process water consumption)	N/A	N/A

Notes:
The environmental limits provided are quantities identified in NEPA source documents. Additional permitting or approvals may be required for project specific activities.

Table 3-1 Acronyms:

ACF - Aerial Cable Facility
AF - U.S Air Force
AST - aboveground storage tank
C4 - Composition C-4 explosive
DETTC - Design, Evaluation, and Test Technology Center
DOE - U.S. Department of Energy
EAL - Explosive Applications Laboratory
ECF - Explosive Components Facility
EBS - Environmental Baseline Survey
EA - Environmental Assessment
FLAME-Fire Laboratory for Accreditation of Modeling by Experiment
FSID - Facilities and Safety Information Document
H^2O^2 - hydrogen peroxide
HMX - Octogen (nitroamine high explosive)
JP - jet propellant
JTA - joint test assembly
LIHE - Light-Initiated High Explosive
N/A- - not applicable
NEW - net explosive weight
NG - neutron generator
RCRA- *Resource Conservation and Recovery Act*
ROD - Record of Decision
SASN - silver acetylide-silver nitrate
STAR - Shock Thermodynamic Applied Research Facility
TA - technical area
TCR - Test Capabilities Revitalization
TNT - trinitrotoluene (explosive)
TTC - Thermal Test Complex
TTF - Thermal Treatment Facility
UNO - United Nations Organization
XTF - Cross Flow Fire Test Facility

Units:

ac - acre
Ci - curie (unit of radioactivity)
ft - feet
ft^3 - cubic feet
gal - gallon
inch - in.
kg - kilogram
kWh- kilowatt hour
lb - pound
M - million
psi - pounds per square inch
yr - year
µCi - microcurie

Table 3-2 - Thunder Range & 9940 Complex, Per Event Explosive Limits

Location	TNT Equivalent Limit Per Event (lb)
9940 Complex	50
9940 Training South	50
9940 Training East	50
9940 Training West	0
Thunder Range—Range 1	100
Thunder Range—Range 1A	1,100
Thunder Range—Range 2	50
Thunder Range—Range 3	5
Thunder Range—Range 4	350
Thunder Range—Range 5	50
Thunder Range—Range 6	130
Thunder Range—Range 7	2,000
Thunder Range—Range 8 (Training Site North)	50
Thunder Range—Range 9 (Training Site South)	50
Thunder Range—Range 10 (ATEF)	50

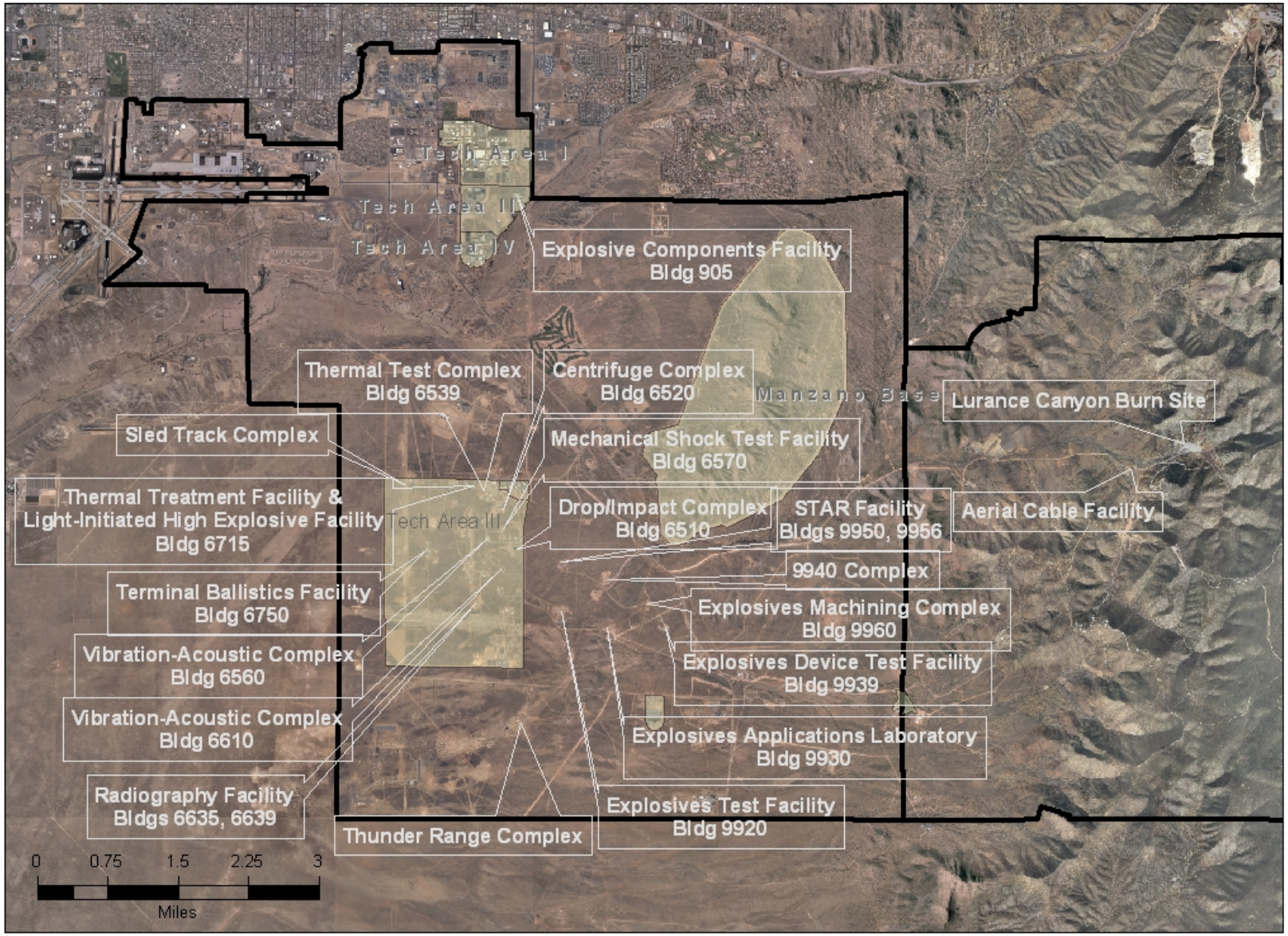
(DOE 2008)

Table 3-3 - Thunder Range & 9940 Complex, Annual Number of Test Events

Area	Explosive Weight (lb TNT equivalent)							
	>0-1	>1-5	>5-20	>20-50	>50-100	>100-500	>500	Total
9940 Expansion–East	600	275	70	30	0	0	0	**975**
9940 Expansion–West	0	0	0	0	0	0	0	**0**
Thunder Range	1,000	300	100	50	20	10	15	**1,495**
TOTAL								**2,470**

(DOE 2008)

Figure 3-1 - Location of Environmental Test and Support Facilities



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4 Conclusion

NEPA documentation has established the existing authorization limits for environmental test facilities. This report should be used to ensure that Members of the Workforce and operational decision-makers:

- Understand the environmental limits for the test facility operations where new work is proposed to be done;
- Consider whether proposed new work activities would cause any bounding environmental limits that are in place to be exceeded;
- Complete a NEPA review for all proposed projects.

This information is provided as a tool to assist Members of the Workforce in meeting NEPA compliance requirements, and increasing awareness about existing authorizations for proper project planning.

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