CHAPTER 6
CUMULATIVE IMPACTS

6.0 CUMULATIVE IMPACTS

Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) regulations (42 *United States Code* [U.S.C.] 4321 et seq.) define a cumulative impact as the "impact on the environment which results from the incremental impact of the action when added to past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time" (40 *Code of Federal Regulations* [CFR] 1508.7). Thus, the cumulative impacts of an action are the total effects on a resource, ecosystem, or human community of that action and all other activities affecting that resource no matter what entity is acting. This cumulative impacts analysis is based on continued operations at National Nuclear Security Administration (NNSA) sites in Nevada, including the Nevada National Security Site (NNSS) (formerly the Nevada Test Site), Remote Sensing Laboratory (RSL), North Las Vegas Facility (NLVF), Tonopah Test Range (TTR), and U.S. Department of Energy (DOE) environmental restoration sites on the U.S. Air Force (USAF) Nevada Test and Training Range, as well as reasonably foreseeable future actions at these sites and reasonably foreseeable actions that are ongoing or planned within each site's region of influence (ROI).

6.1 Methodology and Analytical Baseline

The analysis in this chapter was conducted in accordance with CEQ NEPA regulations, as outlined in the CEQ handbook, *Considering Cumulative Effects Under the National Environmental Policy Act* (CEQ 1997), *and Guidance on the Consideration of Past Actions on Cumulative Effects Analysis* (Connaughton 2005).

Cumulative impacts assessment is based on both geographic (spatial) and time (temporal) considerations. Historical impacts at NNSA facilities in Nevada are captured in the environmental baseline conditions described in Chapter 4 of this *Site-Wide Environmental Impact Statement for the Continued Operation of the Department of Energy/National Nuclear Security Administration Nevada National Security Site and Off-Site Locations in the State of Nevada (NNSS SWEIS)*. Geographic boundaries for impact assessment vary by resource depending on the time an effect remains in the environment, the extent to which the effect can migrate, and the magnitude of the potential impact. The ROI that NNSA used for identifying potential projects for the cumulative impacts analysis includes the area within 50 miles of the boundaries of the NNSS and the TTR and within 10 miles of the boundaries of RSL and NLVF. All of these ROIs intersect, forming a single cumulative impacts ROI, as shown in **Figure 6–1**. The cumulative impacts ROI encompasses about 15,737,760 acres and includes most of Nye County and parts of Clark, Lincoln, and Esmeralda Counties in Nevada, as well as a portion of Inyo County in California. The cumulative impacts ROI was selected because, for most resource areas, there is little likelihood of any impact from activities at NNSA facilities having a cumulative effect beyond the ROIs. For some resource areas, such as transportation and air quality, cumulative impacts may occur in an area far outside of the cumulative impacts ROI just described. Where cumulative impacts may occur over a wider area, an appropriately expanded area is analyzed. For instance, the cumulative impacts analysis for transportation of radiological materials considers a nationwide ROI.

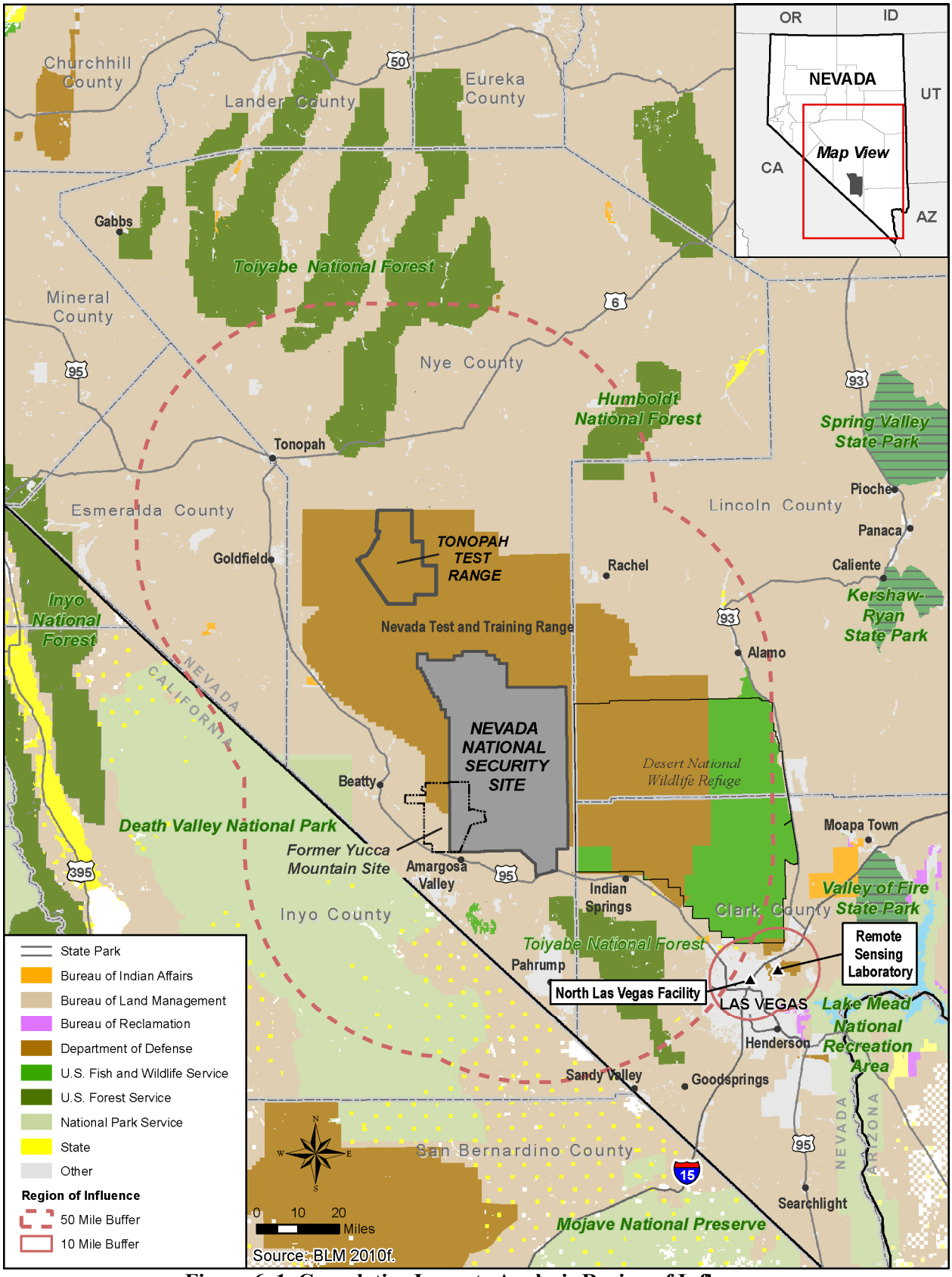

Figure 6–1 Cumulative Impacts Analysis Region of Influence

The cumulative impacts analysis for this *NNSS SWEIS* includes (1) an examination of cumulative impacts presented in the *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada (1996 NTS EIS)* (DOE/EIS-0243); (2) impacts from activities since the *1996 NTS EIS* was issued; and (3) a review of the environmental impacts of past, present, and reasonably foreseeable actions of other Federal and non-Federal agencies and individuals in the ROI. For DOE/NNSA contributions to cumulative impacts, the analysis primarily uses the Expanded Operations Alternative as it tends to result in the highest estimates of potential cumulative impacts associated with alternatives analyzed in this *NNSS SWEIS*. In order to provide a comparison of the cumulative impacts associated with each of the three alternatives considered in this *NNSS SWEIS*, i.e., No Action, Expanded Operations, and Reduced Operations, **Table 6–15**, in Section 6.4, provides a summary of the cumulative impacts by alternative.

Plans for a number of reasonably foreseeable actions identified for this analysis have not reached a sufficient level of development for specific potential impact information to be readily available (e.g., solar power generation projects that have not met the minimum requirements of the U.S. Department of the Interior Bureau of Land Management [BLM] to begin the NEPA process). In those cases, to quantify potential cumulative impacts, a reasonable effort was made to estimate potential impacts by using known information from similar projects.

6.2 Potentially Cumulative Actions

Most of the land within the cumulative impacts ROI for this *NNSS SWEIS* is managed by Federal agencies. In addition to NNSA, other Federal agencies that manage lands within the ROI include BLM, DOE, the USAF, the U.S. Fish and Wildlife Service (USFWS), the National Forest Service, and the National Park Service. In addition, there are lands and facilities under the jurisdiction of agencies of the State of Nevada and the State of California; Nye, Clark, Esmeralda, and Lincoln Counties in Nevada; Inyo County in California; various municipal governments; and private landowners. NNSA identified reasonably foreseeable future actions of others by conducting a review of publicly available documents prepared by Federal, state, tribal, and local government agencies and organizations. In addition, NNSA requested information regarding potential future actions that may not yet have been addressed in publicly available documents. The information obtained through that process formed the basis for this cumulative impacts analysis and is discussed below.

6.2.1 U.S. Department of Energy

This section addresses proposed DOE actions that are not under the auspices of NNSA or are not environmental restoration activities. The proposed Greater-Than-Class C Low-Level Waste Disposal Facility and the formerly proposed Yucca Mountain repository projects are separate from the NNSA programs, projects, and activities addressed in this *NNSS SWEIS*. In addition, the DOE Office of Energy Efficiency and Renewable Energy is proposing to develop a Concentrating Solar Power (CSP) Validation Project in Area 25 of the NNSS. The Office of Energy Efficiency and Renewable Energy will undertake an appropriate level of NEPA analysis for the CSP Validation Project; however, based on available information, this section addresses the proposed project.

6.2.1.1 Concentrating Solar Power Validation Project

DOE's Office of Energy Efficiency and Renewable Energy invests in clean energy technologies that strengthen the economy, protect the environment, and reduce dependence on foreign oil. One of the programs within the Office of Energy Efficiency and Renewable Energy, the Solar Energy Technologies Program, is committed to facilitating the demonstration of utility-scale, concentrating solar power generation technologies, including concentrating solar power, with the goal of making them broadly

competitive with wholesale electricity rates under all conditions by the end of the decade. To achieve this goal, DOE supports the demonstration of not-yet-commercial technologies at a sufficient scale to demonstrate their readiness for commercial, utility-scale power production. Systems that connect to intermediate- or high-voltage power transmission lines and are greater than 20 megawatts are generally considered utility-scale electric power generating systems. The intent is to demonstrate technology advancements that are proven at a prototype level and are ready for commercialization, but have not yet been demonstrated at a scale or for a sufficient period of time to secure project financing.

The DOE Solar Energy Technologies Program is proposing to conduct a CSP Validation Project at the NNSS. As part of the CSP Validation Project, DOE would provide partial funding of solar technology demonstration projects through a competitive solicitation opportunity. Additionally, DOE would provide land at the NNSS and basic infrastructure such as power, water, telecommunications, and security, as well as other operation and support facilities. The funding provided by DOE would partially cover the construction, operation, and decommissioning (dismantling and removal) of various solar technology demonstration projects. The CSP Validation Project would be located on 300 acres within Area 25 of the NNSS along its southern border, just east of Lathrop Wells Road. Access to the proposed project site from U.S. Route 95 would be via Lathrop Wells Road through Gate 510. Gate 510 facilitates restricted access to the project site because it is located in the southern part of Area 25 of the NNSS. Approximately 114 of the 300 acres would be disturbed: 94 acres (34 percent) would be fully disturbed by blading and grading the land and approximately 20 acres (7 percent) would be slightly disturbed by cutting or mowing the vegetation; approximately 165 acres (59 percent) would be undisturbed.

Approximately six demonstration projects of various sizes and technologies would be conducted at this site. The intent would be to demonstrate technology advancements that are proven at a prototype level and are ready for commercialization, but have not yet been demonstrated at a scale or for a sufficient period of time to secure project financing. Some of the technology projects would generate power, and some would demonstrate subsystems of concentrating solar power and require power to operate. Although the specific demonstration projects that would be deployed would not be certain until the completion of the competitive solicitation opportunity, **Table 6–1** contains a list of the representative technologies that could be demonstrated.

Table 6–1 Representative Concentrating Solar Power Validation Technologies

Type	*Equivalent Size*	*Description*	*Power Feed*	*Generator or Consumer* [a]
Dish	1.00 MW	Dish Technology with Thermal Storage	1,250 kVA	Generator
Trough	0.75 MW	Linear Trough System with Molten Salt	100 kVA	Consumer
Linear	0.75 MW	Linear Trough System with Direct Steam	100 kVA	Consumer
Tower	5.00 MW	Tower Compact Heliostat Molten Salt	500 kVA	Consumer
Tower	0.50 MW	Modular Brayton Cycle Tower	750 kVA	Generator
Tower	0.75 MW	Tower Graphite Storage Direct Steam	1,000 kVA	Generator
Tower	0.75 MW	Tower Distant Helio	1,000 kVA	Consumer
Totals	10.00 MW	Total Equivalent MW		
	2.75 MW	Electrical Generation		
	7.25 MW	Equivalent Thermal Only		

CPV = concentrating photovoltaic; kVA = kilovolt-ampere; kW = kilowatt; MW = megawatt.

[a] Generator indicates a facility that would produce power. Consumer indicates a facility that would use power.

The proposed CSP Validation Project at the NNSS is part of DOE's solar demonstration initiative, which addresses demonstration-scale projects focused on subcommercial-scale systems and components with the specific objective of developing the operational and performance data needed to secure technical and financial validation of the technologies.

6.2.1.2 Greater-Than-Class C Low-Level Radioactive Waste Disposal

On February 25, 2011, DOE issued a Notice of Availability for the *Draft Environmental Impact Statement for the Disposal of Greater-Than-Class C (GTCC) Low-Level Radioactive Waste and GTCC-Like Waste (GTCC EIS)* (76 *Federal Register* [FR] 10574) (DOE 2011). The Draft *GTCC EIS* addresses the disposal of low-level radioactive waste (LLW) that contains radionuclides in concentrations exceeding 10 CFR Part 61 Class C limits, generated by activities licensed by the U.S. Nuclear Regulatory Commission (NRC) or an Agreement State, as well as DOE-owned or generated LLW and non-defense-generated transuranic (TRU) waste with characteristics similar to GTCC LLW and for which there may be no path to disposal. The NNSS is one of a number of DOE sites analyzed for disposal of GTCC and GTCC-like waste. In addition to the NNSS and other DOE sites, DOE also evaluated generic commercial disposal sites in four regions of the United States. The disposal technologies considered for the NNSS are intermediate-depth borehole disposal, enhanced near-surface trench disposal, and/or above-grade vault disposal. A combination of disposal methods and locations might be appropriate depending on the characteristics of the waste and other factors.

U.S. Nuclear Regulatory Commission (NRC) Classification System for Low-Level Radioactive Waste (LLW)

The NRC classification system for the four classes of LLW (A, B, C, and greater-than-Class C [GTCC]) is established in 10 *Code of Federal Regulations* (CFR) 61.55 and is based on the concentrations of specific short- and long-lived radionuclides given in two tables. Classes A, B, and C LLW are generally acceptable for disposal in near-surface land disposal facilities. GTCC LLW is LLW "that is not generally acceptable for near-surface disposal," as specified in 10 CFR 61.55(a)(2)(iv). As stated in 10 CFR 61.7(b)(5), there may be some instances where waste with radionuclide concentrations greater than permitted for Class C would be acceptable for near-surface disposal with special processing or design.

Section 3(b)(1)(D) of the Low-Level Radioactive Waste Policy Amendments Act of 1985 specifies that the Federal Government is responsible for disposal of GTCC LLW generated by NRC and agreement state licensees. The U.S. Department of Energy is the Federal Agency responsible for disposal of GTCC LLRW.

All of the disposal technologies would have common supporting infrastructure, such as facilities or buildings for receiving and handling waste packages or containers and space for a retention pond to collect runoff and truck washdown. Each of the facilities, described below, would accommodate the full 12,000 cubic meters (about 420,000 cubic feet) of waste evaluated in the Draft *GTCC EIS*.

Based on the conceptual design for the intermediate-depth borehole disposal facility, about 110 acres of land would be required for 930 boreholes and supporting infrastructure. The conceptual design evaluated in the Draft *GTCC EIS* employs boreholes that are 14 feet in diameter and 130 feet deep with 100 feet between boreholes. Deeper or shallower boreholes than those evaluated in the Draft *GTCC EIS* could be used, depending on site-specific considerations (e.g., depth to groundwater).

The conceptual design for enhanced near-surface trench disposal includes 29 trenches occupying a footprint of about 50 acres. Each trench would be approximately 10 feet wide, 36 feet deep, and 330 feet long. This method of disposal would user deeper trenches than the 21-foot depth typically used for LLW at the Area 5 Radioactive Waste Management Complex (RWMC).

An above-grade vault disposal facility would consist of 12 vault units (each with 11 vault cells) and occupy a footprint of about 60 acres. Each vault would be about 36 feet wide, 310 feet long, and 26 feet

tall, with 12 vault units situated in a linear array. The vault cell would be 27 feet wide, 25 feet long, and 18 feet high, with an internal volume of 12,000 cubic feet per vault cell.

The GTCC reference location at the NNSS is southeast of the Area 5 RWMC. If the NNSS were to be selected as the site for a GTCC waste disposal facility, there would be changes to facilities and operations at the NNSS and cumulative impacts in a number of areas, including cultural and biological resources, transportation, air emissions, number of workers, health and safety, energy consumption, and groundwater use.

6.2.2 U.S. Air Force

The USAF operates the Nevada Test and Training Range (formerly known as the Nellis Air Force Range) in south-central Nevada, a national test and training facility for military equipment and personnel that consists of approximately 3 million acres. In *Renewal of the Nellis Air Force Range Land Withdrawal: Legislative Environmental Impact Statement* (USAF 1999), the USAF addressed potential environmental impacts of extending the land withdrawal to continue use of the Nevada Test and Training Range lands for military use. The Military Lands Withdrawal Act of 1999 (Public Law [P.L.] 106-65) renewed the land withdrawal for the Nevada Test and Training Range for a period of 25 years, beginning November 6, 2001. In addition, the act assigned to DOE lands that were formerly withdrawn for use by the USAF (portions of Areas 19 and 20 of the NNSS) and made additional adjustments to the boundary between the NNSS and Nevada Test and Training Range (see Chapter 2, Figure 2–2, of this *NNSS SWEIS*).

About 394,000 acres (BLM 2010g) of the 1,301,628-acre (BLM 2011) BLM-administered Nevada Wild Horse Range is within the boundary of the Nevada Test and Training Range, including TTR (see Section 6.2.5.2). More than 800,000 acres of the Nevada Test and Training Range are located within the Desert National Wildlife Range (see Section 6.2.3.1, "Desert Wildlife Refuge Complex"). The USAF and USFWS jointly manage this area.

Nellis Air Force Base lies within the cumulative impacts ROI for this *NNSS SWEIS* and is the host site for RSL. The main gate for the base is located approximately 8 miles northeast of downtown Las Vegas. The base covers more than 14,000 acres. Nellis Air Force Base is home to the USAF Warfare Center, an advanced air combat training mission. Nellis Air Force Base provides training for composite strike forces that include every type of aircraft in the USAF inventory. Training is conducted in conjunction with air and ground units of the U.S. Army, Navy, and Marine Corps, as well as air forces from allied nations.

In 2005, the USAF made the Indian Springs Air Force Auxiliary Airfield an air base and renamed it Creech Air Force Base. The USAF expanded its mission and infrastructure at Creech Air Force Base to play a major role in the war on terrorism. The base is home to two key military operations: the MQ-1 unmanned aerial vehicle and the Unmanned Aerial Vehicle Battle Laboratory.

NEPA documents are periodically completed for proposed new or changing activities at Nellis and Creech Air Force Bases, the TTR, and the Nevada Test and Training Range. **Table 6–2** is a summary of USAF NEPA documents related to these facilities completed since the *1996 NTS EIS* was issued. Most of these NEPA documents address activities and projects at existing facilities that are consistent with the designated missions of those facilities. A few proposed projects would affect previously undisturbed areas, but most would not.

Table 6–2 U.S. Air Force National Environmental Policy Act Documents Completed for Activities Within the Cumulative Impacts Region of Influence Since 1996

Title and Date	*Description*
Renewal of the Nellis Air Force Range Land Withdrawal: Legislative Environmental Impact Statement (USAF 1999)	The U.S. Air Force (USAF) addressed potential environmental impacts of extending the land withdrawal to continue use of the Nevada Test and Training Range lands for military use. The Military Lands Withdrawal Act of 1999 (Public Law 106-65) renewed the land withdrawal for a period of 25 years, beginning November 6, 2001.
Final Environmental Assessment for Predator Force Structure Changes at Indian Springs Air Force Auxiliary Field, Nevada (USAF 2003a)	The proposed action included changes to personnel assignments, upgrades to existing facilities, construction of new facilities, and extension of a runway by 120 meters (400 feet). The USAF issued a Finding of No Significant Impact (FONSI). The USAF completed facilities for the Predator unmanned aerial vehicles in 2006.
Nevada Training Initiative Environmental Assessment (USAF 2003c)	To fulfill the USAF's need to train aircrews and security forces in a modern urban and airfield environment at the Nevada Test and Training Range, the USAF proposed the Nevada Training Initiative, which would implement two separate proposed actions: (1) establish and operate a set of integrated, realistic targets and assets that simulate an urban environment for aircrews at one of two locations in the South Range of the Nevada Test and Training Range and (2) construct and operate a Military Operations in Urban Terrain complex at Range 63A that realistically simulates an airbase environment and construct facilities and infrastructure to support security forces training at one of two locations in the Indian Springs area.
Environmental Assessment Nellis Air Force Base Pipeline Project, Nevada (USAF 2005)	The proposed action would increase the refueling and fuel storage capacity of Nellis Air Force Base by installing a new 8-inch-diameter steel pipeline to the West Operational Bulk Storage Area and the East Side Operations Storage, constructing two new 420,000-gallon storage tanks, and a new 6-inch-diameter liquid fuel steel pipeline connecting the new storage tanks to the East Side Operations Storage.
Wing Infrastructure Development Outlook (WINDO) Environmental Assessment, June 2006 (USAF 2006a)	The proposed USAF action consisted of implementing over 630 Wing Infrastructure Development Outlook (WINDO) projects at Nellis Air Force Base, Creech Air Force Base, Nevada Test and Training Range, and the Tonopah Test Range (TTR). Most of the projects addressed were minor improvement, repair, and maintenance projects. Over 80 proposed projects would involve new construction, expansion, or demolition of existing facilities and infrastructure. All of the proposed WINDO projects would occur within functionally compatible areas and would likely be sited on previously used and/or disturbed land; occur within areas similarly zoned for such uses; and avoid important cultural resources, sensitive habitat, and environmental restoration sites. The USAF issued a FONSI.
Expeditionary Readiness Training (ExperRT) Course Expansion Final Environmental Assessment, June 2006 (USAF 2006b)	The USAF proposed to increase Security Forces Expeditionary Readiness Training course student capacity at the Regional Training Center at Silver Flag Alpha and Creech Air Force Base, Nevada. Training and use of facilities would continue at both Creech Air Force Base and Silver Flag Alpha. Improvements at the Silver Flag Alpha complex would include construction of convoy combat training route, two academic facilities, a laundry/shower/ latrine facility, a leach field, and water storage tanks, as well as installation of communication, water, and power lines at the existing tent complex and Military Operation in Urban Terrain training site. All of these infrastructure improvements would occur within the already developed area of Silver Flag Alpha. The USAF issued a FONSI and began implementation of the proposed actions.
Final Environmental Assessment for Leasing Nellis Air Force Base Land for Construction & Operation of a Solar Photovoltaic System, Clark County, Nevada, August 2006 (USAF 2006c)	The USAF proposed to lease 140 acres of land for construction of a solar photovoltaic system that would provide Nellis Air Force Base with a cost-efficient renewable energy source to augment the existing energy provided by its commercial supplier. The system would generate an 18-megawatt direct current that would be transformed into a 13.5-megawatt alternating current. The USAF issued a FONSI, and the photovoltaic system was constructed and is in operation.

Title and Date	Description
Environmental Assessment for Increased Depleted Uranium Use on Target 63-10, Nevada Test and Training Range, September 2006 (USAF 2006d)	The proposed action authorized an increase in the annual use of depleted uranium rounds from 7,900 to 19,000 (and high-explosive incendiary rounds from 1,600 to 3,800) to provide sufficient depleted uranium rounds to accomplish essential training requirements. The USAF issued a FONSI.
Final Environmental Assessment for Sanitary Landfill Expansion on the Tonopah Test Range, Nye County, Nevada, January 2007 (USAF 2007a)	The USAF proposed to construct, operate, and maintain an expansion of its Class II landfill at the TTR to support continued operations. The landfill would be located adjacent to the existing solid waste facility. The total life expectancy of the landfill expansion would be 30 years. The USAF issued a FONSI.
Base Realignment and Closure (BRAC) Environmental Assessment for Realignment of Nellis Air Force Base, March 2007 (USAF 2007b)	The USAF proposed to implement and supplement the 2005 Base Realignment and Closure Commission's mandated realignment for Nellis Air Force Base. Realignment would add 13 F-16 aircraft and 18 F-15C aircraft to Nellis Air Force Base. The proposed action would include construction of 18 new facilities for personnel and equipment scheduled for fiscal year 2007 through fiscal year 2009. The proposed action would also encompass increases of 509 permanently based personnel and 60 part-time Reservists. The proposed action would result in an increase of 1,400 sorties, but the total number of sorties would not exceed the previously approved maximum. The USAF issued a FONSI.
Draft Environmental Assessment For the Integrated Natural Resource Management Plan Nellis Air Force Base and Nevada Test and Training Range, Nevada, May 2007 (USAF 2007c)	The proposed Integrated Natural Resource Management Plan provides guidance for the conservation of natural resources at the Nevada Test and Training Range and Nellis Air Force Base to the extent practicable. The guidelines were developed within the context of the military mission of the affected facilities. A primary goal of the plan is to sustain military readiness while maintaining ecosystem integrity and dynamics.
Range 74 Target Complexes Environmental Assessment Nevada Test and Training Range, Nevada, July 2007 (USAF 2007d)	The USAF proposed to construct mountainous terrain target complexes at three locations within Range 74: Limestone Ridge, Saucer Mesa, and Cliff Springs. The Saucer Mesa target complex comprises 9 discrete sites totaling approximately 131 acres in the hills and valleys along an existing network of two-track trails east of Saucer Mesa. The Limestone Ridge target complex includes 10 discrete sites totaling approximately 245 acres along an existing unimproved road network between Limestone Ridge and the Belted Range. The Cliff Springs target complex comprises 1 linear site situated in a 15-acre corridor along an existing road. The USAF issued a FONSI.
Draft F-35 Force Development Evaluation and Weapons School Beddown Environmental Impact Statement (May 2008) (USAF 2008a)	The USAF proposes to base 36 F-35 fighter aircraft at Nellis Air Force Base between 2012 and 2022. The aircraft would be assigned to the Force Development Evaluation Program and Weapons School at Nellis Air Force Base. Flight activities would occur at Nellis Air Force Base and the Nevada Test and Training Range. The F-35 beddown would also require construction of new facilities and alteration and demolition of existing facilities at Nellis Air Force Base.
BLM Communications Use Lease to USAF to Conduct Patriot Communications Exercises in Lincoln County, Nevada, August 2008 (USAF 2008b)	The USAF proposed to obtain from the Bureau of Land Management a 15-year Communications Use Lease for 14 sites on public land in Lincoln County, Nevada. Each site would be 500 feet by 500 feet (5.7 acres) in size, for a total of approximately 79.8 acres, and would be used for electronic air defense systems to support training with an integrated air defense system. Both the USAF and BLM issued FONSIs.
Nellis and Creech AFBs Capital Improvements Program Environmental Assessment, September 2008 (USAF 2008c)	The USAF proposed to implement updates of the Nellis and Creech Air Force Bases' general plans. The Capital Improvements Plan would include new construction, repair/replacement, installation, maintenance, demolition, and environmental projects. These projects would occur within previously developed or otherwise disturbed lands at both Nellis and Creech Air Force Bases. The USAF issued a FONSI.

Title and Date	Description
Environmental Assessment for Enhanced Use Lease of U.S. Air Force Lands to the City of North Las Vegas for Construction and Operations of a Water Reclamation Facility, Nellis Air Force Base, Nevada, April 2008 (USAF 2008d)	The USAF proposed to initiate an Enhanced Use Lease with the City of North Las Vegas for 40 acres of property that was part of the Nellis Air Force Base Sunrise Golf Course. The city of North Las Vegas would construct a water reclamation facility on the property and supply Nellis Air Force Base with reclaimed water from the facility sufficient to irrigate the golf course, as well as for other non-potable uses on the installation. Excess reclaimed water would be discharged to Sloan Channel, located approximately 500 feet east of the property. The USAF issued a FONSI.
AAFES Gas Station at Creech Air Force Base Environmental Assessment, July 2009 (USAF 2009a)	The USAF proposed to construct and operate a single-pump gasoline station on currently undeveloped land within a developed portion of Creech Air Force Base. The USAF issued a FONSI.
Final Environmental Assessment Upgrade of the Indian Springs Collection and Treatment System, December 2009 (USAF 2009b)	The USAF proposed to improve the wastewater collection and treatment system for the town of Indian Springs, Nevada. All activities associated with the project would occur in previously disturbed areas, except about 6.2 acres of land adjacent to the existing treatment ponds that would be disturbed for construction of two new percolation basins and possibly an additional 8 acres for a solar photovoltaic system for generating electrical power.
Draft Standard Army Qualification Ranges at Nellis AFB Small Arms Range Environmental Assessment, March 2010 (USAF 2010a)	The Nevada Army National Guard proposed to establish and operate new Standard Army Qualification Ranges immediately adjacent to the existing Nellis Air Force Base Small Arms Range. The proposed project would occur in three phases; Phase I and Phase II would require a total of approximately 67 acres of ground-clearing activities. The third phase of the project would be addressed as a separate action under a tiered or separate environmental assessment.
Expeditionary Readiness Course Expansion Final Supplemental Environmental Assessment, September (USAF 2010b)	In a 2006 environmental assessment, the USAF proposed to expand ground combat training facilities for the Expeditionary Readiness Training Course (USAF 2006d) and is now proposing to further expand facilities to accommodate up to 8,000 students each year. Five new buildings would be constructed at Creech Air Force Base in previously disturbed areas. A power projection platform would be installed in the northeast corner of the base on approximately 9 acres of land disturbed by previous training operations. Improvements at Range 63C would include new buildings; two mock overpasses; road improvements; placement of guardrails; and parking areas, pavilions, and sidewalks where needed around existing and new buildings. Existing roads within the TTR would be used to access the proposed convoy training route. Approximately 9.3 miles of the existing Stonewall Flat Road (east and portions of the south and north roads) would be graded and possibly paved to improve the convoy route; road widening is not expected to be necessary. A new road, approximately 1.4 miles long, would be constructed between South Stonewall Flat Road and North Stonewall Flat Road. The training area along the roads would be improved to provide realistic scenarios and handle various tactical vehicles, including low- and high-speed sections for tactical live fire. These additional improvements would be constructed over a period of 5 or more years.
Final Environmental Assessment, Outgrant for Construction and Operation of a Solar Photovoltaic System in Area 1, Nellis Air Force Base, Clark County, Nevada, March 2011 (USAF 2011)	The USAF proposes to lease 160 acres of its land to Nevada Energy for construction of a solar photovoltaic system that would provide Nellis Air Force Base with a cost-efficient renewable energy source that would be used primarily by the USAF. The system would generate an 18-megawatt direct current that would be transformed into 10 to 15 megawatts of alternating current. This would be the second solar photovoltaic system to be located on Nellis Air Force Base. The first such system is located in the northern portion of the base (USAF 2006c).

6.2.3 U.S. Fish and Wildlife Service

6.2.3.1 Desert Wildlife Refuge Complex

USFWS manages the Desert National Wildlife Refuge Complex, which encompasses more than 1.6 million acres of land in Nye, Clark, and Lincoln Counties in southern Nevada and includes the Desert National Wildlife Range and Ash Meadows, Moapa Valley, and Pahranagat National Wildlife Refuges. Each refuge within the Desert National Wildlife Refuge Complex provides important and unique habitat for wildlife, including several endemic species (species native to the refuges and often not found anywhere else). The Ash Meadows and Moapa Valley National Wildlife Refuges were established to protect endangered and threatened species, while the Pahranagat National Wildlife Refuge was established to provide a habitat for migratory birds, and the Desert National Wildlife Range was established to protect desert bighorn sheep and other wildlife (USFWS 2009b).

All of these ranges and refuges except Moapa Valley are located within the cumulative impacts ROI for this *NNSS SWEIS* (see Figure 6–1). The closest of these to the NNSS, the Desert Wildlife Range, is located about 1 mile east of the NNSS. As noted in Section 6.2.2, over 800,000 acres of the western portion of the Desert Wildlife Range is managed as joint use between the USAF and USFWS.

In August 2009, USFWS issued the *Desert National Wildlife Refuge Complex – Ash Meadows, Desert, Moapa Valley, and Pahranagat National Wildlife Refuges Final Comprehensive Conservation Plan and Environmental Impact Statement (DNWR Complex EIS)*. Under the plan, various habitat restoration and management activities would occur and some visitor services facilities would be improved and/or constructed. There would be impacts on various resources from the proposed activities, but the net impacts of the habitat restoration and management activities would generally benefit natural plant and animal populations in the region. Construction activities would result in some localized adverse impacts on wildlife habitat and other resources, but these would be relatively minor and temporary. Because the comprehensive conservation plan is largely conceptual, specific impacts on resources were not addressed in the *DNWR Complex EIS*, but will be evaluated in subsequent NEPA processes. Therefore, although there could be some cumulative impacts with actions proposed in this *NNSS SWEIS*, those impacts cannot be quantified at this time but are expected to be small. For instance, USFWS is proposing to conduct restoration work at Fairbanks and Soda Springs at Ash Meadows National Wildlife Refuge (USFWS 2009c). This would result in small temporary local air quality impacts but would not result in any other impacts that would be cumulative with impacts at the NNSS.

6.2.3.2 Clark County Multi-Species Habitat Conservation Plan

Section 9 of the Endangered Species Act, as amended (16 U.S.C. 1531 et seq.), and Federal regulations prohibit the ‘‘take’’ of a fish or wildlife species listed as endangered or threatened. Under the Endangered Species Act, the following activities are defined as take: to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect listed wildlife species or to attempt to engage in such conduct (16 U.S.C. 1532). However, under Section 10(a)(1)(B) of the act, USFWS may issue permits to authorize ‘‘incidental take’’ of listed wildlife species to non-Federal entities. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Regulations governing permits for endangered and threatened species are found in 50 CFR 17.22 and 17.32, respectively.

In September 2000, USFWS issued a permit to the Cities of Boulder City, Henderson, Las Vegas, Mesquite, and North Las Vegas; Clark County; and the Nevada Department of Transportation for incidental take of 78 covered species, including the federally threatened desert tortoise (*Gopherus agassizii*) by the development of up to 145,000 acres in Clark County, Nevada. The permit was based on the Clark County Multi-Species Habitat Conservation Plan (MSHCP) (USFWS 2000). The

permit is effective as of February 1, 2001, and expires on January 31, 2031. Activities included in the MSHCP for the permitted projects include, but are not limited to, development of residential and commercial areas, urban parks and recreation facilities, utility and transportation facilities, and other capital improvements; operations; and flood control. As noted in the MSHCP, the permit applies to all non-Federal lands that currently exist and all non-Federal lands that result from sales or transfers from the Federal Government after the issuance of the Section 10(a) permit.

In September 2009, USFWS announced that the permitted parties intend to request a permit amendment for the incidental take of covered species on up to 215,000 additional acres in Clark County, Nevada. Activities that would be covered by the MSHCP amendment are not likely to change from the existing MSHCP (74 FR 50239). USFWS is preparing an environmental impact statement (EIS) to address the potential impacts of issuance of a modified incidental take permit.

The combined areas under the current and amended permit would total up to 360,000 acres. However, it is assumed that any amended permit resulting from this process would also apply to all non-Federal lands that currently exist and all non-Federal lands that result from sales or transfers from the Federal Government after issuance of the amendment. For this reason, in calculating potential areas of disturbance within the cumulative impacts ROI, the acres of land that would disposed by BLM, described below in Section 6.2.4.6, "Las Vegas Valley Land Disposal," should be excluded to prevent double counting. Therefore, about 36,000 acres is deducted from the 360,000 acres that would be developed under the modified incidental take permit. The remaining 324,000 acres is used as part of the estimate of potential cumulative environmental impacts in this *NNSS SWEIS*.

6.2.4 Bureau of Land Management

BLM administers public lands within the cumulative impacts ROI for this *NNSS SWEIS*. BLM administers the land immediately adjacent to the southern end of the NNSS and land surrounding much of the Nevada Test and Training Range and the TTR. With the exception of almost 740 acres of the Area 5 RWMC at the NNSS, the NNSS and the Nevada Test and Training Range, including the TTR, are located on land under BLM jurisdiction that is withdrawn from public use by DOE and the USAF, respectively.

Section 102 of the Federal Land Policy and Management Act (P.L. 94-579) states that "the national interest will be best realized if the public lands and their resources are periodically and systematically inventoried and their present and future use is projected through a land use planning process coordinated with other Federal and State planning efforts." In compliance with this policy, BLM uses a public process to prepare resource management plans that serve as the basis for all activities that occur on BLM-administered lands. The purpose of a resource management plan is to provide direction for management of renewable and nonrenewable resources found on public lands administered by BLM and to guide decisionmaking for future site-specific actions. The cumulative impacts ROI for this *NNSS SWEIS* includes parts of the Ely, Southern Nevada, and Battle Mountain Districts of BLM. The Ely District completed its new resource management plan in August 2008 (BLM 2008c). The Las Vegas District initiated the process to revise its resource management plan with public scoping meetings in January 2010 (BLM 2010d). The Battle Mountain District has initiated the process to update and combine the Shoshone, Eureka, and Tonopah resource management plans into a district-wide resource management plan and EIS, but has not yet begun public scoping (BLM 2010e). In 2004, BLM prepared a resource management plan for about 2.2 million acres of withdrawn public lands on the Nevada Test and Training Range (BLM 2004a). The plan guides the management of the affected natural resources through 2024. The decisions, directions, allocations, and guidelines in the plan are based on the primary use of the withdrawn area for military training and testing purposes.

6.2.4.1 Renewable Energy Projects

On May 29, 2008, DOE and BLM issued an NOI to prepare an EIS (73 FR 30908) in response to the following mandates: (1) Executive Order 13212, *Actions to Expedite Energy-Related Projects*, and (2) Title II, Section 211, of the Energy Policy Act of 2005. DOE and BLM identified utility-scale solar energy development as a potentially critical component in meeting these mandates and jointly prepared the *Draft Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States (Solar Energy PEIS)* (BLM/DOE 2010) to evaluate utility-scale solar energy development in Arizona, California, Colorado, Nevada, New Mexico, and Utah. In the course of the *Solar Energy PEIS* analyses, DOE and BLM identified a number of tracts of BLM-administered land for in-depth study for solar development. On June 30, 2009, DOE and BLM issued a Notice of Availability for the solar energy study area maps (74 FR 31307). Seven areas identified for in-depth study are located in Nevada and three are within the cumulative impacts ROI of this *NNSS SWEIS*: Amargosa Valley (31,625 acres), Gold Point (4,810 acres), and Miller's (16,787 acres) (BLM/DOE 2010). Based on the information and analyses in the *Solar Energy PEIS*, DOE and BLM will develop and implement agency-specific programs that establish environmental policies and environmental impact mitigation strategies for solar energy development. The *Solar Energy PEIS* does not provide specific analysis to support any particular project. However, information is available regarding the specific proposed renewable energy projects being considered by BLM for land use permitting within the cumulative impacts ROI in this *NNSS SWEIS*, as discussed below.

As noted in the *Final Environmental Impact Statement for the Amargosa Farm Road Solar Energy Project* (BLM 2010a), there are uncertainties in any large-scale, complex, and costly industrial project as it moves from concept toward realization. However, the level of uncertainty with some proposed renewable energy projects is high for the following reasons: (1) not all of the developers will develop the detailed information necessary to meet BLM standards; (2) following completion of BLM's NEPA process, the developers must obtain any necessary permits required by Federal, state, and local regulatory authorities; (3) the developers must secure funding to construct the project (if not already obtained), which may be affected by the status of competing renewable energy projects; and (4) proposed renewable energy projects must successfully compete for power purchase agreements with utility organizations that are working to meet their state-mandated renewable portfolio standards. Cumulative impacts analysis under NEPA requires consideration of the likelihood that the proposed projects actually will occur. To be conservative, all of the proposed solar energy projects listed in **Table 6–3** were included in the cumulative impacts analysis in this *NNSS SWEIS*.

Table 6–3 Summary of Renewable Energy Projects Within the Cumulative Impacts Region of Influence [a]

Project Name	*Estimated Facility Area (acres)*	*Proposed Plant Capacity (megawatts)*	*Estimated Operational Water Demand [b] (acre-feet per year) [c]*	*Proposed Technology*
Projects for which a Decision has been Made by BLM and a Right-of-Way Permit Issued or Pending				
Solar Millennium LLC; Amargosa Farm Road Solar Energy Project [d]	4,350	500	400	Parabolic Trough
Tonopah Solar Energy LLC; Crescent Dunes Solar Energy Project [e]	1,620	110	600 [f]	Concentrating Solar Power (power tower)
Projects that are in the Permitting Process with BLM				
Abengoa Solar, Inc.; Lathrop Wells Solar Facility [g]	5,336	250 to 520	200 to 405 [h]	Parabolic Trough plus 20 megawatts of photovoltaic
Pacific Solar, Inc.; Amargosa North Solar Project [i]	7,500	150	5 to 10	Photovoltaic
Projects for which BLM has received an Application for Right-of-Way (first-in-line projects only)				
Amargosa Flats Energy, LLC (Ausra) [j]	4,480	140	112 [i]	Linear Fresnel Reflector
Cogentrix Solar [j]	13,440	1,000	800 [h]	Solar Thermal (troughs)
Cogentrix Solar [j]	12,800	1,000	800 [h]	Solar Thermal (troughs)
Cogentrix Solar [j]	22,400	1,000	800 [h]	Solar Thermal (troughs)
Cogentrix Solar [j]	30,720	1,000	800 [h, k]	Concentrating Solar Power
EwindFarm, Inc. [j]	11,238	500	17 [k]	Photovoltaic
Nye County Solar One, LLC [j]	14,160	300	240 [h]	Parabolic Trough
Pacific Solar, Inc.; Amargosa South Solar Project [l]	4,000	500	400 [h]	Parabolic Trough
Element Power [j]	1,039	Unknown	Unknown [k]	Photovoltaic
Totals for Solar Energy Projects	**133,083**	**5,480 to 5,750**	**5,174 to 5,379**	
Sierra Geothermal Power Corp. Alum [j]	9,660	33	Unknown [m]	Geothermal
Sierra Geothermal Power Corp. Silver Peak [j]	Unknown	15	Unknown [m]	Geothermal
Totals for Geothermal Projects	**9,660**	**48**	**Unknown**	
Totals for All Renewable Energy Projects	**142,743**	**5,528 to 5,798**	**5,174 to 5,379**	

BLM = Bureau of Land Management.

[a] Values in this table are based on sources with varying degrees of certainty, from those that are derived from final EIS to those that are derived from initial plans of development. None of these values represent a built project, and all are subject to change. Some of the projects listed in this table are likely to not be built.

[b] Unless otherwise noted, water withdrawals would most likely be from the Amargosa Desert Hydrographic Basin.

[c] 1 acre-foot of water is equal to 325,851 gallons.

[d] BLM 2010a.

[e] BLM 2010f.

[f] Water would be withdrawn from groundwater within the Tonopah Flat member of the Great Smokey Valley Hydrographic Basin.

[g] 75 FR 41231.

[h] Value estimated by assuming dry-cooled technology and scaling from the *Final Environmental Impact Statement for the Amargosa Farm Road Solar Energy Project* (BLM 2010a), i.e., 0.8 acre-feet of water for each megawatt of generating capacity.

[i] 74 FR 66147.

[j] BLM Renewable Energy Table at http://www.blm.gov/pgdata/etc/medialib/blm/nv/energy.Par.56189.File.dat/renewable_energy_project_table_aug2010.pdf. Accessed on January 24, 2010.

[k] Located within the Pahrump Hydrographic Basin.

[l] PSI 2007.

[m] Located in northwestern Esmeralda County.

As shown in Table 6–3, within the cumulative impacts ROI, there are 13 proposed solar facilities and two proposed geothermal projects. There are no wind energy projects proposed within the cumulative impacts ROI, but two firms are evaluating potential wind energy sites west of the NNSS: Altagas Renewable Energy is evaluating a site about 5.5 miles west-southwest of Beatty in Nye County, Nevada (BLM 2010k), and Pacific Wind Development, LLC, a subsidiary of Iberdrola Renewables Inc., is evaluating a site located about 14 miles west-northwest of Lida in Esmeralda County, Nevada (BLM 2010j). As of January 2011, two of the proposed solar energy projects have completed BLM's NEPA process and may proceed: Amargosa Farm Road Solar Energy Project (BLM 2010i), located in Amargosa Valley about 5 miles southwest of the NNSS, and Crescent Dunes Solar Energy Project (BLM 2010h), located north of Tonopah, Nevada. In addition, two of the proposed projects have entered the BLM permitting process and are preparing EISs (74 FR 66147 and 75 FR 41231): Lathrop Wells Solar Facility, located in Amargosa Valley just south of the intersection of U.S. Route 95 and Nevada State Route 373 and Amargosa North Solar Project, located in Amargosa Valley between 5 and 6 miles west of the NNSS. The other seven proposed solar facilities have submitted applications for a right-of-way but have not submitted an approved plan of development to BLM to initiate the permitting process. There are also several solar developers who have submitted applications to BLM that are "second in line," meaning that they proposed development of sites for which applications have already been submitted. The proponents have not submitted detailed project-specific information for these projects, but only basic information such as type of technology to be used, proposed size, and requested acreage. These "second-in-line" applications are not included in this cumulative impacts analysis to preclude double counting potential impacts. In addition, a potential solar project that has submitted an application to BLM that would be located on the NNSS (BLM 2010a) is not addressed in this cumulative impacts analysis because, as the holder of the withdrawal for the land proposed to be used, NNSA has not been consulted regarding this project and believes that the capacity of the facility described in the application to BLM (8,000 megawatts) is unreasonably large and cannot be supported by available resources, particularly groundwater.

6.2.4.2 National Wild Horse Range

Under the Wild Free-Roaming Horses and Burros Act, BLM manages wild horses and burros in herd areas where they were found when the act went into effect in 1971. Herd areas that can provide adequate food, water, cover, and space to sustain healthy and diverse wild horse and burro populations over the long term are designated by BLM as Herd Management Areas. There are 20 BLM Herd Management Areas (19 in Nevada and 1 in California) that lie wholly or in part within the cumulative impacts ROI for this *NNSS SWEIS* (BLM 2009d), as follows:

Amargosa Valley	Johnnie	Sand Springs West
Ash Meadows	Montezuma Peak	Saulsbury
Bullfrog	Nevada Wild Horse Range	Silver Peak
Chicago Valley	Paymaster	Stone Cabin
Goldfield	Pilot Mountain	Stonewall
Gold Mountain	Redrock	Wheeler Pass
Hot Creek	Reville	

As mentioned in Section 6.2.2, BLM administers the Nevada Wild Horse Range located within the boundary of the TTR and Nevada Test and Training Range (BLM 2010g). While the primary purpose of the TTR and Nevada Test and Training Range is weapons development and flight training, the management of wild horses is a secondary use of the lands.

6.2.4.3 Designation of Energy Corridors on Federal Land

Section 368 of the Energy Policy Act of 2005 (P.L. 109-58), directed the Secretaries of Agriculture, Commerce, Defense, Energy, and the Interior to designate, under their respective authorities, corridors on Federal land in the 11 western states for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities (energy corridors); perform any environmental reviews that may be required to complete the designation of such corridors; incorporate the designated corridors into relevant agency land use and resource management plans; ensure that additional corridors for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities on Federal land are promptly identified and designated as necessary; and expedite applications to construct or modify oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities within such corridors. In partial response to that direction, DOE and BLM, as lead agencies, prepared the *Final Programmatic Environmental Impact Statement for the Designation of Energy Corridors on Federal Land in 11 Western States* (DOE/EIS-0386) *(Energy Corridors PEIS)* (DOE 2009j) to conduct a detailed programmatic environmental analysis of potential energy corridors and to integrate NEPA at the earliest possible time.

The *Energy Corridors PEIS* identified potential Section 368 corridors; evaluated effects of potential future development within designated corridors; identified mitigation measures for such effects; and developed interagency operating plans applicable to planning, construction, operation, and decommissioning of future projects within the corridors. In January 2009, BLM issued a Record of Decision (ROD) to amend relevant resource management plans and designate Section 368 energy corridors therein. Several Section 368 corridor segments identified in the *Energy Corridors PEIS* are within the cumulative impacts ROI for this *NNSS SWEIS*. Those corridor segments parallel existing transmission lines and major roadways, such as U.S. Route 95. There were no specific energy transmission projects identified for these corridor segments in the *Energy Corridors PEIS*.

6.2.4.4 Electrical Transmission Line Projects

As part of its long-term planning to support renewable energy development in the Amargosa Valley, the Valley Electric Association intends to upgrade its existing transmission lines in its service territory (BLM 2010a). The first phase would include the upgrade of an existing transmission line located south of U.S. Route 95 and west of Nevada State Route 160 from 138 to 230 kilovolts. The second phase would consist of construction of a new 230-kilovolt transmission line from the existing Valley Electric Association substation at the corner of Powerline Road and Anvil Road to the existing Valley Switching Station. The new 230-kilovolt line would then parallel Valley Electric Association's existing 138-kilovolt transmission line to the site of the proposed Johnnie substation that would be located 5 to 10 miles south of U.S. Route 95 near Nevada State Route 160. Valley Electric Association is currently performing system impact studies based on interconnection requests to determine whether other upgrades are required to accommodate future load growth. Valley Electric Association will file a right-of-way application or update to accommodate these upgrades, and BLM will prepare a separate NEPA review of Valley Electric Association's proposed action.

In January 2010, Renewable Energy Transmission Company filed an application with BLM for the proposed Solar Express Transmission Line Project (RetCo 2010). The Solar Express Transmission Line Project would consist of two 500 kilovolt, double circuit, electric transmission lines which would run 122 miles between the existing Eldorado Valley Substation Complex, south of Boulder City, Clark County, Nevada, and a new 500 kilovolt substation, located in the Amargosa Valley in Nye County, Nevada. An additional 500 kilovolt substation is planned as a mid-terminal, at a location south of the town of Pahrump, close to the Nye and Clark County line. The proposed line would also interconnect with Valley Electric Association's 230-kilovolt system at its proposed Johnnie Substation. The Solar Express Transmission Line would be routed within Section 368 corridors 18–224, 224–225, and 225–231 identified in the *Energy Corridors PEIS*. Renewable Energy Transmission Company filed an application

in September 2010 with Western Area Power Administration for its Transmission Infrastructure Program to receive consideration for funding under Section 402 of the American Recovery and Reinvestment Act. The purpose of the proposed project is to connect new generation facilities with the Eldorado Valley Substation Complex, which is a major point of connection of the western power grid. While it is envisioned that the generation that would be connected will be mostly solar generation, it is possible that wind, geothermal or natural gas fired generation may also connect to the Solar Express Transmission Line Project.

The Southwest Intertie Project and the ON Line Project have both been subject to BLM NEPA processes. The Southwest Intertie Project is a proposed 520-mile, 500-kilovolt transmission line for which BLM originally granted right-of-way permits to Idaho Power Company in December 1994 (BLM 2008b). Idaho Power Company did not undertake final permitting or construction of the Southwest Intertie Project, and the rights to the southern portion were eventually transferred to Great Basin Transmission, LLC (BLM 2008b). The southern portion of the Southwest Intertie Project would extend from the proposed Thirty Mile Substation about 18 miles northwest of Ely, Nevada, south approximately 230 miles to the existing Harry Allen Substation, located about 20 miles northeast of Las Vegas, Nevada. The ON Line Project is an NV Energy-proposed 236-mile, 500-kilovolt transmission line between a new Robinson Summit Substation, located less than 1 mile southeast of the proposed Thirty Mile Substation, and the Harry Allen Substation (BLM 2010k). Both of these transmission line projects would interconnect with the existing Falcon-Gonder 345-kilovolt transmission line at their northern ends (BLM 2008b and 2010k). The alignment of the southernmost portions of both of these transmission lines would follow the Southwest Intertie Project right-of-way and would be outside of the cumulative impacts ROI for this *NNSS SWEIS*.

TransWest Express, LLC, filed an application with BLM for a right-of-way to construct and operate a 600-kilovolt overhead direct current transmission line to cross public and private lands for the TransWest Express 600-kilovolt Project (76 FR 379). The extra-high-voltage line would transmit up to 3,000 megawatts of power generated by renewable energy projects in Wyoming to the desert southwest. The project would begin in south-central Wyoming, cross northwestern Colorado, and Utah, and end south of Las Vegas at the Marketplace hub in the Eldorado Valley near Boulder City, Nevada. Western Area Power Administration plans to partially fund the project under the American Recovery and Reinvestment Act of 2009. The project schedule calls for it to be in operation by 2015. Although one alternative corridor currently under consideration would cross the northern portion of the Las Vegas Valley and would be within the cumulative impacts ROI for this *NNSS SWEIS*, the proposed route would be outside of the ROI.

NV Energy is considering several potential transmission lines within the cumulative impacts ROI (NV Energy 2009). The potential projects are 500-kilovolt transmission lines and associated facilities beginning at the Harry Allen Substation, then going to the Northwest Substation, located in the northwestern area of Las Vegas Valley and then westerly and north along the western part of the state of Nevada, to NV Energy's existing Blackhawk Substation near Carson City. The potential projects could ultimately interconnect with a proposed Raven Substation in northern California. This or an equivalent electrical transmission system, such as the Solar Express Transmission Line project discussed above, would be essential to effectively market the renewable energy generation that is either proposed or considered in southern Nevada. The potential transmission system additions could include a 500-kilovolt interconnection between Amargosa Valley and Mead Substation near Boulder City, Nevada. It is reasonably likely that these 500-kilovolt transmission lines would be primarily routed within the Section 368 corridors identified in the *Energy Corridors PEIS* discussed in Section 6.2.4.3.

6.2.4.5 Groundwater Development Projects

The Southern Nevada Water Authority submitted an application to BLM for a groundwater development project in southern Nevada called the Clark, Lincoln, and White Pine Counties Groundwater Development Project. Based on information in the BLM Round Two Scoping Package, the Southern Nevada Water Authority Groundwater Development Project would withdraw water from the Spring Valley, Snake Valley, Cave Valley, Dry Lake Valley, Delamar Valley, and Coyote Spring Valley hydrographic basins (BLM 2006a). All of the affected hydrographic basins are within the Great Salt Lake or the White River Groundwater Flow Systems and are some distance from the NNSS.

6.2.4.6 Las Vegas Valley Land Disposal

To address issues associated with rapid growth and the need for developable lands and the management of public lands in southern Nevada, Congress passed the Southern Nevada Public Land Management Act in 1998 (P.L. 105-263), which was later amended by the Clark County Conservation of Public Land and Natural Resources Act (Clark County Act) (P.L. 107-282). The Southern Nevada Public Land Management Act and Clark County Act authorized BLM to dispose Federal lands in Clark County, Nevada, consistent with applicable law, population growth, and community land use plans and policies. The disposal boundary established by the two acts encompasses much of the Las Vegas Valley and totals about 46,700 acres. Public lands within the northern portion of the disposal area include the Upper Las Vegas Wash, which is within the cumulative impacts ROI for this *NNSS SWEIS*.

BLM prepared the *Las Vegas Valley Disposal Boundary Final Environmental Impact Statement* (BLM 2004b) to identify the environmental consequences that may result from the disposal and use of the remaining BLM-managed lands within the disposal boundary. The *Las Vegas Valley Disposal Boundary Final Environmental Impact Statement Record of Decision* (BLM 2004c) selected the Conservation Transfer Alternative (BLM 2004b), which allowed BLM to dispose approximately 46,700 acres of land in the Las Vegas Valley. The ROD also required additional study, collaboration, and environmental analysis of approximately 5,000 acres in the Upper Las Vegas Wash area, known collectively as the Conservation Transfer Area, that were withheld from sale because of a high concentration of sensitive resources. Although the ROD identified approximately 5,000 acres of land to be withheld from disposal, it also stipulated that the boundaries were adaptable. Based on input received during public interaction and its own review, BLM expanded the Conservation Transfer Area study area to 13,622 acres. In January 2010, BLM issued the *Draft Supplemental Environmental Impact Statement Upper Las Vegas Wash Conservation Transfer Area, Las Vegas, Nevada* (BLM/NV/EL/ES-10-06+1793) (BLM 2010b) to address the potential environmental impacts of six alternative Conservation Transfer Area configurations and sizes, ranging from about 1,448 to 12,952 acres. The BLM-preferred alternative would protect about 11,008 acres from development, leaving about 35,692 acres for BLM disposition. According to the Clark County Regional Transportation Plan 2009–2030, the area within the Public Land Management Act boundary can accommodate nearly all the growth expected over the next 20 years (RTCSN 2008).

6.2.4.7 Amargosa River Area of Critical Environmental Concern

The BLM Barstow Field Office, located in Barstow, California, published a draft *Amargosa River Area of Critical Environmental Concern Implementation Plan* with an associated environmental assessment in October 2006 (BLM 2006b). The Amargosa River Area of Critical Environmental Concern (ACEC) encompasses 21,552 acres of land in three distinct parcels located in northeastern San Bernardino and southeastern Inyo Counties, California, near the communities of Tecopa and Death Valley Junction, California. The purpose of the draft implementation plan is to guide BLM's on-the-ground management of public lands within the ACEC over the next 20 years. The ACEC implementation plan would have generally beneficial impacts for the lower reaches of the Amargosa River but would have little or no cumulative effects with NNSA activities at the NNSS.

Certain stretches of the Amargosa River in California were designated as either wild, scenic, or recreational by the March 30, 2009, Designation of Wild and Scenic Rivers Act (P.L. 111-11, Section 1805(a)(196)(A)-(E)). One 7.9-mile stretch was designated as "wild," two stretches totaling 12.1 miles were designated as "scenic," and two stretches totaling 6.3 miles were designated as "recreational." These stretches begin approximately 40 miles downstream of the river's confluence with Fortymile Wash, the main Amargosa River tributary originating on the NNSS. The influx of pollutants (i.e., sedimentation and chemical contaminants) from NNSS activities to Amargosa River tributaries is expected to have little effect on water quality in the designated areas, considering the large distance between them and the mostly dry nature of these ephemeral surface waters.

6.2.5 U.S. Department of Justice

In October 2010, the U.S. Department of Justice, Office of the Federal Detention Trustee, opened a contractor-operated detention facility located on 120 acres in Pahrump, Nevada. The facility employs about 235 people.

6.2.6 Federal Aviation Administration

The Federal Aviation Administration is proposing to develop an Air Tour Management Plan for Death Valley National Park, pursuant to the National Parks Air Tour Management Act of 2000 (P.L. 106-181) and its implementing regulations (14 CFR Part 136, Subpart B) (75 FR 2922). The objective of the plan is to develop acceptable and effective measures to mitigate or prevent the significant adverse impacts, if any, of commercial air tour operations on the natural resources, cultural resources, and visitor experiences of a national park unit and any tribal lands within or abutting the park. The Air Tour Management Plan would have no authorization over other non-air-tour operations such as military and general aviation operations; therefore, it should not affect or be affected by aviation activities at the NNSS.

6.2.7 National Park Service

The U.S. Department of Interior, National Park Service (NPS), operates Death Valley National Park. This is the only NPS unit located within the cumulative impacts ROI for this *NNSS SWEIS*. The NPS Planning, Environment and Public Comment website identified 10 proposed projects for Death Valley as of October 2010. The following are brief descriptions of proposed projects that are within the cumulative impacts ROI for this *NNSS SWEIS*.

Wilderness and Backcountry Management Plan – In September 2009, NPS initiated a combined Wilderness and Backcountry Stewardship Plan for Death Valley National Park (NPS 2009). The purpose of the plan is to guide NPS and to make decisions regarding the future use and protection of the park's vast wilderness and backcountry lands. As part of the planning effort, over the next 3 to 4 years, NPS will complete a NEPA environmental analysis.

Keane Wonder Mine Complex and Multi-Mine Safety Installations – NPS published two environmental assessments and Findings of No Significant Impact for the installation of safety features at the Keane Wonder Mine Complex and other abandoned mines within Death Valley National Park (NPS 2010a, 2010b, 2010c, 2010d). NPS determined to use a variety of proven techniques to prevent human and undesired wildlife intrusion while allowing adequate ingress and egress by wildlife, principally bats.

Devils Hole Site Plan – Devils Hole is a 40-acre site located within Ash Meadows Wildlife Refuge that is managed by NPS, in close cooperation with USFWS. The site contains a cave pool, formed by the collapse of the top of a stretch fault leading to a flooded cave system. The cave pool is the habitat of the only remaining population of the endangered Devils Hole pupfish (*Cyprinodon diabolis*). The Devils Hole Site Plan includes improvements to site security, installation of a ladder to improve access to Devils Hole for research and monitoring activities, installing a webcam to improve visitor interpretation, and revegetation of disturbed areas (NPS 2010e).

Devils Hole Long-Term Ecosystem Monitoring Plan – NPS is proposing to implement a Long-Term Ecosystem Monitoring Plan for Devils Hole. This plan represents a more holistic commitment to greater scientific understanding and effective fulfillment of NPS's stewardship of Devils Hole and the resident population of Devils Hole pupfish (NPS 2010g).

Scotty's Castle Waterline Replacement – NPS proposes to replace about 1 mile of waterline that services the Death Valley Scotty Historic District and in June 2010, initiated public scoping to identify potential issues and concerns and determine the appropriate level of NEPA analysis for the project (NPS 2010f).

6.2.8 U.S. Forest Service

Portions of Humbolt–Toiyabe National Forest are located within the cumulative impacts ROI in Nye and Clark Counties. The majority of proposed actions identified for the Forest Service within the cumulative impacts ROI consist of activities to manage National Forest lands, such as vegetation management; development and rehabilitation of trails, campgrounds, and picnic areas; mineral exploration; and livestock grazing (USFS 2007, 2009c, 2010a).

On January 14, 2009, the U.S. Department of Agriculture, Forest Service, signed a ROD for the *Energy Corridors PEIS* (USFS 2009e) to amend relevant forest management plans and designate Section 368 energy corridors therein. There are no Section 368 energy corridor segments on Forest Service land within the cumulative impacts ROI.

In 2009, the Forest Service permitted the Las Vegas Ski and Snowboard Resort to increase the size of the snowmaking water storage pond from an existing full pond water surface of 0.6 acres to approximately 1.2 acres of water surface area, increase pond depth by approximately 15 feet, and increase the northeastern embankment by about 15 feet (USFS 2009b).

In a December 2009 ROD under the final EIS for the Middle Kyle Complex, the Forest Service decided to implement, with modifications, the Market-Supported Alternative and authorized construction of recreation and administrative facilities in the Kyle Canyon area of the Spring Mountain National Recreation Area. The ROD also provided direction to manage recreation use such as dispersed camping in the Kyle Canyon, Lee Canyon, and Deer Creek areas (USFS 2009d). Construction of the Market-Supported Alternative would permanently disturb approximately 330 acres and temporarily disturb about 580 acres. A total of 44 miles of new trails and trail improvements would be constructed, including multiuse trails in previously undisturbed vegetation communities (USFS 2009c).

6.2.9 Nye County

Nye County is proposing several projects within the cumulative impacts ROI that it considers to be reasonably foreseeable future actions. Most of the following information was derived from input provided by Nye County, which is reproduced in its entirety in Section 6.2.9.4.

6.2.9.1 Nye County Water District

In 2007, the State of Nevada passed a law (Chapter 542, Statutes of Nevada 2007, pp. 3396–3402) creating the Nye County Water District, with jurisdiction consisting of all the land within the boundaries of Nye County. Future actions by the Nye County Water District are likely to involve acquisition of land and water rights and other resources related to water resources management and supply. One of the major environmental and socioeconomic issues associated with residential and commercial development in southern Nye County is the demand and competition for scarce water resources. Groundwater resource limitations have the potential to affect both residential and commercial development in Nye County. Included in these concerns is the quantity and quality of groundwater from the NNSS, which naturally flows into southern Nye County along multiple flow paths, and has the potential to directly impact the quality and quantity of water available to communities, residents, and developers in the area from Beatty to Amargosa Valley (see Section 6.3.6.2, "Groundwater"). Nye County has been participating with DOE, NNSA, U.S. Geological Survey, and Desert Research Institute to study and understand groundwater availability and quality in the Amargosa Valley area and southern portions of Nye County.

6.2.9.2 U.S. Route 95 Technology Corridor

Nye County has outlined a strategy for a Technology Corridor along U.S. Route 95 (EDEN 2007). The corridor would extend from Indian Springs in Clark County in the south to Tonopah in the north, passing through the Pahrump Valley, Mercury (entrance to the NNSS), Amargosa Valley, Beatty, and Goldfield (Esmeralda County). Nye County would like to increase industrial space to accommodate new high-technology businesses by completing the Amargosa Valley Science and Technology Park at Lathrop Wells (see Section 6.2.9.3, "Nye County's Amargosa Valley Land Use Concept Plan"), assisting Beatty to reuse the Barrick Bullfrog site adaptively for new industry and encouraging Pahrump to facilitate a business park for the Pahrump Valley. As part of its technology corridor, a major goal of Nye County is to pursue development of renewable energy along the U.S. Route 95 corridor (EDEN 2007). There are no specific facilities or other developments proposed as part of this strategy at this time.

6.2.9.3 Nye County's Amargosa Valley Land Use Concept Plan

Nye County prepared the *Yucca Mountain Project Gateway Area Concept Plan* with proposed land use designations for an area of about 5,760 acres around the entrance to the formerly proposed Yucca Mountain site (Giampaoli 2007). The former Yucca Mountain Project has been determined to be "not a workable option for a nuclear waste repository" and has been discontinued; however, Nye County's *Yucca Mountain Project Gateway Area Concept Plan* presents a proposed multiphase land use plan for the area of the town of Amargosa Valley that is adjacent to the southwest corner of the NNSS. Nye County proposed this plan to ensure that land development in the area occurs in an orderly manner and to increase opportunities for industrial and commercial development consistent with NNSS-related activities and other activities along the U.S. Route 95 Technology Corridor, such as development of renewable energy projects. Nye County also plans to nominate Crater Flat lands for disposal in the BLM resource management plan amendment process.

As the host county for the NNSS and a cooperating agency in development of this *NNSS SWEIS*, Nye County requested inclusion of their input on cumulative impacts. The following section was prepared by Nye County to present its perspective regarding cumulative impacts within the county. This Nye County perspective should in no way be construed to represent the position of DOE or NNSA on any particular issue.

6.2.9.4 Nye County Input for this Site-Wide Environmental Impact Statement

Nye County Input for the Site-Wide Environmental Impact Statement for the Continued Operation of the Department of Energy/National Nuclear Security Administration Nevada National Security Site and Off-Site Locations in the State of Nevada (NNSS SWEIS)

Nye County is proposing several projects that can be considered as reasonably foreseeable future actions and there are other activities, underway or planned, that will impact Nye County.

Water Resources and Nye County Water District

The State of Nevada, in 2007, passed a law (Chapter 542, Statutes of Nevada 2007, pages 3396-3402) creating the Nye County Water District (District), with jurisdiction consisting of all the land within the boundaries of Nye County. The law provides for the acquisition, storage, sale, and distribution of water by the District, and authorizes the District to levy and collect taxes to assist in covering operational expenses. The governing Board of the District was established by the Nye County Board of County Commissioners in 2009. The District has the power to manage water resources and to supply water to any department or agency of the U.S government, the State of Nevada, Nye County, and any town, corporation, association, or person in Nye County, for an appropriate charge. Although water supply is not a current function, future actions by the District are likely to involve acquisition of land and water rights and other resources related to water resources management and supply.

Under Cooperative Agreements with the DOE Yucca Mountain Project Office, Nye County has conducted over 15 years of geologic and hydrogeologic studies related to characterization of groundwater and groundwater resources in the area southwest (down gradient) of the NNSS. This work involved the drilling of over 40 wells. Related studies include aquifer testing, alluvial tracer testing, geochemistry, structural geology, and surface and borehole geophysical surveys. Much of this work is summarized in reports on each phase of drilling (references from the Nye County Nuclear Waste Repository Project Office [NWRPO] website below).

NWRPO, 2001 (Summary FY96-01):
http://www.nyecounty.com/RID_data/RID4527/RID4527text.pdf

NWRPO, 2003 (Phase III): http://www.nyecounty.com/RID_data/rid5579/RID5579_rpt.pdf

NWRPO, 2005 (Phase IV): http://www.nyecounty.com/RID_data/RID6801_Text.pdf

NWRPO, 2009 (Phase V): http://www.nyecounty.com/RID_data/rid7668_report.pdf

Currently, Nye County is conducting an evaluation of groundwater resources in southern Nye County under a grant from the DOE. Studies completed to date include shallow geophysical and geologic investigations of sub-surface hydrogeology at Ash Meadows. A groundwater flow model was developed by Desert Research Institute (DRI) for the Pahrump Valley, and is currently in the calibration stage. Additional major tasks planned under this grant include: drilling and construction of 15 water table piezometer wells in the Oasis, Amargosa, and Pahrump valleys; collection and analysis of water samples to establish baseline water quality at selected wells in Amargosa Desert and Pahrump Valley; evaluation of perennial yield in Basin 230, which lies just to the south of the NNSS, through a cooperative Nye County-U.S. Geological Survey (USGS) evapotranspiration study; and simulation/evaluation of the effects of pumping in key areas in Amargosa Valley and Ash Meadows through development and use of a USGS groundwater flow model.

One of the major environmental and socioeconomic issues associated with residential and commercial development in southern Nye County is the demand and competition for scarce water resources, particularly in the case of wet-cooled solar thermal designs that have been proposed. Groundwater resource limitations have the potential to affect both residential and commercial development in Nye County. Included in these concerns is the quantity and quality of groundwater from the NNSS, which naturally flows into southern Nye County along multiple flow paths, and has the potential to directly impact the quality and quantity of water available to communities, residents, and developers in the area from Beatty to Amargosa Valley. Nye County is also concerned about future County access to water resources on the NNSS and is making an effort to work with the Nevada Site Office to increase understanding of water volume, flow paths, and quality. Increased understanding would benefit not only the County, but all agencies and communities downstream from the NNSS.

Continued protest of Nye County's water rights applications by federal agencies (including the U.S. National Park Service, U.S. Fish &Wildlife Service, U.S. Air Force, and DOE) could result in cessation of development in areas on and/or near the NNSS and in Amargosa Valley, where several renewable energy projects are planned (see Section 6.2.2.x.4). The primary rationale for protesting water rights has been the restrictions on the right to access the land (Nevada State Engineer, 2008a,), and the protection of the Devils Hole Pupfish (Nevada State Engineer, 2008b). However, it has not been proven that pumping in the Amargosa Farms area affects the water level in Devils Hole. Based on scientific work by Nye County, Inyo County, and other agencies, it appears that faults in the area (particularly the Gravity fault, which lies between the Amargosa Farms area and Devils Hole) may act as barriers to groundwater flow that would protect Devils Hole from the potential effects of pumping.

Land-Use Planning

Bureau of Land Management and Other Agency Planning. Nye County participates in the updating of the Battle Mountain and Southern Nevada BLM District Resource Management Plans (RMPs). Participation includes discussion of actions and activities as well as the preparation of formal comments concerning current and planned actions that may affect BLM, Nye County, and adjacent counties; and the identification of disposal lands.

Nye County's experience has shown that the early discussion of federal- and state-agency plans and actions prior to their implementation is frequently beneficial to both the agency and Nye County. These discussions allow the informal introduction of problems and concerns, and the development of solutions to address them. These discussions have proven to be beneficial in that they reduce or eliminate what could otherwise be lengthy and acrimonious legal and political disputes. It also tends to eliminate misunderstandings and hard feelings that would otherwise delay or derail current and future actions and agreements.

Yucca Mountain Project Gateway Area Concept Plan. Nye County has completed a *Yucca Mountain Project Gateway Area Concept Plan* (Concept Plan) with proposed land use designations for the area around the entrance to the proposed Yucca Mountain repository site (Giampaoli, 2007). Whether or not the repository is developed, this land (nine sections) has been designated by the Bureau of Land Management (BLM) for disposal. The Concept Plan presents Nye County's proposed multiphase land use plan for the portion of the town of Amargosa Valley that is adjacent to and near the Yucca Mountain site entrance at the southwest corner of the NNSS. Nye County proposed this Concept Plan to ensure orderly land development associated with potential Yucca Mountain and NNSS-related activities, or

with other activities along the U.S. 95 Technology Corridor, such as development of renewable energy projects. Nye County views this plan as a starting point for development of the infrastructure, institutional capacity, and facilities to offset the potential impacts associated with activities in the vicinity, while also benefiting these activities. Nye County developed the plan to use and manage existing initiatives while expanding and improving the area. The stated purposes of the Concept Plan are applicable to development in the vicinity of the NNSS and the proposed Yucca Mountain Project Gateway:

Describe key objectives and methods to manage the expected impacts of reasonably foreseeable activities, which would include growth in neighboring towns;

Review existing conditions and identify necessary planning and infrastructure improvements;

Review financial options for land and utility development; and

Present a land use concept to ensure orderly and compatible development for the area near the Yucca Mountain site entrance at the southwest corner of the NNSS.

Nye County plans to nominate Crater Flat lands for disposal (transfer of land) in the Bureau of Land Management Resource Management Plan amendment process.

U.S. Highway 95 Technology Corridor

Nye County has outlined a strategy for a Technology Corridor along U.S. Highway 95 (EDEN, Inc., 2007). The corridor extends from Indian Springs in Clark County in the south to Tonopah in the north, passing through the Pahrump Valley, Mercury (entrance to the NNSS), Amargosa Valley, Beatty, and Goldfield (Esmeralda County). Nye County would like to increase industrial space to accommodate new high-technology businesses by completing the Amargosa Valley Science and Technology Park at Lathrop Wells, assisting Beatty to adaptively reuse the Barrick Bullfrog site for new industry, and encouraging Pahrump to facilitate a business park for the Pahrump Valley. Nye County's goals for the Technology Corridor are to change economic diversity of the region's industries, transform the regional economy to one more closely associated with national trends, and increase the presence of green energy industry in the region.

As part of its Technology Corridor, a major goal of Nye County is to pursue development of renewable energy along the U.S. Highway 95 corridor (EDEN, Inc., 2007, Goal 1-7, p. C-1). Wide expanses, sunny climate, and high solar incidence offer abundant opportunity to employ solar energy options to meet energy demand and lower operating costs for households and businesses. Nevada has created an incentive for power utilities to invest in alternative energy. To increase renewable energy research and development activities, Nye County plans to work cooperatively with: 1) the DOE National Laboratory for Renewable Energy to provide contracts to regional providers; 2) private industry to attract investments to promote renewable energy projects; 3) installation providers to recruit and provide skill training through Great Basin College to local workers; and 4) utilities to develop additional transmission capacity for renewable energy projects.

Renewable Energy Developments

Nye County is signatory to the Nye County-BLM Memorandum of Understanding (MOU) for Renewable Energy. Signatories include Nye County and each of the four BLM District Offices with responsibilities within Nye County (Battle Mountain, Southern Nevada, Elko, and Carson City). Under the Nye County-BLM MOU for Renewable Energy, the County is a Cooperating

Agency and provides input to all Environmental Impact Statements (EISs) and actions that apply to or affect renewable energy within the County. This includes transmission capacity development in areas outside of Nye County that will have effects upon developments within Nye County. Nye County is also a cooperating agency on the DOE-BLM Programmatic Environmental Impact Statement to Develop and Implement Agency-Specific Programs for Solar Energy Development (74 FR 31307, June 30, 2009), which covers solar energy and transmission development in six western states, of which Nevada is one.

The BLM has received right-of-way permit applications from renewable energy developers for numerous solar, wind, and geothermal energy facilities in Nye County. The locations of the applications by developers for land within a 50-mile area around the NNSS, Nevada Test and Training Range, and Tonapah Test Range are depicted on the map located at the end of this section. The applications are in varying stages of the review process for obtaining Right-of-Way (ROW) leases from BLM. Nye County facilitates communications between the developers and federal, state, and local agencies to ensure information is fully and properly communicated, and to encourage cooperative efforts in moving renewable energy projects forward. This includes communications with transmission developers and providers, and agencies such as the DOE, the U.S. Department of Agriculture, the Public Utilities Commission of Nevada, the Federal Energy Regulatory Commission, the Western Area Power Administration, and similar California agencies that are concerned with the production and transmission of renewable energy.

Nye County coordinates with the Department of Defense regarding the applications submitted by renewable energy developers and related transmission developers and providers, and intends to continue the cooperative effort in the future. Nye County is also working to facilitate development of transmission lines to support transmission of the energy produced by the proposed renewable energy facilities to markets in Nevada, California, and other states. Nye County works closely with federal and state agencies (e.g., the DOE-Energy Efficiency and Renewable Energy Office, the U.S. Environmental Protection Agency, the Nevada State Office of Energy, etc.) to increase the use of renewable energy and increase transmission capacity within Nye County, adjacent counties, and the State of Nevada.

Water resources are of particular interest to Nye County and its communities and residents because of the arid nature of the area. Nye County provides input to and coordination with all state and federal agencies whose actions impact the quantity and quality of water within the County. Renewable energy developers are encouraged to use dry cooling whenever possible. Where dry cooling cannot be used, hybrid technology is recommended and encouraged. Particular attention is paid to blow back, cooling, and storm water diversion ponds because of concern regarding the proper handling and disposal of evaporate products, the condition of brine and ground water at renewable energy sites, and water naturally returning to or reinjected into the water table. Included in these concerns is water from the NNSS, which flows into southern Nye County to the south and west of the NNSS and has the potential to affect the quality and quantity of water available to communities, residents, and developers.

Four of the applications for ROW leases submitted to date in Nye County are drafting or completing Environmental Impact Statements: Solar Reserve, Solar Millennium, Abengoa Solar, and Pacific Solar Investments.

Solar Reserve has submitted a plan of development to BLM for a 100-megawatt (MW) concentrated solar power project (Crescent Dunes) capable of producing approximately

500 gigawatt hours (GWh) of renewable energy annually. The 653-foot power tower and its surrounding heliostats will heat liquid salt, which will be stored and used to generate electrical energy through a conventional steam turbine cycle, after which the cooled salt will be recycled through the system for reheating. The Solar Reserve site is approximately 16 miles north-northwest of the Tonopah Airport.

Solar Millennium has submitted a plan of development for two 242-MW concentrating solar trough projects on approximately 4,350 acres, located north of Amargosa Farm Road and east of Valley View Road, in Amargosa Valley, approximately 5 miles south of U.S. Highway 95 and 5 miles west of State Highway 373. The plan calls for dry cooling towers, which would be approximately 140 feet high.

Abengoa Solar has submitted a plan of development for a 250-MW net parabolic trough solar power plant with an option to expand the facility by adding a second 250-MW unit. Additionally, the Lathrop Wells Solar Facility may include up to 20-MW of photovoltaic (PV) solar power. The Lathrop Wells Solar Facility would be located on 5,336 acres south of US Highway 95 and west of State Highway 373, in Amargosa Valley, at the former Jackass Aeropark. The plan calls for dry cooling towers that would be approximately 140 feet high.

Pacific Solar Investments has submitted a plan of development for a 300-MW photovoltaic (PV) facility north of the Big Dune Area of Critical Environmental Concern (ACEC) in Amargosa Valley, south of U.S. Highway 95. A second facility is proposed to be located to the south of the Big Dune ACEC, which will be a 500-MW PV facility. Both facilities are located on the west side of the town of Amargosa Valley.

In addition, Ewind Farms has submitted a request for a right-of-way lease for a commercial solar power generation facility of 8 gigawatts on land within and adjacent to the Nevada National Security Site, south and west of the Yucca Mountain tunnel.

DOE has advised Nye County that it is considering locating two solar renewable energy sites on 25 square miles of land in Area 25, just north of the area covered by the *Yucca Mountain Project Gateway Area Concept Plan*. One site would be a solar demonstration facility comprising four to six demonstration plants ranging from 1 to 10 MW each, generating up to 30 MW of power to be used on the NNSS. A second site would be a commercial facility that could possibly generate up to 1 gigawatt of power. Development of the transmission lines being facilitated by Nye County would also be available to support renewable energy and other development on the NNSS.

Several renewable energy developers have entered into agreements with Nye County regarding the development of a PV facility at the Tonopah Airport. Nye County is working with the developers and an EPA contractor to address transmission accessibility at the airport, a former Brownfield's site.

U.S. Department of Justice Detention Facility

The U.S. Department of Justice (DOJ) Office of the Federal Detention Trustee and the U.S. Marshals Service determined that there was a need to house federal detainees at a facility near Las Vegas. In March 2008, the DOJ published the *Final Environmental Impact Statement for the Proposed Contractor Detention Facility, Las Vegas, Nevada Area* (DOJ, 2008). The preferred alternative identified in the EIS was a 120-acre site in Pahrump, about 25 miles from the NNSS. Facility operation is expected to begin in October 2010 and employ 200 to 250 people. Operation of the detention facility is anticipated to result in a number of new contractor

employees who are either current residents of Nye County or who relocate to Nye County, with the remainder of the new contractor employees expected to be current residents of Clark County who would continue to reside in Clark County within commuting distance.

Coordination and Cooperation with Government Programs

Nye County has worked cooperatively with the DOE Yucca Mountain Project to provide a number of services normally provided by local government to its residents. These services have significantly benefited the Yucca Mountain Project through reduced costs and high-quality service. They have also benefited Nye County by increasing its capability to provide services to both local communities and to DOE for Yucca Mountain. Nye County believes that similar agreements with the NNSS would be equally beneficial to both parties and should be incorporated in future agreements. Those services would be provided on a government-to-government basis and could include normal Public Works, Law Enforcement, and Emergency Services, strengthening the abilities of both Nye County and the NNSS to meet both normal and anticipated emergency needs. Such agreements would also allow better implementation of the National Incident Management System (NIMS), the National Response Framework, and related programs and Presidential Directives.

References

Department of Justice, 2008. *Final Environmental Impact Statement for the Proposed Contractor Detention Facility, Las Vegas, Nevada Area.*

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Nevada State Engineer, 2008a. Nevada State Engineer's Ruling 5858. http://images.water.nv.gov/images/rulings/5858r.pdf

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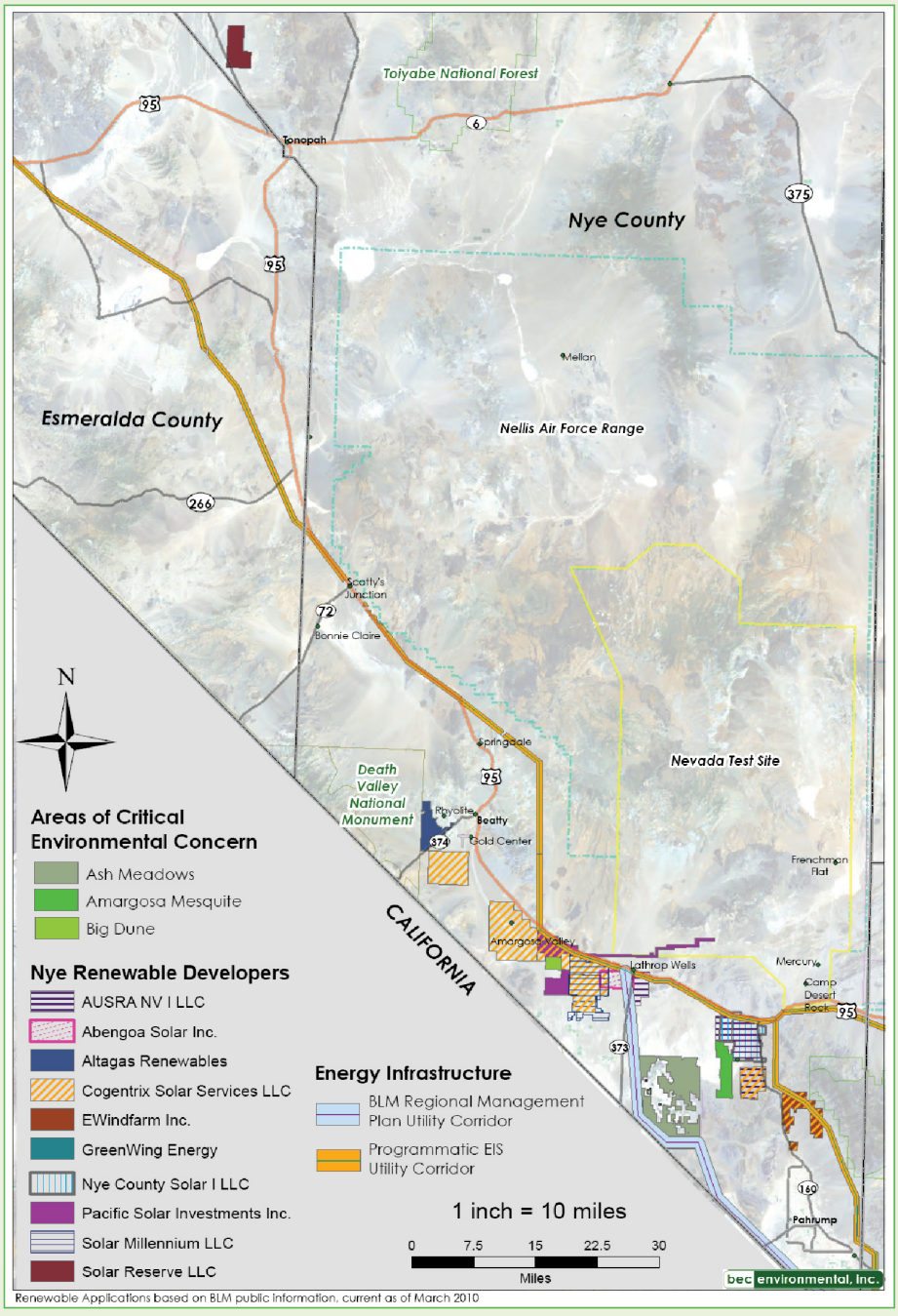
NWRPO, 2009 (Phase V): http://www.nyecounty.com/RID_data/rid7668_report.pdf



Renewable Energy Developer Permit Application Land Areas

6.2.10 Clark County and Las Vegas Area, Nevada

The Regional Transportation Plan for Clark County (RTCSN 2008) projected that, by 2020, the population of Clark County will increase by 1,143,071, from about 1,912,955 in 2006 to about 3,056,026 in 2020 (RTCSN 2008), an approximate 60 percent increase. A number of factors will influence this projected growth and attendant development, including water availability, air quality, the strength of the tourism industry (particularly the gaming sector), and the cost of housing. The Regional Transportation Plan further projected that about 63,533 acres of land will be developed within Clark County during the 2010 to 2020 timeframe (RTCSN 2008). Some of that land is outside the cumulative impacts ROI for this *NNSS SWEIS*. To refine the estimate of potentially developed land, the acreage for Henderson (14,523 acres) was subtracted, resulting in a conservative estimate of 49,010 acres of land within the ROI that is projected to be developed. This area of potential development is included within the areas that may be developed under the BLM Las Vegas Valley Land Disposal and the USFWS Clark County MSHCP, but is not included in the potential land disturbance areas in this cumulative impacts assessment.

Within the cumulative impacts ROI, in rural Clark County and the Las Vegas metropolitan area, no specific projects were identified for analysis from reviews of the following: the *Clark County Comprehensive Plan* (CCCP 2010), the *Northeast Clark County Land Use Plan* (CCCP 2006), the *Northwest Clark County Land Use Plan* (CCCP 2007), planning documents from the City of Las Vegas (LVPC 2000, DFBS 2009), the City of North Las Vegas Downtown Master Plan (NLV 2009), and the *Coyote Springs Development Environmental Impact Statement* (USFWS 2008). Most of the proposed or ongoing projects that were identified during that review were urban development within already-disturbed areas, such as Las Vegas and North Las Vegas, and would have little or no cumulative effect with NNSA activities in the state of Nevada. One large proposed project, the Coyote Springs Development, is located outside of the ROI.

6.2.11 Lincoln County, Nevada

BLM has proposed two separate but related potential projects of concern to cattlemen, ranchers, sportsmen, mining companies, and offroad vehicle enthusiasts in Lincoln County (Maxwell 2010). The first is a draft concept for a National Conservation Area consisting of 600,000 acres in Garden and Coal Valleys. The second consists of the consideration of two areas for solar development in Lincoln County: Delamar Valley (approximately 2,850 acres) and Dry Lake Valley (approximately 19,980 acres).

The National Conservation Area that is proposed would not affect existing rights (i.e., roads, rights-of-way, mining claims, or other valid existing rights). Grazing, hunting, fishing, and trapping would continue in the conservation area, in accordance with Federal and state law (Maxwell 2010). Access to and use of other private parcels within the National Conservation Area would not be affected. A management plan for the conservation area is expected to be completed by BLM within 3 years (Maxwell 2010).

A potential solar energy project in Rachel, Nevada, on Toreson Industries property, off Nevada State Route 375 heading east on Smith Well Road, may be implemented. No permit applications have been submitted for this project at this time.

A possible upgrade to the Tempiute power line may occur within the next 10 years; no permits for this project have been submitted at this time.

6.2.12 Esmeralda County, Nevada

Several projects that may occur in Esmeralda County are still in a speculative phase and are not considered reasonably foreseeable. These include future storm drain projects in Goldfield and Silver Peak; a potential airport north of Goldfield; and rerouting U.S. Route 95 in the Goldfield area.

6.2.13 Inyo County, California

Almost all of the land in Inyo County, California, that falls within the cumulative impacts ROI for this *NNSS SWEI*S is Federal (BLM and NPS) or state land (Inyo County 2002). The communities of Shoshone, Tecopa, and Tecopa Springs are the main towns in the area. There were no nonfederally proposed actions identified within the portion of Inyo County that is included in the cumulative impacts ROI. Proposed Federal actions within Inyo County are addressed in Sections 6.2.4, "Bureau of Land Management," and 6.2.7, "National Park Service."

6.2.14 US Ecology, Inc., Beatty, Nevada

US Ecology operates a permitted solid waste treatment, storage, and disposal facility near Beatty, Nevada, located about 100 miles northwest of Las Vegas in the Amargosa Desert. Among other waste types, at its Beatty facility, US Ecology accepts Resource Conservation and Recovery Act (RCRA) hazardous wastes, polychlorinated biphenyl (PCB)-contaminated materials, and asbestos or asbestos/RCRA debris. US Ecology is currently not permitted to accept LLW or mixed low-level radioactive waste (MLLW) (US Ecology 2010); however, between September 1962 and December 1992, the site disposed about 4,862,000 cubic feet of radioactive waste containing about 709 curies of byproduct material, about 4,807,000 pounds of source material, and about 606 pounds of special nuclear material (Laney 2010). Since acceptance of radioactive waste ceased at its Beatty facility, US Ecology completed a state-approved closure plan to stabilize the site and establish proper security measures. The plan was intended to ensure that the LLW disposed during the operational phase of the facility continued to remain in a suitable, stable, and safe condition after site closure. The Nevada State Health Division continues to monitor for radioactivity in groundwater, air, soil, and vegetation (NSHD 2010). The US Ecology facility at Beatty is a RCRA-permitted facility with engineered barriers and systems and administrative controls that minimize the potential for offsite migration of hazardous constituents, and the Nevada State Health Division continues to monitor the site. In addition, the regional climate of southern Nevada is very arid, with an evapotranspiration rate that far exceeds precipitation, and the depth to groundwater is several hundred feet. For these reasons, NNSA determined that cumulative postclosure impacts from the Beatty LLW disposal facility would be very unlikely.

6.3 Cumulative Impacts Analysis

The following analysis addresses the potential cumulative impacts from past, present, and reasonably foreseeable actions at NNSA sites and facilities in the state of Nevada and similar actions by other Federal and state agencies, local governments, and private parties. Where appropriate, impacts from the NNSS (including environmental restoration activities on the Nevada Test and Training Range), RSL, NLVF, and the TTR are considered separately; otherwise they are combined. **Table 6–4** shows the area of potential land disturbance for all applicable resources. The land disturbance figures were derived from the information contained in Section 6.2, "Potentially Cumulative Actions" and Table 5–1, "Potential Area of Land Disturbance at the Nevada National Security Site for Each Mission Area, Program, and Activity by Alternative" and may differ slightly from figures in those tables due to rounding.

Table 6–4 Area of Potential and Existing Ground Disturbance Used in the Cumulative Impacts Analysis

Cause of Disturbance	*Disturbed Area (acres)* [a]
Estimated Potential Land Disturbance Within the Cumulative Impacts Region of Influence	
Proposed renewable energy facilities (BLM)	143,000 [b]
Yucca Mountain Project Gateway Area (Nye County)	5,800 [c]
Targets at Nevada Test and Training Range (U.S. Air Force)	400 [d]
GTCC Waste disposal (DOE)	110 [e]
EERE Concentrating Solar Power Validation Project (DOE)	110
Las Vegas Valley land disposal (BLM)	36,000 [f]
Las Vegas Valley estimated land disturbance under a modified Multi-Species Desert Habitat Conservation Plan	324,000 [g]
U.S. Forest Service, Middle Kyle Complex	330 [h]
Total Potential Non-NNSA-Related Land Disturbance	**509,750**
NNSA Actions at the NNSS and the TTR (based on Expanded Operations Alternative), including one or more potential commercial solar power generation facilities in Area 25 of the NNSS and Geothermal Demonstration Project	4,500 No Action 26,000 [I] Expanded Operations 2,700 Reduced Operations
Total Potential Land Disturbance	**514,250** No Action **535,750** Expanded Operations **512,450** Reduced Operations
Estimated Existing Land Disturbance Within the Cumulative Impacts Region of Influence	
Estimated Existing Disturbed Area in Clark County	215,000
Estimated Existing Disturbed Area in Nye County	51,000
Estimated Existing Disturbed Area at the NNSS	80,000
Total Estimated Existing Disturbed Land	**346,000**
Estimated Total Potential and Existing Land Disturbance Within the Cumulative Impacts Region of Influence	**860,250** No Action **881,750** Expanded Operations **858,450** Reduced Operations

BLM = Bureau of Land Management; EERE = DOE Office of Energy Efficiency and Renewable Energy; GTCC = greater-than-Class C; NNSA = National Nuclear Security Administration; NNSS = Nevada National Security Site; TTR = Tonopah Test Range.

[a] Number of acres of potential and existing land disturbance represent estimates of areas of disturbance and have been rounded.

[b] From Table 6–3, "Summary of Renewable Energy Projects Within the Cumulative Impact Region of Influence."

[c] *Yucca Mountain Project Gateway Area Concept Plan* (Giampaoli 2007).

[d] *Range 74 Target Complexes Environmental Assessment Nevada Test and Training Range, Nevada*, July 2007 (USAF 2007d).

[e] *Draft Environmental Impact Statement for the Disposal of Greater-Than-Class C (GTCC) Low-Level Radioactive Waste and GTCC-Like Waste* (DOE/EIS-0375-D) (DOE 2011).

[f] *Draft Supplemental Environmental Impact Statement Upper Las Vegas Wash Conservation Transfer Area, Las Vegas, Nevada* (BLM/NV/EL/ES-10-06+1793) (BLM 2010b).

[g] Clark County Multi-Species Habitat Conservation Plan (USFWS 2000) and Notice of Intent to prepare an EIS; and notice of public scoping meetings for a proposed Amendment of the Clark County Multi-Species Habitat Conservation Plan and Issuance of an Amended Incidental Take Permit (74 FR 50239).

[h] *Final Environmental Impact Statement Middle Kyle Complex, Spring Mountains National Recreation Area, Humboldt Toiyabe National Forest, Clark County, Nevada* (USFS 2009c).

[i] From Chapter 5, Table 5–1, "Potential Area of Land Disturbance at the Nevada National Security Site for Each Mission Area, Program, and Activity by Alternative."

6.3.1 Land Use

Under both the Expanded Operations and Reduced Operations Alternatives, NNSA is proposing changes in the NNSS land use zones. Under all three alternatives, the name of the Solar Enterprise Zone would be changed to the Renewable Energy Zone. Under the Expanded Operations Alternative, the designation for Area 15 would be changed from Reserved Zone to Research, Test and Experiment Zone, and the Renewable Energy Zone in Area 25 would expand from about 2,400 acres to 39,600 acres. Under the Reduced Operations Alternative, NNSA would change the designation of Nuclear Test Zone for Areas 19 and 20 and Reserved Zone for Areas 18, 29, and 30 to Limited Use Zone.

Although land use zones under both alternatives would change, this change is not considered an adverse impact. The NNSS developed the land use zones for internal organizational and functional uses and to group similar uses and activities into specific areas based on the support needs of the NNSS mission as determined by previous and anticipated uses. Because the land use changes that would occur under the Expanded Operations or Reduced Operations Alternative would be consistent with the missions of DOE and NNSA at the NNSS and would not affect land uses outside of the NNSS boundaries, there would be no cumulative impacts on land use from any of the alternatives addressed in this *NNSS SWEIS*. Although there would be no cumulative impacts on land use from changes of use of NNSS lands, there may be cumulative impacts on other resources, such as wildlife, vegetation, cultural resources, and socioeconomics, which will be addressed under the appropriate resource areas. However, current land use for large areas of undisturbed land in Amargosa Valley would be changed by construction of reasonably foreseeable solar energy generation projects and Nye County's Yucca Mountain Project Gateway Area development. The cumulative impacts of these land use changes would be withdrawal of approximately 148,800 acres of land in Nye County from public use and commitment of that land to use for renewable energy facilities or commercial/industrial uses.

In Clark County, BLM would dispose up to about 36,000 acres of public land. Use of this land would be changed from its current public uses and it would be made available for private and/or municipal uses.

A very large percentage of the land in Nye County is owned by the Federal Government and administered by several different agencies. Much of the land managed by BLM is available for public use; however, lands managed by the U.S. Department of Defense and DOE have very strict access controls and are not available for any public use. This limits the land available in the county for development of industrial, commercial, municipal, or residential uses. There are no proposals to make large-scale reductions in the amount of land managed by Federal agencies in Nye County; likewise, there are no proposals to increase the amount of such lands. In fact, BLM land disposal actions from time to time make parcels of federally owned land available, thus marginally reducing the proportion of Federal land in the county. It is also important to note there is sufficient undeveloped non-Federal land available in Nye County that growth and development are not being hampered by lack of available land at this time.

6.3.2 Infrastructure and Energy

Impacts on infrastructure are primarily captured in other resource areas. NNSA would construct new infrastructure as needed and continue to appropriately disposition excess infrastructure. As new infrastructure is added, there would be impacts on various resources, such as soils, biology, air, and socioeconomics. Likewise, when infrastructure is dispositioned, there would be other impacts on some of the same resources. For instance, if a building or road is removed and the disturbed area is revegetated with appropriate native species, there would be a positive impact on wildlife habitat and soils along with temporary adverse air quality impacts.

Construction of new facilities, particularly large projects, would place cumulative demands on goods and services. All of the proposed renewable energy projects in Amargosa Valley and Area 25 of the NNSS

would have similar needs for large tracts of undeveloped land and water; use earth-moving/grading equipment, cranes, and other construction equipment; require similar materials, such as concrete, steel, wood, wiring, cables, etc.; and require the services of both general and specialized construction workers. The cumulative effects of these impacts are captured in the analyses for each affected resource.

Large-scale construction projects, particularly renewable energy facilities in Amargosa Valley and Area 25 of the NNSS, that would create cumulative impacts on traffic and roadways in the region are addressed in Section 6.3.3, "Transportation."

In 2009, NNSA facilities in Nevada used almost 84,600 megawatt-hours of electricity. During the same year, NV Energy (southern division) and Valley Electric Association provided about 21,200,000 megawatt-hours and 470,000 megawatt-hours, respectively, of electricity to their customers (NSOE 2010), totaling almost 21,670,000 megawatt-hours. NNSA's use of electricity represents about 0.4 percent of the total electricity supplied by the two major electrical utilities in southern Nevada. The Nevada Public Utilities Commission forecasts a 1.5 percent growth rate in electricity sales through 2020 (NDEP 2008). Based on that growth rate, by 2020, total electricity sales in southern Nevada would be about 25,530,000 megawatt-hours. Based on the projected level of activities and number of employees at NNSA facilities in Nevada under the Expanded Operations Alternative, it is estimated that the cumulative demand for electrical energy at the NNSS, RSL, NLVF, and the TTR in 2020 would be about 150,000 megawatt-hours. This would represent about 0.6 percent of the total demand for electrical energy in southern Nevada by 2020, which represents a slight increase in the proportion of electrical energy consumed by NNSA-related activities in the region. This estimate does not take into account energy conservation measures that are being implemented, nor does it consider the reduction in commercial electrical service demand at the NNSS due to construction of a proposed 5-megawatt photovoltaic electrical generating facility in Area 6, from the DOE Office of Energy Efficiency and Renewable Energy-proposed CSP Validation Project, or from any commercial solar power generation facilities that would be constructed at the NNSS. Any one of these factors could result in a decrease in the proportion of NNSA's demand for electrical power in the region.

Currently, in southern Nevada, there are about 7,800 megawatts of electrical generating capacity available. Based on projected southern Nevada electrical energy demand in 2020, the available generating capacity would be adequate; however, much of that capacity is owned by or contractually obligated to electrical utilities in other regions such as Arizona and southern California. For instance, most of the electricity generated at Hoover Dam is transmitted for use outside of Nevada. However, with development of up to about 5,800 megawatts of solar power generation facilities in the Amargosa Valley area, electrical generating capacity in southern Nevada would continue to be adequate to meet projected demand, provided adequate electrical transmission line capacity is developed to transmit the power (see Section 6.2.2.4).

6.3.3 Transportation

Increased traffic on U.S. Route 95 and other local roadways, primarily in Nye County, resulting from construction and operation of renewable energy projects in Amargosa Valley (including one or more commercial solar power generation facilities in Area 25 of the NNSS) and development of the Yucca Mountain Project Gateway Area would increase wear and tear on the roads and, consequently, maintenance requirements. During construction, roads in Nye County could experience high levels of incremental increases in daily traffic, ranging from a 2- to 5-fold increase in some instances on primary roads such as U.S. Route 95 and Nevada State Route 160, which could degrade levels of service from A to D during peak commuting hours. During operations, primary roadways could experience 30 to 50 percent increases in daily traffic, and levels of service could degrade one level during peak commuting

hours. The degradation in levels of service caused by increased traffic volumes on these roads could generate the need for additional travel lanes and other improvements.

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 that would result in potential radiation exposure to a greater portion of the general population than onsite and NNSS-vicinity transportation; transportation of radioactive materials could also result in fatalities from traffic accidents. Cumulative radiological impacts from transportation are measured using the collective dose to the general population and workers because dose can be directly related to latent cancer fatalities (LCFs) using a cancer risk coefficient, as described in Appendix D, Section D.5.1, of this *NNSS SWEIS*.

In addition to those impacts addressed in this *NNSS SWEIS* (see Chapter 5, Section 5.1.3), 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 timeframe of impacts was assumed to begin in 1943 and continue to some foreseeable future date. The current list of reasonably foreseeable DOE activities estimates risks up to 2042 (DOE 1999d). Projections for commercial radioactive material transport extend to 2073.

Table 6–5 provides a summary of total worker and general population collective doses from past, present, and reasonably foreseeable future transportation activities, as estimated in published NEPA documents. Impacts from these activities are not included in the analysis presented in Chapter 5 of this *NNSS SWEIS*.

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

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 data from the 1990 U.S. census and the U.S. highway network as it existed in 1995. The U.S. population has continuously increased over the time covered in this assessment, thereby increasing the cumulative population dose. In addition, using interstate highway routes as they existed in 1995 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 noninterstate highways, where the 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 LLW transportation impacts in the *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* may also be included in the individual DOE facilities' site-wide EISs. In addition, for reasonably foreseeable actions where no preferred alternative was identified or no ROD was issued, impact values are included for the alternative that has the largest transportation impacts. It was assumed that this *NNSS SWEIS* and other NEPA documents listed in Table 6–5, such as the *Final Sitewide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory, Los Alamos, New Mexico,* and the *Sitewide Environmental Impact Statement for the Y-12 National Security Complex*, would address transportation impacts associated with the *Complex*

Transformation Supplemental Programmatic Environmental Impact Statement; therefore, that NEPA document is not included in Table 6–5.

Table 6–5 Transportation-Related Radiological Collective Doses and Risks from Other U.S. Department of Energy Actions

Category	*Worker*		*General Population*	
	Collective Dose (person-rem)	*Risk (LCF)*	*Collective Dose (person-rem)*	*Risk (LCF)*
Historical Shipments (1943–1994) [a]				
Spent Nuclear Fuel Shipments to the NNSS	1.4	0.00	0.70	0.00
Radioactive Waste to the NNSS	82	0.05	100	0.06
Other Spent Nuclear Fuel Shipments	250	0.15	130	0.08
Subtotal	**330**	**0.20**	**230**	**0.14**
Reasonably Foreseeable Actions [b]				
Surplus Plutonium Disposition EIS	60	0.04	67	0.04
Naval Reactor Disposal	5.8	0.00	5.8	0.00
Treatment of Mixed Low-level Radioactive Waste EIS [c]	18	0.01	1.34	0.00
Waste Management PEIS [d]	15,000	9.0	17,700	10.6
WIPP SEIS II	790	0.47	5,900	3.54
Idaho High-Level Waste and Facilities Disposition Final EIS	520	0.31	2,900	1.74
Sandia National Laboratories SWEIS	94	0.06	590	0.35
Tritium Production in Commercial Light Water Reactor EIS	16	0.01	80	0.05
LANL SWEIS	580	0.35	310	0.19
Plutonium Residues at Rocky Flat EIS	2.1	0.00	1.3	0.00
Disposition of Surplus Highly Enriched Uranium Final EIS	400	0.24	520	0.31
Molybdenum-99 Production EIS	240	0.14	520	0.31
Import of Russian Plutonium-238 EA	1.8	0.00	4.4	0.00
Pantex SWEIS	250	0.15	490	0.29
Storage and Disposition of Fissile Material	N/A	N/A	2,400 [e]	1.44
Stockpile Stewardship	N/A	N/A	38 [e]	0.02
Container System for Naval Spent Nuclear Fuel	11	0.01	15	0.01
S3G and D1G Prototype Reactor Plant Disposal EIS	2.9	0.00	2.2	0.00
S1G Prototype Reactor Plant Disposal EIS	6.7	0.00	1.9	0.00
ETTP DUF_6 Transport to Portsmouth [f]	99	0.06	3.2	0.00
Spent Nuclear Fuel PEIS	360	0.22	810	0.49
Foreign Research Reactor Spent Nuclear Fuel EIS [g]	90	0.05	222	0.13
Private Fuel Storage Facility Final EIS [h]	30	0.02	190	0.11
Mixed Oxide Fuel Fabrication at Savannah River Site [i]	530	0.32	560	0.34
Enrichment Facility in Lea County EIS [j]	1,500	0.9	450	0.27
GTCC EIS [l]	500	0.32	180	0.1
Draft TC&WM EIS [m]	2,884	1.7	425	0.3
West Valley Waste Management EIS	520	0.31	410	0.25
West Valley Demonstration Project EA for the D&D and Removal of Certain Facilities	14	0.01	11	0.01
Draft Y-12 SWEIS [n]	Not listed	Not listed	Not listed	0.18
West Valley Decommissioning EIS [o]	1,900	1	310	0.2
Paducah DUF6 Conversion Final EIS [p]	174	0.06	120	0.06
Portsmouth DUF6 Conversion Final EIS [q]	93	0.04	62	0.04
Subtotal [t]	**24,800** [r]	**15**	**35,000** [r]	**21**

Category	Worker		General Population	
	Collective Dose (person-rem)	Risk (LCF)	Collective Dose (person-rem)	Risk (LCF)
General Radioactive Material Transport [b, t]				
1943–1982 [r]	220,000	132	170,000	102
1983–2073 [s]	154,000	92	168,000	101
1943–2073	**374,000**	**224**	**338,000**	**203**
Total Transportation Impacts Unrelated to this *NNSS SWEIS*				
Total Impacts (up to 2073)	**399,000** [t]	**240**	**373,000** [r]	**224**

DUF_6 = depleted uranium hexafluoride; ETTP = Eastern Tennessee Technology Park; LCF = latent cancer fatality; N/A = not available (the data are provided as a sum for workers and the public); NNSS = Nevada National Security Site; rem = roentgen equivalent man.

[a] *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (DOE 1996c). Estimates for NNSS transportation impacts for the years 1995 to 2010 are not available.

[b] Unless it is specified otherwise, all values are taken 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* (DOE 2002e) and the *Final 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 2008g).

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

[d] The values are for the low-level and mixed low-level radioactive waste transportation impacts on the NNSS, based on the amended Record of Decision for the *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste*, 65 FR 10061, February 25, 2000.

[e] Includes worker and general population doses.

[f] 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 2004e).

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

[h] 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). The impacts shown in this table reflect only those impacts associated with radioactive waste being transported to disposal sites other than the NNSS.

[i] 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).

[j] 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.

[k] DOE/EA-1651, *Final Environmental Assessment for U-233 Material Downblending and Disposition Project at the Oak Ridge National Laboratory Oak Ridge, Tennessee*, January 2010 (DOE 2010b).

[l] DOE/EIS-0375D, Draft *Environmental Impact Statement for the Disposal of Greater-Than-Class C (GTCC) Low-Level Radioactive Waste and GTCC-Like Waste* (DOE 2011).

[m] DOE/EIS-0391, *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington*, October 2009 (DOE 2009g).

[n] DOE/EIS-0387, *Draft Site-Wide Environmental Impact Statement for the Y-12 National Security Complex*, October 2009 (DOE 2009o)

[o] DOE/EIS-0226, *Final Environmental Impact Statement for Decommissioning and/or Long-Term Stewardship at the West Valley Demonstration Project and Western New York Nuclear Service Center*, January 2010 (DOE 2010c). The impacts between 2011 and 2020 are included in Chapter 5 transportation impacts, and reflect the preferred alternative with eventual clean closure. Impacts beyond 2020 are not included because no decision has been made as to the activities to be conducted beyond 2020.

[p] DOE/EIS-0359, *Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Paducah, Kentucky, Site* (DOE 2004d). Includes those transportation impacts occurring beyond the next 10 years.

[q] DOE/EIS-0360, *Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at Portsmouth, Ohio, Site* (DOE 2004e). Includes those transportation impacts occurring beyond the next 10 years.

[r] These estimates are very conservative, since few shipments were made in the 1950s and 1960s. In addition, the nonexclusive shipment dose estimates are based on a very conservative method. See the text in *General Radioactive Materials Transports* for dose estimates for shipments performed in 1975 and 1983. Totals are rounded.

[s] The annual dose estimates are similar to those for the period 1975–1982.

[t] The summed values are rounded to three significant figures.

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, as well as shipments of commercial LLW to commercial disposal facilities. The collective dose estimates from transportation of these types of materials were based on the following: (1) for the period 1943 through 1982, an NRC analysis documented in U.S. Nuclear Regulatory Commission Regulation (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 NRC 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 the general public for 1943 through 1982 (39 years) were estimated to be 220,000 and 170,000 person-rem, respectively (NRC 1977). The estimated collective doses to workers and populations for shipments in 1983 using a combination of truck and plane shipments were 1,690 and 1,850 person-rem, respectively (DOE 1995a). These doses were calculated using more-refined models than those used in the 1977 NRC report. Even though the number of shipments was larger than those of the 1977 NRC report, the estimated doses are smaller by a factor of 2 to 3. As shown in Table 6–5, the collective doses over 91 years, from 1983 through 2073, would be 154,000 and 168,000 person-rem for workers and population, respectively.

Table 6–6 provides impacts on transport workers and the general population from future transportation activities considered in this *NNSS SWEIS* in comparison to the total worker and general population collective doses estimated in Table 6–5. The impacts from transportation in this *NNSS SWEIS* are quite small compared with the overall cumulative transportation impacts. The estimated total collective worker dose from all types of shipments (historical, reasonably foreseeable actions, and general transportation) is about 399,000 person-rem (240 LCFs) for the period from 1943 through 2073 (131 years). The estimated total general population collective dose is about 373,000 person-rem (224 LCFs). To place these numbers in perspective, the National Center for Health Statistics indicates that the average annual number of cancer deaths in the United States from 1999 through 2004 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 468, 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. Note that the majority of the cumulative risks to workers and the general population were due to the general transportation of radioactive material unrelated to activities evaluated in this *NNSS SWEIS*.

6.3.4 Socioeconomics

Cumulative socioeconomic impacts are the impacts that result from the incremental impact of the action added to other past, present, and reasonably foreseeable future actions in Clark and Nye Counties. Because either expanding or reducing operations may have adverse impacts on different aspects of the socioeconomic environment, information from the Expanded Operations and Reduced Operations Alternatives are considered, as appropriate, in this analysis.

Under the Expanded Operations Alternative, there would be a net increase of 723 jobs to support DOE/NNSA activities over the next 10 years. In addition, operation of up to 1,000 megawatts of commercial solar power generation facilities would require an estimated 200 employees. This increase in the number of jobs would have an overall beneficial impact on economic activity in the area, as described in Chapter 5, Section 5.1.2. This increase in economic activity would have a minor contribution to overall cumulative economic impacts in Clark and Nye Counties.

Table 6–6 Cumulative Transportation Impacts Under the Expanded Operations Alternative

	Worker		*General Population*	
	Collective Dose (person-rem)	***Risk (LCFs)***	***Collective Dose (person-rem)***	***Risk (LCFs)***
NNSS Transportation Risk (2011–2020)				
NNSS SWEIS [a]	5,500	3	1,300	0.8
Other Transportation Impacts Not Related to this *NNSS SWEIS*				
Historical Shipments to the NNSS	330	0.20	230	0.14
Reasonably Foreseeable Actions	**24,800**	**15**	**35,000**	**21**
General Radioactive Material Transport	374,000	224	338,000	203
Total	**399,000**	**240**	**373,000**	**224**
Cumulative Total [b]				
Total Impacts [c]	405,000	243	374,000	225

LCF = latent cancer fatality; NNSS = Nevada National Security Site; rem = roentgen equivalent man.
[a] The values provided are for the Expanded Operations Alternative, which has the greatest impacts.
[b] The cumulative total is the sum of the projected impacts for this *NNSS SWEIS* with the impacts from the other nonrelated transportation activities.
[c] Totals are rounded to three significant digits.

Approximately 10 percent (about 92) of the individuals hired to support both DOE/NNSA activities and to operate of commercial solar power generation facilities on the NNSS under the Expanded Operations Alternative are expected to relocate to Clark and Nye Counties from other areas. Given the economic downturn, the population of Clark and Nye Counties decreased by 0.8 and 2.1 percent, respectively, in 2009 (NSBDC 2010), as noted in Chapter 2, Section 2.5.2, and Las Vegas had one of the highest home foreclosure rates in the Nation. In the short term, the increased NNSA-related workforce would likely slightly reduce the adverse impacts of the economic downturn due to new employees purchasing or renting housing and purchasing goods and services in Clark and Nye Counties. In the longer term, this increase would be so small as to be easily absorbed with almost undetectable impacts on local economies. In addition, because there would only be a small increase in population, the need for additional public services would be negligible. Therefore, this increase would not contribute to cumulative impacts on public services.

Under the Reduced Operations Alternative, a net decrease in DOE/NNSA jobs of approximately 381, relative to the No Action Alternative would occur over the next 10 years. This decrease would have an overall minor adverse economic impact in the area, as described in Chapter 5, Section 5.1.2. However, due to the high current unemployment rate, this decrease in economic activity would have a negligible contribution to overall cumulative impacts on the economy in Clark and Nye Counties. The demand for public services is expected to remain the same under the Reduced Operations Alternative. Therefore, no cumulative impacts on public services would occur.

6.3.5 Geology and Soils

Dynamic experiments using plutonium or other radioactive materials not conducted within a containment vessel would result in incremental increases in the deposition of radioactive material in the mined cavities at the U1a Complex. Dynamic experiments would not cause radiologic contamination of the land surface under normal circumstances. These types of activities are not conducted at any other locations in the United States. Therefore, the resulting cumulative impacts on geologic media would be incremental to the direct impacts and confined to the NNSS.

As shown in Table 6–4, construction of new facilities and other infrastructure by DOE/NNSA at the NNSS would result in long-term disturbance of up to 26,000 acres of previously undisturbed soils and near-surface geologic media. This disturbance, when added to previous similar disturbance at the NNSS (an estimated 80,000 acres), would amount to about 13 percent of the total area of the NNSS. Based on

reviews of available documentation, potential non-DOE/NNSA land disturbance within the cumulative impacts ROI would be approximately 509,750 acres; the total area of the cumulative impacts ROI is about 15,737,760 acres. This potential disturbance includes areas specified in EISs, environmental assessments, and other planning documents and assumes that all land that would be disposed by BLM in the Las Vegas Valley would be developed. This new land surface disturbance represents about 3.2 percent of the cumulative impacts ROI. The area of existing land disturbance in the cumulative impacts ROI is about 346,000 acres, or 2.2 percent of the total area. When potential land disturbance resulting from DOE/NNSA actions (26,000 acres) is considered, the existing and potential land disturbance within the ROI would be about 881,750 acres, or 5.6 percent of the ROI.

In addition to direct impacts on soils and geologic media resulting from DOE/NNSA and other agencies, limited access to large areas of land in Nye County would have impacts related to geological resources. Access to almost all of the NNSS and the Nevada Test and Training Range has been restricted since October 1940, when land was withdrawn for establishment of the Tonopah Bombing and Gunnery Range (Karl 1951). Since 1940, additional lands have been added to the withdrawn areas and the agencies responsible for management of various portions of the withdrawn lands have changed, resulting in the most recent configuration of the NNSS and Nevada Test and Training Range.

Based on review of existing data, the Special Nevada Report (SAIC/DRI 1991) concluded that, in areas at the NNSS that are outside of known mining districts, the following base and precious metals could occur: one small-to-medium-sized precious metal deposit, one or two tungsten skarn deposits and/or polymetallic replacement deposits, and one gold deposit. Possible deposits within known mining districts include (1) a low-to-moderate potential for a precious metal or a porphyry-molybdenum deposit in the Calico Hills mining district (in the northern portion of Area 25), (2) a high potential for gold-silver resources in the Wahmonie district (generally located in Area 26) that could support a moderate-sized mining operation, (3) a high potential for skarn tungsten mineralization and porphyry molybdenum mineralization in the Oak Spring district (in the northeastern portion of the NNSS), and (4) disseminated gold deposits in the Mine Mountain district (generally located in the northwestern portion of Area 6). The Nevada Test and Training Range, including the TTR, has the following known and potential minable mineral deposits: (1) up to three small, low-to-moderate potential base-metal replacement deposits, as well as one Carlin-type gold deposit; (2) a moderate-to-high potential for discovery one or more precious metal deposits in volcanic rocks at any of the 10 established mining districts within the Nevada Test and Training Range; (3) a low-to-moderate potential for small base-metal replacement deposits; and (4) a moderate-to-high potential for small vein deposits of precious metals in parts of the Groom Mountain Range.

Continued mining restrictions in the NNSS and Nevada Test and Training Range would result in the continued unavailability of potential mineral resources for evaluation or extraction. Although the potential exists for extractable minerals and precious metals on the NNSS and Nevada Test and Training Range, extensive exploration and testing would be required to determine whether this potential is realizable and, if so, what the potential quantities of those resources would be. Therefore, it is not possible to further analyze the impact of restricted access to these potential mineral resources.

Disposal of BLM land in Las Vegas Valley could affect access to mineral resources; however, there are no economically viable locatable or leasable minerals located within the disposal area (BLM 2004b). The use of aggregate resources on the NNSS would result in a cumulative impact on regional aggregate supply; however, aggregate resources on the NNSS are more than adequate to meet projected needs. No new sand and gravel operations would be developed within the BLM land disposal area in Las Vegas Valley (BLM 2004b). There are abundant sand and gravel resources available outside of the BLM land disposal area throughout southern Nevada.

6.3.6 Hydrology

6.3.6.1 Surface Water

Aside from seeps and springs, there are no perennial water bodies on the NNSS. Closed basins capture surface runoff for the eastern portion of the NNSS (Frenchman Flat and Yucca Flat). The western and southern portions of the NNSS are within the Amargosa River Basin. The Amargosa River (also known as the Amargosa Arroyo) is atypical of most North American rivers because it seldom flows; runoff is infrequent because much of the basin receives less than 6 inches of precipitation annually (Hardman 1965). The Amargosa River originates in the mountains surrounding Beatty, Nevada, flows through the Amargosa Desert region, and terminates at Bad Water in Death Valley National Park. Most of the river course is underground, but about 17 miles of surface flow exist in the areas of Shoshone, Tecopa, and the Amargosa Canyon in California. This perennial surface flow has created lush riparian and wetland habitats that support endemic and sensitive species such as the endangered Amargosa vole (*Microtus californicus scirpensis*). The Amargosa Canyon contains some of the lusher cottonwood–willow gallery forest in the Mojave Desert (BLM 2006b). Under some conditions, unusually heavy precipitation events can produce sufficient runoff to cause the Amargosa River to have flowing water from its headwaters to its terminus (Tanko and Glancy 2001).

The major tributaries to the northern reach of the Amargosa River are Thirsty Canyon Wash and Beatty Wash, which drain the northwestern part of the NNSS. Major tributaries to the central reach of the Amargosa River are Fortymile Wash, Topopah Wash, Rock Valley Wash, and Carson Slough. Fortymile Wash drains the southern part of Pahute Mesa, the western part of Jackass Flats, and the eastern slopes of Yucca Mountain. Topopah Wash drains the eastern part of Jackass Flats. Rock Valley Wash drains the southernmost part of the NNSS in the Rock Valley basin. Carson Slough drains the Ash Meadows area off the NNSS.

Because the only flows off the NNSS go to the Amargosa River via Fortymile Wash and Topopah Wash, this is the only contribution that is made to regional surface waters from the NNSS. In addition, ephemeral surface flows on the NNSS are infrequent, with no flow in some years, while in other years, flows may occur for only a few days. For example, measurements of stream flows in Fortymile Wash near the NNSS boundary from 2002 through 2004 showed no flow at all (USGS 2002, 2004). In 2003, a discharge of less than 0.1 cubic feet per second was measured as the yearly maximum, and the flow was not sufficient to measure a water height (USGS 2003).

In the southwestern portion of Area 25, this *NNSS SWEIS* assumes development of 100 to 1,000 megawatts of commercial solar power generation in the Renewable Energy Zone. These renewable energy activities would result in up to about 10,300 acres of land being disturbed by construction activities in the short term and covered by solar-power-related facilities in the long term. During the construction period, land surface disturbance would likely result in some erosion of soil into Fortymile and Topopah Washes, although implementation of best management practices would minimize this impact. Once construction is complete, erosion of soil and movement of any contaminants from the solar sites would be controlled by a combination of engineered features, such as berms, and implementation of administrative measures, such as spill control plans. Any sediment or contamination that reaches either Fortymile Wash or Topopah Wash potentially could be transported off the NNSS and would have a cumulative impact on erosion from other developed areas, such as Nye County's proposed Yucca Mountain Project Gateway Area development and other renewable energy projects that would disturb up to 94,300 acres in the drainage area of the Amargosa River in southern Nevada and increase the potential for erosion during the construction period; however, implementation of best management practices would minimize this impact.

6.3.6.2 Groundwater

Past underground nuclear testing resulted in a cumulative impact on groundwater under the NNSS. From 1951 to 1992, 828 underground nuclear tests were conducted at the NNSS. Most were conducted hundreds of feet above the groundwater table; however, about one-third of these tests were detonated in proximity of or within the water table in the saturated zone (DOE/NV 2010). These underground tests were conducted primarily on Pahute Mesa, Rainier Mesa, Frenchman Flat, and Yucca Flat (see **Figure 6–2**). Between 1965 and 1992, a total of 82 underground nuclear tests were conducted in deep vertical boreholes on Pahute Mesa. Sixty-four of these tests were conducted on Central Pahute Mesa and 18 on Western Pahute Mesa (SNJV 2006). In a 2001 report, scientists from Los Alamos National Laboratory and Lawrence Livermore National Laboratory calculated the underground inventory of radionuclides resulting from underground nuclear testing at the NNSS between 1951 and 1992 (Bowen et al. 2001). That report estimated the remaining underground inventory of radionuclides as of September 23, 1992 to be about 132 million curies. A general description of underground nuclear testing and its effects is provided in Appendix H.

DOE/NNSA's Underground Test Area Project (UGTA) was established to assess and evaluate the effects of underground nuclear tests on local and regional groundwater through the Federal Facilities Agreement and Consent Order (FFACO). In compliance with the FFACO and in consultation with the Nevada Division of Environmental Protection (NDEP), the UGTA currently uses a total of 89 characterization wells (63 on the NNSS, 11 on the Nevada Test and Training Range, and 15 on public land) and will construct additional wells, as needed. The purpose of these wells is to obtain data to improve understanding of groundwater flow paths, flow velocities, and transport of radioactive contamination resulting from underground nuclear testing. As new information is obtained, DOE/NNSA, in consultation with NDEP, identifies new locations for characterization and monitoring wells. The ultimate purpose of the UGTA Project is to evaluate if there is a potential risk to the public from contaminated groundwater under the NNSS or from radionuclide migration off of the NNSS.

The UGTA has established four corrective action units (CAUs) for system characterization and preparation of groundwater flow and transport models: 1) Western and Central Pahute Mesa, 2) Rainier Mesa-Shoshone Mountain, 3) Frenchman Flat, and 4) Yucca Flat-Climax Mine. Of these CAUs, Pahute Mesa is the only one in which radioactive contamination has been detected off of the NNSS. In October 2009, DOE/NNSA recorded the first detectable amount of underground nuclear testing-related tritium in the newly constructed groundwater characterization well ER-EC-11, located less than one-half mile off the NNSS on lands managed by the USAF as part of the Nevada Test and Training Range (DOE/NV 2010). The results showed the level of tritium in the groundwater at that location to be about 12,000 picocuries per liter, i.e., about 60 percent of the U.S. Environmental Protection Agency (EPA) National Drinking Water Standard of 20,000 picocuries per liter. Groundwater beneath Pahute Mesa generally flows in a southwesterly direction, primarily through fractures in lava-flow and welded tuff aquifers. The ER-EC-11 characterization well is located along the interpreted groundwater flow path from western Pahute Mesa (SNJV 2006, NSTec 2010k). As shown in Figure 6–2, well ER-EC-11 is located about 14 miles from the nearest public or private water supply well along the expected primary groundwater flow path from studied testing areas on western Pahute Mesa.

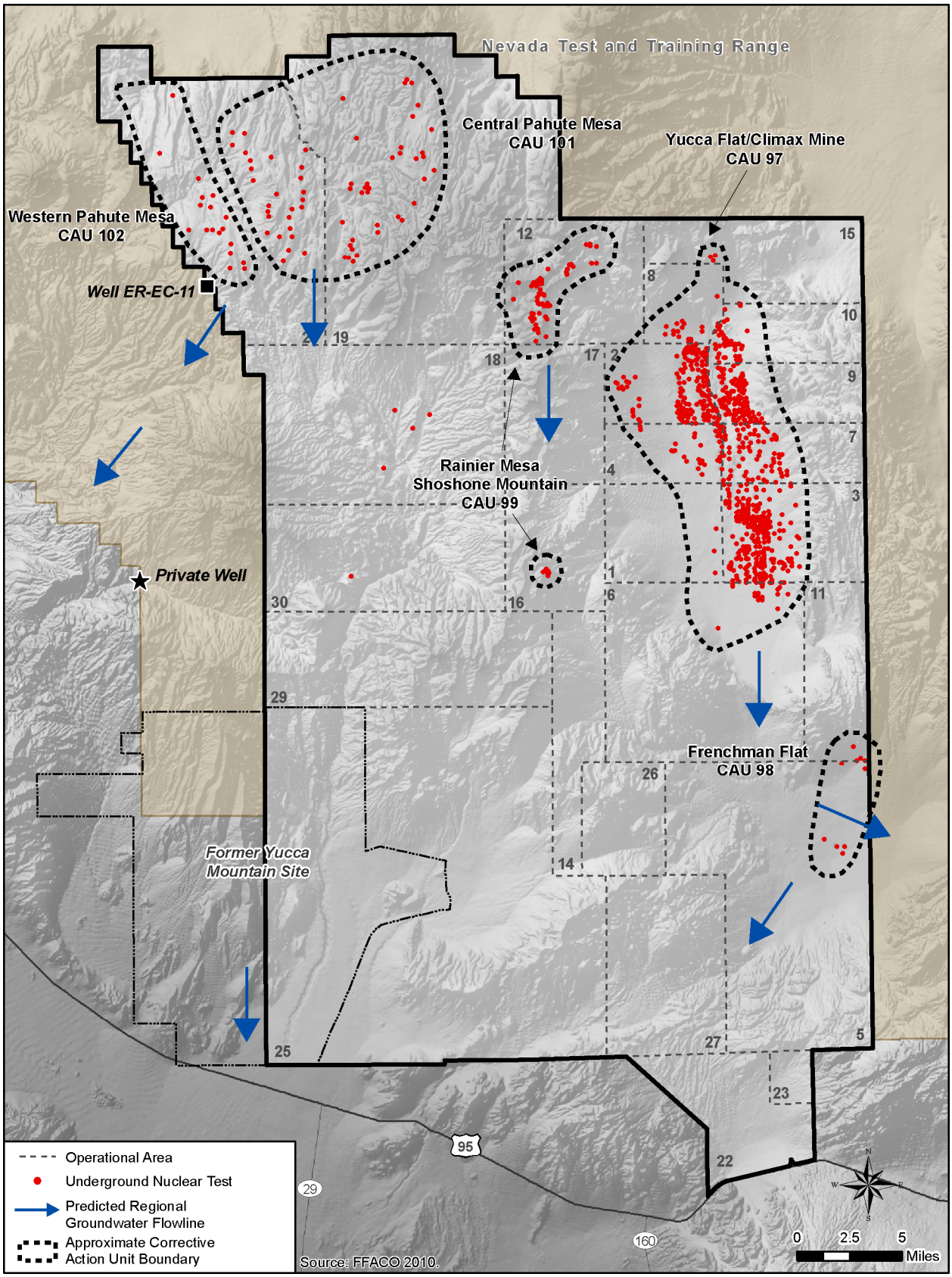


Figure 6–2 Location of Underground Test Area Corrective Action Units, Projected Groundwater Flow Directions, Characterization Well ER-EC-11, and the Nearest Private Water Well

It is difficult to reasonably estimate the volume of groundwater that may have some level of radionuclide contamination resulting from past underground nuclear testing. However, to date, the only radioactively contaminated groundwater that has been detected outside of the boundaries of the NNSS is that mentioned above, which meets EPA national drinking water standards. Because tritium is an isotope of hydrogen, it combines readily in water and is very mobile in the groundwater and probably moves at the approximately the velocity of groundwater flow. A number of factors may actually cause the apparent front of a contaminated zone to move more slowly than the average velocity of the groundwater in a fracture. Some of these factors are lateral dispersion (the tendency of particles to move in all directions in the water and to become less concentrated), matrix diffusion (the diffusive mass transfer of solutes between flowing water in fractures and relatively stagnant water in the surrounding rock matrix), and ionic exchange (attachment to the rock matrix by ionic bonding). In addition, the heterogeneity of the geologic media that the groundwater flows through adds a great deal of complexity to determining the transit times of radionuclides from their points of origin to any particular point, such as a public or private drinking water well.

Groundwater travel times for various flow paths between Pahute Mesa and Oasis Valley were estimated using variations in carbon and radioactive carbon isotopic values in 2002 (Rose et al. 2002). In that study, travel times for all flow paths between Pahute Mesa and Oasis Valley were estimated to range from less than 1,000 years to over 3,900 years. In the 2009 transport model study for Pahute Mesa-Oasis Valley, travel times for flow paths were estimated based on radioactive carbon data (SNJV 2009). Travel time for groundwater was calculated for one segment of a flow path (from well U-20-WW in east-central Pahute Mesa to characterization well ER-EC-6, located a short distance west of the NNSS on the Nevada Test and Training Range), yielding estimated travel times of about 3,264 years (with 95 percent confidence limits of 337 to 6,191 years). A rough extrapolation of travel time to the nearest public or private water well can be made based on these data. As noted above, there contaminant transport in groundwater is a very complex problem but for the purpose of providing an example a simple calculation may be used. The length of the flow path segment just noted is about 5.7 miles (30,096 feet). By assuming a straight-line flow path, groundwater velocity may be estimated by dividing the length of the flow path segment by the travel time, which yields about 9.2 feet per year (30,096 feet/3,264 years = 9.2 feet per year), with a range of from 4.8 feet per year (6,191 year travel time) to 89 feet per year (337 year travel time). As noted, there is considerable uncertainty in this flow rate. In order to help resolve this uncertainty, DOE/NNSA, in consultation with NDEP is developing additional characterization wells to obtain additional data to help refine model predictions for groundwater flow and transport.

For purposes of illustration, it is reasonable to assume that the geology between Pahute Mesa and Oasis Valley is similar to and as complex as that on the mesa. Therefore, by applying the flow rate for the U-20-WW to ER-EC-6 segment to the entire flow path, it can be estimated that the travel time for tritium-contaminated groundwater noted at well ER-EC-11 to the nearest public or private well (14 miles) would be from about 830 to over 15,000 years. The half-life of tritium is about 12.3 years. That means that every 12.3 years, there is one-half as much tritium in the groundwater under the NNSS due to natural radioactive decay. Within the uncertainties regarding groundwater flow and contaminant transport that remain, it appears that given the groundwater flow rate and the decay rate of tritium, it is unlikely that groundwater contaminated with tritium from underground nuclear testing would reach wells used to obtain water for human or livestock consumption in sufficient concentration to exceed today's Safe Drinking Water Standard of 20,000 picocuries per liter.

Cumulative impacts on groundwater availability and quality may result from activities at NNSA facilities in Nevada. RSL and NLVF acquire water from Nellis Air Force Base and Las Vegas Valley Water District, respectively (see Chapter 4, Sections 4.2.2.2 and 4.3.2.2, respectively, for additional

information). The water demand by these facilities is a very small proportion of the overall water demand in the Las Vegas region and contributes minimally to the cumulative impact on that system.

This cumulative impacts analysis considers groundwater contamination resulting from past underground nuclear testing but also considers potential impacts associated with the proposed actions addressed in this SWEIS. Proposed activities that would release chemicals and/or radiological materials to the soil or underground environment include disposal of LLW and MLLW, radiological tracer experiments, and chemical release experiments. These activities would all occur well above the water table, which is hundreds to thousands of feet below the ground surface at all locations on the NNSS. The NNSS is located in a very arid region with low precipitation and high rates of evapotranspiration, which result in a net upward movement of soil moisture in the upper portion of the vadose zone (NSTec 2011). As noted in Chapter 5, Sections 5.1.6.2.1 and 5.1.6.2.2, a number of factors would preclude contamination of the groundwater beneath the NNSS from activities that release chemicals and/or radiological materials, including containment measures and/or aboveground nature of most experiments, depth to groundwater, operational controls, and groundwater monitoring programs.

As described in Chapter 4, Section 4.1.11.1.1.3, DOE/NNSA disposes of radioactive waste at the NNSS and, in accordance with DOE requirements, conducts analyses of possible long-term (over thousands of years) impacts on the public and environment after the disposal facilities are closed, i.e., performance assessments and composite analyses. Chapter 5 Section 5.1.12.1.4 notes that these analyses for radioactive waste disposal sites on the NNSS determined that, because of site-specific factors such as the predominance of evapotranspiration over precipitation, there is little or no potential for transport of disposed radionuclides to the groundwater. Further, the Intergovernmental Panel on Climate Change, in its Fourth Assessment Report estimates that although increases in precipitation extremes (such as storms associated with "El Niño" events) are possible for the Great Basin, annual-mean precipitation is projected to decrease in the southwest United States (IPCC 2007). This would tend to make it even more unlikely that a path to groundwater would develop in the future.

Because of the geographical proximity of the NNSS and the TTR, their combined use of groundwater, combined with other ongoing and reasonably foreseeable uses, could have cumulative impacts on groundwater availability. The cumulative analysis for groundwater availability is focused on locations either up- or down-gradient from the NNSS and the TTR. The NNSS and the TTR both acquire potable and nonpotable water from onsite water wells (see Chapter 4, Sections 4.1.2.2 and 4.4.2.2, respectively, for more information). **Table 6–7** shows potential groundwater demand at the NNSS and the TTR under the Expanded Operations Alternative.

Table 6–7 Annual Cumulative Water Demand at the Nevada National Security Site and the Tonopah Test Range Under the Expanded Operations Alternative

	NNSS	***TTR*** [a]	***Total***
Sustainable Site Capacity (acre-feet)	5,844 to 8,964	200	6,044 to 9,164
Operational Water Requirements [b] (acre-feet)	1,562	18	1,580
Percent of Sustainable Site Capacity	17.4 to 26.7	9.0	17.2 to 26.1

NNSS = Nevada National Security Site, TTR = Tonopah Test Range.
[a] TTR sustainable site capacity is based on water appropriations rather than perennial yield of the underlying hydrographic basins. TTR water requirements include both National Nuclear Security Administration and U.S. Air Force uses.
[b] Total water demand for the NNSS includes assumed operation of 1,000 megawatts of commercial power generation.
Note: 1 acre-foot of water is equal to 325,851 gallons.
Source: Chapter 4, Table 4–29, and Chapter 5, Table 5–21.

Proposed activities under the Expanded Operations Alternative at the NNSS and the TTR would cumulatively use up to 1,580 acre-feet of water each year, assuming operation of up to 1,000 megawatts of commercial solar power generation in Area 25 of the NNSS. While the water used by NNSA at the NNSS and the TTR would not be available for use by others, such NNSA water use would not preclude down-gradient uses of an aquifer by others because NNSA activities would only use a maximum of 17.2 to 26.1 percent of the sustainable capacity.

The town of Beatty, Nevada, is located to the west and down-gradient of the northwestern portion of the NNSS. During 2006, the annual water use for Beatty was about 138,210,050 gallons (BWSD 2008), or approximately 424 acre-feet. The town of Beatty is situated in the Oasis Valley Hydrographic Basin, and most of its water is assumed to be withdrawn from that basin. DOE/NNSA does not withdraw any groundwater from the Oasis Valley Hydrographic Basin but it is assumed that groundwater flows from the Gold Flat and Fortymile Canyon-Buckboard Mesa Hydrographic Basins into that basin. Of these two basins, DOE/NNSA would withdraw about 53 acre-feet of groundwater (about one percent of the sustainable yield of the basin) from the Fortymile Canyon-Buckboard Mesa Hydrographic Basin.

The volume of potential groundwater withdrawn for use at the NNSS and the TTR and by the town of Beatty, added to other reasonably foreseeable down-gradient uses in the region (i.e., nine proposed renewable energy projects in the Amargosa Desert Hydrographic Basin), yields an estimated total of almost 6,000 acre-feet per year. However, if only the four solar energy projects that are either approved or in the permitting process (i.e., Amargosa Farm Road Solar Energy Project, Crescent Dune Solar Energy Project, Lathrop Wells Solar Facility, and Amargosa North Solar Project) are considered, that total would be only about 2,800 acre-feet per year. These combined withdrawals could represent a significant impact on the groundwater resource; however, as discussed below, the total amount of groundwater rights currently approved in the Amargosa Desert Hydrographic Basin (which is part of the Death Valley Flow System) is not likely to increase due to implementation of the reasonably foreseeable projects in that area.

The majority of reasonably foreseeable future projects that could have cumulative groundwater impacts with actions of DOE/NNSA at the NNSS and TTR are solar energy developments on Federal lands in the Amargosa Desert Hydrographic Basin and generally down-gradient from the NNSS; the inferred northern boundary of the Amargosa Desert Hydrographic Basin in the vicinity of the NNSS, generally follows the southern boundary of the NNSS. Nevada State Engineer Order 1197 states in part, "…any applications to appropriate additional underground water and any application to change the point of diversion of an existing ground-water right to a point of diversion closer to Devils Hole, described as being within a 25-mile radius from Devils Hole within the Amargosa Desert Hydrographic Basin, will be denied." For any project needing a stable water supply within the area subject to Order 1197, the developer would need to either lease or purchase water currently being pumped under an existing certified water right. Since the water user can only pump up to the authorized duty of the water right, there would be no net increase in groundwater pumping within the basin. Converting agricultural water rights to industrial water rights could reduce return flow (recharge) from irrigation because the water would be used primarily for cooling and would not be applied to the ground as it would if used for irrigation of crops.

As of September 2010, only two proposed solar projects within the Amargosa Desert Hydrographic Basin, the Lathrop Wells Solar Facility and Amargosa North Solar Project, had reached the Federal permitting stage (BLM 2010a), and only the Amargosa Farm Road Solar Energy Project had been approved by BLM (BLM 2010i). Information about each project's water needs is limited. However, based on industry standards, it is anticipated that the two projects using parabolic trough concentrating solar technology, the Amargosa Farm Road Solar Energy Project and the Lathrop Wells Solar Facility, would require about 400 acre-feet and 200 to 405 acre-feet of water per year, respectively. The Amargosa North Solar Project, a multiphase photovoltaic project, would require substantially less water (5 to

10 acre-feet per year) (BLM 2010a). The water used for the three solar projects would result in a conversion of almost 1,000 acre-feet per year of existing water rights from their current permitted use to industrial use.

In addition to converting existing water rights from their current use to use in a solar energy project, the Amargosa Farm Road Solar Energy Project was required, as mitigation, to acquire no less than 236 acre-feet per year of water rights to hold in abeyance (BLM 2010i). To avoid significant impacts on water resources, both resulting from an individual project and in terms of cumulative impacts of multiple projects, it is likely that NPS, USFWS, and BLM would require other solar developers to agree to water mitigation measures like those required for the Amargosa Farm Road Solar Energy Project. This may result in additional groundwater being retired or held in abeyance until it can be proven that its use would not affect sensitive resources at Ash Meadows National Wildlife Refuge or Devils Hole. No net increase (and a possible decrease) in water usage resulting from these restrictions would avoid significant cumulative impacts on water resources and potential impacts on sensitive species. However, because water must be obtained from an existing water right holder, and there are limited senior water rights within the basin, implementation of such measures would reduce the amount of water that is available for other uses, which might constrain other types of economic development in the region.

Because new water rights would not be granted to potential or proposed projects that would be located within the Amargosa Desert Hydrographic Basin, there would be no cumulative impacts from DOE/NNSA's use of groundwater at the NNSS. Further, the likely requirement that future projects acquire existing water rights in addition to their needs and hold those rights in abeyance will reduce the overall potential use of groundwater resources in the Amargosa Desert Hydrographic Basin and result in net positive cumulative impacts on those resources; however, as noted above, this requirement could constrain some types of development in the region.

As described in Section 4.1.6.2, "Groundwater," there are 10 hydrographic basins underlying the NNSS. The total available, or uncommitted, groundwater within these 10 basins is estimated to be in excess of 32,000 acre-feet per year. In addition, there over 1,800 acre-feet per year are committed to non-DOE/NNSA users. NNSA withdraws water for use on the NNSS from 4 of the 10 hydrologic basins: Yucca Flat, Frenchman Flat, Fortymile Canyon–Buckboard Mesa, and Fortymile Canyon–Jackass Flats). As noted in Table 6–7, there are conservatively about 5,844 acre-feet per year of groundwater available in the four hydrographic basins that currently provide the source for water on the NNSS. Under the Expanded Operations Alternative, DOE/NNSA would use up to 1,562 acre-feet per year, or less than 27 percent, of that available groundwater. Theoretically, this would leave 4,282 acre-feet per year available for other uses. Because the NNSS is a secure facility and may not be accessed by the public, non-DOE/NNSA access to available resources is precluded. Therefore, to use groundwater that flows beneath the NNSS, a potential user would need to withdraw that resource at a down-gradient point off the NNSS. DOE/NNSA, along with other Federal agencies involved in land and resource management in the region (i.e., BLM, USFS, and NPS), have for various reasons protested applications for water withdrawals by others. In DOE/NNSA's case, the protests were based on the need to protect its Federal reserve water rights where the requested withdrawals could affect those rights. To date, it has not been demonstrated that lack of access to NNSS groundwater has adversely affected development in the region. However, it is possible that the restrictions imposed on future groundwater withdrawals within the Amargosa Desert Hydrographic Basin by Nevada State Engineer Order 1197, combined with a lack of access to other sources of water, could constrain certain types of development.

6.3.7 Biological Resources

Cumulative impacts on desert tortoises would occur throughout the region, although the intensity of the impacts would vary from location to location depending on the habitat. Under the Clark County MSHCP, a total of 145,000 acres out of an estimated 4,000,000 acres of desert tortoise habitat may be developed

for other purposes, equal to approximately 3.6 percent of available desert tortoise habitat in Clark County (USFWS 2000). USFWS is evaluating a proposal by the permitted parties to amend the permit to increase the take of covered species on 215,000 additional acres (74 FR 50239) (for more information regarding the Clark County MSHCP, see Section 6.2.3.2). If approved as requested, the modified permit would be for a period of 50 years and allow for incidental take on about 360,000 acres, or about 9 percent of available desert tortoise habitat in the county. The Las Vegas Valley does not have large "islands" of habitat capable of sustaining viable desert tortoise populations; such habitat is randomly dispersed across the valley, and the tortoises are unable to move between habitat areas in most cases. As a result, this loss of habitat is not expected to jeopardize the continued existence of the Mojave population of the desert tortoise.

Within Nye County, desert tortoise habitat would be affected by a number of reasonably foreseeable actions. The development of solar energy projects would remove up to about 131,500 acres of desert tortoise habitat (the two geothermal projects and the Crescent Dunes Solar Energy Project are located outside of the range of the desert tortoise), and development of the Nye County Yucca Mountain Project Gateway Area would remove up to 5,800 acres.

DOE/NNSA activities at the NNSS would affect up to 3,300 acres of desert tortoise habitat. Development of up to 1,000 megawatts of solar power electric generation and associated transmission lines would affect an additional approximately 10,300 acres of tortoise habitat. The total amount of desert tortoise habitat that could be impacted by activities related to DOE/NNSA and other reasonably foreseeable actions in Clark and Nye Counties would affect a total of up to 507,600 acres of desert tortoise habitat in southern Nevada.

Between August 1996 and February 2009, NNSA activities at the NNSS were covered under a Biological Opinion issued by USFWS (USFWS 1996). In February 2009, USFWS issued a new Biological Opinion for the NNSS (USFWS 2009a). Both of these Biological Opinions concluded that under the terms and conditions set forth, the proposed NNSA activities would not likely jeopardize the continued existence of the Mojave population of the desert tortoise and that no critical habitat would be destroyed or adversely modified (DOE/NV 2009d). NNSA established a Desert Tortoise Compliance Program to implement the terms and conditions applicable under any Biological Opinion (DOE/NV 2009d). The Desert Tortoise Compliance Program documents compliance actions taken under the Biological Opinion, conducts pre-activity surveys of potentially disturbed areas within the distribution range of the desert tortoise on the NNSS, and assists NNSA/Nevada Site Office (NSO) in consultations with USFWS.

Table 6–8 shows the Biological Opinion compliance measures and cumulative impacts between 1992 and 2008.

Table 6–8 Cumulative Incidental Take and Desert Tortoise Habitat Disturbance from 1992 to 2008 at the Nevada National Security Site

Compliance Measure	*Threshold Value from 1996 NNSS Biological Opinion*	*Cumulative Total* [a]
Number accidentally injured or killed due to NNSS activities	3 per year	0
Number captured and displaced from NNSS project sites	10 per year	102
Number taken by injury or mortality on paved roads on the NNSS by vehicles other than those in use during a project	Unlimited	12
Number of acres of habitat disturbed by NNSS project construction	3,015 acres	311.46 acres

NNSS = Nevada National Security Site.
[a] Cumulative totals were derived from Table 2 of USFWS 2009a.

Between 1992 and the end of 2008, a cumulative total of about 312 acres was disturbed, or about 10.3 percent of allowable disturbance of tortoise habitat and less than 0.1 percent of the 328,400 acres of desert tortoise habitat on the NNSS. Overall, about 7,350 acres, or 2 percent of NNSS land within desert tortoise range, have been disturbed in the past by construction of facilities and infrastructure and other activities. Disturbance of desert tortoise habitat by NNSA activities is mitigated in one of two ways. Between 1992 and 2004, NNSA paid a designated dollar amount into the Clark County Desert Conservation Fund for each acre, or portion thereof, of desert tortoise habitat that was disturbed on the NNSS. Since 2005, with USFWS's approval, NNSA has, as an alternative to payment into the conservation fund, reclaimed previously disturbed areas of tortoise habitat. Between 2005 and the end of 2007, a total of 67.11 acres of desert tortoise habitat were disturbed and 14.08 acres were reclaimed under this program.

In addition to cumulative impacts on the desert tortoise through direct impacts and indirectly through conversion of habitat into solar power generation facilities, commercial/industrial uses, or other potential activities, other species of wildlife, as well as vegetation, would be subject to cumulative impacts. The development of about 535,750 acres of land in the region would cumulatively affect wildlife and wildlife habitat. While it is not likely that all of the projects addressed in Section 6.2 would be implemented, the loss of large areas of habitat could have a number of adverse cumulative effects. These adverse effects would include reduction of the available habitat for native wildlife; federally listed species such as the desert tortoise; and other special status species, such as Le Conte's thrasher and burrowing owl. Cumulative impacts would contribute to the loss, fragmentation, and degradation of Mojave Desert scrub habitat, which would result in impacts on habitat connectivity, genetic integrity of wildlife populations, wildlife movement corridors, fragmentation of species populations, significant alteration of natural riparian habitat and function, and loss of occupied habitat for a variety of animals. Cumulative impacts would also encourage nonnative invasive species of plants, thereby eliminating or degrading natural plant communities on which wildlife depend. Wildlife species occupying small, isolated patches of habitat are more susceptible to disturbance than species that are more widely distributed over the landscape.

As part of the Expanded Operations Alternative in this NNSS SWEIS, use of depleted uranium with explosives in up to three locations and radioisotope tracer experiments could add an increment of radioactive contamination at the NNSS. The radioisotopes used in the tracer experiments would have very short half-lives and would not likely have any cumulative impact with existing radioactive contamination at the NNSS. Experiments involving detonations of explosives in combination with depleted uranium would add a small increment of added radioactive contamination in the soil at specific locations on the NNSS. As noted in Chapter 5, Section 5.1.7.2.2, inhalation is the most likely pathway for depleted uranium to be internalized in wildlife. In general, wildlife species do not have sufficiently long enough life spans to experience the adverse effects (i.e., damage to lung cells and an increase in the possibility of lung cancer) of inhaling depleted uranium and there would, therefore, be no additional impacts on NNSS wildlife populations.

Perhaps the longest-lived species of wildlife that inhabits the NNSS is the desert tortoise. Given its long lifespan, it is conceivable that inhaled radioactive particles could cause cancer in affected desert tortoises. Although there have been studies of impacts of radionuclides on vegetation and wildlife at the NNSS and NNSA is conducting ongoing monitoring, as noted in Chapter 4, Section 4.1.7.5 and 4.1.7.5, there is no specific data addressing the desert tortoise. However, the only area on the NNSS within desert tortoise habitat where there is radiological contamination in the soil is Frenchman Flat, which provides very poor habitat for the species. Because radioactive contamination within the range of the desert tortoise on the NNSS is in poor habitat for the species and proposed experiments using depleted uranium in combination with explosives would be conducted only in the more northerly portions of the NNSS and outside of desert tortoise habitat, there would be no cumulative impact on that threatened species.

6.3.8 Air Quality and Climate

The analysis criterion for cumulative impacts on air quality and climate is the potential for emissions of criteria or hazardous air pollutants to contribute to or create a nonattainment with applicable National Ambient Air Quality Standards (NAAQS). Based on that threshold, only NNSA-related emissions sources in Clark County received detailed analysis. Greenhouse gas emissions were also analyzed for cumulative impact.

6.3.8.1 Criteria and Hazardous Air Pollutants

Table 6–9 displays the criteria and hazardous air pollutants emissions that would be generated by NNSA activities in Nevada, including those that are unregulated, such as employee commuting, vendor transportation, and shipments of waste to or from the NNSS.

Cumulative diesel emissions from NNSA sources in southern Nevada in 2015 are estimated to be about 3.3 tons per year. This estimate was derived by summing PM_{10} and $PM_{2.5}$ [particulate matter with an aerodynamic diameter less than or equal to 10 and 2.5 micrometers, respectively] emissions for commercial vendors and trucks transporting radioactive waste, all of which are assumed to be powered by diesel engines, from Chapter 5, Tables 5–32, 5–50, 5–56, and 5–58.

Table 6–9 Criteria and Hazardous Air Pollutants from All Sources; Total Emissions for National Nuclear Security Administration Operations in Nevada Under the Expanded Operations Alternative

Pollutant	*NNSS* [a]	*RSL* [b]	*NLVF* [c]	*TTR* [d]	*Total NNSA* [e]
	(tons per year)				
PM_{10}	20.1	0.084	0.44	<3.8	24.42
$PM_{2.5}$	8.1	0.067	0.28	<3.8	12.25
Carbon monoxide	160.9	4.1	30.5	<6.1	201.60
Nitrogen oxides	56.6	1.6	7.2	<14.8	80.20
Sulfur dioxide	1.1	0.034	0.095	<0.92	2.15
Volatile organic compounds	11.0	~0.3	0.096	<1.1	12.50
Lead	~0.010	~0.01	<0.01	<0.01	0.04
Criteria Pollutant Total	**249.7**	**~6.1**	**39.2**	**<26.8**	**321.80**
Hazardous air pollutants	~0.53	~0.19	0.078	<1.1	1.90

NLVF = North Las Vegas Facility; NNSA = National Nuclear Security Administration; NNSS = Nevada National Security Site; PM_n = particulate matter with an aerodynamic diameter less than or equal to *n* micrometers; RSL = Remote Sensing Laboratory; TTR = Tonopah Test Range.

[a] From Chapter 5, Table 5–37.
[b] From Table 5–58.
[c] From Table 5–62.
[d] From Table 5–68.
[e] Values rounded.

6.3.8.1.1 Nye County

DOE/NNSA activities at the NNSS and the TTR would produce emissions of criteria and hazardous air pollutants in Nye County, as shown in **Table 6–10**.

Table 6–10 Current and Projected Emissions of Criteria and Hazardous Air Pollutants in Nye County, Nevada, from Activities Associated With the Nevada National Security Site and the Tonopah Test Range Under the Expanded Operations Alternative

Pollutant	*NNSS 2008 Actual Emissions (tons)* [a]	*TTR 2008 Actual Emissions (tons)* [a]	*Total 2008 DOE/NNSA Air Emissions in Nye County (tons)*	*Projected Total DOE/NNSA Air Emissions in Nye County (tons)* [b]
PM_{10}	2	4	6	23
$PM_{2.5}$	2	4	6	11
CO	83	13	96	82
NO_x	36	20	56	50
SO_2	1	1	2	2
VOCs	3	2	5	10
Lead	0.001	0.04	0.04	0.2
HAPs	0.03	1	1	1

CO = carbon monoxide; HAP = hazardous air pollutant; NNSA = National Nuclear Security Administration; NNSS = Nevada National Security Site; NO_x = nitrogen oxides; PM_n = particulate matter with an aerodynamic diameter less than or equal to *n* micrometers; SO_2 = sulfur dioxide; TTR = Tonopah Test Range; VOC =volatile organic compound.
[a] Emissions taken from Chapter 4, Tables 4–40 and 4–71; numbers are rounded and may not match original tables.
[b] Projected emissions from Chapter 5, Tables 5–37 and 5–71; numbers are summed for each pollutant and are rounded.

Cumulative diesel emissions from NNSA sources in Nye County in 2015 are estimated to be about 2.6 tons per year. This estimate was derived by summing PM_{10} and $PM_{2.5}$ emissions for commercial vendors and trucks transporting radioactive waste, all of which are assumed to be powered by diesel engines (see Chapter 5, Tables 5–32, 5–56, and 5–58).

Because Nye County has been designated by EPA as an attainment/nondesignated area for purposes of compliance with NAAQS, no air monitoring data are available to determine the quantitative cumulative impact; however, the projected levels of criteria and hazardous air pollutant emissions are not considered to be sufficient to precipitate a change in Nye County's designation relative to NAAQS.

6.3.8.1.2 Clark County

Of the air sheds within which NNSA-related activities are located, only parts of Clark County, principally the Las Vegas Valley metropolitan area, are classed as nonattainment areas for compliance with NAAQS. The Las Vegas Valley is designated as a nonattainment area for carbon monoxide and PM_{10}. A larger area, comprising about 60 percent of Clark County, is in nonattainment for ozone (RTCSN 2008). Quantities of these three pollutants generated by NNSA-related mobile sources activities in Clark County would by 2015 annually contribute about 1.87 tons of PM_{10}, 119.26 tons of carbon monoxide, and up to 31.786 tons of ozone (determined by summing ozone precursors nitrogen oxides and volatile organic compounds), as shown in **Table 6–11**. Additional quantities of these pollutants would be generated in Clark County by mobile sources associated with NNSA-related construction, but these would be short-term effects and would likely be spread over several years. Table 6–11 also shows the total quantity of construction-related emissions of PM_{10}, carbon monoxide, nitrogen oxides, and volatile organic compounds.

Table 6–11 Estimated Annual Mobile Source Emissions of Criteria Pollutants that have been in Nonattainment from National Nuclear Security Administration Activities in Clark County, Nevada, Under the Expanded Operations Alternative

Pollutant	*Operations (tons per year)*					*Construction (tons per year)* [e]
	NNSS [a]	*RSL* [b]	*NLVF* [c]	*TTR* [d]	*Total*	*(10-year total)*
PM_{10}	1.4	0.046	0.403	0.022	1.87	0.17
Carbon monoxide	84.8	3.740	30.310	0.410	119.26	16.80
Nitrogen oxides	21.4	0.700	6.470	0.250	28.820	3.60
VOCs	2.6	0.270	0.068	0.028	2.966	0.60

NLVF = North Las Vegas Facility; NNSS = Nevada National Security Site; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 micrometers; RSL = Remote Sensing Laboratory; TTR = Tonopah Test Range; VOC = volatile organic compound.
[a] From Chapter 5, Table 5–37.
[b] From Table 5–58.
[c] From Table 5–62.
[d] From Table 5–68.
[e] From Table 5–38.

State implementation plans prepared by Clark County Air Quality and Environmental Management contain modeled nonattainment pollutant emissions from mobile sources in specific horizon years. **Table 6–12** compares these modeled emissions with NNSA-related emissions of the nonattainment pollutants.

Emissions of PM_{10}, carbon monoxide, volatile organic compounds, and nitrogen oxides would contribute only a very small fraction of the total projected emissions of these pollutants by 2015.

Cumulative diesel particulate matter emissions from NNSA sources in Clark County in 2015 are estimated to be about 0.7 tons per year. This estimate was derived by summing PM_{10} and $PM_{2.5}$ emissions for commercial vendors and trucks transporting radioactive waste, all of which are assumed to be powered by diesel engines, from Chapter 5, Tables 5–32, 5–50, 5–56, and 5–58. The *Regional Transportation Plan 2009–2030: A Plan for Mobility in the Las Vegas Region Over the Next 20 Years* (RTCSN 2008), which provided the data for estimating future air emissions in Clark County, did not include an estimate of diesel particulate matter emissions.

Table 6–12 Comparison of Estimated National Nuclear Security Administration-Related Mobile Source Emissions of Nonattainment Pollutants in Clark County with Emissions Projected for All Clark County Mobile Sources

Pollutant	*Regional Transportation Plan Modeled Emissions* [a, b] *(tons per year)*	*NNSA-Related Emissions* [c] *(tons per year)*	*Percentage of Regional Transportation Plan-Modeled Emissions (tons per year)*
PM_{10}	28,744	2	0.07
Carbon monoxide	140,160	119	0.09
Nitrogen oxides	11,625	29	0.26
VOCs	12,399	3	0.02

NNSA = National Nuclear Security Administration; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 micrometers; VOC = volatile organic compound.
[a] RTCSN 2008, Appendix 4, page 58.
[b] RTCSN 2008 values were in tons per day. The annual emissions displayed in this column were derived by multiplying the tons per day by 365. These values are rounded to the nearest whole number.
[c] Values from Table 6–11 rounded to the nearest whole number.

6.3.8.1.3 Inyo County

Inyo County, California, is part of the Great Basin Unified Air Pollution Control District (GBUAPCD), which also includes Mono and Alpine Counties. Owens Lake, located in the west-central area of Inyo County, is the largest single source of PM_{10} in the United States. The GBUAPCD, in compliance with the Clean Air Act, developed a state implementation plan for dealing with PM_{10} at Owens Lake and has installed dust control measures to meet NAAQS (GBUAPCD 2010). Because the prevailing winds at the NNSS are generally from the southwest or north-northwest (see Chapter 4, Section 4.1.8), it is not likely that emissions of criteria or hazardous air pollutants would create a cumulative effect with similar emissions in Inyo County, leading to a violation of NAAQS.

6.3.8.2 Greenhouse Gas Emissions

Nevada's estimated total gross emissions of greenhouse gases in 2010 were 55.8 million metric tons; these emissions are expected to rise to 78.4 million metric tons by 2020 (NDEP 2008). These estimated emission levels were for the state as a whole. To estimate greenhouse gas production for the cumulative impacts ROI, the proportion of the population of the state residing in Nye, Clark, Esmeralda, and Lincoln Counties was identified. In 2009, the Nevada state demographer estimated the population of the state to be 2,711,206 and the populations of the selected counties as follows: Clark, 1,952,040; Nye, 46,360; Lincoln, 4,317; and Esmeralda, 1,187 (NSBDC 2010), for a total of 2,003,904. These four counties contain about 74 percent of the population of Nevada. By using population as a rough way to apportion greenhouse gas production for the state, approximately 41.3 and 58 million metric tons per year of greenhouse gases would be produced in the four counties in 2010 and 2020, respectively.

NNSA activities in Nevada would generate about 65,430 tons of greenhouse gases by 2015 under the Expanded Operations Alternative. To compare greenhouse gas generation from NNSA activities to the amounts estimated for the four counties, the metric tons values of the state estimates were converted to short tons by multiplying by 1.10. This yields 45.43 and 63.8 million tons of greenhouse gas emissions for the four counties in 2010 and 2020, respectively. NNSA greenhouse gas emissions in 2015 (estimated at 54.6 tons) would account for about 0.12 percent of the combined greenhouse gas emissions for Clark, Nye, Esmeralda, and Lincoln Counties. Thus, the NNSA greenhouse gas contribution is small compared to the four-county greenhouse gas emissions.

6.3.9 Visual Resources

Construction and operation of one or more commercial solar power generation facilities in Area 25 would have adverse visual effects because the facility would introduce considerable infrastructure over approximately 10,000 acres of land, a large portion of which would be directly visible in middleground views from U.S. Route 95 (see Chapter 3, Figure 3–2). In addition, the CSP Validation Project would introduce smaller scale yet similar facilities on up to 300 acres of land in Area 25 that would also be visible from the middleground of U.S. Route 95. A new 500-kilovolt electrical transmission line would be required to interconnect such commercial solar facilities with the main transmission system; most of that new transmission line and attendant visual impacts would be located outside of NNSS boundaries. Portions of the study area visible from U.S. Route 95 have a Class B scenic quality rating, and the viewer sensitivity is moderate (see Chapter 4, Section 4.1.9, "Visual Resources," for a description of scenic quality and viewer sensitivity ratings). Viewer sensitivity would remain the same under the No Action and Reduced Operations Alternatives and would change from moderate to high under the Expanded Operations Alternative from an increase in the number of average daily trips over time. A concentrated solar power generation facility of this size, in addition to the CSP Validation Project, would introduce a considerable source of glare from the reflective surfaces of the solar collectors, alter the existing visual character of the landscape that is largely undeveloped, and reduce the existing visual quality to a Class C

rating because of the intrusion of manmade elements. There is no mitigation to reduce adverse effects associated with the proposed solar array and, therefore, this effect would be adverse and unavoidable.

According to the *Final Environmental Impact Statement for the Amargosa Farm Road Solar Energy Project* (BLM 2010a), over 106,000 acres of land could be developed for solar project projects in Amargosa Valley. The potential additional conversion of over 10,000 acres of land to solar power generation facilities in Area 25 for the Renewable Energy Zone would make the total potentially affected land area over 116,000 acres, primarily located along U.S. Route 95 in the Amargosa Valley. All of these renewable energy projects would require new transmission lines to be constructed to integrate the power they produce into the main electrical transmission system. In addition to the potential solar power generation facilities in Amargosa Valley, Nye County is proposing to develop the Yucca Mountain Project Gateway Area in an approximately 5,800 acre area surrounding the intersection of U.S. Route 95 and Nevada State Route 373. These developments would result in cumulative visual impacts from public roadways, recreation areas, and residential areas. Viewsheds in Amargosa Valley are extensive given the topography, lack of vegetative screening, and dispersed nature of sensitive viewers. Potential cumulative visual impacts would result from the full build-out, operation, and maintenance of the proposed Renewable Energy Zone in Area 25 of the NNSS in the context of current and proposed projects within the Amargosa Valley. Most of the proposed projects are solar power generation facilities and would have similar visual effects when compared to the proposed Renewable Energy Zone. The Yucca Mountain Project Gateway Area would result in a large commercial/light industrial area that would be interposed between the closest viewpoints of the Renewable Energy Zone from U.S. Route 95. Current and future projects would incrementally modify the setting in a similar manner, as compared to the proposed project, which would result in an industrial landscape character. This change in landscape character, in conjunction with potential viewer impacts, would result in adverse cumulative visual impacts.

The proposed project, along with the past, present, and reasonably foreseeable projects, would substantially alter the visual character of the areas within Amargosa Valley. Many of the reasonably foreseeable projects would have the potential to create new visual impacts within the viewsheds that could be affected by the proposed project from public roadways, recreation areas, and residential areas.

6.3.10 Cultural Resources

As noted in Chapter 5, Table 5–38, the overall density of cultural resources sites at the NNSS is 0.051 sites per acre, and the density of sites eligible for inclusion in the National Register of Historic Places (NRHP) is 0.026 sites per acre. However, it is important to note that the potential for an area to contain cultural resource sites is strongly site specific and is influenced by factors such as presence of water, a food source, shelter, and less tangible but equally important factors such as features that may have spiritual value to a culture. While all areas of the NNSS have the potential to possess cultural resources, areas with the highest number of recorded cultural resources are Rainier and Pahute Mesas in the northwest, followed by Jackass Flats in the southwest, and Yucca Flat in the east (DOE 2010a). Prehistoric archaeological sites make up 90 percent of recorded cultural resources on the NNSS. The remaining 10 percent are historic period archaeological sites and structures, more-recent facilities and locations associated with recent scientific research, or sites of unknown age (DOE 2010a). Numerous evaluations of nuclear testing facilities and events have been conducted since the *1996 NTS EIS* was completed, resulting in 38 sites and historic districts associated with NNSS activities becoming eligible for listing in the NRHP.

BLM estimated site density for the southern Nevada region to be about 0.024 sites per acre, and the Nevada State Historic Preservation Officer estimated that approximately 12 percent of all sites identified in Nevada are eligible for inclusion in the NRHP (DOE 1996c). For purposes of this cumulative impacts analysis, it was assumed that for non-DOE/NNSA programs and projects, approximately 509,750 acres of

previously undeveloped land are likely to be disturbed over the next decade. Using the more conservative site density value derived from the NNSS, almost 26,000 cultural resource sites may be located within the potentially disturbed area of the cumulative impacts ROI (excluding the NNSS and the TTR) for this *NNSS SWEIS*. Over 13,000 of these sites could be eligible for inclusion in the NRHP. When potentially affected cultural resources sites from DOE/NNSA activities (including commercial solar power generation facilities) (see Chapter 5, Section 5.1.10.2, "Cultural Resources, Expanded Operations Alternative") are included, the overall number of sites that may be affected would be almost 34,000, of which almost 15,500 would be considered eligible for inclusion in the NRHP.

Cultural resources associated with Federal and state undertakings are subject to Section 106 of the National Historic Preservation Act. For these cultural resources, identification, evaluation, and data recovery, when appropriate, are likely to occur, resulting in increases of cultural resources information in the regional database. Cultural resources on about 20 percent of potentially disturbed acreage (estimated amount of privately held land) may be destroyed without data recovery, resulting in a serious loss of information those resources may contain.

6.3.11 Waste Management

DOE/NNSA activities at the NNSS and other in-state locations generate and manage radioactive and nonradioactive wastes.

Radioactive waste

Table 6–13 presents the estimated quantities of radioactive and nonradioactive solid wastes that have been disposed at the NNSS, both historically and since the *1996 NTS EIS*, as well as the quantities of wastes that could be generated for disposal over the next 10 years. The waste volumes projected for disposal reflect those for the Expanded Operations Alternative (see Chapter 5, Section 5.1.11.2).

The estimates of LLW and MLLW in the table include wastes that are projected from environmental restoration activities at contaminated sites at the NNSS and offsite in-state locations. Generation of these wastes is uncertain and depends on future regulatory actions or agreements. In addition, there may be other options for management of the contaminated sites, including closure in place or development of new disposal units for this waste that are nearer the contaminated sites than the Area 5 RWMC or Area 3 Radioactive Waste Management Site.

The estimates in the table do not include waste that could result from incidents involving nuclear or radioactive materials, such as an accident involving a nuclear weapon or remediation of a site contaminated due to a possible intentional destructive act. Generation of such waste would be unplanned and episodic, but is expected to consist mostly of soil and debris. If the waste were generated, the NNSS could be considered as a disposal location.

LLW and MLLW generation at the NNSS and offsite locations is expected to continue beyond the next 10 years, as is disposal of these wastes at the NNSS along with wastes received from authorized out-of-state generators, consistent with applicable disposal authorizations and permits. Assuming implementation of the Expanded Operations Alternative, up to 52 million cubic feet of combined LLW and MLLW would be received for disposal.

It is expected that available disposal capacity at the Area 5 RWMC would be eventually used and disposal operations would continue at the NNSS by expanding the acreage of the Area 5 RWMC, by transferring disposal operations elsewhere at NNSS, or by re-opening the Area 3 Radioactive Waste Management Site. Additional disposal capacity could be developed on the NNSS or offsite locations to address disposal of wastes generated from in-state environmental restoration or decontamination and

decommissioning activities. It is expected that permitted in-state treatment of MLLW would continue, as would offsite shipment of those mixed wastes generated within Nevada that lack in-state treatment capacity.

Table 6–13 Historical and Projected Waste Disposal at the Nevada National Security Site

Transuranic Waste (cubic feet)	*Low-Level Radioactive Waste (cubic feet)*	*Mixed Low-Level Radioactive Waste (cubic feet)* [a]	*Solid Waste (cubic feet)* [b]
Waste historically disposed at the NNSS through 1995			
11,300 [c]	17,600,000 [d]	283,000 [e]	No information
Waste volumes from 1996 through 2010			
0 [f]	21,700,000 [g]	395,000 [g]	8,660,000 [h]
Waste projected over the next 10 years for NNSS disposal under the Expanded Operations Alternative			
0 [f]	48,000,000 [i]	4,000,000 [i]	9,200,000 [i]
Total historical and projected NNSS waste disposal over the next 10 years [j]			
11,300	87,400,000	4,720,000	>17,800,000

NNSS = Nevada National Security Site.

[a] Includes radioactive materials regulated under the Atomic Energy Act of 1954, as amended, as well as constituents regulated under the Resource Conservation and Recovery Act and some substances regulated under the Toxic Substances Control Act.

[b] Includes sanitary solid waste and construction and demolition debris.

[c] Includes all waste disposed in the greater confinement disposal boreholes (about 10,347 cubic feet) and about 1,959 cubic feet of TRU waste inadvertently disposed at the Area 5 Radioactive Waste Management Complex.

[d] Volume as of December 31, 1995 (DOE 2008a); disposal in both the Area 5 Radioactive Waste Management Complex and the Area 3 Radioactive Waste Management Site.

[e] Source: DOE 1996c.

[f] No TRU (including mixed TRU) waste is projected for NNSS disposal.

[g] Source: Denton 2011.

[h] Estimated by adding all solid waste disposed at the NNSS for 1996 through 2008 (DOE/NV 1997b, 1998c, 1999, 2000c, 2001c, 2002b, 2003a, 2004d, 2005f, 2006a, 2007d, 2008a, 2009d) to the estimated waste quantities disposed at the NNSS in 2009 and 2010, and converting from tons to cubic feet, assuming 0.55 cubic yards per ton.

[i] From Chapter 5, Section 5.1.11.1, includes solid waste generated by commercial solar power generation facilities in Area 25 of the NNSS. Sanitary solid waste generated by a commercial entity could not be disposed on the NNSS under current permit conditions.

[j] Totals may not add precisely because of rounding to three significant figures.

If the NNSS were selected, a licensed GTCC waste disposal facility would not be expected to be operational within the next 10 years. Current GTCC waste volumes and radionuclide activities projected for generation through 2083 are listed in **Table 6–14**, as are wastes owned or generated by DOE that have characteristics similar to GTCC waste and could be considered for disposal in a GTCC waste disposal facility. Only about 24 percent of the total stored and projected waste volume and 1 percent of the total stored and projected activity in this table would be generated by DOE waste generators. Note that these projections include wastes that may never be generated depending on the outcome of DOE or regulatory decisions that are independent of this *NNSS SWEIS*. In addition, there may be other options for managing the identified wastes. For example, it is possible that, rather than being declared waste, sealed sources could be recycled or reused. (Decisions to recycle or reuse sealed sources would be made by others outside of NNSA/NSO and are not part of this *NNSS SWEIS*.) Furthermore, additional disposal options may be available for DOE wastes having characteristics similar to GTCC waste. If a GTCC waste disposal facility were sited at the NNSS, as an NRC-licensed facility, its operation would be independent of other waste management activities at the NNSS or other in-state DOE locations. It would use NNSS infrastructure resources such as roads and utilities.

Table 6–14 Projected Greater-Than-Class C Waste Generation Rates through 2083

Waste Type	In Storage		Projected		Total Stored and Projected	
	Volume (cubic feet)	Activity (curies)	Volume (cubic feet)	Activity (curies)	Volume (cubic feet)	Activity (curies)
GTCC Waste						
Activated metal	2,100	1,400,000	67,000	160,000,000	71,000	160,000,000
Sealed sources	-	-	100,000	2,000,000	100,000	2,000,000
Other waste	2,600	5,100	140,000	530,000	140,000	530,000
Total GTCC Waste	*4,600*	*1,400,000*	*310,000*	*160,000,000*	*310,000*	*160,000,000*
DOE Waste						
Activated metal	220	230,000	230	4,900	460	240,000
Sealed sources	7	6	22	71	29	77
Other waste	34,000	110,000	67,000	670,000	99,000	790,000
Total DOE Waste	*34,000*	*340,000*	*67,000*	*670,000*	*99,000*	*1,000,000*
Total GTCC & DOE waste	39,000	1,700,000	390,000	160,000,000	420,000	160,000,000

GTCC = greater-than-Class C.
Note: Because all values have been rounded, totals may not equal the sum of individual components.
Source: DOE 2011.

A commercial LLW disposal facility operated from 1962 to the end of 1992 in Beatty, Nevada, about 45 miles west of Mercury on the NNSS, and about 102 miles northwest of Las Vegas, Nevada. (A hazardous waste disposal facility still operates adjacent to the closed LLW facility.) During operation, the Beatty facility disposed about 4,862,000 cubic feet of radioactive waste containing about 709,000 curies of byproduct material, about 4,807,000 pounds of source material, and about 606 pounds of special nuclear material (Laney 2010).[1] Because of a lack of a groundwater pathway from NNSS radioactive waste management facilities, the large distances between this facility and DOE waste management operations at the NNSS, the TTR, RSL, and NLVF, this closed disposal facility is not expected to have any projected operational or long-term cumulative impacts on members of the public with DOE waste management activities.

Additional disposal of TRU waste at the NNSS is not expected, and there are no active TRU waste disposal facilities within Nevada. It is expected that TRU (including mixed TRU) waste would continue to be generated beyond the next 10 years as part of DOE/NNSA operations or from environmental restoration or decontamination and decommissioning activities. This waste would be characterized, packaged, and prepared for disposal at the Waste Isolation Pilot Plant.

Nonradioactive waste

DOE/NNSA is expected to continue to generate and manage nonradioactive hazardous and nonhazardous wastes at the NNSS and other in-state facilities. With respect to hazardous waste, after the next 10 years, DOE/NNSA would continue to temporarily store hazardous wastes in permitted storage facilities, as needed, pending shipment to offsite recycle or treatment, storage, or disposal facilities. No operating hazardous waste disposal facilities are located at the NNSS or other in-state NNSA facilities, although there are numerous hazardous waste recycle or treatment, storage, or disposal facilities in operation within Nevada and other nearby states (see Chapter 5, Section 5.1.11.1). None of these facilities would affect DOE/NNSA waste management infrastructure at the NNSS or other in-state locations, and their existence assures that adequate capacity for offsite disposition of hazardous waste would continue. If needed, permitted treatment capacity at the NNSS or offsite locations could be developed consistent with the existing DOE pollution prevention and waste minimizations programs and Executive Order 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*.

[1] *As-disposed (un-decayed) activities.*

The quantities of solid waste disposed at the NNSS over the next 10 years are projected to exceed 9 million cubic feet, as shown in Table 6–13. Following the next 10 years, DOE/NNSA is expected to continue to dispose sanitary solid waste and construction and demolition debris within permitted landfills at the NNSS or other in-state DOE/NNSA locations and continue to recycle solid wastes as appropriate, consistent with DOE pollution prevention and waste minimization programs and Executive Order 13514. In addition to as-needed augmentation of permitted solid waste disposal capacity at the NNSS or other NNSA in-state locations (e.g., a possible new sanitary waste facility in Area 23 and a possible construction/demolition landfill in Area 25), DOE/NNSA is expected to continue to use offsite disposal facilities as needed. As discussed in Chapter 5, Section 5.1.11.1, numerous solid waste disposal and recycle facilities exist in Nevada. None of these facilities would affect DOE/NNSA waste management infrastructure at the NNSS or other in-state locations, and their existence assures that adequate capacity for offsite disposition of solid waste would continue as needed.

Performance Assessment – An analysis of a radioactive waste disposal facility conducted to demonstrate that for waste disposed of after September 26, 1988, there is a reasonable expectation that performance objectives for the long-term protection of the public and the environment will not be exceeded following closure of the facility. The performance objectives address (1) doses to representative members of the public through all pathways, (2) doses to representative members of the public through the air pathway alone, and (3) release of radon gas. The analysis must also assess possible water resources impacts, as well as possible impacts on hypothetical future inadvertent intruders into the disposal facility.

Composite Analysis – An analysis that accounts for all sources of radioactive material that may contribute to the long-term dose projected to a hypothetical member of the public from an active or planned low-level radioactive waste disposal facility. The analysis is a planning tool intended to provide a reasonable expectation that current low-level radioactive waste disposal activities will not result in the need for future corrective or remedial actions to ensure protection of the public and environment. If the combined dose from all interacting sources exceeds 30 millirem (total effective dose equivalent) per year, as evaluated for a specified period, a cost-benefit analysis must be performed to determine whether cost-effective options exist to reduce the dose further (DOE 1999e).

6.3.12 Human Health

Nuclear testing began at the NNSS in 1951. There were 100 atmospheric nuclear explosions before the Limited Test Ban Treaty was implemented in August 1963. Residents who were present during the periods when nuclear weapons testing occurred (in particular, atmospheric weapons testing from 1951 to the early 1960s) would have received up to 5 rem to the thyroid gland from iodine-131 releases, equal to an effective dose of approximately 250 millirem (SNL 2007). 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 ROI at the time of the testing.

Nuclear tests were conducted underground until October 1992, when the nuclear testing moratorium was implemented. Between 1970 and 1992, there were 126 nuclear tests that released approximately 54,000 curies of radioactivity to the atmosphere. Of this amount, 11,500 curies were accidental due to containment failure (massive releases or seeps) and late-time seeps (seeps are small releases after a test when gases diffuse through pore spaces of overlying soil and rock). The remaining 42,500 curies were operational releases. From the perspective of human health risk, if the same person stood at the boundary of the NNSS in the area of maximum concentration of radioactivity for every test since 1970, that person's total exposure would be equivalent to 32 extra minutes of normal background exposure, or the equivalent of one-thousandth of a single chest x-ray (OTA-ISC-414).

The annual radiation dose received by the offsite population within about 50 miles of the NNSS would be 0.89 person-rem per year; the annual dose received by the population with 50 miles of NLVF would be 4.1×10^{-5} person-rem. The 10-year cumulative population dose would be 8.9 person-rem. This cumulative population dose over the next 10 years would be expected to result in no (actual estimated number = 0.005) LCFs. Statistically, the probability of a single LCF occurring in the population within 50 miles of the NNSS as a result of this cumulative dose would be 1 in 200.

Based on the distance between potential sources of contamination and the nearest public or private water supply wells, no impacts on the public are expected from exposure to groundwater containing radioactivity from underground nuclear testing or other NNSS sources (see Section 6.3.6.2, "Groundwater").

As addressed in Chapter 4, Section 4.1.11.1.1.3, and Chapter 5, Section 5.1.12.1.4, radioactive waste disposal occurs at the NNSS in accordance with authorizations issued by DOE that consider analyses of possible long-term (over thousands of years) impacts on the public and the environment after the disposal facilities are closed.

LLW management performance. A combined Area 3 RWMS performance assessment and composite analysis was completed in July 2000. The Area 5 RWMC performance assessment was completed in 1998, and the Area 5 RWMC composite analysis was completed in 2001. These analyses are updated annually to reflect new information such as revised estimates of disposed waste inventories or modifications to waste disposal operations. The analyses determined that, because of the great excess of evapotranspiration over precipitation and other site-specific factors, there was little to no potential for transport of disposed radionuclides to groundwater. The analyses also concluded that all performance objectives would be met. As noted in Chapter 5, Section 5.1.12.1.4, the results of the initial composite analyses were well below the 30-millirem-per-year decision criterion for both the Area 3 RWMS and Area 5 RWMC. The most recent review and update of the Area 3 and 5 performance assessments and composite analyses concluded that the results and conclusions of the performance assessments and composite analyses remained valid (NSTec 2010f).

TRU waste management performance. As discussed in Chapter 4, Section 4.1.11.1.1.3 and Chapter 5, Section 5.1.12.1.4, DOE conducted analyses of compliance with EPA's TRU waste disposal requirements in 40 CFR Part 191 for the TRU waste disposed both intentionally in greater confinement disposal (GCD) boreholes and inadvertently in an Area 5 RWMC trench. It was determined that disposal of TRU waste in the GCD boreholes and disposal trench would meet all applicable EPA containment, individual protection, and groundwater protection requirements. For both analyses, it was determined that the projected cumulative releases would meet the probabilities specified in the EPA standard of exceeding specified quantities of radionuclides. Regarding the EPA individual protection requirement, the mean annual dose to a member of the public from all waste in the boreholes over 1,000 years was about 0.0062 millirem to the whole body and 0.12 millirem to bone. For the TRU waste inadvertently disposed of in the trench, the maximum total effective dose equivalent for a member of the public over 10,000 years was about 1.4 millirem in a year, predominantly from assumed inhalation of radon-222 progeny in air produced by LLW in the same trench. The results of both assessments indicated compliance with applicable EPA requirements. Regarding the EPA groundwater protection requirement, hydrologic processes modeling supported a conclusion of no groundwater pathway within 10,000 years (SNL 2001b; Shott et al. 2008).

Industrial accidents. Based on occupational injury and fatality rates for industrial activities inclusive of construction (DOL 2010a, DOE 2010b), construction activities at NNSS, including construction of one or more solar power generation facilities with a combined capacity of 1,000 megawatts, would result in less than 1 (actual calculated number = 0.08) fatality over the next 10 years. Assuming an average construction period of 36 months for all of the renewable energy projects in Amargosa Valley and a total

average number of construction workers of 6,025, a single (actual calculated number = 0.69) worker fatality could be expected during the construction period. There would be a cumulative total of 1 (calculated number = 0.77) worker fatality for large-scale construction projects in the area over the 10-year period. Based on incidence rates for total recordable cases (TRCs) and days away, restricted or transferred (DART) cases as a result of accidents (DOL 2010b, DOE 2010b) across a broad range of activities, projected TRC and DART cases for 10 years of activities (operations and construction) at the NNSS, RSL, NLVF, and the TTR were estimated. The estimate includes the construction and 5 years of operation of one or more solar power generation facilities. Over a 10-year period, there would be an estimated 810 TRCs and 370 DART cases. Based on the estimated number of workers and construction duration for renewable energy projects in Amargosa Valley (see above), an additional 750 TRCs and 380 DART cases would be expected, for totals of 1,560 TRCs and 750 DART cases.

Noise

At the regional level, it is expected that ambient noise levels would increase, especially in areas undergoing urban development and those that are adjacent to industrial and mineral extraction activities. Noise impacts associated with activities at the NNSS would be restricted to the geographical area contained therein and would not affect residents in adjacent areas or add measurably to regional noise levels.

6.3.13 Environmental Justice

American Indian environmental justice concerns, as identified by the Consolidated Group of Tribes and Organizations, include holy land violations, perceived risks from radiation, and cultural survival. Increased land disturbance associated with all forms of development in the ROI could result in a decrease in access to these areas for American Indians. Limiting access could reduce the traditional use of the area and affect its sacred nature. Increased development throughout the ROI has the potential for greater disturbance and vandalism of American Indian cultural resources. Such impacts would be perceived, in the main, by American Indian groups who would make up the population group experiencing disproportionate impacts of project implementation.

6.4 Summary of Cumulative Impacts

Table 6–15 contains a summary of cumulative impacts addressed in Section 6.3. As noted at the beginning of this chapter, the impacts associated with the NNSS in the preceeding analyses are based on the Expanded Operations Alternative, unless otherwise noted. Table 6–15 includes summary information for all three alternatives addressed in this *NNSS SWEIS*, i.e., No Action, Expanded Operations, and Reduced Operations.

Table 6–15 Summary of Cumulative Impacts

Resource Area	*Non-DOE/NNSA Contribution to Cumulative Impacts*	*DOE/NNSA Contribution to Cumulative Impacts*	*Cumulative Impacts*
Land Use	In Nye County, approximately 143,000 acres of public land managed by BLM would be committed to use for renewable energy facilities or commercial/industrial uses. In Clark County, BLM would dispose up to about 36,000 acres of public land. Use of this land would be changed from its current public uses to private and/or municipal uses.	The following land use changes would occur under the noted *NNSS SWEIS* alternatives: **No Action** – There would be no changes to NNSS Land Use Zones. – Construction of a commercial solar power generation facility would affect land use patterns outside of the NNSS due to construction of a 230-kilovolt transmission line. **Expanded Operations** – Area 15 – Change from Reserved Zone to Research, Test and Experiment Zone. – Area 25 – Designate about 39,600 acres as a Renewable Energy Zone. – Construction of a commercial solar power generation facility would affect land use patterns outside of the NNSS due to construction of a 500-kilovolt transmission line. **Reduced Operations** – Areas 19 and 20 – Change from Nuclear Test Zone to Limited Use Zone. – Areas 18, 29, and 30 – Change from Reserved Zone to Limited Use Zone. – Construction of a commercial solar power generation facility would not affect land use patterns outside of the NNSS.	Regardless of the implement6ation of any alternative in this *NNSS SWEIS,* changes in NNSS land use zone designations or functions are not expected to affect land use patterns in areas outside of the NNSS, except for the potential construction of interconnecting transmission lines for commercial solar power generation facilities under the No Action (250 acres) and Expanded Operations (300 acres) Alternatives. Land uses at RSL, NLVF, and the TTR are expected to remain unchanged and would not affect land uses in other areas. A total of over 185,000 acres of public land managed by BLM would be either disposed or withdrawn for non-public uses within Clark and Nye Counties.

Resource Area	*Non-DOE/NNSA Contribution to Cumulative Impacts*	*DOE/NNSA Contribution to Cumulative Impacts*	*Cumulative Impacts*
Infrastructure and Energy	***Infrastructure***		
	Construction of new facilities, particularly large projects, would place cumulative demands on goods and services. The proposed renewable energy projects in Amargosa Valley and Area 25 of the NNSS would all have similar needs for large tracts of undeveloped land and water; use earth-moving/grading equipment, cranes, and other construction equipment; require similar materials, such as concrete, steel, wood, wiring and cables, etc.; and require the services of both general and specialized construction workers.	Construction of new facilities at the NNSS, particularly one or more solar power generation facilities with a capacity of 240 megawatts under the No Action Alternative, a combined capacity of 1,000 megawatts under the Expanded Operations Alternative, and 100 megawatts under the Reduced Operations Alternative,, would cause a demand for construction materials and skilled labor, in proportion to their size, similar to those of other large construction projects.	Large-scale construction projects, particularly renewable energy facilities in the Jackass Flats area of the NNSS and in Amargosa Valley and construction of new high voltage transmission lines, would create an increase in demand for and cumulatively affect availability of construction materials, supplies, and labor. Because of the relative number and/or size of new facility construction considered in this *NNSS SWEIS*, the noted cumulative impact would be substantially greater for the Expanded Operations Alternative than for the No Action Alternative. The Reduced Operations Alternative would create the least demand on construction materials, supplies, and labor and would contribute the least to cumulative impacts.
	Energy		
	In 2009, NV Energy (southern division) and Valley Electric Association provided a total of about 21,670,000 megawatt-hours of electricity to their customers (NSOE 2010). The Nevada Public Utilities Commission forecasts a 1.5 percent growth rate in electricity sales through 2020 (NDEP 2008). Based on that growth rate, by 2020, total electricity sales in southern Nevada would be about 25,500,000 megawatt-hours, an increase of almost 4,000,000 megawatt-hours. There are proposals for renewable energy projects in southern Nevada that would produce a total of about 5,800 megawatts of new generating capacity.	The 2020 projected cumulative annual electrical energy demand for DOE/NNSA activities in Nevada under No Action Alternative is about 113,000 megawatt-hours; under the Expanded Operations Alternative about 127,000 megawatt-hours; and under the Reduced Operations Alternative, about 96,000 megawatt-hours. A portion of the electrical energy demand under the Expanded Operations Alternative would be offset by development of a 5-megawatt photovoltaic solar power generation facility in Area 6 of the NNSS.	Cumulatively, the projected increase in electrical energy demand, regardless of the demand under any of the alternatives, would be offset by development up to 5,800 megawatts of new generating capacity from proposed renewable energy facilities. In addition, construction of new high voltage transmission lines, such as the Solar Express Transmission Line Project, the Transwest Express Transmission Project, etc. would provide a stronger connection with other regions to support electrical demand in southern Nevada.

Resource Area	*Non-DOE/NNSA Contribution to Cumulative Impacts*	*DOE/NNSA Contribution to Cumulative Impacts*	*Cumulative Impacts*
Transportation and Traffic		***Traffic***	
	During construction of proposed renewable energy projects in Amargosa Valley and the Yucca Mountain Project Gateway Area development, roads in Nye County could experience increases in daily traffic ranging from a 2- to 5-fold on primary roads such as U.S. Route 95 and Nevada State Route 160, which could degrade levels of service from A to D during peak commuting hours. During operations, primary roadways could experience increases in daily traffic, and levels of service could degrade one level during peak commuting hours. The degradation in levels of service caused by increased traffic volumes on these roads could generate the need for additional travel lanes and other improvements.	Personnel and trucks associated with one or more commercial solar power generation facilities in Area 25 would increase daily vehicle trips on local roadways by 500 to 1,000 through the 36-month construction period under the No Action Alternative; by 750 to 1,500 through the 42-month construction period under the Expanded Operations Alternative; and by 400-800 under the Reduced Operations Alternative. The addition of these vehicles and associated construction trucks on a daily basis would increase the rate of pavement deterioration, degrade levels of service, and could require increased road maintenance and upgrades for roads in the project area.	The cumulative impact of increased traffic on local roadways in southern Nye County, nearby the NNSS, associated with NNSS operations and construction and operation of commercial solar power generation facilities in Area 25 would be a reduction in level of service on U.S. route 95 from B to C, relative to the 2008 baseline, regardless of the traffic increases resulting from implementation of any of the alternatives. When combined with increased traffic from other large construction projects in Amargosa Valley, the level of service would degrade to D, causing accelerated deterioration and associated increased need for maintenance and repair. Some roadways and traffic control measures would need to be upgraded.
		Radiological Transportation	
	Collective worker dose (1943 to 2073) = 399,000 person-rem, equivalent to 240 LCFs over 130 years. Collective general population dose (1943 to 2073) = 373,000 person-rem, equivalent to 224 LCFs over 130 years.	**No Action Alternative** – Worker dose = 2,100 person-rem, equivalent to 1.2 LCFs. – Population dose = 390 person-rem, equivalent to 0.2 LCF. **Expanded Operations Alternative** – Worker dose = 5,500 person-rem, equivalent to 3 LCFs. – Population dose = 1,300 person-rem, equivalent to 1 LCF. **Reduced Operations Alternative** – Worker dose = 2,100 person-rem, equivalent to 1.2 LCFs. – Population dose = 390 person-rem, equivalent to 0.2 LCF.	**No Action Alternative** – Worker dose = 401,000 person-rem, equivalent to 241 LCFs over 130 years. – Population dose = 374,000 person-rem, equivalent to 224 LCFs over 130 years. **Expanded Operations Alternative** – Worker dose = 405, 000 person rem, equivalent to 243 LCFs over 130 years. – Population dose = 374,000 person-rem, equivalent to 225 LCFs over 130 years. **Reduced Operations Alternative** – Worker dose = 401,000 person-rem, equivalent to 241 LCFs over 130 years. – Population dose = 374,000 person-rem, equivalent to 224 LCFs over 130 years.

Resource Area	*Non-DOE/NNSA Contribution to Cumulative Impacts*	*DOE/NNSA Contribution to Cumulative Impacts*	*Cumulative Impacts*
Geology and Soils	Within the cumulative impacts ROI, about 215,000 acres of Clark County and 51,000 acres of Nye County have been disturbed by previous development. A total of about 509,750 acres of additional soil and near-surface geologic media would be impacted by reasonably foreseeable land development activities in Nye and Clark Counties. This would result in a total of about 775,750 acres of soil and near surface geologic media being disturbed.	An unknown but substantial amount of deep subsurface geologic media has been affected by underground nuclear tests conducted on the NNSS. Approximately 80,000 acres of land on the NNSS has been disturbed by previous DOE/NNSA activities. Overall, new disturbance of soils and near-surface geological media resulting from proposed DOE/NNSA actions at the NNSS would be as follows: **No Action**: About 1,800 acres plus an additional 2,650 acres for a commercial solar power generation facility. **Expanded Operations**: About 15,500 acres, plus an additional 10,350 acres for commercial solar power generation facilities and a Geothermal Demonstration Project. **Reduced Operations**: About 1,540 acres plus an additional 1,200 acres for a commercial solar power generation facility.	Previous combined actions within the cumulative impacts ROI have disturbed about 346,000 acres. Reasonably foreseeable actions would disturb additional soil and near-surface geological media within the ROI, as follows: **No Action:** About 514,250 acres **Expanded Operations:** About 535,750 acres **Reduced Operations:** About 512,450 The total potential cumulative area of land disturbance would range from about 858,450 to 881,750 acres, which represents about 5.5 to 5.6 percent of the total area of the ROI (15,737,760 acres).

Resource Area	*Non-DOE/NNSA Contribution to Cumulative Impacts*	*DOE/NNSA Contribution to Cumulative Impacts*	*Cumulative Impacts*
Hydrology	***Surface Water***		
	Disturbing about 94,300 acres in Amargosa Valley for constructing solar power generation facilities and developing the Yucca Mountain Project Gateway Area could potentially result in erosion and slightly increase sedimentation in the Amargosa River during the construction period. However, BLM prescribed and enforced erosion control measures would reduce the likelihood of such an impact.	Within areas that drain off the NNSS, under the No Action, Expanded Operations, and Reduced Operations Alternatives, a total of 2,650, 10,300, and 1,200 acres, respectively, of land could be disturbed for construction of one or more commercial solar power generation facilities and under each alternative 110 acres of land would be disturbed for a Solar Demonstration Project. During construction of these facilities, the potential for soil erosion affecting surface waters would be greater due to removal of vegetation and other earth-disturbing activities. If such erosion were to occur it would likely result in increased sediments being transported into Fortymile Wash and eventually into the Amargosa River. However, implementation of erosion control measures would reduce the likelihood of such erosion.	Although the potential for increased sedimentation in the Amargosa River drainage is a potential cumulative impact regardless of alternative considered in this SWEIS, implementation of recognized measures to prevent erosion would reduce the likelihood of such impacts occurring.
	Groundwater		
	The town of Beatty, Nevada, uses just under 500 acre-feet of water per year obtained from the Oasis Valley Hydrographic Basin. Operational water requirements for the solar power generation facilities proposed in Amargosa Valley would require almost 6,000 acre-feet of groundwater each year, primarily from the Amargosa Desert, Oasis Valley, and Crater Flats Hydrographic Basins. Nevada State Engineer Order 1197 requires that water for new uses in the Amargosa Desert Hydrographic Basin be obtained by acquisition of existing water rights.	Past underground nuclear testing has contaminated an unknown volume of groundwater beneath the NNSS. That contamination is not expected to impact publicly available water supplies within the next 100 years. DOE/NNSA proposed activities under this *NNSS SWEIS* would not cause new or additional groundwater contamination. DOE/NNSA activities at the NNSS and the TTR, as well as operation of solar power generation facilities in Area 25 of the NNSS, under all three alternatives addressed in this *NNSS SWEIS*, would require withdrawal of groundwater, as follows: **No Action:** 959 acre feet **Expanded Operations:** 1,580 acre-feet **Reduced Operations:** 815 acre feet This volume of groundwater represents about 16 percent, 27 percent, and 14 percent, respectively, of the cumulative sustainable yield for all of the affected hydrographic basins.	Regardless of alternative considered in this *NNSS SWEIS,* groundwater monitoring programs conducted by DOE/NNSA and other organizations, such as the U.S. Geological Survey and Desert Research Institute, would ensure that there would be sufficient lead-time for DOE/NNSA to identify and implement, appropriate protective and mitigative measures if contamination associated with underground nuclear testing were to affect any water supply located off Federal land. Due to the implementation of Nevada State Engineer Order 1197, there would be no new cumulative impacts associated with groundwater availability resulting from DOE/NNSA proposed actions and reasonably foreseeable projects in the Amargosa Desert Hydrographic Basin.

Resource Area	*Non-DOE/NNSA Contribution to Cumulative Impacts*	*DOE/NNSA Contribution to Cumulative Impacts*	*Cumulative Impacts*
Hydrology (cont'd)		DOE/NNSA would not withdraw groundwater from the Oasis Valley, Crater Flats, or Amargosa Valley Hydrographic Basins.	
Biological Resources	Reasonably foreseeable actions by USFWS would result in a total of about 360,000 acres of desert tortoise habitat in Clark County, Nevada, being permitted under the Endangered Species Act for incidental take of desert tortoises (USFWS 2000; 74 FR 50239). This represents about 9 percent of the estimated 4,000,000 acres of tortoise habitat in Clark County. Within Nye County, desert tortoise habitat would be affected by a number of reasonably foreseeable actions. The development of solar energy projects in Nye County would remove up to about 131,500 acres of desert tortoise habitat; development of the Nye County Yucca Mountain Project Gateway Area would remove up to 5,800 acres. The development of over 509,000 acres of currently open land in the region would cumulatively affect wildlife and wildlife habitat. The loss of large areas of habitat would reduce the available habitat for native wildlife, including federally listed species and other special status species. Development of undisturbed land would contribute to loss, fragmentation, and degradation of habitat and encourage nonnative invasive species, thereby eliminating or degrading natural plant communities on which wildlife depend.	Currently, approximately 80,000 acres of the NNSS are considered disturbed. Overall, new wildlife habitat disturbed by DOE/NNSA actions would be as follows: **No Action**: About 1,810 acres plus an additional 2,650 acres for a commercial solar power generation facility. **Expanded Operations**: About 15,500 acres, plus an additional 10,350 acres for commercial solar power generation facilities and a Geothermal Demonstration Project. **Reduced Operations**: About 1,540 acres plus an additional 1,200 acres for a commercial solar power generation facility. Impacts to the threatened desert tortoise under all alternatives would be the result of harassment. **No Action**: DOE/NNSA activities at the NNSS would affect about 1,055 acres of desert tortoise habitat and impact up to 47 tortoises; a commercial solar power generation facility would affect an additional 2,650 acres of tortoise habitat and up to 41 tortoises. **Expanded Operations**: DOE/NNSA activities at the NNSS would affect about 3,370 acres of desert tortoise habitat and impact up to 60 tortoises; commercial solar power facilities would disturb about 10,300 acres of tortoise habitat and up to 161 desert tortoises. **Reduced Operations**: DOE/NNSA activities at the NNSS would disturb about 920 acres of desert tortoise habitat and impact up to 37 tortoises; a commercial solar power generation facility would affect an additional 1,200 acres of tortoise habitat and up to 19 tortoises.	The development of from about 512,000 (Reduced Operations Alternative) to 535,750 acres (Expanded Operations Alternative) of currently open land in the region would cumulatively affect wildlife and wildlife habitat. The loss of large areas of habitat would reduce the available habitat for native wildlife, including federally listed species and other special status species. Development of undisturbed land would contribute to loss, fragmentation, and degradation of habitat and encourage nonnative invasive species, thereby eliminating or degrading natural plant communities on which wildlife depend. DOE/NNSA proposed actions and reasonably foreseeable actions by others within the cumulative impacts ROI would result in the loss of over 522,000 acres of tortoise habitat under the Expanded Operations Alternative or about 508,000 acres under the No Action and Reduced Operations Alternatives. However, because a large portion of that habitat loss would be permitted by USFWS under the Endangered Species Act, pursuant to Section 10(a)(1)(B) non-Federal entities and Section 7 for Federal agencies this habitat loss would not threaten the continued existence of the desert tortoise.

Resource Area	*Non-DOE/NNSA Contribution to Cumulative Impacts*	*DOE/NNSA Contribution to Cumulative Impacts*	*Cumulative Impacts*
Biological Resources (cont'd)		An additional 125 tortoises may experience impacts due to harassment on NNSS roads under all three alternatives The Concentrating Solar Power Validation Project would disturb an additional 110 acres of desert tortoise habitat, but based on a survey of the area by qualified tortoise biologists, would not likely impact tortoises. Overall, wildlife habitat disturbed by DOE/NNSA actions would total about 26,000 acres.	
Air Quality and Climate	***Nye County***		
	Because Nye County is considered an attainment/nondesignated area for purposes of compliance with NAAQS, there are no countywide air monitoring data available.	Annual DOE/NNSA air emissions in Nye County from all sources in 2015: **No Action Alternative:** PM_{10} = 9.8 tons $PM_{2.5}$ = 6.8 tons CO = 66 tons NO_x = 40 tons SO_2 = 1.3 tons VOCs = 5.2 tons Lead = 0.04 tons HAPs = 1.4 tons **Expanded Operations Alternative:** PM_{10} = 22.6 tons $PM_{2.5}$ = 11 tons CO = 82 tons NO_x = 50 tons SO_2 = 2 tons VOCs = 10 tons Lead = 0.2 tons HAPs = 1.4 tons **Reduced Operations Alternative:** PM_{10} = 7.2 tons $PM_{2.5}$ = 5.8 tons CO = 55 tons NO_x = 36 tons SO_2 = 1.2 tons VOCs = 4.1 tons Lead = 0.01 tons HAPs = 1.3 tons	Cumulatively, the annual air emissions from Federal and non-Federal activities in Nye County from all sources in 2015, regardless of the level of projected emissions under any of the alternatives considered in this *NNSS SWEIS,* are not expected to cause a nonattainment condition with respect to NAAQS.

Resource Area	*Non-DOE/NNSA Contribution to Cumulative Impacts*	*DOE/NNSA Contribution to Cumulative Impacts*	*Cumulative Impacts*
Air Quality and Climate (cont'd)		***Clark County***	
	Clark County, principally the Las Vegas Valley, is classed as a nonattainment area for some air pollutants i.e., not in compliance with NAAQS. Criteria pollutants for which the Las Vegas Valley have been out of attainment and the projected (2013) annual mobile source emissions are: PM_{10} = 28,744 tons CO = 140,160 tons NO_x = 11,625 tons VOCs = 12,399 tons	Estimated annual mobile source emissions related to DOE/NNSA activities in Clark County, including worker commuting, for the criteria pollutants that are in nonattainment in the Las Vegas Valley are: **No Action Alternative:** PM_{10} = 1.5 tons CO = 97 tons NO_x = 24 tons VOCs = 3.1 tons **Expanded Operations Alternative:** PM_{10} = 2 tons CO = 119 tons NO_x = 29 tons VOCs = 3.9 tons **Reduced Operations Alternative:** PM_{10} = 2 tons CO = 86 tons NO_x = 22 tons VOCs = 3 tons	The estimated 2015 cumulative total of annual mobile source emissions of criteria pollutants that are currently in nonattainment in the Las Vegas Valley are: **No Action Alternative:** PM_{10} = 28,746 tons CO = 140,257 tons NO_x = 11,649 tons VOCs = 12,402 tons **Expanded Operations Alternative:** PM_{10} = 28,746 tons CO = 140,279 tons NO_x = 11,654 tons VOCs = 12,403 tons **Reduced Operations Alternative:** PM_{10} = 28,746 tons CO = 140,246 tons NO_x = 11,647 tons VOCs = 12,402 tons
		Greenhouse Gas Emissions	
	Estimated annual greenhouse gas emissions in Nye, Clark, Lincoln, and Esmeralda Counties in 2015 are projected to be about 54.6 million tons.	DOE/NNSA activities in Nye and Clark County would annually generate of the following estimated amounts of greenhouse gas emissions in 2015: **No Action Alternative:** 60,555 tons **Expanded Operations Alternative:** 88,679 tons **Reduced Operations Alternative:** 53,755 tons	Estimated annual cumulative greenhouse gas emissions in 2015 would in Nye, Clark, Lincoln, and Esmeralda Counties would be: **No Action:** 54,661,000 tons **Expanded Operations:** 54,689,000 tons **Reduced Operations:** 54,654,000 tons
Visual Resources	In Nye County, in the vicinity of the NNSS, development of solar power generation facilities would substantially alter the visual character along U.S. Route 95 in Amargosa Valley.	Under all three alternatives addressed in this SWEIS, the development of one or more solar power generation facilities with generating capacities ranging from 100 to 1,000 megawatts in Area 25 of the NNSS would reduce the visual quality rating of that viewshed from Class B to Class C due to intrusion of manmade elements. Under the Expanded Operations Alternative, construction of additional facilities at Desert Rock Airport would adversely impact the viewshed along U.S. Route 95 in Mercury Valley.	Regardless of the alternative considered in this *NNSS SWEIS,* development of solar power generation facilities, the Yucca Mountain Gateway Project, and new facilities at Desert Rock Airport (only under the Expanded Operations Alternative) would substantially alter the visual character along U.S. Route 95 in Amargosa and Mercury Valleys, reducing the visual quality rating from Class B to Class C.

Resource Area	*Non-DOE/NNSA Contribution to Cumulative Impacts*	*DOE/NNSA Contribution to Cumulative Impacts*	*Cumulative Impacts*
Cultural Resources	An estimated 26,000 cultural resources sites would be affected by land-disturbing activities within the cumulative impacts ROI, with about 13,000 of those sites being considered eligible for inclusion in the NRHP.	The estimated number of cultural resources sites potentially affected by DOE/NNSA activities and development of commercial solar power generation facilities under each alternative are as follows: **No Action Alternative:** DOE/NNSA activities would potentially affect up to 53 sites; 18 could be considered eligible for inclusion in the NRHP Development of a 100 megawatt commercial solar power generation facility would potentially affect up to 802 sites; 557 could be considered eligible for inclusion in the NRHP. **Expanded Operations Alternative:** DOE/NNSA activities would potentially affect up to 682 sites; 283 could be considered eligible for inclusion in the NRHP Development of up to 1,000 megawatts of commercial solar power generation facilities and a Geothermal Demonstration Project would potentially affect up to 7,006 sites; 2,163 could be considered eligible for inclusion in the NRHP. **Reduced Operations Alternative:** DOE/NNSA activities would potentially affect up to 45 sites; 14 could be considered eligible for inclusion in the NRHP. Development of a 100 megawatt commercial solar power generation facility would potentially affect up to 816 sites; 252 could be eligible for inclusion in the NRHP.	The estimated cumulative total of potentially affected cultural resource sites including both proposed and reasonably foreseeable activities under each alternative are as follows: **No Action Alternative:** Total sites – 26,855 NRHP-eligible sites – 13,565 **Expanded Operations Alternative:** Total sites – 33,688 NRHP-eligible sites – 15,446 **Reduced Operations Alternative:** Total sites – 26,861 NRHP-eligible sites – 13,266

Resource Area	*Non-DOE/NNSA Contribution to Cumulative Impacts*	*DOE/NNSA Contribution to Cumulative Impacts*	*Cumulative Impacts*
Waste Management	***Radioactive Waste***		
	The NNSS is the only active disposal facility for LLW and MLLW in Nevada. It accepts for disposal only LLW and MLLW that meet the NNSS Waste Acceptance Criteria. A commercial LLW disposal facility operated from 1962 to the end of 1992 in Beatty, Nevada, about 45 miles west of Mercury on the NNSS. Because of a lack of a groundwater pathway from NNSS radioactive waste management facilities, the large distances between this facility and DOE/NNSA waste management operations, depth to groundwater, high evaporation rate in the region, and monitoring by the Nevada Division of Environmental Protection to ensure continued proper function of closure/containment measures, this closed disposal facility is not expected to have any cumulative impacts with DOE/NNSA waste management activities.	Historic disposal of LLW, MLLW, and some TRU waste at the NNSS totaled about 40,000,000 cubic feet through 2010. During the next 10 years, the following estimated volumes of radioactive waste would potentially be disposed at the NNSS: **No Action and Reduced Operations Alternatives:** LLW = 15,000,000 cubic feet MLLW = 900,000 cubic feet **Expanded Operations Alternative:** LLW = 48,000,000 cubic feet MLLW = 4,000,000 cubic feet	Because the NNSS operates the only LLW/MLLW disposal facilities in Nevada, there would be no cumulative impacts from management of such wastes outside of the NNSS.
	Nonradioactive Waste		
	There are a number of hazardous waste treatment, storage, and disposal facilities in Nevada and neighboring states that treat and dispose such wastes from many generators.	The following estimated volumes of hazardous waste would be generated by DOE/NNSA activities and commercial solar power generation facilities over the next 10 years: **No Action Alternative:** DOE/NNSA activities—170,000 cubic feet Commercial solar facility—42,000 cubic feet **Expanded Operations Alternative:** DOE/NNSA activities—170,000 cubic feet Commercial solar facilities—170,000 cubic feet **Reduced Operations Alternative**: DOE/NNSA activities—170,000 cubic feet Commercial solar facility—17,000 cubic feet All hazardous waste generated by DOE/NNSA activities would be transported to commercial treatment, storage, and disposal facilities for treatment and/or disposal. Hazardous waste generated by commercial solar facilities would be managed by the operator in accordance with applicable statutes and regulations.	The volume of hazardous waste that DOE/NNSA and commercial solar power generation facilities would dispose at commercial treatment, storage, and disposal facilities would not exceed the capacity of such facilities and would represent a very small portion of the overall volume of such waste disposal, regardless of the alternative considered.

Resource Area	*Non-DOE/NNSA Contribution to Cumulative Impacts*	*DOE/NNSA Contribution to Cumulative Impacts*	*Cumulative Impacts*
Human Health		***Radiological***	
	There are no other non-background sources of potential radiological exposure for an offsite member of the public within the cumulative impacts ROI.	The dose to the offsite population resulting from DOE/NNSA activities in southern Nevada under each alternative addressed in this SWEIS would be: **No Action Alternative:** Dose = 5.0 person-rem over 10 years Consequence = No (0.003) LCFs **Expanded Operations Alternative:** Dose = 8.9 person-rem over 10 years Consequence = No (0.005) LCFs **Reduced Operations Alternative:** Dose = 4.8 person-rem over 10 years Consequences = No (0.003) LCFs	Because there is no other source for above-background level of exposure to radioactivity in the cumulative impacts ROI, DOE/NNSA is the sole contributor to the cumulative dose analyzed in this *NNSS SWEIS*. Cumulatively, the impacts would then be as follows: **No Action Alternative:** Dose = 5.0 person-rem over 10 years Consequence = No (0.003) LCFs **Expanded Operations Alternative:** Dose = 8.9 person-rem over 10 years Consequence = No (0.005) LCFs **Reduced Operations Alternative:** Dose = 4.8 person-rem over 10 years Consequences = No (0.003) LCFs
		Nonradiological	
	During construction of proposed renewable energy projects in Amargosa Valley, industrial accidents could result in an estimated one worker fatality for 750 total recordable cases, and 380 days away, restricted or transferred.	The following estimated nonradiological consequences would occur over a 10-year period from DOE/NNSA activities at NNSS, RSL, NLVF, and TTR and construction of commercial solar power facilities at the NNSS under each alternative addressed in this SWEIS: **No Action Alternative:** Operations Total recordable cases = 578 Days away, restricted, or transferred = 253 Construction Total Recordable Cases = 60 Days Away, Restricted, or Transferred = 31 TOTAL for Alternative Total Recordable Cases = 638 Days Away, Restricted, or Transferred = 314	Industrial accidents from all activities at DOE/NNSA sites over a 10-year period, and construction of renewable energy projects in Amargosa Valley could result in the following Total Recordable Cases and Days Away, Restricted or Transferred for each alternative: **No Action Alternative:** Total recordable cases = 1,328 Days away, restricted, or transferred = 633

Resource Area	*Non-DOE/NNSA Contribution to Cumulative Impacts*	*DOE/NNSA Contribution to Cumulative Impacts*	*Cumulative Impacts*
Human Health (cont'd)		**Expanded Operations Alternative:** Operations Total Recordable Cases = 700 Days Away, Restricted, or Transferred = 314 Construction Total Recordable Cases = 148 Days Away, Restricted, or Transferred = 48 TOTAL for Alternative Total Recordable Cases = 848 Days Away, Restricted, or Transferred = 362 **Reduced Operations Alternative:** Operations Total recordable cases = 508 Days away, restricted, or transferred = 225 Construction Total Recordable Cases = 44 Days Away, Restricted, or Transferred = 23 TOTAL for Alternative Total Recordable Cases = 552 Days Away, Restricted, or Transferred = 248	**Expanded Operations Alternative:** Total recordable cases = 1,598 Days away, restricted, or transferred = 742 **Reduced Operations Alternative:** Total recordable cases = 1,302 Days away, restricted, or transferred = 628
Environmental Justice	Non-DOE/NNSA actions would account for approximately 509,750 acres of new land disturbances within the cumulative impacts ROI. Land disturbance of this magnitude would likely have adverse impacts on American Indian traditional cultural properties by destroying places important to the continuation of those cultures.	Potential new land disturbances on the NNSS for both DOE/NNSA activities and development of commercial solar generation facilities would result in new land disturbance on up to about 4,500 acres 26,000 acres, and 2,700 acres, respectively under the No Action, Expanded Operations, and Reduced Operations Alternatives. Previously undisturbed lands may be important to American Indians. Land disturbances on the NNSS could affect traditional cultural properties of concern for various American Indian tribes with a cultural affiliation with the NNSS.	The potential disturbance of up to 514,250 acres (No Action Alternative), 535,750 acres (Expanded Operations Alternative), or 512,450 acres (Reduced Operations Alternative) of currently undisturbed land within the cumulative impacts ROI would likely have adverse impacts on American Indian traditional cultural properties by affecting places important to the continuation of those cultures.

BLM = Bureau of Land Management; CO = carbon monoxide; HAP = hazardous air pollutant; LCF = latent cancer fatality; LLW = low-level radioactive waste; MLLW = mixed low-level radioactive waste; NAAQS = National Ambient Air Quality Standards; NLVF = North Las Vegas Facility; NNSA = National Nuclear Security Administration; NNSS = Nevada National Security Site; NO_x = nitrogen oxides; NRHP = National Register of Historic Places; PM_n = particulate matter with an aerodynamic diameter less than or equal to *n* micrometers; rem = roentgen equivalent man; ROI = region of influence; RSL = Remote Sensing Laboratory; SO_2 = sulfur dioxide; TTR = Tonopah Test Range; USFWS = U.S. Fish and Wildlife Service; VOC = volatile organic compound.