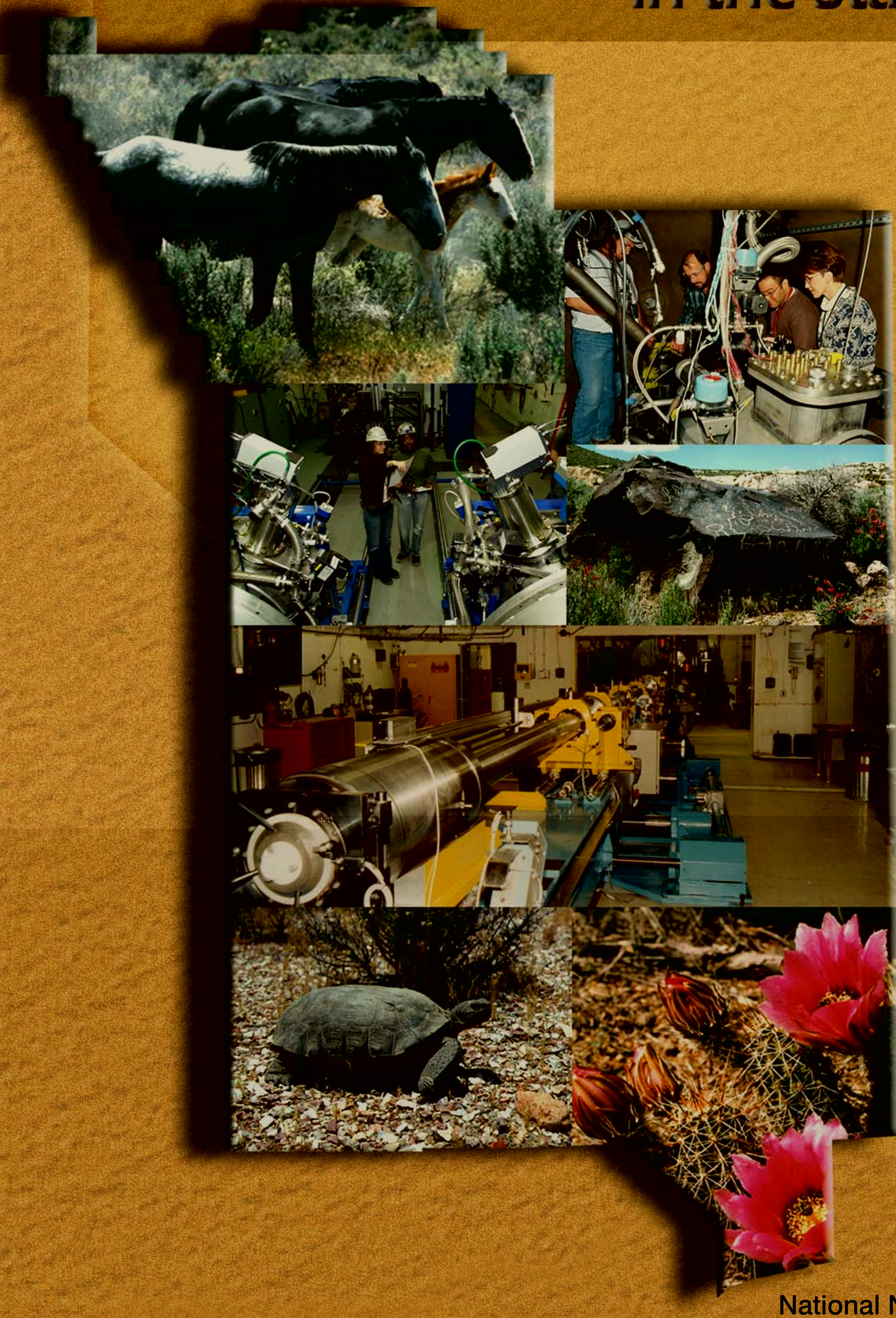
DOE/EIS-0243-SA-03
April 2008

Draft Supplement Analysis for the Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada



U.S. Department of Energy
National Nuclear Security Administration
Nevada Site Office

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ACRONYMS, ABBREVIATIONS, AND CONVERSION CHARTS

ACRONYMS, ABBREVIATIONS, AND CONVERSION CHARTS

AIWS	American Indian Writers Subgroup
ALARA	as low as reasonably achievable
CFR	*Code of Federal Regulations*
BEEF	Big Explosives Experimental Facility
CAIRS	DOE's Computerized Accident/Incident Reporting System
CEF	Criticality Experiments Facility
CGTO	Consolidated Group of Tribes and Organizations
DAF	Device Assembly Facility
DART	days away from work, restricted work, or job transfer
DHS	U.S. Department of Homeland Security
DOE	U.S. Department of Energy
EA	Environmental Assessment
EIS	environmental impact statement
E-MAD	Engine Maintenance, Assembly, and Disassembly
ERPG	Emergency Response Planning Guideline
FONSI	Finding of No Significant Impact
FR	*Federal Register*
FUSRAP	Formerly Utilized Sites Remedial Action Program
GTCC	Greater-Than-Class C [waste]
JASPER	Joint Actinide Shock Physics Experimental Research
LCF	latent cancer fatality
NAC	Nevada Administrative Code
NDEP	Nevada Division of Environmental Protection
NEPA	National Environmental Policy Act of 1969
NNSA	National Nuclear Security Administration
NNSA/NSO	National Nuclear Security Administration Nevada Site Office
NTTR	Nevada Test and Training Range
NTS	Nevada Test Site
PCB	polychlorinated biphenyl
PM_n	particulate matter less than or equal to *n* microns in aerodynamic diameter
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RTG	radioisotope thermoelectric generator
RWMS	Radioactive Waste Management Site
SA	Supplement Analysis
SWEIS	Site-Wide Environmental Impact Statement
TTR	Tonopah Test Range
U.S.C.	*United States Code*
VOC	volatile organic compound
WIPP	Waste Isolation Pilot Plant

CONVERSIONS

METRIC TO ENGLISH			ENGLISH TO METRIC		
Multiply	**by**	**To get**	**Multiply**	**by**	**To get**
Area					
Square meters	10.764	Square feet	Square feet	0.092903	Square meters
Square kilometers	247.1	Acres	Acres	0.0040469	Square kilometers
Square kilometers	0.3861	Square miles	Square miles	2.59	Square kilometers
Hectares	2.471	Acres	Acres	0.40469	Hectares
Concentration					
Kilograms/square meter	0.16667	Tons/acre	Tons/acre	0.5999	Kilograms/square meter
Milligrams/liter	1 [a]	Parts/million	Parts/million	1 [a]	Milligrams/liter
Micrograms/liter	1 [a]	Parts/billion	Parts/billion	1 [a]	Micrograms/liter
Micrograms/cubic meter	1 [a]	Parts/trillion	Parts/trillion	1 [a]	Micrograms/cubic meter
Density					
Grams/cubic centimeter	62.428	Pounds/cubic feet	Pounds/cubic feet	0.016018	Grams/cubic centimeter
Grams/cubic meter	0.0000624	Pounds/cubic feet	Pounds/cubic feet	16,025.6	Grams/cubic meter
Length					
Centimeters	0.3937	Inches	Inches	2.54	Centimeters
Meters	3.2808	Feet	Feet	0.3048	Meters
Kilometers	0.62137	Miles	Miles	1.6093	Kilometers
Temperature					
Absolute					
Degrees C + 17.78	1.8	Degrees F	Degrees F - 32	0.55556	Degrees C
Relative					
Degrees C	1.8	Degrees F	Degrees F	0.55556	Degrees C
Velocity/Rate					
Cubic meters/second	2118.9	Cubic feet/minute	Cubic feet/minute	0.00047195	Cubic meters/second
Grams/second	7.9366	Pounds/hour	Pounds/hour	0.126	Grams/second
Meters/second	2.237	Miles/hour	Miles/hour	0.44704	Meters/second
Volume					
Liters	0.26418	Gallons	Gallons	3.78533	Liters
Liters	0.035316	Cubic feet	Cubic feet	28.316	Liters
Liters	0.001308	Cubic yards	Cubic yards	764.54	Liters
Cubic meters	264.17	Gallons	Gallons	0.0037854	Cubic meters
Cubic meters	35.315	Cubic feet	Cubic feet	0.028317	Cubic meters
Cubic meters	1.3079	Cubic yards	Cubic yards	0.76456	Cubic meters
Cubic meters	0.0008107	Acre-feet	Acre-feet	1233.49	Cubic meters
Weight/Mass					
Grams	0.035274	Ounces	Ounces	28.35	Grams
Kilograms	2.2046	Pounds	Pounds	0.45359	Kilograms
Kilograms	0.0011023	Tons (short)	Tons (short)	907.18	Kilograms
Metric tons	1.1023	Tons (short)	Tons (short)	0.90718	Metric tons
ENGLISH TO ENGLISH					
Acre-feet	325,850.7	Gallons	Gallons	0.000003046	Acre-feet
Acres	43,560	Square feet	Square feet	0.000022957	Acres
Square miles	640	Acres	Acres	0.0015625	Square miles

a. This conversion is only valid for concentrations of contaminants (or other materials) in water.

METRIC PREFIXES

Prefix	Symbol	Multiplication factor
exa-	E	1,000,000,000,000,000,000 = 10^{18}
peta-	P	1,000,000,000,000,000 = 10^{15}
tera-	T	1,000,000,000,000 = 10^{12}
giga-	G	1,000,000,000 = 10^{9}
mega-	M	1,000,000 = 10^{6}
kilo-	k	1,000 = 10^{3}
deca-	D	10 = 10^{1}
deci-	d	0.1 = 10^{-1}
centi-	c	0.01 = 10^{-2}
milli-	m	0.001 = 10^{-3}
micro-	μ	0.000 001 = 10^{-6}
nano-	n	0.000 000 001 = 10^{-9}
pico-	p	0.000 000 000 001 = 10^{-12}

Radiation Basics

What is radiation? Radiation is energy emitted from unstable (radioactive) atoms in the form of atomic particles or electromagnetic waves. This type of radiation is also known as ionizing radiation because it can produce charged particles (ions) in matter.

What is radioactivity? Radioactivity is produced by the process of radioactive atoms trying to become stable. Radiation is emitted in the process. In the United States, radioactivity is measured in units of curies. Smaller fractions of the curie are the millicurie (1/1,000 curie), the microcurie (1/1,000,000 curie), and the picocurie (1/1,000,000 microcurie).

What is radioactive material? Radioactive material is any material containing unstable atoms that emit radiation.

What are the four basic types of ionizing radiation?

Alpha particles—Alpha particles consist of two protons and two neutrons. They can travel only a few centimeters in air and can be stopped easily by a sheet of paper or by the skin's surface.

Beta particles—Beta particles are smaller and lighter than alpha particles and have the mass of a single electron. A high-energy beta particle can travel a few meters in the air. Beta particles can pass through a sheet of paper, but may be stopped by a thin sheet of aluminum foil or glass.

Gamma rays—Gamma rays (and x-rays), unlike alpha or beta particles, are waves of pure energy. Gamma radiation is very penetrating and can travel several hundred feet in air. Gamma radiation requires a thick wall of concrete, lead, or steel to stop it.

Neutrons—A neutron is an atomic particle that has about one-quarter the weight of an alpha particle. Like gamma radiation, it can easily travel several hundred feet in air. Neutron radiation is most effectively stopped by materials with high hydrogen content, such as water or plastic.

What are the sources of radiation?

Natural sources of radiation—(1) Cosmic radiation from the sun and outer space; (2) natural radioactive elements in the earth's crust; (3) natural radioactive elements in the human body; and (4) radon gas from the radioactive decay of uranium naturally present in the soil.

Manmade sources of radiation—Medical radiation (x-rays, medical isotopes), consumer products (TVs, luminous dial watches, smoke detectors), nuclear technology (nuclear power plants, industrial x-ray machines), and fallout from past worldwide nuclear weapons tests or accidents (Chernobyl).

What is radiation dose? Radiation dose is the amount of energy of ionizing radiation absorbed per unit mass of any material. For people, radiation dose is the amount of energy absorbed in human tissue. In the United States, radiation dose is measured in units of rad or rem; a smaller fraction of the rem is the millirem (1/1,000 rem).

Person-rem is a unit of collective radiation dose applied to populations or groups of individuals; it is the sum of the doses received by the all the individuals of a specified population.

Average Annual Radiation Dose from Natural and Manmade Sources

Globally, humans are exposed constantly to radiation from the solar system and the Earth's rocks and soil. This radiation contributes to the natural background radiation that always surrounds us. Manmade sources of radiation also exist, including medical and dental x-rays, household smoke detectors, and materials released from nuclear and coal-fired power plants. The attached table shows average annual radiation in the United States.

Source	Average Annual Dose (millirem)
Cosmic Radiation (from outer space)	
If your home is located at sea level your cosmic radiation dose is:	26
If you live above sea level your dose must be adjusted by the addition of the following amounts:	
Elevation up to 1,000 feet	2
Elevation 1,000 to 2,000 feet	5
Elevation 2,000 to 3,000 feet	9
Elevation 3,000 to 4,000 feet	15
Elevation 4,000 to 5,000 feet	21
Elevation 5,000 to 6,000 feet	29
Elevation 6,000 to 7,000 feet	40
Elevation 7,000 to 8,000 feet	53
Elevation above 8,000 feet	70
Terrestrial Radiation (from the ground)	
Terrestrial radiation varies by location; if you live in the:	
Gulf States or Atlantic Coast regions	23
Colorado plateau	90
Elsewhere in the United States	46
Internal Radiation (in your body)	
From food and water (e.g., potassium)	40
From air (radon)	200
Plutonium-powered pacemaker	100
Porcelain crowns or false teeth	0.07
Travel Related Sources	
For each 1000 miles traveled by jet:	1
Miscellaneous Sources	
Nuclear weapons test fallout (global)	1
Brick, stone, or concrete home construction	7
Luminous wrist watch	0.06
Watching television	1
Computer use	0.1
Home smoke detector	0.08
Each medical x-ray	40
Each nuclear medicine procedure	14
Living within 50 miles of a nuclear power plant	0.009
Living within 50 miles of a coal fired power plant	0.03

Note: The amount of radiation exposure is usually expressed in millirem. In the United States, the average person is exposed to an effective dose equivalent of approximately 360 millirem (whole-body exposure) per year from all sources (NCRP Report No. 93). These doses are based on the American Nuclear Society's brochure "Personal Radiation Dose Chart." The primary sources of information are the National Council on Radiation Protection and Measurements Reports No. 92, 95, and 100. Values in the table are general averages and do not provide data for precise individual dose calculations.

Source: U.S. EPA website at http://www.epa.gov/radiation/understand/calculate.html (January 2008).

SUMMARY

SUMMARY

The U.S. Department of Energy, National Nuclear Security Administration has prepared a draft Supplement Analysis of the *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (*NTS EIS*). Based on the draft Supplement Analysis, the National Nuclear Security Administration has reached a preliminary conclusion that no additional National Environmental Policy Act documentation is required.

- No substantial changes have occurred with respect to the proposals included in the *NTS EIS* and selected for implementation in U.S. Department of Energy Records of Decision.
- Screening analyses for the following resource areas showed no significant new circumstances or information relevant to environmental concerns: land use, infrastructure, socioeconomics, geology and soils, hydrology, biological resources, air quality, noise, visual resources, cultural resources, public radiological impacts from normal operations, worker radiological and occupational health and safety, waste management (portions), transportation (portions), and environmental justice.
- More detailed analyses were performed and identified no significant new circumstances or information relevant to environmental concerns for the following resource areas: public and worker impacts from radiological and chemical accidents, low-level and mixed low-level radioactive waste management, and transportation (portions).

S.1 Introduction

The National Nuclear Security Administration Nevada Site Office prepared this Supplement Analysis in accordance with National Environmental Policy Act requirements and the U.S. Department of Energy's National Environmental Policy Act Implementing Procedures. These U.S. Department of Energy procedures require the preparation of a site-wide environmental impact statement, a broad-scoped document that identifies and assesses the individual and cumulative impacts of ongoing and reasonably foreseeable future actions at a site such as the Nevada Test Site, as well as periodic preparation of a Supplement Analysis to determine whether the existing environmental impact statement should be supplemented, a new environmental impact statement should be prepared, or no further National Environmental Policy Act documentation is required.

In 1996, the U.S. Department of Energy issued the *NTS EIS* (DOE/EIS-0243), and its Record of Decision (61 FR 65551), which examined the impacts from operations at the Nevada Test Site and other Nevada locations over a 10-year period. The U.S. Department of Energy implemented the *NTS EIS* Expanded Use Alternative for most activities, but decided to manage low-level and mixed low-level radioactive wastes at levels described by the No Action Alternative, pending decisions on the *Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (*Waste Management PEIS)* (DOE/EIS-0200). In a February 2000 *Waste Management PEIS* Record of Decision, the U.S. Department of Energy announced that the Nevada Test Site would be one of two regional sites for low-level and mixed low-level radioactive waste disposal. At the same time, the U.S. Department of Energy amended the *NTS EIS* Record of Decision to implement the Expanded Use Alternative for waste management activities at the Nevada Test Site (65 FR 10061).

In 2002, the National Nuclear Security Administration Nevada Site Office conducted a 5-year review of the *NTS EIS*, documented in the *Supplement Analysis for the Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada (2002 NTS SA)* (DOE/EIS-0243-SA-01). The National Nuclear Security Administration Nevada Site Office found that there were no substantial changes to the actions proposed in the *NTS EIS* and no significant new circumstances or information relevant to environmental concerns; thus, the National Nuclear Security Administration Nevada Site Office determined that no further National Environmental Policy Act documentation was required.

For this Supplement Analysis, the National Nuclear Security Administration Nevada Site Office conducted a systematic environmental impacts review to determine if there were substantial changes in the actions proposed in the *NTS EIS* or significant new circumstances or information relevant to environmental concerns. Projects and activities introduced since the *NTS EIS* Record of Decision or proposed for the next 5 years were screened. Those projects and activities that were clearly within the baseline set in the *NTS EIS* impact analyses did not require further analysis. Those potentially outside the baseline were analyzed further. The National Nuclear Security Administration Nevada Site Office included input from the American Indian Writers Subgroup of the Consolidated Group of Tribes and Organizations in the Supplement Analysis to present American Indian perspectives.

S.2 Background

Occupying approximately 3,561 square kilometers (1,375 square miles) in southern Nevada, the Nevada Test Site is surrounded on three sides by the U.S. Air Force Nevada Test and Training Range (formerly the Nellis Air Force Range) and the Desert National Wildlife Refuge. The primary Nevada Test Site missions are summarized below:

- *Defense Programs.* The primary mission is to ensure the safety and reliability of the Nation's nuclear weapons stockpile through the National Nuclear Security Administration Stockpile Stewardship Program.

- *Waste Management Program.* The primary mission is to serve as a low-level and mixed low-level radioactive waste disposal facility for the Nevada Test Site and other U.S. Department of Energy-approved waste generators.

- *Environmental Restoration Program.* This program addresses characterization and remediation of groundwater, soils, and structures contaminated from past nuclear testing at the Nevada Test Site and the Nevada Test and Training Range, and decontamination and decommissioning of some surplus facilities.

- *Nondefense Research and Development Program.* This program conducts a variety of research and development projects, focusing on alternative energy and fuel sources, hazardous chemical safety, environmental site cleanup, and ecosystem preservation.

- *Work-for-Others Program*. This program involves the shared use of certain Nevada Test Site and Tonopah Test Range facilities and resources with other Federal agencies for various military training exercises and research and development projects.

S.3 Status of Facilities, Activities, and the Environment

The primary missions at the Nevada Test Site remain unchanged; however, there have been some changes in the activities conducted in support of the missions and in environmental conditions since the *NTS EIS* was prepared. Additional changes in activities are expected in the future.

S.3.1 Missions, Facilities, and Projects

S.3.1.1 Defense Programs

Status of Defense Programs Activities from the *NTS EIS*

The Nevada Test Site continues stockpile stewardship activities and maintains nuclear emergency capabilities. The Nevada Test Site was not selected as the site for the National Ignition Facility or for storage and disposition of weapons-usable fissile materials.

New Defense Programs, Missions, and Facilities since the *NTS EIS*

Joint Actinide Shock Physics Experimental Research (JASPER) – Construction and modifications at the Able Site for the Joint Actinide Shock Physics Experimental Research Facility were completed.

Baker Site – Baker Site is a staging, assembly, and storage facility for explosives.

Glovebox Work and Other Stockpile Stewardship Programs at the Device Assembly Facility (DAF) – The Device Assembly Facility now includes the Criticality Experiments Facility for performing nuclear material criticality research and experimentation, relocated from the Los Alamos National Laboratory. A new glovebox system and downdraft table for plutonium and special nuclear materials experiments have also been installed at the Device Assembly Facility.

Big Explosives Experimental Facility (BEEF) – New missions identified in the *2002 NTS SA*—increased diagnostic capabilities and tests involving nuclear assemblies—were not implemented. The Big Explosives Experimental Facility was modified to perform pulsed-power experiments.

Atlas Facility – Relocated from Los Alamos National Laboratory, Atlas conducted pulsed-power experiments until it was placed in stand-by mode in 2006.

Infrastructure Improvements at U1a Complex – Several infrastructure upgrades were made to the U1a Complex since the *NTS EIS*, and additional upgrades are expected.

Stockpile Stewardship Program Activities – Experimental capability at the U1a Complex has been augmented by the introduction of containment vessels and other equipment; installation of a large-bore powder gun is planned.

Improvised Nuclear Device Program in G-Tunnel – Identified in the *2002 NTS SA*, this ongoing program involves use of the U12g Tunnel for staging and assessment of a damaged nuclear weapon or improvised nuclear device, should one be recovered.

Open Burn Experiments – Identified in the *2002 NTS SA* as a possible future project, the National Nuclear Security Administration Nevada Site Office currently does not anticipate a need for construction and operation of a fire and thermal testing facility at the Nevada Test Site or the Tonopah Test Range.

Potential Future Projects at the Nevada Test Site

On January 11, 2008, the National Nuclear Security Administration announced the availability of the *Draft Complex Transformation Supplemental Programmatic Environmental Impact Statement (Draft Complex Transformation SPEIS)*, which analyzes the environmental impacts from the continued transformation of the United States' nuclear weapons complex (73 FR 2023). In the *Draft Complex Transformation SPEIS* preferred alternative, the National Nuclear Security Administration would have the Nevada Test Site remain the high explosives research and development testing center for large quantities of high explosives; would locate future open-air hydrotesting and a next generation multi-axis radiographic hydrodynamic test facility at the Nevada Test Site; would consider the Nevada Test Site for future major environmental testing facilities as facilities at other sites reach the end of their lives; and would cease flight test operations at the Tonopah Test Range.

The National Nuclear Security Administration is developing plans to use the Device Assembly Facility for limited dismantlement of nuclear weapons. The number of weapons shipments to the Nevada Test Site would be no more than the number of shipments analyzed in the *NTS EIS*.

S.3.1.2 Waste Management Programs

Changes in program activities are described in Section S.3.2.

S.3.1.3 Environmental Restoration Programs

The environmental restoration program strategy for the Nevada Test Site is the same as that developed and described in the *NTS EIS* and the March 15, 1996, Federal Facility Agreement and Consent Order. Surface remediation has been performed at two offsite locations (Project Shoal and Central Nevada Test Areas) and future responsibility transferred to the U.S. Department of Energy, Legacy Management Program.

S.3.1.4 Nondefense Research and Development Programs

A solar enterprise zone was established at the Nevada Test Site, but the proposed solar facility originally addressed in the *NTS EIS* was cancelled. Since then, a commercial utility-scale solar power plant was proposed for the solar enterprise zone. The Kistler Launch Facility, addressed in the *2002 NTS SA* was cancelled. The

- *Waste Management* – The Nevada Site Office placed the Area 3 Radioactive Waste Management Site on standby, and expects to close it within a few years. By permit, the Nevada Test Site is limited to receipt of no more than 20,000 cubic meters (710,000 cubic feet) of mixed low-level radioactive waste from offsite generators and must close the mixed waste disposal unit (in the Area 5 Radioactive Waste Management Site) by December 2010. The Nevada Site Office has made progress in shipping legacy transuranic and mixed transuranic waste offsite for disposition, and annually generates about 23 cubic meters (810 cubic feet) of contact-handled transuranic waste from Joint Actinide Shock Physics Experimental Research Facility operations. The Nevada Site Office continues to operate facilities for evaporating tritiated water, an explosive ordnance disposal unit, a hydrocarbon-contaminated waste disposal facility, landfills, and a sanitary wastewater system, and continues to generate hazardous wastes that are shipped offsite for treatment and disposal.

S.4 Screening Analyses

A screening analysis was performed for each resource area to determine whether the impacts associated with past and projected activities at the Nevada Test Site are bounded by the analysis in the *NTS EIS*. Resource areas expected to have impacts that are clearly bounded by the *NTS EIS* are the following: land use, infrastructure, socioeconomics, geology and soils, hydrology, biological resources, air quality, noise, visual resources, cultural resources, and environmental justice. Additional resource areas bounded by the *NTS EIS* are public radiological impacts from normal operations, worker radiological and occupational health and safety, transuranic and tritiated liquid waste management, nonradioactive waste management, and transportation of special nuclear and other defense materials. Resource areas requiring additional analysis or discussion (Section S.5) are public and worker impacts from radiological and chemical accidents, low-level and mixed low-level radioactive waste management, transportation of low-level and mixed low-level radioactive waste, and transportation of transuranic and mixed transuranic waste.

S.5 Detailed Consequence Analysis

This section addresses technical disciplines for which an initial screening indicated the need for additional analyses and discussion. It also summarizes cumulative impacts.

S.5.1 Public and Worker Impacts from Radiological or Chemical Accidents

Because of changes in accident analysis methodology and an increase in population size in the Nevada Test Site vicinity, radiological and chemical accident scenarios analyzed in the *NTS EIS* were reviewed or reanalyzed. For radiological accidents, analytical input parameters were updated, and the accident consequences and risks were revised. Accident consequences and risks were somewhat higher than those calculated before, but the absolute magnitude of the highest accident risks remain low. Chemical accident scenarios were reanalyzed. In general, the reanalysis resulted in comparable or lower health consequences than *NTS EIS* projections.

NNSA is also preparing a classified analysis of the potential impacts of an intentional destructive act at NTS.

S.5.2 Low-Level and Mixed Low-Level Radioactive Waste Management

Receipt and disposal of low-level and mixed low-level radioactive wastes are expected to be within *NTS EIS* projections. Low-level radioactive waste management was given additional analysis because of uncertainties in quantities of waste that could be received at the Nevada Test Site; mixed low-level radioactive waste was addressed with low-level radioactive waste as a matter of analytical convenience.

Low-Level Radioactive Waste – Safe waste disposal is ensured through the waste acceptance program, risk assessments, monitoring, and disposal unit closure. Performance Assessments and Composite Analyses for the Area 3 Radioactive Waste Management Site and Area 5 Radioactive Waste Management Site have been prepared, reviewed, and approved, and are updated in accordance with a published maintenance plan. The National Nuclear Security Administration Nevada Site Office implemented a decision support system to enable determining inventory limits for the disposal sites to ensure compliance with U.S. Department of Energy Order 435.1. Closure of Area 3 and Area 5 disposal sites will occur in accordance with an integrated closure and monitoring plan. Existing disposal units within a 37-hectare (92-acre) area of Area 5 Radioactive Waste Management Site are expected to be filled and closed by 2012.

Low-level radioactive waste volumes disposed and projected through 2012 are about 60 percent of the 10-year projections in the *NTS EIS*. Projections of waste, however, are uncertain, and additional sources of waste were identified that could be considered for Nevada Test Site disposal. If all such waste was shipped to the Nevada Test Site, the total low-level radioactive waste volume would be about 17 percent more than the volume projected in the *NTS EIS*. Much of this waste, however, may not actually be generated or disposed at the Nevada Test Site. In the event that large quantities of these uncertain waste streams are actually proposed for disposal at the Nevada Test Site, additional National Environmental Policy Act documentation may be required.

Mixed Low-Level Radioactive Waste – Similar to low-level radioactive waste, safe waste disposal is ensured through the waste acceptance program, risk assessments, monitoring, and disposal unit closure. The volumes of mixed low-level radioactive waste that have been disposed and projected through 2012 are far smaller than the 10-year projections of these wastes in the *NTS EIS*. Sufficient capacity exists at the Nevada Test Site to dispose of all mixed low-level radioactive waste projected to be received.

S.5.3 Transportation Impacts

Transportation impacts were re-assessed for the following reasons: additional radioactive waste transportation analyses were issued since the *NTS EIS;* there are uncertainties in radioactive waste volumes – and therefore shipments – that may be received at the Nevada Test Site for disposal; and the number of shipments of transuranic and mixed transuranic waste to the Waste Isolation Pilot Plant may be somewhat larger than that assessed in previous analyses. Using projections of unit impacts to transport crews and populations obtained from the *Waste Management PEIS*, risks were determined for transport of low-level and mixed low-level radioactive wastes to the Nevada Test Site, based on an annual average number of projected waste shipments, and on an assumed repeat of the largest annual shipments of these wastes since 1996. Annual incident-free risks from the additional waste shipments were small, ranging from a likelihood of about 1 in 16 to 1 in 7 of a single latent cancer fatality occurring in the transport crew and population.

The *NTS EIS* did not analyze impacts from transporting transuranic and mixed transuranic waste to the Waste Isolation Pilot Plant, although other National Environmental Policy Act documents did, including the 1997 *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement* (*WIPP SEIS II*). Principally because of waste generation by the Joint Actinide Shock Physics Experimental Research Facility, NTS shipments of transuranic and mixed transuranic waste to the Waste Isolation Pilot Plant may be about 40 percent larger through 2022 than analyzed in the *WIPP SEIS II*; however, the 34 additional shipments would only increase the number of shipments analyzed in the *WIPP SEIS II* by 0.09 percent. Incident-free risk from transporting this additional waste directly to the Waste Isolation Pilot Plant or through another U.S. Department of Energy site were small, a likelihood of less than 1 in 200 of a single latent cancer fatality occurring in the transport crew or the population.

S.5.4 Cumulative Impacts

The cumulative impacts analysis addresses: (1) impacts presented in the *NTS EIS*; (2) impacts since the *NTS EIS* was issued; and (3) a review of past, present, and reasonably foreseeable actions of the U.S. Department of Energy, other Federal and non-Federal agencies, and private entities in the region. While cumulative impacts from Nevada Test Site operations were identified in the *NTS EIS* for electrical power, water use, public health and safety, waste management, transportation, and American Indian environmental justice, the Nevada Test Site contribution to regional cumulative impacts as evaluated in this SA remains unchanged or has decreased for most resource areas.

Resource areas for which the cumulative impacts could exceed those evaluated in the *NTS EIS* are electrical usage and waste management. Proposals evaluated in the Draft *Complex Transformation SPEIS* would require much more electricity for operation of a Consolidated Nuclear Production Center at NTS (not the Preferred Alternative) and a replacement for the Annular Core Research Reactor (the need for which would be considered when existing facility reaches the end of its life). Many waste streams that are very uncertain at this time, could eventually be planned for NTS disposal. Additional NEPA evaluation would be needed to support these actions.

CHAPTER 1
INTRODUCTION

1.0 INTRODUCTION

The U.S. Department of Energy (DOE), Nevada Operations Office prepared the *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (*NTS EIS*) (DOE/EIS-0243) in 1996, in accordance with the National Environmental Policy Act (NEPA) and the requirements of DOE's NEPA Implementing Procedures (10 *Code of Federal Regulations* [CFR] 1021.330(c)). These DOE procedures require the preparation of a site-wide environmental impact statement (EIS), a broad-scoped document that identifies and assesses the individual and cumulative impacts of ongoing and reasonably foreseeable future actions at a DOE site such as the Nevada Test Site (NTS). These procedures also require the evaluation of site-wide EISs at least every 5 years (10 CFR 1021.330(d)). The evaluation is to occur through the preparation of a Supplement Analysis (SA) to determine whether the existing EIS should be supplemented, a new EIS should be prepared, or no further NEPA documentation is required (10 CFR 1021.314). The National Nuclear Security Administration (NNSA)[1] Nevada Site Office (NNSA/NSO) prepared this SA in accordance with DOE's NEPA Implementing Procedures and guidance documents.

1.1 Nevada Test Site National Environmental Policy Act Documentation

DOE issued the *NTS EIS* in August 1996 and published the associated Record of Decision (ROD) in the *Federal Register* on December 13, 1996 (61 FR 65551). The *NTS EIS* examined the existing and potential impacts to the environment from ongoing and anticipated future (the following 10-year period) DOE operations at NTS, the Tonopah Test Range, portions of the Nevada Test and Training Range (formerly the Nellis Air Force Range), the Project Shoal Area, and the Central Nevada Test Area. Also examined in the *NTS EIS* were newer programs, such as the proposed Solar Enterprise Zone facility sites at NTS, Eldorado Valley, Dry Lake Valley, and Coyote Spring Valley (DOE 1996b).

Four Alternatives were considered and analyzed: 1) No Action, to continue to operate at the level maintained in the previous 5 years; 2) Discontinue Operations; 3) Expanded Use; and 4) Alternative Use of Withdrawn Lands. In the ROD for the *NTS EIS*, DOE made the decision to implement a combination of three alternatives: No Action, Expanded Use, and Alternate Use of Withdrawn Lands. Most activities would be carried out at levels described by the Expanded Use Alternative. However, low-level radioactive waste and mixed low-level radioactive waste management activities would be conducted at levels described by the No Action Alternative, pending decisions by DOE on the *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (*Waste Management PEIS*) (DOE/EIS-0200F), then under preparation. Also, DOE committed itself to certain public education activities analyzed under the Alternate Use of Withdrawn Lands Alternative. This decision was intended to continue the multipurpose, multi-program use of the NTS and offsite locations, while pursuing further diversification of interagency, private industry, and public education uses of the site in accordance with defense programs, waste management, and environmental restoration mission requirements.

On February 25, 2000, DOE issued the *Waste Management PEIS* ROD for management of low-level and mixed low-level radioactive waste, announcing that NTS would be one of two regional sites for low-level radioactive waste disposal (65 FR 10061). In addition, DOE announced that it would establish regional mixed low-level radioactive waste disposal operations at NTS. In the same announcement, DOE amended the *NTS EIS* ROD to implement the Expanded Use Alternative for waste management activities at NTS, including low-level and mixed low-level radioactive waste disposal.

[1] *NNSA is a semiautonomous agency within DOE (see the 1999 National Nuclear Security Administration Act [Title 32 of the Defense Authorization Act for fiscal year 2000, Public Law 106-65]).*

In July 2002, NNSA/NSO completed a 5-year review of the *NTS EIS*, documented in the *Supplement Analysis for the Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada (2002 NTS SA)* (DOE/EIS-0243-SA-01) (DOE 2002c). Based on that analysis, NNSA determined that there were no substantial changes to the *NTS EIS* or its ROD, or significant new circumstances or information relevant to environmental concerns, and that no supplemental EIS was needed.

1.2 Relationship to Other National Environmental Policy Act Documents

Since the *NTS EIS* was released, DOE, NNSA, and NNSA/NSO have completed additional NEPA documents for specific proposed actions potentially affecting NTS, as follows:

- *Final Programmatic Environmental Impact Statement for Stockpile Stewardship and Management* (*Stockpile Stewardship and Management PEIS*) (DOE/EIS-0236), September 1996 – The *Stockpile Stewardship and Management PEIS* evaluated the potential environmental impacts resulting from activities associated with nuclear weapons research, design, development, and testing, as well as the assessment and certification of weapons safety and reliability. The stewardship portion of the document analyzed the development of three new facilities to provide enhanced experimental capabilities. When the *NTS EIS* was issued, NTS was under consideration as a site for the National Ignition Facility and next-generation facilities for science-based stockpile stewardship, as well as for relocation of the nuclear weapons assembly and disassembly function from the Pantex Plant. In the ROD, published in the *Federal Register* on December 26, 1996 (61 FR 68014), DOE elected to build the National Ignition Facility at Lawrence Livermore National Laboratory and to continue nuclear weapons assembly and disassembly at the Pantex Plant.

- *Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic Environmental Impact Statement (Storage and Disposition PEIS)* (DOE/EIS-0229), December 1996 – The *Storage and Disposition PEIS* evaluated the potential environmental impacts from providing safe and secure storage of weapons-usable fissile materials (plutonium and highly enriched uranium), and from implementing a strategy for the disposition of surplus weapons-usable plutonium. When the *NTS EIS* was issued, NTS was under consideration for alternatives addressing consolidation of plutonium at a single site, and collocation and consolidation of plutonium and highly enriched uranium at a single site. In its January 21, 1997, ROD (62 FR 3014), DOE elected to consolidate storage of weapons-usable plutonium at the Pantex Plant and the Savannah River Site, and to continue the storage of weapons-usable highly enriched uranium at the Y-12 Plant at the Oak Ridge Reservation. DOE's strategy for disposition of surplus plutonium was to immobilize some in glass or ceramic material and to burn some as mixed oxide fuel in existing nuclear reactors, with eventual disposal of the immobilized plutonium and spent nuclear fuel.

- *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (*Waste Management PEIS*) (DOE/EIS-0200F), May 1997 – The *Waste Management PEIS* examined the potential environmental impacts of strategic alternatives for managing five types of radioactive and hazardous wastes resulting from nuclear defense and research activities at DOE sites around the United States. The five waste types were low-level radioactive waste, mixed low-level radioactive waste, transuranic waste, high-level radioactive waste, and hazardous waste. When the *NTS EIS* was issued, NTS was under consideration as a site for central or regional management for certain DOE wastes.

  DOE published four decisions from the *Waste Management PEIS*, three of which were relevant to NTS. In its ROD for the treatment and management of transuranic waste, published January 23, 1998 (63 FR 3629), and subsequent revisions to this ROD, published December 9, 2000, July 25, 2001, and September 6, 2002 (65 FR 82985, 66 FR 38646, and 67 FR 56989, respectively), DOE decided (with one exception) that each DOE site with transuranic waste or that might generate transuranic waste would prepare the waste for disposal and store it onsite until it could be shipped to the Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico, for disposal.

In the second ROD, published August 5, 1998 (63 FR 41810), DOE decided to continue using offsite facilities for the treatment of major portions of nonwastewater hazardous wastes generated at DOE sites.

DOE addressed the management and disposal of low-level radioactive waste and mixed low-level radioactive waste in a fourth ROD, published February 25, 2000 (65 FR 10061). In this ROD, DOE decided to perform minimal treatment of low-level radioactive waste at all sites and continue, to the extent practicable, onsite disposal of low-level radioactive waste at Idaho National Laboratory, Los Alamos National Laboratory, the Oak Ridge Reservation, and Savannah River Site. DOE decided to establish regional disposal capacity at the Hanford Site and NTS. Specifically, in addition to disposing of their own low-level radioactive waste, the Hanford Site and NTS would dispose of low-level radioactive waste generated at other DOE sites, provided the waste meets their respective waste acceptance criteria. DOE decided to treat mixed low-level radioactive waste at the Hanford Site, Idaho National Laboratory, the Oak Ridge Reservation, and Savannah River Site, with disposal at either the Hanford Site or NTS.

- *Final Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride (Depleted Uranium PEIS)* (DOE/EIS-0269), April 1999 – The *Depleted Uranium PEIS* included evaluation of the conversion of depleted uranium hexafluoride to an oxide and a generic assessment of the disposal of the depleted uranium oxide conversion product (as U_3O_8 or UO_2). It concluded that disposal of either conversion product in shallow earthen structures, vaults, or mines would adequately protect human health and the environment over the time period considered, as long as the disposal facility was located in a dry environment and appropriately engineered. DOE subsequently prepared site-specific EISs for constructing and operating conversion facilities at sites in Paducah, Kentucky and Portsmouth, Ohio and a Supplement Analysis addressing disposal (the EISs and SA are discussed later in this section).

- *The Nevada Test Site Development Corporation's Desert Rock Sky Park at the Nevada Test Site Environmental Assessment* (DOE/EA-1300), March 2000 – This environmental assessment (EA) analyzed the potential environmental effects of developing, operating, and maintaining a commercial/industrial park in Area 22 at NTS, between Mercury Camp and U.S. Highway 95, east of Desert Rock Airport. DOE issued a Finding of No Significant Impact (FONSI) in March 2000, but the project was not implemented.

- *Aerial Operations Facility, Nevada Test Site Environmental Assessment* (DOE/EA-1334), March 2001– This EA analyzed the potential environmental effects of developing, operating, and maintaining an aerial operations facility for testing and operating aerial vehicles in Area 6 at NTS, at the Airborne Response Team Hangar located at the southern end of Yucca Lake. DOE issued a FONSI based on this EA in 2001.

- *Atlas Relocation and Operation at the Nevada Test Site Final Environmental Assessment* (DOE/EA-1381), May 2001 – This EA analyzed the relocation of the Atlas pulse power machine from Los Alamos National Laboratory to NTS. At NTS, Atlas would be reassembled in a newly constructed building within a designated Industrial, Research, and Support site in Area 6. NNSA issued a FONSI based on this EA in May 2001.

- *Final Environmental Impact Statement for the Proposed Relocation of Technical Area 18 Capabilities and Materials at the Los Alamos National Laboratory* (DOE/EIS-0319), August 2002 – This EIS addressed the impacts of relocating criticality missions and materials from Technical Area 18 at Los Alamos National Laboratory to several sites, including NTS. In a December 31, 2002, ROD (67 FR 79906), DOE made the decision to relocate Security Category I/II missions and materials to the Device Assembly Facility (DAF) at NTS.

- *Hazardous Materials Testing at the Hazardous Materials Spill Center, Nevada Test Site Environmental Assessment* (DOE/EA-0864), September 2002 – This EA established limits for environmental impacts from planned releases of hazardous and toxic materials at the Hazardous Materials (HazMat) Spill Center (formerly the Liquefied Gaseous Fuels Spills Test Facility and now called the Nonproliferation Test and Evaluation Complex). NNSA issued a FONSI based on this EA in September 2002.

- *Supplement Analysis for the Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada to Address the Increase in Activities Associated with the National Center for Combating Terrorism and Counterterrorism Training and Related Activities* (*Counterterrorism SA*) (DOE/EIS-0243-SA-02), November 2003 – The *Counterterrorism SA* was prepared to determine whether activities and potential improvements to facilities and infrastructure proposed for NTS related to combating terrorism and performing counterterrorism training were sufficiently bounded by the impacts analysis in the *NTS EIS*. NNSA/NSO determined that the proposed actions were bounded by the *NTS EIS* analyses.

- *Final Environmental Assessment for Activities Using Biological Simulants and Releases of Chemicals at the Nevada Test Site* (DOE/EA-1494), June 2004 – This EA analyzed the potential environmental effects of conducting tests, experiments, training, and other similar activities using biological simulants (non-infectious bacteria, fungi, viruses, and similar materials) and controlled releases of low concentrations of various chemicals at NTS. NNSA issued a FONSI based on this EA in June 2004.

- *Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Paducah, Kentucky, Site* (DOE/EIS-0359), June 2004 – This EIS considered the potential environmental impacts from the construction, operation, maintenance, and decontamination and decommissioning of a proposed facility for converting depleted uranium hexafluoride to a more stable chemical form at alternative locations within the Paducah Site. DOE evaluated transportation of the depleted uranium conversion product to a commercial facility or NTS for disposal as low-level radioactive waste. The July 27, 2004, ROD (69 FR 44654) stated that DOE planned to decide the specific disposal location(s) after further NEPA review.

- *Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio, Site* (DOE/EIS-0360), June 2004 – This EIS considered the potential environmental impacts from the construction, operation, maintenance, and decontamination and decommissioning of a proposed facility for converting depleted uranium hexafluoride to a more stable chemical form at alternative locations within the Portsmouth Site. DOE evaluated transportation of the depleted uranium conversion product to a commercial facility or NTS for disposal as low-level radioactive waste. The July 27, 2004, ROD (69 FR 44649) stated that DOE planned to decide the specific disposal location(s) after further NEPA review.

- *Radiological/Nuclear Countermeasures Test and Evaluation Complex, Nevada Test Site Final Environmental Assessment* (DOE/EA-1499), August 2004 – This EA evaluated the proposed action to construct a Radiological/Nuclear Countermeasures Test and Evaluation Complex at NTS for post-bench-scale testing and evaluation of radiological and nuclear detection devices that may be used in transportation-related facilities. NNSA issued a FONSI based on this EA in September 2004.

- *Final Environmental Assessment for Aerial Operations Facility Modifications Nevada Test Site* (DOE/EA-1512), October 2004 – This EA evaluated the potential impacts of constructing a new runway, hangars, and operations buildings, and performing infrastructure upgrades to accommodate an increase in Aerial Operations Facility personnel. NNSA issued a FONSI based on this EA in October 2004.

- *Draft Supplement Analysis for Location(s) to Dispose of Depleted Uranium Oxide Conversion Product Generated from DOE's Inventory of Depleted Uranium Hexafluoride* (DOE/EIS-0359-SA1 and DOE/EIS-0360-SA1) – DOE issued a Notice of Availability for this draft SA on April 3, 2007 (72 FR 15869). DOE is proposing to amend the two site-specific RODs for depleted uranium hexafluoride conversion to decide if the depleted uranium conversion product would be disposed of at either the NTS or the EnergySolutions (formerly Envirocare of Utah, Inc.) low-level radioactive waste disposal facilities.

Future projects related to the NNSA nuclear weapons complex or that otherwise potentially affect NTS are also undergoing NEPA review during the timeframe of this analysis. To the extent that information is available, the impacts of these proposed actions have been included in the cumulative impacts analysis. Projects that could potentially affect NTS include:

- *Draft Complex Transformation Supplemental Programmatic Environmental Impact Statement (Complex Transformation SPEIS* [previously called *Complex 2030 SEIS])* (DOE/EIS-0236-S4). On January 11, 2008, NNSA announced the availability of a draft supplemental programmatic EIS to analyze the environmental impacts from the continued transformation of the United States' nuclear weapons complex (73 FR 2023). NNSA's proposed action is to continue currently planned modernization activities. NNSA would select a site to consolidate plutonium research and development, surveillance, and pit manufacturing; consolidate special nuclear material[2] throughout the complex; consolidate, relocate, or eliminate duplicative facilities and programs and improve operating efficiencies; identify one or more sites for conducting NNSA flight test operations; and accelerate nuclear weapons dismantlement activities. NTS is being considered as a potential location for a consolidated plutonium center or a consolidated nuclear production center, which both entail consolidation of Category I/II special nuclear material. NTS is also a potential site for consolidated hydrotesting, high explosives research and development, and environmental testing[3]. In addition, existing U.S. Department of Defense and DOE test ranges (such as White Sands Missile Range in New Mexico and NTS) are being considered as alternatives to continued use of the Tonopah Test Range for NNSA flight test operations.

  In the *Draft Complex Transformation SPEIS* preferred alternative, NNSA would have NTS remain the high explosives research and development testing center for large quantities of high explosives; would locate future open-air hydrotesting and a next generation multi-axis radiographic hydrodynamic test facility at NTS; would consider NTS for future major environmental testing facilities as facilities at other sites reach the end of their lives; and would cease flight test operations at the Tonopah Test Range.

  In its October 19, 2006, Notice of Intent for the *Complex Transformation SPEIS* (71 FR 61731), NNSA announced cancellation of the previously planned *Supplemental Programmatic Environmental Impact Statement on Stockpile Stewardship and Management for a Modern Pit Facility* (DOE/EIS-0236-S2); NTS was a candidate site for a modern pit facility.

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[2] As defined in Section 11 of the Atomic Energy Act of 1954, special nuclear materials are: (1) plutonium, uranium enriched in the isotope 233 or in the isotope 235, and any other material which the U.S. Nuclear Regulatory Commission determines to be special nuclear material; or (2) any material artificially enriched by plutonium or uranium-233 or uranium-235.

[3] In this use, environmental testing refers to subjecting a test unit to specified environments such as vibration, shock, or static acceleration in a controlled environment.

- *Environmental Impact Statement for the Disposal of Greater-Than-Class-C Low-Level Radioactive Waste* (*GTCC EIS*) – On July 23, 2007, DOE issued a Notice of Intent (72 FR 40135) to prepare an EIS to address disposal of low-level radioactive waste generated by activities licensed by the U.S. Nuclear Regulatory Commission or an Agreement State that have radionuclides in concentrations exceeding 10 CFR 61 Class C limits (referred to as Greater-Than-Class C [GTCC] low-level radioactive waste) and DOE's GTCC-like waste. Currently, there is no location for disposal of GTCC low-level radioactive waste and the Federal government is responsible for such disposal under the Low-Level Radioactive Waste Policy Amendments Act (Public Law 99-240). NTS is being considered as one of eight candidate DOE disposal sites in the *GTCC EIS*, along with a generic commercial disposal facility option in arid and humid environments. DOE is evaluating several disposal technologies in the *GTCC EIS*, including repositories, intermediate depth boreholes, and enhanced near-surface disposal facilities.

1.3 Scope of the 2008 Nevada Test Site Supplement Analysis

Figure 1–1 represents a schematic diagram of the process undertaken with the preparation of this 5-year review SA of the *NTS EIS*. Projects and facilities that were introduced since the *NTS EIS* ROD or are proposed for the next 5 years were identified and reviewed in an initial screening to determine if they were within the scope of the ROD or if their environmental impacts had the potential to be outside the original baseline in the *NTS EIS* impact analyses. Those missions and activities that were obviously within the scope did not require further analysis; any activities that were not clearly within the scope of the *NTS EIS* were analyzed further to determine if there was a potential for impacts outside the environmental baseline and if such impacts were significant.

This SA focuses on an analysis of past and future operational impacts and tiers from the *NTS EIS* with summaries of information provided from that document where necessary to adequately frame the SA discussion. Other NTS documents and information sources identified and discussed in detail later in the SA have also been used to support the review of NTS operational impacts over the 5-year period.

NNSA/NSO will use this SA to decide whether the total operational impacts at NTS since issuance of the ROD plus those during the next 5-year period, are still within the bounds of impacts expected in the *NTS EIS* at the expanded operations level, or whether additional NEPA analyses are necessary. The scope of the SA does not include reconsideration of the alternative selected in the ROD for the *NTS EIS.*

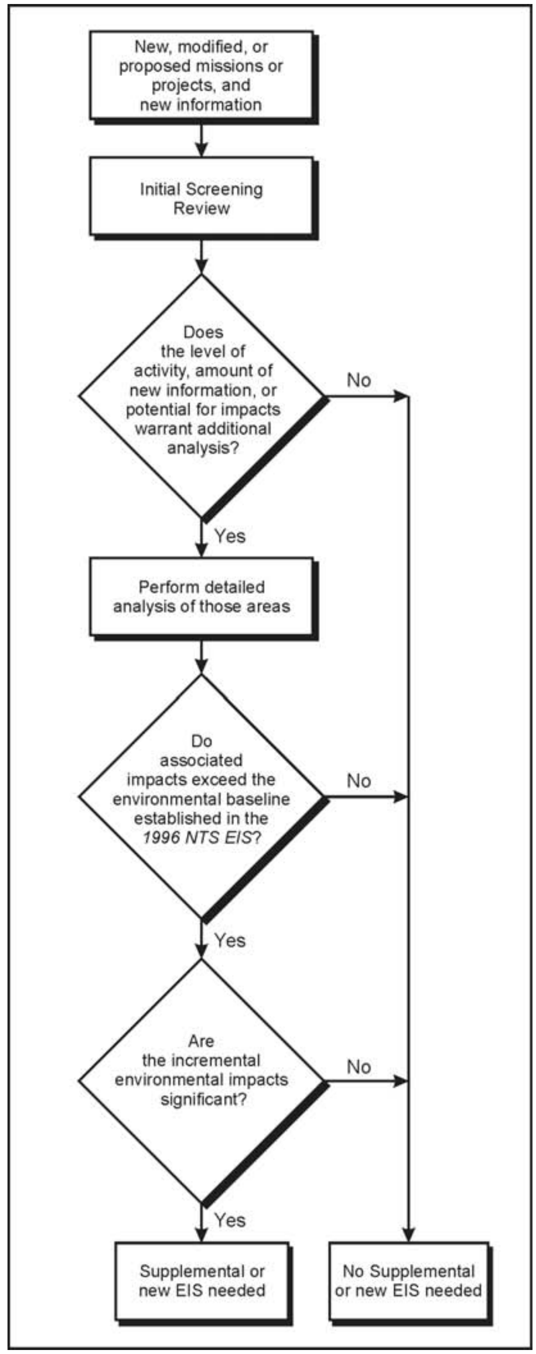

Figure 1–1 Review Process

1.4 Public Involvement

NNSA/NSO decided that public and stakeholder review of this SA is important to its preparation. To this end, copies of the draft are available to the public and NTS stakeholders by mail, on the NNSA/NSO website (www.nv.doe.gov/library/publications/environmental.aspx), and in the following NNSA Public Reading Room and libraries:

NNSA Public Reading Room
Frank Rogers Building
775 East Flamingo Road
Las Vegas, NV 89119

Carson City Public Library
900 North Roop Street
Carson City, NV 89701-3101

Churchill County Library
553 South Maine Street
Fallon, NV 89406-3306

Caliente Branch Library
PO Box 306
Caliente, NV 89008

Pahrump Library District
701 East Street
Pahrump, NV 89048-0578

Tonopah Public Library
167 South Central Street
Tonopah, NV 89049-0449

Beatty Community Library
PO Box 129
Beatty, NV 89003-0129

Washington County Library
50 S. Main
St. George, UT 84770

Additionally, copies have been provided to those who have expressed interest in receiving NTS-related NEPA compliance documents and will be provided to individuals upon request. NNSA/NSO invites comments on the draft SA contents during a comment period ending on May 30, 2008. Comments may be submitted in writing to NNSA/NSO, at the following address:

NEPA Document Manager
DOE NNSA/NSO
P.O. Box 98518
Las Vegas, NV 89193-8518

Alternatively, comments may be faxed to (702) 295-5300 or emailed to NTS-SA@nv.doe.gov. NNSA/NSO will conduct public information meetings during the draft SA comment period.

Comments received by the end of the comment period will be considered as NNSA/NSO prepares the final SA. A summary of the comments will be presented in the final SA.

1.5 Content of the 2008 Supplement Analysis

The remaining chapters of this SA provide the bases for determining whether activities since the 1996 *NTS EIS*, as well as activities proposed through 2012, are covered by the *NTS EIS*. An activity is considered to be covered by the *NTS EIS* if it is within the range of actions evaluated in the *NTS EIS* and its environmental impacts, when added to the impacts of ongoing activities, are within or not significantly larger than the environmental impacts associated with the Expanded Use Alternative.

Chapter 2 of this SA provides a description of the locale and missions of NTS and offsite locations that were analyzed in the *NTS EIS*. Chapter 3 describes the status of activities at NTS in support of those missions, as well as any changes in activities or NTS environmental conditions since publication of the *NTS EIS*. In Chapter 4, a screening analysis is performed for the resource areas (or technical disciplines) addressed in DOE

NEPA analyses to determine if the changes in activities, activities levels, or the NTS environment result in larger impacts than those presented in the *NTS EIS*. Resource areas requiring more detailed or additional analysis beyond the screening analysis of Chapter 4 are addressed in Chapter 5. Chapter 6 presents the conclusions of this SA, while Chapter 7 provides a list of references.

As occurred when the *NTS EIS* and the *2002 NTS SA* were prepared, the American Indian Writers Subgroup (AIWS) of the Consolidated Group of Tribes and Organizations (CGTO) was invited to provide American Indian perspectives on the topics addressed in the SA. Topical input is included in text boxes in Chapters 3, 4, and 5; these boxes are identified by a feather logo. A more detailed discussion of the American Indian perspective is included as Appendix A of this SA.

CHAPTER 2
BACKGROUND

2.0 BACKGROUND

This section provides a description of the locale and mission of NTS and offsite locations that were analyzed in the *NTS EIS*. At the time the *NTS EIS* was issued, DOE was preparing several programmatic EISs, and NTS was a candidate for additional missions. The Expanded Use Alternative selected for implementation in the *NTS EIS* ROD addresses the environmental impacts of locating these additional missions at NTS.

2.1 Site Information

Among the major responsibilities of NNSA are the continued stewardship of the Nation's nuclear weapons stockpile and the maintenance of a testing capability. Historically, the primary mission of NTS was to conduct nuclear weapons tests. Since the current moratorium on testing began in October 1992, this mission changed to maintaining a readiness to conduct tests, if so directed, in the future. Because of its favorable environment and infrastructure, NTS has also supported DOE waste management and other national-security-related research, development, and testing programs.

NTS occupies approximately 3,561 square kilometers (1,375 square miles) in southern Nevada, making it one of the largest restricted access areas in the United States[1]. **Figure 2–1** shows the location in southern Nevada of NTS and offsite locations included in the *NTS EIS*. **Figure 2–2** shows NTS operational areas and major facilities at the time of the *NTS EIS*. **Figure 2–3** shows the land managers and uses of land surrounding NTS.

NTS is surrounded on three sides by about 16,800 square kilometers (6,500 square miles) of additional land withdrawn from the public domain for the U.S. Air Force's Nevada Test and Training Range (formerly the Nellis Air Force Range) (an area for armament and high hazard testing; aerial gunnery, rocketry, electronic warfare, and tactical maneuvering training; and equipment and tactics development and training), and the Desert National Wildlife Refuge. (The airspace above the Refuge is shared with the Nevada Test and Training Range.) The overland distance from the southern edge of NTS (Gate 100 at Mercury) to downtown Las Vegas (the intersection of Interstate 15 and U.S. Highway 95) is about 92 kilometers (57 miles) (NTS 2007). Numerous offices, laboratories, and support buildings are spread across NTS.

The *NTS EIS* addressed the environmental impacts of four different levels of operations at NTS and the following locations (see Figure 2–1):

- Central Nevada Test Area
- Project Shoal Area
- Tonopah Test Range (including Double Tracks)
- Nevada Test and Training Range (previously called the Nellis Air Force Range)[2]
- Dry Lake Valley
- Eldorado Valley
- Coyote Spring Valley

[1] *At the time of the NTS EIS, NTS covered about 3,496 square kilometers (1,350 square miles).*
[2] *The Nevada Test and Training Range is managed by the U.S. Air Force. It includes the Tonopah Test Range which is used by NNSA under a land permit issued by the U.S. Air Force (Air Force 2002).*

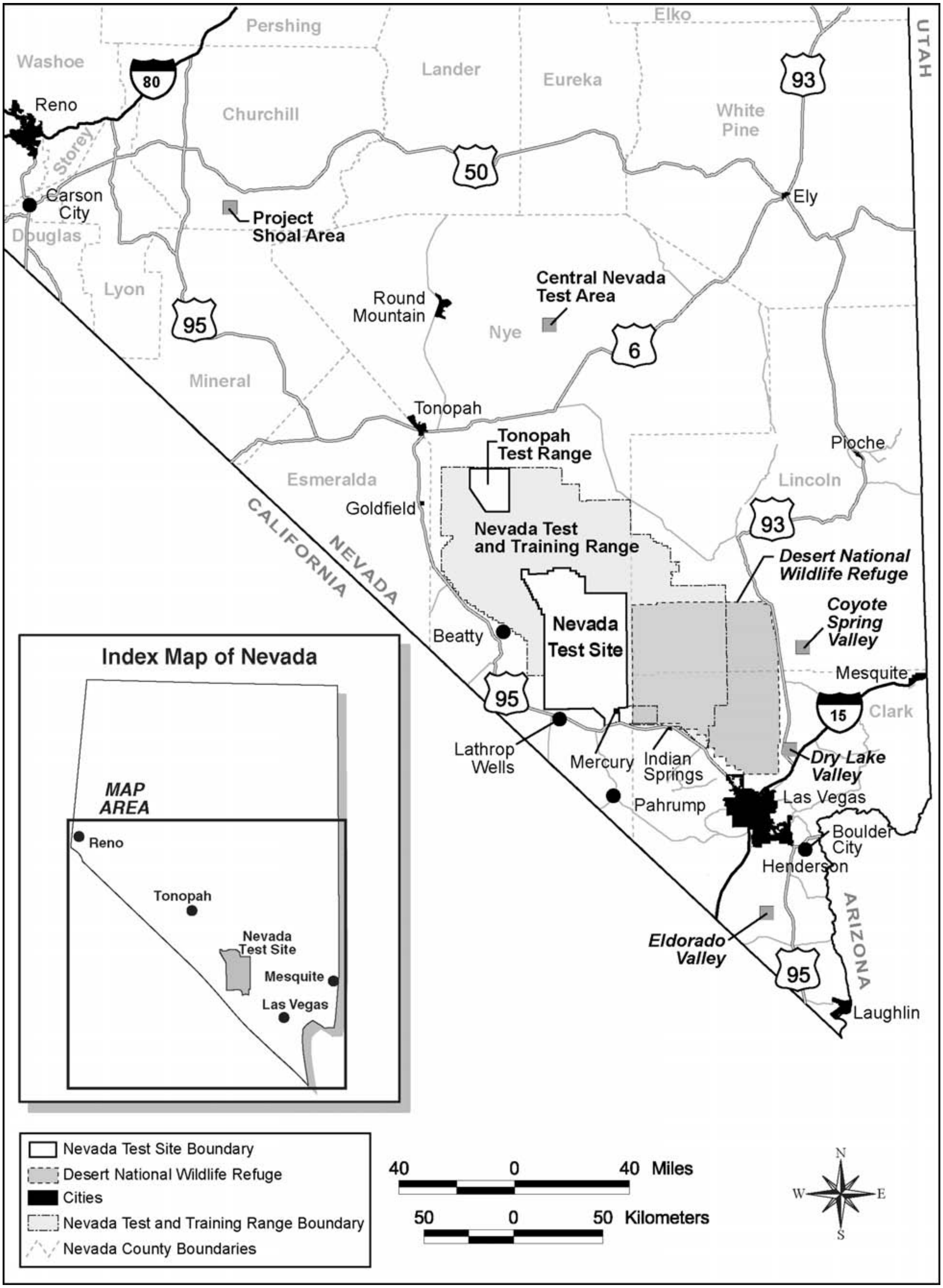

Figure 2–1 Location of Nevada Test Site and Offsite Locations in Southern Nevada

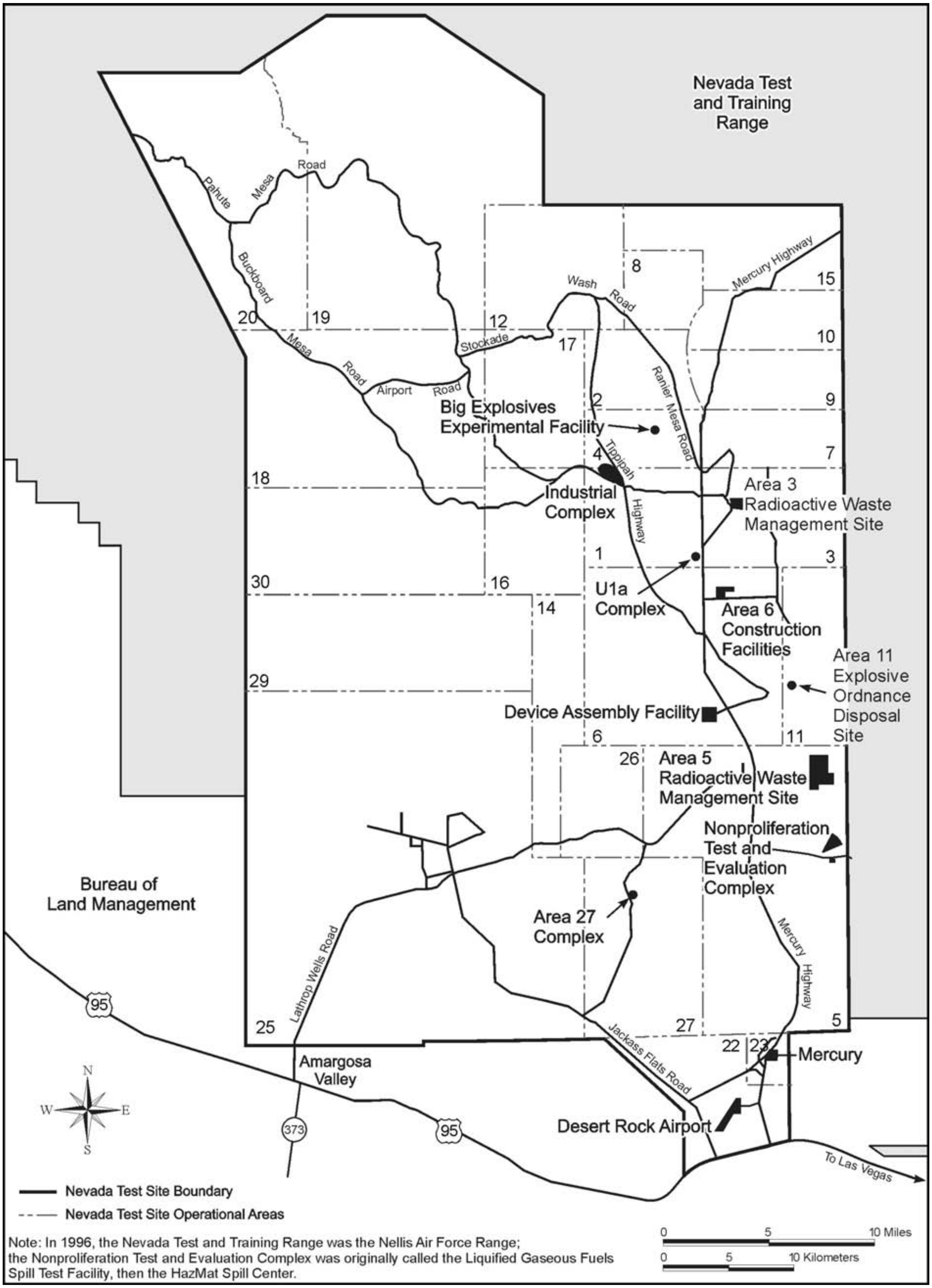

Figure 2–2 Nevada Test Site Areas and Facilities in 1996

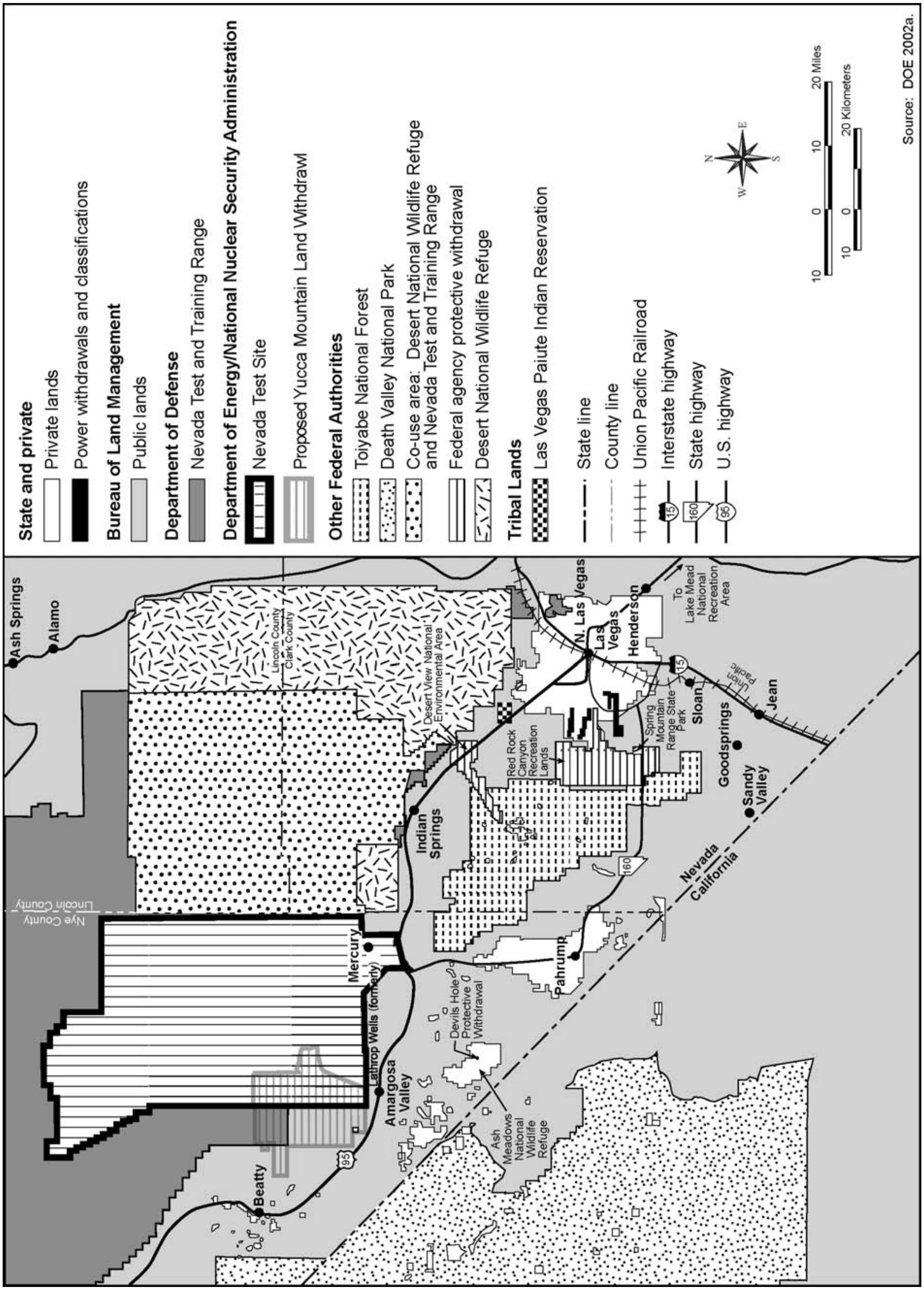

Figure 2–3 Nevada Test Site and Surrounding Land Use

2.2 Nevada Test Site Programs and Level of Operation

The *NTS EIS* evaluated projects and activities categorized into five programs areas (in the *2002 NTS EIS SA*, these were referred to as missions). These programs and their purposes are described as follows:

Defense Programs – The primary mission of the NNSA Defense Programs at NTS is to ensure the safety and reliability of the Nation's nuclear weapons stockpile. NTS has a long history of participating in the Stockpile Stewardship Program, including maintaining the readiness and capability to conduct underground nuclear weapons tests and conducting such tests if so directed by the President (DOE 1996b). Other aspects of stockpile stewardship include conventional high-explosives tests, dynamic experiments (including subcritical experiments [sometimes called dynamic plutonium experiments]), and hydrodynamic testing. NTS has been a key site for past efforts in the areas of nuclear nonproliferation and verification of international treaties.

Waste Management Program – The primary mission of the Waste Management Program is to serve as a low-level and mixed low-level radioactive waste disposal facility in support of DOE. NTS provides disposal capability for NTS-generated waste and other DOE-approved waste generators. NTS continues to store existing transuranic and mixed transuranic waste pending transportation for disposal at WIPP. Hazardous waste is accumulated and stored at the Resource Conservation and Recovery Act (RCRA) Part B-permitted storage facility, and the majority is sent off site for treatment or disposal. Waste explosives are treated in the RCRA Part B-permitted Explosive Ordnance Disposal Unit.

Environmental Restoration Program – The Environmental Restoration Program is committed to assessing and remediating contaminated sites, complying with all applicable environmental regulations and statutes, and protecting the health and safety of workers and the public. This includes addressing the lands of the NTS as well as the other locations used by DOE in the State of Nevada.

Nondefense Research and Development – Consistent with past practices, NNSA supports a variety of research and development activities in cooperation with universities, industry, and other federal agencies. Examples include safety aspects of handling and responding to incidents involving hazardous materials and evaluation of solar energy technologies and options.

Work-for-Others Program – The Work-for-Others Program involves the shared use of certain NTS and Tonopah Test Range facilities and resources with other Federal agencies, such as the U.S. Department of Defense. Activities may require large, remote, and secure areas, and include various military training exercises and research and development projects.

When the *NTS EIS* and its ROD were issued, DOE was preparing three Programmatic EISs that addressed operations evaluated in the *NTS EIS*. The Expanded Use Alternative includes the impacts of assigning to NTS those proposed programs, projects, and operations from the *Stockpile Stewardship and Management PEIS*, the *Waste Management PEIS,* and the *Storage and Disposition PEIS*.

The selected level of operations is based on the Preferred Alternative from the *NTS EIS*, which is the Expanded Use Alternative, together with the public education activities from the Alternative Use of Withdrawn Lands Alternative. This level of operations is the basis for comparing ongoing and projected activities to evaluate the adequacy of the impacts analysis in the *NTS EIS* to current and reasonably anticipated activities at NTS. Subsequent to the *NTS EIS* ROD, some of the proposed programs, projects, and operations that were included in the *NTS EIS* impacts analyses were assigned to other sites. Refer to Chapter 3 of this SA for descriptions of the status of existing NTS programs.

CHAPTER 3
STATUS OF FACILITIES, ACTIVITIES, AND THE ENVIRONMENT

3.0 STATUS FACILITIES, ACTIVITIES, AND THE ENVIRONMENT

This chapter describes the current and 5-year projected status of the NTS missions; changes to environmental conditions on and around the NTS since the *NTS EIS* was issued; and changes to regulatory or legal requirements impacting NTS operations. Consistent with the organization of the *NTS EIS* and the *2002 NTS SA*, facilities and activities at NTS in the five mission areas – Defense Programs, Waste Management, Environmental Restoration, Nondefense Research and Development programs, and Work-for-Others – are evaluated for changes. Environmental conditions at the site are also evaluated and any changes from those described in the *NTS EIS* are presented. The last section of this chapter addresses changes in laws, regulations, and other requirements that could potentially affect operations at NTS. This chapter provides the technical basis for the analyses presented in Chapters 4 and 5 to determine if additional NEPA documentation is required.

3.1 Program Updates

This section provides an update of the NTS program areas since the *NTS EIS* was issued and projected activities through 2012. The five NTS program areas are Defense Programs, the Waste Management Program, the Environmental Restoration Program, the Nondefense Research and Development Program, and the Work-for-Others Program.

For each program area, the status of program activities as described in the *NTS EIS* is presented, followed by a description of new projects, activities, and facilities that have been initiated since the issuance of the *NTS EIS*. These new projects, activities, and facilities are within the range of activities evaluated in the *NTS EIS* as determined through an NNSA/NSO NEPA review, inclusion in the *2002 NTS SA*, or through preparation of separate NEPA documentation (an EA or EIS). Where a separate NEPA document was prepared, it is identified in the description.

3.1.1 Defense Programs

The NTS maintains a readiness to perform nuclear testing. NNSA/NSO provides management, direction, and oversight to various defense and national security programs, projects, and experiments, as described below.

3.1.1.1 Status of Defense Programs Activities from the *NTS EIS*

Table 3–1 lists each of the defense programs activities evaluated in the *NTS EIS* (derived from Table S–1 of the *NTS EIS*), and provides the current status of each activity. As noted in Table 3–1, the ongoing key NTS defense programs-related activities include maintaining readiness to conduct full-scale nuclear testing, conducting underground nuclear weapons testing, handling damaged and foreign nuclear weapons, and conducting dynamic experiments (including subcritical experiments). Section 3.1.1.2 describes the NTS Defense Programs activities and facilities initiated since the *NTS EIS* was prepared, including stockpile stewardship activities and experiments.

3.1.1.2 New Defense Programs Facilities, and Activities since the *NTS EIS*

Joint Actinide Shock Physics Experimental Research (JASPER) Facility

The JASPER Facility (construction completed in September 1999) conducts shock physics experiments on special nuclear material and other actinide materials. JASPER uses a two-stage, light-gas gun to shoot projectiles at actinide target materials located in a primary target chamber within a secondary confinement chamber. Up to 24 special nuclear material shots per year could be conducted (NTS 2007). Over two dozen plutonium experiments have been conducted to date. JASPER generates small quantities of transuranic waste (see Section 3.1.2.2).

Table 3–1 Status of Defense Programs Activities

Activity	*Status*	*Remarks*
Maintain readiness to test	Ongoing	NTS capabilities are unique; annual assessment of readiness performed.
Maintain capability to conduct underground nuclear weapons testing	Ongoing	Would require a Presidential directive to resume.
Conduct dynamic experiments, including subcritical experiments	Ongoing	Active, with multiple experiments per year.
Conduct conventional high explosives testing	Ongoing	Active, with multiple tests per year.
Construct nuclear weapons simulators	Ongoing	Active planning ongoing.
National Ignition Facility	NTS not selected for project location	Lawrence Livermore National Laboratory was selected for the location of this facility in the *Stockp.6(.82ek)9.1 Stekdsehip andr S*

Baker Site Facility

The Baker Site Facility is a staging, assembly, and storage facility for explosives used at BEEF, the JASPER Facility, and other approved NTS locations. The facility is located at the Baker Site in NTS Area 27, described in Appendix A of the *NTS EIS*. The Baker Site Facility was included in the *2002 NTS SA* as the Nevada Energetic Materials Operations Facility (DOE 2002c).

Device Assembly Facility (DAF)

DAF is a multi-structure facility where nuclear devices and high explosives can be assembled, disassembled or modified, staged, and component-tested. Since the *NTS EIS*, NNSA has constructed a glovebox system and a downdraft table capable of handling plutonium and other special nuclear material at DAF (NTS 2007). The glovebox system consists of two separate glovebox assemblies, a nitrogen gas purifier, and nitrogen circulation piping connecting the gloveboxes to the gas purifier. The target preparation glovebox consists of three workstations for sample introduction, preparation, and inspection. No machining or other mechanical or chemical processing of the material is allowed in this glovebox. A double-door, sealed transfer system on one end of the box accepts a transfer canister that is used to transfer material manually to the second glovebox. The second glovebox is a recirculating downdraft glovebox connected to an open-front air hood. The downdraft glovebox has a built-in gas circulation/filtration system that establishes an ultraclean vertical laminar flow region within the glovebox. The introductory hood can function as an air hood or as a glovebox depending on the door position. The hood contains a slide mechanism and a pneumatically-actuated gate valve that allows a target holder to be inserted into the laminar flow region of the downdraft glovebox without inserting air into the inert environment. The glovebox system establishes the capability to handle plutonium and other actinides at NTS. Initially, the glovebox system will be used to meet programmatic requirements of the JASPER project, but other programs at NTS that support NNSA's Stockpile Stewardship Program may also benefit from this capability. Approval to begin operations has been given for the glovebox system, and operation is expected in early 2008 (NTS 2007).

The downdraft table is enclosed within primary and secondary containment rooms having decreasing pressure differentials so that air is always pulled in through the filtration system (NTS 2007). The downdraft table was used to support two subcritical experiments in 2006 but has since been placed in a standby mode.

NNSA relocated the principal Los Alamos National Laboratory Technical Area 18 operational activities involved in the research, design, development, construction, and application of experiments on nuclear criticality to DAF. The NNSA ROD for the *Final Environmental Impact Statement for the Proposed Relocation of Technical Area 18 Capabilities and Materials at the Los Alamos National Laboratory* (DOE 2002d) selected DAF at NTS for the Criticality Experiments Facility (CEF). Most of the special nuclear material formerly at Technical Area 18 has been transferred to DAF. Operations in support of NNSA and other national missions have begun. Modification of some of the DAF buildings to allow operation of the CEF criticality machines commenced in May 2007 (NTS 2007).

NNSA is currently developing plans for the use of DAF for limited nuclear weapons dismantlement activities. Currently, dismantlement of nuclear weapons occurs at the Pantex Plant in Texas. DAF would be used for dismantlement of certain weapons or weapon systems that have unique requirements for dismantling, which would allow the Pantex Plant to conduct higher volume work. Using DAF for limited dismantlement would aid in meeting the United States' obligation to reduce its nuclear stockpile. The use of DAF for the weapons assembly/disassembly activities currently conducted at the Pantex Plant was addressed in the *Stockpile Stewardship and Management PEIS*; the *NTS EIS* addressed conducting these activities and reserving land and infrastructure for accepting the full mission at NTS. The number of weapons shipments to NTS under this activity would be no more than the number of shipments analyzed in the *NTS EIS*. Waste would consist of high explosives that may be sent to the Explosive Ordnance Disposal Unit in Area 11 for treatment and low-level radioactive waste (rags, etc.) that would be disposed at the Area 5 Radioactive Waste Management Site (RWMS). Treatment of high explosives at the Area 11 Explosive Ordnance Disposal Unit would be in accordance with the NTS RCRA and Air Quality Operating permits. Plutonium pits and highly enriched uranium would be stored for a short time until they could be transferred to the Pantex Plant, the Y-12 National Security Complex, or another NNSA facility. Some non-nuclear components may be cleaned and recycled, if appropriate.

Big Explosives Experimental Facility (BEEF)

BEEF was analyzed in Appendix F of the *NTS EIS*. BEEF dynamic experiments have been an integral part of the Stockpile Stewardship Program, Counterproliferation and Nonproliferation Programs, and Advanced Conventional Weapons, a Work-for-Others activity. These experiments have continued research on explosive pulsed-power technology (needed for weapons physics experiments) and on advanced shape charges for augmented conventional weapons and render-safe technologies. BEEF supports hydrodynamic applications, including proof of concept, prototype testing and explosive evaluation, and Work-for-Others applications, including explosive sensitivity testing and shaped charge experiments. New activities for BEEF were identified in the *2002 NTS SA* but are not currently planned, as discussed below:

- *Increased diagnostic capabilities, including (1) a linear accelerator and/or (2) a one-stage gas gun.* As of 2007, the proposed linear accelerator and one-stage gas gun are no longer expected to be moved to NTS.

- *New experiments involving nuclear explosive-like assemblies.* These experiments are still proposed for NTS, but not for BEEF. Facilities for these experiments are part of NNSA's *Complex Transformation SPEIS* (see the discussion of Proposed Future Projects at NTS in Section 3.1.1.3).

BEEF has been modified to perform high explosives pulsed-power experiments to develop a technique to measure the equation of state of various materials over the entire range of interest to weapons scientists. The purpose of the modifications is to be able to use a compact explosive-driven pulsed power system to achieve the high pressures needed for such experiments. The modifications at BEEF will not result in an increase in the potential size of detonations or change the amount or types of materials involved in detonations beyond those analyzed in the *NTS EIS*.

Atlas Facility

The Atlas Facility, designed to perform pulsed-power experiments on macroscopic targets, was relocated from Los Alamos National Laboratory and conducted experiments until it was placed in cold stand-by mode in 2006, pending the budgetary priority to resume experiments (NTS 2007). Relocation of the Atlas Facility was the subject of an EA and FONSI (DOE 2001b).

U1a Complex

The U1a Complex comprises an underground laboratory of horizontal tunnels about 0.8 kilometers (0.5 miles) in length, mined at the base of a vertical shaft approximately 290 meters (960 feet) beneath the surface (NTS 2007), and several fixed and temporary metal buildings and instrument trailers on the surface. NNSA/NSO plans to continue upgrades to the U1a Complex, as needed to support program activities. Appropriate NEPA analysis would be performed as specific improvements are identified.

Subcritical Experiments (also known as Dynamic Plutonium Experiments)

As of June 2007, 22 subcritical experiments and 12 smaller special nuclear material recovery experiments have been conducted in the U1a Complex (NTS 2007). One vertical subcritical experiment was conducted at the U6c experiment site. In addition to the original method for executing a single subcritical experiment in an alcove, the operational concept for subcritical experiments changed to include other operations. Lawrence Livermore National Laboratory introduced vessels to contain subcritical experiments and Los Alamos National Laboratory introduced racklettes (small cylindrical racks). Both laboratories have introduced use of diagnostic clean rooms, screen rooms, and radiographic and laser diagnostics (NTS 2007).

NNSA is planning to install a large-bore powder gun in the U1a Complex. The gun would measure approximately 19 meters (63 feet) in length with a bore of about 8.9 centimeters (3.5 inches) (NTS 2007). The gun would be used to fire a large projectile, approximately 18 centimeters (7 inches) long, into fixed special nuclear material targets. The targets would be delivered to the room in U.S. Department of Transportation-approved containers, with the target assemblies themselves being sealed. The containment system, including an explosively driven fast closure valve, would be attached to the gun (prior to arrival of the target). The powder gun would have an expendable containment system, and the zero room (location of the target) would act as a secondary containment system. Loading the projectile and the explosive charge would be the last step prior to sealing the room and firing the gun. Post-execution activities would include monitoring the remote sensors inside the room. A re-entry into the firing chamber above would be controlled. The containment system assembly would be removed and the gun prepared for the next shot. Expended powder gun containment system assemblies would be entombed in the alcove.

Experiments could become more complex and potentially use larger quantities of special nuclear material. Appendix J (classified) of the *NTS EIS* provides limits for the amount of special nuclear material that could be present at the U1a Complex (then called the Lyner Complex) (DOE 2002c). These material quantity limits *would not* be exceeded during anticipated future subcritical experiments at the U1a Complex.

Emplacement Hole Subcritical Experiments

These experiments are similar to the experiments conducted in the U1a Complex described above, but are performed in vertical emplacement holes, like those used for underground testing (DOE 2002c, NTS 2007).

G-Tunnel Improvised Nuclear Device Program

U12g Tunnel (G-Tunnel) would be used for staging and minimal assessment of a damaged nuclear weapon or an improvised nuclear device, should one be recovered. This was identified as a proposed activity (damaged nuclear weapons program) in the *2002 NTS SA*; as of 2007, it is an ongoing program (NTS 2007).

Tonopah Test Range Fire Experiment Facility Open Burn Experiments

In the *2002 NTS SA*, open burn experiments were identified as a possible future project. The open burn experiments would involve the construction of a fire and thermal testing facility at NTS or the Tonopah Test Range. The thermal tests would include open-pool fire testing and radiant-heat testing on full-scale test units in support of the Stockpile Stewardship Program. NNSA previously analyzed the environmental consequences of constructing and operating the Fire Experiment Facility at the Tonopah Test Range (DOE 1999b). As of 2007, NNSA/NSO does not expect a need to perform the open burn experiments; if these experiments become necessary in the future, NNSA would conduct the appropriate level of NEPA review and analysis.

3.1.1.3 Proposed Future Projects at the NTS

On January 11, 2008, NNSA issued a Notice of Availability (73 FR 2023) of a Draft *Complex Transformation SPEIS*. As part of the *Complex Transformation SPEIS*, NTS is identified as an alternative site for the following facilities and activities (NNSA 2006, NTS 2007):

- Consolidated Plutonium Center
- Consolidated Weapons Program special nuclear material storage
- Consolidated hydrotesting – this was originally proposed in the *2002 NTS SA* as the Advanced Hydrotest Facility
- Consolidated major environmental testing (facilities for putting environmental stresses [heat, cold, vibration, etc.] on nuclear weapons components)
- NNSA flight test operations currently performed at the Tonopah Test Range
- Consolidated Nuclear Production Center

Proposed Complex Transformation missions and facilities are addressed in the cumulative impacts portion of this SA. The Notice of Intent regarding the *Complex Transformation SPEIS* (71 FR 61731) announced the cancellation of NNSA's previous proposal to build a modern pit facility for which a draft Supplemental EIS was issued in June 2003 (68 FR 33487). (The modern pit facility was included in the *2002 NTS SA* as a possibility for NTS.)

3.1.2 Waste Management Program

The primary ongoing Waste Management Program activity is providing low-level and mixed low-level radioactive waste disposal capacity in support of DOE. Additionally, NTS continues to store existing transuranic and mixed transuranic wastes until they can be shipped to WIPP for disposal. Hazardous and PCB wastes may be accumulated and temporarily stored at the RCRA Part B-permitted storage facility in Area 5 pending shipment offsite for treatment or disposal. Waste explosives are treated in the RCRA Part B-permitted Explosive Ordnance Disposal Unit.

3.1.2.1 Status of Waste Management Activities in the *NTS EIS*

Table 3–2 lists each of the waste management activities evaluated in the *NTS EIS* and the current status.

Table 3–2 Status of Waste Management Activities

Activity	*Status*	*Remarks*
Area 3 Radioactive Waste Management Site		
Disposal		
NNSA/NSO-generated low-level radioactive waste	On standby	The Area 3 RWMS would only be used for specific waste streams for which it would be economically or environmentally advantageous to dispose at that facility.
Other low-level radioactive waste		
Closure		
Disposal Crater Complex U3ax/bl	Complete	Facility closure as a RCRA-regulated mixed low-level radioactive waste disposal unit was completed in 1999.
Disposal Crater Complex U3ah/at	On standby	Expected to close by 2010.

Activity	*Status*	*Remarks*
Construction		
Future low-level radioactive waste disposal pit	On standby	Additional subsidence craters would be developed as needed.
Building 3-302 (expansion)	Cancelled	
Area 3 Truck Decontamination Station	Cancelled	
Area 5 Radioactive Waste Management Site		
Disposal		
NNSA/NSO-generated low-level radioactive waste	Ongoing	Two to three disposal pits are typically constructed per year for disposal of onsite- and offsite-generated waste.
Other low-level radioactive waste		
Mixed low-level radioactive waste	Ongoing	Disposal is ongoing in pit 3 for NTS waste. Disposal of non-NTS waste, authorized by the Nevada Division of Environmental Protection in December 2005, is ongoing. Under the current Nevada Division of Environmental Protection authorization, disposal of non-NTS mixed waste may continue until December 2010 or until 20,000 cubic meters (about 710,000 cubic feet) is disposed, whichever comes first. Mixed waste includes low-level radioactive waste containing PCBs in concentrations exceeding 50 parts per million.
Greater confinement disposal waste	Ongoing	No new waste will be disposed in the Greater Confinement Disposal Facility; its performance assessment has been completed.
Asbestiform low-level radioactive waste	Ongoing	Asbestiform waste has been accepted and is expected in the future, as will low-level radioactive waste containing less than 50 parts per million of PCBs.
Landfill	Cancelled	This proposed landfill for construction and sanitary waste was cancelled.
Storage		
Nevada-generated mixed waste	Ongoing	A mixed low-level radioactive waste storage area operates at the Transuranic Waste Storage Pad for NTS-generated waste only.
Transuranic and mixed transuranic waste	Ongoing	Most stored transuranic and mixed transuranic waste is legacy waste received from Lawrence Livermore National Laboratory between 1974 and 1990. Most has been shipped to WIPP, and the remaining legacy waste is being processed and characterized for offsite shipment. Since the *NTS EIS*, experiments at the JASPER facility generate small annual quantities of transuranic waste, which will be disposed at WIPP.
Hazardous waste	Ongoing	Temporary storage before shipment for offsite treatment or disposal.
Facility Construction Activities		
Breaching and Sampling Facility	Cancelled	
Real-Time Radiography	Complete	A real-time radiography unit is operational for nondestructive examination of low-level and mixed low-level radioactive waste. Nondestructive examination of transuranic waste is provided by an operational mobile unit.
Transuranic Waste Certification Facility	Complete	Also known as the Waste Examination Facility. Within the Waste Examination Facility, minor modifications are being made to the Visual Examination and Repackaging Building glovebox to support repackaging of mixed transuranic waste for offsite shipment.
Transuranic Waste Handling and Loading Facility		
Mixed waste storage pad	Cancelled	A new epoxy-coated, curbed, concrete pad was proposed, but was not constructed.
Mixed waste disposal units	Ongoing	New disposal units are constructed as needed, consistent with Nevada Division of Environmental Protection permit requirements.

Activity	*Status*	*Remarks*
Greater confinement disposal units	Cancelled	No new waste will be disposed in the Greater Confinement Disposal Facility; its performance assessment has been completed.
Hazardous waste storage unit (expansion)	Not constructed	If needed in the future, increase to 0.056 hectares (0.138 acres), with a capacity of 208,000 liters (55,000 gallons)
Water supply line	Complete	
Access control building	Complete	
Maintenance building	Not constructed	This 300-square meter (3,200-square foot) storage facility for equipment and machinery was not constructed, but may be needed in the future.
5-01 road reconstruction	Cancelled	
5-07 road reconfiguration	Cancelled	
500-year flood protection	Cancelled	
Low-level Radioactive Waste Storage Facility	Not constructed	This 280-square meter (3,000-square foot) curbed concrete pad was not constructed, but may be needed in the future.
Fire protection utilities	Cancelled	
Telephone system	Complete	
Closure Activities		
Close designated low-level radioactive waste disposal units	Ongoing	Individual disposal units are interim-closed as they are filled to capacity with waste. Final closure of the existing 37-hectare (92-acre) area will start in calendar year 2011.
Close designated mixed waste disposal units		
Close designated greater confinement disposal units	Ongoing	All disposal units have been interim-closed. Final closure will occur as part of closure of the existing 37-hectare (92-acre) area.
Treatment Facility		
Cotter concentrate mixed waste	Cancelled	This waste was recycled, and is no longer at NTS.
Area 6		
Storage Activities		
PCB waste	Discontinued	This facility operated temporarily as part of an NTS program to collect and dispose of PCB waste. Current PCB waste may be stored on the Area 5 Hazardous Waste Storage Unit before offsite shipment for disposal.
Treatment Activities		
Low-Level Liquid Waste Treatment Facility	Cancelled	
Mixed Liquid Waste Treatment Facility	Cancelled	
Disposal Activities		
Hydrocarbon landfill	Ongoing	Hydrocarbon-contaminated soils and materials generated at NTS are disposed at this NDEP-permitted facility. Small quantities of hydrocarbon waste may also be disposed at the landfill in Area 9.
Area 9		
Disposal Activities		
U10c Disposal Site	Ongoing	Accepts inert debris and small quantities of hydrocarbon waste.
Area 11		
Treatment Activities		
Explosive ordnance disposal unit	Ongoing	This RCRA-permitted treatment unit may treat up to 45.4 kilograms (100 pounds) of approved waste per hour, and up to 1,873 kilograms (4,100 pounds) in a year.

Activity	Status	Remarks
Area 23		
Disposal Activities		
Landfill	Ongoing	Accepts less than 18 metric tons (20 tons) daily of sanitary solid waste.

JASPER = Joint Actinide Shock Physics Experimental Research, NDEP = Nevada Division of Environmental Protection, NNSA/NSO = National Nuclear Security Administration/ Nevada Site Office, PCB = polychlorinated biphenyl, RCRA = Resource Conservation and Recovery Act, RWMS = Radioactive Waste Management Site, WIPP = Waste Isolation Pilot Plant.
Sources: Clark et al. 2005; Di Sanza and Carilli 2006; DOE 1996b, 2002c; NTS 2007.

3.1.2.2 New Waste Management Facilities and Activities since the *NTS EIS*

Existing waste management facilities and activities are expected to largely continue over the next five years. NTS will continue to be a regional disposal center for low-level and mixed-low level radioactive waste generated throughout the DOE Complex. Current disposal operations will continue, as will other management operations such as temporary waste storage and confirmatory waste examination. Additional information on current and potential new low-level and mixed low-level radioactive waste management activities and waste streams is provided in Section 5.2.

Possible new waste management activities are:

- *Treatment of RCRA or Toxic Substances Control Act wastes.* With the exception of wastes treated at the Area 11 Explosive Ordnance Disposal Unit, DOE is not permitted to treat hazardous (RCRA) waste, the hazardous (RCRA) portion of mixed low-level radioactive waste, or Toxic Substances Control Act waste at NTS. Several offsite generators have requested that NTS provide in-cell macro-encapsulation for debris waste streams containing hazardous or toxic constituents. This activity would require a permit from the Nevada Division of Environmental Protection.

- *Disposal of GTCC low-level radioactive waste.* As addressed in Chapter 1, DOE is preparing a *GTCC EIS* to address disposal of GTCC low-level radioactive waste and GTCC-like DOE waste. NTS is being considered as one of eight candidate DOE sites for disposal of such waste, along with generic commercial disposal facility options in arid and humid environments. The alternatives in the *GTCC EIS* could result in changes to facilities and operations at NTS, but because the alternatives are still being developed and disposal facility operation would not occur before 2012, they are not able to be addressed in detail in this SA.

- *Transloading of waste shipments to the NTS.* To provide NTS-approved generators with additional cost-effective waste transportation options, NTS staff has encouraged the establishment of transloading alternatives. There are no transloading facilities for low-level or mixed low-level radioactive waste operating in the state of Nevada. In addition, NSO encourages generators and their transporters to review route selections and requires that shipments avoid Hoover Dam and the Las Vegas metropolitan area. To date, six commercial vendors have expressed interest in offering transloading services.

Since the *NTS EIS*, NTS has significantly reduced the volume of legacy transuranic and mixed transuranic waste at NTS, by repackaging, characterizing, and shipping the stored waste to WIPP. NTS intends to ship nearly all the remaining legacy waste for offsite disposition in 2008 (Chapter 4.11). Operations at JASPER annually result in about 23 cubic meters (810 cubic feet) of newly generated transuranic waste that will also be sent for offsite disposition.

Five potential low-level radioactive waste streams were identified in the *2002 NTS SA* for management at NTS (DOE 2002c). To date, only two[1] of these waste streams have been disposed at NTS:

- Low-level radioactive waste generated by Battelle Columbus
- Thorium nitrate waste from the U.S. Department of Defense

NTS-approved generators have provided forecasts of low-level and mixed low-level radioactive wastes that are planned for NTS disposal (see Section 5.2). Other potential low-level and mixed low-level radioactive waste streams, however, have been identified that are not at this time planned for NTS disposal but may be considered for NTS disposal. The actual generation of these waste streams is uncertain, or there are options for their disposition other than disposal at NTS. These waste streams are listed below (SAIC 2008):

- U.S. Department of Defense waste from accidents involving nuclear weapons[2]
- U.S. Department of Defense and DOE strontium-90 radioisotope thermoelectric generators other than those in current forecasts[2]
- Depleted uranium hexafluoride conversion waste[2]
- U.S. Department of Defense cleanup of facilities or sites containing depleted uranium
- Site cleanups at former Manhattan Project and supporting facilities
- Former research reactor site cleanups
- Disposition of uranium-233 waste from Oak Ridge National Laboratory
- DOE Naval Reactors Program waste
- Waste from environmental restoration at Los Alamos National Laboratory

3.1.3 Environmental Restoration Program

The continuing role of the Environmental Restoration Program is to assess and remediate DOE contaminated sites, comply with all applicable environmental regulations and statutes, and protect public and worker health and safety. Under the Environmental Management Program, NNSA/NSO provides support for environmental restoration activities and groundwater characterization related to past nuclear testing. The overall environmental restoration strategy is the same as that developed and described in the *NTS EIS* and the 1996 Federal Facility Agreement and Consent Order[3] (NDEP 1996).

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[1] Another waste stream addressed in the 2002 NTS SA consisted of 10 strontium-90 radioisotope thermoelectric generators to be shipped from U.S. Air Force facilities (DOE 2002c). These radioisotope thermoelectric generators were not shipped to NTS to date, but shipment is expected in 2009.

[2] These wastes were included in the 2002 NTS SA as potential new waste streams that may be managed at NTS. They have not been received for management at NTS as of the end of 2007.

[3] The March 15, 1996, Federal Facility Agreement and Consent Order was signed for the State of Nevada on March 26, 1996, for the U.S. Department of Energy on April 4, 1996, and for the U.S. Department of Defense on May 10, 1996. The Federal Facility Agreement and Consent Order was modified on March 10, 1999, and July 19, 2000 (NDEP 1996).

The environmental restoration program addresses three sub-project areas and four other related activity projects. Since the *NTS EIS*, the Underground Test Area, Soils Media, and Industrial Sites titles have changed from Corrective Action Units to Sub-Projects (NTS 2007). **Table 3–3** lists each of the environmental restoration program activities evaluated in the *NTS EIS* and the *2002 NTS SA*. The table was derived from Table S–3 of the *NTS EIS* and reflects the updated titles and the current status of each activity. The first column under each project is updated to reflect activities expected to continue or reach completion in the next 5 years (2008 to 2012) under this SA (NTS 2007).

Table 3–3 Status of Environmental Restoration Activities

Activity	*Status*	*Remarks*
Underground Test Area Sub-Project	Ongoing	No significant changes to future activities. Phase I is near completion. Phase II is on schedule for three of four corrective action units.
Continue monitoring groundwater from existing wells		
Continue drilling characterization wells		
Expand groundwater monitoring to include new wells		
Continue to evaluate and implement remediation strategies		
Soils Media Sub-Project	Ongoing	Soils Sites on NTTR and the Tonopah Test Range are expected to be remediated to an action level that is mutually agreed upon by DOE/NNSA, the U.S. Air Force, and the Nevada Division of Environmental Protection. Within the exception of the finally approved remediation action level, future activities are not expected to change from those described in the *NTS EIS*. Activities would continue at present levels, although alternate uses may require stricter cleanup levels.
Continue studies to identify, analyze, etc., alternate remedial measures		
After studies, select alternate remedial action methods and implement		
Ensure contaminated soils on NTS and NTTR lands are in compliance with 10 CFR Part 835 (Fence and Post contaminated areas)		
Characterize the soils sites to ensure the public and worker are protected from hazards		
Industrial Sites Sub-Project	Ongoing	The majority of the Federal Facility Agreement and Consent Order sites have been closed; completion of Industrial Sites cleanup is projected to occur by 2012. The current number of corrective action units is 265, with a total of 1,852 corrective action sites. As of 2005, eight of nine Part A sites identified in the *NTS EIS* have been closed under RCRA. The remaining Part A site is being completed under the waste management program. Activities would continue at present levels, although alternate uses may require stricter cleanup levels.
Continue field program to identify sites		
Continue to characterize and remediate the industrial sites under the Federal Facility Agreement and Consent Order		
Decontamination and Decommissioning Facilities	Ongoing	The E-MAD facility has been added to the D&D Project to increase the original seven facilities identified in the *NTS EIS* to a total of eight facilities. The new projected completion date for closure of all eight facilities is 2012, compared to the projected year of 2005 referenced in the *NTS EIS*. The estimated affected building area of 12,100 square meters (130,000 square feet) has increased to 12,965 square meters (139,500 square feet).
Continue remedial actions		
Alternative may require clean closure, not closure in place		

Activity	*Status*	*Remarks*
Defense Threat Reduction Agency (formerly Defense Nuclear Agency) Sites	Ongoing	All muckpile and pond corrective action units have been closed in place with no further action. The Defense Threat Reduction Agency has adopted a risk-based closure strategy for closure of nine corrective action units. The original estimate of 200 hectares (500 acres) of affected land has decreased to a new estimate of approximately 40 hectares (100 acres).
Continue operations to stop radiation and hazardous contaminant migration		
Select and implement alternate remedial action or redesign		
Alternate uses may require stricter cleanup levels		
Characterize and remediate contaminated muck piles and ponds		
Tonopah Test Range		
Continue characterization and remediation of site	Ongoing	The majority of the Industrial Sites (63 of 64) have been closed (NTS 2007). Also, see Soils Media Sub-Project above in this table.
Central Nevada Test Area		
Accelerate characterization and remediation	Responsibility transferred	DOE's Office of Legacy Management is now responsible for environmental restoration and NEPA documentation for the Central Nevada Test Area. Previously, surface contamination was removed or capped with engineered barriers, as approved by the Nevada Division of Environmental Protection. Subsurface and groundwater contamination is being addressed by the Office of Legacy Management defining the contaminant and compliance boundaries using modeling, and by monitoring to ensure non-migration past the compliance boundary. Three wells were installed and the modeling effort approved by the Nevada Division of Environmental Protection.
Project Shoal Area		
Accelerate characterization and remediation of site	Responsibility transferred	DOE's Office of Legacy Management is now responsible for environmental restoration and NEPA documentation for the Project Shoal Area. Previously, surface contamination was removed or capped with engineered barriers, as approved by the Nevada Division of Environmental Protection. Subsurface and groundwater contamination is being addressed by the Office of Legacy Management defining the contaminant and compliance boundaries using modeling, and by monitoring to ensure non-migration past the compliance boundary. Three wells were installed, the modeling effort approved by the Nevada Division of Environmental Protection, and a 5-year proof of concept scheduled to begin.

CFR = *Code of Federal Regulations*, D&D = decontamination and decommissioning, E-MAD = Engine Maintenance Assembly, and Disassembly, NEPA = National Environmental Policy Act, NTTR = Nevada Test and Training Range.
Sources: DOE 1996b, 2002c; DOE/NV 2006f; NDEP 2002; NTS 2007.

3.1.4 Nondefense Research and Development Program

NNSA maintains the capability at NTS to implement Nondefense Research and Development activities. This program includes research activities by NNSA, universities, industry, and other Federal agencies.

3.1.4.1 Status of Nondefense Research and Development Program Activities from the *NTS EIS*

Table 3–4 lists each of the Nondefense Research and Development Program activities evaluated in the *NTS EIS* (derived from Table S–4 of the *NTS EIS*) and provides the current status of each activity.

Table 3–4 Status of Nondefense Research and Development Activities

Activity	*Status*	*Remarks*
Establish solar enterprise zone	Complete	The solar enterprise zone was established; however, the original project sponsors abandoned the proposed facility. Recently, a commercial utility-scale solar power plant has been proposed for the solar enterprise zone.
Construct and operate solar production facilities	Cancelled	The NTS Development Corporation, a non-profit entity previously funded by NNSA to facilitate commercial interaction between the Nevada business community and NTS, initially worked with Boulder City, Nevada, to establish a "Green Energy Futures Park" demonstration program to be located within a limited portion of the 2,500-acre Eldorado Valley Energy Zone in Boulder City. Subsequently, NTS Development Corporation merged with the University of Nevada, Las Vegas Research Foundation; further development is the responsibility of the land owners. NNSA no longer provides funding for the NTS Development Corporation.
Nonproliferation Test and Evaluation Complex (previously the HazMat Spill Center)	Inactive	No longer supports Nondefense Research and Development; see Work-for-Others Program, Table 3–5.
Alternate fuel demonstration project (16 vehicles plus fueling station)	Ongoing	The program was expanded to include: - Hydrogen/electricity co-production system - Hybrid electric/hydrogen-fueled internal combustion engine transit bus - Heavy-duty engine development for hydrogen-enriched natural-gas-powered internal combustion engine (to be demonstrated in six dedicated buses in Las Vegas) - Conversion of light-duty fleet vehicles to hydrogen-enriched natural gas (up to 18 fleet vehicles) - Fuel-cell-powered shuttle bus Responsibility for the Alternate Fuel Demonstration Program was transferred in 2003; it is now managed by the DOE Golden Field Office.
Technology development (expanded)	Inactive	Activities have occurred since 1996, but currently there are no ongoing activities.
Environmental Research Park	Ongoing	The only ongoing projects are at the Nevada Environmental Research Center. These are the Nevada Desert Free Air Carbon Dioxide Enrichment Facility and the

Nonproliferation Test and Evaluation Complex

The Nonproliferation Test and Evaluation Complex (originally called the Liquified Gaseous Fuels Spill Test Facility, and then the HazMat Spill Center) no longer supports Nondefense Research and Development, however it still supports the Work-for-Others Program (see Section 3.1.5).

Nevada Environmental Research Center

As part of the Nevada Environmental Research Park, there are two facilities operated by the Desert Research Institute; the University of Nevada, Las Vegas; and the University of Nevada, Reno (NDRC 2007). These are the Nevada Desert Free Air Carbon Dioxide Enrichment Facility and the Mojave Desert Global Change Facility. Since operations began in 1997, the Nevada Desert Free Air Carbon Dioxide Enrichment Facility has been conducting a 20-year study on the impact of elevated carbon dioxide on the Mojave Desert ecosystem. At the Mojave Global Change Facility, research on effects of other predicted climate changes are underway, specifically nitrogen deposition, crust disturbance, and increased precipitation.

Solar Power Plant

A solar power plant has been proposed for the Solar Enterprise Zone at NTS Area 22 that would be a commercial, utility-scale solar power plant (NTS 2007). The power plant could produce up to 200 megawatts of electricity. The proposed technology would concentrate solar power (Fresnel lens/trough type) using tracking/positioning arrays. The power generated would supply NTS with the majority of its required power and excess power would be distributed to Nevada utilities. Power transmission would be via the Mercury sub-station and existing connected transmission lines, although transmission line upgrades may be required. Additional 200-megawatt power plants may be added in modular form (for future development). Planning, development, and construction prior to operation are expected to take 3 to 5 years.

3.1.5 Work-for-Others Program

NNSA/NSO provides management, direction, and oversight of Work-for-Others Program activities at the NTS. These activities include ongoing work for the U.S. Department of Defense (including the U.S. military and the Defense Threat Reduction Agency), the U.S. Department of Homeland Security (DHS), law enforcement agencies, and others. These programs include research and development, data collection and analysis applications, testing, and evaluation associated wtgrrayThr()ee(Thr-0.004.6(e)5521.7.3ee((en)-9.5(h)-1..2(S)-dion) capacity of state and local agencies to respond to weapons of mass destruction incidents through coordinated training, equipment acquisition, technical assistance, and support for state and local exercise planning. As a result, NNSA/NSO contractor personnel have been involved in providing training. The Counter Terrorism Operations Support Group conducts a wide range of weapons of mass destruction response training and hazardous material mitigation training. This training is conducted at the NTS or at NNSA/NSO facilities in Las Vegas by Mobile Training Teams.

Table 3–5 Status of Work-for-Others Activities

Activity	*Status*	*Remarks*
Treaty Verification		
Threshold Test Ban Treaty	Ongoing	
Peaceful Nuclear Explosion Treaty	Ongoing	
Chemical Weapons Convention Treaty	Ongoing	
Treaty on Open Skies	Ongoing	
Nonproliferation Projects Counterproliferation Research and Development		
U.S. Department of Defense, Defense Threat Reduction Agency Research, Development, Test & Evaluation Program	Ongoing	
BEEF	Ongoing	See "Defense Programs" heading for information concerning new activities at BEEF.
Cut and Cover	Completed	Activity completed in 2003.
Nonproliferation Test and Evaluation Complex (previously the HazMat Spill Center)	Ongoing	Programs have evolved to add capabilities to address national needs for emergency response and counterterrorism training. EAs (and associated FONSIs) for activities at this facility were issued in September 2002 (DOE 2002e) and June 2004 (DOE 2004c). Previously also supported Nondefense Research and Development.
Conventional Weapons Demilitarization Nondefense Research and Development		
Conduct munitions research and development	Cancelled	A munitions demilitarization project was considered but never executed.
Training exercises	Ongoing	

BEEF = Big Explosives Experimental Facility.
Source: DOE 1996b, NTS 2007.

U.S. Military Development and Training in Tactics and Procedures for Counter Terrorism Threats and National Security Defense

NNSA/NSO supports U.S. Department of Defense in developing methods for engaging or neutralizing an adversary in a variety of topographical environments. U.S. Department of Defense organizations take advantage of the NTS restricted access and remote high desert terrain for developing realistic scenarios expected to be encountered in specific mission profiles, including:

- Direct action live-fire take-down of high fidelity target test beds
- Low altitude fixed and rotary wing desert flight training and technique development
- Remote area advanced personnel overland navigation techniques
- Development and field-testing of special use military hardware, including new ordnance and vehicles
- Field-testing and training activities for unmanned aerial vehicles and/or unmanned aircraft systems
- Overland movement through rugged terrain to assess fatigue and war-fighter capability.

In addition to the military operations that occur at NTS, the U.S. Air Force conducts military operations in the restricted air space above NTS and the Tonopah Test Range. The number of sorties flown over NTS ranges from approximately 13,000 to 20,000 per year, while the number of sorties over the Tonopah Test Range is approximately 17,500 to 27,000 per year (USAF 2007b). NNSA/NSO has given permission to the U.S. Air Force to conduct major military exercises such as Red Flag at altitudes less than 760 meters (2,500 feet) above ground level in western areas of NTS. At the same time, restrictions at altitudes greater than 5,800 meters (19,000 feet) above mean sea level are in place for these exercises in the eastern part of NTS. The U.S. Air Force uses NTS primarily as a transition corridor for Nevada Test and Training Range air traffic at altitudes greater than 4,300 meters (14,000 feet) above mean sea level. Future use could include research, development, testing, and evaluation and integration of training and exercises in conjunction with unmanned aerial vehicles and/or unmanned aircraft systems.

Aerial Operations Facility

An EA (DOE 2001a) was prepared in March 2001 and a FONSI issued to establish the Aerial Operations Facility at NTS. The purpose of the facility is to operate and test a variety of unmanned aerial vehicles. In October 2004 a second EA and FONSI (DOE 2004f) evaluated the potential impacts of constructing a new runway, hangars and operations buildings, and performing infrastructure upgrades to accommodate an increase in Aerial Operations Facility personnel.

National Center for Combating Terrorism

The National Center for Combating Terrorism provided a comprehensive, fully integrated system of facilities and capabilities to meet a wide range of combating terrorism requirements, including research, development, testing and evaluation; exercises; training; and intelligence support. The program was analyzed in a Supplement Analysis to the *NTS EIS* in 2003 (DOE 2003b). Construction of the National Center for Combating Terrorism was completed in 2006. Training is ongoing through the Counter-Terrorism Support Program.

Nonproliferation Test and Evaluation Complex

The Nonproliferation Test and Evaluation Complex (originally called the Liquified Gaseous Fuels Spill Test Facility, and then the HazMat Spill Center) conducts research on the behavior and safety aspects of chemical handling and releases including releases due to explosive detonations. An EA prepared and a FONSI signed in September 2002 for the HazMat Spill Center further expanded the capabilities to address national needs for emergency response and counterterrorism training (DOE 2002e). The Nonproliferation Test and Evaluation Complex serves as a chemical and biological test center. Such work includes research, development, testing, and evaluation of applied technologies; training and exercises; and/or integration of these activities. In 2004 NTS expanded its capabilities to conduct tests and experiments involving the release of biological simulants and low concentrations of chemicals at various NTS locations (DOE 2004c) under the Work-for-Others Program.

Activities Using Biological Simulants and Releases of Chemicals at the Nevada Test Site

One of the NTS roles is to provide the capability to conduct chemical release tests to assess risks from accidental releases of hazardous materials, to provide data on sensor development, and to provide first responder training (DOE 2002c). In a 2004 EA, NNSA/NSO evaluated impacts associated with tests and experiments involving the release of biological simulants and low concentrations of chemicals at various locations within NTS (DOE 2004c). Additionally, the EA evaluated a modification to the release parameters under which the Nonproliferation Test and Evaluation Complex (then called the HAZMAT Spill Center) operated at the time. A FONSI was issued on June 30, 2004. The activities involve no construction, permanent land disturbance, or land use changes (DOE 2004c). There has been an average of approximately 8 to 16 campaigns per year with approximately 10 testing days per campaign (NTS 2007).

Radiological/Nuclear Countermeasures Test and Evaluation Complex

The DHS requested that NNSA/NSO construct, operate, and maintain the Radiological/Nuclear Countermeasures Test and Evaluation Complex for use by DHS. An EA was finalized in August 2004 (DOE 2004e) and a FONSI issued. The Radiological/Nuclear Countermeasures Test and Evaluation Complex, currently under construction, is an isolated complex located in Area 6 south of DAF that supports capabilities for post bench-scale testing of radiological and nuclear detection devices that may be used in transportation-related facilities. Testing and evaluation activities include prototype detector testing and evaluation; systems testing and evaluation; performance standards validation; demonstration of prototype detectors, systems, and performance standards; verified threat demonstration; concept of operations evaluation and verification; and training.

3.1.6 Miscellaneous New Programs and Facilities (any new programs or facilities not covered under the five programs identified in the *NTS EIS*)

In the *2002 NTS SA*, the National Center for Combating Terrorism was identified as a miscellaneous new program. This project has since been identified as a Work-for-Others Program and was discussed in Section 3.1.5.2. No other miscellaneous new missions or facilities have been identified.

3.2 Environmental Conditions

The purpose of this section is to identify changes in the environmental conditions on and around NTS since the *NTS EIS* was issued. Each environmental resource area listed below was evaluated for changes that may have occurred resulting from NTS operations since 1996:

- Land use
- Infrastructure
- Socioeconomics
- Geology and Soils
- Hydrology

- Biological Resources
- Air Quality and Climate
- Noise
- Visual Resources
- Cultural Resources
- Human Health
- Waste Management
- Environmental Justice

Some of these resource areas include American Indian perspectives prepared by the AIWS; the AIWS input is in text boxes identified with a CGTO feather icon.

3.2.1 Land Use

The Federal Government manages more than 85 percent of the land in Nevada 241,000 square kilometers [93,000 square miles]). Most of this land is under the control of the U.S. Department of the Interior, Bureau of Land Management, the U.S. Department of Defense, or DOE (DOE 2002c). The *NTS EIS* identified the various Public Land Order withdrawals, as well as a Memorandum of Understanding between the U.S. Air Force and DOE/Nevada, pertaining to land acquisitions for NTS (DOE 1996b).

As noted in the *NTS EIS* response to comments, DOE committed to consult with the U.S. Department of Interior regarding the status of the administrative land withdrawals constituting the NTS. That consultation process was initiated in 1997 and is continuing. DOE anticipates that these consultations will continue and hopes they will reach a satisfactory conclusion.

Figure 3–1 depicts the current NTS boundary and the boundary as it was when the *NTS EIS* was issued. At the time of the *NTS EIS*, NTS comprised approximately 3,496 square kilometers (1,350 square miles). Since the *NTS EIS* was published the size of NTS increased to approximately 3,561 square kilometers (1,375 square miles), as a result of the Military Land Withdrawals Act of 1999, Public Law 106-65 (DOE 2002c), which revoked Public Land Order 1662 in its entirety but withdrew the area designated as Pahute Mesa for exclusive DOE use; as it was previously used through a Memorandum of Understanding with the U.S. Air Force.

Land Use

(DaMiDovia "Our Land", Ia-vooTuvipum "Our Land")

CGTO The CGTO maintains that members of the consulting tribes have Creation-based rights to protect, use, and have access to lands (Divia,[1] Tuvip,[2]) of the NTS and immediate area. These rights were established at Creation and persist forever. During the past decade representatives of the consulting tribes have visited portions of the NTS and have identified places, Puha Paths, and cultural landscapes of traditional and contemporary cultural significance. The managers of the NTS have responded to CGTO requests that portions of these identified areas be set aside for traditional and contemporary ceremonial use. Because this is a public document the exact locations of these areas will not be revealed, however they do include a burial cave, a Native American Graves Protection and Repatriation Act (NAGPRA) reburial area, and a local Puha Path and ceremonial landscape near a large water tank. These actions by the agency are in keeping with the persistent recommendations of the CGTO that portions of their holy lands be placed under co-stewardship arrangements.

In order to fulfill the holy land use expectations, the members of the consulting tribes of the CGTO recommend continuing to identify special places, Puha Paths, and landscapes and setting aside these places for unique co-stewardsh ip and ceremonial access. For example, currently studies have begun and portions are completed regarding the identification of places, Puha Paths and cultural landscapes in the Timber Mountain Caldera. These studies are planned to continue and when completed will add a Native American cultural sensitivity component which will contribute to the currently recognized importance of this National Natural Landmark and Area of Critical Environmental concern.

See Appendix A for more details.

[1] Western Shoshone
[2] Southern Paiute

In 1994, NNSA/NSO entered into a management agreement with the Yucca Mountain Site Characterization Office for use of about 23,500 hectares (58,000 acres) of NTS land for site characterization activities related to the Yucca Mountain Project. Under the agreement, the Yucca Mountain Project is responsible for meeting the same environmental requirements that apply to NTS independent of, but in coordination with, NNSA/NSO (DOE 2001b).

3.2.2 Infrastructure

The *NTS EIS* described the NTS infrastructure and determined that the then-current level of infrastructure support would be available, and would be used and expanded commensurate with activities as circumstances dictate. **Table 3–6** summarizes the current status of principal physical infrastructure components. Roads, communications systems, facilities, and water supply systems are dated and some are degraded. NNSA/NSO has implemented or proposed several projects at NTS and auxiliary sites to upgrade buildings, the NTS power distribution and transmission system, the water distribution system, roads, the communication system, and security (see Section 4.2).

Table 3–6 Current Physical Infrastructure Status

Infrastructure	*Current Status*
Electrical power system	138-kilovolt transmission loop onsite, connected to two power sources: Nevada Power Company and Valley Electric Association. Onsite transmission system is limited to 36 megawatts.
Water supply	Water is supplied to NTS from a series of wells, while water and other utilities are supplied to the North Las Vegas Facility from city services. NTS receives its drinking water from 3 permitted public water systems served by 6 wells for potable water, approximately 30 usable storage tanks, 13 usable construction water sumps, and 6 water transmission systems. Potable water is hauled to support facilities not connected to the potable water supply system in 2 permitted water hauling trucks. Three former (non-permitted) water supply wells also supply construction water sumps. Water systems require major recapitalization to meet long-term deterioration issues. NTS drinking water systems meet all applicable standards.
Wastewater system	The domestic and industrial wastewater system is largely the same as that addressed in the *NTS EIS*. Several upgrades have been made recently (the sanitary waste disposal system is in fair to adequate condition). Because of insufficient inflows, 8 of 10 permitted sewage lagoon systems on the NTS have been placed in inactive status and replaced with permitted septic systems.
Communication (telephone; microwave; data, video, and teleconferencing communication; and radio)	The telecommunications-information technology backbone structure is comprised of fiber optic and copper cabling and microwave systems. The structure is technologically dated and has been degraded in many locations.
Roads	About 1,030 kilometers (640 miles) of roadways exist at NTS, including approximately 550 kilometers (340 miles) of paved roads, of which 314 kilometers (195 miles) are mission-essential. Portions of the paved road system are substandard.
Facilities & structures	As of September 2005, NTS floor space totaled 214,000 gross square meters (2,306,000 square feet). An additional 88,000 gross square meters (948,000 square feet) of owned and leased floor space existed at auxiliary sites located in Nevada.[a] Many existing facilities have reached the end of their useful structural and technological lives. The average infrastructure age is over 30 years.

[a] Auxiliary sites owned or leased in Nevada are the North Las Vegas Facility, the Cheyenne Facility, and the Remote Sensing Laboratory at Nellis Air Force Base.
Source: DOE 1996b, DOE/NV 2005d, NTS 2007.

The *NTS EIS* projected the annual use of about 17 million liters (4.54 million gallons) of fuel and 11,260 million liters (2,975 million gallons) of water. There were no projections of electricity or natural gas use, although it was noted that propane was used as needed (DOE 1996b). NTS and auxiliary sites currently use water, electricity, fuel oil, natural gas, liquid petroleum gas, and steam. Vehicles and equipment are powered by automobile gasoline, diesel, aviation gasoline, and jet fuel.

In compliance with the Energy Policy Act of 2005, NNSA implemented an energy management program at NTS to reduce the use and cost of energy by advancing energy efficiency, water conservation, and renewable energy sources. NTS electrical usage from 2003 through 2006 ranged from 57 to 95 million kilowatt-hours, averaging 81 million kilowatt-hours (NTS 2007). Peak load usage is 27 megawatts with a site peak load capacity of 45 megawatts. NTS used approximately 4.2 million liters (1.1 million gallons) of liquid fuels in

2000 (DOE 2002d). Water use in Nevada is regulated by the Nevada Department of Conservation and Natural Resources through an appropriations process. The Federal Government asserts sovereign immunity from the state's management of water resources where water is used from land withdrawn from the public and the use is associated with the withdrawal (DOE/NV 1998b). Since 1995, annual water use at NTS has been less than 1,514 million liters (400 million gallons), and usually less than 1,136 million liters (300 million gallons) (USGS 2007). NTS water use from 2003 through 2006 ranged from 397 to 674 million liters (105 million to 178 million gallons), averaging 553 million liters (146 million gallons) (NTS 2007).

The *NTS EIS* estimated 16,310 onsite vehicle trips per day associated with the preferred alternative, and projected no significant onsite traffic congestion. Key roads within metropolitan Las Vegas were already operating at congested levels; however, these conditions would exist regardless of which alternative was selected (DOE 1996b). NTS-related employment is currently less than the *NTS EIS* projections (Section 3.2.3). Using employment as a surrogate indicator for traffic volumes, it is unlikely that NTS-related activities affect traffic congestion on NTS or elsewhere in surrounding municipalities.

3.2.3 Socioeconomics

The region of influence for socioeconomic purposes in this SA, Nye and Clark Counties, is the same region of influence that was analyzed in the *NTS EIS* (DOE 1996b). Approximately 90 percent of the NTS Nevada workforce resides in Clark County, and 7 percent resides in Nye County (DOE 2004c).

Population

The mid-year 2005 populations of Nye and Clark Counties were estimated as 40,395 and 1,709,364, respectively (Census 2007b). Both counties, along with the state, are among the fastest growing areas of the country. The Nye County population grew by 127 percent in the 15 years since 1990 and 24 percent in the 5 years since 2000. Clark County's population grew by 131 percent and 24 percent over the same intervals. The mid-year 2005 population of Nevada, 2,412,301, grew by 101 percent and 21 percent over the same intervals. In comparison, the national population grew by 19 percent and 5 percent, respectively. The most recent (July 1, 2006) population estimate for the State of Nevada indicated 2,623,050 residents (NSBDC 2007a). The trends in Nye and Clark Counties are illustrated in **Table 3–7**.

Table 3–7 Population Trends in the Nevada Test Site Region of Influence

County	*1990 Census Population* [a]	*2000 Census Population* [a]	*2005 Midyear Population* [a]	*2006 Mid-year Population* [b]
Nye County	17,781	32,485	40,395	44,795
Clark County	741,459	1,375,765	1,709,364	1,874,837

[a] Census 2007b.
[b] NSBDC 2007a.

Housing

Between 1990 and 2000, the housing stock in Nye County nearly doubled from 8,073 units to 15,934 units. Nearly all of this growth occurred in tract that extends from NTS southward along the Clark County border and includes the Town of Pahrump. This area contained 74 percent (11,721 units) of the housing units in Nye County and 58 percent (1,514 units) of the county's vacant housing in 2000. The median values of homes in these census tracts bordering NTS and Clark County are the highest in Nye County (Census 2007b).

Clark County added 242,611 housing units in the decade ending in 2000, which represented a 76 percent increase. Most growth occurred in the city of Las Vegas. The census tracts in Clark County closest to NTS contain less than 1,200 housing units combined. The median home values in these census units are lower than the median value of all homes in Clark County, but they are more comparable to the median home values in adjacent Nye County (Census 2007b).

Employment

The *NTS EIS* estimated a direct workforce of 6,576 full-time equivalents for the No Action and a higher level of the Expanded Use Alternative.(DOE 1996b). This total is assumed to be the baseline workforce for NTS in 1996, including personnel at Las Vegas, NTS, and other Nevada locations, as well as in other states. The *2002 NTS SA* reported that NTS had an average of 3,659 employees in 1996 and 3,593 in 2001 (DOE 2002c).

Table 3–8 summarizes NTS employment levels from 2002 to the present, which indicates that NTS employment fell below the 1996 baseline rather than realizing the *NTS EIS* projected gains, losing 2,281 full-time equivalents overall by 2005. Furthermore, NTS has continued to lose jobs since 2005.

Table 3–8 Nevada Test Site Employment (2002 through 2007) [a]

Year	*Las Vegas*	*Nevada Total*	*Other Areas*	*Grand Total*
2002	3,238	5,048	1,179	6,227
2003	3,487	5,491	998	6,489
2004	2,007	3,965	418	4,383
2005	1,826	3,859	436	4,295
2006	1,660	3,604	433	4,037
2007	1,602	3,193	433	3,626

[a] Listings in the NNSA/NSO source documents have been consolidated as follows: Las Vegas includes counts for "Total Las Vegas"; Nevada Total includes counts for "Total Las Vegas" plus "Total NTS" plus "Other Nevada"; and Other Areas includes counts for other states and locations.

Source: NTS 2007.

3.2.4 Geology and Soils

The *NTS EIS* included a thorough description of site geology and soils (DOE 1996b). Although geological and soils investigations were conducted at NTS and the surrounding area (e.g., Yucca Mountain) providing new data and refining the understanding of the NTS geology and soils, the condition of the geology and soils remains largely unchanged in the ten years since the *NTS EIS* was published. The physical infrastructure footprint has increased since the *NTS EIS*, although most new construction was in previously disturbed areas (see Section 4.2).

3.2.5 Hydrology

Although surface water conditions remain essentially unchanged since 1996, work conducted since the *NTS EIS* produced new data and a refined understanding of the hydrogeology of NTS. Additional onsite and offsite groundwater monitoring has been conducted since the release of the *NTS EIS*. Detection of radioactivity in onsite groundwater continues to be localized to the vicinity of specific test areas, and not in potable groundwater. Offsite monitoring by NNSA and the independent Community Environmental Monitoring Program (see Section 3.2.7) continues to show no detection of offsite migration of radioactivity through groundwater (DOE/NV 1998a, 1999c, 2000c, 2001b, 2002c, 2003d, 2004c, 2005e, 2006f).

Surface water continues to be scarce at NTS and is not a viable human water source, though surface water does provide habitat and a drinking water source for wild animals. Surface water consists mainly of ephemeral stream flow and ponds, isolated perennial springs, and impounded water (e.g., containment ponds and sewage lagoons). Impounded surface water and springs are routinely monitored (DOE/NV 1998a, 1999c, 2000c, 2001b, 2002c, 2003d, 2004c, 2005e, 2006f).

3.2.6 Biological Resources

The biological communities of NTS have changed very little since issuance of the *NTS EIS*. Land-disturbing activities associated with new facility and infrastructure development, waste management, and environmental restoration have occurred, but disturbance activities have been minimal compared to the total NTS acreage. Many of the disturbed areas were within or adjacent to existing facility areas, which typically are areas with little or no native vegetation or wildlife. Other areas were disturbed in the course of site characterization or remediation and offered only marginal wildlife habitat prior to remediation (DOE 2002c).

No new threatened or endangered species have been discovered at NTS since issuance of the *NTS EIS* (NTS 2007), but more is known about the ecology (distribution, abundance, recruitment, preferred habitat) of previously identified populations as a result of the Ecological Monitoring and Compliance Program. Information has been obtained for additional species that are not threatened or endangered, but are protected by NNSA/NSO as part of its commitment to the principles of ecosystem management and natural resource stewardship (DOE/NV 1998b).Since 1996, NNSA/NSO has expended considerable effort identifying, mapping, and monitoring the health and viability of sensitive species (DOE/NV 2003f, 2005b, 2006d). The current list of NTS sensitive species has grown to include raptors and bats, which are indicators

Biological Resources

CGTO The current 100-year drought has increasingly stressed all of the plants and animals on the NTS. Because this is a unique, albeit, perhaps a cyclical event, its environmental impacts are unprecedented in the history of the operation and management of the lands of NTS. It is expected that the 100-year drought has modified the abundance and distribution of all animals and plants. The quality, quantity, and distribution of indigenous plants necessary to sustain a healthy environment to maintain a productive animal habitat is clearly affected. Because American Indians view the NTS lands as holy lands, there is deep concern for it. Certain springs have dried up making animals travel into other districts, food foraging becomes difficult and land dries up.

The remaining stressed animals and plants have lower fecundity and nutritional value in the food chain. The CGTO recognizes the nation-wide need to identify and protect threatened and endangered plants and animals. The members of the consulting tribes who have lived on these lands since Creation value all plants and animals, yet some of these occupy a more culturally central position in their lives. The main characteristic of a healthy landscape is healthy plants, animals, and visual beauty. The role of land managers is to help care for the land and its ecosystems. Therefore, the CGTO applauds the efforts being designed to minimize the severe impacts of the ongoing drought. Conservation and preservation should become a high priority.

In order to convey the Native American meaning of these plants, a series of studies were conducted and the findings were negotiated into a set of criteria for assessing the cultural importance of each plant and of places where plant communities exist. The CGTO provided these cultural guidelines so that NEPA analysis and other agency decisions could be assessed from a Native American perspective.

See Appendix A for more details.

of the health of NTS ecosystems (DOE/NV 2006f, 2007b). NNSA/NSO conducts biological surveys at proposed NTS project sites for 43 flowering plant, 1 moss, 1 mollusk, 2 reptile, 19 bird, and 26 mammal species that are sensitive or protected under state or Federal regulations and known to occur on or adjacent to NTS (DOE/NV 2007b). Although the number of species that are monitored and protected at NTS increased, the number of species protected under the Endangered Species Act decreased since 1996, as several species were removed from the candidate list in 1997 (62 FR 49397). In addition, the falcon was de-listed in 1999 (64 FR 46541), and the bald eagle was de-listed in 2007 (72 FR 37345).

The list of permanent water sources (natural and manmade), which are important contributors to biological diversity at NTS, has also expanded since the *NTS EIS* was issued. The *NTS EIS* identified ten springs and 23 manmade ponds and impoundments (DOE 1996b). Approximately 30 natural water sources (wetlands, seeps, and springs) presently exist at NTS, although some are dry for most of the year. Additionally, 143 manmade impoundments (plastic-lined and earthen sumps) currently exist at NTS, but similar to natural water sources, not all of the manmade impoundments contain water year round (NTS 2007). During 2006, the Ecological Monitoring and Compliance Program monitored the condition of 12 natural water sources (wetlands, seeps, and springs) and 38 manmade water sources (sumps) (DOE/NV 2007b).

3.2.7 Air Quality and Climate

Climate

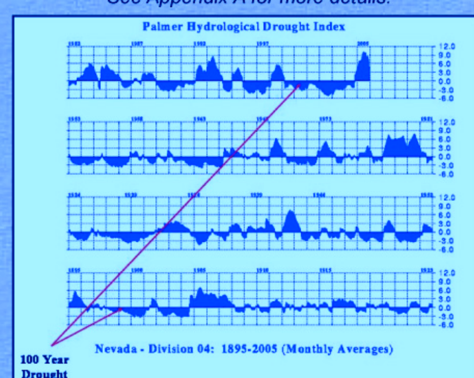
NTS is characterized by desert valley and Great Basin mountain topography and the climate is typical of the southwest deserts, with limited precipitation, low humidity, and large diurnal temperature ranges (DOE 1996b). The mean annual precipitation on NTS ranges from almost 33 centimeters (13 inches) on the higher elevations in the northwestern part of NTS to less than 13 centimeters (5 inches) at Frenchman Flat (Soule 2006). Although broad regional data may indicate drought-like conditions in the State of Nevada, local conditions can vary significantly in desert environments and site-specific data are more indicative of actual local conditions. NNSA/NSO monitors precipitation on NTS through a system of 17 rain gauge stations operated by National Oceanic and Atmospheric Administration, Air Resources Laboratory/Special Operations and Research Division. Based upon actual measurements, annual average precipitation on the NTS has remained consistent (or relatively constant) since installation of the rain gauges. **Table 3–9** provides a list of the NTS rain gauge stations, the average precipitation over the last 10 complete years, and the lifetime average precipitation since each station was installed. As shown in the table, the 10-year average precipitation for 10 stations is higher than the lifetime average; 5 stations show a slightly lower 10-year average precipitation as compared to the lifetime average; and 2 stations show no change (these stations have less than 10 years of data). The location of each NTS rain gauge station is illustrated in **Figure 3–2**.

Climate

CGTO

The CGTO maintains that during the last decade the NTS and surrounding region has experienced a meteorological drought. Current meteorological analysis suggests that this is a 10-year duration type drought and even could be the beginning of a longer drought episode. The region has not experienced a drought with these characteristics since a decade spanning the beginning of the 20th century. Therefore, this meteorological episode can be termed a 100-year drought. The early 20th century drought becomes an analog agains which to discuss the environmental implications of the current episode (see figure).

See Appendix A for more details.



Hydrological Drought Index for Southern Nevada (1895-2005)

Table 3–9 Comparison of Ten-Year Average Precipitation Levels to Long-Term Averages for Gauge Stations Located on the Nevada Test Site

Location/Name (designation on map Figure 3-2)	*10-Year Average (inches)*	*Long-Term Average (inches)*	*Initial Year of Monitoring Included in Long-Term Average*	*Difference Between 10 and 40 Year Averages (inches)*
Rainier Mesa (A12)	12.47	12.82	1959 to 1995 and 1997 to 2006 [a]	-0.35
Buster Jangle (BJY)	6.70	6.37	1960	+0.33
Cane Springs (CS)	7.47	7.82	1965	-0.35
Desert Rock (DRA)	6.14	5.81	1964	-0.33
Area 06 (South)	5.79	5.79	1997	0.00
Jackass Flats (4JA)	7.42	5.72	1958	+1.70
E Tunnel (ETU)	11.77	11.77	1997	0.00
Little Feller 2 (LF2)	7.76	8.09	1977	-0.33
Mercury (MER)	5.94	5.89	1972	+0.05
Mid Valley (MV)	9.60	9.19	1965	+0.41
40 Mile Canyon North (40M)	8.52	8.16	1960	+0.36
Pahute Mesa 1 (PM1)	8.00	7.73	1964	+0.27
PHS Farm (PHS)	8.22	7.56	1965	+0.66
Rock Valley (RV)	7.25	6.34	1964	+0.91
Tippipah Springs (TS2)	8.12	8.72	1961	-0.60
Well 5B (W5B)	4.98	4.92	1963	+0.06
Yucca Dry Lake (UCC)	6.82	6.67	1959	+0.15

[a] The Rainier Mesa station did not operate during 1996. The long-term average precipitation for this station is based on data collected from 1959 to 1995. The ten-year average precipitation is based on data collected from 1997 through 2006.

Note: To convert inches to centimeters, multiply by 2.54.

Source: NOAA/ARL 2007.

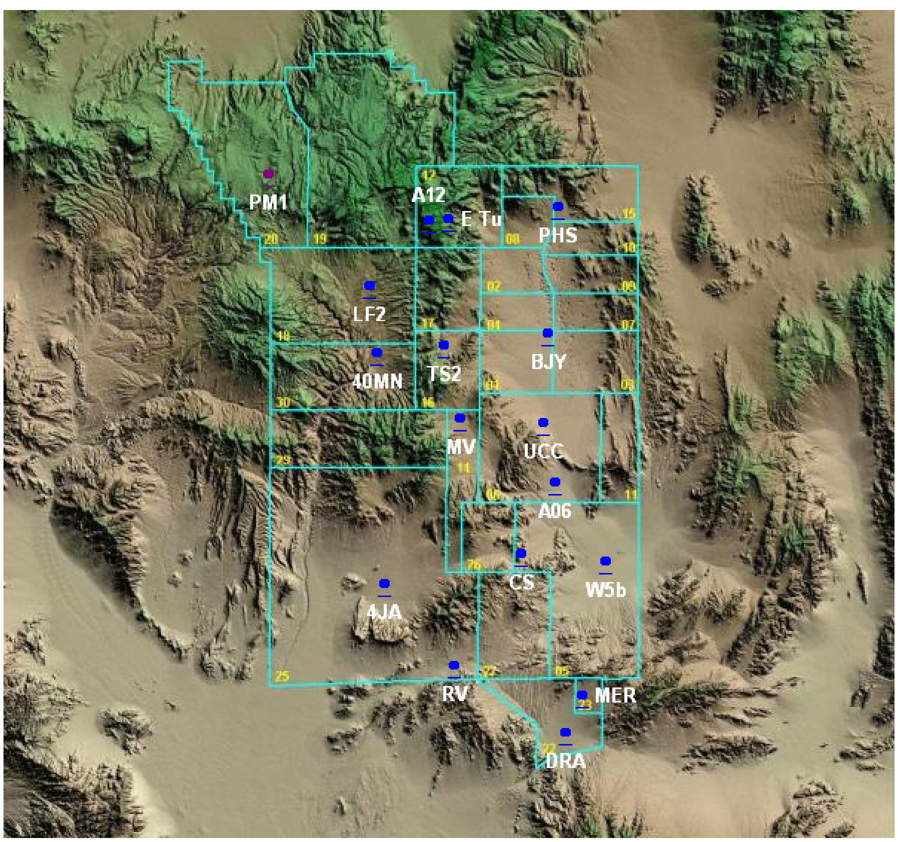


Figure 3–2 Location of Nevada Test Site Rain Gauges

Nonradiological Air Quality

NTS is located in Nye County in Nevada Intrastate Air Quality Control Region 147, which is currently unclassified/attainment status according to National Ambient Air Quality Standards (DOE/NV 2006f). The nearest non-attainment area is the Las Vegas area, which is part of Las Vegas Valley Hydrographic Area 212. The direct distance from the southern edge of NTS (Gate 100 near Mercury) to downtown Las Vegas (the intersection of Interstate 15 and U.S. Highway 95) is about 92 kilometers (57 miles) (NTS 2007). Clark County is in serious non-attainment for carbon monoxide and particulate matter less than 10 microns in diameter (PM_{10}). The nearest Class I areas are the Grand Canyon, which is approximately 210 kilometers (130 miles) to the southeast and Sequoia National Park, which is approximately 169 kilometers (105 miles) to the southwest (DOE/NV 2006f). In 2005, all operations at NTS were carried out, both cumulatively and individually, within the limits of the NTS Air Quality Operating Permit, which was issued by the Nevada Bureau of Air Pollution Control in June 2004. During that year, an estimated 3.32 metric tons (3.66 tons) of criteria air pollutants were released, including PM_{10}, carbon monoxide, nitrous oxides, sulfur dioxide, and 1.76 metric tons (1.94 tons) of volatile organic compounds. The total emission of lead was 6.60×10^{-3} metric tons (7.28×10^{-3} tons), while the total quantity of hazardous air pollutants released was 0.045 metric tons (0.05 tons). No emission limits for any criteria air pollutant or hazardous air pollutants were exceeded. Also during this year, the combined quantity of emitted criteria air pollutants and hazardous air pollutants at the North Las Vegas Facility was 1.262 metric tons (1.391 tons), ranging from 9×10^{-4} metric tons (0.001 tons) of hazardous air pollutants to 0.831 metric tons (0.916 tons) of nitrous oxides (DOE/NV 2006f). Actual emissions by year compared to projected emissions in the *NTS EIS* are presented in Section 4.7.1, Table 4–4.

Radiological Air Quality

Extensive monitoring is conducted at NTS for radiological parameters including particulates, tritium, noble gases, and tritiated water vapor (DOE 1996b). Offsite monitoring includes the Community Environmental Monitoring Program which independently confirms NTS compliance with air and water quality standards. The Community Environmental Monitoring Program includes the annual monitoring of radioactivity at 29 stations in towns and communities within 390 kilometers (240 miles) of NTS, as well as the annual monitoring of offsite wells and springs. Monitoring results for 2005 detected no airborne radioactivity related to historic or current NTS operations in any of the samples from the Community Environmental Monitoring Program particulate air samplers. Gross alpha and gross beta radioactivity and gamma-emitting radionuclides were detected at all Community Environmental Monitoring Program stations at levels which reflect radioactivity from naturally-occurring radioactive materials (DOE/NV 2006f). On site, several human-made radionuclides from legacy contamination were measured in air samples at levels above their minimum detectable concentrations in 2005 (DOE/NV 2006f). These levels were attributed to the resuspension of contamination in surface soils from historical nuclear testing legacy sites and to the evaporation and transpiration of tritium from the soil, plants, and containment ponds at legacy sites. Uranium isotopes ratios were close to what one would expect from naturally-occurring uranium in soil with possibly a slight contribution of enriched uranium; the ratios did not resemble those expected from depleted uranium. Gross alpha and gross beta radioactivity were detected at all stations at NTS. In 2005, combined plutonium-239 and plutonium-240, and tritium concentrations, as detected in onsite air monitors, continued to decline since the cessation of testing in 1992; results show an average decrease ranging from 38 percent to 91 percent and 52 percent to 99.7 percent, respectively (DOE/NV 2006f). Radiological emissions by year from 1993 through 2005 are presented in Section 4.7.2, Table 4–5.

3.2.8 Noise

In general, because of its remote location and large size, noise levels at the NTS boundaries have remained essentially the same since 1996. Major sources of noise at NTS include equipment and machines, blasting and explosives testing, and aircraft (DOE 2001b). Except for noise generated from aircraft operations at the Nevada Test and Training Range, typical noise levels at the site boundaries from most sources on NTS are barely distinguishable from background levels (DOE 2004c). Employment at NTS decreased since 1996, and as a result traffic-related noise at NTS is unchanged (or decreased).

Noise

CGTO

The CGTO knows that noise was offensive while traditional ceremonies were being held. In the last 15 years, data collected proved that while the traditional ceremony was occurring, the noise generated from military activities and other noise-bearing projects interrupted the spiritual importance of the ceremony. Because the thoughts and focus are interrupted, the balance, harmony, and well-being of the community as a whole become affected. The CGTO recommends setting aside quiet zones or periods near on the NTS where and when Indian people are conducting ceremonies.

3.2.9 Visual Resources

Scenic quality, visual sensitivity, and distance and/or visibility from key public viewpoints at the NTS are unchanged from 1996. Because the southern boundary of the NTS is surrounded by various mountain ranges, including the Spector Range, Striped Hills, Red Mountain, and the Spotted Range, views from U.S. Highway 95 are limited to Mercury Valley and portions of the southwestern sector of NTS, which can be seen from Amargosa Valley.

Visual Resources

CGTO

All landforms within the NTS have high sensitivity levels for American Indians. The ability to see the land without the distraction of buildings, towers, cables, roads, and other objects is essential for the spiritual interaction between Indian people and their traditional lands. Landscape modifications should be done in consultation with American Indians.

Views from places are an important cultural resource in itself that contributes to the location and performance of American Indian ceremonialism. Views combine with other cultural resources to produce special places where power is sought for medicine and other types of ceremony. Views can be of any landscape, but more central viewscapes are experienced from high places, which are often the tops of mountains and the edges of mesas. Indian viewscapes tend to be panoramic and are made special when they contain highly diverse topography. The viewscape panorama is further enhanced by the presence of volcanic cones and lava flows. Viewscapes are tied with songscapes and storyscapes especially when the vantage point has a panorama composed of multiple locations from either song or story. Key in the Indian experience of viewscapes is isolation. Successful performances of ceremony are often commemorated by the building of rock cairns and by rock peckings and paintings.

The CGTO tribes recognize the cultural significance of viewscapes and have identified a number of these on the NTS. The Timber Mountain Caldera contains a number of significant points with different panoramas including Scrugham Peak-Buckboard Mesa and Shoshone Mountain. The CGTO feels this revisiting of such sites should continue as a renewal to recharge the spirits, to say prayers, to sing songs, and to monitor the condition of the cultural site. Special considerations should be given to tribal elders and the youth to accommodate and provide educational leeway to experience the positive effect of their culture.

3.2.10 Cultural Resources

The *NTS EIS* (DOE 1996b) identified the presence of important archaeological resources throughout NTS, ranging from early sites dating to the first populating of the New World, through the historic period, and up through the development of nuclear testing and the sites and structures associated with that activity and the Cold War. In 1996, approximately 4.68 percent or 16,387 hectares (40,491 acres) of NTS had been surveyed, producing a large database documenting over 1,700 cultural resources. By 2005, the latest date for which cultural resources information is summarized, the NTS cultural resources program had surveyed an additional 7,082 hectares (17,500 acres), doubling the number of recorded resources to over 3,600, including more than 41 buildings, and another 600 buildings dating to the Cold War that have not been documented or evaluated for the National Register of Historic Places eligibility. The total of National Register of Historic Places-eligible resources is over 1,100 (DOE 2002c; DOE/NV 2002b, 2004c, 2005e, 2006f).

The NTS *Cultural Resources Management Plan* describes cultural resources management policies and procedures at the time of the *NTS EIS* (DOE/NV 2002b). Additional archaeological and architectural surveys on NTS under the auspices of the National Historic Protection Act, Section 110 (inventory) and Section 106 (related to undertakings) will continue to encounter cultural resources, many of which will be determined to be eligible for listing on the National Register of Historic Places. Continued consultation with the CGTO will identify resources of traditional importance. All resources will continue to be managed in compliance with the specific procedures outlined in the *Cultural Resources Management Plan* and with relevant laws and regulations. Although additional sites have been recorded and evaluated for the National Register of Historic Places eligibility, site inventory procedures, investigative measures, impact mitigation policies, and the general state of knowledge has not changed since 1996. NNSA/NSO remains sensitive to the presence of significant cultural resources, and continues to comply with Section 106 of the National Historic Preservation Act and other regulations.

3.2.11 Human Health

This section addresses radiological impacts to the public and workers, as well as occupational health and safety. A radiological primer is included in the front matter of this SA. Nonradiological health and safety impacts to the public are above detection levels, and all sample concentrations obtained by DOE contractors or the Community Environmental Monitoring Program were within the range of concentrations indicative of analytical background levels. No gamma-emitting radionuclides were found in any well or spring, and gross alpha and beta radioactivity (likely from background sources) were below drinking water standards (DOE/NV 2006f).

The potential for public radiation exposure from consumption of contaminated game animals was not addressed in the *NTS EIS*, but is addressed in annual NTS environmental reports. Each year, the results of small game animals sampling from different contaminated sites at NTS are used to construct scenarios for radiation dose to hunters who might take and consume the animals after the animals had left NTS. Although the assumptions for the types, numbers, and radionuclide content within game animals have changed each year since the *NTS EIS* was issued, hypothetical radiation doses from consumption of contaminated animals have not exceeded 1.2 millirem in a year (see Section 4.11). This compares to the 100 millirem per year limit specified in DOE Order 5400.5 for exposure of the public from all routine DOE activities.

Radiological Safety of Workers

Radiological operations are conducted using technical and administrative controls to ensure that radiation doses received by workers are maintained at levels as low as reasonably achievable and do not exceed DOE occupational dose limits. The *NTS EIS* estimated an annual collective radiation dose risk to workers corresponding to 45 person-rem, assuming nuclear testing occurred, or 32.5 person-rem, assuming no nuclear testing. From 1996 through 2002, collective worker doses ranged from 0.4 to 1.6 person-rem, or an average of about 1.1 person-rem per year, which is much smaller than the *NTS EIS* projection. But for 2003 and 2005, the collective dose was about three times as large as the 1996-2002 average, and for 2004, the collective dose was about six times as large. The number of exposed workers was also larger. (This increased dose and number of exposed workers at NTS resulted from increased radioactive waste management activities, including examination, characterization, repackaging, and shipment of transuranic waste to WIPP, and receipt of low-level and mixed low-level radioactive wastes for disposal.) Nonetheless, annual collective worker doses for 2003 through 2005 were all smaller than those projected in the *NTS EIS*. Furthermore, the average dose among all workers receiving a measurable dose remained fairly stable from 1996 through 2005. The average dose ranged from 30 to 77 millirem, or never more than a factor of two different than the average, 54 millirem. This average worker dose was 27 percent smaller than the DOE average during this period (DOE 1996d, 1999a, 2002a, 2005).

Occupational Health and Safety

The *NTS EIS* found that worker occupational risks would be primarily associated with waste handling, construction, environmental restoration, and decontamination and demolition activities. A total of 773 injuries and 9 worker fatalities were predicted over ten years (DOE 1996b). The *2002 NTS SA* noted the continuation of a comprehensive occupational health and safety program, and concluded that there was no evidence that expected changes in NTS missions would cause occupational safety and health risks that would exceed those reported in the *NTS EIS* (DOE 2002c).

DOE's Computerized Accident/Incident Reporting System (CAIRS) was queried for injury and illness information, and for accidents involving government-owned vehicles.[4] Although the total number of hours worked showed an upward trend between 1996 and 2005, the rate of total recorded cases per 200,000 hours worked remained fairly stable, as did the rates of accident cases causing days away from work, restricted work, or job transfer (DART cases). These accident statistics are comparable to those for the DOE Complex as a whole. In 2006, the total recorded cases rate at NTS was 2.3, the DART case rate was 0.9, and the DART rate was 50.8; there were no fatalities. (The comparative rates for 2006 over all DOE were 1.6, 0.7, and 27.9; there

[4] *CAIRS can be accessed at http://hss.energy.gov/CSA/Analysis/cairs.*

was one fatality.) The NTS total recorded cases rate for 2006 was 10 percent larger than the 10-year NTS average, while the NTS DART rate was 20 percent larger than the 10-year NTS average. Still, the values for these parameters for 2006 were not outside the ranges for these parameters in previous years at NTS. From 1996 through 2004, accident rates for government vehicles at NTS averaged 0.5 accidents per million vehicle miles, while overall DOE accident rates over this period averaged 1.7 accidents per million vehicle miles.

Regarding risks from handling accidents involving toxic or hazardous chemicals, the *NTS EIS* referenced worker programs requiring adherence to Federal and state laws, DOE orders, and plans and procedures for performing work including training, monitoring, use of personnel protective equipment, and administrative controls. The *NTS EIS* indicated that the North Las Vegas Facility stored and used few hazardous materials in amounts greater than the threshold planning quantities that require reporting under Federal regulations (DOE 1996b). For the *2002 NTS SA*, NTS chemical inventories were reviewed to identify any substantial increases or decreases in chemical source terms. Although chemical inventories might increase in response to ongoing activities, administrative controls ensure that quantities would not approach the levels addressed in the *NTS EIS* (DOE 2002c).

Beryllium can cause acute respiratory disease (for which a workplace air concentration limit has long been in place) and chronic beryllium lung disease. On December 8, 1999, DOE codified the Chronic Beryllium Disease Prevention Program (64 FR 68853), and on February 9, 2006, DOE included the program in worker safety and health regulations established to govern contractor activities at DOE sites (71 FR 6857). NNSA has implemented the program at NTS to reduce the number of workers potentially exposed to beryllium while at work, minimize the potential for exposure and levels of exposure to beryllium, and establish a medical surveillance program for early detection of the disease (DOE 2002c). DOE sponsors and funds a screening program for former DOE workers who may have been exposed to beryllium at NTS and other DOE sites. In August 2003, beryllium was found in Buildings B-1, B-2, and B-3 at the North Las Vegas Facility. It was determined that most of the beryllium was naturally-occurring, and that the limited samples of beryllium were from copper-beryllium alloys milled in Building B-1 in the 1980s. Buildings B-1 and B-2 were demolished in 2004, while Building B-3 will be renovated and reoccupied (NNSA/NV 2004a, 2004b).

3.2.12 Waste Management

Waste types managed at NTS principally include low-level radioactive waste, mixed low-level radioactive waste, transuranic waste (including mixed transuranic waste), chemical wastes (particularly hazardous and PCB-contaminated wastes), and solid non-hazardous waste. NTS also operates facilities for disposal of low-level and mixed low-level radioactive wastes, facilities for evaporating tritiated water, an explosive ordnance disposal unit, a hydrocarbon-contaminated waste disposal facility, landfills, and a sanitary wastewater treatment system. The status of the principal waste management activities evaluated in the *NTS EIS* is summarized in Section 3.1.2.1, Table 3–2.

Because NTS is one of two regional low-level and mixed low-level radioactive waste disposal sites for the DOE Complex, most low-level and mixed low-level radioactive wastes disposed at NTS originate from outside the State of Nevada. Low-level radioactive waste disposal continues at the Area 5 RWMS; the Area 3 RWMS was recently placed on standby (Di Sanza and Carilli 2006). In accordance with the December 2005 renewal of the NTS Hazardous Waste Permit, NTS is limited to no more than 20,000 cubic meters (about 710,000 cubic feet) of mixed waste received from offsite generators, and must permanently close the only operating mixed waste disposal unit (in the Area 5 RWMS) by December 2010. The *NTS EIS* proposal to construct an expanded mixed waste storage unit at NTS has not been implemented.

Since the *NTS EIS*, about half of the legacy transuranic and mixed transuranic waste stored at NTS was shipped for offsite disposal at WIPP. The remaining legacy waste is being prepared for offsite disposition. Newly generated transuranic waste from the JASPER facility (about 23 cubic meters [810 cubic feet] per year) is currently being stored but is also being prepared for offsite disposition. Prior to DOE's determination that all transuranic and mixed transuranic waste would be disposed at WIPP, transuranic waste was intentionally disposed at NTS as part of the greater confinement disposal program; inadvertent disposal occurred in 1986 when a shipment of transuranic waste was disposed in a classified trench at the Area 5 RWMS. An analysis showing compliance with EPA 40 CFR Part 191 requirements for the greater confinement disposal transuranic waste disposal was completed and approved by DOE (Colarusso et al. 2003). A Part 191 analysis was also prepared for the inadvertent Area 5 disposal. The analytical conclusion was that the Part 191 requirements could be met but a final DOE decision on the disposition of the inadvertently disposed waste is pending (DOE/NV 2006c).

Waste Management

CGTO After 5 years the CGTO continues to have reservations in regards to the storage of low-level and other hazardous wastes at the NTS and the transportation of low-level waste to the NTS for storage. The CGTO still maintains that what was suggested 5 years ago still exists and affects cultural resources. Because of improper disposal, it diminishes visitation by members of the CGTO representatives and other Indian people. The CGTO still believes that the waste should be disposed of in a culturally appropriate manner and that the transportation of low-level radioactive waste poses risks to the people and the environment. Previous reports on this issue document the extent and depth of our concerns for these issues.

Activity on the NTS is ongoing in regards to non-Nevada low-level radioactive waste. The NTS presently uses the Disposal Crater Complex, which is expected to close by 2010. Although the NTS has future low-level radioactive waste disposal pits on standby, there is a possibility that additional craters would need to be developed. Disposal of the following materials is performed at the NTS: Nevada-generated low-level radioactive waste, mixed low-level radioactive waste, greater confinement disposal waste, asbestiform low-level radioactive waste, Nevada-generated mixed waste and transuranic waste, and mixed transuranic waste. These materials are stored on-site until shipped elsewhere. The CGTO remains on record as opposed to this type of practice as it will soon limit cultural activities involving the Indian tribes.

Hazardous waste generated at NTS may be stored temporarily in the RCRA-permitted Hazardous Waste Storage Unit located in Area 5.[5] Mixed wastes generated at NTS may be stored on the Transuranic Pad in the Area 5 RWMS, pursuant to the 1995 modification to the Mutual Consent Agreement (see Section 3.3.3). The *NTS EIS* proposal to expand the hazardous waste storage capacity at NTS was not implemented. Waste containing regulated concentrations of PCBs may be temporarily stored at NTS before offsite shipment for treatment or disposal. However, low-level radioactive waste containing regulated concentrations of PCBs may be accepted for disposal at NTS under the same volume and time restrictions applicable for mixed low-level radioactive waste.

NTS continues to operate three permitted landfills for disposal of non-hazardous waste:[6] Area 6 Hydrocarbon Disposal Site (Permit SW 13 097 02), Area 9 U10c Disposal Site (Permit SW 13 097 03), and Area 23 Landfill (Permit SW 13 097 04). Soils and sludge contaminated with hydrocarbons are disposed in the Area 6 Hydrocarbon Disposal Site, while inert debris such as construction waste and demolition debris is disposed in the Area 9 U10c Disposal Site. The Area 9 U10c landfill can also accept small quantities of hydrocarbon waste. The Area 23 landfill can accept less than 18 metric tons (20 tons) daily (based on an annual average) of sanitary solid waste. All landfills only accept waste from NTS and offsite Nevada locations under NNSA/NSO control (DOE 2002c).

NTS continues to dispose of tritiated liquids by evaporation. Containment ponds in Area 12 are used for evaporation of tritiated water collected from E Tunnel, while tritiated water removed from characterization wells (such as some wells in Area 20) may be placed in open tanks for evaporation.

Nonradioactive explosive wastes generated at NTS from tunnel operations, the NTS Security firing range, the resident national laboratories, and other NTS activities may be treated by open detonation at the Explosive Ordnance Disposal Unit in Area 11. The Explosive Ordnance Disposal Unit is a detonation pit permitted

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[5] Much of the hazardous waste generated at NTS is from environmental restoration. Much of the environmental restoration waste is delivered directly as bulk shipments (dump trucks, rolloff boxes) to offsite treatment and disposal facilities. The Hazardous Waste Storage Unit only manages packaged (non-bulk) hazardous waste (DOE/NV 2004c).
[6] An additional permit (SW 13 097 02) is for landfill of asbestiform low-level radioactive waste in the Area 5 Asbestiform Low-Level Solid Waste Disposal Unit (PO6U).

under RCRA and surrounded by an earthen pad about 8 meters (25 feet) by 31 meters (100 feet), and includes ancillary equipment including a bunker, electric shot box, and electric wire. DOE is allowed to detonate a maximum of 45.4 kilograms (100 pounds) of approved waste at a time, not to exceed one detonation event per hour. The maximum annual treatment capacity is 1,873 kilograms (4,100 pounds).

Domestic and industrial wastewater is treated using sewage lagoons or septic systems located throughout NTS. Sludge removed from the systems is disposed in the Area 23 sanitary landfill or the Hydrocarbon Disposal Site in Area 6, depending on the hydrocarbon content. Portable sanitary units are provided at areas not serviced by permanent wastewater systems. The NTS sanitary waste disposal system has been judged by DOE to be in fair to adequate condition. In fiscal year 2003, blocked underground sewage system lines were cleared for those systems still in use. Because then-existing sewage lagoons lacked sufficient flow to stay compliant with Nevada requirements, seven septic systems were installed allowing the lagoons to be bypassed. Other than the Area 23 Mercury and Area 6 Yucca Lake systems, all sewage lagoon systems have been replaced by septic systems. Installation of these septic systems enabled NTS to meet current site needs and to comply with state regulations (DOE 1996b, 2002c; DOE/NV 2005d; NTS 2007).

3.2.13 Environmental Justice

The region of influence for environmental justice for the *NTS EIS* and this SA includes Nye, Clark, and Lincoln Counties (DOE 1996b).

Minority Populations

Table 3–10 compares the distributions of minorities in the region of influence, the State of Nevada, and the United States between the 1990 and 2000 censuses (Census 2007b). As indicated in the table, the proportions of minorities in the state increased by 14 percent and national populations increased by 7 percent during the decade. Within the NTS region of influence, the proportion of minorities increased by 15 percent in Clark County and 3 percent in Nye County, while the proportion in Lincoln County remained the same from 1990 to 2000. As estimated by the Nevada State Demographer's Office, Clark County has the highest proportion of minorities in the region of influence; since the 2000 census, the county's proportion increased by 3 percent (NSBDC 2007b). The proportions of minorities in Nye and Lincoln Counties declined slightly since 2000.

NTS is located within census tract 9805 of Nye County, for which no demographic data was recorded in the 2000 census. Tract 9805 is surrounded by census tracts 9802 to the north, 9803 to the west and south, and 9804.01 through 9804.06 to the south in Nye County; tracts 58.18 and 59 to the southeast in Clark County; and tract 9502 (block group 1) to the east and northeast in Lincoln County. As indicated in Table 3–10, none of these census tracts has a minority distribution exceeding 50 percent of the total population or that is meaningfully greater than the proportion of minorities in the general populations of respective counties. The proportions of minorities in the census tracts in Nye County increased by 6 to 9 percent from 1990 to 2000, and the proportions of minorities in tracts 9802 and 9803 are slightly higher than the proportion in Nye County as a whole. The proportion of minorities in tracts 9804.01 through 9804.06 is comparable to the distribution in the county. In Clark County, the proportion of minorities in census tract 58.18 increased by 19 percent between the 1990 and 2000 census, while the proportion of minorities in tract 59 declined by 17 percent. Both tracts have smaller proportions of minorities than Clark County as a whole. Tract 9502, block group 1, which includes the western part of Lincoln County, experienced no change in the relatively low proportion of minorities during the decade, which is comparable to the distribution in the county as a whole.

Table 3–10 Local and Regional Distributions of Minority Populations

County	*1990 Census (percent minorities)* [a]	*2000 Census (percent minorities)* [a]	*2005 Estimate (percent minorities)* [b]
Nye County	12	15	14
Tract 9802	10	18	—
Tract 9803	10	19	—
Tract 9804 (all)	8	14	—
Clark County	25	40	43
Tract 58.18	20	39	—
Tract 59	42	25	—
Lincoln County	10	10	7
Tract 9502 BG 1	9	9	—
Nevada	21	35	38
United States	24	31	—

[a] Source: Census 2007b.
[b] Source: NSBDC 2007b.

Low-Income Populations

Table 3–11 compares the distributions of residents having incomes below the poverty level in the region of influence, the State of Nevada, and the United States between the 1990 and 2000 censuses (Census 2007b). As indicated in the table, the proportions of residents having incomes below poverty levels in the state and national populations remained relatively constant during the decade. Within the NTS region of influence, the proportions of low-income residents remained constant in Clark and Nye Counties, while the proportion in Lincoln County increased slightly during the decade.

As indicated, none of the census tracts surrounding NTS has a low-income population exceeding 50 percent of the total population or that is meaningfully greater than the proportion of residents below poverty in the general populations of respective counties. The proportion of low-income population remained relatively constant from 1990 to 2000 in all of the local census tracts. Only tract 9802 in Nye County and tract 58.18 in Clark County experienced increases in low-income populations (by 2 percent) during the decade. The other census tracts surrounding the NTS recorded declines in the proportions of low-income residents.

Table 3–11 Local and Regional Distributions of Low-Income Populations

County	*1990 Census (percent below poverty)*	*2000 Census (percent below poverty)*
Nye County	11	11
Tract 9802	9	11
Tract 9803	16	14
Tract 9804 (all)	12	11
Clark County	11	11
Tract 58.18	9	11
Tract 59	19	8
Lincoln County	14	16
Tract 9502 BG 1	16	14
Nevada	10	10
United States	13	12

Source: Census 2007b.

3.2.14 American Indian Resources

The CGTO knows, based upon its collective knowledge of Indian culture and past American Indian studies, that American Indian people view cultural resources as being integrated. Thus certain systematic studies of a variety of American Indian cultural resources must be conducted before the cultural significance of a place, area, or region can be fully assessed. Although some of these studies have been conducted, in other areas studies have not begun. A number of studies are currently planned.

Indian people can fully assess the cultural significance of a place and its associated natural and cultural resources when all studies have been completed and our governments and tribal organizations have reviewed the recorded thoughts of our elders and have officially supported these conclusions. American Indian studies focus on one topic at a time so that tribes and organizations can send experts in the subject being assessed. The following is a list of studies for a complete American Indian assessment:

1) Ethnoarchaeology – the interpretation of the physical artifacts produced by our Indian ancestors
2) Ethnobotany – the identification and interpretation of the plants used by Indian people
3) Ethnozoology – the identification and interpretation of the animals used by Indian people
4) Rock Art – the identification and interpretation of traditional American Indian paintings and rock peckings
5) Traditional Cultural Properties – the identification and interpretation of places of central cultural importance to a people, called Traditional Cultural Properties; often Indian people refer to these as "power places."

Native American Indian properties and interpretations shall be determined by a Native American Indian spiritual person when:

A) Cleansing (removing negatives)
B) Purifications/preperations (repatriating and related issues)

6) Ethnogeography – the identification and interpretation of soils, rocks, water, and air
7) Cultural Landscapes – the identification and interpretation of special units that are culturally and geographically unique areas for American Indian people.

When all of these subjects have been studied, then it will be possible for American Indian people to assess three critical issues: (1) What is the natural condition of this portion of our traditional lands? (2) What has changed due to DOE activities? and (3) What impacts will proposed alternatives have on either furthering existing changes in the natural environment or restoring our traditional lands to their natural condition? Indian people believe that the natural state of their traditional lands was what existed before 1492, when Indian people were fully responsible for the use and management of these lands.

The NTS and nearby lands were central to the Western Shoshone, Owens Valley Paiute, and Southern Paiute people. The lands were central in the lives of these people and so were mutually shared for religious ceremony, resource use, and social events. When Europeans encroached on these lands, the number of Indian people, their relations with one another, and the condition of their traditional lands began to change. European diseases killed many Indian people; European animals replaced Indian animals and disrupted fields of natural plants; Europeans were guided to and then assumed control over Indian minerals; and Europeans took Indian agricultural areas.

Despite the pollution and destruction of some cultural resources and the physical separation from the NTS and neighboring lands, Indian people continue to value and recognize the central role of these lands in their continued survival. Recognizing this continuity in traditional ties between the NTS and Indian people, the DOE in 1985 began long-term research involving the inventory and evaluation of American Indian cultural resources in the area. This research was designed to comply with the American Indian Religious Freedom Act (AIRFA), which specifically reaffirms the First Amendment of the U.S. Constitution rights of American Indian people to have access to lands and resources essential in the conduct of their traditional religion. These rights are exercised not only in tribal lands, but also beyond the boundaries of a reservation.

To reinforce their cultural affiliation rights to prevent the loss of ancestral ties to the NTS, 17 tribes and organizations have aligned themselves to form the CGTO. This group is formed by officially appointed representatives who are responsible for representing their respective tribal concerns and perspectives. The CGTO has established a long standing relationship with DOE. The primary focus of the group has been the protection of cultural resources.

DOE and the CGTO have participated in cultural resource management, including the Yucca Mountain Project, the Underground Weapons Testing Project, the Rock Art Study, the Water Bottle Canyon Interpretation and Traditional Cultural Property Study and the Timber Mountain Caldera Study. These studies are used in this report, along with the collective knowledge of the CGTO, as the basis of the comments in the 1996 *NTS EIS*, *2002 NTS SA*, and this SA. The cultural resource management projects sponsored by DOE have been extremely useful for expanding the inventory of American Indian cultural resources beyond the identification of archaeological remains and historic properties.

It is clear that site properties have been changed (rearranged and removed). In 2004, during the Traditional Cultural Property determination study of Water Bottle Canyon, the CGTO and the escort discovered and varied that the small rock ring was dismantled and there were cultural and spiritual artifacts removed. The CGTO recommends that DOE create a full-time monitoring position similar to the Bureau of Land Management and Forest Service's rangers and monitors. The purpose of this position would be to inventory site properties by using an acceptable recording system. The monitor would report any changes to the CGTO. The details would be worked out at a later date.

The NTS lands are held in high regard for all affiliated tribes of the CGTO. The relationship is strong and to help keep it positive and alive, the CGTO always seeks to improve the resources available to it. One important issue that the CGTO would like the land managers to consider is to improve the status of consenting to hire a permanent Native American Indian monitor position. This position should be budgeted and taken into consideration. The CGTO believes right now the situations on the NTS lands are good but there is room for improvement. With this request, the CGTO feels that the relationship between the affiliated tribes, the NTS lands and the land managers will only help strengthen the resource and ties for everyone.

See Appendix A for more details.

3.3 Regulations

This section presents changes in applicable Federal laws and regulations and State of Nevada regulations and agreements that have occurred since the *NTS EIS*. Also, new missions and projects were examined to identify newly applicable requirements.

3.3.1 Federal Environmental Statutes and Regulations

Homeland Security Act of 2002, 6 *United States Code* (U.S.C.) 101 et seq., enacted by Public Law 107-296. The act establishes the U.S. Department of Homeland Security, integrating the functions of organizations related to national security. The Act authorizes the U.S. Department of Homeland Security to enter into work agreements, joint sponsorships, contracts, and any other agreement with DOE regarding the use of the national laboratories or sites and support of the science and technology base at those facilities.

Resource Conservation and Recovery Act of 1976, 42 U.S.C. 6901 et seq., enacted by Public Law 94-580, as amended. In February 1997, EPA finalized regulations which clarify when conventional and chemical military munitions become a hazardous waste under RCRA. The new provisions clarify what actions and conditions constitute "intended use" of military munitions and therefore are not subject to RCRA regulation. The following regulations were amended: 40 CFR Parts 260, 261, 262, 263, 264, 265, 266, and 270.

Clean Air Act, 42 U.S.C. 7401 et seq., enacted by Public Law 90-148, as amended. Since the *NTS EIS*, states including Nevada have issued permits for emission sources under Title V of the Clean Air Act amendments. In October 2006, EPA lowered the National Ambient Air Quality Standard for particulate matter less than 2.5 micrometers in diameter (referred to as $PM_{2.5}$) (71 FR 61143). The current air quality permit for NTS does not regulate $PM_{2.5}$, but the standard could be imposed if new permitting actions are undertaken.

Safe Drinking Water Act of 1974, 42 U.S.C. 3001 et seq., enacted by Public Law 93-523, as amended. In December 2000, EPA added uranium to the list of radionuclides regulated and revised monitoring methods for some radionuclides (65 FR 76708). EPA also reorganized the drinking water provisions, with maximum contaminant levels for radionuclides now specified in 40 CFR Part 141.66 (65 FR 76708). In January 2001, EPA adopted a new, more stringent maximum contaminant level for arsenic (66 FR 6976). For perchlorate, EPA established an official reference dose in February 2005, but has not yet determined whether a maximum contaminant level will be promulgated (EPA 2006). The maximum contaminant levels are used as groundwater protection standards and performance objectives for the radiological performance assessments conducted under DOE Order 435.1, Radioactive Waste Management.

Military Lands Withdrawal Act of 1999, Public Law 106-65. The Act on October 5, 1999, renewed the withdrawal of lands known as Pahute Mesa that are an integral part of the NTS and include the site of nuclear weapons testing activities. Pursuant to the Act, these lands were transferred from the U.S. Department of Defense to DOE, thus aligning jurisdictional responsibilities consistent with DOE's retention of environmental safety and health responsibilities at the NTS.

Jurisdictional Wetlands under the Clean Water Act. The Clean Water Act prohibits the discharge of pollutants (including dredged or fill material) into "waters of the U.S.," except as authorized by a permit. Joint guidance by EPA and the U.S. Army Corps of Engineers, issued in response to a June 2006 Supreme Court decision, provides new guidelines for determining whether tributaries and wetlands are waters of the U.S. and are regulated under the Clean Water Act (EPA and Army 2007). Based on the new guidance, no wetlands at NTS are expected to qualify as waters of the U.S.; a site-specific evaluation by the U.S. Army Corps of Engineers, based on the new guidance, will be determinative.

3.3.2 Executive Orders

Executive Order 13007 (Indian Sacred Sites). This Order, issued May 24, 1996 as the *NTS EIS* was being finalized, directs Federal land management agencies, to the extent practicable, (1) to allow access to and ceremonial use of Indian sacred sites by Indian religious practitioners, and (2) to avoid adversely affecting the physical integrity of Indian sacred sites.

Executive Order 13045 (Protection of Children from Environmental Health Risks and Safety Risks). This Order, issued on April 21, 1997, requires each Federal agency to identify and assess environmental health risks and safety risks that may disproportionately affect children and ensure that its programs address disproportionate risks to children.

Executive Order 13112 (Invasive Species). This Order, issued on February 3, 1999, directs each Federal agency, whose actions may affect the status of invasive species, to take action to prevent the introduction of invasive species and promote restoration of native species and natural habitat.

Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments). This Order, issued on November 6, 2000, requires each agency to establish an accountable process to ensure meaningful and timely input by tribal officials in the development of regulatory policies that have tribal implications. The Order recognizes the right of American Indian tribes to self-government and requires that tribal sovereignty be considered when formulating and implementing agency policies.

Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds). This Order, issued on January 10, 2001, requires each Federal agency, whose actions have or are likely to have a measurable negative effect on migratory birds, to enter into a Memorandum of Understanding with the U.S. Fish and Wildlife Service. The Memorandum of Understanding defines the steps the agency must take to protect migratory birds.

Executive Order 13423 (Strengthening Federal Environmental, Energy, and Transportation Management). This Order, issued on January 24, 2007, requires that Federal agencies conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions in an environmentally, economically and fiscally sound, integrated, continuously improving, efficient, and sustainable manner.

3.3.3 DOE Regulations and Orders

Through the authority of the Atomic Energy Act, as amended, DOE is responsible for establishing comprehensive health, safety, and environmental programs for its facilities. The regulatory mechanisms through which DOE manages its facilities are regulations and orders.

The regulations address such areas as energy conservation, administrative requirements and procedures, nuclear safety, and classified information. For purposes of this SA, relevant regulations include 10 CFR Part 820, *Procedural Rules for DOE Nuclear Facilities*; 10 CFR Part 830, *Nuclear Safety Management, Contractor and Subcontractor Activities*; 10 CFR Part 835, *Occupational Radiation Protection*; 10 CFR Part 850, *Chronic Beryllium Disease Prevention Program;* 10 CFR Part 851, *Worker Health and Safety Program*; and 10 CFR Part 1021, *National Environmental Policy Act Implementing Procedures*. On June 8, 2007, DOE amended 10 CFR Part 820 to take into account the establishment of NNSA; 10 CFR Part 835 was amended to incorporate lessons learned since the initial adoption of these regulations, comments from the Defense Nuclear Facilities Safety Board and members of the public, new recommendations from the International Commission on Radiological Protection, and the establishment of NNSA (72 FR 31904). On December 8, 1999, DOE promulgated 10 CFR Part 850 to establish a chronic beryllium disease prevention program; the program improves and codifies provisions of a temporary chronic beryllium disease prevention program established by DOE directive in 1997 (64 FR 68853). On February 9, 2006, DOE published a final rule to establish worker safety and health regulations governing contractor activities at DOE sites; this program codifies and enhances the worker protection program already in operation, including the chronic beryllium disease prevention program (71 FR 6857).

DOE Order 435.1, *Radioactive Waste Management*, issued in 1999 (Change 1 was added to the Order on August 28, 2001), and its associated Manual (DOE M 435.1-1) establish requirements for managing radioactive waste (including mixed waste) to provide radiological protection related to facilities, operations, and activities. Low-level radioactive waste disposal facilities, including NTS low-level radioactive waste disposal facilities, are required to have the following specific waste management controls: performance assessments, composite analyses, disposal authorization statements, closure plans, waste acceptance requirements, and monitoring plans. NNSA/NSO compliance with this order is ongoing. Performance assessments and composite analyses have been conducted for the radioactive waste disposal facilities in Areas 3 and 5.

Applicable DOE Orders that have been revised since 1996 are identified in **Table 3–12**.

State of Nevada Requirements

Hazardous Materials. The State of Nevada codified its Regulation of Highly Hazardous Substances (Nevada Administrative Code [NAC] 459.952 to 459.95528) in January 2000. The regulation requires facilities that have listed highly hazardous substances in threshold quantities to conduct a hazard assessment, implement prevention and emergency response programs, and submit assessment and annual compliance reports. NTS manages their hazardous materials in accordance with Federal, state, and NNSA requirements.

***Storage Tank and Cleanup of Discharged Petroleum*.** In January 2000, the State of Nevada promulgated storage tank regulations (NAC 459.9921 to 459.9995). The new regulations adopted Federal regulations at 40 CFR Part 280. Regulations addressing the cleanup of discharged petroleum (NAC 590.700 to 590.810) were promulgated in March 2000. NTS will continue to operate, maintain, and close storage tanks and clean up any discharged petroleum in accordance with these regulations.

Table 3–12 Revised or New DOE Orders

DOE Order/Number	*Subject (date)*
Leadership/Management/Planning	
O 151.1C	Comprehensive Emergency Management System (11/02/05)
O 153.1	Departmental Radiological Emergency Response Assets (06/27/07)
Information and Analysis	
O 231.1A	Environment, Safety, and Health Reporting (08/19/03; Change 1, 06/03/04)
Work Process	
O 413.3A	Program and Project Management for the Acquisition of Capital Assets (07/28/06)
O 414.1C	Quality Assurance (06/17/05)
O 420.1B	Facility Safety (12/22/05)
O 425.1C	Startup and Restart of Nuclear Facilities (03/13/03)
O 430.1B	Real Property Assessment Management (09/24/03)
O 433.1A	Maintenance Management Program for DOE Nuclear Facilities (02/13/07)
O 435.1	Radioactive Waste Management (07/09/99; Change 1, 08/28/01)
O 440.1B	Worker Protection Management for DOE Federal and Contractor Employees (05/17/07)
O 450.1	Environmental Protection Program (01/15/03; Change 2, 12/07/05; Admin Change 1, 01/03/07)
O 451.1B	National Environmental Policy Act Compliance Program, (10/26/00; Change 1, 09/28/01)
O 460.1B	Packaging and Transportation Safety (04/04/03)
O 460.2A	Departmental Materials Transportation and Packaging Management (12/22/04)
O 461.1A	Packaging and Transfer or Transportation of Materials of National Security Interest (04/26/04)
O 470.2B	Independent Oversight and Performance Assurance Program (10/31/02)
O 470.4A	Safeguards and Security Program (05/25/07)
Environmental Quality and Impact	
O 5480.19	Conduct of Operations Requirements for DOE Facilities (07/09/90; Change 1, 05/18/92; Change 2, 10/23/01)
O 5480.20A	Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities (11/15/94; Change 1, 07/12/01)

Environmental Audits. In November 1998, the State of Nevada promulgated regulations (Chapter 445C) for the conduct of environmental audits by regulated facilities under agreement with the Nevada Division of Environmental Protection. These regulations allow NTS to choose this environmental management tool as a means of assessing compliance.

Environmental Covenants. The State of Nevada adopted the Uniform Environmental Covenants Act (Chapter 445D of the Nevada Revised Statutes) in June 2005. This Act provides the legal framework for instituting land use controls on properties that are the subject of environmental remediation projects. The Act overcomes obstacles inherent in real property law by establishing the mechanism and authority for placement and enforcement of institutional controls.

Federal Facility Compliance Act - Consent Order. The State of Nevada and DOE approved the Order and its associated NTS Site Treatment Plan in March 1996. The Order and Plan address treatment of legacy mixed waste streams at NTS. Under a June 1998 revision to the Order, new milestones and deadlines for mixed waste treatment must be proposed through annual updates to the Site Treatment Plan.

Mutual Consent Agreement. The Mutual Consent Agreement was signed by DOE and the State of Nevada in January 1994 and modified in June 1995 and 1998. The Mutual Consent Agreement authorizes the storage of newly identified mixed waste at NTS Area 5 RWMS. State of Nevada approval of a Treatment and Disposal Plan is required for mixed waste storage greater than 9 months.

Agreement in Principle. This Agreement, updated in June 1999, includes commitments with regard to NNSA/NSO technical and financial support to Nevada for environmental, safety, and health oversight and associated monitoring activities. The DOE-State of Nevada Joint Low-Level Waste Oversight Agreement was incorporated as an appendix to the Agreement in Principle. This appendix is a cooperative oversight arrangement between DOE and the State of Nevada and grants the state an increased role in monitoring the management of low-level radioactive waste generated at NTS, as well as low-level radioactive waste generated elsewhere and disposed at NTS. By entering into the agreement, DOE and the State of Nevada agree to share information concerning waste types and quantities, in addition to general information that allows the state to conduct detailed oversight of waste disposal operations.

3.3.4 Permits

Current environmental permits for NTS are presented annually in the NTS annual site environmental reports (e.g., DOE/NV 2006f).

CHAPTER 4
SCREENING ANALYSES

4.0 SCREENING ANALYSES

This chapter presents the results of the screening analysis performed for each resource area to determine whether the impacts associated with past and projected activities at NTS are bounded by the analysis in the *NTS EIS*. The screening analysis was performed in accordance with the process described in Section 1.3 of this SA, and the results are summarized in **Table 4–1**. Resource areas that are expected through the screening analysis to have impacts that are bounded by the *NTS EIS* are addressed in the following sections. Resource areas requiring additional analysis or discussion are addressed in Chapter 5.

4.1 Land Use

Land use falls within the parameters of the *NTS EIS*; however, if the Yucca Mountain Project is approved for disposal of radioactive waste, land use would change on the portion of NTS land intended for withdrawal for the proposed geologic repository.

NTS is bordered by the Nevada Test and Training Range to the north, east, and west, and by Bureau of Land Management land to the south and southwest (see Figure 2-3). Land uses in Nye County, where NTS is located, include mining, grazing, agriculture, and recreation. There are urban and residential land uses outside of NTS in fertile valley regions such as the Owens and San Joaquin Valleys to the west, the Virgin River to the east, Pahrump Valley to the south, and the Moapa River to the southeast. The nearest community to NTS is Amargosa Valley (3.2 kilometers [2 miles]); additional nearby communities include Indian Springs, Beatty, Pahrump, Hiko, and Alamo. The closest major metropolitan area is Las Vegas, which is southeast of NTS.[1]

The *NTS EIS* projected that about 26,100 hectares (64,500 acres) of NTS land would be developed, leaving more than ninety percent (about 320,000 hectares [800,000 acres]) undeveloped. Since then, although the areal extent of NTS increased as described in Section 3.2.1, the percentage of NTS land that is undeveloped remains about the same as that projected in the *NTS EIS*.

Because there is no public access to NTS lands, no additional impacts resulting from denial of access of the general public to NTS for current or planned projects are expected. Construction and operation of offsite facilities would cause minimal land use impacts, because the facilities are in areas where operations and missions are similar to those in surrounding areas. Land disturbance would be short-term and within the parameters outlined in the *NTS EIS*. The management agreement with the Yucca Mountain Project, described in Section 3.2.1, is not expected to significantly impact current or planned operations at NTS.

[1] *The distance from Mercury at the southern edge of NTS to downtown Las Vegas is about 92 kilometers (57 miles).*

Table 4–1 Summary Comparison of Impacts Indicators

Resource Area	*Impacts Indicators from the NTS EIS* [a]	*Impacts Indicators in this SA*	
		Current Values [b]	*5-Year Future Projection (through 2012)*
Land Use			
Developed	2,351 hectares of new ground disturbance under the *NTS EIS* Expanded Use Alternative, resulting in 26,100 developed hectares at NTS.	*2002 NTS SA* stated minimal land use impacts due to construction (DOE 2002c); since 2002, minimal construction and similar values.	Minimal new ground disturbance from construction with the exception of increased construction for the Yucca Mountain Project, if approved.
Undeveloped	About 320,000 hectares of undisturbed land at NTS under the *NTS EIS* Expanded Use Alternative.	Total NTS acreage increased to about 356,000 hectares, but the percentage of NTS land that is undeveloped remained about the same as that projected in the *NTS EIS.*	Percentage of NTS land that is undeveloped will stay about the same with the exception of increased construction for the Yucca Mountain Project, if approved.
Comparison to the *NTS EIS*: Land use falls within the parameters of the *NTS EIS*; however, if the Yucca Mountain Project is approved for disposal of radioactive waste, land use would change in the portion of NTS land that is intended for withdrawal for the geologic repository.			
Infrastructure			
Electricity Use	Not reported	81 million kilowatt-hours per year (average from 2003 to 2006) [c]	May increase somewhat with Work-for-Others projects
Water Use	11,260 million liters per year	<1,500 million liters per year since 1995 [d]	Up to 1,600 million liters per year
Fuel Use	17 million liters per year	4.2 million liters per year as of 2000 [e]	Comparable to current values
Comparison to the *NTS EIS*: Current water and fuel use is lower than that projected in the *NTS EIS*, and this condition is expected to continue. Future electricity use may increase somewhat, but electrical upgrades are planned, and power suppliers have been informed of expected NTS loads to enable planning. Continued and new activities at NTS would not change utility and resource use to a degree that would exceed impacts reported in the *NTS EIS*.			
Socioeconomics			
Total NTS Employees	13,294 (projected for 2000)	4,295 (as of September 2005)	Within *NTS EIS* projections
Total Region of Influence Employment	Clark County – 663,270 Nye County – 15,961 (projected for 2005)	Clark County – 875,700 [f] Nye County – no data [f] (DETR data for mid-year 2005)	Clark County – 1,264,000 Nye County – no data (based on population growth)
Region of Influence Population	Clark and Nye Counties 1,430,112 (projected for 2005)	Clark and Nye Counties [g] 1,749,759 [g] (for mid-year 2005)	Clark and Nye Counties [h] 2,527,446 [h] (projected for 2012)
Comparison to the *NTS EIS*: While the direct employment levels for NTS have fallen considerably short of the projections developed in the *NTS EIS* for the Expanded Use Alternative, employment growth in Clark County has exceeded estimates in the *NTS EIS*. Also, the population growth for both counties in the region of influence has exceeded estimates in the *NTS EIS*. These trends indicate that NTS is not a strong influence on regional socioeconomic conditions.			

Table 4–1 Summary Comparison of Impacts Indicators (continued)

Resource Area	Impacts Indicators from the NTS EIS [a]	Impacts Indicators in this SA: Current Values [b]	Impacts Indicators in this SA: 5-Year Future Projection (through 2012)
Geology and Soils			
Soil Contamination and Disturbance	Estimated areas of contaminated soils. No estimates of disturbance due to construction or site remediation.	Although the physical infrastructure footprint increased since the *NTS EIS* (DOE/NV 2005d), new construction was principally in areas already disturbed. Some surface disturbance occurs due to environmental restoration activities.	The physical infrastructure footprint is expected to decrease, with demolition and new construction continuing to occur, principally in areas already disturbed. Some surface disturbance will continue due to environmental restoration activities.
Comparison to the *NTS EIS*: New and augmented activities begun since the *NTS EIS* would be within the scope of impacts evaluated in the *NTS EIS*, or would have little or no effect on geology and soils.			
Hydrology			
Surface Water	Surface water consists mainly of ephemeral streams, springs, and impoundments. Impounded surface water and springs are routinely monitored for water quality.	No additional impacts to surface water have occurred since the *NTS EIS.*	Same as current values
Groundwater	Groundwater is impacted from past nuclear tests	No additional impacts to groundwater resources have occurred since the *NTS EIS*. An improved understanding of groundwater quality and movement in the NTS area is being obtained through the Underground Test Area Sub-Project. Groundwater withdrawals have been smaller than those projected in the *NTS EIS*.	Same as current values
Comparison to the *NTS EIS*: No additional impacts to surface water or groundwater have occurred since the *NTS EIS*, and this situation is expected to continue. Groundwater withdrawals are expected to continue to be smaller than those projected in the *NTS EIS.*			

Table 4–1 Summary Comparison of Impacts Indicators (continued)

Resource Area	*Impacts Indicators from the NTS EIS* [a]		*Impacts Indicators in this SA*			
			Current Values [b]		*5-Year Future Projection (through 2012)*	
Biological Resources						
Wildlife Habitat						
Undeveloped	Approximately 320,000 hectares		The total area of NTS increased to about 350,000 hectares (DOE 2002c), but the percentage of total NTS area that was undeveloped stayed about the same.		Percentage of undeveloped land will stay approximately the same with the exception of increased construction for the Yucca Mountain Project, if approved for radioactive waste disposal.	
Permanent Water Sources	At least 10 springs and 23 manmade impoundments; 1 spring is located outside the NTS boundary.		Approximately 30 natural water sources (including 9 springs), and 143 manmade impoundments (DOE/NV 2007b).		Same as current water sources	
Number of Sensitive and Protected Species In and Adjacent to NTS (Federal and State Status)						
	Federal	***State***	***Federal***	***State***	***Federal***	***State***
Plants						
Endangered [i]	0	0	0	0	0	0
Threatened [i]	0	1	0	1	0	1
Candidate [i]	2	0	0	0	0	0
Sensitive [i, j]	Not applicable	Not reported	Not applicable	19	Not applicable	19
Protected [i]	Not applicable	0	Not applicable	0	Not applicable	0
Animals						
Endangered [i]	1	2	0	2	0	2
Threatened [i]	2	2	1	2	1	2
Candidate [i]	1	0	1	0	1	0
Sensitive [i, j]	Not applicable	Not reported	Not applicable	27	Not applicable	27
Protected [i]	Not applicable	> 21 [k]	Not applicable	30	Not applicable	30
Comparison to the *NTS EIS*: All impact indicators for biological resources are bounded by the *NTS EIS*.						

Table 4–1 Summary Comparison of Impacts Indicators (continued)

Resource Area	*Impacts Indicators from the NTS EIS* [a]	*Impacts Indicators in this SA*	
		Current Values [b]	*5-Year Future Projection (through 2012)*
Air Quality			
Stationary Source Operation Emissions (metric tons per year [see Table 4-4]):			potential to emit values:
CO NO_x PM_{10} SO_2 VOCs HAPs TSP HC	440 390 560 29 46 12 160 30	0.14 0.63 0.76 0.036 1.8 .045 Not reported Not reported	<14 <26 <33 <6.0 <17 Not reported Not reported Not reported
Principal Sources of Nonradiological Emissions	Area 1, rotary dryer Area 6, boiler Area 12, boiler Area 23, boiler, incinerator	Potential NTS sources of nonradiological air pollution include aggregate production, surface disturbance (e.g., construction), release of fugitive dust from driving on unpaved roads, use of fuel-burning equipment, open burning, venting from bulk fuel storage facilities, and release of chemicals during testing at NPTEC.	Similar to current sources, except for some additional emissions associated with new construction projects.
Principal Radioactive Emissions (curies per year):			
Tritium Krypton-85 Plutonium	From 1993 ASER: [1] 714 160 1.8×10^{-3}	From 2005 ASER: [1] 170 – 0.29	Similar to current emissions, except for an additional 10 curies of argon-10 from Criticality Experiments Facility operations.
Principal Sources of Radiological Emissions	Principal sources of radioactive emissions:[1] • Area 3 • Area 5, Radioactive Waste Management Site • Area 9, Bunker • Area 12, Containment Ponds and P Tunnel Portal • Areas 19 and 20, Pahute Mesa	Sources of radioactive air emissions from NTS include evaporation of tritiated water from containment ponds; diffusion of tritiated water vapor from the soil at Area 3 and Area 5 RWMS, Sedan Crater, and Schooner Crater; release of tritium gas during equipment calibrations at Building 650 in Area 23; and resuspension of plutonium and americium from contaminated soil at historical nuclear device safety test locations and atmospheric test locations.[1]	Similar to current emissions, except minor increases are possible from new or augmented operations at facilities including: • Criticality Experiments Facility • DAF • Dense Plasma Focus Facility
Attainment Status	*Nye County:* Unclassified/attainment *Clark County:* CO - moderate nonattainment PM_{10} - serious nonattainment	*Nye County:* Unclassified/attainment *Clark County:* CO - serious nonattainment PM_{10} - serious nonattainment	Same as current values

Table 4–1 Summary Comparison of Impacts Indicators (continued)

Resource Area	Impacts Indicators from the NTS EIS [a]	Impacts Indicators in this SA	
		Current Values [b]	*5-Year Future Projection (through 2012)*
Comparison to the *NTS EIS*: NTS is expected to operate within the bounds of the impacts projected for nonradiological emissions in the Expanded Use Alternative in the *NTS EIS*. Radiological emissions are expected to continue to cause minimal impacts to air quality, as projected in the *NTS EIS*; air quality is expected to continue to be dominated by estimated emissions associated with past nuclear tests.			
Noise			
Closest Sensitive Receptor to NTS Boundary	Residences are located 2 kilometers to the south in Amargosa Valley	Same	Same
Noise from Construction Activities	Temporary and barely distinguishable from background noise levels at the NTS boundary.	Same	Same, except for a higher number of occurrences due to proposed projects.
Noise Levels as a Result of Personnel, Material, and Waste Transport	Transportation-related noise impacts would be minor. Majority of NTS noise impacts result from transportation of personnel and materials to and from the site.	Currently, the number of personnel and waste shipments is lower than *NTS EIS* projections; thus, current transportation-related noise impacts are less than those estimated in 1996.	Because current personnel and waste shipments are lower than those predicted in the *NTS EIS*, it is expected that transportation-related noise levels would continue to be less than those estimated in the *NTS EIS*.
Noise Levels from Explosive Testing	Noise levels associated with conducting multiple tests would be sporadic and transitory. Specifications for explosive testing at BEEF: • 1,100 dynamic experiments (including subcritical experiments), and hydrodynamic experiments would be performed from 1996 to 2005. • The maximum high-explosive charge that could be detonated at BEEF is 32,000 kilograms.	Same	Same
Comparison to the *NTS EIS*: The closest residential area is still approximately 2 kilometers from the southern boundary of NTS, and areas adjacent to NTS remain fairly undeveloped. Current and future employment and waste shipments are below levels presented in the *NTS EIS*; thus, traffic-related noise would be consistent with or less than impacts projected in the *NTS EIS*. Noise levels from construction activities would barely be detected at the NTS boundary as originally stated in the 1996 analysis. It is expected that current and future expectations for explosives testing would be within the boundaries of the 1996 analysis. Thus, noise levels from such testing would be within the bounds of the 1996 analysis.			

Table 4–1 Summary Comparison of Impacts Indicators (continued)

Resource Area	*Impacts Indicators from the NTS EIS* [a]	*Impacts Indicators in this SA*	
		Current Values [b]	*5-Year Future Projection (through 2012)*
Visual Resources			
Scenic Quality	NTS Scenic Quality ranges from Class B to Class C (Class A includes areas that combine the most outstanding characteristics of each physical feature category; Class B, areas in which there is a combination of some outstanding characteristics and some that are fairly common; and Class C, areas in which the characteristics are fairly common to the region).	Same	Same
Visual Sensitivity	Visual sensitivity was determined by the volume of traffic on public highways because these roads are the only key public viewpoints from which NTS can be seen. Study areas that are visible from highways carrying 3,000 or more vehicles-per-day (annual average) were assigned a medium sensitivity level. (Traffic at the Mercury exit is approximately 3,600 vehicles per day.) Study areas that are visible from highways with annual average daily traffic flows below 1,000 vehicles were assigned a low sensitivity level.	Traffic increases based on increased population and associated traffic, but increases are largely independent of NTS activities. The Solar Enterprise Zone at the Nevada Test Site (Area 22) may host a commercial, utility-scale solar power plant that would be visible from U.S. Highway 95.	Same
Distance and/or Visibility from Key Public Viewpoints	Public views of NTS are from U.S. Highway 95. Views from U.S. Highway 95 are limited to Mercury Valley and some portions of the southwestern sector of NTS, which can be seen from Amargosa Valley. Portions of NTS viewed from this area have a high sensitivity level.	The Solar Enterprise Zone at the Nevada Test Site (Area 22) may host a commercial, utility-scale solar power plant that would be visible from U.S. Highway 95.	Same
Comparison to the *NTS EIS*: NTS areas visible to the public from U.S. Highway 95 in Mercury and Amargosa Valley are common to the region. NTS is otherwise surrounded by Federal land. Short-term visual impacts could occur at NTS from new construction or modification of existing facilities; however, these impacts would generally occur in areas that are already disturbed or being used for similar operations and not visible from public viewpoints; however, a proposed commercial, utility-scale solar power plant may be constructed in the Solar Enterprise Zone in Area 22 and be visible from U.S. Highway 95. No further impacts to visual resources were identified beyond those in the *NTS EIS*.			

Table 4–1 Summary Comparison of Impacts Indicators (continued)

Resource Area	*Impacts Indicators from the NTS EIS* [a]	*Impacts Indicators in this SA*	
		Current Values [b]	*5-Year Future Projection (through 2012)*
Cultural Resources			
Historic Properties: Prehistoric and Historic Archaeological Resources	Impacts to prehistoric and historic archaeological resources are possible but would be avoided or mitigated.	In accordance with the NTS *Cultural Resources Management Plan* (DOE/NV 2002b), continued inventory and identification, and compliance with Section 106 of the National Historic Protection Act, including consultation with American Indians and the Nevada State Historic Preservation Office, will avoid or mitigate adverse effects.	Same
Historic Properties: Architectural Resources (pre-World War II, World War II, and Cold War)	Impacts to historic architectural resources are possible but would be avoided or mitigated.		
American Indian Resources	Any project that may impact sites of American Indian significance will include consultations with American Indian tribes and other potentially affected cultural groups before activities are initiated.	In accordance with the NTS *Cultural Resources Management Plan* (DOE/NV 2002b), working with and through the CGTO will continue to identify issues and avoid or mitigate impacts.	Same
Comparison to the *NTS EIS*: Continued follow-through with the inventory, identification, and evaluation program outlined in the NTS *Cultural Resources Management Plan* (DOE/NV 2002b) will identify historic properties (i.e., cultural resources that are eligible for listing on the National Register of Historic Places) and allow the design of projects to avoid or mitigate impacts. Continued collaboration with the CGTO will identify properties of traditional and cultural importance.			
Human Health			
Normal Operations			
Annual Dose to the MEI from Air Emissions (millirem per year)	Minimal impact to air quality by radioactive effluents	<0.2 (The average from 1996 through 2004 was 0.12)	<0.2
Annual Dose to the MEI from Groundwater Consumption (millirem per year)	Zero (No migration of contaminated groundwater at NTS to a publicly accessible location.)	Same	Same
Annual dose to the MEI from consumption of potentially contaminated game animals (millirem per year)	Not reported in the *NTS EIS*	0.32 (The 7-year average from 1999 through 2005 was 0.43)	Comparable to current values
Annual dose to the general population (airborne only) (person-rem per year)	Minimal impact to air quality by radioactive effluents	No longer reported in ASERs (The average from 1996 through 2004 was 0.39)	<1.0
Annual worker population dose (person-rem per year)	3.25, no testing 4.50, with testing (not including the National Ignition Facility)	3.6 [m] (The average from 1996 through 2005 was 2.09)	Comparable to current values

Table 4–1 Summary Comparison of Impacts Indicators (continued)

Resource Area	Impacts Indicators from the *NTS EIS* [a]	Impacts Indicators in this SA: Current Values [b]	Impacts Indicators in this SA: 5-Year Future Projection (through 2012)
Average annual worker dose (millirem per year)	Not reported in the *NTS EIS*	51 [m] (The average from 1996 through 2005 was 54)	Comparable to current values
Occupational Accidents			
Number of injuries per year	77.3	82 [n] (The average from 1996 through 2005 was 68)	Comparable to current values
Number of fatalities per year	0.9	0 [n] (No fatalities, 1996 through 2006)	Comparable to current values
Facility Accidents			
Number of Accident Scenarios	17 radiological and 13 chemical scenarios	16 radiological and 13 chemical scenarios. (One radiological scenario is no longer applicable)	Same as current values
Accident Scenario Material At Risk	Accident Specific	Same	Same
MEI Distances	3.5 to 90 kilometers	Same	Same
Involved Worker Distances	10 meters	Same	Same
Noninvolved Worker Distances	100 meters to 8.6 kilometers, depending on accident scenario	Same	Same
Annual Number of Flight Sorties over Tonopah Test Range	16,000	Up to 27,000	Same as current values
50-mile (80-kilometer) Population (see Table 5–2)	Based on the 1990 census.	Based on the 2000 census.	Based on the 2000 census, but projected to 2012
Public Population Distance Considered	50 miles (80-kilometers)	Same	Same
Soil Contamination Level Assumed for Analysis	2,000 picocuries of plutonium per gram	Same	Same

Comparison to the *NTS EIS*: Possible public radiation doses from normal operations are expected to continue to be minimal and to comply with all applicable DOE and U.S. Environmental Protection Agency standards. Radiation doses to workers from normal operations are expected to be compliant with DOE limits and comparable to current doses. Occupational health and safety will be ensured through adherence to Federal and state requirements and by training, monitoring, use of personal protective equipment, and administrative controls. Regarding facility accidents, public and worker radiation doses and LCF risks have increased due to changes in modeling assumptions and increases in the total 80-kilometer (50-mile) population. Public and worker chemical accident consequences are comparable to those in the *NTS EIS*.

Table 4–1 Summary Comparison of Impacts Indicators (continued)

Resource Area	*Impacts Indicators from the NTS EIS* [a]	*Impacts Indicators in this SA* — *Current Values* [b]	*Impacts Indicators in this SA* — *5-Year Future Projection (through 2012)*
Waste Management [o]			
Transuranic Waste – Stored (cubic meters)	612 (after the *NTS EIS* was issued, this number was revised to 617)	302 (as of December 2007)	< 302
Transuranic Waste – Annually Generated (cubic meters per year)	Not estimated	23	Comparable to current values
Low-Level Radioactive Waste (cubic meters per year)	104,142	44,693 (10-year average)	27,000 to 103,000 [p]
Mixed Low-Level Radioactive Waste (cubic meters per year)	30,050	48 (10-year average)	3,200 to 4,300 [q]
Hazardous Waste (metric tons per year)	768	166 (7-year average)	530 (historical annual maximum over 7 years)
Nonhazardous Waste (metric tons per year)	42,810	18,100 (10-year average)	30,800 (historical annual maximum over 10 years)
Comparison to the *NTS EIS*: Additional significant reductions in transuranic waste storage are expected, while small quantities will be annually generated from JASPER operations. Low-level and mixed low-level radioactive waste disposal is expected to be within or comparable to *NTS EIS* projections, although there are uncertainties in the quantities of wastes that may be generated and sent to NTS for disposal. Generation of hazardous and nonhazardous wastes is expected to be lower than *NTS EIS* projections.			
Transportation			
Radioactive Material Shipments			
Onsite (low-level radioactive and mixed low-level radioactive waste)	Annual average: 1,400 per year	16 to 160 per year [r]	Comparable to current values
Offsite (low-level radioactive and mixed low-level radioactive waste)	Annual average: 4,049 per year	350 to 2,600 per year [r]	Comparable to current values
Offsite (transuranic waste)	Estimated as 86 over 35 years in *WIPP SEIS II* (DOE 1997b)	48 total offsite shipments in 2004 and 2005	Up to about 72 additional offsite shipments through 2022
NNSA/Defense Programs	Annual average: 210 per year	200 per year [s]	Comparable to current values
Comparison to the *NTS EIS*: It is expected that the number of annual shipments of low-level and mixed low-level radioactive waste would be bounded by the projections in the *NTS EIS*, although there are uncertainties in future waste generation rates and deliveries to NTS. Offsite shipments of transuranic waste are expected to be up to about 40 percent larger (34 shipments) than analyzed previously. Annual shipments of special nuclear and other high explosive materials between NTS and other NNSA sites are expected to be bounded by the *NTS EIS*.			

Table 4–1 Summary Comparison of Impacts Indicators (continued)			
Resource Area	*Impacts Indicators from the NTS EIS* [a]	*Impacts Indicators in this SA*	
		Current Values [b]	*5-Year Future Projection (through 2012)*
Environmental Justice			
Region of Influence Total Population	Clark County – 741,459 Nye County – 17,781 Lincoln County – 3,775 Nevada – 1,201,833 [g]	Clark County – 1,375,765 Nye County – 32,485 Lincoln County – 4,165 Nevada – 1,998,257 [g]	Clark County – 2,471,684 Nye County – 55,762 Lincoln County – 5,023 Nevada – 3,311,416 [h]
Region of Influence Minority Population Percentage	Clark County – 25% Nye County – 12% Lincoln County – 10% Nevada – 21% [g]	Clark County – 40% Nye County – 15% Lincoln County – 10% Nevada – 35% [g]	Clark County – 47% Nye County – 15% Lincoln County – 7% Nevada – 43% [h]
Region of Influence Low-Income Population Percentage	Clark County – 11% Nye County – 11% Lincoln County – 14% Nevada – 10% [g]	Clark County – 11% Nye County – 11% Lincoln County – 16% Nevada – 10% [g]	No data
Comparison to the *NTS EIS*: The demographic compositions of census units closest to NTS boundaries and areas of activity have not changed since publication of the *2002 NTS SA*. Therefore, the conclusions of the *NTS EIS*, remain valid with respect to minority and low-income populations. There remains a high and disproportionate impact to American Indians based on their cultural affiliation with the land on and around NTS.			

Table 4–1 Summary Comparison of Impacts Indicators (continued)

Resource Area	***Impacts Indicators from the NTS EIS*** [a]	***Impacts Indicators in this SA***	
		Current Values [b]	***5-Year Future Projection (through 2012)***

ASER = annual site environmental report, BEEF = Big Explosives Experimental Facility, CGTO = Consolidated Group of Tribes and Organizations, CO = carbon monoxide, DAF = Device Assembly Facility, dBA = decibels A-weighted, DETR = Nevada Department of Employment, Training, and Rehabilitation, HAP = hazardous air pollutant, HC = hydrocarbons, JASPER = Joint Actinide Shock Physics Experimental Research, LCF = latent cancer fatality, MEI = maximally exposed individual, NO_x = nitrous oxides, NPTEC = Non-Proliferation Test and Evaluation Complex, NSBDC = Nevada Small Business Development Center, PM_{10} = particulates that are less than 10 microns in diameter, RWMS = Radioactive Waste Management Sites, SA = Supplement Analysis, SO_2 = sulfur dioxide, TSP = total suspended particulates, USCB = U.S. Census Bureau, VOC = volatile organic compound, WIPP = Waste Isolation Pilot Plant.

[a] Except as noted, for the Expanded Use Alternative, from the *NTS EIS* (DOE 1996b).

[b] Except as noted, from the 2005 NTS annual site environmental report (DOE/NV 2006f).

[c] From NTS 2007.

[d] From USGS 2007. From 2003 through 2006, water use ranged from 397 million to 674 million liters per year (NTS 2007).

[e] From DOE 2002d.

[f] From DETR 2007.

[g] From Census 2007b.

[h] From NSBDC 2007b.

[i] Endangered, threatened, and candidate plants and animals are so defined by Federal regulations; sensitive and protected plants and animals are so defined by State of Nevada regulations.

[j] This category was not addressed in the *NTS EIS*.

[k] The *NTS EIS* states that over 20 birds (predominantly hawks and owls) and the banded Gila monster are classified as state-protected (DOE 1996b).

[l] The *NTS EIS* projected minimal impacts to air quality by radioactive effluents, and cited emissions as reported in the 1993 NTS ASER (DOE/NV 1994). The 1993 NTS ASER did not include the contribution from actinides resuspended from soils contaminated by past tests, but all subsequent annual site environmental reports did, including the one for 2005 (DOE/NV 2006f). Resuspended radionuclides were conservatively calculated from an inventory of radionuclides in surface soil, a resuspension model provided in a 1983 U.S. Nuclear Regulatory Commission report, and equation parameters derived at NTS. Later annual site environmental reports included this source term, plus radionuclides assumed to be emitted from the Sedan and Schooner Craters, and point sources from laboratories and other facilities. Principal point sources tended to vary year to year.

[m] From DOE Radiation Exposure Monitoring System. Value quoted was for 2005 (DOE 2005).

[n] From CAIRS (http://hss.energy.gov/csa/analysis/cairs). Value quoted was for 2006.

[o] From NTS 2007 and other sources (see Sections 3.1.2, 3.2.12, and 5.2).

[p] Future waste receipts are uncertain. The smaller value represents the largest annual volume currently projected from identified NTS customers (Table 5–9); the largest value is the largest annual volume of low-level radioactive waste that has been received at NTS for disposal since the *NTS EIS* (Table 5–8).

[q] The smaller value represents the largest annual volume of mixed low-level radioactive waste currently projected from identified NTS customers (Table 5–9). The larger value represents the largest volume of mixed low-level waste received since the *NTS EIS* (Table 5–9) (NTS 2007). Receipt and disposal of mixed low-level radioactive waste must be compliant with the Nevada Division of Environmental Protection disposal permit requirements and volume and time restrictions.

[r] Onsite annual shipments ranged from 16 to 160 from fiscal years 1998 through 2006 (DOE/NV 1999a, 2000a, 2001a, 2002a, 2003a, 2004a, 2005a, 2005f, 2007a). Total onsite and offsite annual shipments for calendar years 1996 through 2006 ranged from 350 shipments to 2,600 shipments (NTS 2007).

[s] Combined shipments to and from NTS.

Note: To convert hectares to acres, multiply by 2.471; to convert cubic meters to cubic feet, multiply by 35.315; to convert kilograms to pounds, multiply by 2.2046; to convert kilometers to miles, multiply by 0.62137; to convert liters to gallons, multiply by 0.26418; to convert metric tons to tons, multiply by 1.023; to convert meters to feet, multiply by 3.2808.

4.2 Infrastructure

Continued and new activities at NTS would not change the physical infrastructure, utility and resource use, or traffic volume to a degree that would exceed impacts addressed in the *NTS EIS*.

Physical Infrastructure

The physical infrastructure footprint increased from the 269,419 square meters (2.9 million square feet) estimated in the *NTS EIS*[2] to about 302,000 square meters (3.25 million square feet) by September 2005, including owned and leased space at NTS and auxiliary sites in Nevada. Most construction occurred in previously disturbed areas. The footprint decreased thereafter. By the beginning of fiscal year 2013, the total site footprint, including leased space, is projected to be about 280,000 square meters (3.0 million square feet) (DOE/NV 2005d).

NNSA/NSO has identified the need for upgrades to buildings, power distribution and transmission system, water distribution system, roads, communications system, and security at NTS. (Upgrades would occur within the budgetary constraints of the Facilities and Infrastructure Recapitalization Program.) Selected current and proposed projects to be initiated through fiscal year 2012 are listed in **Table 4–2**. In several cases, related projects are grouped. In addition, one or more new water wells may be needed assuming construction and operation of a commercial utility-scale solar power plant at the Solar Enterprise Zone in NTS Area 22. New or future projects would be reviewed pursuant to requirements in DOE NEPA Implementing Procedures (10 CFR 1021) and Council on Environmental Quality NEPA regulations (40 CFR 1500-1508).

Utility and Resource Use

Water, electricity, fuel oil, natural gas, liquid petroleum gas, and steam are used at NTS and auxiliary sites. Annual water and fuel use has been lower than that projected in the *NTS EIS* (see Section 3.2.2).

The NTS power system has adequate capacity for current loads and loads projected over the next few years; however, system capacity is becoming strained as utility use in areas surrounding NTS continues to grow. NTS is expected to increase its electrical load to more than 40 megawatts as early as 2008. At this load level, combined with projected utility growth, the 138-kilovolt transmission system at NTS would be at peak capacity. Utility-providers serving NTS have been informed of expected NTS loads and are planning upgrades to increase total system capacity (DOE/NV 2005d). Operation of a commercial solar power plant at NTS would supply electrical power that could be used by NTS and others.

The current plan for the Yucca Mountain Project is to purchase power from a local utility company while using 10 megawatts from NTS during the Project's construction period. Over the next several years, Work-for-Others clients at NTS will likely require several megawatts of power in addition to new power requirements for the Criticality Experiments Facility. Although NTS has adequate power for these new loads, as well as existing Defense Program loads, the available power may approach full capacity (DOE/NV 2005d). Additional power may be provided by the solar power plant addressed above, although transmission line upgrades may be needed (NTS 2007). In addition, the existing electrical distribution system at the Remote Sensing Laboratory at Nellis Air Force Base in North Las Vegas is only capable of supporting present demands (DOE/NV 2005d).

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[2] The NTS EIS did not specify whether the estimated footprint included leased space or auxiliary sites outside of the NTS, either within or outside of the State of Nevada.

Table 4–2 Selected Ongoing and Proposed Future Infrastructure Upgrade Projects at the Nevada Test Site

Projects [a]	***Remarks***
Replace fire stations Nos. 1 and 2 at NTS	Ongoing in Areas 6 and 23
Remediate, restore, and upgrade Building B-3 at the North Las Vegas Facility	Ongoing
Mercury highway	Ongoing
Radiological/Nuclear Countermeasure Test and Evaluation Complex	Ongoing
Aerial Operations Facility runway and hanger complex (Area 6)	Ongoing
NTS DAF roof replacement	Proposed
NTS cafeteria (Area 6)	Proposed
NTS fire alarm system replacement	Proposed
Mercury office building reconfiguration	Proposed
Administration Facility (A-23)	Proposed
NTS security service facility in Mercury	Proposed
Nuclear Security Response Facility (Area 6)	Proposed
Readiness and Technical Base and Facilities Projects at DAF, U1a, JASPER, and High Explosives Facilities	Several small projects for security, fencing, lighting, and flood control upgrades; road repair; boiler, cooling tower, and water tank repairs; communications upgrades; power supply upgrades; and others.
Facilities and Infrastructure Recapitalization Projects at NTS and North Las Vegas Facility	Several existing and proposed small projects for tasks such as utility, communication system, facility equipment, building, and road repair or replacement.
Facility and infrastructure projects for non-NNSA tenant programs and activities (unfunded)	Several proposed small projects at North Las Vegas, Remote Sensing Laboratory, Yucca Lake, and various NTS locations including DAF and Areas 5, 6, and 25.
Security infrastructure projects (funded)	Projects such as roof reconfiguration, communication equipment upgrades, facility renovation, and security training facility construction.
Security infrastructure projects (unfunded)	Several proposed construction projects such as vehicle barrier systems, training facilities, and buildings; and structure and equipment upgrades.
Structure demolition projects	Numerous small structure demolition projects have occurred annually, involving several hundred thousand gross square feet of building floor space. Additional projects are proposed for fiscal year 2008 through fiscal year 2012.

DAF = Device Assembly Facility, JASPER = Joint Actinide Shock Physics Experimental Research.
[a] Does not include operating and maintenance projects.

It is expected that future fuel use would be similar to current use, and both fuel and water use would be lower than that projected in the *NTS EIS*. Assuming the largest annual water use for the past several years (674 million liters [178 million gallons]), and annual use of up to 925 million liters (244 million gallons) at the Solar Enterprise Zone, future annual water use could be up to 1,600 million liters (423 million gallons), or about 14 percent of the *NTS EIS* projections. As noted above, however, several projects have been proposed to upgrade the NTS water distribution system. Additionally, the water system at the Remote Sensing Laboratory suffers from low pressure and limited supply capability. NNSA/NSO is working with Nellis Air Force Base officials to address these issues (DOE/NV 2005d).

Traffic

The *NTS EIS* noted that key roads within metropolitan Las Vegas were already operating at congested levels, and that these conditions would exist regardless of the alternative selected (DOE 1996b). As addressed in Section 3.2.2, expected changes in employment attributable to future activities at NTS would not exceed the projections for the Expanded Use Alternative in the *NTS EIS*. Using employment as a surrogate indicator for traffic volumes, NTS-related activities would not significantly affect traffic congestion at NTS or in surrounding municipalities.

4.3 Socioeconomics

The *NTS EIS* concluded that changes attributable to NTS "…would not severely impact the ability of county government to provide adequate public services to their residents" (DOE 1996b). The *2002 NTS SA* likewise concluded that changes in NTS employment "…would have only a small impact on the total employment in the region of influence" (DOE 2002c). The analysis for this SA indicates that NTS employment has had less of an impact on population and employment in the region of influence than that expected in the *NTS EIS*. Moreover, the expected changes in employment attributable to future activities at NTS would not exceed the projections for the Expanded Use Alternative. Hence, NTS would continue to play a relatively minor role in the changing socioeconomic conditions in the region of influence, and the conclusions of the *NTS EIS* remain valid.

Population

Population estimates for the Expanded Use Alternative in the *NTS EIS* projected 1,390,940 persons in Clark County and 39,172 persons in Nye County in 2005 (DOE 1996b). These projections would have resulted in growth rates since 1990 of 88 percent and 120 percent, respectively, for Clark and Nye Counties. As described in Section 3.2.3, the actual population growth rates in Clark and Nye Counties between 1990 and 2005 were 131 percent and 127 percent, respectively. Hence, the regional population growth has exceeded even the relatively aggressive projections of the planners at the time of the *NTS EIS*. These trends are compared in **Table 4–3**. By 2012, the Nye and Clark County populations are projected to grow to 55,762 and 2,471,684, respectively (NSBDC 2007b).

Table 4–3 Comparative Population Trends in the Nevada Test Site Region of Influence

County	*1990 Census Population*	*"NTS EIS" 2000 Population Estimate*	*2000 Census Population*	*NTS EIS 2005 Population Estimate*	*2005 Mid-Year Population*
Nye County	17,781	35,014	32,485	39,172	40,395
Clark County	741,459	1,244,186	1,375,765	1,390,940	1,709,364

Sources: DOE 1996b, Census 2007b.

Housing

The *NTS EIS* projected 486,007 occupied housing units in Clark County and 13,119 occupied housing units in Nye County, with corresponding vacancy rates of 6.3 percent and 13.6 percent, respectively (DOE 1996b). Housing stock in 2000 actually reached 559,799 units in Clark County with 512,253 units occupied and 15,934 units in Nye County with 13,309 occupied (Census 2007b). Actual vacancy rates in 2000 were 8.5 percent and 16.5 percent, respectively, in Clark and Nye Counties. Therefore, total housing units and occupied housing units exceeded *NTS EIS* projections in both counties in 2000, but vacancy rates were higher than *NTS EIS* projections for both counties, because new housing construction exceeded *NTS EIS* expectations.

The *NTS EIS* projected that by 2005, housing stock would increase to 585,414 units (543,264 occupied) in Clark County and 17,221 units (14,672 occupied) in Nye County for the Expanded Use Alternative (DOE 1996b). Housing data for 2005 show 718,358 units (637,740 occupied) in Clark County, which is substantially more than the *NTS EIS* projected. Data for Nye County in 2005 show 16,548 units (no occupancy data available), which is fewer than the number projected in the *NTS EIS* (Census 2007b).

Employment

The *NTS EIS* projected a maximum direct workforce for NTS in 2000 of 13,294 full-time equivalents (DOE 1996b), representing an increase of 6,718 full-time equivalents above the baseline for the No Action (Continue Current Operations) Alternative. Although the *NTS EIS* projected that direct employment at NTS would be lower in 2005 than 2000, the document estimated that direct and secondary (induced) employment would result in 12,857 jobs in Clark County and 516 jobs in Nye County by 2005 (DOE 1996b). Instead, NTS overall lost 2,281 direct full-time equivalents below the EIS baseline by 2005, as discussed in Section 3.2.3. NTS has continued to lose jobs since 2005, as described in Section 3.2.3. Operation and maintenance of a power plant at the NTS Solar Enterprise Zone would create only 10 to 12 full-time jobs.

Despite the lower employment levels at NTS through 2005, the average employment in Nevada grew by 39 percent between 1996 and 2005, and the state unemployment rate declined from 5.2 percent in 1996 to 4.2 percent in 2005. The Las Vegas metropolitan area accounted for 83 percent of state employment growth during the decade. Also, while employment at NTS continued to decline since 2005, state employment grew by 8 percent between mid-year 2005 and mid-year 2007 (DETR 2007).

4.4 Geology and Soils

The *NTS EIS* analyzed past, current, and expected impacts to geology and soils at NTS. The activity judged to have the most significant impact on geology and soils would be a resumption of underground nuclear weapons testing. Resumption of testing, however, has not occurred and is not expected. Current and proposed new and augmented activities at NTS are expected to be within the scope of impacts evaluated in the *NTS EIS*, or would have little or no effect on geology and soils.

As discussed in the *2002 NTS SA*, the proposed Kistler Launch Facility might have caused impacts not captured in the *NTS EIS*; however, the Kistler Launch Facility was cancelled. Soil disturbance due to new facility construction or decommissioning of existing facilities would impact site soils, but would generally occur in previously disturbed areas, and likely would be of minimal significance. As noted in Section 4.2, the total footprint of the physical infrastructure at NTS is not expected to be significantly different than that existing at the time of the *NTS EIS*. Possible impacts would be addressed through existing NEPA and other applicable procedures; if needed, projects would be modified to reduce or mitigate impacts.

Work under the Environmental Restoration Program, begun in 1989, has characterized and delineated soils at NTS that were contaminated from past activities (see Section 3.1.3). As it progresses, the Environmental Restoration Program will have beneficial impacts to site soils by removing or isolating contamination. For offsite locations, impacts to geology and soils were captured in the *NTS EIS*. The only exceptions are beneficial impacts resulting from completion of site remediation and closure at the Project Shoal Area and Central Nevada Test Area, as noted in the *2002 NTS SA* (DOE 2002c), and from progress in remediating sites at the Tonopah Test Range and Nevada Test and Training Range.

4.5 Hydrology

No adverse impacts to groundwater quality have resulted from operations since 1996; contamination in onsite supply wells is much lower than regulatory thresholds of maximum contaminant levels (MCLs), and no offsite migration of contamination has been found. An improved understanding of groundwater quality in the NTS area is occurring through the Underground Test Area Sub-Project. The *NTS EIS* conclusions concerning impacts to groundwater quality remain valid.

As discussed in the *NTS EIS*, groundwater withdrawals at NTS have decreased significantly since the cessation of underground nuclear weapons testing. Groundwater availability was examined, but groundwater impacts related to specific projects under consideration were not examined in the *NTS EIS*. Modeling was conducted for the Frenchman Flat, Fortymile Canyon, and Mercury Valley groundwater basins to evaluate impacts to groundwater levels and availability resulting from possible alternative uses of NTS such as tritium production facilities or large-scale solar energy production facilities (DRI 2003, 2006a).

Although some surface water is used as a water source for wildlife and humans (e.g., Travertine Springs in Death Valley, located downgradient of NTS), surface water is scarce and largely is not a viable water source for human consumption. Surface water consists mainly of ephemeral stream flow and ponds, isolated perennial springs, and impounded water (e.g., containment ponds and sewage lagoons). Impounded surface water and springs are routinely monitored for water quality, and no additional impacts to surface water have occurred since the *NTS EIS*. The *NTS EIS* conclusions concerning impacts to surface water remain valid.

4.6 Biological Resources

The conclusions of the *NTS EIS* remain valid. Impacts to biological resources have been less severe than those described in the *NTS EIS*, because fewer new industrial facilities have been built than were analyzed, and this situation is expected to continue. Furthermore, the NTS Ecological Monitoring and Compliance Program has effectively reduced impacts to biological resources through its ongoing monitoring program.

Ecological communities at NTS have changed very little since issuance of the *NTS EIS*. Because of the NTS Ecological Monitoring and Compliance Program, NNSA/NSO monitors considerably more species and potential habitats, including natural and manmade water sources, than it did at the time of the *NTS EIS*.

The NTS Ecological Monitoring and Compliance Program monitors sensitive ecological resources (plants, animals, and water) at NTS (see Table 4–1) to ensure compliance with applicable environmental laws and regulations (e.g., Clean Water Act, Endangered Species Act, NEPA). The program is also intended to delineate and define NTS ecosystems and provide ecological information that can be used to predict and evaluate the potential impacts of proposed projects and programs on those ecosystems (DOE 2002c). The Ecological Monitoring and Compliance Program calls for biological surveys "at proposed project sites where land disturbing activities are proposed" (DOE/NV 2007b). Once surveys are completed, survey reports are provided to the appropriate NNSA/NSO organizations along with mitigation recommendations. In fiscal year 2006, 34 biological surveys were conducted on 342 hectares (845 acres) of NTS. All but four surveys involved relatively small (0.4 to 10 hectares [1 to 25 acres]) tracts of land (DOE/NV 2007b).

Because of activities such as the Ecological Monitoring and Compliance Program, impacts to biological resources from NTS operations have been and would continue to be minimized, as sensitive areas (i.e., those known to harbor sensitive species, springs, or wetlands) are avoided to the extent practicable when sites are being considered for new activities, facilities, and missions. When impacts are unavoidable, the Ecological Monitoring and Compliance Program serves to reduce them by suggesting mitigation measures. These mitigation measures include capturing and relocating individual animals, revegetating disturbed areas, marking areas (e.g., nests and burrows) that should be avoided by vehicles and personnel, and limiting times of day or year in which construction activity may be conducted to minimize disturbance to a particular roosting, denning, or nesting areas (DOE 2002c).

In NEPA documentation published since the *NTS EIS*, only minimal impacts to biological resources have been identified. Some impacts to local populations of plants and wildlife could occur, primarily due to displacement. Effects to these local populations would be minimized through careful planning and execution of activities. Surveys to determine the presence of sensitive species or habitat are conducted prior to land disturbing activities, and all construction activities are coordinated to prevent biological harm during construction (DOE 2002c).

Additional land disturbance associated with new facility and infrastructure development, waste management, and environmental restoration has occurred since 1996, but these activities have affected relatively small amounts of land out of the total NTS acreage (DOE/NV 2002d, 2003f, 2005b, 2006d, 2007b). Many of the disturbed areas were within or adjacent to existing facility areas having little or no native vegetation or wildlife. Other areas were disturbed in the course of site characterization or remediation, but, prior to remediation, offered only marginal wildlife habitat.

4.7 Air Quality and Climate

NTS is expected to continue to operate within the bounds of the impacts projected for nonradiological air emissions in the *NTS EIS*. Because no substantial increases in air pollution emissions are expected at NTS through 2012, Nye County would continue its present attainment designation for all criteria pollutants. Radiological emissions from NTS are dominated by releases from legacy test activities, and, since 1992, the concentrations of tritium and plutonium-239 and plutonium-240 detected in onsite air samplers have generally declined. New and augmented activities at NTS are not expected to result in significant releases of radionuclides to the air nor reverse the overall trend of declining radionuclide concentrations in onsite air samplers.

4.7.1 Nonradiological Air Emissions

Nonradiological air emissions from stationary, mobile, and fugitive dust sources are expected within and outside of NTS; however, those emissions are expected to be well within the levels projected in the *NTS EIS*. The *NTS EIS* presented annual projections of emissions of several pollutants that were expected to disperse over the NTS area (**Table 4–4**). The projected PM_{10} emissions from construction at NTS represented 0.002 percent of the total Nye County emissions, while the projected emissions of other pollutants were less than 50 percent of Nye County emissions (DOE 1996b). Because Nye County has always been in attainment with ambient air quality standards, pollutant concentrations within NTS were expected to be below ambient air standards. Ambient pollutant concentrations at the boundary of NTS were expected to be well below ambient air quality standards (DOE 1996b).

Table 4–4 compares the projected emissions from the *NTS EIS* to actual emissions from NTS from 1996 to 2005, and to annual emissions projected through 2012. The emissions projected through 2012 are based on the potential to emit of the equipment and activities at NTS as determined from the 2005 NTS environmental report (DOE/NV 2006f). The potential to emit is the quantity of criteria pollutant that each facility or piece of equipment would emit annually if it were operated for the maximum number of hours at the maximum production rate specified in the NTS air permit.

As shown, annual emissions from NTS never exceeded the projected emissions in the *NTS EIS*. Annual emissions decreased since 2001, and in 2005, were less than 1 percent of the EIS projections. Potential future annual emissions were estimated based on potential activities in all NTS missions through 2012. Annual emissions projected through 2012 are all less than those projected in the *NTS EIS*, yet greater than the annual quantity actually emitted through 2005 for each pollutant. Therefore, NTS is expected to continue to operate within the bounds of the impacts projected for nonradiological air emissions in the *NTS EIS*.

Effective December 18, 2006, U.S. Environmental Protection Agency implemented a revised 24-hour $PM_{2.5}$ National Ambient Air Quality Standard of 35 micrograms per cubic meter. Nye County is in attainment/unclassifiable status for $PM_{2.5}$ under the new standard. $PM_{2.5}$ emissions were not estimated for the *NTS EIS* because the pollutant was not then regulated; between 1996 and 2005, NNSA/NSO did not calculate $PM_{2.5}$ emissions because it was not a requirement of the NTS air permit. Current research and data indicate that multipliers in the range of 0.06 to 0.11 can be used to infer or scale $PM_{2.5}$ emissions and concentrations from PM_{10} data (EPA 2005); therefore, the bounding level for $PM_{2.5}$ emissions based on the 1996 PM_{10} estimate is about 61 metric tons (67 tons) per year. The actual PM_{10} emissions from 1996 to 2005 have annually been less than 1 percent of the 1996 projection, indicating that annual $PM_{2.5}$ emissions during this time would have been less than about 0.6 metric tons (0.7 tons). Assuming future annual emissions of 33 metric tons (37 tons) of PM_{10}, based on potential to emit considerations, future $PM_{2.5}$ emissions would range from about 2 to 3.6 metric tons (2.2 to 4 tons) per year. Because these emissions would be dispersed over a large area, impacts from $PM_{2.5}$ emissions at NTS would be negligible.

Table 4–4 Comparison of Nonradiological Air Emissions from the Nevada Test Site to *NTS EIS* Projections (metric tons per year)

Year	***PM_{10}***	***CO***	***VOCs***	***NO_x***	***SO_2***	***TSP***	***HC***	***HAPs***
***NTS EIS* Expanded Use Alternative [a]**								
Construction	550							
Mobile Source		340	46	60				
Operational Sources	8.4	110		330	29	160	30	12
Total Projected Annual Emissions	**560**	**440**	**46**	**390**	**29**	**160**	**30**	**12**
Actual Emissions from 1996 through 2005 [b]								
1996	2.6	0.036	2.6	0.15	0.27	NR [c]	NR [c]	NR
1997	1.5	4.8	0.85	18	0.77	NR	NR	NR
1998	1.0	1.7	11	6.9	0.34	NR	NR	NR
1999	1.5	1.7	1.8	7.3	0.38	NR	NR	NR
2000	1.3	2.5	1.7	12	0.89	NR	NR	9.1×10^{-3}
2001	1.9	4.4	1.8	20	1.5	NR	NR	0.027
2002	3.3	4.2	1.9	19	1.5	NR	NR	9.1×10^{-3}
2003	2.2	1.6	1.1	7.4	0.69	NR	NR	0
2004	0.85	0.22	4.2	0.92	0.11	NR	NR	0.37
2005	0.76	0.14	1.8	0.63	0.036	NR	NR	0.045
Projected Annual Emissions (2008 through 2012) [d]	**33**	**14**	**17**	**26**	**6.0**	**NR**	**NR**	**NR**

CO = carbon monoxide, HAPs = hazardous air pollutants, HC = hydrocarbons, NO_x = nitrogen oxides, NR = not reported, PM_{10} = particulates having diameters less than 10 microns, SO_2 = sulfur dioxide, TSP = total suspended particulates, VOCs = volatile organic compounds.

[a] Emissions from construction and mobile source activities related to the five programs and the Site Support Activities program. Operational source emissions cover site support activities stationary emissions and stockpile management facilities. Source: Table 5.3-12, 5.3-13, 5.3-14, and 5.3-15 of the *NTS EIS* (DOE 1996b).

[b] Source: Table 3-15, DOE/NV 2006f.

[c] The permit does not regulate the emissions of this pollutant.

[d] Projected emissions are based on the potential to emit in the 2005 NTS environmental report (DOE/NV 2006f).

Note: Values from original sources have been converted from units of tons and rounded to two significant figures. To convert metric tons to tons, multiply by 1.1023.

4.7.2 Radiological Air Emissions

Most releases of radioactive material at NTS occur as diffuse sources from legacy areas contaminated from past nuclear tests, including release of tritiated water vapor from ponds and tanks, and resuspension of radionuclides from contaminated soil at historic surface test locations and from the Sedan and Schooner Craters. Diffuse sources from NTS operations have potentially included waste management and disposal, experiments using radioactive materials, radioactive material storage, depleted uranium ordnance tests, characterization and remediation activities, and pumping of a well near the Cambric underground test site (DOE/NV 1999b, 2006f). Reported point sources of airborne releases from NTS operations varied from year to year and included NTS laboratories and Building A-1 in the North Las Vegas Facility (DOE/NV 1994, 1995, 1996, 1997, 1998a, 1999c, 2000b, 2001b, 2002c, 2003d, 2004c, 2005e, 2006f).[3] Current programs and activities involving radioactive materials include laboratory analyses; handling, transport, storage, and assembly of radioactive targets for the JASPER gas gun; subcritical experiments at the U1a Facility; and operation of the Area 3 and Area 5 RWMS (DOE/NV 2006f).[4]

Since 1993, the total estimated release of tritium from NTS and auxiliary sites annually ranged from about 48 to 714 curies, while total estimated release of plutonium-239 and plutonium-240 annually ranged from about 0.002 to 0.4 curies (see **Table 4–5**). The largest total release of tritium in any year from all point sources was about 6 curies, almost all from the DAF laboratory in Area 6. The reported emissions of plutonium-239 and plutonium-240 in 1993 (see Table 4–5) were much lower than in later years, because the estimated emissions in 1993 did not include the contribution from resuspended particulates from surface deposits of legacy contamination. Annual quantities of resuspended radionuclides were conservatively estimated for the years after 1993 and were included in annual CAP88 analyses. The annual environmental monitoring reports, however, consistently concluded that no radioactivity attributable to current NTS operations was detected in any of the offsite monitoring networks (DOE/NV 1994, 1995, 1996, 1997, 1998a, 1999c, 2000b, 2001b, 2002c, 2003d, 2004c, 2005e, 2006f).

Table 4–5 Radiological Air Emissions from the Nevada Test Site from 1993 to 2005 (curies)

Year	*Tritium*	*Plutonium-239 and Plutonium-240*
1993	714	0.0018
1994	48	0.28
1995	281	0.40
1996	131	0.28
1997	160	0.28
1998	297	0.24
1999	363	0.24
2000	431	0.32
2001	564	0.32
2002	289	0.29
2003	314	0.29
2004	560	0.29
2005	170	0.29

Sources: DOE/NV 1994, 1995, 1996, 1997, 1998a, 1999c, 2000b, 2001b, 2002c, 2003d, 2004c, 2005e, 2006f.

[3] One of the sources of release in Building A-1 in the North Las Vegas Facility was the Atlas Facility, which completed tritium decontamination in 1997 (DOE/NV 1998a). The Atlas Facility in North Las Vegas is different from the Atlas pulsed-power machine that has been relocated to NTS from Los Alamos National Laboratory.

[4] The JASPER facility in Area 27 is the only NTS facility requiring stack monitoring (DOE/NV 2006b). Nonetheless, JASPER has not been a source of airborne release of manmade radionuclides above the minimum detectable concentration.

Monitoring results for 2005 showed that concentrations of tritium and plutonium-239 and plutonium-240 in NTS air samples continued to decline since the cessation of underground nuclear weapons testing in 1992. Similar to the previous year, the 2005 NTS environmental report concluded that no airborne radioactivity related to historic or current NTS operations had been detected in any of the Community Environmental Monitoring Program air samplers (DOE/NV 2006f).

Future radioactive emissions are expected to continue to be dominated by diffuse releases from areas contaminated from past nuclear testing, with only a small contribution from operational sources similar to those discussed above. A review of potential radiological activities from new or augmented activities at NTS indicated that incidental releases of tritium could result from operation of the Dense Plasma Focus Machine in Area 11 (DOE/NV 2006a, NTS 2007), while dismantlement of nuclear weapons at DAF could result in very small emissions of uranium, actinides, and tritium, based on experience at the Pantex Plant.[5] Operation of the Criticality Experiments Facility is estimated to release about 10 curies per year of argon-41 (DOE 2002d). Otherwise, environmental restoration projects at sites contaminated with radionuclides could cause temporary local increases in radioactive air emissions, principally from resuspension of particulates. Emissions would be controlled as needed using standard dust suppression methods or temporary containment structures. Nonetheless, any such temporarily increased emission rates would be followed by significant reductions in emissions caused by removal of the source terms. Levels of emissions from waste management activities at the Area 3 and Area 5 RWMS are expected to be consistent with those identified in current monitoring programs for these areas (DOE/NV 2004b, 2005c, 2006e).

4.8 Noise

The conclusions of the *NTS EIS* remain valid. Noise levels associated with activities at NTS would be restricted to the geographical area contained therein and would neither affect persons or residents in adjacent areas nor add measurably to regional noise levels due to the size and remote location of NTS. Because personnel and shipment numbers are below the estimates in the *NTS EIS*, traffic-related noise impacts are within the bounds of those described in the *NTS EIS*. Noise impacts for proposed future missions and activities would not exceed the scope of consequences established in the *NTS EIS*.

The *NTS EIS* stated that noise from onsite activities would not propagate offsite at audible levels. The closest residential area was Amargosa Valley, about 2 kilometers (1.3 miles) south of the NTS boundary. Another public area, U.S. Highway 95 along the southern border of the NTS property line, was also identified. The *NTS EIS* indicated that any potential noise impacts would mainly result from operation of construction equipment and from transport of personnel and materials to and from the site. To predict the magnitude of traffic-related noise, the *NTS EIS* projected the numbers of construction and operations personnel and material and waste shipments over a 10-year period. The *NTS EIS* also reviewed impacts from construction, training exercises, operations testing, and miscellaneous program activities. Potential noise impacts were generally described as minor and temporary (DOE 1996b).

New actions and missions carried out or proposed by NNSA/NSO since the *NTS EIS* were reviewed. It was determined that the closest residential area is still approximately 2 kilometers from the southern boundary of the NTS area and that the rural characteristics of adjacent areas remained largely unchanged. Thus, any potential noise impacts to sensitive receptors would still be limited to this area and U.S. Highway 95, as assessed in the *NTS EIS*.

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[5] Up to 100 nuclear weapons per year may be dismantled at DAF. Based on experience with management of a far larger annual number of weapons at the Pantex Plant, it is expected that the possible dismantlement of weapons at DAF would not result in a significant release of radioactive material. For example, in 2005, Pantex radiological emissions totaled only 5.5×10^{-5} curies of tritium, 7.3×10^{-10} curies of uranium, and 1.8×10^{-12} curies of other actinides (DOE 1996c, DOE 2003a, BWXT 2006).

As discussed in Sections 3.2.3 and 4.3 (Socioeconomics), the direct workforce at NTS decreased rather than increased, as projected in the *NTS EIS*, and current estimates suggest that the workforce would continue to decline. As discussed in Section 5.3 (Transportation), the estimated number of vehicle trips from material and waste shipments are also below the levels presented in the *NTS EIS*. Therefore, noise impacts from traffic would be consistent with or less than the impacts discussed in the *NTS EIS*.

Construction activities related to new facilities or improvements to existing facilities or infrastructure not considered in the *NTS EIS* would result in minor and temporary increases in noise levels that would barely be detected at the NTS boundary. A minor increase in traffic noise levels from construction employees and material shipments along routes leading to NTS would occur.

Sources of noise at the Aerial Operations Facility include aircraft, traffic, heating and air conditioning equipment, and operation of heavy equipment for loading and unloading operations; however, these levels would barely be audible at the NTS boundaries (DOE 2001a).

The *NTS EIS* estimated that 1,100 dynamic experiments (including subcritical experiments) and hydrodynamic experiments would be performed within the 1996 to 2005 timeframe, and that the maximum high-explosive charge that could be detonated at the BEEF would be 32,000 kilograms (70,000 pounds). Because current specifications for explosives testing remain the same as those in the *NTS EIS*, current and future noise levels from such testing would be within the bounds of the 1996 analysis and would remain minor, sporadic, and transitory.

4.9 Visual Resources

Areas of NTS visible from U.S. Highway 95 in Mercury and Amargosa Valley are common to the region. There have been no new facilities or activities completed since the *NTS EIS* that would impact views from public vantage points. However, a commercial, utility-scale solar power plant is proposed for the Solar Enterprise Zone in Area 22. Solar collectors associated with this project would be sited on 500 or more acres of the Solar Enterprise Zone and be visible from U.S. Highway 95. Planning, development, and construction prior to operation are anticipated to take 3 to 5 years. This project has a likely 20-year lifetime before replacement or disposition would be required. Other operations conducted or planned since the *NTS EIS* have been or would be in or near existing operational areas.

4.10 Cultural Resources

Projected impacts on cultural resources would meet the screening criteria established in Section 1.3. Although there could be some adverse impacts, these impacts would not be greater than those projected for the *NTS EIS* and further addressed in the *2002 NTS SA*.

The *NTS EIS* estimated that 67 sites could be impacted by projects associated with the proposed alternatives. Eight structures were expected to be decommissioned; none was evaluated for the National Register of Historic Places eligibility, but all had the potential for significance (DOE 1996b). The *NTS EIS* projected that impacts would occur to cultural resources resulting from the Expanded Use Alternative, and that the exact nature and significance of those impacts would not be fully understood until cultural resource inventories and consultations with American Indian tribes were conducted. The *NTS EIS* also proposed mitigation measures for any project that would adversely affect significant cultural resources. Although some new facilities would be constructed in undisturbed areas, many proposed NTS missions and facilities would be in existing facilities or built in previously disturbed areas. Direct impacts to cultural resources could result from construction of new facilities or infrastructure, improvements to existing facilities or infrastructure, and training activities. Indirect impacts such as vandalism, artifact collection, or inadvertent damage could result from improved access to project areas (DOE 1996b, 2002c).

In the years since the *2002 NTS SA*, more than 27 cultural resources investigations have been added to the previous number, 443, for a total of 470. These investigations have recorded more than 23 archaeological sites and 41 historic structures, for a total of 2,983 archaeological sites and 41 buildings. Over 1,100 of these cultural resources are eligible for listing on the National Register of Historic Places, the vast majority consisting of American Indian archaeological sites. Investigations continue to record and evaluate new resources for National Register of Historic Places-eligibility. The results of cultural resources investigations since the *2002 NTS SA* have not changed the general understanding of the project area. The inventory of known sites is still primarily archaeological resources concentrated in the northwest NTS, in the vicinity of Pahute and Ranier Mesas, followed by the general area of Jackass Flats, Yucca Mountain, and Shoshone Mountain in the southwest. (However, the bulk of the investigations have taken place in these areas, which could skew the information.) Numerous Cold War-era and nuclear test facilities still need to be inventoried and evaluated.

NNSA/NSO intends to continue to follow DOE policy and comply with Federal laws, including the National Historic Protection Act. This would be accomplished by adhering to the 2002 revisions to the *Cultural Resources Management Plan for the Nevada Test Site* (DOE/NV 2002b). This document describes procedures for complying with Section 106 of the National Historic Protection Act, as well as relevant cultural resources management methods and standards.

4.11 Human Health

Radiological impacts to the public from normal operations are addressed below, as are worker radiological and occupational health and safety impacts. Impacts to workers and the public from radiological and chemical accidents are addressed in Section 5.1. Nonradiological impacts to the public from normal operations are addressed in Section 4.7.

Possible radiological impacts to members of the public from normal operations at NTS are expected to be very low, and well within all applicable standards, due to the remoteness of NTS, the restrictions on public access, the limited sources of radionuclide release, and the imposition of technical and administrative controls. A comprehensive radiological and occupational health and safety program remains effective at NTS, and occupational health and safety throughout the DOE Complex was strengthened by DOE's February 9, 2006, promulgation of health and safety regulations (10 CFR Part 851) governing contractor activities at DOE sites (71 FR 6858).

Radiological Impacts to the Public

It is expected that the only pathways of possible radiation exposure to the public would continue to be the air pathway, the groundwater pathway, and the contaminated game animal pathway.

Regarding the air pathway, the *NTS EIS* concluded that impacts to air quality by radioactive effluents would be minimal. Since the *NTS EIS*, annual site environmental reports have all concluded that no radioactivity attributable to current NTS operations had been detected by any of the offsite monitoring networks (DOE/NV 1994, 1995, 1996, 1997, 1998a, 1999c, 2000b, 2001b, 2002c, 2003d, 2004c, 2005e, 2006f). In recent years, no radioactivity attributable to historic or current NTS operations has been detected (DOE/NV 2005e, 2006f). For most of these years, NTS annually calculated a dose to the maximally exposed individual (MEI) and surrounding population using CAP88 modeling and assuming annual radionuclide releases from legacy contaminated areas and from operations as described in Section 4.7.2. The annual MEI dose as conservatively estimated by this process has always been less than 0.2 millirem, which is a factor of 50 less than the U.S. Environmental Protection Agency 10-millirem National Emission Standards for Hazardous Air Pollutants standard in 40 CFR Part 61, Subpart H. But because of the consistent low calculated dose, the U.S. Environmental Protection Agency and DOE no longer require modeling to confirm compliance with the U.S. Environmental Protection Agency standard.

Rather, data collected onsite each year from six critical receptor air sampling stations are being used to document compliance.[6] Starting in 2005, DOE has assumed the maximum possible annual dose to an MEI to be 0.2 millirem and the dose to the 80-kilometer (50-mile) population to be 1 person-rem.

In the future, possible doses to the public from airborne release of radionuclides are expected to continue to be significantly smaller than the U.S. Environmental Protection Agency standard. Possible doses to the public are expected to continue to be dominated by those associated with airborne release from areas contaminated from past test activities. Future remediation of contaminated soils and industrial areas at NTS could cause temporary increases in emission rates from these sites as they are being remediated; therefore, slight increases in offsite dose could occur, but any increased doses would be followed by reduced doses after remediation. Otherwise, future activities were reviewed for their potential to cause public radiation doses. These activities are not expected to cause offsite radiation doses from NTS through the air pathway that would exceed even a fraction of the U.S. Environmental Protection Agency standard.

Regarding the groundwater pathway, the *NTS EIS* addressed the potential for impacts to the public from drinking groundwater that had been contaminated from previous nuclear tests within or close to the groundwater table. It was determined that tritium in groundwater had not migrated an appreciable distance from the test sites, and that no manmade radionuclides had been detected in drinking water wells at NTS or in monitored drinking water sources off NTS. It was concluded that impacts to the public were not expected within the 10-year timeframe considered in the EIS, whether or not additional underground testing occurred (DOE 1996b).

NTS annual environmental monitoring reports have consistently supported the *NTS EIS* conclusions, based on onsite and offsite analysis of numerous wells and springs by NTS contractors and on the efforts of the Community Environmental Monitoring Program conducted by the Desert Research Institute (DOE/NV 1994, 1995, 1996, 1997, 1998a, 1999c, 2000b, 2001b, 2002c, 2003d, 2004c, 2005e, 2006f). In addition, an improved understanding of groundwater movement and quality in the NTS area is being obtained through the Underground Test Area Sub-Project. Through the Underground Test Area Subworkers receiving a measurable occupational dose was about 27 percent smaller than the average received by all DOE workers (see Section 3.2.11).

A review of new activities proposed through 2012 identified none that would likely cause a significant increase in annual radiation dose among NTS workers. Much of the past radiation dose experienced by NTS workers was associated with radioactive waste management operations, and future annual rates of receipt of low-level and mixed low-level radioactive wastes are not expected to be significantly different from past years. Nonetheless, should operational experience indicate that a group of radiation workers were experiencing a disproportionate radiation dose, NNSA/NSO would impose administrative or technical controls to reduce average dose levels among the group. Radiological operations would continue to be conducted to ensure that radiation doses received by workers would be maintained to ALARA levels, and would not exceed the DOE occupational dose limit for individual workers.

Occupational Health and Safety

A comprehensive occupational safety and health program continues at NTS. As noted in Section 3.11, from 1996 through 2006, accident rates at NTS were relatively stable from year to year and were similar to those for the DOE Complex as a whole. Accident rates for government vehicles at NTS through 2004 were about one-third of overall DOE accident rates over this period.

Although workers may be at risk from accidents involving handling toxic or hazardous chemicals, worker programs at NTS require adherence to Federal and state laws, DOE orders, and plans and procedures for performing work. Workers are protected from specific hazards by training, monitoring, use of personnel protective equipment, and administrative controls. DOE has established and codified the Chronic Beryllium Disease Prevention Program at all DOE sites, including NTS, to reduce the number of workers potentially exposed to beryllium while at work, minimize the levels of and potential for exposure to beryllium, and establish a medical surveillance program for early detection of the disease (DOE 2002c).

Most hazardous material use occurs at the Nonproliferation Test and Evaluation Complex. Chemical inventories at this facility, however, are not expected to significantly increase above the current level. As projects come and go, inventories tend to increase before and during a project and decrease once the project is completed. The objective is to keep a minimum inventory of only those chemicals that have identified uses. Nonproliferation Test and Evaluation Complex personnel are trained and experienced with chemical handling, and there have not been any occupational incidents at the Complex for several years (NTS 2007).

4.12 Waste Management

Management of nonradioactive and radioactive wastes is expected to be within the bounds of the *NTS EIS*, but because of uncertainties in the quantities of wastes that could be generated and sent to NTS, low-level radioactive waste management is addressed in more detail in Section 5.2. For convenience, mixed low-level radioactive waste is also addressed in Section 5.2.

4.12.1 Nonradioactive Waste Management

Nonradioactive wastes include chemical wastes, solid wastes, sanitary wastewater, and explosive wastes which are treated at the Explosive Ordnance Disposal Unit. Continued management of nonradioactive wastes at NTS is expected to be within the bounds of analyses in the *NTS EIS*.

Chemical Wastes

Chemical wastes include hazardous wastes managed under RCRA, and other wastes managed under the Toxic Substances Control Act. Quantities of hazardous and Toxic Substances Control Act wastes shipped offsite from 2000 through 2006 (an annual average of 166 metric tons [183 tons]) (DOE/NV 2004c, 2005e, 2006f; NTS 2007) were all smaller than the annual 768 metric tons (847 tons) of hazardous wastes projected in the *NTS EIS*. Projections were not made for future years. Yet even if the largest quantity of hazardous waste from past years (529.3 metric tons [583.4 tons] in 2003) was annually generated, the projections analyzed in the *NTS EIS* would not be exceeded.

PCB waste is not routinely generated during operations, but could be generated during environmental restoration and decontamination and decommissioning activities, and may be received mixed with low-level radioactive waste. NTS-generated waste containing only PCBs or PCBs mixed with hazardous constituents regulated under RCRA may be stored in the Hazardous Waste Storage Unit in Area 5 pending shipment offsite for treatment and disposal. Sufficient offsite treatment and disposal capacity currently exists.[7]

Nonhazardous Solid Waste

The *NTS EIS* (DOE 1996b) made the following projections of the remaining capacity of the three permitted NTS landfills for the disposal of nonhazardous waste: Area 6 Hydrocarbon Disposal Site – 42,000 cubic meters (1.5 million cubic feet);[8] Area 9 U10c Disposal Site – 990,000 cubic meters (35 million cubic feet); and Area 23 landfill – 450,000 cubic meters (16 million cubic feet). The largest quantity of solid waste disposed of in all three landfills from 1996 through 2006 was 20,089 metric tons (22,144 tons) in 2003 (DOE/NV 1997, 1998a, 1999c, 2000b, 2001b, 2002c, 2003d, 2004c, 2005e, 2006f; NTS 2007). Assuming an average waste density of 0.55 tons per cubic yard, the total volume of solid waste disposed in 2003 was about 30,800 cubic meters (1.09 million cubic feet), which is smaller than the annual 42,810 cubic meters (1.512 million cubic feet) projected for all three landfills in the *NTS EIS*. The total volume of waste projected over 10 years in the *NTS EIS* was 428,100 cubic meters (15.12 million cubic feet) (DOE 1996b). Assuming a density of 0.55 tons per cubic yard, the total mass of solid waste disposed through 2005, 120,000 metric tons (130,000 tons), represents about 181,000 cubic meters (6.390 million cubic feet), which is roughly 42 percent of the volume projected in the *NTS EIS*.

The most recent survey of remaining landfill capacity was in 2003. The estimated remaining waste capacities and life spans for the landfills are (BN 2003): Area 6 Hydrocarbon – 89,100 cubic meters (3.5 million cubic feet), 69 years; Area 9 U10c – 550,000 cubic meters (19.4 million cubic feet) 30 years; and Area 23 – 376,000 cubic meters (13.3 million cubic feet), 18 years. If the largest waste volume disposed in a year since 1996 (roughly 30,800 cubic meters [1.09 million cubic feet] in 2003) was disposed of annually from 2007 through 2012, about 185,000 cubic meters (6.53 million cubic feet) of additional solid waste would be disposed. The total volume disposed of and projected from 1996 through 2012 would be about 380,000 cubic meters (13.4 million cubic feet), which is smaller than the 10-year projection in the *NTS EIS*.

Wastewater

Domestic and industrial wastewater is treated using sewage lagoons or septic systems located throughout NTS, although portable sanitary units may be provided at areas not serviced by permanent wastewater systems. The NTS sanitary system meets current site needs (Section 3.2.12). Because personnel

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[7] *Low-level radioactive wastes containing PCBs, whether generated at NTS or received from offsite DOE sources, may be accepted for disposal at NTS provided that the waste meets the standards under 40 CFR 761.50(b)(7) (DOE/NV 2003e).*

[8] *At the time of the NTS EIS, the hydrocarbon landfill contained about 15,290 cubic meters (540,000 cubic feet) of soil, sludge, and debris (DOE 1996b).*

requirements at NTS through 2012 are expected to be lower than those projected in the *NTS EIS*, it is expected that the existing wastewater treatment system would be adequate for NTS needs. Future system upgrades would be undertaken as needed, in accordance with physical infrastructure projects conducted after appropriate NEPA review (see Section 4.2).

Explosive Ordnance Disposal Unit

Conventional explosive wastes generated from NTS activities may be treated by open detonation at the Explosive Ordnance Disposal Unit in Area 11 (see Section 3.2.12). Annual quantities treated have been much smaller than permitted levels. Quantities of explosive wastes treated in the Explosive Ordnance Disposal Unit from 1996 through 2005 ranged from zero to 380 kilograms (838 pounds). Since 2002, the maximum quantity treated was 2.2 kilograms (4.9 pounds) (DOE/NV 2004c, 2005e, 2006f; NTS 2007). Although use of DAF for dismantlement of some nuclear weapons could generate high explosive wastes that would be treated at the Explosive Ordnance Disposal Unit, it is expected that future explosive needs for NTS would be well within the capacity set by the RCRA permit and smaller than the annual quantity evaluated in the *NTS EIS*.

4.12.2 Radioactive Waste Management

Receipt and disposal of radioactive low-level and mixed low-level radioactive waste is expected to be within *NTS EIS* projections. But because of uncertainties, low-level radioactive waste management is addressed in more detail in Section 5.2; for convenience, management of mixed low-level radioactive waste is also addressed in Section 5.2. Transuranic waste management and treatment of tritium-containing liquids are addressed below.

Transuranic Waste Management

As discussed in the *NTS EIS*, transuranic waste has been disposed of in the past in the Area 5 RWMS. Closure of disposal units containing transuranic waste will occur in accordance with DOE, the U.S. Environmental Protection Agency, and state requirements. Stored transuranic waste includes legacy waste and newly generated waste (legacy waste includes transuranic and mixed transuranic waste). Much legacy transuranic waste stored at NTS has been shipped for offsite disposal at the WIPP. Shipment of the remaining legacy waste volume is expected within the next few years. Small quantities of newly generated transuranic waste are annually generated and would be shipped offsite for disposition. The quantity of transuranic waste stored at NTS is smaller than that assessed in the *NTS EIS*, and should be even smaller in future years.

Most transuranic waste is stored in the Area 5 RWMS in a steel-framed, fabric-covered structure known as the Transuranic Pad Cover Building. This structure rests on a 0.85-hectare (2.1-acre) asphalt pad containing a protective waterproof layer, plus a 20-centimeter (8-inch) curb to prevent run-on and run-off (DOE/NV 2006b). Classified transuranic material is stored in a classified storage building. Mixed transuranic waste is stored in the Nevada Division of Environmental Protection-permitted Mixed Waste Storage Unit in Area 5.

Since the 1970s, NTS stored legacy transuranic waste mostly generated from weapons research activities at Lawrence Livermore National Laboratory. In addition, since the 1980s, NTS stored some legacy transuranic waste obtained from the Rocky Flats Environmental Technology Site, Lawrence Berkeley Laboratory, EG&G, and environmental restoration at NTS and the Tonopah Test Range.

Since 1996, about half of the legacy waste stored at NTS was repackaged, characterized, and shipped to WIPP. A legacy waste drum shipping campaign began in January 2004 and was completed in November 2005. Waste characterization was performed at Area 5 by the NTS managing and operating contractor and WIPP's Central Characterization Project. In 2004 and 2005, 1,860 drums of legacy waste were shipped to WIPP (about 392 cubic meters [13,800 cubic feet] of waste) in 48 shipments (DOE/NV 2005a, 2005f, 2006g, 2007a).

NTS is currently processing and repackaging the remaining legacy transuranic waste which, as of the end of December 2007, consists of 58 oversize boxes, 151 drums, and two 3-foot-diameter (0.9-meter-diameter) steel spheres that were used in subcritical experiments (totaling 302 cubic meters [10,660 cubic feet]). The wastes in the oversize boxes are being repackaged into standard waste boxes acceptable for WIPP disposal. Wastes in drums and boxes will be shipped off NTS in TRUPACT II casks (DOE/NV 2006b, 2006g; NTS 2007). The spheres, however, cannot be shipped in their current configuration in TRUPACT II casks because their fissile gram equivalent content exceeds the TRUPACT II limit of 325 grams. Options for preparing the spheres for shipment are being considered, and could include size reduction in the Visual Examination and Repackaging Building (NTS 2007). All remaining legacy wastes including legacy waste drums and oversized boxes repacked to standard waste boxes are scheduled for offsite shipment in 2008.

Newly generated transuranic waste consists of standard waste boxes generated from experiments at the JASPER facility. As of December 2007, 14 standard waste boxes (about 26.5 cubic meters [935 cubic feet]) were in storage (NTS 2007). Assuming an experiment schedule of up to 24 special nuclear experiments per year through 2022, and generation of 1 standard waste box of waste for every two experiments, about 23 cubic meters (810 cubic feet) of JASPER-generated transuranic waste could be generated per year, or up to about 389.5 cubic meters (13,750 cubic feet) of JASPER-generated transuranic waste through 2022 (NTS 2007). The schedule for shipping the JASPER waste to WIPP has not yet been determined.

Evaporation Facilities

Small quantities of liquids containing tritium continue to be disposed by evaporation into the air from ponds and open tanks. The sources of the tritium include tritium-containing water removed from tunnels in Area 12, and from onsite wells, that were contaminated from past nuclear tests. The tritium inventory discharged for evaporation has ranged from about 13 to 130 curies per year from 1996 through 2005, and has averaged about 50 curies (DOE/NV 1997, 1998a, 1999c, 2000b, 2001b, 2002c, 2003d, 2004c, 2005e, 2006f). In recent years, the largest releases of tritium have been from past test areas such as the Sedan and Schooner Craters rather than the evaporation facilities. Nonetheless, NTS has consistently demonstrated compliance with U.S. Environmental Protection Agency National Emission Standards for Hazardous Air Pollutants standards. Given radioactive decay, it is expected that future releases of tritium from NTS evaporation will continue to decline.

4.13 Transportation

Radioactive, hazardous, industrial, commercial, and recyclable materials are regularly transported to and from and onsite at NTS. Shipments to and from NTS are transported by commercial carriers or by the NNSA Office of Secure Transportation using secure vehicles called safe and secure transports or safeguard trailers. The shipments meet applicable U.S. Department of Transportation or DOE and NNSA requirements. Primary features of these regulations are stringent packaging and safeguards and security requirements governing shipments on public roads. Onsite shipments are made using NNSA/NSO-operated vehicles such as pickup trucks, flatbed trailers, or safe and secure transports or safeguard trailers depending on the quantity, type and radioactivity of the materials shipped.

Past annual shipments of low-level and mixed low-level radioactive wastes are bounded by the projections in the *NTS EIS*. Future annual shipments of low-level and mixed low-level radioactive wastes are also expected to be bounded by the *NTS EIS*, although there are uncertainties in waste generation rates that may affect waste shipment rates. Uncertainties in waste generation rates depend in part on regulatory and other issues that cannot be resolved at this time, and the number of waste shipments that could result would depend on the radiological and physical characteristics of the waste, and other factors such as the availability of disposal capacity at other sites than NTS. The hypothetical receipt of 2,600 waste shipments, which would equal the largest annual number of low-level and mixed low-level radioactive waste shipments from onsite and offsite sources since the *NTS EIS*, would still be less than the 4,049 average annual shipments projected in the *NTS EIS* from offsite sources (see Table 5-8). Nonetheless, because of these uncertainties and the existence of analyses having different technical assumptions than those in the *NTS EIS*, additional analyses of low-level and mixed low-level radioactive waste shipment impacts are presented in Section 5.3.

The *NTS EIS* did not analyze shipments of transuranic waste to WIPP for disposal, but other contemporary analyses such as the *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement (WIPP SEIS II)* (DOE 1997b) and the *Waste Management PEIS* (DOE 1997a) did. The number of offsite shipments of transuranic waste from NTS though 2022 is expected to be up to about 40 percent (34 shipments) larger than analyzed; although this is not a large increase, transportation of transuranic waste is analyzed further in Section 5.3.

Review of the existing and new activities of Defense Programs at NTS as summarized in Section 3.1.1, indicates that the transportation requirements for special nuclear material and other high explosive materials would be within the values analyzed in the *NTS EIS*. Therefore, potential transportation risks would be within the levels estimated in the *NTS EIS*.

4.14 Environmental Justice

Environmental justice analysis requires a two-step process as described in the *NTS EIS*: First, determine whether significant and adverse effects may result from project activities, and second, determine whether a minority or low-income population may be affected disproportionately by any significant and adverse effects. Regarding the first step, changes in programs and activities at NTS from 1996 to the present are not expected to cause significant and adverse effects on off-site populations beyond those described in the *NTS EIS*. Regarding the second step, the reported demographic compositions of census units closest to NTS boundaries and areas of activity have not changed since publication of the *2002 NTS SA*. The conclusions of the *NTS EIS* remain valid with respect to the lack of potential impacts on minority and low-income populations.

Minority Populations

Based on an analysis of census block groups in Clark, Nye, and Lincoln Counties from the 1990 census, the *NTS EIS* concluded that the Expanded Use Alternative would not have a disproportionately high and adverse impact on minority populations (DOE 1996b). The *2002 NTS SA* evaluated demographic data from the 2000 census for changes in minority populations of census block groups in the three counties and determined that the conclusions of the *NTS EIS* remained valid with respect to the lack of disproportionate impacts anticipated for minority populations (DOE 2002c).

More recent data showing distributions of minorities for census units in the three counties are not available from the U.S. Census Bureau or the Nevada State Demographer's Office. As described in Section 3.2.13, the percentages of minorities in the State of Nevada and in Clark County have continued to increase since 2000, an increase generally related to population growth in the Las Vegas metropolitan area. However, the percentages of minorities in Nye and Lincoln Counties have declined since 2000.

In projections from the Nevada State Demographer's Office (NSBDC 2007b), the percentage of minority population in the State of Nevada is expected to grow to 43 percent by 2012, while the percentage of minority populations in Clark, Nye, and Lincoln Counties is projected to be 47 percent, 15 percent, and 7 percent, respectively.

Low-Income Populations

Based on an analysis of census block groups in Clark, Nye, and Lincoln Counties from the 1990 census, the *NTS EIS* concluded that Expanded Use Alternative would not have a disproportionately high and adverse impact on low-income populations (DOE 1996b). Although data from the 2000 census for low-income populations were not available for block groups, census tracts, or counties in Nevada when the *2002 NTS SA* was completed, the SA concluded that the *NTS EIS* remained valid with respect to the lack of disproportionate impacts anticipated for low-income populations (DOE 2002c).

As described in Section 3.2.13, statistics regarding low-income populations in the three counties are now available from the 2000 census (Census 2007b). The percentages of individuals with incomes below poverty level have remained consistent for the State of Nevada, as well as for Nye and Clark Counties, while the percentage has increased slightly (from 14 to 16 percent) in Lincoln County. However, the only census unit in Lincoln County bordering NTS property (tract 9502, block group 1) experienced a decline in low-income population (from 16 to 14 percent) between 1990 and 2000. Among the census tracts in Nye and Clark Counties closest to NTS, only tract 9802 in Nye County (along the north border of NTS) and tract 58.18 in Clark County (southeast of NTS) experienced increases in low-income populations by 2 percentage points during the decade. The low-income populations of all other census tracts in proximity to NTS declined during the decade; most noticeably, the low-income population in tract 59 of Clark County (southeast of NTS) declined from 19 to 8 percent.

American Indian Environmental Justice

As indicated in the *NTS EIS*, the CGTO identified concerns including violations of lands they consider sacred, perceived risks from radiation, and cultural survival, especially limitations of access. These impacts would be perceived only by American Indian groups with affiliation to the region and would, therefore, have a disproportionately high impact on these groups. As part of mitigation activities as identified in the *NTS EIS*, NNSA/NSO encourages the participation of the CGTO in DOE-sponsored cultural resources investigations, including those associated with ground-disturbing activities such as environmental restoration, and in education programs intended to guide students and researchers about interactions with the physical environment and cultural landscape. NNSA/NSO is committed to accommodating Tribal organization requests to access NTS for cultural purposes, to the extent consistent with mission needs and activities. At the same time, restricted access to NTS lands affords a substantial level of protection to sacred and culturally sensitive sites compared to areas with open access. Current and projected use of NTS is expected to cause similar impacts to those identified in the *NTS EIS*, except that in accordance with the NTS *Cultural Resources Management Plan* (Section 4.10), reduced impacts would result from working with and through the CGTO to continue to identify issues and avoid or mitigate impacts.

CHAPTER 5
DETAILED CONSEQUENCE ANALYSIS

5.0 DETAILED CONSEQUENCE ANALYSIS

This chapter presents more detailed analyses for the resource areas for which an initial screening analysis indicated the need for additional analyses and discussion. The technical disciplines considered are:

- Public and worker impacts from radiological or chemical accidents
- Low-level and mixed low-level radioactive waste management
- Transportation impacts

Also included in this chapter is a summary of the cumulative impacts for technical disciplines for which the combined impacts of NTS and other activities in the region of influence have changed since the analysis presented in the *NTS EIS*.

5.1 Public and Worker Impacts from Radiological or Chemical Accidents

The *NTS EIS* (DOE 1996b) analyzed radiological and chemical accident scenarios for several alternatives, including the Expanded Use Alternative. Accident scenarios for the Expanded Use Alternative were re-evaluated in the *2002 NTS SA* (DOE 2002c). This SA analyzes these accident scenarios to determine if changes at NTS and associated offsite locations, as well as changes in accident analysis methodology, would indicate a revision of the calculated accident consequences and risks to workers and the public. The radiological and chemical accidents addressed in the *NTS EIS* and evaluated in this SA are presented in **Table 5–1**.

The evaluation of accidents consisted of three principal steps:

1. Determination if any changes at NTS would result in new accident scenarios;
2. Evaluation of the *NTS EIS* accident scenarios to assess if assumptions or input parameters that would affect their consequences or risks have changed; and
3. Analysis of accident consequences and risks if changes have been noted in steps 1 and 2.

After a review of ongoing and planned (through 2012) activities and projects at NTS, no new accident scenarios were identified for this SA. However, changes in assumptions and analytical input parameters were identified that affect the calculated radiological and chemical accident consequences and risks to workers and the public. Although the risks for some radiological accident scenarios increased significantly for this SA, the absolute magnitude of the largest accident risks remained very small. In general, the chemical accident analysis for this SA resulted in comparable or lower health consequences to a noninvolved worker and the MEI than in the *NTS EIS*.

Radiological Accidents

A total of 17 radiological accident scenarios from the *NTS EIS* were evaluated in this SA. The accident locations are BEEF (Area 4), Area 5, DAF (Area 6), Yucca Flat (Area 6), Area 12, Area 13 (Nevada Test and Training Range), Area 27, and the Tonopah Test Range. Because the facility at Area 27 is no longer in use for the purpose identified in the *NTS EIS* accident analysis, the accident scenario involving Area 27 was eliminated from consideration. The remaining 16 accidents were evaluated in terms of the factors that affect their calculated radiation doses, latent cancer fatalities (LCFs), and annual risks to workers and the public.

Table 5–1 Accident Scenarios Involving Release of Radioactive or Chemical Material Considered in the *NTS EIS* (Expanded Use Alternative)

Scenario Identification	*Scenario Description*
DPR1	P-Tunnel: mechanical release of plutonium during handling.
DPR2	DAF: explosion involving 25 kilograms (55 pounds) of high explosive and 5 kilograms of plutonium.
DPR3	TTR: mechanical release of plutonium from test assembly.
DPR4	TTR: failure of artillery fired atomic projectile during firing.
DPR5	NTS Area 27: explosion in interim stored nuclear weapons.
DPR6	Accidental venting from an underground test.
DPH1	TTR: explosion of rocket test assembly containing depleted uranium and beryllium.
DPH2	TTR: rocket propellant storage area fire.
WMR1	NTS Area 5: explosion/fire in two transuranic waste containers.
WMR2	NTS Area 5: explosion/fire in multiple transuranic waste containers.
WMR3	NTS Area 5: airplane crash into transuranic waste storage unit.
WMH1	NTS Area 5: explosion/fire in two hazardous waste containers.
WMH2	NTS Area 5: explosion/fire in multiple hazardous waste containers.
WMH3	NTS Area 5: airplane crash into hazardous waste storage unit.
ERR1	Environmental restoration waste spill in plutonium-contaminated soil (evaluated for both TTR and NTTR Area 13[a]).
ERR2	Environmental restoration waste fire in plutonium-contaminated soil (evaluated for both TTR and NTTR Area 13[a]).
ERR3	Airplane crash into environmental restoration site containing plutonium-contaminated soil (evaluated for both TTR and NTTR Area 13[a]).
ERH1	Fire involving one container-equivalent in composite hazardous environmental restoration site at NTS.
ERH2	Fire involving multiple container-equivalents in composite hazardous environmental restoration site at NTS.
ERH3	Airplane crash into composite hazardous environmental restoration site at NTS.
NDRDH1	NPTEC: spill of one container of hazardous chemicals.
NDRDH2	NPTEC: tank failure.
NDRDH3	NPTEC: airplane crash into tank farm area.
WFOR1	BEEF: 100-curie tritium release.
WFOR2	BEEF: 1,000-curie tritium release.
WFOH1	BEEF: heavy metal release.
WHOH2	BEEF: beryllium and depleted uranium release.

BEEF = Big Explosives Experimental Facility, DAF = Device Assembly Facility, NPTEC = Nonproliferation Test and Evaluation Complex (called the Liquefied Gaseous Fuels Spill Test Facility [LGFSTF] in the *NTS EIS*), NTTR = Nevada Testing and Training Range, TTR = Tonopah Test Range.

[a] There is no Area 13 within the NTS boundary; however, there is a landplot on the Nevada Test and Training Range, known as Complex 13, which lies off the northeast corner of NTS. This was the location for a plutonium disposal safety experiment conducted in early 1957 (DOE 1996b).

Source: DOE 1996b.

Accident consequences and risks are a function of the source term, number and location of worker and public dose receptors, meteorology, dose-to-LCF-risk conversion factor, and annual accident frequency. The source term, number and locations of involved and noninvolved workers, location of the MEI, and meteorology were found to be unchanged from the *NTS EIS* for all accident scenarios (SAIC 1996);[1] however, the total 80-kilometer (50-mile) population, dose-to-LCF-risk conversion factor, receptor breathing rate, and accident frequency have changed. The figure used for the *NTS EIS* population was based on the 1990 census, whereas this SA uses a figure based on the 2000 census extrapolated to 2012. The dose-to-LCF-risk conversion factor changed due to updated information on cancer rates in exposed populations that was evaluated by a U.S. intergovernmental task force and resulted in new recommended factors (DOE 2003c). The changes in public breathing rate are based on DOE accident dose calculation recommendations for the MACCS2 computer code (DOE 2004d). A higher annual number of aircraft flight sorties possibly transiting the Tonopah Test Range (USAF 2007b) resulted in higher accident frequencies for three scenarios (USAF 2007b). In addition, the two BEEF accidents have tritium source terms that require an additional multiplier of 1.5 to account for the effects of low beta energy tritium skin absorption (DOE 2004d) for all worker and public dose receptors that were not accounted for in the *NTS EIS* analysis of radiological accidents. The 1990 and 2000 census 80-kilometer (50-mile) populations from each accident scenario location at NTS are presented in **Table 5–2** along with the estimated 2012 population (Census 2007a, Nevada 2006). The extrapolation from 2000 to 2012 population was conservatively based on the largest population growth for any of the counties within 80 kilometers (50 miles) of NTS. The changes in these parameters for each accident scenario are presented in **Table 5–3**.

Based on the factors in Table 5–3, the *NTS EIS* noninvolved worker accident doses have not changed, but the MEI dose increased by a factor of 1.25 to account for the increase in breathing rate assumed for accident dose calculations (DOE 2004d). The 80-kilometer (50-mile) population dose is increased by a factor, based on the specific accident scenario location, of the product of 1.25 (for increased breathing rate) and the increase in population between 1990 and 2012 (Census 2007a, Nevada 2006). This factor varies from 0.95 for accident scenarios at NTS Area 12 to 4.17 for accident scenarios at NTS Area 5. The accident radiation doses (consequences) for each scenario are presented in **Table 5–4**, comparing the results for the *NTS EIS* and this SA. If the results from this SA exceed those of the *NTS EIS*, the value in the table has been bolded.

Table 5–2 Accident Scenario Population Change

Accident Location	*1990 Census 80-Kilometer (50-mile) Population* [a]	*2000 Census 80-Kilometer (50-mile) Population* [a]	*Estimated 2012 80-Kilometer (50-mile) Population* [b]
Area 12	3,758	1,680	2,839
DAF, Area 6	12,159	23,179	39,173
Tonopah Test Range	5,526	3,328	5,624
Yucca Flat, Area 6	8,156	8,240	13,926
Area 5	14,523	28,527	48,211
Area 13 (NTTR)	2,052	1,118	1,889
BEEF, Area 4	6,893	5,571	9,415

BEEF = Big Explosives Experimental Facility, DAF = Device Assembly Facility, NTTR = Nevada Test and Training Range.
[a] Source: Census 2007a.
[b] Based on an estimated 69 percent population growth for Clark County from 2000 to 2012 (Nevada 2006).

[1] *The analysis in the NTS EIS was performed using the RSAC-5 Computer Code. It uses dose conversion factors from DOE/EH-0070 and DOE/EH-0071 (DOE 1988a, 1988b).*

Table 5–3 Changes Affecting Nevada Test Site Radiological Accident Scenarios

Scenario Identification and Location [a]	*80-Kilometer (50-mile) 1990 to 2012 Population Change* [b] *Multiplier*	*Accident Frequency*	*Breathing Rate Dose Factor* [c]	*Dose-to-LCF-Risk Conversion Factor* [c]
DPR1, Area 12	0.76	No Change	Increase by 25 percent (factor of 1.25) for public No change for workers	Increase by 20 percent (factor of 1.2) for public Increase by 50 percent (factor of 1.5) for workers
DPR2, DAF	3.221	No Change		
DPR3, TTR	1.02	No Change		
DPR4, TTR	1.02	No Change		
DPR6, Yucca Flat	1.71	No Change		
WMR1, Area 5	3.332	No Change		
WMR2, Area 5	3.332			
WMR3, Area 5	3.332	Increase by 69 percent [d] (factor of 1.69)		
ERR1, NTTR Area 13	0.92			
ERR2, NTTR Area 13	0.92	No Change		
ERR3, NTTR Area 13	0.92	Increase by 69 percent [d] (factor of 1.69)		
ERR1, TTR	1.02	No Change		
ERR2, TTR	1.02	No Change		
ERR3, TTR	1.02	Increase by 69 percent [d] (factor of 1.69)		
WFOR1, BEEF [e]	1.37	No Change		
WFOR2, BEEF [e]	1.37	No Change		

BEEF = Big Explosives Experimental Facility, DAF = Device Assembly Facility, LCF = latent cancer fatality, NTTR = Nevada Test and Training Range, TTR = Tonopah Test Range.

[a] Refer to Table 5–1 for descriptions of the accident scenarios. All accident scenarios occur at NTS locations except for the scenarios for Area 13 of the Nevada Test and Training Range and the three scenarios for the Tonopah Test Range.

[b] Based on the estimated change in population from 1990 to 2012 using 1990 and 2000 census data (Census 2007a) and projections from 2000 to 2012 (Nevada 2006) as shown in Table 5–2.

[c] Calculation analytical assumption.

[d] Based on high use annual sortie operations that may overfly portions of the Tonopah Test Range (up to 27,000 per year) (USAF 2007b), compared with 16,000 sorties assumed for the *NTS EIS*.

[e] An additional multiplier of 1.5 to account for the dose from absorption of tritium through the skin (DOE 2004d) is applied to all worker and public doses from the two BEEF accidents.

Table 5–4 Nevada Test Site Accident Consequences (radiation dose)

Scenario Identification and Location [a]	*Noninvolved Worker Dose (rem)*		*Maximally Exposed Individual Dose (rem)*		*80-Kilometer (50-mile) Population Dose (person-rem)*	
	NTS EIS [b]	*This SA*	*NTS EIS* [b]	*This SA*	*NTS EIS* [b]	*This SA*
DPR1, Area 12	4.5	4.5	3.5×10^{-4}	**4.4×10^{-4}**	7.0×10^{-2}	6.7×10^{-2}
DPR2, DAF	1,200	1,200	0.19	**0.24**	110	**440**
DPR3, TTR	1.3×10^{-2}	1.3×10^{-2}	6.7×10^{-3}	**8.4×10^{-3}**	5.4×10^{-4}	**6.9×10^{-4}**
DPR4, TTR	71	71	2.3	**2.9**	18	**23**
DPR6, Yucca Flat	1.6	1.6	2	**2.5**	360	**770**
WMR1, Area 5	2.3	2.3	2.3×10^{-3}	**2.9×10^{-3}**	0.93	**3.9**
WMR2, Area 5	3.7	3.7	3.6×10^{-3}	**4.5×10^{-3}**	1.5	**6.2**
WMR3, Area 5	3,500	3,500	3.5	**4.4**	1,400	**5,800**
ERR1, NTTR Area 13	1.5×10^{-8}	1.5×10^{-8}	6.0×10^{-9}	**7.5×10^{-9}**	5.6×10^{-7}	**6.4×10^{-7}**
ERR2, NTTR Area 13	1.4×10^{-7}	1.4×10^{-7}	2.4×10^{-7}	**3.0×10^{-7}**	5.1×10^{-6}	**5.9×10^{-6}**

Scenario Identification and Location [a]	***Noninvolved Worker Dose (rem)***		***Maximally Exposed Individual Dose (rem)***		***80-Kilometer (50-mile) Population Dose (person-rem)***	
	NTS EIS [b]	***This SA***	***NTS EIS*** [b]	***This SA***	***NTS EIS*** [b]	***This SA***
ERR3, NTTR Area 13	1.1×10^{-3}	1.1×10^{-3}	2.2×10^{-3}	**2.8×10^{-3}**	4.1×10^{-2}	**4.7×10^{-2}**
ERR1, TTR	1.2×10^{-7}	1.2×10^{-7}	3.4×10^{-8}	**4.3×10^{-8}**	1.9×10^{-6}	**2.4×10^{-6}**
ERR2, TTR	1.1×10^{-6}	1.1×10^{-6}	3.1×10^{-7}	**3.9×10^{-7}**	1.7×10^{-5}	**2.2×10^{-5}**
ERR3, TTR	1.2×10^{-2}	1.2×10^{-2}	3.4×10^{-3}	**4.3×10^{-3}**	0.19	**0.24**
WFOR1, BEEF	3.5×10^{-2}	**5.3×10^{-2}**	4.7×10^{-6}	**8.8×10^{-6}**	2.0×10^{-3}	**5.1×10^{-3}**
WFOR2, BEEF	0.35	**0.53**	4.7×10^{-5}	**8.8×10^{-5}**	2.0×10^{-2}	**5.1×10^{-2}**

BEEF = Big Explosives Experimental Facility, DAF = Device Assembly Facility, NTTR = Nevada Test and Training Range, SA = Supplement Analysis, TTR = Tonopah Test Range.

[a] Refer to Table 5–1 for descriptions of the accident scenarios. All accident scenarios occur at NTS locations except for the scenarios for Area 13 of the Nevada Test and Training Range and the three scenarios for the Tonopah Test Range.

[b] Source: DOE 1996b.

Bold text indicates values in this SA that exceed the values in the *NTS EIS*.

The *NTS EIS* used a dose-to-LCF-risk factor of 0.0004 LCF per rem for workers and 0.0005 LCF per rem for the public (DOE 1996b, SAIC 1996). Using the revised dose-to-LCF-risk factor of 0.0006 LCF per rem for both workers and the public (DOE 2003c), the concomitant 1.2 or 1.5 multipliers were used to calculate public and worker LCFs, respectively, which are presented in **Table 5–5**.

Table 5–5 Nevada Test Site Accident Consequences (latent cancer fatality)

Scenario Identification and Location [a]	***Noninvolved Worker***		***Maximally Exposed Individual***		***80-Kilometer (50-mile) Population***	
	NTS EIS [b]	***This SA***	***NTS EIS*** [b]	***This SA***	***NTS EIS*** [b]	***This SA***
DPR1, Area 12	1.8×10^{-3}	**2.7×10^{-3}**	1.8×10^{-7}	**2.6×10^{-7}**	3.5×10^{-5}	**4.0×10^{-5}**
DPR2, DAF	0.48	**0.72**	9.5×10^{-5}	**1.4×10^{-4}**	5.5×10^{-2}	**0.26**
DPR3, TTR	5.2×10^{-6}	**7.8×10^{-6}**	3.4×10^{-6}	**5.0×10^{-6}**	2.7×10^{-7}	**4.1×10^{-7}**
DPR4, TTR	2.8×10^{-2}	**4.3×10^{-2}**	1.2×10^{-3}	**1.7×10^{-3}**	9.0×10^{-3}	**1.4×10^{-2}**
DPR6, Yucca Flat	6.4×10^{-4}	**9.6×10^{-4}**	1.0×10^{-3}	**1.5×10^{-3}**	0.18	**0.46**
WMR1, Area 5	9.2×10^{-4}	**1.4×10^{-3}**	1.2×10^{-6}	**1.7×10^{-6}**	4.7×10^{-4}	**2.3×10^{-3}**
WMR2, Area 5	1.5×10^{-3}	**2.2×10^{-3}**	1.8×10^{-6}	**2.7×10^{-6}**	7.5×10^{-4}	**3.7×10^{-3}**

The annual risks to workers and the public were calculated using the annual frequency of occurrence of each accident scenario and are presented in **Table 5–6**. For this SA, only the frequency of occurrence of the NTS Area 5 WMR3, Nevada Test and Training Range Area 13 ERR3, and Tonopah Test Range ERR3 accident scenarios changed due to an increase in the annual number of flights overflying the Tonopah Test Range (USAF 2007b); this increase directly affects these scenarios because they are initiated by an assumed aircraft impact[2]. Although the accident risks for some scenarios increased by a relatively large amount for this SA, the absolute magnitude of the largest accident risk remains very small. The largest noninvolved worker risk of an LCF in this SA, for accident scenario WMR1 at Area 5, is 1.4×10^{-5} per year, which is 1 chance in 71,000 of developing an LCF. The maximum annual risks of the MEI developing an LCF and of an LCF occurring in the population in this SA are 4.5×10^{-6} per year (1 chance in 220,000) and 1.4×10^{-3} per year (1 chance in 700), respectively.

Table 5–6 Nevada Test Site Accident Annual Risk (latent cancer fatality per year)

Scenario Identification and Location [a]	*Annual Frequency of Occurrence*	*Noninvolved Worker*		*Maximally Exposed Individual*		*80-Kilometer (50-mile) Population*	
		NTS EIS [b]	*This SA*	*NTS EIS* [b]	*This SA*	*NTS EIS* [b]	*This SA*
DPR1, Area 12	1×10^{-3}	1.8×10^{-6}	**2.7×10^{-6}**	1.8×10^{-10}	**2.6×10^{-10}**	3.5×10^{-8}	**4×10^{-8}**
DPR2, DAF	2×10^{-6}	9.6×10^{-7}	**1.4×10^{-6}**	1.9×10^{-10}	**2.8×10^{-10}**	1.1×10^{-7}	**5.2×10^{-7}**
DPR3, TTR	1×10^{-6}	5.2×10^{-12}	**7.8×10^{-12}**	3.4×10^{-12}	**5.0×10^{-12}**	2.7×10^{-13}	**4.1×10^{-13}**
DPR4, TTR	1×10^{-7}	2.8×10^{-9}	**4.3×10^{-9}**	1.2×10^{-10}	**1.7×10^{-10}**	9.0×10^{-10}	**1.4×10^{-9}**
DPR6, Yucca Flat	3×10^{-3}/test	1.9×10^{-6}	**2.9×10^{-6}**	3.0×10^{-6}	**4.5×10^{-6}**	5.4×10^{-4}	**1.4×10^{-3}**
WMR1, Area 5	1×10^{-2}	9.2×10^{-6}	**1.4×10^{-5}**	1.2×10^{-8}	**1.7×10^{-8}**	4.7×10^{-6}	**2.3×10^{-5}**
WMR2, Area 5	1×10^{-6}	1.5×10^{-9}	**2.2×10^{-9}**	1.8×10^{-12}	**2.7×10^{-12}**	7.5×10^{-10}	**3.7×10^{-9}**
WMR3, Area 5	6×10^{-7} (EIS) 1×10^{-6} (SA)	6.0×10^{-7}	**1.0×10^{-6}**	1.1×10^{-9}	**2.7×10^{-9}**	4.2×10^{-7}	**3.5×10^{-6}**
ERR1, NTTR Area 13	3×10^{-2}	1.8×10^{-13}	**2.7×10^{-13}**	9×10^{-14}	**1.4×10^{-13}**	8.4×10^{-12}	**1.1×10^{-11}**
ERR2, NTTR Area 13	4×10^{-6}	2.2×10^{-16}	**3.4×10^{-16}**	4.8×10^{-16}	**7.2×10^{-16}**	1.0×10^{-14}	**1.4×10^{-14}**
ERR3, NTTR Area 13	7×10^{-7} (EIS) 1.2×10^{-6} (SA)	3.1×10^{-13}	**7.8×10^{-13}**	7.7×10^{-13}	**2.0×10^{-12}**	1.5×10^{-11}	**3.4×10^{-11}**
ERR1, TTR	3×10^{-2}	1.4×10^{-12}	**2.2×10^{-12}**	5.1×10^{-13}	**7.8×10^{-13}**	2.9×10^{-11}	**4.2×10^{-11}**
ERR2, TTR	4×10^{-6}	1.8×10^{-15}	**2.6×10^{-15}**	6.4×10^{-16}	**9.2×10^{-16}**	3.4×10^{-14}	**5.2×10^{-14}**
ERR3, TTR	1×10^{-6} (EIS) 1.7×10^{-6} (SA)	4.8×10^{-12}	**1.2×10^{-11}**	1.7×10^{-12}	**4.4×10^{-12}**	9.5×10^{-11}	**2.4×10^{-10}**
WFOR1, BEEF	2×10^{-2}	2.8×10^{-7}	**6.4×10^{-7}**	4.8×10^{-11}	**1.1×10^{-10}**	2.0×10^{-8}	**6.2×10^{-8}**
WFOR2, BEEF	3×10^{-5}	4.2×10^{-9}	**9.6×10^{-9}**	7.2×10^{-13}	**1.6×10^{-12}**	3.2×10^{-10}	**9.3×10^{-10}**

BEEF = Big Explosives Experimental Facility, DAF = Device Assembly Facility, NTTR = Nevada Test and Training Range, SA = Supplement Analysis, TTR = Tonopah Test Range.

[a] Refer to Table 5–1 for descriptions of the accident scenarios. All accident scenarios occur at NTS locations except for the scenarios for Area 13 of the Nevada Test and Training Range and the three scenarios for the Tonopah Test Range.

[b] Sources: DOE 1996b, USAF 2007b.

Bold text indicates values in this SA that exceed the values in the *NTS EIS*.

[2] *Overflights of the Tonopah Test Range would probably not impact the NTS Area 5 scenario, but may impact the Area 13 scenarios because flights to the Tonopah Test Range would probably transit the Nevada Test and Training Range. For conservatism, the same number of flights was assumed for all accident scenarios.*

Chemical Accidents

To determine potential health effects to workers and members of the public that could result from postulated accidents involving hazardous materials, in the *NTS EIS*, DOE assumed that the accidents released such materials (DOE 1996b). DOE then determined the airborne concentrations of the materials at the locations of an involved worker, a noninvolved worker, and an MEI, as well as concentrations in worker and surrounding public populations. The concentrations were then compared to Emergency Response Planning Guideline (ERPG) values. ERPG values, which depend on the material or chemical being considered, have been developed for three general severity levels to ensure that necessary emergency actions would occur to minimize worker and public exposures after accidents (NOAA 2007). They are defined for this SA as:

- *ERPG-1 Values*: Exposure to airborne concentrations greater than ERPG-1 values for a period greater than 1 hour results in an unacceptable likelihood that a person would experience mild transient adverse health effects or perception of a clearly defined objectionable odor.

- *ERPG-2 Values*: Exposure to airborne concentrations greater than ERPG-2 values for a period greater than 1 hour results in an unacceptable likelihood that a person would experience or develop irreversible or other serious health effects or symptoms that could impair one's ability to take protective action.

- *ERPG-3 Values*: Exposure to airborne concentrations greater than ERPG-3 values for a period greater than 1 hour results in an unacceptable likelihood that a person would experience or develop life-threatening health effects.

No new accident scenarios were identified for this SA. All source terms, meteorological dispersion parameters, and locations of noninvolved workers and MEIs were unchanged for the chemical accidents analyzed in the *NTS EIS*; however, a review of the ERPG values used in the *NTS EIS* (NIOSH 1990) against those currently recommended by DOE (DOE 2007a) showed that a number of values had decreased. These lower ERPG values may affect the consequences of chemical accidents. Therefore, chemical accident consequences for the noninvolved worker and MEI were re-analyzed using the ALOHA Version 5.2.3 computer code (EPA 2004). (The ALOHA code is a deterministic representation of atmospheric releases of toxic and hazardous chemicals. It is sponsored by EPA and the National Oceanic and Atmospheric Administration and has been widely used in support of chemical accident responses and also in support of NEPA and safety documentation for DOE facilities.) Hazardous chemical accident impacts for the 80-kilometer (50-mile) population, worker population, and involved worker were not re-calculated because chemical concentrations at distances where populations could be affected were too low for meaningful analysis, and involved worker health effects are dominated by close juxtaposition accident phenomena which cause serious impacts up to and including lethality.[3]

A total of 28 different chemicals were analyzed for the 13 chemical accident scenarios addressed in the *NTS EIS*, Expanded Use Alternative. The 13 chemical accident scenarios and their acute health effects to the noninvolved worker and MEI are presented for both the *NTS EIS* and this SA in **Table 5–7**. Because multiple chemicals are involved in each accident scenario, the bounding health effect for all the chemicals in terms of ERPG level is presented for the noninvolved worker and the MEI.

[3] *Calculating ERPGs for populations and involved workers are currently not common practice for NEPA analyses, because the calculations usually do not provide information that can be meaningfully used for a comparison of alternatives.*

Table 5–7 Comparison of Environmental Impact Statement and Supplement Analysis Chemical Accident Health Consequences

Scenario Identification and Location [a]	*Accident Annual Frequency* [b]	*Noninvolved Worker*		*Maximally Exposed Individual*	
		NTS EIS [b]	*This SA*	*NTS EIS* [b]	*This SA*
DPH1, TTR	6.0×10^{-6}	ERPG-2	**ERPG-3**	ERPG-3	ERPG-3
DPH2, TTR	1.6×10^{-6}	ERPG-1	None	ERPG-1	None
WMH1, Area 5	2.96×10^{-2}	ERPG-3	ERPG-3	None	None
WMH2, Area 5	8.0×10^{-5}	ERPG-3	ERPG-3	None	None
WMH3, Area 5	1.0×10^{-7} (*NTS EIS*) 1.7×10^{-7} (this SA)	ERPG-3	ERPG-3	ERPG-1	None
ERH1, TTR and NTTR Area 13	0.11	ERPG-3	ERPG-3	None	None
ERH2, TTR and NTTR Area 13	8.0×10^{-5}	ERPG-3	ERPG-3	None	None
ERH3, TTR and NTTR Area 13	7×10^{-7} (*NTS EIS*) 1.2×10^{-6} (this SA)	ERPG-3	ERPG-3	None	None
NDRDH1, Area 5	1.7×10^{-2}	ERPG-3	ERPG-3	ERPG-1	None
NDRDH2, Area 5	1.0×10^{-4}	ERPG-3	ERPG-3	ERPG-1	None
NDRDH3, Area 5	1.0×10^{-7} (*NTS EIS*) 1.7×10^{-7} (this SA)	ERPG-3	ERPG-3	ERPG-2	ERPG-1
WFOH1, Area 4	1.0×10^{-3} to 1.0×10^{-2}	ERPG-1	**ERPG-2**	None	None
WFOH2, Area 4	1.0×10^{-4} to 1.0×10^{-3}	ERPG-3	ERPG-3	None	None

ERPG = Emergency Response Planning Guideline; NTTR = Nevada Test and Training Range, SA = Supplement Analysis, TTR = Tonopah Test Range.

[a] Refer to Table 5–1 for descriptions of the accident scenarios. Areas 3, 4, and 5, refer to NTS locations; Area 13 refers to a location on the Nevada Test and Training Range; and TTR refers to Tonopah Test Range locations.

[b] Sources: DOE 1996b, SAIC 1996, USAF 2007b.

Bold text indicates values in this SA that exceed the values in the *NTS EIS*.

The analysis for this SA shows that most of the chemical accidents would result in concentrations above ERPG-3 values for the noninvolved worker. Of the accidents that would result in exceeding ERPG-3 concentrations, the accident scenario having the largest annual frequency (0.11, or 1 chance in 9) is ERH1 at the Tonopah Test Range and Nevada Test and Training Range Area 13. The only accident scenario that would exceed ERPG-3 values for the MEI is DPH1 at the Tonopah Test Range. This accident scenario has a frequency of 6×10^{-6} per year, which is the equivalent of 1 chance in 167,000 that this accident would occur. Accident scenario NDRDH3 would result in mild transient adverse health consequences to the MEI. Accident scenario NDRDH3 has a frequency of 1.7×10^{-7} per year, which is the equivalent of 1 chance in 5.9 million that it would occur. All other chemical accidents would result in no health effects to the MEI. Several accident scenarios (DPH2, WMH3, NRDH1, and NRDH2) for which health consequences to the MEI were projected in the *NTS EIS* would have no health consequences based on the analysis for this SA. The lower consequences for these accident scenarios are due to different values of ERPG-1 for the chemicals involved as well as the assumption of neutral 50 percent meteorology for the noninvolved worker and MEI in this SA. (The *NTS EIS* determined impacts assuming both neutral 50 percent meteorology and stable 95 percent meteorology). The assumption of 50 percent meteorology is consistent with other current DOE NEPA hazardous chemical accident analyses. In general, the chemical accident analysis in this SA results in comparable or lower health consequences to the noninvolved worker and MEI than the *NTS EIS* analysis.

NNSA is preparing a classified analysis of the potential impacts of an intentional destructive act at NTS. This analysis will be considered by NNSA in determining the continued adequacy of the *NTS EIS*.

5.2 Low-Level and Mixed Low-Level Radioactive Waste Management

Existing low-level and mixed low-level radioactive waste management facilities and activities are enveloped by those discussed in the *NTS EIS*. Continued disposal of low-level and mixed low-level radioactive waste is expected to be within the bounds of the *NTS EIS*, but there are uncertainties in the quantities of these wastes that may be received for disposal. Additional NEPA analysis may be warranted if disposed volumes are significantly larger than the *NTS EIS* projections.

Table 5–8 compares the volumes and shipments of low-level and mixed low-level radioactive wastes that were projected to be disposed at NTS from 1996 through 2005 with those that actually occurred. Volumes and shipments for 2006 are also shown. **Table 5–9** lists the volumes of low-level and mixed low-level radioactive wastes projected to be delivered to NTS disposal facilities from onsite and offsite sources from fiscal year 2008 through fiscal year 2012. Also shown are the actual waste volumes disposed at NTS during fiscal year 2007. **Table 5–10** presents waste volumes disposed at NTS from 1996, plus waste volumes projected through fiscal year 2012.

Table 5–8 Ten-Year Low-Level and Mixed Low-Level Radioactive Waste Disposal Volumes and Shipments

Calendar Year	Low-Level Radioactive Waste [a, b]		Mixed Low-Level Radioactive Waste [a, b]		Total [a, b]	
	Volume (cubic meters)	Shipments	Volume (cubic meters)	Shipments	Volume (cubic meters)	Shipments
1996	14,321	576	4.6	1	14,325	577
1997	25,348	781	—	—	25,348	781
1998	9,714	341	263.5	10	9,977	351
1999	18,020	664	42.9	3	18,063	667
2000	20,537	578	1.1	2	20,538	580
2001	42,817	1,113	—	—	42,817	1,113
2002	68,062	1,702	164.1	8	68,226	1,710
2003	98,589	2,599	0.4	1	98,590	2,600
2004	102,863	2,303	—	—	102,863	2,303
2005	46,655	1,260	—	—	46,655	1,260
Total through 2005	446,927	11,917	476.6	25	447,403	11,942
10-Year Average	44,693	1,192	48	2.5	44,740	1,194
2006	28,592	1,016	212.3	13	28,804	1,029
Total Projected in the *NTS EIS*, 1996-2005 [c]						
Onsite sources	150,000	14,000	500	9	150,500	14,009
Offsite sources	891,422	25,084	300,000	15,406	1,191,422	40,490
Total	1,041,422	39,084	300,500	15,415	1,341,922	54,499
10-Year Average	104,142	3,908	30,050	1,542	134,192	5,450

[a] Actual volumes and shipments include low-level and mixed low-level radioactive wastes from both onsite and offsite sources.
[b] Source: NTS 2007. Volumes of waste and number of shipments are based on calendar years; data for all of the years presented were not available by fiscal year. Although comparable, they will not match the data in the annual transportation reports for radioactive waste shipments to and from NTS (e.g., DOE/NV 2005b), which are presented by fiscal year.
[c] Source: *NTS EIS* (DOE 1996b), Tables 5.3-5 and 5.3-6.
Note: To convert cubic meters to cubic feet, multiply by 35.315.

Table 5–9 Projected Low-Level and Mixed Low-Level Radioactive Waste Volumes (cubic meters)

Waste	*Disposed in Fiscal Year 2007* [a]	*Projected by Fiscal Year* [b]					*Total Projected (2008-2012)*
		2008	*2009*	*2010*	*2011*	*2012*	
Low-level radioactive waste	22,470	25,465	24,251	30,283	23,804	20,490	124,474
Mixed low-level radioactive waste [c]	4,256	3,334	2,038	1,970	873	271	8,487

[a] Data for fiscal year 2007 represent actual disposed volumes. Of the 1,112 low-level radioactive waste shipments during fiscal year 2007, 110 shipments (1,684 cubic meters [59,469 cubic feet]) were from onsite sources, and 1,002 shipments (20,786 meters [734,047 cubic feet]) were from offsite sources. Of the 154 mixed low-level radioactive waste shipments during fiscal year 2007, 20 shipments (288 cubic meters [10,169 cubic feet]) were from onsite sources and 134 shipments (3,966 cubic meters [140,144 cubic feet]) were from offsite sources.

[b] Of the 124,474 cubic meters (4,395,786 cubic feet) of low-level radioactive waste projected from fiscal year 2008 through fiscal year 2012, 99 percent of the waste (123,363 cubic meters [4,356,569 cubic feet]) would be from offsite sources. Of the 8,487 cubic meters (299,718 cubic feet) of mixed low-level radioactive waste projected from fiscal year 2008 through fiscal year 2012, all but (104 cubic meters [3,663 cubic feet]) would be from offsite sources.

[c] Disposal of mixed low-level radioactive waste beyond 2010 would require an amendment to the current mixed low-level radioactive waste disposal permit.

Note: To convert cubic meters to cubic feet, multiply by 35.315. Sums and products may not be exact due to rounding.

Source: DOE/NV 2007c, NTS 2007.

Table 5–10 Waste Volumes Disposed at the Nevada Test Site from 1996, plus Waste Volumes Projected through Fiscal Year 2012 (cubic meters)

Waste Type	*NTS EIS Projected 10-Year Volume*	*Approximate Total Volume Disposed and Projected through 2012* [a]	*Approximate Percent of NTS EIS Projection*
Low-level radioactive waste	1,041,422	620,000	60
Mixed low-level radioactive waste	300,500	13,000 [b]	4

[a] Estimated by summing wastes disposed from calendar year 1996 through calendar year 2006 (Table 5–8), wastes disposed during fiscal year 2007 (Table 5–9), and wastes projected from fiscal year 2008 through fiscal year 2012 (Table 5–9).

[b] Projections of mixed low-level radioactive waste include receipt of waste through 2012. Disposal of mixed low-level radioactive waste beyond 2010 would require an amendment to the current mixed low-level radioactive waste disposal permit.

Note: To convert cubic meters to cubic feet, multiply by 35.315.

Sources: DOE 1996b, NTS 2007.

Low-Level Radioactive Waste

Given current projections of low-level radioactive waste to be disposed at NTS through 2012 and the existing decision support system (SAIC 2008), continued disposal of low-level radioactive waste through 2012 would be well within the bounds of the *NTS EIS*. Nonetheless, through 2012, wastes could be considered for NTS disposal that are not included in current projections, and additional wastes could be considered for NTS disposal beyond 2012 (see Section 5.4). If future waste receipts are significantly larger, to the point of exceeding *NTS EIS* projections, additional NEPA analyses may be warranted. NNSA/NSO monitors waste disposed and waste proposed for disposal and would be able to ascertain if *NTS EIS* projections may be exceeded sufficiently far in advance to initiate the appropriate NEPA process.

As shown in Tables 5–8 through 5–10, the volumes and number of shipments of low-level radioactive wastes that have been disposed and projected through 2012 are smaller than the projections of these wastes through 2005 in the *NTS EIS*. Future projections of waste, however, are uncertain, both in terms of the volumes of radioactive wastes that may be received, and of the inventories of the radionuclides within the wastes.

Regarding waste volumes, annual quantities of waste that could be disposed at NTS would depend on funding and staffing levels. Funding proposed for fiscal year 2008 and beyond would provide for one dedicated crew of field personnel for NTS disposal operations, plus technical, managerial, and support personnel. At that level of staffing, the nominal capacity for waste disposal would be about 42,480 cubic meters (1.5 million cubic feet) of waste per year (NTS 2007). Assuming annual disposal at this rate, the total amount of low-level radioactive waste disposed from 2008 through 2012 would be about 212,000 cubic meters (7.5 million cubic feet). Added to the waste disposed in fiscal year 2007 (Table 5–9), the total low-level radioactive waste volume disposed and projected would increase to roughly 710,000 cubic meters (25 million cubic feet), or 68 percent of the *NTS EIS* projections. The largest annual volume of low-level radioactive waste disposed since the *NTS EIS* was 103,000 cubic meters (3.64 million cubic feet) in 2004. Assuming funding and staffing sufficient to support disposal at this rate from 2008 through 2012, and including the waste disposed in fiscal year 2007, the total low-level radioactive waste volume disposed and projected through 2012 would be roughly 1 million cubic meters (35 million cubic feet), which would be comparable to the *NTS EIS* projections.

There are additional sources of low-level radioactive waste that could be generated and considered for disposal at NTS through 2012 (SAIC 2008). Volumes not included in current projections are summarized in **Table 5–11**. If all low-level radioactive waste quantified in Table 5–11 was shipped to NTS, the total additional volume would be up to about 600,000 cubic meters (21.2 million cubic feet). Added to the projections in Table 5–10, this would raise the total low-level radioactive waste volume to about 1.22 million cubic meters (43 million cubic feet), or about 17 percent larger than the volume projected over 10 years in the *NTS EIS*. Much of the cited waste, however, may not be actually generated or disposed at NTS given the uncertainties in volume projections and the availability of disposal capacity at sites other than NTS. The total low-level and mixed low-level radioactive waste volume under these assumptions (roughly 1.3 million cubic meters or 46 million cubic feet) would be comparable to the 10-year projections of combined low-level and mixed low-level radioactive waste in the *NTS EIS* (Table 5–8).

Regarding waste radiological inventories, using the decision support system, NNSA/NSO is able to track actual inventories versus any disposal limits for the Area 5 RWMS to ensure compliance with DOE Order 435.1 and all other applicable requirements. If the inventory limits were reached, an appropriate portion of the Area 5 RWMS would be closed and new disposal capacity would be developed after appropriate NEPA and regulatory review.

Mixed Low-Level Radioactive Waste

As shown in Tables 5–8 through 5–10, the volumes and number of shipments of mixed low-level radioactive wastes that have been disposed and projected through 2012 are far smaller than the projections of these wastes through 2005 in the *NTS EIS*. Sufficient capacity exists at NTS to dispose of all mixed low-level radioactive waste projected to be received. Generation of mixed low-level radioactive waste is uncertain, but even if hypothetically all mixed low-level radioactive waste quantified in Table 5–11 was shipped to NTS for disposal, the total volume would nonetheless be smaller than the *NTS EIS* 10-year projections.[4] As for low-level radioactive waste disposal, using the decision support system, NNSA/NSO is able to track actual inventories versus any disposal limits for the Area 5 RWMS to ensure compliance with DOE Order 435.1 and other applicable requirements.

[4] Disposal of mixed low-level radioactive waste at NTS is currently limited by a Nevada Division of Environmental Protection permit to 20,000 cubic meters (about 710,000 cubic feet) of waste through 2010 from sources outside the State of Nevada. Disposal of 20,000 cubic meters (about 710,000 cubic feet) of mixed low-level radioactive waste would represent about 7 percent of the NTS EIS 10-year projections.

Table 5–11 Possible Low-Level and Mixed Low-Level Radioactive Wastes Not Included in Current Projections through 2012

Waste	*Low-Level Radioactive Waste (cubic meters)*	*Mixed Low-Level Radioactive Waste (cubic meters)*	*Remarks*
Depleted uranium hexafluoride waste	46,000 to 55,000	–	Impacts for transport of this waste to NTS have been addressed (DOE 2004a, 2004b).
Strontium-90 RTGs	9	–	Based on a projected 30 RTGs and an assumed average RTG volume of about 0.3 cubic meters.
U.S. Department of Defense cleanup of depleted uranium	Not available	Not available	No waste estimates are available.
Cleanups at former Manhattan Project and supporting facilities	57,000	3,800	Projections are for the FUSRAP program, which is also expected to generate 210,000 cubic meters of 11e(2) byproduct material (Hearty 2007a). Commercial facilities are available for disposal of FUSRAP waste.
Former research reactor cleanups	Not available	Not available	As has occurred in the past, future low-level and mixed low-level radioactive waste may be determined to be eligible for NTS disposal.
Returned DOE-owned materials	212		DOE-owned radioactive materials are occasionally returned from overseas use, and portions may be determined to have no further value and disposed as waste. DOE plans to receive from Germany, DOE-owned scientific equipment containing depleted uranium that may be determined to be low-level radioactive waste.
Oak Ridge National Laboratory Building 3019 dismantlement and uranium-233 downblending	872	16.3	Low-level and mixed low-level radioactive waste projected from Building 3019 Complex shutdown at Oak Ridge National Laboratory. Through 2012, the project is also expected to generate construction debris and 14.6 cubic meters of transuranic waste from downblending operations (to be disposed at WIPP). After 2012, additional transuranic and low-level radioactive wastes would be generated (see Table 5–16).
GEVNC decontamination waste	Up to 142		This waste volume represents all transuranic, low-level, and possibly mixed low-level radioactive waste from decontaminating a hot cell used for DOE-funded work. Transuranic waste would be disposed of at WIPP, while commercial disposal is an option for low-level and mixed low-level radioactive waste.
DOE Naval Reactors Program wastes	2.8 to 5.7 in a year		Contingency use of NTS for disposal of low-level or mixed low-level radioactive wastes from shipyards if other disposal options are precluded (Roles 2007).
Los Alamos National Laboratory environmental restoration waste	490,000	100,000	Generation is uncertain, and depends on regulatory decisions and resolution of technical and funding issues. Other DOE and commercial disposal options are available. Impacts for transport of this waste to NTS have been addressed (DOE 2006a).

FUSRAP = Formerly Utilized Sites Remedial Action Program, GEVNC = General Electric Vallecitos Nuclear Center, RTG = radioisotope thermoelectric generator, WIPP = Waste Isolation Pilot Plant.
Note: To convert cubic meters to cubic feet, multiply by 35.315.
Source: NTS 2007, except as noted.

5.3 Transportation Impacts

Transportation impacts were re-assessed for this SA for the following reasons: additional radioactive waste transportation analyses have been issued since the *NTS EIS*; there are uncertainties in radioactive waste volumes – and therefore shipments – that may be received at NTS for disposal; and a number of shipments of transuranic and mixed transuranic waste to WIPP may be somewhat larger than that assessed in previous analyses.

Past annual shipments of low-level and mixed low-level radioactive waste are bounded by the projections in the *NTS EIS*. Future annual shipments of low-level and mixed low-level radioactive wastes are also expected to be bounded by the *NTS EIS*, although there are uncertainties in waste generation rates that may affect waste shipment rates. Waste generation rates depend on a number of factors including regulatory decisions, technical issues, and funding that cannot be resolved at this time; and the number of waste shipments that could result will depend on the radiological and physical characteristics of the waste, and other factors such as the availability of disposal capacity at sites other than NTS. The largest number of annual waste shipments from both onsite and offsite sources since the *NTS EIS* was 2,600 (see Table 5–8). The hypothetical future receipt of 2,600 shipments, all from offsite sources, would be about 64 percent of the 4,049 average annual shipments from offsite sources projected in the *NTS EIS* (see Table 5–8). Incident-free impacts to transport crews and population from 2,600 shipments of waste to NTS were found to be less than one LCF.

Although the *NTS EIS* did not analyze shipments of transuranic waste to WIPP for disposal, other contemporary analyses did, including the *WIPP SEIS II* (DOE 1997b) and the *Waste Management PEIS* (DOE 1997a). The number of offsite shipments of transuranic waste from NTS through 2022 is expected to be up to about 40 percent (34 shipments) larger than previously analyzed.

The *NTS EIS* evaluated transportation impacts over a 10-year period, assuming an average of 1,400 annual onsite transfers of low-level and mixed low-level radioactive wastes (about 15,000 cubic meters [530,000 cubic feet] per year), and 4,049 annual shipments from multiple offsite sources of low-level and mixed low-level radioactive wastes (119,142 cubic meters [4.207 million cubic feet] per year) (see Table 5–8). In addition, the *NTS EIS* evaluated transportation impacts for 210 annual shipments of special nuclear material and high explosive materials between NTS, Los Alamos National Laboratory, Lawrence Livermore National Laboratory, and the Pantex Plant (DOE 1996b). The risk analysis in the *NTS EIS* was limited to transport by truck.

In 1997, DOE issued the *Waste Management PEIS*, which evaluated the potential transportation risks of moving various wastes between DOE sites and major DOE disposal sites, including NTS (DOE 1997a). DOE evaluated a potential low-level and mixed low-level radioactive waste volume of 1.5 million cubic meters (53 million cubic feet) over a 20-year period. The *Waste Management PEIS* Centralized 2 Alternative, where all low-level radioactive waste would be disposed at NTS, addressed approximately 257,000 truck shipments. In 1999, DOE published *Life Cycle Cost and Risk Analysis of Alternative Configuration for Shipping Low-Level Radioactive Waste to the Nevada Test Site* (*Life Cycle Cost and Risk Analysis Report*), which analyzed shipments to NTS over the next 70 years (DOE 1999d). This study used a total waste volume of 740,000 cubic meters (26 million cubic feet), with an estimated 27,737 truck shipments. This study did not include wastes from the Hanford Site or the Savannah River Site. Both the *Waste Management PEIS* and the *Life Cycle Cost and Risk Analysis Report* assumed truck and rail transport of waste, and the latter study also evaluated potential risks from a combination of truck and rail transport through the use of intermodal transfer facilities.

The above assessments differed in the number of shipments because of differences in shipment duration (10 years in the *NTS EIS*, 20 years in the *Waste Management PEIS*, and 70 years in the *Life Cycle Cost and Risk Analysis Report*), changing waste volume estimates, and the assumption of weight-limited shipments. The *Waste Management PEIS* assumed an equivalent volume of eighty 208-liter (55-gallon) drums, or approximately 16 cubic meters (560 cubic feet) of waste per shipment (DOE 1997a). The *NTS EIS* assumed twelve $1.2 \times 1.2 \times 2.1$-meter ($4 \times 4 \times 7$-foot) boxes per shipment, or approximately 38 cubic meters (1,300 cubic feet) of waste per shipment (DOE 1996b). The *Life Cycle Cost and Risk Analysis Report* assumed a standard 6.1-meter (20-foot) shipping container, or about 26.7 cubic meters (940 cubic feet) of waste per shipment (DOE 1999d). **Table 5–12** summarizes the transportation risks by truck from these three studies. As indicated, the risks presented in the *NTS EIS* are the lowest among the three studies. The main reason is that the *NTS EIS* used a transport index of 0.05 for all shipments, as compared to transport index of 1 used in the other two studies.[5] The radiological risks per transport from these three studies range between 1.9×10^{-6} and 5.6×10^{-5} LCF per truck transport,[6] with the *Waste Management PEIS* presenting the highest risk and the *NTS EIS* the lowest risk. The effect of the new dose-to-LCF-risk factor per person-rem exposure of 0.0006 (DOE 2003c) would not change the risk significantly: a maximum change in risk of about 30 percent. Therefore, these studies provide a reasonable range of applicable transportation risks for future offsite transport to NTS.

Table 5–12 Incident-Free Low-Level and Mixed Low-Level Radioactive Waste Transportation Impacts Summary

Studies	Number (and Years) of Offsite Truck Shipments	Crew		Population	
		Dose (person-rem)	Risk (LCF)	Dose (person-rem)	Risk (LCF)
NTS EIS [a]	40,000 (10 years)	Not available	Not available	154-193 [b]	0.077 [c]
Waste Management PEIS [d]	257,270 (20 years)	14,500	5.9	17,200	8.6
Life Cycle Cost and Risk Analysis Report [e]	27,737 (70 years)	730	0.29	850	0.43

LCF = latent cancer fatality.

[a] Expanded Use Alternative for truck transport (avoiding Las Vegas) of low-level and mixed low-level radioactive wastes to NTS. The *NTS EIS* did not provide separate dose and risks for the transportation crew.

[b] The range of values were derived using the risk from the *NTS EIS* and LCF risk factors per person-rem dose of 0.0005 and 0.0004, corresponding to those for the population and workers, respectively. The lower range reflects a dose if all risks were public risks, and the upper range reflect a dose if all risks were crew risks.

[c] Total crew and population risk value provided in the *NTS EIS* for the Expanded Use Alternative. This risk is calculated using LCF risk factors of 0.0004 and 0.0005, per person-rem, respectively.

[d] Truck transport of low-level radioactive waste to NTS. The dose and risk values are those provided for the Centralized 2 Alternative. This analysis did not prohibit transport of low-level radioactive waste through Las Vegas.

[e] Truck transport of low-level radioactive waste avoiding Las Vegas.

Note: No attempts were made to adjust the LCF risk factors to the current value of 0.0006 LCF per person-rem dose in the above data.

Sources: DOE 1996b, 1997a, 1999d.

[5] A transport index (TI) of 1 represents a dose rate of 1 millirem per hour at a distance of 1 meter from the container, while a TI of 0.05 represents a dose rate of 0.05 millirem per hour at a distance of 1 meter from the container. The NTS EIS determined TI by taking shielding into account and considering data from DOE low-level radioactive waste shipments (DOE 1996b, Appendix I, page 3-8).

[6] These risks per truck transport are determined by the sum of the crew and population risks per shipment.

Radioactive Waste Shipments to NTS. The current projected average annual low-level and mixed low-level radioactive waste volume over the next 5 years (2008 through 2012) is about 26,592 cubic meters (939,000 cubic feet) (see Table 5–9). An average waste volume per shipment of about 25 cubic meters (883 cubic feet)[7] would correspond to about 1,060 truck shipments per year, assuming all waste was delivered from offsite sources. Therefore, using the maximum risk per shipment of 5.6×10^{-5} LCF provided above for the *Waste Management PEIS* analysis, the potential annual incident-free transportation risk for both transport crew and the population would be about 0.06 LCF.

As noted in Section 5.2, future receipt of low-level and mixed low-level radioactive wastes at NTS is uncertain. In addition to wastes projected for NTS disposal based on forecasts from NTS customers, other wastes are identified in Section 5.2 that may or may not be generated, and may or may not be shipped to NTS for disposal. Uncertainties in waste generation rates depend on regulatory and other issues that cannot be resolved at this time, and the number of waste shipments that could result would depend on the radiological and physical characteristics of the waste, and other factors such as the availability of disposal capacity at sites other than NTS. The largest number of annual waste shipments from both onsite and offsite sources since the *NTS EIS* was 2,600, which is about 64 percent of the average number of annual shipments from offsite sources projected in the *NTS EIS*. The hypothetical future receipt of 2,600 shipments of waste to NTS, all from offsite sources, would result in an annual risk to both the transport crew and population of 0.15 LCF (assuming an incident-free risk per shipment of 5.6×10^{-5} LCF).

As a point of reference, in fiscal year 2006, there were 972 offsite inbound shipments and 15 offsite outbound shipments. None of the shipments experienced incidents[8] while in-transit to or from NTS. Experience during other fiscal years also show zero, or one incident.

Transuranic and Mixed Transuranic Waste Shipments. Although the *NTS EIS* did not address offsite shipment of transuranic waste (stored legacy transuranic waste includes mixed transuranic waste), both the *WIPP SEIS II* (DOE 1997b) and the *Waste Management PEIS* (DOE 1997a) addressed impacts from transporting transuranic waste to WIPP. The quantity of transuranic waste addressed in *WIPP SEIS II* was 630 cubic meters (22,000 cubic feet) through 2022; a similar volume was addressed in the *Waste Management PEIS*. The total quantity of legacy and newly generated transuranic waste projected in this SA for offsite shipment through 2022 is about 1,080 cubic meters (38,100 cubic feet), assuming that the remaining legacy waste would be repackaged with no change in waste volume before shipment (see Section 4.12.2). *WIPP SEIS II* included analyses of crew and population doses for transporting transuranic wastes from DOE sites to WIPP or other DOE sites on a per-shipment basis (DOE 1997b). These analyses were calculated assuming a conservative average transport index of 4 for contact-handled waste shipments. Transuranic waste shipped from NTS is expected to be all contact-handled, and may be shipped directly to WIPP or routed through another site for additional characterization. Using the *WIPP SEIS II* analysis, total incident-free risks to transportation crew and en-route populations could range from 7.2×10^{-5} to 1.3×10^{-4} LCF per shipment, with the lower value for direct shipment to WIPP and the larger number for shipments routed through a representative site (Idaho National Laboratory), and an assumed unit dose risk of 0.0006 LCF per person-rem. *WIPP SEIS II* projected 86 shipments of waste from NTS to WIPP. For this SA, shipment of all legacy and newly generated transuranic waste through 2022 would require up to about 120 shipments. This would result in about 34 shipments above those in *WIPP SEIS II*, or about 0.09 percent of the 37,723 shipments projected in WIPP SEIS II, and an additional risk to transport crews and populations of 0.0024 to 0.0043 LCF. These risks are low both by themselves and when compared with the annual incident-free risks addressed above for low-level and mixed low-level radioactive waste transport.

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[7] Twenty-five cubic meters (880 cubic feet) is the approximate volume of one standard 6.1-meter (20-foot) container. This value is calculated based on the volume per shipment used in the Integrated Planning, Accountability, and Budgeting System projection and the NTS EIS.

[8] Incident is defined as a traffic-related accident, a load shift, or a leaking or breached package reported during transportation.

5.4 Cumulative Impacts

The cumulative impact analysis for this SA addresses: (1) cumulative impacts presented in the *NTS EIS*; (2) impacts since the *NTS EIS* was issued (presented in this SA in Chapter 4 and Sections 5.1 through 5.3); and (3) a review of past, present and reasonably foreseeable actions of other Federal, non-Federal agencies, and private entities in the region. While cumulative impacts from NTS operations have been identified for electrical power, water use, public health and safety, waste management, transportation, and American Indian environmental justice; the NTS contribution to the cumulative impacts in the region remains unchanged or less than the contributions presented in the *NTS EIS*. Based on the analysis in this section, the effects of NTS activities when combined with the effects of other actions defined in the scope of this section do not result in cumulatively significant impacts.

Reasonably foreseeable future actions likely to occur at NTS are described in Section 3.1. Additional DOE or NNSA actions potentially impacting NTS include the related NEPA actions described in Chapter 1 of this SA. The largest of the potential NNSA projects is Complex Transformation (DOE 2007d); while most of the projects would not occur until after 2012 (the time frame for this SA) they are included in this cumulative impacts analysis. The Draft *Complex Transformation SPEIS* evaluates the impacts of NNSA's comprehensive plan, originally called Complex 2030, for a smaller, more efficient nuclear weapons complex by the year 2030 that is better able and more suited to respond to future national security challenges. The Notice of Intent for the *Complex Transformation SPEIS* (71 FR 61731) also announced the cancellation of NNSA's previous proposal to build a modern pit facility, which was included in the *2002 NTS SA* as a possibility for NTS. In the Draft *Complex Transformation SPEIS*, NTS was identified as a potential site for (DOE 2007d):

- Consolidated Plutonium Center
- Consolidated high explosives research and development
- Consolidated hydrotesting
- Consolidated major environmental testing (facilities for putting environmental stresses [heat, cold, vibration, etc.] on nuclear weapons components)
- NNSA flight test operations currently performed at the Tonopah Test Range
- Consolidated Nuclear Production Center

The preferred alternatives identified in the Draft *Complex Transformation SPEIS* (DOE 2007d) identified NTS as the site for high explosives research and development for large quantities of high explosives (greater than 10 kilograms) and open-air hydrotesting, and the included transfer of NNSA flight test operations from the Tonopah Test Range to a Department of Defense facility. Potential impacts at NTS described in the Draft *Complex Transformation SPEIS* are summarized in **Table 5–13** for both the preferred alternatives and the alternatives having the maximum impacts at NTS (a Consolidated Nuclear Production Center at NTS). For comparison purposes impacts projected in the *NTS EIS* are included in the table. Impacts in the table are for operations; construction impacts are of short duration and therefore not expected to add to the long-term cumulative impacts of the region.

Table 5–13 Projected Nevada Test Site Impacts from the Draft *Complex Transformation SPEIS* Operations Compared to the *NTS EIS*

Preferred Alternative [a]	***Maximum Impact Alternatives*** [b]	***NTS EIS***
	Land Use	
Total long-term disturbance of 12 hectares. Moving flight testing to a U.S. Department of Defense facility would free up 1,233 hectares of land at Tonopah Test Range.	Total long-term disturbance of about 194 hectares for operations for all NTS maximum impact alternatives.	Projected 2,351 hectares of new ground disturbance, resulting in a total of 26,100 disturbed hectares.
	Site Infrastructure	
Minimal increase in power requirements and water use at NTS; Tonopah Test Range would decrease water consumption and annual electrical energy consumption by 595,000 kilowatt-hours.	Power requirements would be 270.5 million kilowatt-hours per year or 359 percent of available site electrical energy capacity. NTS would have to procure additional power. Water use would be approximately 1,245 million liters per year, or 24 percent of sustainable site water capacity.	Electrical use was not reported, but current use averages approximately 81 million kilowatt-hours per year. Projected water use was 11,260 million liters per year; actual use has been less than 1,500 million liters per year.
	Socioeconomics	
No appreciable changes to regional socioeconomic characteristics expected. An additional 256 operational jobs could be added. Moving flight testing from Tonopah Test Range to a Department of Defense facility would result in the direct loss of 135 jobs locally and an indirect loss of approximately 119 jobs. Additionally, socioeconomic impacts for Tonopah were identified for community services, educational systems, and housing.	The maximum NTS impact alternatives could result in 4,778 operational workers. No appreciable changes to regional socioeconomic characteristics expected. Moving flight testing from Tonopah Test Range would be the same as for the Preferred Alternative.	Projected total direct employment would be approximately 11,150 in 2005. Actual 2005 employment was 4,295.
	Air Quality	
Temporary PM_{10} emissions during construction. Moving flight testing from Tonopah Test Range to a Department of Defense facility would decrease emissions by 13.32 tons per year for NAAQS emissions and 3.7×10^{-6} tons per year for hazardous air pollutants.	Negligible impacts to air quality for construction and operation. No air quality standards exceeded. Temporary PM_{10} emissions during construction.	At the boundaries of the site, quality pollutant concentrations would be well below ambient air standards.
	Health and Safety	
Similar to current operations.	Annual dose and risk are projected to be: - Population - 0.013 person-rem (likelihood of 1 in 128,000 of an LCF occurring in the population) - MEI - 0.004 millirem (likelihood of 1 in 400 million of an LCF) - Worker population 386 person-rem (likelihood of 1 in 4 of an LCF occurring in the worker population; individual worker risk is controlled per DOE regulations)	The average annual public radiation risk (without nuclear testing) was estimated to be about 1 in 180,000 of an LCF occurring in the population. Minimum impact to air from radioactive emissions.

Preferred Alternative [a]	***Maximum Impact Alternatives*** [b]	***NTS EIS***
Waste Management		
Similar to current operations.	Annual waste volume totals reported for the CNPC for NTS maximum alternatives are: - Transuranic waste (includes mixed) – 726 cubic meters - Low-level radioactive waste – 9,664 cubic meters - Mixed low-level radioactive waste – 598 cubic meters - Liquid low-level radioactive waste – 33,785 liters - Liquid mixed low-level radioactive waste – 13,712 liters	- Transuranic waste – 612 cubic meters (stored) - Low-level radioactive waste – 104,142 cubic meters per year disposed of - Mixed low-level radioactive waste – 30,050 cubic meters per year disposed of
Transportation		
Similar to current operations.	Health impacts were estimated for the one-time transportation of pits and highly enriched uranium to the CNPC. 0.116 LCFs for incident free radiological impacts and 0.0220 traffic fatalities were estimated.	An annual average of 4,049 shipments of low-level and mixed low-level radioactive waste from offsite. *WIPP SEIS II* (DOE 1997b) estimated 86 shipments of transuranic waste from NTS. 0.077 LCFs were estimated for transportation of radiological wastes and materials.

CNPC = consolidated nuclear production center, LCF = latent cancer fatality, MEI = maximally exposed individual, PM_{10} = particulate matter with an aerodynamic diameter of less than 10 microns.

[a] The preferred alternative in the Draft *Complex Transformation SPEIS* would establish NTS as the high explosives research and development center for large quantities of high explosives (greater than 10 kilograms), transfer Tonopah Test Range flight test operations to a Department of Defense facility, and conduct future open-air hydrotesting at NTS beginning in 2009. Possible future replacement (beyond 2025) at NTS of the Los Alamos National Laboratory Dual Axis Radiographic Hydrodynamic Test (DARHT) facility and the Sandia National Laboratories/New Mexico Annular Core Research Reactor and Aerial Cable Facility are not included in the table.

[b] The maximum impacts at NTS alternatives include the following facilities and operations: a Consolidated Nuclear Production Center, consolidated high explosives research and development operations, consolidated hydrodynamic testing and environmental test facilities, and transfer of Tonopah Test Range flight operations to NTS.

Notes: To convert hectares to acres, multiply by 2.471; liters to gallons, multiply by 0.26418; cubic meters to cubic feet, multiply by 35.315.

Sources: DOE 2007d, DOE 1996a, and Table 4–1 of this SA.

The summary information in Table 5–13 does not include impacts from possible replacements for the Annular Core Research Reactor (Sandia National Laboratories/New Mexico) or the Dual Axis Radiographic Hydrodynamic Test Facility (Los Alamos National Laboratory) that could be sited at NTS as part of Complex Transformation in the 2020 to 2050 timeframe. Because the concepts for these next generation facilities are not fully developed, only a general sense of the impacts can be presented. Information on the existing facilities implies: an Annular Core Research Reactor-like facility would employ about 42 staff; electrical needs would be large, about 490,000 megawatt-hours per year; emissions of National Ambient Air Quality Standard pollutants would range from 0.1 to 2.0 metric tons per year; radioactive emissions would include small quantities of argon-41; and annual radioactive waste generation would include about 0.15 cubic meters (0.2 cubic yards) of transuranic waste and 7.6 cubic meters (10 cubic yards) of low-level radioactive waste (DOE 2007d). A next generation Dual Axis Radiographic Hydrodynamic Test facility would employ about 30 staff; emissions of National Ambient Air Quality Standard pollutants would be about 57 kilograms (125 pounds) per year; and annual waste generation would be about 1.8 metric tons (4,000 pounds) of transuranic waste and 9,557 cubic meters (12,500 cubic yards) of low-level radioactive waste (DOE 2007d). [9]

The cumulative impacts from the *Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada (Yucca Mountain EIS)* (DOE 2002b) were included in the *2002 NTS SA* and were reexamined for this SA. Additionally, the following recent Yucca Mountain NEPA analyses were issued and included in this cumulative impacts analysis:

- *Draft Supplemental Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (DOE/EIS-0250F-S1D) (*Draft Repository SEIS*) (DOE 2007b)

- *Draft Supplemental Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada – Nevada Rail Transportation Corridor DOE/EIS-0250F-S2D and Draft Environmental Impact Statement for a Rail Alignment for the Construction and Operation of a Railroad in Nevada to a Geologic Repository at Yucca Mountain, Nye County, Nevada DOE/EIS-0369D* (DOE 2007c)

Additionally, a Draft Programmatic EIS was issued for the designation of energy corridors on Federal lands in the 11 western states (DOE and BLM 2007). The lead Federal agencies are DOE and the U.S. Department of the Interior, Bureau of Land Management. Cooperating agencies are the U.S. Department of Agriculture, Forest Service; U.S. Department of Defense; and the U.S. Department of Interior, U.S. Fish and Wildlife Service. The Agencies' proposed action is to designate energy corridors on Federal land for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities in the 11 contiguous western states. The need is to improve the delivery of electricity, oil, gas, and hydrogen in the West, while also enhancing the western electrical transmission grid by improving reliability, reducing congestion, and expanding the national electrical grid. The nearest designated energy corridors to NTS are south and west of the NTS and east of the Nevada Test and Training Range and Desert National Wildlife Range boundaries. While there would be some impacts during construction, long-term operational impacts would not add appreciably to NTS cumulative impacts.

Reasonably foreseeable future actions for the region surrounding NTS were also reviewed and included in the analysis. Personnel from Nellis Air Force Base (for Nellis and Creech Air Force Bases and the Nevada Test and Training Range), the regional Bureau of Land Management Office, the U.S. Fish and Wildlife Service, the U.S. Forest Service, the National Park Service, and the Southern Nevada Water Authority were interviewed for potential cumulative impacts. Available documentation was reviewed for cumulative impacts, including the following sources:

U.S. Air Force –

- *Renewal of the Nellis Air Force Range Land Withdrawal, Legislative Environmental Impact Statement* (USAF 1999)

- *Final Base Realignment and Closure (BRAC) Environmental Assessment for Realignment of Nellis Air Force Base* (USAF 2007b)

[9] *The Dual Axis Hydrodynamic Radiographic Test Facility EIS indicates expected annual waste generation rates of about 11.8 metric tons (26,000 pounds) of transuranic and 350 cubic meters (12,500 cubic feet) of low-level radioactive waste (DOE 1995b).*

- *Draft Environmental Assessment for the Integrated Natural Resource Management Plan, Nellis Air Force Base and Nevada Test and Training Range, NV* (USAF 2007c)
- *Draft Range 74 Target Complexes Environmental Assessment Nevada Test and Training Range, Nevada* (USAF 2007d)
- *Expeditionary Readiness Training (ExpeRT) Course Expansion Final Environmental Assessment* (USAF 2006a)
- *Wing Infrastructure Development Outlook (WINDO) Final Environmental Assessment* (USAF 2006b)
- *Final Environmental Assessment for Leasing Nellis Air Force Base Land for Construction and Operation of a Solar Photovoltaic System, Clark County, Nevada* (USAF 2006c)
- *Final Environmental Assessment for Increased Depleted Uranium Use on Target 63-10, Nevada Test and Training Range* (USAF 2006d)
- *Final Environmental Assessment for Sanitary Landfill Expansion on the Tonopah Test Range, Nye County, NV* (USAF 2007a)

In addition, the following two NEPA analyses are underway for the Air Force. These NEPA documents will be reviewed, if available, for the final SA for their contribution to cumulative impacts in the region.

- *Creech Air Force Base Capital Improvements Environmental Assessment*
- *F-35 Beddown Environmental Impact Statement*

Bureau of Land Management – The following Bureau of Land Management NEPA documents were reviewed; however, no potential cumulative impacts that would be additive to those from NTS were identified.

- *Draft Resource Management Plan/Environmental Impact Statement* (BLM 2005)
- *Las Vegas Valley Disposal Boundary Environmental Impact Statement* (BLM 2004)
- *Proposed Nevada Test and Training Range Resource Management Plan and Final Environmental Impact Statement* (BLM 2003)

Additionally, the Bureau of Land Management Las Vegas Field Office is preparing an *Upper Las Vegas Wash Conservation Transfer Area Supplemental Environmental Impact Statement (SEIS)*. This SEIS is analyzing possible boundary adjustments to the Upper Las Vegas Wash Conservation Transfer Area referenced in the *Las Vegas Valley Disposal Boundary Environmental Impact Statement* (BLM 2004*)*.

U.S. Fish and Wildlife Service – The U.S. Fish and Wildlife Service is in the process of developing a *Desert National Wildlife Refuge Complex Comprehensive Conservation Plan/Environmental Impact Statement*. The conservation plan and EIS address planning and management of the Desert National Wildlife Refuge including wildlife habitat, cultural resources, and opportunities for compatible recreation.

Each resource area in this SA was reviewed for potential cumulative impacts. The resource areas that were identified as either having a potential cumulative impact or a cumulative impact in the region of influence were analyzed; the results are summarized in the following subsections. The following resources areas are included in the cumulative impacts analysis:

- Infrastructure (electrical power and traffic)
- Water use and groundwater impacts
- Air quality and climate
- Public health and safety
- Waste management
- Transportation
- Environmental justice (American Indian)

5.4.1 Infrastructure

Electrical power capacity and traffic were identified as having potential regional cumulative impacts. Cumulative impacts of water use by NTS are discussed in Section 5.4.2.

Electrical capacity—The capacity of the NTS power system is adequate for current loads and loads projected over the next few years; however, the system's capacity is becoming strained as the surrounding utilities continue to grow. NTS is expected to increase its electrical load to possibly more than 40 megawatts as early as 2008. At this load level, combined with projected utility growth, the 138-kilovolt transmission system would be at peak capacity. The companies that provide electrical power to NTS are planning upgrades to increase total system capacity to meet expected loads in the region. Potential future load growth at NTS was considered as part of the planning process by these electrical utilities (DOE/NV 2005d).

The Yucca Mountain Project has estimated an electrical requirement of 54 megawatts. The current plan for the Yucca Mountain Project is to purchase permanent power directly from a local utility while using 10 megawatts from NTS during construction. Over the next several years, Work-for-Others clients at NTS will require several megawatts of power in addition to new power requirements for the Atlas and Critical Experiments Facility when they go into operation. Although it appears that NTS has adequate power for these new loads, as well as existing Defense Program loads, the available power at NTS may approach full capacity during this period. In addition, the existing electrical distribution system at the Nellis Remote Sensing Laboratory is only capable of supporting present demands (DOE/NV 2005d). Operation of a commercial solar power plant at NTS would supply electrical power that could be used by NTS and others.

For the maximum impact alternatives at NTS from the Draft *Complex Transformation SPEIS*, a Consolidated Nuclear Production Center at NTS would require an increase in electricity of approximately 357 percent. In this case, NTS would have to procure additional power and upgrade electrical transmission facilities. For the preferred alternative there would be a minimal increased power requirement offset by decreased power consumption by relocating NNSA flight test operations from Tonopah Test Range to a U.S. Department of Defense facility.

Traffic—As population growth continues in Nye and Clark counties, traffic will continue to increase. However, NTS-related activities are not likely to significantly affect traffic congestion at NTS or in surrounding municipalities.

5.4.2 Water Use and Groundwater Impacts

Since the *NTS EIS* was issued, water use by NTS has decreased such that in recent years (2003 through 2006) the average annual use (553 million liters or 146 million gallons) is approximately 13 percent of the historical peak NTS water use that occurred in 1989, and less than 5 percent of the 11,260 million liters (2,975 million gallons) projected in the *NTS EIS* (NTS 2007, DOE 1996b). Water consumption at NTS in the future is expected to be similar to current use, except that the possible construction and operation of a solar power plant in NTS Area 22 could use up to 925 million liters (244 million gallons) of additional water annually (see Section 4.2). Even with the power plant, NTS water use is expected to be much smaller than that projected in the *NTS EIS*; nonetheless, water demand in the region has increased due to the larger than expected growth in the region in both Clark and Nye Counties (see Section 4.3). As such, any water withdrawals in the region would have a cumulative effect.

For the maximum impact alternatives at NTS from the Draft *Complex Transformation SPEIS*, a Consolidated Nuclear Production Center at NTS would require 1,245 million liters (329 million gallons) per year. While this is much less than the 11,260 million liters (2,975 million gallons) projected in the *NTS EIS*; any increased water consumption in the region would add to cumulative impacts. For the preferred alternative, water use increases would be minimal.

Since the *NTS EIS*, several diversions of groundwater in the vicinity of NTS have been proposed, most notably by the Southern Nevada Water Authority, Vidler Water Company, Inc., and Nye County. These diversions were proposed in locations west, southeast, and east of NTS. The potential impacts to the groundwater basins within NTS were examined through groundwater modeling studies. The primary concerns were a reduction in water availability to NTS as well as changes in groundwater gradients beneath NTS. Large changes to groundwater gradients could result in changes to transport pathways and subsequently create the potential for offsite migration of contaminants currently believed to be contained within NTS boundaries (DRI 2006b).

The potential effects on groundwater levels and groundwater gradients at NTS were examined. Scenarios based on the maximum groundwater withdrawals proposed by the Southern Nevada Water Authority and the Vidler Water Company, Inc. were examined by running a modified version of the Death Valley Regional Groundwater Model (DRI 2006b). This modified model contains finer-grained grid spacing in the vicinity of the areas of study. While the model assumes withdrawals of 37,506 million liters (9,909 million gallons) per year by the Southern Nevada Water Authority and 10,627 million liters (2,808 million gallons) per year by the Vidler Water Company, Inc., the withdrawals currently proposed are much less. The Southern Nevada Water Authority is currently proposing to withdraw 9,870 million liters (2,608 million gallons) per year (Davis 2007). The modeling results for the higher withdrawal indicate that the proposed pumping could be sustained for 75 years, but that impacts to NTS groundwater would occur. Specifically, the areal extent of a 0.5-meter (1.6-foot) drawdown would impact Mercury Valley, Amargosa, Indian Springs, Three Lakes, and Frenchman Flat groundwater basins. Drawdown would affect Army #1 Water Well at NTS by lowering water levels by 2.1 meters (6.9 feet). The model also predicted that groundwater flowpaths from detonation sites within NTS would be altered with the potential to move material out of NTS. Impacts to springs appeared to be minimal (DRI 2006b). While in reality, the withdrawal would be much less than was modeled, continued development near NTS with expanded water demands could have similar results to the model. With the proposed expansion of Creech Air Force Base and growth within Nye County, additional water withdrawal in the area to the south or southeast of NTS would be expected. An EA for the capital improvements to Creech Air Force Base is underway and data from that EA will be considered for assessment of cumulative impacts when it becomes available, as appropriate.

5.4.3 Air Quality and Climate

NNSA/NSO activities at NTS do not have an appreciable effect on air quality cumulative impacts. NTS operations do not affect precipitation. Although broad regional data may indicate drought-like conditions in Nevada, local NTS rain gauge stations show that precipitation at NTS remained relatively constant since the installation of the rain gauges approximately 40 years ago (see Section 3.2.7). The climate at NTS is not substantially different than that described in the *NTS EIS*.

CGTO The CGTO recognizes that climatic change is occurring and will continue to impact the natural resources of the NTS and the surrounding region. When rain gauge data are averaged over a decade they can mask the reality that plants and animals are adjusted to regular cycles of rain and snow. Isolated heavy rain events can increase the annual rainfall amounts, but are largely not useful for sustaining life which is adjusted to the normal annual rainfall that is more evenly dispersed by season.

The CGTO knows that over the past decade the NTS and surrounding region has experienced an unusual drought. Our studies of places have shown us that the plants and animals are stressed by this drought. Their numbers are less and they are not in as many places due to the drought. Water, both as free flowing springs and that absorbed by plants and distributed to animals, is less available than it was. The nutritional and medicinal value of plants has diminished greatly. Another example is found in wildlife that has less body fat which causes them to shorten hibernation cycles. Indian people have observed that in order to survive ground squirrels (guim'bah, tsip species) are becoming cannibals. Other animals too are changing their habits (like rabbits eating unusual foods like Yucca) as the environment is being altered in this drought.

The CGTO believes that a drought such as is being experienced not only weakens all species but it threatens their ability to recover when the drought ends. Indian people traditionally used and managed their natural resources in terms of what we sometimes call today "The Seven Generation" time frame, which means we evaluate our actions in terms of what they could do for or to the next seven generations. This is sometimes called the Precautionary Principle. Indian people believe that this drought could be the beginning of longer drought periods (more than 60 years) like those we experienced in the past. Thus, the CGTO believes that this drought is significant.

5.4.4 Public Health and Safety

Radiological doses to the public from normal operations at NTS were analyzed in conjunction with radiological doses to the public from construction and operation of the Yucca Mountain Repository, and historical nuclear weapons testing. The only pathways of possible radiation exposure to the public from current NTS operations were identified in Section 4.11 as the air pathway, the groundwater pathway, and the contaminated game pathway.

Current radiological impacts to the public from NTS are quite low, with an MEI located in Cactus Springs or Springdale receiving a radiological dose from airborne emissions at NTS of less than 0.2 millirem per year. Because the calculated population dose has been less than 0.6 person-rem for over a decade, the population dose to the residents within 80 kilometers (50 miles) is no longer estimated. For the groundwater pathway, monitoring results from sampled wells indicated no detectable concentrations of manmade gamma radionuclides, and gross alpha and beta radioactivity (attributed to naturally occurring radionuclides) was found at levels below drinking water limits (DOE/NV 2006f). For contaminated game animals, the results varied from year to year depending upon the animals sampled. Since 1998, the result varied from a high in 2002 of 1.24 millirem per year when the assumption was that the hunter would consume 20 mourning doves from the E Tunnel ponds, 20 quail from the T2 site, and 20 jackrabbits from the T2 site, to a low in 2001 of 0.07 millirem per year from the consumption of 12 chukar from E-Tunnel ponds. The average value since 1998 for the chosen hunting scenarios is approximately 0.4 millirem (DOE/NV 2000b, 2001b, 2002c, 2003d, 2004c, 2005e, 2006f). The calculated doses do not represent actual doses to real hunters because hunting is not allowed at NTS where the animals were sampled. As a result, the maximum combined individual dose from current and projected NTS operations would be approximately 0.6 millirem per year. This annual dose is expected to generally decrease over time as contaminated soil and industrial sites are remediated.

For the maximum impact alternatives at NTS from the Draft *Complex Transformation SPEIS*, a Consolidated Nuclear Production Center at NTS could result in a collective population dose of 0.013 person-rem per year and a maximally exposed individual dose of 0.004 millirem per year. Adding these doses to existing doses at NTS (although some operations would be replacements at NTS) would not appreciably increase the total population dose and maximum individual dose.

The only other identified Federal, non-Federal, or private actions with spatially or temporally coincident short-term impacts in the region of influence were past nuclear weapons testing. Residents who were present during the periods when nuclear weapons testing occurred (in particular, atmospheric weapons testing from the 1950s to the early 1960s) could have received up to 5 rem to the thyroid from iodine-131 releases, which equates to an effective dose of approximately 250 millirems (DOE 2007b). Because of the length of time since the end of atmospheric weapons testing, this potential legacy dose would not apply to current residents that were not in the region of influence at the time of the testing.

For construction, operation, monitoring and closure of the Yucca Mountain Repository, **Table 5–14** shows the expected radiological doses and radiological health impacts to the public for each activity and the entire project (DOE 2007b). The radiological doses and impacts would result primarily from exposure of the public to naturally occurring radon-222 and its decay products released from the subsurface facilities in ventilation exhaust air.

Table 5–14 Yucca Mountain Repository Radiation Doses and Radiological Health Impacts to the Public for Each Activity Period and Entire Project

Dose and Health Impact	*Construction (5 years)*	*Operation (50 years)*	*Monitoring (40 years)*	*Closure (10 years)*	*Entire Project (105 years)*
Proposed Action					
MEI					
Maximum annual dose (millirem)	1.3	6.8	6.8	6.8	6.8
Total dose (millirem)	3.8	280	270	37	480
Probability of LCF	2.3×10^{-6}	1.7×10^{-4}	1.6×10^{-4}	2.2×10^{-5}	2.9×10^{-4}
Exposed 80-kilometer (50-mile) population collective dose (person-rem)	85	6,400	6,100	840	13,000
Number of LCFs	0.051	3.8	3.7	0.51	8
Inventory Module 1 or 2					
MEI					
Maximum annual dose (millirem)	1.3	14	14	14	14
Total dose (millirem)	3.8	580	560	77	990
Probability of LCF	2.3×10^{-6}	3.5×10^{-4}	3.4×10^{-4}	4.6×10^{-5}	5.9×10^{-4}
Exposed 80-kilometer (50-mile) population collective dose (person-rem)	85	13,000	13,000	1,700	28,000
Number of LCFs	0.051	7.9	7.6	1.0	17

LCF = latent cancer fatality, MEI = maximally exposed individual.
Source: Table 8–6, *Draft Repository SEIS* (DOE 2007b).

5.4.5 Waste Management

Table 5–15 presents the estimated quantities of radioactive, solid, and hazardous wastes that have been generated or received for disposal at NTS both historically and since the *NTS EIS*, as well as the quantities of these wastes that could be generated or received for disposal through 2012.[10]

Of the wastes listed in the table, low-level and mixed low-level radioactive wastes would be disposed at NTS, as would solid waste. Transuranic and hazardous wastes (including regulated PCB wastes) would be shipped offsite for treatment or disposal. Sufficient offsite capacity exists for the disposition of both these types of waste.

The estimates of low-level and mixed low-level radioactive wastes through 2012 are based on current projections provided to NNSA/NSO by identified onsite and offsite disposal customers. Also shown are the quantities of low-level and mixed low-level radioactive wastes that are not currently projected for NTS disposal but could be generated through 2012 by entities outside NTS and plausibly considered for NTS disposal (see Section 5.2). NTS disposal of these wastes is uncertain; they may not actually be generated or may be disposed at another DOE or commercial disposal facility. Volumes of mixed low-level radioactive waste that may be received and disposed are subject to the conditions of applicable Nevada Division of Environmental Protection permits. NTS is currently limited by a Nevada Division of Environmental Protection permit to receive 20,000 cubic meters (about 710,000 cubic feet) of mixed low-level radioactive waste through 2010, from sources outside the State of Nevada.

Table 5–15 Historic, Generated, Projected, and Reasonably Foreseeable Waste Management through 2012

Transuranic Waste (cubic meters)	*Low-Level Radioactive Waste (cubic meters)*	*Mixed Low-Level Radioactive Waste (cubic meters)*	*Hazardous Waste (metric tons)*	*Solid Waste (cubic meters)*
Waste Historically Disposed at NTS through 1995				
320 [a]	498,087 [b]	8,024 [c]	No information	No information
Generated and Projected Wastes, 1996 through 2012				
1,080 [d]	620,000 [e]	13,000 [f]	2,800 [g]	380,000 [h]
Possible Additional Wastes Projected through 2012				
Not applicable	~600,000 [i]	~104,000 [i]	Not applicable	Not applicable
Total Generated, Projected, and Possible Additional Wastes, 1996 through 2012				
1,080 [d]	~1,220,000	~120,000	2,800	380,000

[a] Includes all waste disposed in the greater confinement disposal boreholes (about 293 cubic meters) and about 30 cubic meters of transuranic waste inadvertently disposed at the Area 5 RWMS. See SAIC 2008.
[b] As of December 31, 1995 (NTS 2007).
[c] *NTS EIS* (DOE 1996b).
[d] Includes stored legacy waste and newly generated transuranic waste projected to be shipped offsite through 2022 (see Section 4.12.2).
[e] Includes NTS-generated waste, as well as waste from offsite disposal customers.
[f] Includes NTS-generated waste, as well as waste from offsite disposal customers. Waste receipt, management, and disposal are subject to applicable 3 Tc-0.002bu(a)8.4to 3TEcy0.002qui 3 Tc-0.002omiic theendi(tio s)7.1(of)176(o a)8.4(pplic)8.4(a)8.4(b)-2.1(le)8.4(Ns)6

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Beyond 2012, additional wastes may be considered for disposal at or in the vicinity of NTS as summarized in **Table 5–16**. Again, generation of the identified wastes is uncertain, or if generated, much of the waste could also be considered for disposal at other commercial or DOE sites.

Table 5–16 Summary of Cumulative Waste Sources Beyond 2012

Waste Source	*Waste Description*
Identified NTS customers	Identified NTS customers have projected generation for NTS disposal of about 14,546 cubic meters of low-level radioactive waste for fiscal year 2013, as well as 85 cubic meters of mixed low-level radioactive waste (NTS 2007).
Depleted uranium hexafluoride conversion waste	About 229,000 cubic meters of depleted uranium hexafluoride conversion product is projected over 18 to 25 years. NTS disposal is under consideration for this waste, as is commercial disposal. Assuming 46,000 to 55,000 cubic meters of waste is generated through 2012, about 174,000 to 183,000 cubic meters would be generated after 2012. Impacts from transport of this waste to NTS have been addressed (DOE 2004a, 2004b).
Strontium-90 RTGs	Through 2012, possible disposal of 36 strontium-90 RTGs at NTS is included in the estimates in Tables 5–9 and 5–11. Additional units exist at DOE and U.S. Department of Defense sites and in foreign countries. The number of additional RTGs that could be considered for future NTS disposal is uncertain, but is estimated to be 13 (Parks 2007).
U.S. Department of Defense cleanup of depleted uranium	It is expected that NTS will continue to be considered on an *ad hoc* basis for disposal of depleted uranium wastes from environmental restoration at U.S. Department of Defense sites where a clear connection is established to DOE-funded projects, or DOE-supplied raw materials were used to produce depleted uranium products. Information is not sufficiently developed at this time to quantify this potential waste stream.
Waste from accidents involving nuclear weapons	In the event of an accident involving a nuclear weapon, NTS could be considered a candidate disposal site for waste such as soil and debris. Generation of such waste would be unplanned, episodic, and difficult to project. Its disposition would be considered on a case-by-case basis.
Site cleanups at former Manhattan Project and support facilities	Following 2012, the FUSRAP program is estimated to generate about 38,000 cubic meters of low-level radioactive waste, 3,800 cubic meters of mixed low-level radioactive waste, and 310,000 cubic meters of 11e(2) byproduct material (Hearty 2007b). Commercial disposal facilities might be used for these wastes.
Former research reactor site cleanups	Additional wastes may be generated as DOE or other Federal agency sites that conducted research and testing funded by the Atomic Energy Commission or its successor agencies are decontaminated, decommissioned, and demolished. Information is not sufficiently developed at this time to quantify this potential waste stream.
Returned DOE-owned materials	Wastes may be generated as DOE-owned radioactive materials are returned from overseas use and determined to have no further value. Information is not sufficiently developed at this time to quantify this potential waste stream.
Oak Ridge National Laboratory Building 3019 dismantlement and uranium-233 downblending	Low-level and mixed low-level radioactive wastes through fiscal year 2012 are included in Table 5–11 as candidates for NTS disposal. Following fiscal year 2012, an additional 142 cubic meters of low-level radioactive waste is projected from construction, operations, decontamination, and decommissioning; as well as 14.6 cubic meters of downblended low-level radioactive waste and an additional 117 cubic meters of downblended transuranic waste (NTS 2007). NTS is a candidate disposal site for the low-level radioactive waste. Transuranic waste would be disposed at WIPP.
Naval Reactor Program wastes	Contingency use of NTS for disposal of 2.8 to 5.7 cubic meters of low-level or mixed low-level radioactive wastes annually from shipyards if other disposal options are precluded (Roles 2007).
Idaho National Laboratory remote-handled waste	Disposal of remote-handled low-level radioactive waste at the Idaho National Laboratory is expected to continue through 2015, and possibly longer depending on the schedule for facility closure and available disposal capacity. The Idaho National Laboratory is currently evaluating options for the disposition of low-level radioactive waste upon closure of its existing disposal facility. The impacts of any proposed actions will be evaluated in accordance with NEPA. Annual disposal of approximately 80 cubic meters of remote-handled low-level radioactive waste at NTS is an alternative under consideration (Conner 2008).

Waste Source	***Waste Description***
Los Alamos National Laboratory environmental restoration waste	Table 5–11 addresses Los Alamos National Laboratory environmental restoration waste through fiscal year 2012. Beyond fiscal year 2012, generation of about 310,000 cubic meters of low-level radioactive waste and about 37,000 cubic meters of mixed low-level radioactive waste is projected (DOE 2006a). Impacts associated with transporting the waste for disposal at Los Alamos National Laboratory, disposal at NTS, and disposal partly at NTS and partly at a commercial disposal facility have been analyzed (DOE 2006a). Generation of these wastes is uncertain. Actual volumes that may be generated, and the timing of their generation, will depend on regulatory decisions and resolution of technical and funding issues.
Greater-Than-Class C waste disposal	DOE is preparing a *GTCC EIS* addressing disposal of low-level radioactive waste generated by activities licensed by the U.S. Nuclear Regulatory Commission or an Agreement State that contain radionuclides in concentrations exceeding 10 CFR Part 61 Class C limits (72 FR 40135). The *GTCC EIS* would also consider DOE low-level radioactive waste and transuranic waste having characteristics similar to GTCC low-level radioactive waste and which may not have an identified path to disposal. NTS is being considered as a candidate location for a new GTCC waste disposal facility. Such a disposal facility is not expected to be operational until after 2012, but could receive about 5,300 cubic meters of GTCC waste and similar DOE waste already in storage or projected to be generated from facilities already in operation (such as from decommissioning existing commercial nuclear power plants). In addition, DOE estimates there is about 31,000 cubic meters of GTCC waste and similar DOE waste that may be generated (Joyce 2008). If NTS were selected as the location for a GTCC disposal facility, appropriate site-specific NEPA analysis and documentation would be conducted.
Yucca Mountain Repository	DOE is proposing to construct, operate and monitor, and eventually close a geologic repository for disposal of 70,000 metric tons (heavy metal) of spent nuclear fuel and high-level radioactive waste at Yucca Mountain. DOE projects that construction, operation and monitoring, and closure of the repository would generate 476,000 cubic meters of construction and demolition debris, 3.2 million cubic meters of industrial wastewater and sanitary sewage, 100,000 cubic meters of sanitary and industrial waste, 8,900 cubic meters of hazardous waste, and 74,000 cubic meters of low-level radioactive waste. Hazardous wastes would be sent offsite for treatment and disposal, while sanitary and industrial solid waste, sanitary sewage, and industrial wastewater would be disposed at the repository site. Alternatively, NTS landfills could be considered for solid waste disposal. Low-level radioactive waste would be generated at an annual rate of about 648 cubic meters over the life of the project, and could be disposed at NTS disposal facilities or other DOE or commercial facilities (DOE 2002a, 2007c).
Complex Tranformation	If the Consolidated Nuclear Production Center were constructed at NTS, it could result in the generation of construction wastes of up to 6,935 cubic meters of low-level radioactive waste, 11.8 metric tons of hazardous waste, 8,750 metric tons of non-hazardous solid waste, and 363,400 liters of non-hazardous liquid waste. Annual waste generation from operations is projected to be 726 cubic meters of transuranic waste (including mixed transuranic waste), 9,664 cubic meters of low-level radioactive waste, 598 cubic meters of mixed low-level radioactive waste, 33,785 liters of liquid low-level radioactive waste, 13,712 liters of liquid mixed low-level radioactive waste, 18.1 metric tons of hazardous solid waste, 5.9 metric tons of liquid hazardous waste, 21,100 cubic meters of non-hazardous solid waste, and 647,300 liters of liquid non-hazardous waste (DOE 2007d). If the Consolidated Nuclear Production Center were constructed at another NNSA facility, low-level and mixed low-level radioactive waste from construction and operations could be disposed of at NTS.

FUSRAP = Formerly Utilized Sites Remedial Action Program, GTCC = Greater-than-Class C, NEPA = National Environmental Policy Act, RTG = radioisotope thermoelectric generator, WIPP = Waste Isolation Pilot Plant.
Note: To convert cubic meters to cubic feet, multiply by 35.315; to convert metric tons to tons, multiply by 1.1023; to convert liters to gallons multiply by 0.2648.

5.4.6 Transportation

The assessment of cumulative impacts for past, present, and reasonably foreseeable future actions involving radioactive material transports concentrates on impacts from offsite transportation throughout the nation, which would result in potential radiation exposure to a greater portion of the general population than onsite and NTS-vicinity transportation; transportation of radioactive materials could also result in fatalities from traffic accidents. The collective dose to the general population and workers is the measure of impact used to quantify cumulative transportation impacts because it can be directly related to LCFs using a cancer risk coefficient.

In addition to those impacts addressed in this SA (Section 5.3), the cumulative impacts of the transportation of radioactive material consist of impacts from historical shipments of radioactive waste and spent nuclear fuel, reasonably foreseeable actions that include transportation of radioactive material identified in Federal, non-Federal, and private environmental impact analyses, and general radioactive material transportation that is not related to a particular action. The time frame of impacts was assumed to begin in 1951, when NTS began operation, and continue to some foreseeable future date. The current list of reasonably foreseeable activities involving NTS indicates an end date of about 2073, when radioactive material shipments to a geologic repository ends, based on assumptions in the *Draft Repository SEIS* (DOE 2007b).

Table 5–17 provides a summary of total worker and general population collective doses, and traffic fatalities from past, present, and reasonably foreseeable future transportation activities. This table lists activities with documented transportation impacts. The table lists activities that are not related to those considered in this SA. In addition, this table does not list NTS transportation activities that are either ongoing, expected to occur in future, or not occurring on public roads.

Historical Shipments. The impact values provided for historical shipments to NTS include shipments of spent nuclear fuel from 1951 through 1993 and the impacts from radioactive waste shipments to NTS from 1974 through 1994 (DOE 1996b). The impact values also include historical shipments of spent nuclear fuel to the Idaho National Laboratory, the Savannah River Site, the Hanford Reservation, and the Oak Ridge Reservation, as well as shipments of Naval spent fuel and test specimens (DOE 1996b).

There are considerable uncertainties in these historical estimates of collective dose. For example, the population densities and transportation routes used in the dose assessment were based on the census data of 1990 and the United States highway network as it existed in 1995. Using the census data for 1990 overestimates historical collective doses because the United States population has continuously increased over the time covered in this assessment. On the contrary, using interstate highway routes as they existed in 1996 may slightly underestimate doses for shipments that occurred in the 1950s and 1960s, because a larger portion of the transport routes would have been on non-interstate highways where population may have been closer to the road. By the 1970s, the structure of the interstate highway system was largely fixed and most shipments would have been made using interstate routing.

Reasonably Foreseeable Actions. The values provided for reasonably foreseeable actions could lead to some double counting of impacts. For example, the low-level radioactive waste transportation impacts in the *Waste Management PEIS* may also be included in the individual DOE facilities' site-wide EISs. Also, for the foreseeable actions where no preferred alternative was identified or no ROD has been issued, the impact values are included for the alternative having the largest transportation impacts.

Table 5–17 Transportation-Related Radiological Collective Doses and Risks Not Related to this Supplement Analysis

Category	Worker		General Population		Traffic Fatalities
	Collective Dose (person-rem)	*Risk (LCF)*	*Collective Dose (Person-rem)*	*Risk (LCF)*	
Historical Shipments (1943-1994) [a]					
Spent Nuclear Fuel Shipments to NTS	1.4	0.00	0.70	0.00	Not listed
Radioactive Waste to NTS	82	0.05	100	0.06	Not listed
Other Spent Nuclear Fuel Shipments	250	0.15	130	0.08	Not listed
Subtotal	**330**	**0.20**	**230**	**0.14**	**Not listed**
Reasonably Foreseeable Actions [b]					
Surplus Plutonium Disposition EIS	60	0.04	67	0.04	0.05
Naval Reactor Disposal	5.8	0.00	5.8	0.00	0.00
Treatment of Mixed Low-level Radioactive Waste EIS [c]	18	0.01	1.34	0.00	1.25
Waste Management PEIS [d]	15,000	9.0	17,700	10.6	36
WIPP SEIS II	790	0.47	5,900	3.54	5
Idaho High-Level Waste and Facility Disposition Final EIS	520	0.31	2,900	1.74	1.0
Sandia National Laboratories SWEIS	94	0.06	590	0.35	1.3
Tritium Production in Commercial Light Water Reactor EIS	16	0.01	80	0.05	0.06
LANL SWEIS	580	0.35	310	0.19	8
Plutonium Residues at Rocky Flat EIS	2.1	0.00	1.3	0.00	0.01
Surplus Disposition HEU	400	0.24	520	0.31	1.1
Molybdenum-99 Production EIS	240	0.14	520	0.31	0.1
Import of Russian Plutonium-238 EA	1.8	0.00	4.4	0.00	0.00
Pantex SWEIS	250	0.15	490	0.29	0.01
Storage and Disposition of Fissile Material	NA	NA	2,400 [e]	1.44	5.5
Stockpile Stewardship	NA	NA	38 [e]	0.02	0.06
Container System for Naval Spent Nuclear Fuel	11	0.01	15	0.01	0.05
S3G and D1G Prototype Reactor Plant Disposal EIS	2.9	0.00	2.2	0.00	0.01
S1G Prototype Reactor Plant Disposal EIS	6.7	0.00	1.9	0.00	0.00
DUF_6 Conversion at Paducah EIS [f]	770	0.46	31	0.02	0.42
DUF_6 Conversion at Portsmouth EIS [g]	520	0.31	29	0.02	0.45
ETTP DUF_6 Transport to Portsmouth [g]	99	0.06	3.2	0.00	0.03
West Valley Draft EIS	1,400	0.84	12,000	7.2	3.6
Spent Nuclear Fuel PEIS	360	0.22	810	0.49	0.77
Foreign Research Reactor Spent Nuclear Fuel EIS [h]	90	0.05	222	0.13	0.07
Private Fuel Storage Facility Final EIS [i]	30	0.02	190	0.11	1
Yucca Mountain EIS [j]	5,900	3.54	1,200	0.72	2.8
West Valley Waste Management EIS	520	0.31	410	0.25	0.15
Mixed Oxide Fuel Fabrication at Savannah River Site [k]	530	0.32	560	0.34	0.20
Enrichment Facility in Lea County EIS [l]	300	0.18	5,000	3.0	18
West Valley Demonstration Project EA for the D&D and Removal of Certain Facilities	14	0.01	11	0.01	0.01
Subtotal	**28,531**	**17**	**52,013**	**31**	**87**

Category	Worker		General Population		Traffic Fatalities
	Collective Dose (person-rem)	Risk (LCF)	Collective Dose (Person-rem)	Risk (LCF)	
General Radioactive Material Transport					
1943-1982 [m]	220,000	132	170,000	102	Not listed
1983-2073 [n]	154,000	92	168,000	101	116
1943-2073	**374,000**	**224**	**338,000**	**203**	**116**
Total Transportation Impacts Not Related to the NTS EIS SA					
Total Impacts (up to 2073)	**402,860 [o]**	**242**	**390,240 [o]**	**234**	**200 [o]**

DUF_6 = depleted uranium hexafluoride, ETTP = Eastern Tennessee Technology Park, EA = Environmental Assessment, LCF = latent cancer fatality, NA = not available (the data are provided as a sum for workers and the public).

[a] *NTS EIS* (DOE 1996b).

[b] Unless it is specified otherwise, all values are taken from *Yucca Mountain EIS* and the *Draft Repository SEIS*.

[c] *Environmental Impact Statement for Treatment of Low-Level Mixed Waste*, February 1998 (JEGI 1998).

[d] The values are for the low low-level and mixed low low-level radioactive waste transportation impacts to the NTS, based on the amended ROD for the *Waste Management PEIS*, 65 FR 10061, February 25, 2000.

[e] Includes worker and general population doses.

[f] DOE/EIS-0359, *Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Paducah, Kentucky, Site*, June 2004 (DOE 2004a).

[g] DOE/EIS-0360, *Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio,* Site, June 2004 (DOE 2004b).

[h] DOE/EIS-0218, *Final Environmental Impact Statement on a Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel*, February 1996 (DOE 1996a).

[i] NUREG-1714, *Final Environmental Impact Statement for the Construction and Operation of an Independent Spent Fuel Storage Installation on the Reservation of the Skull Valley Band of Goshute Indians and the Related Transportation Facility in Tooele County, Utah*, December 2001 (NRC 2001).

[j] Impacts for the Proposed Action in the *Draft Repository SEIS* (DOE 2007b). Similar impacts in the *Yucca Mountain EIS* (DOE 2002b) were 4,600 and 1,600 person-rems, respectively, for workers and population. If DOE decides to expand the program to include all potential high-level and Greater-Than-Class C wastes and spent nuclear fuel (e.g., implement Inventory Module 2), the worker and public doses would be about 15,000 and 2,700 person-rem, respectively.

[k] NUREG-1767, *Environmental Impact Statement on the Construction and Operation of a Proposed Mixed Oxide Fuel Fabrication Facility at the Savannah River Site*, January 2005 (NRC 2005a).

[l] NUREG-1790, *Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico*, June 2005 (NRC 2005b). The risk values presented in this report are per year of operation. The values presented in this table are for 30 years of operation.

[m] These estimates are very conservative, since few shipments were made in the 1950s, and 1960s. Also, the non-exclusive shipment dose estimates are based on a very conservative method. See the text for the dose estimates for 1975 and 1983 shipments.

[n] The annual dose estimates are similar to those for the period 1975-1982. The estimate of traffic fatalities is detailed in the text.

[o] The summed values are rounded to the nearest ten.

General Radioactive Materials Transports. General radioactive material transports are shipments not related to a particular action; they include shipments of radiopharmaceuticals, industrial and radiography sources, and uranium fuel cycle materials; and shipments of commercial low-level radioactive waste to commercial disposal facilities. The collective dose estimates from transportation of these types of materials were based in this SA on the following: (1) for the period 1943 through 1982, a U.S. Nuclear Regulatory Commission analysis documented in NUREG-0170 for shipments made in 1975 (NRC 1977); and (2) for the period 1983 through 2043, an analysis of unclassified shipments in 1983, documented in the *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (DOE 1995a). The U.S. Nuclear Regulatory Commission report estimated collective doses to the workers and population of 5,600 and 4,200 person-rem, respectively, for transports in 1975. The modes of transportation included truck, rail and plane. The collective doses to workers and population for 1943 through 1982 (39 years) were estimated to be 220,000 and 170,000 person-rem, respectively (NRC 1977). The collective doses to workers and populations for shipments in 1983 using a combination of truck and plane shipments were estimated to be 1,690 and 1,850 person-rem, respectively (DOE 1995a). These doses were calculated using more refined models than those used in the 1977 U.S. Nuclear Regulatory Commission report. Even though the number of shipments was larger than those of the 1977 U.S. Nuclear Regulatory Commission report, the estimated doses are smaller by a factor of 2 to 3. The collective doses over 91 years from 1983 through 2073, would be 154,000 and 168,000 person-rem for workers and population, respectively. Neither of these reports provides any specific estimates for nonradiological traffic fatalities. Most of the radioactive materials are shipped incidental to other freight shipments, i.e., the shipment is non exclusive-use and would take place whether or not the radioactive material were on board. For exclusive-use shipments (similar to those evaluated in this SA that require the exclusive use of the transport vehicle, such as spent fuel, uranium fuel cycle, and radioactive waste), there are potential nonradiological risks (traffic fatalities). Historically, there have been minimal accidents involving radioactive material transports and zero, or very few, non-occupational fatalities (DOT 2007). Therefore, only potential future traffic fatalities would be estimated for this category of transport. Using the estimated projected transport distances for exclusive use shipments (fuel cycle and wastes) from the NRC report, and an average traffic fatality of 1.5 per 100 million kilometers (62 million miles) (Saricks and Tompkins 1999), the nonradiological traffic fatalities were estimated to be 116. This value is small when compared to similar estimates provided in other reasonably foreseeable actions.

Table 5–18 provides impacts to transport workers and the general population from future transportation activities considered in this SA. As indicated in Section 5.3, there are 1,060 projected annual truck shipments. The maximum historical number of shipments to NTS was 2,600 truck loads in 2003. The projected doses to the workers and the public are estimated in Table 5–18 using these two annual estimates and the risk per shipment from the values given in Table 5–12. The impacts from transportation in this SA are quite small compared with the overall cumulative transportation impacts. The cumulative worker dose from all types of shipments was estimated to range between 403,120 and 403,590 person-rem, or about 242 LCFs. The cumulative dose to the general population was estimated to range between 390,550 and 391,110 person-rem, or about 234 LCFs. The cumulative nonradiological impacts (i.e., traffic fatalities) were estimated to be about 200. To place these numbers in perspective, the National Center for Health Statistics indicates that the annual cancer deaths in the United States from 1999 through 2004 on average was about 554,000, with less than a 1 percent fluctuation in the number of deaths in any given year (CDC 2007). The total number of LCFs (among the workers and general population) estimated to result from radioactive material transportation over the period between 1943 and 2073 is 476, or an average of about 4 LCFs per year. The transportation-related LCFs are about 0.0007 percent of the annual number of cancer deaths; therefore, it is indistinguishable from the natural fluctuation in the total annual death rate from cancer. The estimated number of traffic fatalities of about 200 over a period of more than 100 years is also small compared with the average annual traffic fatalities of 40,000 in the United States. Note that the majority of the cumulative risks to workers and the general population was due to the general transportation of radioactive material unrelated to activities evaluated in this SA.

The major radiological transportation actions related to the Draft *Complex Transformation SPEIS* Consolidated Nuclear Production Center at NTS would be:

- Pits currently stored at Pantex would be transported to NTS.
- Highly enriched uranium stored at Y-12 would be transported to NTS.

After completion of these shipments, there would be no annual shipment of plutonium pits from Pantex and highly enriched uranium from Y-12. The estimated radiological health impacts of the one-time transportation of pits and highly enriched uranium to NTS under this proposal would result in approximately 0.116 LCFs (no LCFs would be expected). The collective dose to workers handling pits and highly enriched uranium materials for transportation would be about 1,100 and 4,420 person-rem, respectively. Although this implies 1 to 3 LCFs may be expected among the worker population, the annual maximum individual worker dose is administratively limited to 2 rem (DOE 1999c). For an individual worker, this equates to an annual risk of 0.001 (a likelihood of 1 in 1,000) of developing an LCF. Non-radiological impacts associated with this transportation would be expected to result in zero fatalities (0.022) as a result of traffic accidents (DOE 2007d).

Table 5–18 Cumulative Transportation Impacts for this Supplement Analysis

	Worker		***General Population***		
	Collective Dose (person-rem)	***Risk (LCFs)***	***Collective Dose (person-rem)***	***Risk (LCFs)***	***Traffic Fatalities***
SA Transportation Risk (2008 - 2012)					
This SA [a]	299 - 733	0.18 - 0.44	354 - 869	0.21 - 0.52	0.73 - 1.8
Other Transportation Impacts Not Related to this SA					
Historical Shipments to NTS	330	0.20	230	0.149	Not Listed
Reasonably Foreseeable Actions	28,531	17	52,013	31	87
General Radioactive Material Transport	374,000	224	338,000	203	116
Total	**402,860**	**242**	**390,240**	**234**	**205**
Cumulative Total [b]					
Total Impacts [c]	403,160 - 403,590	242	390,590 - 391,110	~235	205

LCF = latent cancer fatality.
[a] The values provided are for a range of potential shipments (average projected annual shipment of 1,060, and a maximum number of shipments of 2,600). See text.
[b] The Cumulative Total is the sum of the projected impacts for this SA with the impacts from the other non-related transportation activities.
[c] Totals are rounded to nearest ten.

5.4.7 American Indian Environmental Justice Impacts

Environmental justice impacts, as viewed by the CGTO, for the local American Indians have been identified. In the *NTS EIS* and the *2002 NTS SA*, American Indian environmental justice concerns, as identified by the CGTO, include violations of lands they consider sacred, perceived risks from radiation, and cultural survival. Increased land disturbance associated with all forms of development in the region of influence could result in a decrease in access to these areas for American Indians, and has the potential for greater disturbance and vandalism of American Indian cultural resources. While NNSA/NSO is committed to accommodating Tribal organization requests, to the extent consistent with mission needs and activities, to access NTS for cultural purposes, not allowing unrestricted access to the land may reduce the traditional use of the area and affect its sacred nature. At the same time, restricted access to NTS lands affords a substantial level of protection to sacred and culturally sensitive sites compared to areas with open access. American Indian groups living in the region of NTS, the Nevada Test and Training Range, and the proposed Yucca Mountain Repository have expressed concerns about the protection of traditions and the spiritual integrity of the land. Additionally, increased noise from additional aircraft associated with expanded activities at Nellis and Creech Air Force Bases and the Nevada Test and Training Range may disrupt American Indian ceremonies. These impacts would mainly affect American Indian groups who would comprise the population group experiencing disproportionate impacts.

Cumulative Impacts of Tribal Consultation

CGTO The CGTO affirms that the Laws viewed by American Indian people are natural laws given to them by the Creator and differ greatly from man-made laws. The CGTO believes that these laws are inherent and are integrated in all aspects of life. When it comes to the stewardship and responsibility to the land, American Indians say these laws engulf all lands. Stewardship is a contract, not an arbitrary contract, but one that is based on inherent birthrights given by the Creator that goes back to the beginning of time. The example that is most often given is said that when a native traditionalist goes before the Life Giver it is like going into the Supreme Court and he comes out a changed human being. This is a statement of faith that indigenous people understand and is considered supreme knowledge because it is understood. That is the way it always has been and always will be. These stewardship laws guide our consultation with the people who manage the NTS.

The CGTO wants Indian people to have access to more proactive roles in the long term management of the natural and cultural resources of the NTS. Past roles such as early and continuous participation in cultural resource inventories and environmental impact assessments are positive and should continue to be supported. New proactive roles can involve Indian specialists to help manage specific resource issues, such as the impacts of the drought on plant and animals. The physical environment continues to decline, especially springs and water storage sources like rock tanks (pohs), so there is a need for these to be restored (by cleaning and prayer) by Indian people to a traditional condition. Re-vegetation should be accomplished in a traditional manner. In some cases such as sacred sites, spiritual restoration is needed. This is achievable by having religious specialists lead ceremonies at these locations.

CHAPTER 6
CONCLUSIONS

6.0 CONCLUSIONS

This draft SA was prepared to determine whether there are substantial changes to the actions proposed in the *NTS EIS*, or significant new circumstances or information relevant to environmental concerns that bear on the

In addition to the analysis in this draft SA, NNSA is preparing a classified analysis of the potential impacts of an intentional destructive act at NTS. The intentional destructive act analysis will be completed and considered by NNSA in making its SA determination.

The screening and detailed analyses will be the basis for deciding whether changes from actions foreseen in 1996, or new and modified proposals and projects, are significantly different than those presented in the *NTS EIS*. NNSA will consider these analyses along with other factors in determining whether the *NTS EIS* should be supplemented, a new EIS should be prepared, or no further NEPA documentation is required.

CHAPTER 7
REFERENCES

7. REFERENCES

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CHAPTER 8
GLOSSARY

8. GLOSSARY

asbestiform low-level radioactive waste – Any low-level radioactive waste containing friable asbestos material; Category I nonfriable asbestos-containing material that has become friable; Category I nonfriable asbestos-containing material that will be or has been subjected to sanding, grinding, cutting, or abrading; or Category II nonfriable asbestos-containing material that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder.

biological simulant – A biological substance, or microorganism that shares at least one physical or biological characteristic of a biological agent, that has been shown to be non-pathogenic, and can be used for biological defense testing to replace the agent under study.

contact-handled waste – Radioactive waste or waste packages whose external dose rate is low enough to permit contact handling by humans during normal waste management activities (waste with a surface dose rate not greater than 200 millirem per hour). (See **remote-handled waste**.)

criticality (nuclear) – The condition in which a system is capable of sustaining a nuclear chain reaction.

depleted uranium (DU) – Uranium whose content of the fissile isotope uranium-235 is less than the 0.7 percent (by weight) found in natural uranium, so that it contains more uranium-238 than natural uranium. (See **enriched uranium**.)

downblending – A process in which an appropriate substance is added to a fissile material (generally) such as plutonium or enriched uranium to reduce the concentration of the fissile material in the resulting mixture. The quantity of the fissile material in the resulting mixture remains the same while the total quantity of the mixture increases.

downdraft table – A work area having a surface perforated with holes. A vacuum applied to the surface removes air containing particulates, gases, or vapors from the work area. Air thus removed is then normally treated by filtration or other processes before discharge.

dynamic experiment – An experiment to provide information regarding changes in materials under conditions caused by the detonation of high explosives. Dynamic experiments are used to gain information on the physical properties and dynamic behavior of materials used in nuclear weapons, including changes due to aging.

enriched uranium – Uranium whose content of the fissile isotope uranium-235 is greater than the 0.7 percent (by weight) found in natural uranium. (See **depleted uranium**.)

environmental testing – Subjecting a test unit to specified environments such as vibration, shock, or static acceleration in a controlled environment.

fissile materials – An isotope that readily fissions after absorbing a neutron of any energy, either fast or slow. Fissile materials are uranium-235, uranium-233, plutonium-239, and plutonium-241. Uranium-235 is the only naturally occurring fissile isotope. Although sometimes used as a synonym for fissionable material, this term has acquired a more restricted meaning, namely, any material fissionable by thermal (slow) neutrons. The three primary fissile materials are uranium-233, uranium-235, and plutonium-239.

glovebox – A large enclosure that separates workers from equipment used to process hazardous material, while allowing the workers to be in physical contact with the equipment; normally constructed of stainless steel, with large acrylic/lead glass windows. Workers have access to equipment through the use of heavy-duty, lead-impregnated rubber gloves, the cuffs of which are sealed in portholes in the glovebox windows.

hydrodynamic test – A dynamic, integrated systems test of a mock-up nuclear package during which the high explosives are detonated and the resulting motions and reactions of materials and components are observed and measured. The explosively generated high pressures and temperatures cause some of the materials to behave hydraulically (like a fluid). Hydrodynamic tests are used to obtain diagnostic information on the behavior of a nuclear weapon's primary assembly (using simulant materials for the fissile materials in an actual weapon) and to evaluate the effects of aging on the nuclear weapons remaining in the stockpile.

latent cancer fatality (LCF) – A death from cancer occurring some time after, and postulated to be due to, exposure to ionizing radiation or other carcinogens.

maximally exposed individual (MEI) – A hypothetical individual whose location and habits result in the highest total radiological or chemical exposure (and thus dose) from a particular source for all exposure routes (inhalation, ingestion, external exposure).

nuclear material – A composite term applied to: (1) special nuclear material; (2) source material such as uranium or thorium or ores containing uranium or thorium; and (3) byproduct material, which is any radioactive material that is made radioactive by exposure to the radiation incident to the process of producing or using special nuclear material.

nuclear testing – An underground nuclear weapons test of either a single underground nuclear explosion or two or more underground nuclear explosions conducted at NTS within an area delineated by a circle having a diameter of two kilometers and conducted within a total period of 0.1 second. The yield of a test shall be the aggregate yield of all explosions in the test.

nuclear weapons simulator – A device that simulates some aspect of a nuclear weapon, but can not produce an explosion resulting from the energy released by reactions involving atomic nuclei, either fission, fusion, or both.

open-pool fire testing – Tests used to simulate transportation accidents, which usually involve pooling of spilled fuel which subsequently ignites.

pit (nuclear) – The central core of a primary assembly in a nuclear weapon typically composed of plutonium-239 and/or highly-enriched uranium and other materials.

pit (waste management) – An excavation similar to a trench within which waste is emplaced for disposal.

pulse power – The technology of using electrical energy stores for producing multi-terawatt (10^{12} Watts or higher) pulses of electrical power for inertial confinement fusion, nuclear weapon effects simulation, and directed energy weapons.

radiant-heat testing – A test in which an object is heated using devices such as infrared lamps that are external to the test object. The test provides for controlled heat flux and temperature conditions.

radioisotope thermoelectric generator (RTG) – An electrical generator that derives its electric power from heat produced by the decay of radioactive strontium-90, plutonium-238, or other suitable isotopes. The heat generated is directly converted into electricity, in a passive process, by an array of thermocouples.

real-time radiography – A nondestructive test method whereby an image is produced electronically, rather than on film, so that very little lag time occurs between the item being exposed to radiation and the resulting image.

remote-handled waste – In general, refers to radioactive waste that must be handled at a distance to protect workers from unnecessary exposure (waste with a dose rate of 200 millirem per hour or more at the surface of the waste package). (See **contact-handled waste**.)

subcritical experiment – A dynamic experiment that involves the use of special nuclear material and does not achieve a condition of criticality – that is, there is no self-sustaining nuclear reaction.

transloading – Transfer of material at an intermodal transfer facility from one packaging to another for purposes of continuing the movement of the material in commerce.

APPENDIX A
AMERICAN INDIAN CONTRIBUTIONS TO THE 2008 SUPPLEMENT ANALYSIS FOR THE FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE NEVADA TEST SITE AND OFF-SITE LOCATIONS IN THE STATE OF NEVADA

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2008 Native American Responses to the Supplement Analysis

This report is a summary of American Indian responses to issues raised by the 2008 Supplement Analysis (SA) that is being prepared by the National Nuclear Security Administration, Nevada Site Office NNSA/NSO. The SA process is mandated by the U.S. Department of Energy (DOE). It involves looking at the previous large-scale Environmental Impact Assessment conducted 10 years ago and the 2002 *Supplement Analysis for the Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (*2002 NTS SA*) conducted 5 years ago to consider whether the issues Indian people assessed are still being addressed by the 1996 *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (*NTS EIS*) and *2002 NTS SA* and whether new issues have arisen that require a supplement assessment.

This effort was funded by the NNSA/NSO to revisit the *NTS EIS* and the *2002 NTS SA* (American Indian Writers Subgroup 1996, American Indian Writers Subgroup 2002). During these analyses, a committee of American Indian people was convened by the NNSA/NSO to follow these processes closely and to represent the seventeen tribes and Indian organizations that are in consultation with the NNSA/NSO regarding the Nevada Test Site (NTS) and related locations. The consulting Indian tribes and organizations are known as the Consolidated Group of Tribes and Organizations (CGTO), within which there are numerous subgroups who act in different roles such as the American Indian Writers Subgroup (AIWS). The recognized role of the AIWS and other CGTO subcommittees is to follow closely specific issues and report to the CGTO. The CGTO members then report back to their respective tribal governments or Indian organization governing boards. It is important to note that official responses to issues only come from tribal governments and governing boards.

The role of the AIWS is to review all manuscripts that involve Indian people on the NTS and to review fieldwork proposals. The AIWS is composed of a coordinator, three officially appointed members, and three alternates who were selected by the subgroup members. The members of this subcommittee are:

Southern Paiute	***Western Shoshone***	***Owens Valley Paiute***	***Coordinator***
Betty Cornelius	Maurice Frank-Churchill	Gerald Kane	Richard Arnold
Lalovi Miller*	Jerry Charles*	Lee Chavez*	

* Denotes alternate.

During the 1996 and 2002 assessments, the AIWS was responsible for drafting the Native American response and came together once again for this analysis to bring forth Native American comments.

2008 AIWS Responses

The AIWS believes that the Native American responses for the current SA should be presented together with some responses also repeated in relevant sections of the SA. Their responses, however, are directed at different sections of this SA and vary in terms of structure and purpose. The current American Indian text builds upon already established ideas presented in Appendix G (American Indian Writers Subgroup 1996) and the *2002 NTS SA* (American Indian Writers Subgroup 2002). This writing procedure reflects the ongoing interest of the CGTO in the activities and potential environmental impacts of NNSA/NSO, and emphasizes the continuity of issues established in the previous documents and again in this SA.

The following text is provided as an appendix of this SA. This integrated essay represents the responses of the consulting tribes who have participated for almost 21 years in the NNSA/NSO American Indian Program and who refer to themselves in this consultation as the CGTO. Some portions of the following text are repeated in other sections of this report. The full analysis and text are held together in this section so that the consulting tribes and organizations who will review this document will have a holistic view of the American Indian responses. This report reflects the assessments of the AIWS, but it was technically finalized by the BARA team at the University of Arizona.

LAND USE (DaMiDovia "Our Land", Ia-vooTuvipum "Our Land")

The CGTO maintains that members of the consulting tribes have Creation based rights to protect, use, and have access to lands (Divia,[1] Tuvip,[2]) of the NTS and immediate area. These rights were established at Creation and persist forever. During the past decade representatives of the consulting tribes have visited portions of the NTS and have identified places, Puha Paths, and cultural landscapes of traditional and contemporary cultural significance. The managers of the NTS have responded to CGTO requests that portions of these identified areas be set aside for traditional and contemporary ceremonial use. Because this is a public document the exact locations of these areas will not be revealed, however they do include a burial cave, a Native American Graves Protection and Repatriation Act (NAGPRA) reburial area, and a local Puha Path and ceremonial landscape near a large water tank (Stoffle, Evans, and Harshbarger1989, Stoffle et al. 2001a, Stoffle et al. 2001b, Stoffle, Zedeño, and Halmo 2001, Stoffle et al. 2006). These actions by the agency are in keeping with the persistent recommendations of the CGTO that portions of their holy lands be placed under co-stewardship arrangements.

In order to fulfill the holy land use expectations, the members of the consulting tribes of the CGTO recommend continuing to identify special places, Puha Paths, and landscapes and setting aside these places for unique co-

[1] *Western Shoshone*
[2] *Southern Paiute*

stewardship and ceremonial access. For example, currently studies have begun and portions are completed regarding the identification of places, Puha Paths and cultural landscapes in the Timber Mountain Caldera (Stoffle et al. 1994a, Stoffle et al. 1994b, Stoffle et al. 2001a, Stoffle et al. 2001b, Stoffle, Zedeño, and Halmo 2001, Stoffle et al. 2006). These studies are planned to continue and when completed will add a Native American cultural sensitivity component which will contribute to the currently recognized importance of this National Natural Landmark and Area of Critical Environmental concern.

INFRASTUCTURE

Roads: Currently, portions of the paved roads to Pahute, Rainer and Buckboard Mesas are substandard and require maintenance to alleviate potential safety hazards and reasonable access to important cultural sites.

Access to Sacred Sites and Traditional Cultural Properties

Since the NTS/EIS was issued, the CGTO identified certain areas that have been considered Sacred Sites on the NTS. These areas include national register eligible Traditional Cultural Properties. As such, maintaining American Indian access to these areas is a critical component in fulfilling government-to government relations.

In consideration of Executive Order 13007 (Access to Sacred Sites) The CGTO believes that maintenance of the roads to Pahute, Rainer and Buckboard Mesas are necessary to conduct traditional ceremonies and maintain the cultural integrity of those sites. Portions of these roads have been eroded and been covered with boulders over the past decade and are at the point of becoming impassable, even with four wheel drive vehicles.

As promulgated in Executive Order 13007 (Access to Sacred Sites) federal agencies are required to provide reasonable access and not restrict culturally affiliated Indian Tribes from visiting, evaluating, and managing those sacred sites in a traditional manner up to and including the right to conduct traditional ceremonies in accordance with the American Indian Religious Freedom Act.

SOCIOECONOMICS

As discussed in Section 5.1.1.3 of the 1996 NTS EIS, the CGTO remains concerned about American Indian socioeconomic impacts due to fluctuations in DOE employment opportunities for tribal members from the CGTO region of influence. Employment opportunities that allow tribal members to continue to live on their reservations are needed. Tribal economic development projects also may be impacted by transporting hazardous waste to the NTS.

GEOLOGY AND SOILS

The CGTO views the geology and soils as being in poorer condition than 10 years ago when the NTS EIS was written. Drought conditions are having a significant impact on the soils, and activities that involve weapons firings from small arms to bombs, or driving off-road have had negative impacts on the soils. Tunnel activities including contaminants tested or stored in the tunnels have negative impacts on the surrounding geology including geology and soils in the runoff path from the tunnel. Negative impacts to these resources are long-lasting. Sedan Crater, for example, continues to be a dead site; the spirits of the site and resources on it were destroyed in 1962 and the loss can still be felt by members of the CGTO. Activities that alter geologic structure also alter hydrologic systems. Such actions result in changes to important geologic and soil features that directly connect the tribes to their homelands in specific spiritual ways. These changes require spiritual and cultural intervention necessary for maintaining and/or restoring balance.

AIR QUALITY AND CLIMATE

The CGTO maintains that during the last decade the NTS and surrounding region has experienced a meteorological drought. Current meteorological analysis suggests that this is a 10-year duration type drought and even could be the beginning of a longer drought episode. The region has not experienced a drought with these characteristics since a decade spanning the beginning of the 20th century. Therefore, this meteorological episode can be termed a 100-year drought. The early 20th century drought becomes an analog against which to discuss the environmental implications of the current episode (see Figure A–4).

The 100-Year Drought (Uh-na-hp dumime sogobe basa-type "A long time our Mother Earth has been dry",[3] Minga- na-vas-so-quip "very dry land"[4])

Nevada is "much below normal" to date in 2007. As of June 2007, the Palmer Z Index, which measures short-term drought on a monthly scale, indicated that central Nevada, including the NTS, was in a "severe drought" condition. Data from the National Climatic Data Center shows that Nevada was ranked the driest state in the U.S. for the period of August 2006 to June 2007. This period reflects the drought trend in Nevada that has characterized the past decade (Figures A–1, A–2) (http://www.ncdc.noaa.gov/oa/climate/research/2007/jun/st026dv00pcp200706.html). On a broad scale, the two previous decades (1980s and 1990s) were unusually wet with short periods of extensive droughts. The 1930s and 1950s showed the opposite trend with prolonged periods of extensive droughts and few wet periods (http://www.ncdc.noaa.gov/oa/climate/research/2007/jun/us-drought.html).

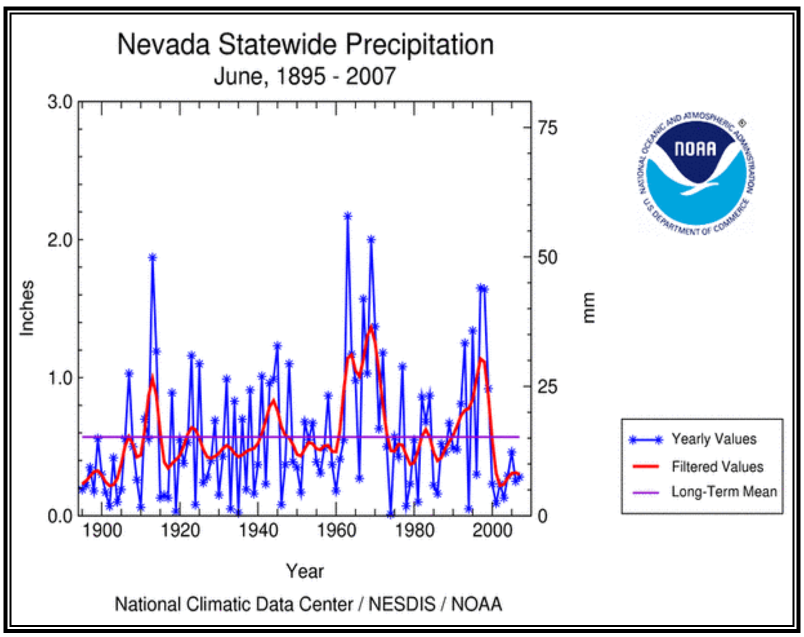

Figure A–1 One hundred and twelve years of Nevada precipitation averages

[3] Western Shoshone
[4] Southern Paiute

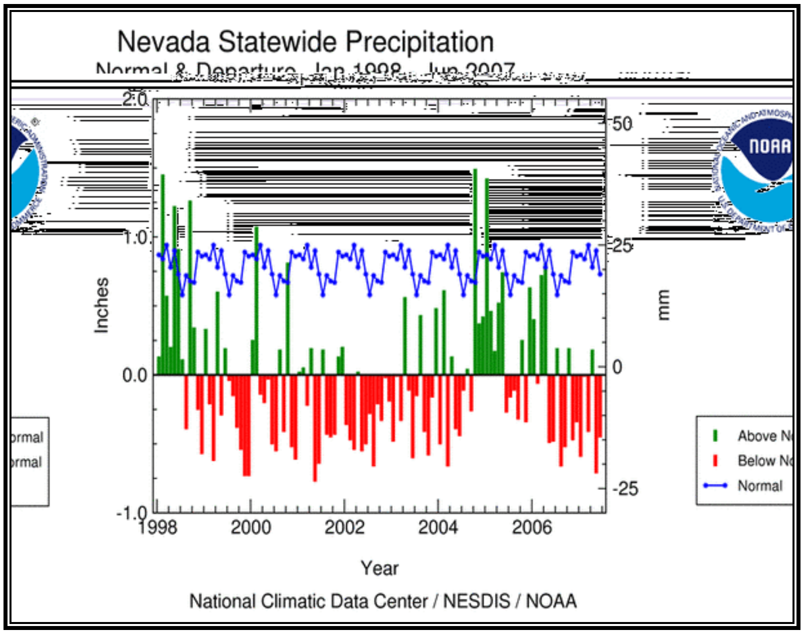

Figure A–2 Nevada precipitation was below normal for the past decade

Hughes and Graumlich (1996) reconstructed 7979 years of annual precipitation from bristlecone pine in the White Mountains of eastern California to document the occurrence of eight multi-decadal droughts, with the two most recent centered on 924 AD and 1299 AD (Figure A–3).

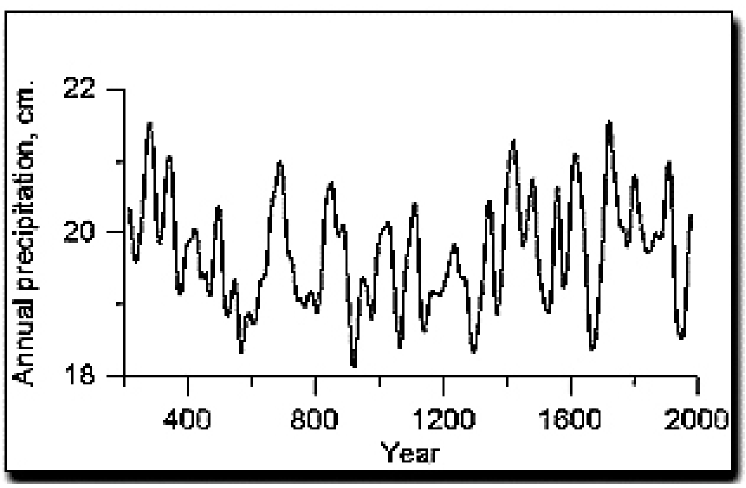

Figure A–3 Two thousand years of precipitation records show several extended drought periods for the California-Nevada region (Hughes and Graumlich 1996)

Areas specific to the NTS and southern Nevada are in a 100-year drought cycle; Figure A–4 shows that major drought conditions have occurred in multiyear waves since 1895. The current drought that is affecting the NTS and its neighboring lands has persisted since 1996 (Goodrich 2007). Researchers think that the rise in greenhouse gases in the atmosphere may lead to a return of multi-decadal megadrought conditions that existed prior to 1600 AD. The most severe megadrought occurred between 900 AD and 1300 AD (Cook et al. 2004, Goodrich 2007).

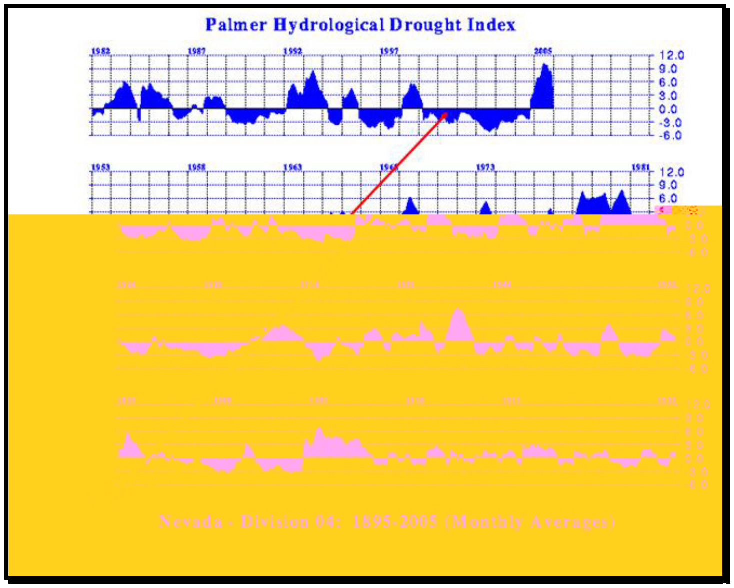

Figure A–4 Palmer Hydrological Drought Index for Southern Nevada (1895-2005) (NOAA 2007)

The CGTO recommends that action be taken to lessen the impacts of this drought cycle through meaningful research and management applications because there is the potential for irreversible environmental degradation and biodiversity loss. This type of action is a concept found in social impact assessment and environmental studies known as the precautionary principle. This principle implies that there must be a willingness to take action in the advance of scientific proof or evidence of the need for proposed action. If there is a delay in action, it will be devastating to both society and nature (Cooney and Dickson 2005). The precautionary principle stresses that there must be ethical responsibilities towards maintaining the integrity of natural systems, and the fallibility of human understanding. The CGTO requests that traditional environmental management practices occur in order to help restore and maintain the ecology of the NTS.

HYDROLOGY

One inevitable implication of the current 100-year drought is that the surface water on the NTS and immediate areas has diminished and become more sporadic. Surface water is here defined as water available for shallow rooted plants during rainfall, water available during post-rain ponding, runoff, and absorption; and water recharged into near-surface aquifers. The modification and availability of surface water has the ability to affect all plants, animals, and associated trophic levels on the NTS.

Calling the Rain (Pahwwanipagee "calling the rain",[5] Oo-wap-pi "calling the rain"[6])

One type of interaction was in the form of calling the rain. Rain calling is a basic aspect of American Indian life and culture. Traditionally there were rain callers (rain shamans, rain doctors), rain ceremonies, and helpers from the spiritual world which would help facilitate rain production and most traditional communities had a rain maker. When the special rain shaman called upon the rain, he sang songs and was aided by his spirit helper, which was usually in the form of a mountain sheep, to call upon the rain. The mountains had important roles in this activity. They interacted with the clouds and the sky to call down the rain.

[5] *Western Shoshone*
[6] *Southern Paiute*

Winter Ceremonies-Snow Making Ceremonies: Western Shoshone

The Winter Ceremony was performed in the fall to ensure that a good winter with heavy snow fall will happen. The spiritual leader (weather doctor) would call the people together and meet at a special place in the mountains, sometimes near a Pine Nut gathering area. Prayers and songs were done by the spiritual leader. Usually this ceremony lasted a day.

If too much rain is falling certain precautions would be taken, for example, the children were not allowed to shake willows that would be used for weaving or to kill frogs as this would bring more rain. Hummingbirds were not killed for many reasons, but if they were killed, there would be flooding and lighting storms, with lightning killing the person who killed the hummingbird.

Stinkbug (Bee-voos,[7] Wu-who-koo-wechuts[8])

Even today, individual traditional native people can bring rain. This is done by turning a stinkbug on his back. The rain will come provided the stinkbug allows a person tickle his belly with a small stick. As the person prays for rain, he tells the stinkbug why he is asking for rain.

Snow Fleas[9]

Snow Fleas represent a special category of Native American environmental knowledge because they are almost invisible and live at the highest elevations on mountains. According to Indian beliefs during the late fall when it is cold there is a snow ceremony. A part of this ceremony involves calling on the snow fleas. The snow fleas are the ones that make the snow wet and absorb into the mountain. Without the snow fleas, the snow is dry and evaporates quickly. Without ceremonies and the water making fleas, there is less water for the mountains and the valleys below. The snow ceremony is conducted in relationship with ceremony of the seeds where young girls dance with seeds in winnowing trays and a spiritual person sings songs to bring whirlwinds which envelope the dancers and scatter the seeds as a gesture of fertilizing the earth. Thus, water is brought to the fertile and dispersed seeds.

BIOLOGICAL RESOURCES (Dá Me Na-Nu-Wu-Tsi "Our Relations All of Mother Earth"[10])

It is nearly impossible to observe and monitor the changes on cultural resources on the NTS study lands. Some changes occur quickly and certain changes happen slowly. For an example, an earthquake could cause serve damage instantly and the onslaught of impending drought and famine can become a great heavy burden on mankind and his environment.

The current 100-year drought has increasingly stressed all of the plants and animals on the NTS. Because this is a unique, albeit, perhaps a cyclical event, its environmental impacts are unprecedented in the history of the operation and management of the lands of the NTS. It is expected that the 100-year drought has modified the abundance and distribution of all animals and plants. The quality, quantity, and distribution of indigenous plants necessary to sustain a healthy environment to maintain a productive animal habitat is clearly affected. Because Native Americans view the NTS lands as holy lands there is deep concern for it. Certain springs have dried up making animals travel into other districts, food foraging becomes difficult and land dries up.

The remaining stressed animals and plants have lower fecundity and nutritional value in the food chain. The CGTO recognizes the nation-wide need to identify and protect threatened and endangered plants and animals.

[7] *Western Shoshone*
[8] *Southern Paiute*
[9] *Western Shoshone*
[10] *Western Shoshone*

The members of the consulting tribes who have lived on these lands since Creation value all plants and animals, yet some of these occupy a more culturally central position in their lives. The main characteristic of a healthy landscape is healthy plants, animals, and visual beauty. The role of land managers is to help care for the land and its ecosystems. Therefore, the CGTO applauds the efforts being designed to minimize the severe impacts of the ongoing drought. Conservation and preservation should become high priority.

In order to convey the Native American meaning of these plants, a series of studies were conducted and the findings were negotiated into a set of criteria for assessing the cultural importance of each plant and of places where plant communities exist. The CGTO provided these cultural guidelines so that NEPA analysis and other agency decisions could be assessed from a Native American perspective.

Because of these stresses, the animals and plants of the NTS require management interventions unforeseen during the 1996 *NTS EIS*. American Indian people have faced such drought episodes in the past and have the capacity to suggest and carry out adaptive responses. Adaptive responses to extreme climatic fluctuations involve both physical and spiritual interventions designed to restore balance and well-being to the area. All tribes involved in the CGTO recognize a range of these interventions, which have been successful in the past. The following are a series of cases that demonstrate how Native American people have interacted with the land and natural elements to help all aspects of life.

What is Out There?

The CGTO has identified as central in their cultural concern a list of 364 plants and 170 animals which were traditionally used and are currently culturally central. Concerns exist that this larger list has been reduced to an official list of 107 plants and 26 animals (see American Indian Writers Subgroup 1996: Table G-1, G-2, pp G-14-G17, G-18). The underlying reason for this reduction is that the full list of Indian concern plants and animals are not officially recognized as being on the NTS. The CGTO, however, argues that the full list should be used to assess impacts because both plants and animals appear and disappear on the NTS at various seasons and during various climatic episodes. Thus the working list of potentially impacted plants and animals needs to be expanded to the full list of Indian plants and animals. These species have been identified as indicators of the health of NTS ecosystems.

Native Americans have always been concerned that the native species of vegetation on the NTS may be in danger of being lost. To native people, plants provided most of the food resources as well as the raw materials for medicines, tools, shelter, and even ceremonial objects. Take the tobacco, considered highly sacred, the tobacco plant was carefully cultivated to ensure its posterity. Religious leaders and traditionalists would guard the location for their own use. The plant used properly would bloom and blossom for the user, because it was being utilized appropriately. Other sacred plants were the sage, sweet-grass and cedar. These are considered as gifts from the earth and are to be applied in traditional ceremonies and not for so-called “recreational” purposes. There is much evidence that regaining and reclaiming Indian plant knowledge could benefit humans in many ways. The CGTO would like the land managers of the NTS to implement measures with the goal of restoring lands with native species.

Ecosystem health includes the people with whom the natural environment developed, specifically, the member tribes of the CGTO. By involving the CGTO in the design, implementation, and analysis of the biological surveys, NNSA/NSO can obtain more comprehensive reports of ecosystem health and potential impacts, as well as further facilitate government-to-government consultation with the CGTO.

Environmental Restoration

Previously, the CGTO provided information that supports most environmental restoration activities that have occurred on the NTS and Tonopah Test Range (TTR) to include cultural and spiritual initiatives to restore the environmental balance. In addition, the CGTO requested involvement in various aspects of environmental restoration.

In the *NTS EIS* and in the *2002 NTS SA*, the CGTO continued to express concerns about the removal of contaminated soils and the need for religious leaders to conduct balancing ceremonies and healing prayers at these sites. Also, it was recommended that tribal representatives provide information about the re-vegetation on a portion of the Double Tracks Site located on the Tonopah Test Range. In response to this request, the NNSA/NSO arranged for tribal representatives to become involved in one environmental restoration project that requested cultural input regarding the re-vegetation of some native plants at a location of the Double Tracks within the past 10 years.

According to the 1996 Record of Decision (ROD), the DOE indicated that it will continue its Environmental Restoration Program activities of characterization and selected remediation of contaminated areas or facilities. In order to enhance and expand these efforts to conduct comprehensive environmental restoration activities, the CGTO believes that the DOE American Indian Program should be modified to include cultural and spiritual initiatives that will restore balance to the spiritual, cultural, and ecological environment. Indian people believe that many of the activities conducted on the NTS would benefit from CGTO involvement.

During the past 10 years, various initiatives have been undertaken to restore animal habitats and restock certain animals including the restocking of desert big horn sheep near the southern portion of the NTS without participation from the CGTO. Modification of habitat or the restocking animals is considered a highly sensitive religious act and requires participation from the CGTO. In order for these activities to be successful and restore environmental balance, it is essential to have tribal representatives involved throughout the consultation process.

An example of a successful environmental restoration project involving Native Americans occurred in Idaho in the late 1970s. A Federal agency carried out a reintroduction project involving the gray wolf. On the day of release, a Federal liaison unlatched the door of the cage and the animal scrambled out. Waiting for the wolf was a fully dressed out traditional American Indian man. The wolf and man gazed at each other and the traditionalist spoke words welcoming the wolf back to its natural habitat. The wolf stood for a few more seconds and accepted the holy man’s encouragement and blessing. Then the wolf turned and ran into the forest. Everyone present was very moved by the welcoming back ceremony. They knew that was the right thing to do. The Federal agency had a mission and goal to involve American Indians in their wolf restoration project.

The CGTO knows that inclusion of such cultural experts in environmental restoration projects should be addressed in such a manner as not to defray from spiritual harmony. Spiritual people will perform ceremonies when asked but if certain protocols are not set in place, then, important ceremonies will not occur. Therefore, the CGTO recommends instilling stewardship responsibilities into the hands of those who manage the NTS lands by offering other Federal agencies’ examples.

The CGTO views environmental restoration as an effort to rebalance the world. Everything is connected. Individual restoration projects are insufficient alone but are starting points and should be considered as stages or steps in a comprehensive spiritual/cultural/ecological restoration program. The CGTO’s view is ideally suited to the spirit of holistic ecosystem management touted by Federal agencies.

In the annotated outline used in preparation of the this SA, it has been noted that the NNSA/NSO has shifted its responsibility of the Central Nevada Test Area, including the CGTO recommendations relating to the protection of a culturally significant site in Hot Creek Valley, to the Office of Legacy Management. Due to the sensitivity and concerns for the continued protection of this area, the CGTO was not advised of the transfer nor of any plan to ensure protection and monitoring by tribal representatives.

Environmental Restoration Defined

The CGTO views environmental restoration as an effort to rebalance the world. Everything is connected. Individual restoration projects are insufficient alone but are starting points and should be considered as stages or steps in a comprehensive spiritual/cultural/ecological restoration program. The CGTO's view is ideally suited to the spirit of holistic ecosystem management touted by Federal agencies.

The Final *NTS EIS* (1996) addresses Environmental Restoration as an assessment protocol for contaminant impacts. From an American Indian perspective, environmental restoration assessments should address any and all impacts to a site, not just physical contaminants. An environmental restoration assessment should address spiritual and cultural contaminants and impacts no matter the source of the contaminant.

The CGTO recommends a spiritual/cultural/ecological restoration approach to assessments and restoration projects. Such an approach should apply from the first thoughts of a restoration project. The tribes should be contacted by NNSA/NSO to discuss ideas for potential projects, to participate in pre-planning, planning, and implementation of projects, and to address ongoing activities that result in the need for an ecological restoration assessment. An example of the need for tribal involvement is the supplementing of water to desert bighorn sheep in the Specter Range who also use the NTS. The desert bighorn sheep is one of the most culturally significant animals for the members of the CGTO. It is associated with rain and power, and any interaction with it requires specific cultural activities, none of which were observed during this project, which in fact, only recently was brought to the attention of the CGTO.

Spiritual/cultural/ecological restoration assessments require ethnographic studies involving the CGTO and targeting sites such as, but not limited to, Water Bottle Canyon, Timber Mountain, Shoshone Mountain, and other sites identified by the CGTO. Spiritual/cultural/ecological restoration assessments and projects require traditional management practices, and the involvement of tribal elders, spiritual leaders, traditional ecological knowledge experts, and other cultural experts. These specialists are needed to conduct initial assessments and site inventories, and to make recommendations for the next steps of the restoration project. This strategy will result in the identification of resources, features, and other site aspects both tangible and intangible, that are in need of healing and restoration, as well as the culturally appropriate steps to take to achieve restoration and balance.

Members of the CGTO have experience in collaborative spiritual/cultural/ecological restoration. Examples include the Duckwater Shoshone Tribe and the Reese River Valley "Yomba Shoshone." Big Warm Spring is an example from Duckwater. The spring was used in time past and is still used for spiritual cleansing and healing. Young men are taken there during the "coming of age" to wash and cleanse themselves. There is a prayer done after the cleansing and a "give away" to men who accompanied the young man and the spiritual leader. In 2005, with the collaboration of the U.S. Fish and Wildlife Service, the Duckwater Shoshone Tribe restored the Big Warm Spring to its original size with boulders. The non-native tilapia and catfish were removed from the Big Warm Spring at the conclusion of the final phase of the Big Warm Spring project. The Railroad Valley Spring fish will be re-introduced in the Big Warm Spring. Similar warm springs, such as Little Warm Spring, are used for the same purpose with offerings left at times in the spring. In the Duckwater's story of the Zoh-ah-vich, she lived in the trees and mountains, and on her way to the mountains she fell in the quicksand and drowned. But along the edge of Little Warm Springs, the remains of her "wosa" or burden basket are still there.

The Reese River Valley Yomba Shoshones were involved in the restoration of Waterfall Canyon. The place is called by the Yomba Shoshone as "Bah-zoy-zoy" meaning "water coming out and dripping," as compared to "Bah-do-y" meaning "water or spring coming out of the ground." This water has flowed since the beginning of time and is in the area of the traditional pine picking area of Elmer and Emma Bobb. Prayers were done before the pine nut gathering and water from the Bah-zoy-zoy used in the prayers. More recently Johnnie Bobb has put a sweat lodge near Bah-zoy-zoy and holds sweats and vision quests. Also, on a ridge close by stands "Zoh-ah-vich," Rock Woman, who ate young Shoshone children who did not listen to their parents. The "waterfall" is still used for spiritual cleansing, healing, and seeking of "Puha," and the waterfall is cleansed by the spiritual leader.

There are many potential spiritual/cultural/ecological restoration projects on the NTS, all with the goal of balancing the spiritual, cultural, and ecological workings of the project places. Examples include the cleaning of pohs and tanks, the reintroduction of desert bighorn sheep, restoration of pine nut harvesting areas, and restoration of Water Bottle Canyon. Proposals have been drafted for such activities, and are summarized here.

Environmental Restoration Projects

Based on CTGO experience with environmental restoration projects, the AIWS suggests a more collaborative environmental restoration program. Several potential projects for which proposals have been or are being developed include wildlife, plant resources, and geologic features.

Restoration of Water Bottle Canyon

Water Bottle Canyon is an exceptional cultural site. Cultural resources include pohs, tanks, rock rings, tonal rocks, and traditional use plants (Stoffle, Van Vlack, and Arnold 2005). Side canyons to Water Bottle Canyon may act as support sites to Water Bottle. Any activities in or impacts to a side canyon or to Water Bottle Canyon affect the rest of the canyon system, which is connected through physical and spiritual flows. Presently, the spiritual aspects of Water Bottle Canyon are out of balance and require cultural interactions to bring the canyon back into balance. The cleaning of the pohs and tanks in this canyon system is one of several cultural practices needed to begin spiritual/cultural/ecological restoration. This project can reduce drought conditions, and provide spiritual, cultural, and ecological benefits to the CGTO, NNSA/NSO, and the environment consequently fulfilling the primary goal of spiritual/cultural/ecological rebalancing. Implementation of this project will require the appropriate cultural experts to identify project sites, to inventory and evaluate the conditions, resources, and features of the sites, and to design the restoration plan. This project would involve annual activities and monitoring of site conditions.

Cleaning Pohs and Tanks

The pohs and tanks found throughout the NTS require cultural practices in order to function effectively. The pohs and tanks at Water Bottle Canyon and Ammonia Tanks, for example, are related to one another and tie each location to each other. Both sites are used to bring water from the rain that is needed and used for ceremonial use. Indian people have Rain Callers who have the ability to talk to the all of the elements responsible for bringing water or rain to the land, people and animals. When the water arrives, it is approached with great respect and awakened very carefully then prayed upon. In appreciation and in honor of the water's return the animals come back, the plants will grow and people will continue to pray all ultimately leading to balance and restoration of the area. Customarily, Indian people cleaned the pohs and tanks through the use of songs, stories and prayers. The women cleaned the pohs and tanks and were followed by the Rain Callers who called the rains. This project also can reduce drought conditions, and provide spiritual, cultural, and ecological benefits to the CGTO, NNSA/NSO, and the environment consequently fulfilling the primary goal of spiritual/cultural/ecological rebalancing. Implementation of this project will require the appropriate cultural experts to identify project sites, to inventory and evaluate the conditions, resources, and features of the sites, and to design the restoration plan. This project would involve annual activities and monitoring of site conditions.

Restoration of Pine Nut Harvesting Areas

Pine nut harvesting areas present a unique opportunity to address significant cultural and ecological problems. In times past, the pine nut trees were cared for by pruning and whipping to encourage production and reduce dead wood. The areas under and around the trees were kept clean, and other traditional use plants in the area were cared for as well. Ceremonies and cleaning activities occurred in the spring and fall each year. The removal of Indian people from these areas has resulted in limitations to passing on traditional cultural and ecological knowledge, and in unhealthy ecosystems. The contemporary concerns with wildfires and invasive species such as cheat grass in the Great Basin are issues that can be addressed proactively through the reintroduction of traditional pine nut harvesting practices. This project can provide spiritual, cultural, and ecological benefits to the CGTO, NNSA/NSO, and the environment consequently fulfilling the primary goal of spiritual/cultural/ecological rebalancing. Implementation of this project will require the appropriate cultural experts to identify project sites, to inventory and evaluate the conditions, resources, and features of the sites, and to design the restoration plan. This project would involve annual activities and monitoring of site conditions so that potential benefits can be measured.

Reintroduction of Desert Bighorn Sheep

The reintroduction of desert bighorn sheep is a critical issue for the CGTO. The desert bighorn sheep is a sensitive animal with connections to rain and power. As such, it has the ability to bring rain and reduce drought impacts. The desert bighorn sheep must be provided all the resources and considerations needed to encourage it to remain in the reintroduction site. Resources include spiritual and cultural aspects that must be addressed by tribal specialists and cultural experts, and consideration of other species in the area that may be affected negatively by the sheep, or may compete with the sheep and impede successful rebalancing. This project can provide spiritual, cultural, and ecological benefits to the CGTO, NNSA/NSO, and the environment consequently fulfilling the primary goal of spiritual/cultural/ecological rebalancing. Implementation of this project will require the appropriate cultural experts to identify project sites, to inventory and evaluate the conditions, resources, and features of the sites, and to design the restoration plan including off-site resources necessary to support project sites such as landings or birthing places. This project would involve annual activities and monitoring of site conditions.

NOISE (Ba-na-ngu "noise", Bic-cka "loud noise")[11]

The CGTO knows that noise is offensive while traditional ceremonies were being held. In the last 15 years, data collected proved that while the traditional ceremony was occurring, the noise generated from military activities and other noise bearing projects interrupted the spiritual importance of the ceremony (Greider 1993). Because the thoughts and focus are interrupted, the balance, harmony, and well-being of the community as a whole become affected. The CGTO recommends setting aside quiet zones or periods near the NTS where and when Indian people are conducting ceremonies.

VISUAL RESOURCES

All land forms within the NTS have high sensitivity levels for American Indians. The ability to see the land without the distraction of buildings, towers, cables, roads, and other objects is essential for the spiritual interaction between Indian people and their traditional lands. Landscape modifications should be done in consultation with American Indians.

Views from places are an important cultural resource in itself that contributes to the location and performance of American Indian ceremonialism. Views combine with other cultural resources to produce special places

[11] *Western Shoshone*

where power is sought for medicine and other types of ceremony. Views can be of any landscape, but more central viewscapes are experienced from high places, which are often the tops of mountains and the edges of mesas. Indian viewscapes tend to be panoramic and are made special when they contain highly diverse topography. The viewscape panorama is further enhanced by the presence of volcanic cones and lava flows. Viewscapes are tied with songscapes and storyscapes especially when the vantage point has a panorama composed of multiple locations from either song or story. Key in the Indian experience of viewscapes is isolation. Successful performances of ceremony are often commemorated by the building of rock cairns and by rock peckings and paintings.

The CGTO tribes recognize the cultural significance of viewscapes and have identified a number of these on the NTS. The Timber Mountain Caldera contains a number of significant points with different panoramas including Scrugham Peak-Buckboard Mesa and Shoshone Mountain. The CGTO feels this revisiting of such sites should continue as a renewal to recharge the spirits, to say prayers, to sing songs, and to monitor the condition of the cultural site. Special considerations should be given to tribal elders and the youth to accommodate and provide educational leeway to experience the positive effect of their culture.

CULTURAL RESOURCES

The CGTO affirms a commitment to assisting the archaeology program by providing CGTO appointed tribal monitors. These monitors are provided approved guidance and training by the CGTO as well as extensive project orientation by the professional archaeologists. Monitors are trained so they know certain appropriate cultural responses to materials identified during archaeological survey, but they recognize that certain kinds of cultural resources require spiritual specialists who are then called in to evaluate and respond to newly identified cultural resources. In cases where NAGPRA relevant resources are identified then the CGTO is contacted and will set into motion NAGPRA inadvertent discovery protocols (Stoffle et al. 1994b, Stoffle, Zedeño, and Carroll 2000). At the end of the monitoring experience, each monitor provides his or her own personal notes and experiences for a summary report that is prepared and submitted to the CGTO.

The CGTO knows the distribution and density of sites has not changed since the 1996 *NTS EIS*. They know the largest number of recorded cultural resources is in the northwest part of the NTS, on and around Jackass Flats, Yucca Mountain and Shoshone Mountain. The reason for this is because numerous activities were conducted on those portions of the NTS within the last 10 years, less attention has been directed to these regions and adverse impacts has been minimized. While this lapse is occurring, NTS decision-makers may consider new projects and new investigations be conducted. The CGTO recommends that prior to land disturbances of projects a timely American Indian Assessment be completed.

NATIVE AMERICAN RESOURCES

The CGTO knows, based upon its collective knowledge of Indian culture and past American Indian studies, that American Indian people view cultural resources as being integrated. Thus certain systematic studies of a variety of American Indian cultural resources must be conducted before the cultural significance of a place, area, or region can be fully assessed. Although some of these studies have been conducted, in other areas studies have not begun. A number of studies are currently planned.

Indian people can fully assess the cultural significance of a place and its associated natural and cultural resources when all studies have been completed and our governments and tribal organizations have reviewed the recorded thoughts of our elders and have officially supported these conclusions. American Indian studies focus on one topic at a time so that tribes and organizations can send experts in the subject being assessed. The following is a list of studies for a complete American Indian assessment:

1) Ethnoarchaeology – the interpretation of the physical artifacts produced by our Indian ancestors.

2) Ethnobotany – the identification and interpretation of the plants used by Indian people

3) Ethnozoology – the identification and interpretation of the animals used by Indian people

4) Rock Art – the identification and interpretation of traditional Indian paintings and rock peckings.

5) Traditional Cultural Properties – the identification and interpretation of places of central cultural importance to a people, called Traditional Cultural Properties; often Indian people refer to these as "power places."

Native American Indian properties and interpretations shall be determined by Native American spiritual person when:

A) Cleansing (removing negatives)

B) Purifications/preparations (repatriations and related issues).

6) Ethnogeography – the identification and interpretation of soils, rocks, water, and air

7) Cultural Landscapes – the identification and interpretation of special units that are culturally and geographically unique areas for American Indian people.

When all of these subjects have been studied, then it will be possible for American Indian people to assess three critical issues: (1) What is the natural condition of this portion of our traditional lands? (2) What has changed due to DOE activities? And (3) What impacts will proposed alternatives have on either furthering existing changes in the natural environment or restoring our traditional lands to their natural condition? Indian people believe that the natural state of their traditional lands was what existed before 1492, when Indian people were fully responsible for the continued use and management of these lands.

The NTS and nearby lands were central to the Western Shoshone, Owens Valley Paiute, and Southern Paiute people. The lands were central in the lives of these people and so were mutually shared for religious ceremony, resource use, and social events (Stoffle et al. 1990a and b). When Europeans encroached on these lands, the numbers of Indian people, their relations with one another, and the condition of their traditional lands began to change. European diseases killed many Indian people; European animals replaced Indian animals and disrupted fields of natural plants; Europeans were guided to and then assumed control over Indian minerals; and Europeans took Indian agricultural areas.

Despite the pollution and destruction of some cultural resources and the physical separation from the NTS and neighboring lands, Indian people continue to value and recognize the central role of these lands in their continued survival. Recognizing this continuity in traditional ties between the NTS and Indian people, the DOE in 1985 began long-term research involving the inventory and evaluation of American Indian cultural resources in the area. This research was designed to comply with the American Indian Religious Freedom Act (AIRFA), which specifically reaffirms the First Amendment of the U.S. Constitution rights of American Indian people to have access to lands and resources essential in the conduct of their traditional religion. These rights are exercised not only in tribal lands, but also beyond the boundaries of a reservation (Stoffle et al. 1994a, Stoffle et al.1994b).

To reinforce their cultural affiliation rights to prevent the loss of ancestral ties to the NTS, 17 tribes and organizations have aligned themselves to form the CGTO. This group is formed by officially appointed representatives who are responsible for representing their respective tribal concerns and perspectives. The

CGTO has established a long standing relationship with the DOE. The primary focus of the group has been the protection of cultural resources.

The DOE and the CGTO have participated in cultural resource management, including the Yucca Mountain Project (Stoffle 1987; Stoffle, Evans, and Halmo 1988; Stoffle, Olmsted, and Evans 1988; Stoffle, Evans, and Harsbarger 1989; Stoffle et al. 1989; Stoffle, Halmo, and Olmsted 1990; Stoffle et al. 1990a; Stoffle et al. 1990b; Stoffle and Evans 1988; Stoffle and Evans 1990; Stoffle and Evans 1992), the Underground Weapons Testing Project (Stoffle et al. 1994), the Rock Art Study (Zedeño et al. 1999), the Water Bottle Canyon Interpretation and Traditional Cultural Property Study (Arnold et al. 1998, Stoffle, Van Vlack, and Arnold 2005) and the Timber Mountain Caldera Study (Stoffle et al. 2006). These studies are used in this report, along with the collective knowledge of the CGTO, as the basis of the comments in the 1996 NTS EIS, 2002 NTS SA, and the current SA. The cultural resource management projects sponsored by the DOE have been extremely useful for expanding the inventory of American Indian cultural resources beyond the identification of archaeological remains and historic properties.

It is clear that site properties have been changed (rearranged and removed). In 2004, during the TCP determination study of Water Bottle Canyon, the CGTO and the escort discovered and verified that the small rock ring was dismantled and there were cultural and spiritual artifacts removed. The CGTO recommends that the DOE create a full time monitoring position similar to the BLM and Forest Service's rangers and monitors. The purpose of this position would be to inventory site properties by using an acceptable recording system. The monitor would report any changes to the CGTO. The details would be worked out at a later date.

The NTS lands are held in high regard for all affiliated tribes of the CGTO. The relationship is strong and to help keep it positive and alive the CGTO always seeks to improve the resources available to it. One important issue that the CGTO would like the land managers to consider is to improve the status of consenting to hire a permanent Native American Indian monitor position. This position should be budgeted and taken into consideration. The CGTO believe right now the situations on the NTS lands are good but there is room for improvement. With this request, the CGTO feels that the relationship between the affiliated tribes, the NTS lands and the land managers will only help strengthen the resource and ties for everyone.

HUMAN HEALTH

Risks from radiation began with atomic testing. Today the CGTO perceives that the radioactive risk continues in known and unknown ways in underground testing. There are still ongoing risks to Indian people from storage waste disposal and these will continue. Finally, radioactive transportation is continuing and increasing. It is not clear to the CGTO tribes that after two American Indian studies of radioactive waste transportation whether there have been meaningful considerations of their concerns. The CGTO believes that although the two Indian studies of radioactive waste transportation were reflective of the 1996 NTS EIS, the perceived lack of consideration of the findings from these studies represents a movement away from the intentions of the NTS EIS and consultation protocols.

WASTE MANAGEMENT

After 5 years the CGTO continues to have reservations in regards to the storage of low-level and other hazardous wastes at the NTS and the transportation of low-level waste to the NTS for storage. The CGTO still maintains that what was suggested 5 years ago still exists and affects cultural resources. Because of improper disposal, it diminishes the visitation by members of the CGTO representatives and other Indian people. The CGTO still believes that the waste should be disposed of in a culturally appropriate manner and that the transportation of low-level radioactive waste poses risks to the people and the environment. Previous reports on this issue document the extent and depth of our concerns for these issues (American Indian Transportation Committee 1998; Arnold et al.1997; Austin 1998; Stoffle and Arnold 2003).

Activity on the NTS is still ongoing in regards to non-Nevada low-level radioactive waste. The NTS presently uses the Disposal Crater Complex, which is expected to close by 2010. Although the NTS has future low-level radioactive waste disposal pits on standby, there is a possibility that additional craters would need to be developed. Disposal of the following materials is performed at the NTS: Nevada-generated low-level radioactive waste, mixed low-level radioactive waste, greater confinement disposal waste, asbestiform low-level radioactive waste, Nevada-generated mixed waste and transuranic waste, mixed transuranic waste. These materials are stored on-site until shipped elsewhere. The CGTO remains on record as opposed to this type of practice as it will soon limit cultural activities involving the Indian tribes.

TRANSPORTATION

The CGTO maintains their concern for potential spiritual and physical impacts due to the transportation of low and high-level radioactive waste and hazardous waste. The CGTO maintains that perceived risk analysis is essential for measuring and indicating Native American concerns for these issues. Calculated risk does not represent such concerns. The CGTO insists that further impacts to Native American concerns not be aggregated with other peoples' concerns in the region.

American Indian Transportation Studies

The transportation of low-level radioactive waste was a major issue originally addressed in Appendix G of the 1996 *NTS EIS*. The AIWS addressed serious flaws in the then draft transportation study by noting that neither the CGTO nor the tribes were consulted formally. The tribes were only informed of the matter through a series of public meetings, which the AIWS viewed as a violation of Federal legislation requiring government-to-government consultation. The AIWS also detected limited and faulty assessments of new railroads and other activities on cultural and Native American resources. The study documents revealed missing or misnamed Indian tribes and reservations therefore, the AIWS recommended a systematic comprehensive study of American Indian transportation issues to complete the general study that incorporated concerns of "stakeholders."

Native Americans Respond to the Transportation of Low-Level Radioactive Waste to the Nevada Test Site (Austin 1998)

On July 25, 1996, the NNSA/NSO sent a letter announcing a comprehensive Native American low-level radioactive waste study and requested tribal participation. The five members of the AIWS who recommended the study participated in a planning team and formed the core of the American Indian Transportation Committee (AITC). The planning team began by meeting with NNSA/NSO officials to determine which proposed transportation routes were under consideration. A study proposal was developed and three criteria were determined that needed to be met by each tribe invited to participate in the study. The criteria were aboriginal and/or historic cultural affiliation to the lands along any of the three proposed routes, location near any of the three proposed routes in the vicinity of Nevada, and frequent use of the proposed routes by tribal members.

In addition to the regular CGTO members, the AITC planning team identified six additional Western Shoshone tribes, bands, communities, and organizations, as well as Mohave, Hopi, Navajo, and Goshute peoples all of whom met the criteria for participation in the study. A total of 29 tribes, subgroups, bands, communities, and organizations were potentially affected by the transportation of low-level radioactive waste.

This study addressed perceived risks by American Indians that derive from the transportation of low-level radioactive waste. It focused on three truck haul routes as these pass through in a four-state area that generally reflects the administrative responsibility of the NNSA/NSO. The study involved a series of unique methods including both quantitative and qualitative data collection. The study documented that radiation is perceived as an Angry Rock by many Indian people. It exists and acts according to epistemological guidelines that do not reflect those perceived as existing in Western science. This is an extremely important finding because American Indian responses to radioactivity reflect its spiritual as well as its physical dimensions (Austin 1998).

U.S. DOE Nevada Operations Office, Intermodal Transportation of Low-level Radioactive Waste to the Nevada Test Site, Summary of Meeting with Native Americans, November 18 to 20, 1998, Tonopah, NV (American Indian Transportation Committee 1998)

While the initial Native American low-level radioactive waste study was being completed, the DOE decided to conduct an Environmental Assessment of the Intermodal Transportation of Low-level Radioactive Waste (IM EA). Intermodal refers to the use of both railroad and trucks to haul low-level radioactive waste from its producers to the NTS. The intermodal study introduced the concept of an entrepot (a trans-shipment facility) where low-level radioactive waste would be taken from railroads, perhaps stored for a period of time, and then reshipped via truck to the NTS. The DOE asked the members of the AITC to take the findings from the Austin report and any pertinent previous studies and apply them directly to the IM EA. This task was accomplished at a meeting held in Tonopah, Nevada and resulted in a report entitled U.S. DOE Nevada Operations Office, Intermodal Transportation of Low-level Radioactive Waste to the NTS, Summary of Meeting with Native Americans, November 18 to 20, 1998, Tonopah NV (American Indian Transportation Committee 1998).

American Indian Transportation Committee Field Assessment of Cultural Sites Regarding the U.S. Department of Energy Pre-approval Draft Environmental Assessment of Intermodal Transportation of Low-Level Radioactive Waste to the Nevada Test Site (American Indian Transportation Committee 1999)

The AITC concluded that the Austin study (1) was not designed to assess specific locations along its study-area highways, (2) the IM EA was considering some highway routes that had not been considered in the Austin study, and (3) the IM EA raised the issue of potential low-level radioactive waste impacts along railroad routes. The AITC thus recommended to the DOE/NV (now NNSA/NSO) that they support the AITC to conduct on-site studies along the new highway routes. This request was resulted in a formal research proposal submitted to the DOE on December 22, 1998. The proposal was funded on January 4, 1999. The AITC went into the field on January 11, 1999 and worked continuously until January 21, 1999. The direct field observations of the AITC during this period of study were the foundation for their summary of findings.

The study was guided by a series of agreed to methods for collecting data. Given the great distances and the time needed to assess each place visited along the proposed routes, it was agreed by the AITC that two kinds of site evaluations would be conducted. The first is a complete site evaluation and the second was called a mini-site evaluation. Each had his/her own forms and each AITC member filled out one or the other form at each site that was identified along the proposed routes. At the end of three days of site visits, the AITC spent one day writing the results of their evaluations. These site descriptions and evaluations were fully discussed by the AITC; therefore, the text provided in this summary of findings has been agreed to by the entire AITC.

A total of 25 sites were evaluated by the AITC. The sites were dispersed across an extensive area within the previously established region of influence, from Moapa and Caliente, Nevada in the east, to Barstow, California in the west. This vast stretch of land contained a large variety of culturally significant Indian places. Cultural resources and cultural landscape features were identified and evaluated. These included mountains, valleys, springs, trails, a variety of plants and animals, archaeological remains, rock art panels, rivers, and urban communities considered important to Numic and Yuman speaking peoples.

Comments and concerns made for the places visited and the associated resources, as well as Indian socioeconomics and environmental justice were edited and integrated into the existing pre-approval draft IM

EA text sections. Also recommendations pertaining to further Native American input and assessments as part of the EA process were made to the DOE (Arnold et al. 1999).

Confronting the Angry Rock: American Indians' Situated Risks from Radioactivity (Stoffle and Arnold 2003)

This article synthesized the key findings from the previous transportation studies by discussing Numic-speaking peoples' epistemological views towards radioactive materials and how it could impact places and resources on traditional lands. The article framed the discussion in terms of perceived risks from the transportation of radioactive waste. As mentioned earlier, Numic-speaking people view radioactive material as an angry rock and they have possessed this knowledge and have used this rock for thousands of years. The angry rock is a powerful spiritual being that is a threat that cannot be controlled nor contained through conventional means. It has the power to pollute places, food, and medicines thus they cannot be used afterwards by Indian people. The angry rock also has the ability to cause serious spiritual impacts. The transportation of the angry rock along the highways poses threats to areas like Animal Creation places (the Red Tail Hawk Origin Site), access to spiritual beings (Potato Woman), human souls that have not been sung to the afterlife (Hiko Massacre Site), and ceremonial areas (Black Canyon, Pahranagat Valley).

The findings presented in this article demonstrate that American Indian risk perceptions are real and need to be understood as calculated risks. Also the shared cognitions of risk among people who share a common culture raise questions of alternative epistemologies which are not normally addressed in risk assessments. The article concluded with thoughts on the "logical step" towards addressing risk. There is a need to afford special protection for Indian people and their connected environment and allow the reestablishment of this relationship (Stoffle and Arnold 2003). The AIWS addresses this issue directly in the Biological Resources and Environmental Justice sections of this essay.

ENVIRONMENTAL JUSTICE

DOE has recognized the need to address environmental justice concerns of the CGTO based on disproportionately high and adverse impacts to their member tribes from DOE NTS activities. In 1996, the CGTO expressed concerns relating to environmental justice that included 1) damage to Holy Lands, 2) negative health impacts, and 3) lack of access to traditional places that contributes to breakdowns in cultural transmission. In the 2002 NTS SA, NNSA/NSO concluded that with the selection of the Preferred Alternative, the CGTO would be impacted at a disproportionately high and adverse level consequently creating an environmental justice issue. Since 2002, NNSA/NSO has supported a few ethnographic studies involving the CGTO and culturally important places including in 2004, when NNSA/NSO arranged for tribal representatives to conduct evening ceremonies at Water Bottle Canyon. While the opportunity for the evening ceremony was a significant accommodation, disproportionately high and adverse impacts from DOE NTS activities continue to affect American Indians. The three environmental justice issues noted by the CGTO need to be addressed.

The CGTO is the voice for acclaiming the responsibility of maintaining stewardship with the land for all Native American Indian Tribes. The bonding is a privilege to be faceted above all else and must be carried and held by enabling principles. The CGTO believes this rite was given to them at Creation and must be followed. Otherwise, the networking of the other spirit world will be severed.

The CGTO knows there are places on the NTS landscape that needs traditional ceremonies and blessings to offset the tensions of severe land disturbances done to it. An example is Shoshone Mountain. Shoshone Mountain is large and long. Roads are limited to its crest making it inaccessible for religious and traditional people to go there to conduct ceremonies. The CGTO recommends that special privileges be allowed for pilgrimages to take place and to provide funding for transporting traditional leaders to inaccessible places such as Shoshone Mountain by helicopter to perform ceremonies.

Environmental Impacts

In the ROD, resources analyzed by DOE for environmental impacts were land resources, air quality, noise, water resources, soils, biological resources, cultural resources, socioeconomics, and human health (61 FR 65553, December 13, 1996). These resources occupy traditional use lands of the CGTO tribes and while American Indians are considered in the *NTS EIS* (1996) and the *2002 NTS SA*, they are not considered in terms of environmental impacts. This oversight reflects a fragmented approach to maintaining government-to-government consultation with the CGTO.

The ROD specifies the impacts that were considered under five program categories: defense, waste management, environmental restoration, non-defense research and development, and work-for-others. The CGTO views each of these programs as areas for pertinent government-to-government consultation. Environmental restoration is a particular concern of the CGTO which members believe they should address actively and in collaboration with NTS resource managers and decision-makers. The ROD states that approximately 7,500 acres would be disturbed during environmental restoration activities. The CGTO takes the position that this figure is greatly underestimated because it represents less than one percent of the NTS land base of 864,000 acres, and because of the cultural interconnectedness. Environmental impacts are not limited to specific sites or to physical contaminants.

Related to the ROD statements on environmental restoration is the statement on human health risks. In evaluating environmental impacts, the CGTO recognizes that the extent of human health risks extends beyond occupational injuries. The lack of access to traditional use lands, sites, and resources suffered by CGTO tribes has resulted in physical and spiritual health problems among tribal members. Lack of access has impeded the continuation of cultural traditions necessary to maintain cultural identities, tribal relations with the land, and the passing on of traditional ecological knowledge.

The ROD references DOE's commitment to develop a Resource Management Plan. The CGTO continues to desire to be included in all aspects of that plan and any subsequent updates in order to address these environmental impact and health risk oversights. This approach further supports the Environmental Protection Agency's recommendation that DOE continue to seek active Native American participation in future projects and proposals at NTS and off-site locations in Nevada. The ROD further reiterates DOE's commitment to continue to incorporate the Department's American Indian Policy in ongoing and long-term planning and management (61 FR 65555).

FEDERAL AND STATE LAWS AND REGULATION

Native American Graves Protection and Repatriation Act (NAGPRA)

In 1990, Congress passed NAGPRA, which calls for the return of human remains and four categories of material remains to culturally affiliated American Indian tribes, Alaskan natives and Hawaiian native organizations. NAGPRA requires Federal agencies, museums, and other federally funded repositories to inventory their collections and formally consult with American Indian tribal governments that established cultural affiliation to items in the collections. Consultation has to occur for the purposes of identifying sacred objects, human remains, associated and unassociated funerary objects, and objects of cultural patrimony according to legal definitions set forth in the legislation. Identified items belonging to one or more of the five categories must be repatriated to the culturally affiliated tribe by the institution upon request. Tribal governments have the right to determine the final disposition of the items through reburial, curation, or return to tribal possession.

American Indian Religious Freedom Act (AIRFA)

AIRFA was signed into law on August 11, 1978 (Public Law 95-341; 92 Stat. 469) and it specifically reaffirms the First Amendment of the United States Constitution rights of American Indian people to have access to lands and natural resources essential in conducting their traditional religious activities. They have these rights even though the lands and natural resources are located beyond the boundaries of a tribal reservation. AIRFA also requires Federal agencies to "evaluate their policies and procedures in consultation with native traditional religious leaders in order to determine appropriate changes necessary to protect and preserve Native American religious cultural rights and practices," (Public Law 95-341; 92 Stat. 469).

Amendments to AIRFA were passed by the United States Congress in 1994 (U.S.C. 103D - Report 103-675). These amendments explicitly include provisions for protecting, in addition to sacred sites and objects, substances (plants and animals) that are needed for the practice of Native American religious rites and ceremonies. Executive Orders 13007 and 13175 directly address sacred sites protection policies, and they require consultation.

National Historic Preservation Act (NHPA) and Advisory Council on Historic Preservation (ACHP)

NHPA was passed in 1966 and has since been modified by numerous amendments. Under Section 106, the act has established a review process, commonly called "the Section 106 process," to ensure that historic properties are effectively considered in planning by Federal agencies. In order to clarify the role of traditional cultural values in project planning, the ACHP developed guidelines which were issued in draft form in 1985.

Since the ACHP issued a draft of its "Guidelines for Consideration of Traditional Cultural Values in Historic Preservation Review," these guidelines have been reviewed and termed state-of-art by a number of scientists, agency personnel, and American Indian religious and political leaders (Harjo 1985). The ACHP guidelines provide a basis for discussing which cultural resources are directly related to the Section 106 assessment process.

A major issue addressed in these guidelines is the definition of the term "cultural value." According to the guidelines (Advisory Council on Historic Preservation 1985):

> *Cultural value means the contribution made by a historic property to an ongoing society or cultural system. A traditional cultural value is a cultural value that has historic depth; a non-traditional cultural value is a cultural value that lacks such depth…(The guidelines focus) on those properties, normally though not necessarily non-architectural, whose primary value springs from the role they play in maintaining the cultural integrity of a particular social group, usually a relatively small segment of the total national society, usually though not necessarily localized, often though not necessarily of ethnic minority heritage.*

The purpose of Section 106 is to ensure that values ascribed to historic properties by the public, or most affected segments of the public, are taken into consideration when evaluating project plans that may affect such properties. Potential adverse project effects on such properties are minimized by identifying them during project planning and seeking negotiated mitigation solutions from among the concerned parties (Advisory Council on Historic Preservation 1985).

On October 30, 1992, the NHPA was again amended, providing greater authority and assistance to American Indian people. The 1992 amendments specifically mention the need for Federal agencies to contact and consult with Indian tribes. Properties of traditional religious and cultural importance to an Indian tribe may be determined as eligible for inclusion on the National Register, and a Federal agency must consult with any *tribe that attaches religious or cultural significance to such properties. Coordination among tribes, State Historic Preservation Offices (SHPO), and Federal agencies is to be encouraged in historic preservation planning, and in the identification, evaluation, protection, and interpretation of historic properties. Tribes are also eligible to receive direct grants for the purpose of carrying out the Act. The amendments also provide for tribes to assume part or all of the functions of a SHPO with respect to tribal lands.*

In response to the 1992 NHPA amendments, a new policy statement, "Consultation with Native Americans Concerning Properties of Traditional Religious and Cultural Importance," was adopted by the ACHP on June 11, 1993, and became finalized on January 11, 2001. The policy provides explicit principles for application of the amendments, including particularly that Native American groups who ascribe cultural values to a property or area be identified by culturally appropriate methods" and that participants in the Section 106 process should learn how to approach Native Americans in "culturally informed ways" (Advisory Council on Historic Preservation 2005). Consultation with Native Americans must be conducted with sensitivity to cultural values, socioeconomic factors, and administrative issues such as a seasonal availability of Native American participants. According to this policy, Native American groups not identified during the initial phases of the Section 106 process may legitimately request to be included later in the process. The ACHP policy statement also reaffirms the U.S. government's commitment to maintaining confidentiality regarding cultural resources and states that participants in the Section 106 process "should seek only the information necessary for planning" (Advisory Council on Historic Preservation 2005).

Executive Orders 13007 and 13175

In 1996 and 2000, President Bill Clinton exercised his executive authority and signed two executive orders that require Federal agencies to be in consultation with Native American tribes for the protection of the tribes' cultural and religious practices. The first Executive order was Executive Order 13007, and it was signed May 24, 1996. The order was designed for the purposes of protecting and preserving Indian religious practices. It says that Federal agencies must "accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, and 2) avoid adversely affecting the physical integrity of such sacred sites. Where appropriate, agencies shall maintain the confidentiality of sacred sites (EO 13007)."

Executive Order 13175

In 2000, the government-to-government relationship between tribes and the Federal Government was made stronger by the signing of Executive Order 13175.[12] It reaffirms the U.S. Government's responsibility for continued collaboration and meaningful consultation with Tribal Governments in the development of Federal policies that have tribal implications. This executive order also seeks to reduce the imposition of unfunded mandates upon Indian tribes (EO 13175).

DOE REGULATIONS AND ORDERS

American Indian Government-to-Government Consultation

The 17 American Indian tribes who make up the CGTO have been in consultation with the DOE since a cultural affiliation study was approved in 1986 (Stoffle 1987) and the resulting consultation program was in compliance with the American Indian Religious Freedom Act (AIRFA). Initial CGTO-DOE consultations through ethnographic studies began in 1987, focused on lands potentially impacted by the Yucca Mountain Project (YMP) (Stoffle, Zedeño, and Halmo 2001). These consultations were expanded as the American

[12] This executive order supersedes Executive Order 13084 signed May 14, 1998.

Indian program focused on the NTS (Pippin 1991), while a separate YMP consultation continued. Both consultations have continued until the present time.

In 1986 CGTO began to make recommendations as part of their ethnographic studies (Stoffle, Olmsted, and Evans 1988, Stoffle, Evans, and Harsbarger 1989, Stoffle et al. 1989) during interviews and at the annual consultation meetings. After a decade of consultation a set of guidelines and protocols were agreed to, formally approved by the consulting tribal governments, and published in the 1996 NTS EIS (American Indian Writers Subgroup 1996: C-1). These same guidelines were reaffirmed in the 2002 NTS SA (American Indian Writers Subgroup 2002).

Over the past decade DOE compliance activities have closely followed these recommended guidelines, but in a few instances alternative procedures have been used in the environmental assessment of new proposals. Most of these variations from protocols have occurred in the Work-for-Others Program. The CGTO works in collaboration with DOE in offering advice and recommending assessments to fully understand traditional lands of the NTS. Activities can adversely impact cultural resources and without a formal study, the exact impacts of military training exercises will not be fully understood. The CGTO recommends that adequate funds and time be provided so that a guidance document can be developed based on the guidelines established in 1996 (and reaffirmed in this analysis). This document will be the standard in guiding NNSA/NSO's Work-for-Others Program and the CGTO in decisionmaking in regards to adverse impacts to NTS lands.

In the past, DOE has initiated an open-door policy in regards to cultural resource issues on the NTS of which they are the land managers. This formation allowed for Native Americans to apply and incorporate their concerns in specially prepared studies and reports. Specific Federal laws opened this door for inclusion of Native American Indian governments to take part in the decisionmaking setting and to provide recommendations on common interests. This has been a responsibility that DOE has made an effort to comply with. With trying times and under a difficult period, the DOE has managed to continue the response for consultation in an established process. However, recent global events have reduced the annual meeting significantly. The CGTO values the continued purpose of resolving issues and defending common interests in cultural preservation. The outcome affirms the formation and function of the open-door-policy set by the DOE and Native American Indian tribal governments. Therefore, the DOE obligation to consultation and compliance with Native American Indian tribal governments should take precedent on a continued basis.

Today, in this SA, the CGTO again reaffirms those guidelines and protocols for Native American consultation. The following are key aspects of the consultation guidelines chosen for emphasis in this document.

Time

is a key factor in determining level of effort. The cultural importance of the area potentially impacted by a project is another key factor. Level of effort refers to the size of the Native American ethnographic study. There are three types or scales of Native American Ethnographic studies. The first type of study is a small scale study and only involves members of the AIWS which is one person per three ethnic groups, one Indian organization (the Las Vegas Indian Center-LVIC), and the subgroup chairperson. The second type of study is a mid-scale assessment and it involves four representatives from the three ethnic groups and one Indian organization. The third level of study is a full-scale assessment, which involves two members from each of the 17 affiliated tribes and organizations (Figure A–5).

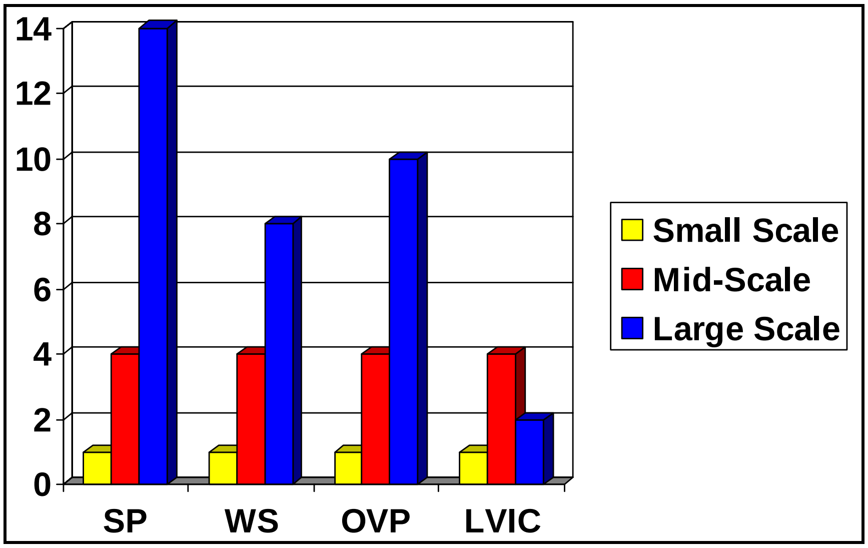

Figure A–5 Native American Studies by number of representatives per Ethnic Group and Organization

When the CGTO is involved in the planning stages of a project they can assess potential proposal impacts to American Indian cultural resource and thus recommend the appropriate scale of study needed when consulted at the American Indian Program annual meeting. When a project proposal occurs between annual meetings, then the AIWS of the CGTO should be consulted for a recommendation regarding scale. When a project involves a new area or potential impact, the AIWS should be incorporated into a scoping trip to potentially impacted areas and the results of the scoping trip should be submitted in writing by the AIWS to the CGTO.

Variables

American Indian people lived in these lands for thousands of years during which time they became attached to and used many natural elements – some physical and some spiritual. Because of this long attachment to the lands of the NTS and southern Nevada, the consulting tribes and organizations of the CGTO express concern for a wide range of natural resources. The following are the human and natural variables that the CGTO specified as needed for analysis early in the consultation and officially recommended in Appendix G of the 1996 NTS EIS (American Indian Writers Subgroup 1996).

1) Ethnoarchaeology

2) Ethnobotany

3) Ethnozoology

4) Rock Art

5) Traditional Cultural Properties

6) Ethnogeography

7) Cultural Landscapes

8) Background psychological trauma

Each variable may not be appropriate for the American Indian impact assessment of every project proposal. When a new project is discussed at the American Indian Program Annual meeting, the whole CGTO can participate in suggesting variables for analysis. Between Annual meetings proposals can be reviewed by the AIWS of the CGTO.

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