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 – Nevada Rail Transportation Corridor

DOE/EIS-0250F-S2

and

Final Environmental Impact Statement for a Rail Alignment for the Construction and Operation of a Railroad in Nevada to a Geologic Repository at Yucca Mountain, Nye County, Nevada

DOE/EIS-0369

Volume IV

Rail Alignment EIS - Chapters 5 through 8

List of Preparers

Glossary

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U.S. Department of Energy
Office of Civilian Radioactive Waste Management

June 2008

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5. CUMULATIVE IMPACTS

This chapter presents the results of the DOE analysis of potential cumulative impacts under the Proposed Action for the Caliente rail alignment and the Mina rail alignment. The analysis considers impacts associated with past, present, and reasonably foreseeable future and continuing actions along with potential impacts from each of the rail alignments.

Glossary terms are shown in ***bold italics***.

5.1 Introduction

Cumulative Impact: The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

The U.S. Department of Energy (DOE or the Department) combined potential ***impacts*** reported in Chapter 4 of this Rail Alignment environmental impact statement (EIS) with the potential impacts of other relevant past, present, and ***reasonably foreseeable future actions*** in the ***regions of influence*** for each rail alignment. These combined impacts are called ***cumulative impacts***. Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] 1500 to 1508) that implement the procedural requirements of the National Environmental Policy Act (42 United States Code [U.S.C] 4321 *et seq.*) (NEPA) require a cumulative impacts analysis as part of the environmental impact statement (EIS) process. In conducting this analysis, DOE followed the guidelines in CEQ handbook *Considering Cumulative Effects Under the National Environmental Policy Act* (DIRS 103162-Council on Environmental Quality 1997, all).

5.1.1 REGIONS OF INFLUENCE

DOE considered regions of influence in this cumulative impact analysis that extend beyond most of the resource-specific regions of influence (for example, width of the construction right-of-way) described in Chapters 3 and 4 of this Rail Alignment EIS. For the Caliente rail alignment, the region of influence for cumulative impacts consists of Lincoln, Nye, and Esmeralda Counties (referred to as the Caliente region of influence in this chapter). For the Mina rail alignment, the region of influence for cumulative impacts consists of the Walker River Paiute Reservation, and Lyon, Mineral, Esmeralda, and Nye Counties (referred to as the Mina region of influence in this chapter). Clark, Churchill, and Washoe Counties are generally excluded from the cumulative impacts regions of influence except as needed to maintain consistency with individual resource analyses in Chapters 3 and 4 of this Rail Alignment EIS, such as socioeconomics or air quality. Because the cumulative impacts regions of influence for the Caliente and Mina rail alignment are different for much of their routes, some of the past, present, and reasonably foreseeable activities and projects affecting cumulative impacts for each rail alignment are also different, as described in this chapter.

5.1.2 APPROACH AND ANALYTICAL PERSPECTIVE

DOE used the following approach, analytical perspective, and considerations to perform this cumulative impacts analysis:

- Where analysis indicated a potential for cumulative impacts, information is quantified to the extent feasible (for example, land disturbance and water demand); however, the analysis is primarily ***qualitative***.
- The analysis considers federal, state and local government, and private activities.
- Projects included in the analysis have potential interaction in time (the foreseeable future) or space with the effects from implementation of the Proposed Action or the Shared-Use Option.
- Effects from past and existing projects and activities are primarily considered in the Chapter 3 and Chapter 4 discussions for each resource area (such as mining and grazing).
- DOE considers reasonably foreseeable actions as those future actions for which there is a reasonable expectation that the action could occur, such as a Proposed Action under analysis, a project that has already started, or a future action that has obligated funding.
- Assessment of whether potential impacts would be beneficial or adverse would in many cases depend on individual and group values, beliefs, and goals, and would vary from location to location within the cumulative impacts regions of influence.

DOE has assessed potential cumulative impacts under the Proposed Action qualitatively and quantitatively to the extent available information allows. Not all quantitative information is additive because of different methodologies or conflicting regions of influence.

DOE identified activities relevant to the cumulative impacts analysis from reviews of information available from government agencies, such as environmental impact statements, land-use and natural resource management plans, and from private organizations. DOE reviewed this information for relevance to this cumulative impacts analysis based on potential geographical and temporal relationships with construction and operation of the proposed railroad along either the Caliente or Mina rail alignment. Not all actions identified in this analysis would have cumulative impacts on all resource areas.

This section describes some future actions only in general terms because the projects are in an early stage of planning or development, or they are broad concepts of activity (for example, Bureau of Land Management [BLM] resource management planning). This analysis focuses more on geographic interaction of projects than timing of interactions because the actual timeframes for many of the reasonably foreseeable future actions are uncertain.

The approach taken for this cumulative impact analysis is consistent with the intent of CEQ regulations at 40 CFR 1502.22, *Incomplete or Unavailable Information*. This regulation directs agencies how to proceed when evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information. While information describing the characteristics and potential effects of other projects and activities within the regions of influence is primarily qualitative and, in some cases is incomplete or unavailable, there is sufficient information to complete a fair disclosure and hard look at potential cumulative impacts in the Caliente and Mina regions of influence.

5.1.3 RELATIONSHIP OF THIS ANALYSIS TO THE YUCCA MOUNTAIN REPOSITORY CUMULATIVE IMPACTS ANALYSIS

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* (the Yucca Mountain FEIS) (DIRS 155970-DOE 2002, all) provided an analysis of potential cumulative impacts associated with construction and operation of a repository at Yucca Mountain. To evaluate the potential environmental impacts, including cumulative impacts, of the revised repository design and operational plans, DOE has prepared 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/EIS-0250F-S1) (Repository SEIS), which includes an analysis of cumulative impacts as they relate to the Yucca Mountain Repository. Sections 5.2.1.2.1 and 5.3.1.2.1 include a description of the repository and additional context about the repository as a reasonably foreseeable action. This Rail Alignment EIS cumulative impacts analysis incorporates updated cumulative impacts information from the Repository SEIS, as appropriate.

5.1.4 MITIGATION OF POTENTIAL IMPACTS RELATING TO CUMULATIVE IMPACTS

DOE is responsible for mitigating adverse impacts associated with activities for which it is the project proponent. The Department has preliminarily designed the Caliente and Mina rail alignments to avoid sensitive and regionally important resources like Wilderness Areas and Wilderness Study Areas and to avoid or minimize impacts to sensitive environmental areas (such as wetlands) and to private property.

To comply with requirements and to eliminate or reduce potential environmental impacts, the Department would implement a variety of engineering, site planning actions, and best management practices, all of which are parts of the Proposed Action (see Chapters 2 and 7). The DOE best management practices include the practices, techniques, methods, processes, and activities commonly accepted and used throughout the construction and railroad industries that facilitate compliance with applicable requirements and that provide an effective and practicable means of preventing or minimizing the environmental impacts of an action. Such practices would avoid, minimize, or otherwise reduce the direct and indirect environmental impacts of the DOE Proposed Action, thereby avoiding or minimizing contributions to direct, indirect, and cumulative environmental impacts along either the Caliente or Mina rail alignment. For example, DOE would coordinate with the BLM and grazing permittees to mitigate adverse impacts to grazing operations.

To the extent the Proposed Action would contribute cumulatively to impacts to regional resources, or to other activities such as BLM land-management activities, DOE could take additional actions to reduce any identified impacts associated with its Proposed Action, as practicable (see Chapter 7). DOE continues to coordinate with public- and private-sector project entities to foster consideration of cumulative environmental issues.

5.1.5 ORGANIZATION OF THE ANALYSIS

Section 5.2 summarizes potential cumulative impacts associated with implementing the Proposed Action along the Caliente rail alignment. Section 5.3 summarizes potential cumulative impacts associated with implementing the Proposed Action along the Mina rail alignment. Section 5.4 summarizes combined repository and Nevada rail transportation impacts. Section 5.5 provides the Nye County perspective.

5.2 Caliente Rail Alignment

Sections 5.2.1 and 5.2.2 summarize the projects and activities considered in the Caliente rail alignment cumulative impacts analysis. Figure 5-1 shows the locations of these major projects and activities, including:

1. Southwest Intertie Project
2. Southern Nevada Water Authority Groundwater Development Project
3. Nevada Test and Training Range
4. Timbisha Shoshone Trust Lands
5. Yucca Mountain Repository
6. Nevada Test Site
7. Coyote Springs Development Project
8. Union Pacific Railroad Operations
9. Toquop Energy Project Site
10. BLM Disposal of Public Land – Lincoln County Land Sales
11. Department of Justice Detention Facility

This section also considers other relevant projects and actions that are not depicted on the map, such as:

- BLM planning and management actions – There are a variety of BLM past, present, and reasonably foreseeable actions within the three BLM management areas (Ely, Battle Mountain, and Las Vegas) relevant to the Caliente rail alignment.
- Various rights-of-way – Many future utility or other right-of-way corridors and their specific routes are not known. In October 2007 DOE and the BLM issued the *Draft Programmatic Environmental Impact Statement of the Designation of Energy Corridors on Federal Land in the 11 Western States* (DOE/EIS-0386), which analyzes the potential designation of energy corridors on federal land in western states (DIRS 185274-DOE 2007, all). A number of energy corridors proposed in the Draft EIS run through the state of Nevada; two of these corridors would be located near the proposed Caliente rail alignment (See Figure 5-1). One proposed energy corridor in western Nevada would enter the state north of Reno and travel southeast toward Las Vegas. This corridor would consist of both existing and new rights of way, and would parallel the proposed Caliente rail alignment west of the Nevada Test Site, overlapping the rail alignment right-of-way in several locations. A second corridor in eastern Nevada would run north to south, and would enter the Las Vegas area after passing east of the Desert National Wildlife Range. This corridor would primarily be in a new right-of-way and would cross the proposed Caliente rail alignment in Lincoln County.
- Energy and mineral development activities.
- Other regional economic development plans and activities within Lincoln, Nye, and Esmeralda Counties.

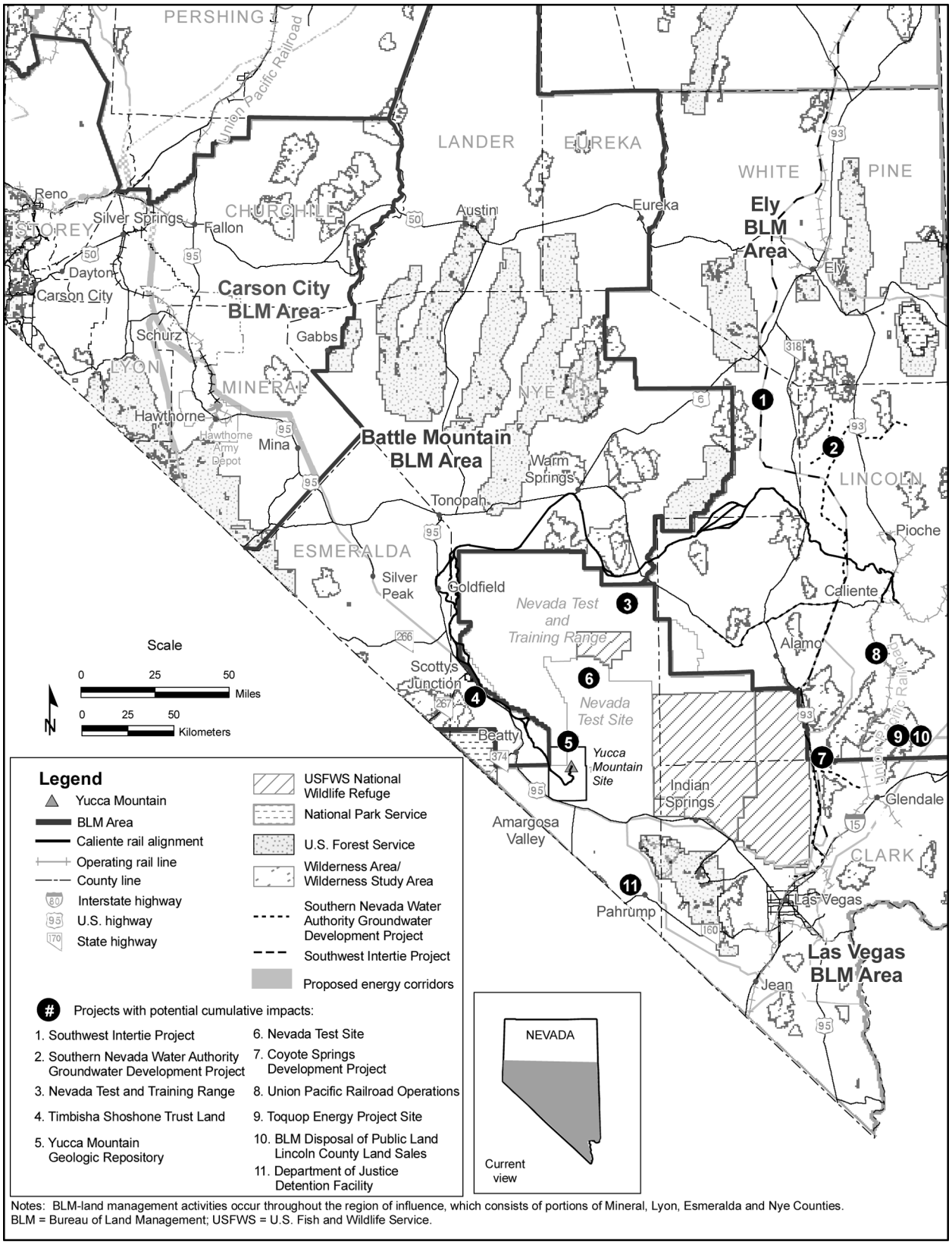

Figure 5-1. Major reasonably foreseeable future actions and continuing activities in the Caliente region of influence.

The Caliente rail alignment ranges in length from about 528 to 541 kilometers (328 to 336 miles), depending on the alternative segments considered. As a linear project, land disturbance and other direct impacts would be most likely to occur within the relatively narrow ***construction right-of-way*** and the narrower ***operations rights-of-way***. However, other direct and indirect impacts for some resources could occur outside of these rights-of-way.

To evaluate the potential for cumulative impacts, DOE identified and reviewed public and private actions in the Caliente region of influence to determine if the impacts associated with these actions could coincide in time or space with potential impacts from construction and operation of the proposed railroad. In some cases, similar actions have been grouped together and listed by category of action.

5.2.1 PROJECTS AND ACTIVITIES INCLUDED IN THE CUMULATIVE IMPACTS ANALYSIS – CALIENTE RAIL ALIGNMENT

5.2.1.1 Past and Present Actions

The descriptions of existing (baseline) environmental conditions (Chapter 3) and impacts (Chapter 4) associated with the various environmental resource regions of influence for the Caliente rail alignment considered in this Rail Alignment EIS include the relationships between proposed railroad construction, operations, abandonment, and past and present actions such as:

- Operations at major federal facilities such as the Yucca Mountain Repository, Nevada Test and Training Range, and Nevada Test Site
- BLM resource management planning and land-management uses
- Traditional land uses such as grazing, mining, and recreation
- Military operations
- Residential, commercial, and industrial development activities associated with growth in the Caliente region of influence

Reasonably foreseeable future actions and the continuation of existing actions in the Caliente region of influence were also considered. Figure 5-1 shows the locations of reasonably foreseeable future individual projects and continuing activities in the Caliente region of influence.

5.2.1.2 Reasonably Foreseeable Future and Continuing Federal Actions

Sections 5.2.1.2.1 through 5.2.1.2.7 describe reasonably foreseeable future and continuing federal agency actions that could result in cumulative impacts when combined with the potential impacts of constructing and operating the proposed railroad along the Caliente rail alignment.

5.2.1.2.1 Yucca Mountain Repository

The Proposed Action in this Rail Alignment EIS is directly related to the proposed geologic repository at Yucca Mountain, which is a reasonably foreseeable project that would have potential cumulative impacts in the Caliente region of influence (see Figure 5-1, Project #5). The repository would disturb about 6.5 square kilometers (1,600 acres) of land, most of which would be on the Nevada Test Site. In the Yucca Mountain FEIS (DIRS 155970-DOE 2002, all) and the Repository SEIS (DOE/EIS-0250F-S1), DOE proposes to construct, operate, monitor, and eventually close a ***geologic repository*** for the ***disposal*** of 70,000 metric tons (77,000 tons) of heavy metal of ***spent nuclear fuel*** and ***high-level radioactive waste*** at Yucca Mountain in Nye County, Nevada. DOE proposes to dispose of spent nuclear fuel and high-level radioactive waste in the repository using the natural geologic features of the mountain and engineered

barriers as a total system to help ensure long-term ***isolation*** of the materials from the accessible environment. As analyzed in the Repository SEIS, the repository design and associated construction and operation plans require the following:

- DOE spent nuclear fuel and high-level radioactive waste would be placed in disposable canisters at the DOE sites, and as much as 90 percent of the commercial spent nuclear fuel would be placed in transportation, aging, and disposal (TAD) canisters at the commercial sites prior to shipment. This is the preferred method of receipt. The remaining commercial spent nuclear fuel (about 10 percent) would be transported to the repository in dual-purpose canisters (canisters suitable for storage and transportation), or would be uncanistered.
- Most spent nuclear fuel and high-level radioactive waste would be transported from 72 commercial and four DOE sites to the repository in Nuclear Regulatory Commission-certified transportation casks placed on trains dedicated only to these shipments. Some shipments, however, would be transported to the repository by truck over the Nation's highways.
- At the repository, DOE would conduct waste handling activities to manage thermal output of the commercial spent nuclear fuel and to package the spent nuclear fuel into TAD canisters. The disposable canisters and TAD canisters would be placed into ***waste packages*** for disposal in the repository. A waste package is a container that consists of the barrier materials and internal components in which DOE would place the canisters that contained spent nuclear fuel and high-level radioactive waste.
- DOE would place approximately 11,000 waste packages, containing no more than a total of 70,000 metric tons (77,000 tons) of heavy metal, spent nuclear fuel, and high-level radioactive waste in the repository at Yucca Mountain.
- The surface and subsurface facilities and associated infrastructure, such as the on-site road and water distribution networks and emergency response facilities, would be constructed in phases to accommodate the expected receipt rates of spent nuclear fuel and high-level radioactive waste.
- DOE also would construct a four-lane access road that would extend from U.S. Highway 95 to the existing access road at Gate 510. This access road might be constructed using a phased approach, with initial construction of two lanes, and the road being widened later. The Department would also build a suitable intersection at U.S. Highway 95.
- DOE assumes that the following facilities would be constructed outside the repository land withdrawal area: a training facility near Yucca Mountain to support the Project Prototype Testing and the Operator Training and Qualification programs; temporary accommodations for construction workers; a proposed Sample Management Facility to consolidate, upgrade, and improve storage and warehousing for scientific samples and materials; and a marshalling yard and warehouse, a proposed facility that would consolidate material shipment and receipt into a 0.2-square-kilometer (50-acre) facility to allow for off-site receipt, transfer, and staging of materials required to perform construction activities at the Yucca Mountain site.

The Nuclear Regulatory Commission, through its licensing process, would regulate repository construction, operation, monitoring, and closure. Repository operations would only begin after the Commission granted DOE a license to receive and possess spent nuclear fuel and high-level radioactive waste. DOE has recently submitted an application seeking construction authorization.

The Yucca Mountain FEIS and the Repository SEIS evaluate the cumulative impacts of two additional inventories, Modules 1 and 2. Under Module 1, DOE would emplace all of the projected spent nuclear fuel and high-level radioactive waste in Yucca Mountain. Inventory Module 1 includes all projected commercial spent nuclear fuel from currently licensed reactors (about 130,000 metric tons [about 143,000

tons]) (DIRS 182343-BSC 2006, all), all DOE spent nuclear fuel (about 2,500 metric tons [about 2,800 tons]) (DIRS 155970-DOE 2002, all) and all high-level radioactive waste (approximately 36,000 canisters) (DIRS 182702-Koutsandreas 2007, all). Under Module 2, DOE would emplace all of Inventory Module 1 plus other radioactive materials that could require disposal in a geologic repository. The Repository SEIS evaluates two disposal cases for Inventory Modules 1 and 2 that evaluate the effects of potential future recycling of spent nuclear fuel on the cumulative impacts in the Repository SEIS. Because Modules 1 and 2 exceed the NWPA disposal limit of 70,000 metric tons (77,000 tons) of heavy metal considered in the Repository SEIS, the emplacement of any such waste at Yucca Mountain would require legislative action by Congress. DOE also acknowledges that prior to disposal of spent nuclear fuel and high-level radioactive waste in excess of 70,000 metric tons of heavy metal, appropriate regulatory authorizations would be obtained from the Nuclear Regulatory Commission, including any necessary amendments to DOE's license for the operation of the Yucca Mountain Repository. As shown in the Repository SEIS, the number of shipments though Nevada in the case involving recycling would be less than that currently evaluated, Therefore, this cumulative impacts analysis only considers the base case without recycling.

Inventory Module 1 or 2 could have cumulative impacts on the operation of the proposed railroad. Regarding potential cumulative impacts from Inventory Module 1 or 2, there would be no cumulative construction impacts because the need for a new railroad would not change; that is, whichever rail alignment DOE selected in which to build the proposed railroad would also be used to transport Module 1 or 2 inventories. Cumulative operations impacts could result because of the increased number of shipments for Module 1 or 2.

DOE is preparing the *Disposal of Greater-Than-Class-C Low-Level Radioactive Waste Environmental Impact Statement* (DOE/EIS-0375) (72 *FR* 40135, July 23, 2007). That EIS will address the disposal of wastes with concentrations greater than Class C, as defined in U.S. Nuclear Regulatory Commission regulations at 10 CFR Part 61, and DOE ***low-level radioactive waste*** and ***transuranic waste*** having characteristics similar to Greater-Than-Class-C waste and that otherwise do not have a path to disposal. DOE proposes to evaluate alternatives for Greater-Than-Class-C low-level waste disposal in a geologic repository, in intermediate depth boreholes, and in enhanced near-surface facilities. Candidate locations for these disposal facilities are the Idaho National Laboratory, the Los Alamos National Laboratory and Waste Isolation Pilot Plant in New Mexico, the Nevada Test Site and the proposed Yucca Mountain Repository, the Savannah River Site in South Carolina, the Oak Ridge Reservation in Tennessee, and the Hanford Site in Washington. DOE will also evaluate disposal at generic commercial facilities in arid and humid locations. The Repository SEIS evaluates the potential cumulative impacts of disposal of these wastes at Yucca Mountain as a reasonably foreseeable action, which are included in Inventory Module 2. The emplacement of commercial Greater-Than-Class-C waste could require either legislative action or a determination by the Nuclear Regulatory Commission to classify these materials as high-level radioactive waste.

DOE is preparing the *Programmatic Environmental Impact Statement for the Global Nuclear Energy Partnership* (DOE/EIS-0396). GNEP is a domestic and international program designed to support expansion of nuclear energy production worldwide while advancing nonproliferation goals and reducing the impacts of spent nuclear fuel disposal. Some of the GNEP programmatic alternatives involve the recycling of commercial spent nuclear fuel. The Repository SEIS evaluates the potential impacts that GNEP could have on the repository. As mentioned earlier, any potential recycling of commercial spent nuclear fuel as a result of GNEP programmatic alternatives would only reduce the number of shipments to the repository; therefore, this program would not have additional cumulative impacts beyond those of Inventory Modules 1 or 2.

5.2.1.2.2 Nevada Test Site (Continuation of Activities)

The Nevada Test Site, adjacent to the Nevada Test and Training Range, engages in a number of defense-related material and management activities, waste management, environmental restoration, and non-defense research and development (see Figure 5-1, Project #6). The Nevada Test Site was established in 1951 as the Nation's proving ground for developing and testing nuclear weapons. The site is on land administratively held by the BLM, but the Nevada Test Site land was withdrawn for use by the Atomic Energy Commission and its successors (including DOE). At present, the DOE National Nuclear Security Administration manages the site. It consists of about 3,200 square kilometers (800,000 acres) of land, and the proposed railroad would use about 4.1 square kilometers (1,000 acres) of this land.

The *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (DIRS 101811-DOE 1996, all) described existing and projected future actions at the Nevada Test Site. That EIS was followed by a *Supplement Analysis for the Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (DIRS 162638-DOE 2002, all). DOE activities at the Nevada Test Site include stockpile stewardship and management (helping ensure the U.S. nuclear weapon stockpile is safe, secure, and reliable), materials disposition (removal of nuclear materials in a safe and timely manner), and nuclear emergency response. Activities at the Nevada Test Site since the 1996 EIS and 2002 supplement analysis have continued to support these missions in accordance with federal law, DOE policies and missions, and NEPA requirements. There are a number of other programmatic DOE waste-management initiatives that can affect current and potential future operations at the Nevada Test Site, many of which require NEPA analyses. The Nevada Test Site also produces annual environmental reports that describe program activities and related environmental issues and activities.

In December 2007, the DOE National Nuclear Security Administration published the *Draft Complex Transformation Supplemental Programmatic Environmental Impact Statement* (Complex Transformation Supplemental PEIS [formerly known as the Complex 2030 SEIS]; DOE/EIS-0236-S4) (DIRS 185273-DOE 2007, all). The Supplemental PEIS analyzes the potential environmental impacts of reasonable alternatives to continue transformation of the U.S. nuclear weapons complex under the National Nuclear Security Administration's vision of the complex to be smaller, more responsive, efficient, and secure. As part of the proposed action, activities could take place at Los Alamos National Laboratory, the Nevada Test Site, the Pantex Plant, the Y-12 National Security Complex, White Sands Missile Range, Lawrence Livermore National Laboratory, and the Savannah River Site. The Supplemental PEIS identified no significant potential environmental impacts to any resource area, including land use and air quality, among others.

DOE manages several types of radioactive and hazardous waste (low-level radioactive waste, mixed low-level waste, transuranic waste, high-level radioactive waste, and ***hazardous waste***) generated by past and present nuclear defense research activities at many DOE sites across the United States, including the Nevada Test Site. The Department manages each of those waste types separately because they have different components, levels of radioactivity, and regulatory requirements. DOE needs facilities like the Nevada Test Site to manage its radioactive and hazardous wastes to maintain safe, efficient, and cost-effective control of these wastes; comply with applicable federal and state laws; and protect public health and safety and the environment. In the *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (DIRS 101816-DOE 1997, all) DOE evaluated the environmental impacts of managing the five waste types. The Nevada Test Site will continue to be a major facility involved in DOE waste-management programs, including serving as a disposal site for certain waste types generated off the site, and for on-site wastes primarily from environmental restoration and remediation activities.

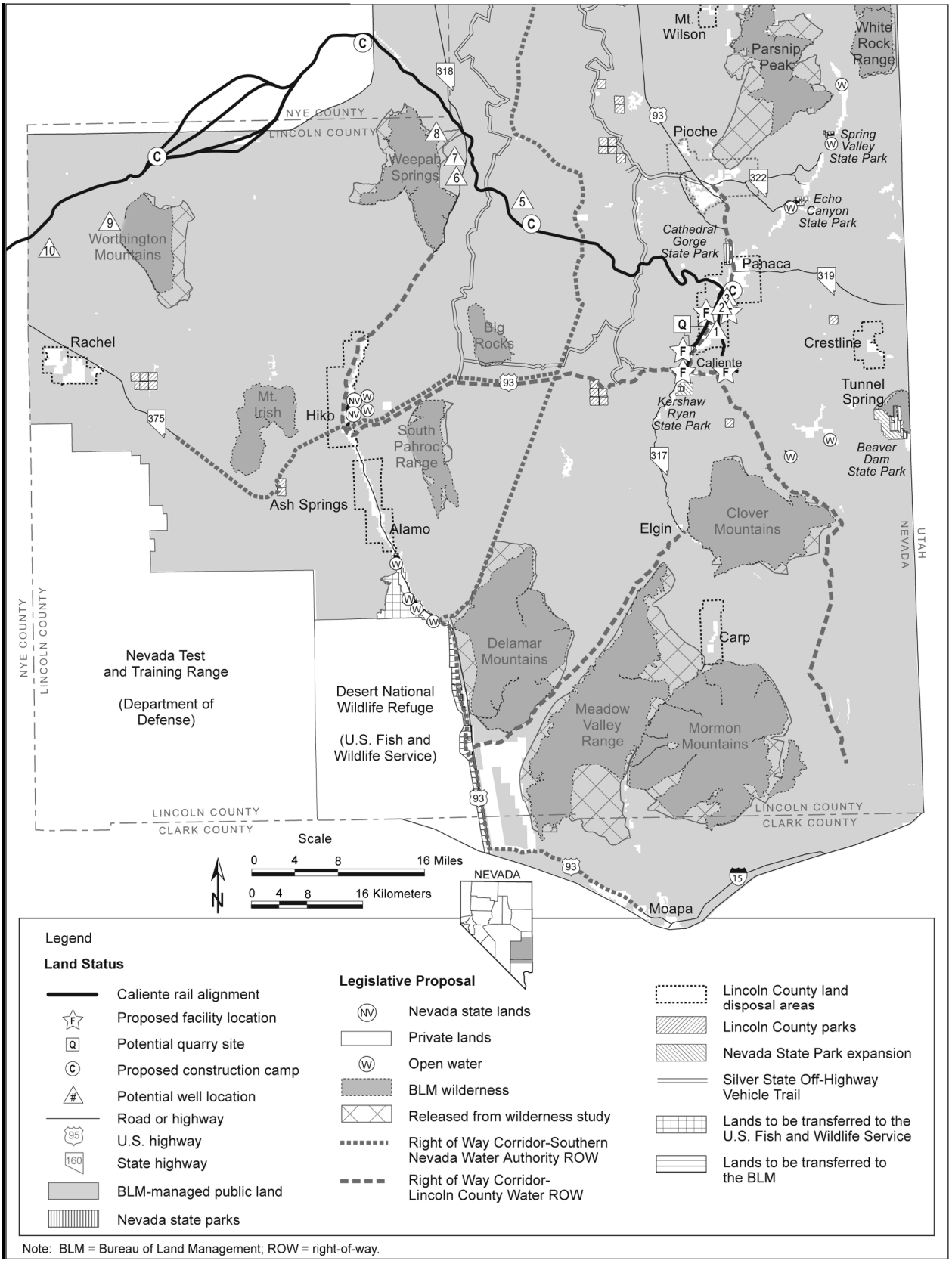

Figure 5-2. Lincoln County Conservation, Recreation, and Development Act activities.

The Nevada Test Site is a candidate disposal location for Greater-Than-Class-C low-level radioactive waste, which is currently being examined in the *Disposal of Greater-Than-Class-C Low-Level Radioactive Waste Environmental Impact Statement* (DOE/EIS-0375). That DOE EIS will address the disposal of wastes with concentrations greater than Class C, as defined in Nuclear Regulatory Commission regulations at 10 CFR Part 61, and DOE low-level radioactive waste and transuranic waste having characteristics similar to Greater-Than-Class-C low-level waste and that might not have an identified path to disposal. DOE proposes to evaluate alternatives for Greater-Than-Class-C low-level waste disposal in a geologic repository, in intermediate-depth boreholes, and in enhanced near-surface facilities.

Table 5-1 lists and briefly describes recent environmental assessments that describe Nevada Test Site operations.

Table 5-1. Recent environmental assessments describing Nevada Test Site operations.

Title	Description
Environmental Assessment for Relocation of Technical Area 18 Capabilities and Materials from the Los Alamos National Laboratory to the Nevada Test Site (DIRS 162639-DOE 2002, all)	DOE completed relocation of Technical Area 18 operational capabilities and materials from the Los Alamos National Laboratory to the Nevada Test Site in November 2005. Relocation included the transport of about 2.4 metric tons (2.6 tons) of special nuclear material and approximately 10 metric tons (11 tons) of natural and depleted uranium and thorium, as well as support equipment, some of which would have radioactive contamination, associated with the operations. A Finding of No Significant Impact was issued.
Environmental Assessment for Defense Logistics Agency Transfer of Waste to DOE and Finding of No Significant Impact (DIRS 172280-DLA 2003, all; DIRS 172281-DOD 2003, all)	The Defense Logistics Agency of the Department of Defense issued an environmental assessment of its proposal to transfer thorium nitrate from the Defense National Stockpile Center to DOE for disposal as a low-level radioactive waste at the Nevada Test Site. The Agency issued a Finding of No Significant Impact in November 2003 (DIRS 172281-DOD 2003, all). The Defense Logistics Agency made eight shipments of low-level thorium waste (about 400 cubic yards [10,900 cubic feet]) in 2004 (DIRS 182346-DOE 2005, all).
Draft Supplement Analysis for the Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada, DOE/EIS-0243-SA-03 (DIRS 185437-DOE 2008, all)	The National Nuclear Security Administration Nevada Site Office is preparing this Supplement Analysis to determine whether the existing environmental impact statement should be supplemented, a new statement should be prepared, or no further NEPA documentation is required. The Administration conducted a systematic environmental impacts review to determine if there were substantial changes in the actions proposed in previous documents or significant new circumstances or information relevant to environmental concerns. Projects and activities introduced since the most recent published document (2002) or proposed for the next five years were screened. In the Draft Supplement Analysis, DOE determined preliminarily that no additional documentation is required because no substantial changes have occurred, and because analyses of resources showed that there are no significant new circumstances or information relevant to environmental concerns.

5.2.1.2.3 BLM Resource Planning and Management

The presence of BLM-administered public land is a very important factor affecting how and where activities occur within the Caliente region of influence. Many private and federal projects, including the proposed ***railroad***, would involve use of BLM-administered public land. Therefore, these projects would require BLM-issued ***right-of-way grants*** before they could proceed. Right-of-way grants have two

general forms: linear (applicable to such projects as transmission lines, railroads, and pipelines), and nonlinear (applicable to projects at one specific location). Rights-of-way on BLM-administered land are extensive in the region and vary tremendously in size and scope of activity.

The BLM administers most of the land through which the Caliente rail alignment would pass. The BLM manages these lands through a multiple-use concept (which means managing public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people) in accordance with the Federal Lands Policy and Management Act of 1976 (43 U.S.C. 1732, *et seq*.) and other federal legislation. The management framework for each BLM planning area is documented in a resource management plan. The Caliente rail alignment crosses three BLM planning areas (Ely, Battle Mountain, and Las Vegas). The Battle Mountain and Las Vegas planning areas are operating under resource management plans adopted in 1998 and 1997, respectively (DIRS 176043-BLM 1998, all; DIRS 173224-BLM 1997, all). The Caliente rail alignment passes through areas in the Ely planning area. The BLM Ely Field Office issued a Proposed Resource Management Plan and EIS in 2007 (DIRS 184767-BLM 2007, all). The EIS analyzed alternatives for disposal of 364 square kilometers (90,000 acres) of public land and would maintain 0.8-kilometer (0.5-mile) corridors established by the Lincoln County Conservation, Recreation, and Development Act of 2004. When issued, the Approved Ely Resource Management Plan will remain in effect as long as the management direction contained in the plan is valid in light of scientific evidence and BLM needs. BLM monitors and evaluates plans every five years, and updates them when practical. The life of a plan is around 20 years, at which time the plan will be revised.

The BLM manages public lands in accordance with the existing management goals and objectives in applicable plans, and takes various specific actions on the affected public lands. The BLM has a major role in balancing competing needs and resources, and in determining the scope and locations of public and private activities on public lands.

5.2.1.2.4 Public Lands in Lincoln County

Based on the terms of federal legislation, the BLM is implementing the following laws that authorize disposing of (selling) public lands in Lincoln County, Nevada (See Figure 5-1, Project #10). These land disposals are driven by two primary legislative initiatives, as follows:

- Lincoln County Land Act of 2000 – This Act (Public Law 106-298) identified approximately 53 square kilometers (13,000 acres) in the southeastern corner of Lincoln County near Mesquite, Nevada, for sale.
- Lincoln County Conservation, Recreation and Development Act of 2004 – This Act (Public Law 108-424) provides for the sale of up to 360 square kilometers (90,000 acres) in Lincoln County.

The Approved Ely Resource Management Plan will identify lands that would be eligible for sale. The Act will affect the growth and development in the Caliente region of influence. See Figure 5-2 for the locations of activities and projects related to this Act. In addition to the planned BLM land disposals, the Act provides for:

- Designation of 14 new Wilderness Areas (consisting of 3,100 square kilometers [770,000 acres]) of BLM-administered land in Lincoln County, and release of 1,000 square kilometers (250,000 acres) of land from the BLM Wilderness Study Area status.
- Establishment of nonexclusive utility corridors for the Southern Nevada Water Authority and the Lincoln County Water District/Vidler Water Company totaling 740 kilometers (460 miles) as rights-of-way for water pipelines and associated facilities to convey water in Clark and Lincoln Counties.

- Movement of an undeveloped right-of-way from the east side of U.S. Highway 93 to an existing utility corridor on the west side of the highway. Coyote Springs Investment will pay the Federal Government for the appreciated value of the property due to adding the right-of-way to their property.
- Establishment of a 420-kilometer (260-mile) Silver State Off-Highway Vehicle Trail along a series of existing backcountry roads that are currently open and used by off-highway vehicle enthusiasts, subject to the BLM preparation of a management plan for this trail.
- Transfer of about 35 square kilometers (8,500 acres) of BLM-administered land to the Desert National Wildlife Range, and transfer of about 34 square kilometers (8,400 acres) of Desert National Wildlife Range land to the BLM to facilitate the utility corridor for the Coyote Spring Investment development.
- Conveyance of up to 61 square kilometers (15,000 acres) of BLM-administered land to Lincoln County for conservation of natural resources or for public parks, with specific lands to be identified based on consultation between the county and the BLM.

In addition to the disposals required by the federal legislation described above, about 92 square kilometers (22,622 acres) have been identified for potential disposal in the vicinity of Goldfield, about 23 square kilometers (5,765 acres) have been identified for potential disposal near Scottys Junction, and 160 square kilometers (39,432 acres) have been identified for potential disposal near Beatty.

5.2.1.2.5 Nevada Test and Training Range (Continuation of Activities)

The U.S. Air Force operates the Nevada Test and Training Range in south-central Nevada (see Figure 5-1, Project #3), a national test and training facility for military equipment and personnel consisting of approximately 12 million square kilometers (3 million acres), where about 530 square kilometers (130,000 acres) of that land has been disturbed by Air Force facilities. Military training maneuvers and jet aircraft are commonly visible in the Caliente region of influence. In 2005, the U.S. Air Force designated the Indian Springs Air Force Auxiliary Airfield as Creech Air Force Base and expanded its mission and infrastructure 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.

The 1,600-square-kilometer (390,000-acre) BLM-administered National Wild Horse Management Area is within the boundary of the Nevada Test and Training Range. More than 3,200 square kilometers (800,000 acres) of the Nevada Test and Training Range comprise the Desert National Wildlife Range. The U.S. Air Force and the U.S. Fish and Wildlife Service jointly manage this area.

In the *Renewal of the Nellis Air Force Range Land Withdrawal: Legislative Environmental Impact Statement* (DIRS 103472-USAF 1999, all) the U.S. Air Force addressed potential environmental consequences of extending the land withdrawal in order to continue using the Nevada Test and Training Range lands for military use. Activities at the Nevada Test and Training Range change, as necessary, to meet military test and training needs.

In 2004, the BLM prepared a resource management plan for about 8,900 square kilometers (2.2 million acres) of withdrawn public lands within the Nevada Test and Training Range (DIRS 178102-BLM 2004, all). The plan guides the management of the affected Nevada Test and Training Range natural resources 20 years into the future (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.

Table 5-2 lists and briefly describes recent environmental assessments that describe Nevada Test and Training Range operations.

Table 5-2. Recent environmental assessments describing Nevada Test and Training Range operations.

Title	Description
Final Environmental Assessment for Increased Depleted Uranium Use on Target 63-10, Nevada Test and Training Range (DIRS 181607-USAF 2006, all)	The proposed action was to increase the use of depleted uranium ammunition at the Nevada Test and Training Range to meet ongoing test and training requirements for A-10 aircraft. The Air Force was to increase the number of depleted uranium rounds authorized to be fired on Target 63-10 from 7,900 to 19,000 annually. The environmental assessment evaluated five resource areas—air quality, soils and water resources, health and safety, hazardous and radioactive materials and waste, and biological resources—in detail to identify potential environmental consequences. The Air Force issued a Finding of No Significant Impact.
Final Environmental Assessment for Predator Force Structure Changes at Indian Springs Air Force Auxiliary Field, Nevada (DIRS 172314-USAF 2003, all)	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 Air Force completed facilities for the Predator unmanned aerial vehicles in 2006. The Air Force issued a Finding of No Significant Impact.
Expeditionary Readiness Training Course Expansion, Final Environmental Assessment, Creech AFB (DIRS 182838-USAF 2006, all)	Environmental assessment to increase the number of Security Forces personnel trained at the Regional Training Center at Silver Flag Alpha and Creech Air Force Base, Nevada, from an existing 2,520 to 6,000 students per year. The Air Force issued a Finding of No Significant Impact.
Wing Infrastructure Development Outlook, Final Environmental Assessment, Nellis AFB (DIRS 182839-USAF 2005, all)	The proposed action consists of 630 Wing Infrastructure and Development Outlook projects in 11 categories as classified under 32 CFR Part 989, *Air Force EIAP*. A total of 18 new construction and demolition projects are proposed for Creech Air Force Base. On the Nevada Test and Training Range, the proposed action would implement four new construction projects at four locations. At Tonopah Test Range, three new construction projects are planned along with the demolition of 10 buildings. The Air Force issued a Finding of No Significant Impact.
Final Range 74 Target Complexes Environmental Assessment Nevada Test and Training Range, Nevada (DIRS 185372-USAF 2007, all)	The proposed action is to construct and operate three target complexes in mountainous terrain in Range 74 of the Nevada Test and Training Range at Saucer Mesa, Limestone Ridge, and Cliff Springs. The Saucer Mesa target array would employ both large-scale live and inert munitions; the Limestone Ridge sites would employ large-scale inert munitions; both target sites would employ small-scale live munitions. The Cliff Springs target complex would be laser and simulated attack targets and no munitions would be used. The Air Force issued a Finding of No Significant Impact.
A Final Base Realignment and Closure Environmental Assessment for Realignment of Nellis Air Force Base (DIRS 181492-USAF 2007, all)	The proposed action would affect the Nevada Test and Training Range by adding 1,400 F-16 sorties flown from Nellis Air Force Base, although they would not cause total annual sortie operations to exceed the current maximum of 300,000 at the Nevada Test and Training Range. The environmental assessment evaluated noise, air quality, socioeconomics and infrastructure, water and soil resources, biological resources, cultural resources, and hazardous materials and waste. The Air Force issued a Finding of No Significant Impact.
F-35 Force Development Evaluation and Weapons School Beddown Draft Environmental Impact Statement (DIRS 185373-USAF 2008, all)	The proposed action would base 36 F-35 aircraft at Nellis Air Force Base to support the Force Development Evaluation program and the Weapons School. The F-35 beddown would require the construction, demolition, or modification of base facilities. The Air Force would conduct an additional 17,280 annual airfield operations at Nellis Air Force Base by 2022, and an additional 51,840 annual sortie operations at the Nevada Test and Training Range. A Record of Decision will not be issued until after the Final EIS is published.
BLM Communication Use Lease to USAF to Conduct Patriot Communications Exercises in Lincoln County, Nevada, Draft Environmental Assessment (DIRS 185370-USAF 2008, all)	The proposed action involves Nellis Air Force Base implementing a 15-year communications use lease from the BLM to support ground-based radar/communications exercises at fourteen 0.023-square-kilometer (5.7-acre) sites (for a total of 0.32 square kilometer [80 acres]) across Lincoln County. The Integrated Air Defense System and radar/communications systems would be deployed on the Nevada Test and Training Range in up to five annual exercises over 15 years.
Draft Environmental Assessment for the Integrated Natural Resource Management Plan, Nellis AFB and NTTR, NV (DIRS 181899-USAF 2007, all)	The proposed action provides guidance to establish mission actions that minimize impacts to natural resources at Nellis Air Force Base and the Nevada Test and Training Range as much as practicable. The Integrated Natural Resources Management Plan provides guidance for the conservation of natural resources at the Nevada Test and Training Range and Nellis Air Force Base. The Air Force issued a Finding of No Significant Impact.

5.2.1.2.6 Timbisha Shoshone Trust Lands (Federal Action)

The Secretary of the Interior issued a draft report to Congress (DIRS 103470-Timbisha Shoshone Tribe [n.d.], all) describing a plan to establish trust lands for people of the Timbisha Shoshone Tribe in portions of the Mojave Desert in eastern California and southwestern Nevada (see Figure 5-1, Project #4). On November 1, 2000, the President signed the Timbisha Shoshone Homeland Act (Public Law 106-423) to provide a permanent land base for the Timbisha Shoshone Tribe within its ancestral homeland in five separate parcels. Lands in the designated area for tribal purposes were then identified, including land parcels containing water rights. The parcel near Scottys Junction (about 11 square kilometers [2,800 acres]) is approximately 3.2 kilometers (2 miles) from the proposed Caliente rail alignment. The Timbisha Shoshone Tribe is actively evaluating economic development opportunities on this Scottys Junction parcel, although no one is residing there at this time. *The Final Legislative Environmental Impact Statement for the Timbisha Shoshone Homeland* (DIRS 154121-DOI 2000, all) stated that expected development for the trust lands would include a service station/convenience store, a gift/souvenir shop, and single-family detached housing units.

5.2.1.2.7 Department of Justice Proposed Detention Facility

The U.S. Department of Justice Office of the Federal Detention Trustee and the U.S. Marshals Service determined that there is a need to house federal detainees at a facility located in proximity to Las Vegas. In March 2008, the Department of Justice published the *Final Environmental Impact Statement for the Proposed Contractor Detention Facility, Las Vegas, Nevada Area* (DIRS 185475-DOJ 2008, all). The agency's preferred alternative identified in the EIS is a 0.49-square-kilometer (120-acre) site approximately 110 kilometers (68 miles) northwest of downtown Las Vegas, in Pahrump at 2250 East Mesquite Avenue (See Figure 5-1, Project #11). Development of the proposed facility would take about 12 to 15 months, and would employ 200 to 250 people.

5.2.1.3 Reasonably Foreseeable Future Non-Federal Actions

Non-federal and private actions in the Caliente region of influence primarily consist of energy development, infrastructure development, groundwater development projects, continued Union Pacific railroad operations, residential development, and general economic development initiatives and efforts. As noted above, many of these privately sponsored projects would interact with the BLM land-management policies and procedures because of a need to acquire right-of-way grants to initiate proposed activities on BLM-administered land.

5.2.1.3.1 Power Plants, Transmission Lines, Pipelines, and Other Infrastructure

Various power companies and public utilities have proposed locations for new power plants in southern Nevada due to substantial population and economic growth in southern California, Arizona, and southern Nevada. Much of this recent and proposed development is in Clark and Nye Counties. In addition to the power plants, regional infrastructure developments include natural gas pipelines and transmission lines that provide fuel and transmit electricity. Recently completed projects or reasonably foreseeable projects that could result in cumulative impacts near the proposed Caliente rail alignment and associated facilities are listed below. It is likely that other power plants, transmission lines, pipelines, and other infrastructure would be built in the proposed Caliente rail alignment region of influence in the future, but the locations and timing of other future projects are not known at this time.

- Southwest Intertie Project (see Figure 5-1, Project #1) – LS Power Associates acquired the right-of-way, which is approximately 870 kilometers (540 miles) long, originally granted by the BLM in 1994 for a transmission line that would run from near Twin Falls, Idaho, to the Dry Lake

Valley northeast of Las Vegas (DIRS 185483-BLM 2001, all). The power line would connect the Nevada Power Company and Sierra Pacific Power Company electrical generation and transmissions systems.

- Toquop Energy Power Project (see Figure 5-1, Project #9) – This proposed power plant would be near Mesquite in Lincoln County, about 160 kilometers (100 miles) northeast of Las Vegas, on BLM-administered lands. In September 2003, the BLM issued to the proponent, Toquop Energy, Inc., a right-of-way to build the proposed 1,100-megawatt natural-gas fired power plant and associated facilities. However, since then, the project plan has changed to a 750-megawatt coal-fired power plant, in the same location as originally proposed. The BLM has determined that the proposed changes warrant the preparation of a new NEPA analysis, and a Draft Environmental Impact Statement was published in October 2007 (DIRS 185338-BLM 2007, all). In addition to the power plant itself, the project would require an approximate 50-kilometer (30-mile) rail spur, transmission lines, water, and a new access road.
- Various utilities in the Caliente rail alignment have recently been constructed and are being planned, including new cable lines (for example, fiber-optic lines) and other facilities (such as wireless towers) that would require BLM right-of-way grants or use of private land in the area. The BLM has designated certain corridors in the area that should be used for most utility purposes; however, use of other BLM-administered land requiring new right-of-way grants has traditionally been considered on a case-by-case basis. To identify appropriate right-of-way corridors throughout the western United States, including Nevada, in October 2007 DOE and the BLM issued the *Draft Programmatic Environmental Impact Statement of the Designation of Energy Corridors on Federal Land in the 11 Western States* (DOE/EIS-0386), which analyzes the potential designation of energy corridors on federal land in western states (DIRS 185274-DOE 2007, all). Proposed energy corridors in the Caliente region of influence are described in Section 5.2 and depicted in Figure 5-1.

The BLM has received 11 right-of-way permit applications for solar energy facilities in Nye County. The applications are in varying stages of completion. The following are descriptions of the eight solar energy applications being evaluated by the BLM Las Vegas Field Office.

- Solar Millennium LLC applied in November 2007 for a right-of-way permit for about 3.4 square kilometers (840 acres) of BLM land in Amargosa Valley in the Anvil Farm Road area. The applicant is proposing to build and operate a 150- to 350-megawatt solar parabolic trough electric power plant (DIRS 185368-Seley 2008, all).
- Solar Millennium LLC applied in November 2007 for a right-of-way permit for about 17 square kilometers (4,100 acres) of BLM land in Amargosa Valley in the Amargosa Farm Road area. The applicant is proposing to build and operate a 150- to 350-megawatt solar parabolic trough electric power plant (DIRS 185368-Seley 2008, all).
- Solar Investments LLC applied in March 2007 for a right-of-way permit for about 89 square kilometers (22,000 acres) of BLM land northwest of the Big Dune Area of Critical Environmental Concern and abutting U.S. Highway 95. The applicant is proposing to construct and operate a 1,000-megawatt solar thermal energy facility in the Big Dune area of Nye County (DIRS 185368-Seley 2008, all).
- Solar Investments LLC applied in February 2007 for a right-of-way permit for about 53 square kilometers (13,000 acres) of BLM land east of the Big Dune Area of Critical Environmental Concern and abutting U.S. Highway 95. The applicant is proposing to construct and operate a 1,000-megawatt solar thermal energy facility in Amargosa (DIRS 185368-Seley 2008, all).

- Solar Investments LLC applied in March 2007 for a right-of-way permit for about 53 square kilometers (13,000 acres) of BLM land south of the Beatty Airfield, near the town of Beatty. The applicant is proposing to construct and operate a 1,000-megawatt solar thermal energy facility (DIRS 185368-Seley 2008, all).
- Pacific Solar Investments, Inc. applied in December 2007 for two right-of-way permits, one for about 30 square kilometers (7,500 acres), and one for about 31 square kilometers (7,700 acres), for BLM land in the Amargosa Desert adjacent to the Big Dune Area of Critical Environmental Concern and south of U.S. Highway 95. The applicant is proposing to construct and operate 500-megawatt parabolic trough plants, known as the proposed Amargosa South and North Plants (DIRS 185368-Seley 2008, all).
- Ausra NV 1 LLC applied in March 2008 for a right-of-way permit for about 28 square kilometers (7,000 acres) of BLM land near the Ash Meadows Wildlife Refuge in the Johnnie Amargosa area. The applicant is proposing to construct and operate a compact linear Fresno reflector power plant, where the first phase would be 400 megawatts and the second phase would be 200 megawatts (DIRS 185368-Seley 2008, all).

The following are descriptions of the three solar energy applications being evaluated by the BLM Battle Mountain Field Office.

- Solar Millennium LLC applied in November 2007 for a right-of-way permit for about 10 square kilometers (2,500 acres) of BLM land just west of the Beatty Airport, near the town of Beatty. The applicant is proposing to build and operate a 150- to 350-megawatt solar parabolic trough electric power plant (DIRS 185368-Seley 2008, all).
- Solar Millennium LLC applied in November 2007 for a right-of-way permit for about 19 square kilometers (4,800 acres) of BLM land near the Tonopah Airport. The applicant is proposing to build and operate a 150- to 350-megawatt solar parabolic trough electric power plant (DIRS 185368-Seley 2008, all).
- Tonopah Solar Energy LLC applied in March 2008 for a right-of-way permit for about 31 square kilometers (7,700 acres) of BLM land at Mud Lake near the Tonopah Airport. The applicant is proposing to build and operate a 100-megawatt power tower (DIRS 185368-Seley 2008, all).

The BLM has received three permit applications for site-specific wind energy site testing and monitoring rights-of-way for individual meteorological towers and instrumentation facilities in Nye County.

- Desert Research Institute applied in May 2003 for a right-of-way permit for about 0.01 square kilometer (1.6 acres) of BLM land in the Smokey Valley area of Nye County (DIRS 185367-Seley 2008, all).
- Desert Research Institute applied in June 2006 for a right-of-way permit for about 2.1×10^{-3} square kilometer (0.52 acre) of BLM land in the Royston Hills, Lower Smokey Valley area of Nye County (DIRS 185367-Seley 2008, all).
- Round Mountain Gold Corporation applied in August 2007 for a right-of-way permit for about 4.1×10^{-3} square kilometer (1 acre) of BLM land in the Round Mountain area of Nye County (DIRS 185367-Seley 2008, all).

The BLM has received two applications for a wind energy site testing and monitoring right-of-way for a larger site testing and monitoring project area in Nye and Esmeralda Counties.

- Greenwing Pacific Energy Corporation applied in August 2007 for a right-of-way permit for about 30 square kilometers (7,400 acres) of BLM land west of the town of Beatty and abutting State Route 374 (DIRS 185367-Seley 2008, all).
- Clipper Windpower Development Company, Inc. applied in October 2004 for a right-of-way permit for about 32 square kilometers (8,000 acres) of BLM land in the Montezuma Range area of Esmeralda County (DIRS 185367-Seley 2008, all).

DOE and BLM have also issued a Notice of Intent in response to Executive Order 13212, *Actions to Expedite Energy-Related Projects*, and Title II, Section 211 of the Energy Policy Act of 2005 (73 *FR* 30908, May 29, 2008). DOE and BLM have identified utility-scale solar energy development as a potentially critical component in meeting these mandates. DOE and BLM are considering the development and implementation of agency-specific programs related to solar energy development in six western states (Arizona, California, Colorado, New Mexico, Nevada, and Utah). DOE proposes to develop a solar energy program of environmental policies and mitigation strategies that would apply to the deployment of DOE supported solar energy projects on BLM-administered lands or other Federal, State, tribal, or private lands. The BLM would establish its own environmental policies and mitigation strategies to use when making decisions on whether to issue rights-of-way for utility-scale solar energy development projects on public lands administered by the BLM. Until the determination of the locations of the proposed solar energy development projects in the EIS, the possibility of cumulative impacts, if any, with the Caliente or Mina regions of influence is unknown.

5.2.1.3.2 Groundwater Development Projects and Proposed Future Water-Rights Locations

As part of its effort to augment future water supplies, the Southern Nevada Water Authority has initiated plans to develop groundwater for which it holds rights and applications in Clark, Lincoln, and White Pine Counties (see Figure 5-1, Project #2). The groundwater proposed for development involves seven hydrographic areas. These hydrographic areas generally lie along the east side of the state from an area north of the Las Vegas Valley, north into Lincoln County, and then extending into White Pine County. One of the hydrographic areas involved in the plan is hydrographic area 181 (Dry Lake Valley), which is west of the City of Caliente. The proposed Caliente rail alignment would pass through hydrographic area 181. The proposed project would develop and convey about 250 million cubic meters (204,000 acre-feet) per year of groundwater through a series of water wells, pipelines, and other infrastructure. The groundwater planned for development includes both existing and future permitted water rights, as permitted by the Nevada State Engineer. Of the total annual water planned for development, the Southern Nevada Water Authority would produce about 210 million cubic meters (170,000 acre-feet) per year for use by its purveyor members in the Las Vegas Valley, and about 44 million cubic meters (36,000 acre-feet) per year for conveyance to the Lincoln County Water District under terms of a February 2006 cooperative agreement between the two entities (DIRS 178053-Southern Nevada Water Authority 2005, all). The project would also involve electricity substations, transmission lines, pumping stations, a water storage facility, and a water-treatment facility.

Final locations for individual well fields, and the number of wells in each valley, have not yet been determined, but preliminary exploratory areas have been identified, and water-rights applications have been submitted for some proposed new wells at some specific locations (described below) that could lie within the region of influence used for groundwater resources as determined through the impacts analysis. In August 2004, the Southern Nevada Water Authority filed an application with the BLM to obtain necessary rights-of-way for the proposed system of regional water-supply facilities associated with the project. The BLM has begun development of an EIS (70 *FR* 18043, April 8, 2005) to identify and disclose the environmental effects associated with this project. Scoping for the project was originally conducted in 2005; however, because of refinements in project plans, scoping for the project was

reopened in July 2006. The Final Summary Scoping Report was prepared and made available to the public in January 2007 and was updated in February 2007, and a Draft EIS is expected in the fall of 2008.

As described in Section 3.2.6.3, applications (NDWR Application Numbers 64668 and 73331) have been filed for a proposed irrigation well that would be within approximately 2 kilometers (1.3 miles) of a DOE-proposed well location in Dry Lake Valley (hydrographic area 181), and an application has been filed for a proposed municipal well that would be located within approximately 2 kilometers (1.3 miles) of a DOE-proposed new well location in the Pahroc Valley hydrographic area (hydrographic area 208). The proposed production rates for the proposed irrigation and municipal wells would be approximately 10, 200 liters (2,690 gallons) per minute, and 17,000 liters (4,448 gallons) per minute, respectively, and both wells would operate year round. The proposed irrigation well has been assigned a "Ready for Action, Protested (RFP)" status and the proposed municipal well has been assigned a "Ready for Action (RFA)" status. Each application gives 5 years as the time period required for the construction of works and an estimated time required to complete the application of water to beneficial use of 10 years, as of the date the application was submitted (either April 1999 or October 2005). Section 5.2.2.6 evaluates the potential for cumulative impacts if these proposed well applications were to be approved and the wells installed and pumped contemporaneously with the DOE-proposed groundwater withdrawals. Applications have also been submitted for two proposed wells (NDWR Application Numbers 54044 and 54048 – both listing municipal and domestic as their intended uses). One of these wells would be located approximately 1.5 kilometers (0.9 mile) north of another DOE-proposed new well location in hydrographic area 208, and the other well would be located approximately 0.3 kilometer (0.2 mile) northeast of another DOE-proposed well location in hydrographic area 208, respectively (Section 3.2.6.3). The production rates for these two proposed municipal/domestic wells would be 10,200 liters (2,690 gallons) per minute, and 17,000 liters (4,448 gallons) per minute, respectively, and both wells would operate year round. Both applications are under RFP status and according to the applications, the minimum time for construction of works (pumping station, pipelines, reservoirs, and distribution system) is 20 years for each proposed well, as of the date the applications were submitted (March 1990). Section 5.2.2.6 evaluates the potential for cumulative impacts associated with these proposed water-rights locations.

The Lincoln County Land Act Groundwater Development and Utility Right of Way Project would include a projected eight water production wells in the Tule Desert hydrographic basin and up to 10 water production wells in the Clover Valley hydrographic basin, cumulatively producing over 28 million cubic meters (23,000 acre-feet) of groundwater per year. A system of pipelines would collect the pumped water for conveyance through a main transmission pipeline southeast to the Lincoln County Land Act development area near Mesquite. Associated facilities would include power distribution and transmission and communications lines to be placed in the utility right-of-way to provide power and communication for the project facilities. A natural gas pipeline would parallel the water pipeline from the existing Kern River Natural Gas pipeline. The BLM initiated an EIS on this project (71 *FR* 16340, March 31, 2006) to evaluate potential impacts associated with this project.

As described in Section 3.2.6.3.3 of this Rail Alignment EIS, an application has been filed for a proposed municipal well that would be approximately 1.2 kilometers (0.8 mile) southwest of a DOE-proposed new well location in Garden Valley (hydrographic area 172). This proposed municipal well would have a production rate of up to 10,200 liters (2,690 gallons) per minute and would operate year round. The application lists an estimated time to construct this new well of 5 years and lists the estimated time required to complete the application of water to beneficial use as 10 years, as of the date the application was submitted (October 2005). This proposed well has been assigned a status of "RFP" Section 5.2.2.6 evaluates the potential for cumulative impacts if these proposed well applications were to be approved and the wells installed and pumped contemporaneously with the DOE-proposed groundwater withdrawals.

The Kane Springs Valley Groundwater Development Project would consist of up to seven water production wells along Kane Springs Road north of the Coyote Springs development site. The project is being proposed by the Lincoln County Water District, and would result in the groundwater withdrawal of about 6.17 million cubic meters (5,000 acre-feet) of groundwater per year for delivery to the northern portion of the coyote Spring Valley. Ancillary facilities would include lateral pipelines, power distribution and communications lines, and access roads. The BLM published the *Kane Springs Valley Groundwater Development Project Final EIS* that evaluates potential impacts associated with this project (DIRS 185377-BLM, U.S. Fish and Wildlife Service, Nevada Department of Wildlife, Moapa Valley 2008, all).

As with the other BLM EIS processes under way, the BLM could not issue the necessary right-of-way grants for any of the water development projects, and the projects could not be initiated, until the EIS processes were completed and the BLM decisions were to allow the developments. In addition, the Nevada State Engineer must approve any proposed water production and grant approval for the use of groundwater for any project in Nevada (Nevada Revised Statutes, Chapters 532 through 538). The proposed rights-of-way for the proposed groundwater development projects are all based on terms of the Lincoln County Conservation, Recreation and Development Act of 2004 (see Section 5.2.2.6).

An application (NDWR Application Number 53982) has been filed for a proposed municipal and domestic well that would be approximately 0.5 kilometer (0.3 mile) northwest of a DOE-proposed new well location in the Railroad Valley South hydrographic area (hydrographic area 173A). This proposed well would have a production rate of 10,200 liters (2,690 gallons) per minute and would operate year round. The application lists an estimated minimum time of 20 years require to construct this new well an estimated minimum time of 20 years required to complete the application of water to beneficial use, as of the date the application was submitted (March 1990). This proposed well has been assigned a status of "RFP."

Applications (NDWR Application Numbers 74816 through 74818) have been filed for one commercial and two mining and milling water rights that would be located in hydrographic area 229. All three applications have been assigned a status of RFA. Geologic information (e.g., DIRS 176904-Workman et al. 2002, all) indicates that a mapped northwest-southeast trending fault trace may be located in close proximity to proposed rail alignment-related well location CF-3 in hydrographic area 229. A well installed at location CF-3 therefore might intercept a (water-bearing) fault zone. One or more of the proposed RFA water-rights locations could also be located in close proximity to the same fault zone (or a directly associated fault zone) as the fault zone near location CF-3 (based on the mapped geology contained in DIRS 176904 - Workman et al. 2002, all). However, the three proposed RFA water-rights locations are over 11 kilometers (7 miles) away from proposed well location CF-3 and are therefore outside the region of influence (up to 9.7 kilometers [6 miles]) considered for potential fault-zone well location CF-3. The fault zone near the RFA well locations does not appear to extend to or appear to be directly associated with mapped fault traces located around or near any of the other proposed rail alignment-related well locations in hydrographic area 229.

An application (NDWR Application Number 71204) has been filed for a proposed quasi-municipal water right that would be located in hydrographic area 227A. This water-right location, which has been assigned a status of RFP, appears to be at the same location as an existing well (J-12), a USGS-catalogued well located in Jackass Flats (Figure 3-82) based on information contained in the NDWR water-rights database and location information for Well J-12 (DIRS 182821 – Converse Consultants 2005, Appendix A). The application indicates that the proposed water-rights location is associated with a previously-constructed infrastructure device. The requested diversion rate for this proposed water right is 4.47 million cubic meters (3,620 ***acre-feet)*** per year, which is equivalent to an average pumping rate of approximately 8,500 liters (2,224 gallons) per minute; however, the requested annual duty that is

identified for this proposed water right in the NDWR water-rights database is 0 ***acre-feet*** per year. Section 5.2.2.6 evaluates the potential for cumulative impacts associated with all of these proposed water-rights applications.

5.2.1.3.3 Union Pacific Railroad Operations

Under the Caliente Implementing Alternative evaluated in this Rail Alignment EIS, rail transportation of spent nuclear fuel and high-level radioactive waste would originate in or near the City of Caliente from the Union Pacific Railroad Mainline track (see Figure 5-1, Project #8). The existing relevant portion of the Union Pacific Railroad track enters Nevada from Utah, with the track generally trending southwest into the Caliente area. From Caliente, the track continues southwest into Las Vegas. Union Pacific Railroad operations are well established in the area, and as of 2005, approximately 25 trains pass through Caliente each day on the Union Pacific Railroad track.

5.2.1.3.4 Coyote Springs Development Project

The Coyote Springs Development Project would be a planned community about 80 kilometers (50 miles) north of Las Vegas (see Figure 5-1, Project #7). The planned development area consists of about 170 square kilometers (43,000 acres) in the Coyote Spring Valley. About one-third of the land held by Coyote Springs Investment, LLC, is in Clark County and two-thirds is in Lincoln County. As envisioned, the community would consist of a series of neighborhoods and villages located among open space corridors. Initially, the community focus would be on second-home development and development of a destination resort concept centering on golf courses. Over time, there would be more traditional community development, with ultimate development occurring over 40 years. Development would begin in the Clark County portion of the land, with plans for about 47,500 residential units, together with commercial and recreational facilities. The BLM stated that public services such as water, roads, law enforcement, emergency services, sewer, and power must be established before home construction could begin on the land. Water for the potential new housing developments on the land might come from the Tule Springs area of Lincoln County. In addition, a new road from Caliente to Mesquite might be built to provide additional land access to these areas. The road would be about 130 kilometers (80 miles) long with a 30-meter (100-foot)-wide construction right-of-way. Coyote Springs Development, LLC, has not yet obtained water rights to provide for full build-out, and this could be a limiting factor for the development.

5.2.1.3.5 Other Regional Economic Development

Cumulative impacts issues associated with regional economic development actions include socioeconomic effects and overall growth in the region of influence. All of the counties and cities in the Caliente region of influence have expressed a desire for economic development. The Lincoln County government is preparing for extensive growth (for example, Coyote Springs and population growth through BLM land disposals) with expansion of the county planning department, development of a Strategic Tourism Plan, and refinement of economic development strategies. Examples of Lincoln County economic development include the Meadow Valley Industrial Park and the Alamo Industrial Park (that would use land obtained through a BLM land disposal). The Nye County perspective is available in Section 5.5 of this Rail Alignment EIS; other county and city perspectives are located in Chapter 7.

Nye and Esmeralda Counties also are pursuing growth and development opportunities. Economic development plans and tourism enhancement concepts have also been developed in those areas. Pahrump will continue to grow and urbanize with its proximity to Las Vegas. A perceived need for support to the Nevada Test Site has led to designation of the Nevada Science and Technology Corridor by the Economic Development Authority for Nye County. The Science and Technology 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 Nevada Test Site), Amargosa Valley, Beatty, and Goldfield, with industrial park and technology initiatives associated with the Tonopah Aeronautics and Technology Park, the Nevada Science and Technology Park in Amargosa Valley, and the Pahrump Center for Technology Training and Development. The continuing BLM land sales and other development in the area indicate an increasing trend toward and desire for economic development, especially in Lincoln County. The locations and nature of specific future development opportunities are not known and are not considered to be reasonably foreseeable for the purpose of this analysis.

Nye County has completed a *Yucca Mountain Project Gateway Area Concept Plan* with proposed activities for the area around the entrance to the proposed repository site (DIRS 182345-Giampaoli 2007, all). This plan presents Nye County's conceptual, multi-phased land-use guidance for communities adjacent to and near the site entrance area. Nye County proposed this plan with the objective that land development occurs in an orderly and consistent manner and to increase opportunities for industrial and commercial development beneficial to the repository program. Nye County views this plan as a starting point for development of the infrastructure, institutional capacity, and facilities to support the proposed repository. The county developed the plan to use and manage existing initiatives while expanding and improving the area. To facilitate Crater Flat development, Nye County will nominate these lands for disposal in the BLM resource management plan amendment process. More information on the Nye County perspective is available in Section 5.5 of this Rail Alignment EIS.

5.2.2 POTENTIAL CUMULATIVE IMPACTS – CALIENTE RAIL ALIGNMENT

The Caliente rail alignment is located in portions of Lincoln, Esmeralda, and Nye Counties. Most of the land in the Caliente rail alignment region of influence is undeveloped, although much of it has been affected by human activity such as ranching, mining, and recreation.

Potential cumulative impacts are often discussed herein within the context of the existing regulatory framework (primarily federal and state laws and regulations) and the BLM resource management planning goals and objectives. For example, the existing regulatory frameworks for water and air consider a regional and cumulative impacts perspective, in that regulatory decisions consider the potential effects from other projects and a proposed action. As the primary regional land manager, BLM planning and management actions consider the cumulative effects for many resources through stated planning goals and objectives, which often are based on quantitative criteria.

The following analysis of the cumulative impacts associated with the Caliente rail alignment is organized by resource area, with Sections 5.2.2.1 through 5.2.2.15 summarizing potential cumulative impacts in the same order of resource discussions in Chapter 4.

5.2.2.1 Physical Setting

5.2.2.1.1 Disturbance of Physical Resources

Physical resources consist of resources, conditions, and characteristics such as physiography, soils, and geology. As construction of any project in the area occurs, there would be a potential for changes to the physical setting because land would be disturbed through activities such as cuts and fills, and constructing new structures such as buildings and bridges. The proposed railroad would be one of many new sources of change to physical resources that would continue the trend of increasing land disturbance and modifications of the natural physical environment. In large-scale projects that involve substantial ground disturbance, natural features are considered in project design, construction, operations, and potential abandonment plans, which would tend to limit direct, indirect, and cumulative impacts. The proposed railroad would disturb only a small percentage of land in Lincoln, Esmeralda, and Nye Counties.

There is a large amount of land potentially available for development of existing and reasonably foreseeable projects, and a small percentage of potentially available land required for the proposed railroad. The area disturbed during the construction phase would range from approximately 55 to 61 square kilometers (14,000 to 15,000 acres) (DIRS 182825-Nevada Rail Partners 2007, p. B-3). The Caliente rail alignment construction right-of-way would occupy between 153 and 162 square kilometers (37,900 and 40,100 acres) of land.

Existing and reasonably foreseeable projects and activities would cause disturbance of physical resources. About 530 square kilometers (130,000 acres) of land has been disturbed from the construction of U.S. Air Force facilities at the Nevada Test and Training Range. The repository would disturb about 6.3 square kilometers (1,600 acres) of land, most of which would be on the Nevada Test Site. The preferred alternative for the proposed Department of Justice detention facility is a 0.49-square-kilometer (120-acre) site. The Coyote Springs planned development area consists of about 170 square kilometers (43,000 acres) in the Coyote Spring Valley. The BLM has received 11 right-of-way permit applications for solar energy facilities in Nye County, totaling approximately 360 square kilometers (90,000 acres), a portion of which could be disturbed if the facilities are constructed.

5.2.2.1.2 Known or Potentially Contaminated Soils

The major sources of existing soil contamination in the Caliente region of influence include mining and the Nevada Test Site. Mining activities in the region have occurred for many years, and most wastes resulted from past operations when there was little or no regulatory framework requiring waste management and clean-up. Nevada Test Site contamination has been described in recent NEPA documentation (DIRS 101811-DOE 1996, all; DIRS 162638-DOE 2002, all; DIRS 185437-DOE 2008, all). Historic contamination of soils resources at the Nevada Test Site resulted primarily from radioactive-waste management sites and nuclear testing activities. Environmental restoration and remediation is occurring at contaminated Nevada Test Site locations in accordance with the facility's Environmental Restoration Program. For most of the contaminated soils within the Nevada Test Site boundary, DOE is planning a characterization and long-term monitoring program. Contaminated areas on the Nevada Test Site are generally defined and access is restricted for safety and security reasons. In April 1996, a Federal Facility Agreement and Consent Order was entered into by and among the State of Nevada, acting by and through the Department of Conservation and Natural Resources, Division of Environmental Protection, the United States Department of Energy, and the United States Department of Defense. The purpose of the Consent Order was to identify sites of potential historic contamination due to Nevada Test Site operations and implement proposed corrective actions based on public health and environmental considerations. The Consent Order identifies Corrective Action Units, which are groupings of Corrective Action Sites that delineate and define areas of concern for contamination. Offsite Corrective Action Sites include the Central Nevada Test Area and Project Shoal.

Corrective Action Units within the off-site Corrective Action Sites that address surface contamination are 416 and 417. Closure Reports were submitted to the Nevada Division of Environmental Protection on February 13, 1998, for Corrective Action Unit 416, and on June 27, 2002, for Corrective Action Unit 417 indicating that the site remediation process was complete. Based on the work conducted under the Consent Order, the potential for workers or the public to be exposed to contamination due to fallout during railroad construction and operations in any of the rail corridors would be unlikely. DOE has not identified any information identifying similar contamination off the Nevada Test Site in the vicinity of the proposed rail corridors.

The proposed railroad could result in very localized contamination of soils through occasional spills (such as fuel, oil, and solvents). However, such incidents would be minor in scope and quickly mitigated in accordance with plans and regulations. All existing and foreseeable projects would be subject to the same

regulations. Spills of hazardous materials are possible from some of the projects described in this section; however, the current regulatory framework to manage and control hazardous materials and wastes ensures that actions are in place to minimize any impacts.

While any potential impacts associated with hazardous materials and wastes from current and future mining operations in the region are controlled through the existing regulatory framework, mining wastes from past mining extraction and processing activities, especially in the Goldfield area, remain a concern related to soil contamination.

5.2.2.1.3 Physical Setting Conclusion

The cumulative impacts on physical resources of the proposed railroad and other existing and reasonably foreseeable projects would be small. The disturbance of physical resources would be small due to the small percentage of land that the proposed railroad would disturb and due to best management practices that would be used during construction of the railroad and other planned projects in the Caliente region of influence. Although other projects have affected and could affect soil contamination, cumulative impacts related to contamination of soils would likely be small because of the ongoing restoration and remediation to address past actions, and the implementation of spill prevention and control plans for potential future actions.

5.2.2.2 Land Use and Ownership

Many of the past, present, and reasonably foreseeable future actions in the Caliente region of influence result in land-use changes. Changes in land uses can also alter land ownership, land-management responsibilities, and preclude future activities from these areas. More than 97 percent of the land the proposed Caliente rail alignment and associated facilities would disturb is on BLM-administered public land in Lincoln, Nye, and Esmeralda Counties. The BLM manages more than 55,700 square kilometers (13.7 million acres) in those three counties. Grazing is a significant land use on public lands in and around the proposed Caliente rail alignment. Section 5.2.1 describes existing and proposed projects that could impact land use in the Caliente region of influence.

The proposed Caliente rail alignment would disturb up to 162 square kilometers (40,000 acres) of BLM land, most of which would be within the construction right-of-way. Therefore, the proposed Caliente rail alignment would directly affect about 0.3 percent of the BLM-administered land in Lincoln, Nye, and Esmeralda Counties. This disturbance would include construction and operation of the proposed rail line, facilities, quarries, water wells, construction camps, and access roads.

5.2.2.2.1 Existing or Potential Land-Use Conflicts

The Federal Government administers most of the land in the Caliente region of influence, with the BLM, DOE, and the U.S. Air Force acting as the major federal land managers. Private land holdings are small, and generally associated with the towns in the Caliente region of influence. Traditional land uses in most of the Caliente region of influence that would be directly and indirectly affected include grazing and wildlife management. Much of this land is not extensively disturbed, although it has been modified through activities such as grazing.

Over time, human activity in the area, while relatively minor, has begun to change the natural and traditional conditions, and land-use conflicts occasionally result from this human activity. The Nevada Test Site and Nevada Test and Training Range lands have been withdrawn for special purpose and use. Both of these areas are inaccessible to the general public and land use is that of "dominant use," in which the specific DOE and U.S. Air Force missions, respectively, for these lands have ultimate priority over all other potential land uses. However, around these primary regional land uses are other uses, including

mineral development, recreation, urban development, and rights-of-way for various infrastructure. All of these activities and land uses result from a much more intensive land usage involving human activity.

BLM land-management goals allow for management of the land for special purposes (protection of cultural resources, wilderness designations or study areas, protection of wildlife habitat, or visual resource management), but with increasing development in the Caliente region of influence there are more occurrences of land-use conflicts. As noted in Chapter 4 of this Rail Alignment EIS, construction and operation of a railroad along the Caliente rail alignment would have potential direct and indirect conflicts with grazing uses, access to grazing infrastructure, access to mineral resources, recreational resources, other linear rights-of-way (for example, utility corridors), and wildlife movement patterns in some locations. Potential impacts from the proposed railroad outside the construction right-of-way would include fragmentation of grazing allotments, particularly where the rail line would act as a barrier and "isolate" a portion of land. However, DOE would work with affected grazing permittees and the BLM to mitigate adverse impacts to the land both inside and outside the construction right-of-way. As described in Chapter 7, Best Management Practices and Mitigation, DOE would work with the permittees and the BLM to develop interim grazing management plans and allotment management plans, which could include compensation or range improvements for the direct loss of crops, pastures, rangelands, or reductions in animal unit months.

Between 1980 and 2004, there has been an almost 30 percent reduction in authorized animal unit months state-wide. Table 5-3 illustrates the animal unit month reductions in BLM districts between 1960 and 2004. Within the BLM Ely District over that period, animal unit months declined approximately 13 percent. The Tonopah District experienced the largest decline over that period, at 34 percent. A 2001 study of grazing trends on federal lands in Nevada revealed that one-third of animal unit month reductions were the result of permit violations or for resource protection reasons. These reasons included: trespass violations, non-payment, exceeding standards or guidelines, carrying capacity estimates, threatened and endangered species conflicts, wildlife conflicts, and wild horse competition (DIRS 176949-Resource Concepts 2001, p. 60). Other reasons for reductions include transfer of ownership and changes in class of livestock grazed.

Table 5-3. Animal unit month reductions in the State of Nevada and the Ely, Carson City and Tonopah BLM Districts.[a]

Location	1960 levels[b]	1980 levels[b]	1999 levels[b]	2004 levels[c]	Percent reduction, 1980-2004	Percent reduction, 1960-2004
State of Nevada (all federal land)	Not available	3,020,399	2,546,846	2,129,485	29.5	Not available
Ely District	605,962	598,675	502,280	523,504	12.6	13.6
Carson City District	197,409	193,665	160,841	171,291	11.6	13.2
Tonopah District	198,208	198,228	134,120	130,435	34.2	34.2

a. The proposed railroad would not affect active grazing allotments in the Las Vegas BLM District and therefore, cumulative impacts in that district were not evaluated.
b. Source: Grazing Statistics Report and Economic Analysis for Federal Lands in Nevada (DIRS 176949-Resource Concepts 2001, p. 94).
c. Source: "Federal Expenditures and Receipts …." (DIRS 185482-U.S. G.A.O. 2005, p. 70).

Wildland fire has also contributed to losses in animal unit months in Nevada. For example, the 6,500-square-kilometer (1.6 million-acre) fire of 1999 contributed to the loss of over 133,000 animal unit months across five of Nevada's northern counties (DIRS 185481-Riggs, Brazeale, and Myer 2001, pp. 39

and 40). The losses due to fires may be considered temporary in the sense that plant life would eventually recover naturally or be replanted, although the process of restoring land to its former grazing capacity could take years.

While the number of animal unit months authorized in the state has declined over time, livestock grazing is an important land use both historically and socioeconomically to Nevada that will continue on federal lands. Through their respective resource management plans, each BLM district office aims to manage the land to allow grazing in a manner and at levels consistent with multiple use, sustained yield and the standards for rangeland health. As illustrated in Table 5-3, although there are decreases in animal unit months since 1980 levels, there was an increase between 1999 and 2004 in the Ely District. The authorized grazing levels in the Caliente region of influence may continue to fluctuate based on a variety of factors, including: BLM management goals and actions, permittee decisions, wildlife levels and use, and even natural processes, like rainfall levels, spread of invasive species, and wildland fire.

The proposed railroad could reduce animal unit months by less than 1 percent across all affected allotments in the Caliente region of influence (maximum of 974 animal unit months lost over 20 active allotments). Land disturbance from other proposed rights-of-way or projects on federal lands could also reduce animal unit months, although with the use of best management practices, these reductions would be minimal.

The Southwest Intertie Project would require a new substation and transmission line interconnections that would result in the permanent displacement of 0.31 square kilometers (77 acres) on the 730-square kilometer (180,000-acre) Thirty Mile Spring BLM grazing allotment in the Ely BLM District. This displacement could result in the potential loss of 4 animal unit months on that allotment (0.04 percent of the allotment's 8,405 authorized animal unit months).

The Toquop Energy Project (under the Proposed Action) within the Ely BLM District would temporarily disturb 0.36 square kilometers (90 acres) within the Garden Springs and Gourd Springs allotments for installation of the water line, but would not impact to management of livestock because best management practices would be followed. The project's well sites, monitoring well, and storage tank would remove up to 0.07 square kilometers (17 acres) from current livestock use, affecting a portion of the White Rock, Garden Springs, Summit Spring and Snow Springs allotments, depending on the location of the well sites (DIRS 185338-BLM 2007, p. 4-62). However, this disturbance would result in a loss of animal unit months of 2 or less (regardless of the allotment affected) as shown in Table 5-4.

Table 5-4. Potential animal unit months affected by the Toquop Energy Project.[a]

Grazing allotment	Allotment acreage	Authorized animal unit months	Maximum animal unit month loss	Percent loss
White Rock	32,916	2,880	2	0.1
Garden Spring	38,823	2,809	2	0.1
Summit Spring	18,035	715	1	0.1
Snow Springs	44,042	3,567	2	0.1

a. Source: DIRS 184767-BLM 2007, Tables 2.4-15 and 2.4.-16.

Under the *Draft Programmatic Environmental Impact Statement of the Designation of Energy Corridors in the 11 Western States* (DOE/EIS-0386), corridors would be identified and designated as necessary and to expedite applications to construct or modify oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities. Routes studied in the energy corridor EIS would cross BLM-managed lands within the Ely and Tonopah Districts. As a programmatic analysis, potential losses in animal unit months along proposed corridors in Nevada or within the BLM districts crossed by the

proposed rail corridors was not quantified. Furthermore, additional rights-of-way for electric lines associated with solar and wind energy projects could also disturb forage within grazing allotments. However, corridor development for electric transmission lines and buried pipelines would be generally compatible with many land uses, including livestock grazing. Nevertheless, impacts could result in areas where permanent loss of forage occurs, although these impacts could be avoided or minimized through coordination with BLM on best management practices and mitigation measures.

Cumulatively, the proposed railroad, the Southwest Intertie Project and the Toquop Energy Project would reduce animal unit months by less than 1.5 percent in the Caliente region of influence. The proposed Coyote Springs Development Project would be located on private land that is not used for grazing, and would not affect levels of authorized animal unit months in the study area. Similarly, existing activities and proposed projects on other federally-operated land in the study area, like the Nevada Test Site and Nevada Test and Training Range, do not have active grazing programs and would not affect grazing levels in the study area in the foreseeable future.

5.2.2.2.2 Energy and Mineral Development

Existing and potential future energy and mineral development occurs in various locations throughout the Caliente region of influence. In addition to the traditional energy and mineral development (primarily hard-rock mining, industrial mineral development, and limited oil and gas development), more recently, this development includes geothermal resources and wind energy. The BLM administers energy and mineral development on public lands. Today's energy development environment includes a mix of old and new, involving both nonrenewable and renewable resource development. As described in Section 5.2.1.3.1, solar and wind-energy development on the BLM-administered lands could be one of the biggest changes in the future landscape. The BLM has received 11 right-of-way permit applications for solar energy facilities in Nye County, totaling of approximately 360 square kilometers (90,000 acres).

Because of the scope and extent of typical mining operations, mineral resources that become actual operating mines could result in environmental and land-use issues. Within the Caliente region of influence, most mining and energy-development activities would occur on federal lands, and the BLM will have a major role in mitigating and monitoring potential effects through its mining and reclamation requirements, NEPA, and other elements of the regulatory framework. Mineral exploration will continue to occur in many parts of the Caliente region of influence, and some level of conflict from mining exploration and development with other land uses could be unavoidable.

Any potential conflict of the proposed railroad with energy and mineral development would be small to moderate in scope and occur in localized areas, and the effects of any such conflicts would be addressed through the existing regulatory framework and BLM policies and plans. All existing and foreseeable projects would be subject to regulatory requirements and BLM policies and plans related to energy and mineral development.

5.2.2.2.3 BLM Land Sales and Other Disposals

The BLM has identified a number of land parcels in the Caliente region of influence that have been or could be removed from government ownership and disposed of through auctions or agreements with local governments. For example, to facilitate Crater Flat development, Nye County is requesting that the BLM designate these lands for disposal. Additionally, the BLM's Proposed Ely Resource Management Plan would provide for the disposal of approximately 310 square kilometers (75,600 acres) of BLM-administered land to state, local, and/or private entities. In many cases, these BLM-administered land disposals would result in permanent land-use changes. With private land at a premium in the area, commercial development projects will likely be proposed on land disposed of or sold through the BLM. These BLM land disposals will continue, and will either directly or indirectly enhance the potential for

growth and urbanization in the Caliente region of influence, as the land is changed from generally undeveloped to private lands available for residential or other development, or to government lands available for utility corridors, airports, or parks.

The proposed railroad right-of-way, where it intersects areas of possible land disposal, could preclude at least portions of those areas from future disposal. However, the land area used by the proposed railroad would be relatively small in comparison to the areas available for disposal, and the railroad could potentially be a beneficial feature that aids future commercial development along the rail line under the Shared-Use Option.

5.2.2.2.4 Recreational Land Use

Public lands in the Caliente region of influence provide a number of diverse recreation opportunities, and the BLM has designated certain lands as recreation management areas. Dispersed recreation, the principal opportunities available within the Caliente region of influence, requires a variety of sites but needs no special facilities. These opportunities include caving, photography, automobile touring, backpacking, bird watching, hunting, primitive camping, hiking, rock climbing, and competitive and noncompetitive off-highway vehicle events. Increased demand for off-highway vehicle use from the increasing regional population, including the Las Vegas area, is expected to continue. Many areas of BLM-administered land in Clark County previously used for off-highway vehicle recreation have been closed, causing a shift in use into the BLM Ely District. Water-based recreation in the Caliente region of influence is extremely limited. As growth and development occur in the Caliente region of influence, recreational resources will continue to be in demand, and the potential for conflict with recreational resources also will increase. Recreational resource locations, quality, and availability will evolve as the Caliente region of influence changes.

The Lincoln County Conservation, Recreation, and Development Act of 2004 (Public Law 108-424) designated recreational land-use areas, including Wilderness Areas and the Silver State Off-Highway Vehicle Trail. Table 5-5 lists the wilderness designations, and the amount of land designated as Wilderness Area in Lincoln County. The Wilderness-Area designations provide wilderness characteristics such as solitude, primitive conditions, and unconfined recreation in these areas. DOE has sited the proposed Caliente rail alignment to avoid Wilderness Areas. The Silver State Off-Highway Vehicle Trail is a 420-kilometer (260-mile) combination of existing backcountry roads that are currently open and being used by off-highway vehicle enthusiasts. The Lincoln County Conservation, Recreation, and Development Act of 2004 provided for the creation of a Silver State Trail Management Plan to minimize impacts on natural resources and to protect cultural and archaeological resources. The Act also provides for the temporary closure of the Trail in the event that there are unintended adverse impacts on resources associated with the Trail. The proposed Caliente rail alignment would intersect the Silver State Off-Highway Vehicle Trail in three places; however, access to its trails would not be restricted. The BLM's Proposed Ely Resource Management Plan designated a Special Recreation Management Area north and west of Caliente, the 400-square kilometer (100,000-acre) Chief Mountain. While the Caliente rail alignment would occupy some of this area, access to its trails would not be restricted. However, future trail designations within the Chief Mountain area could be affected by the presence of the rail line.

Table 5-5. Lincoln County wilderness designations from Public Law 108-424.

Wilderness Area	Designated as wilderness (square miles)[a]
Weepah Springs	80
Worthington Mountains	47
Big Rock	20
Mt. Irish	44
South Pahroc Range	40

a. To convert square miles to square kilometers, multiply by 2.59.

5.2.2.2.5 BLM Rights-of-Way

As urbanization and other development occurs in the Caliente region of influence, the need for utility and other rights-of-way will increase. This has already begun to occur and will likely continue in the future in various parts of the Caliente region of influence. The BLM has developed certain preferred corridors over federal lands that it uses to the maximum extent possible for linear rights-of-way, such as for utilities. This keeps many right-of-way purposes together in one location instead of spreading them out over more dispersed areas. However, the BLM also acknowledges the need for exceptions to these standard rights-of-way locations. *Approved Caliente Management Framework Plan Amendment and Record of Decision for the Management of the Desert Tortoise* (DIRS 174200-BLM 2000, p. 27) states that the BLM would "[g]rant power distribution lines 69 kilovolt or less, local telephone, water distribution pipelines and facilities, local fiber optic loops and cable lines outside of designated corridors on a case-by-case basis." Proposed other future projects involving pipelines, railroads, transmission lines, etc., would all change land uses along a linear route if approved through the BLM right-of-way approval process. The BLM also has seen increasing demand for nonlinear rights-of-way, and will continue to grant rights-of-way for these nonlinear projects such as power plants, construction camps, and communication-tower sites.

The land-use changes authorized by a BLM right-of-way grant would also have the potential to impact other resource areas as those land-use changes occur. Before approval of right-of-way applications, the BLM will evaluate the impacts of the projects through appropriate NEPA evaluation. Use of land for right-of-way purposes is consistent with BLM regulations and planning processes, and any land-use changes or disturbances associated with those rights-of-way are mitigated to the extent possible and according to BLM policies. As required for the issuance of rights-of-way, the project proponent would prepare and submit to the BLM a Plan of Development for each proposed right-of-way. The Plan of Development would describe the methods and procedures to be used to construct the Proposed Action on the right-of-way, including site-specific stipulations, terms, and conditions to satisfy all BLM requirements. Certain rights-of-way are long term in nature and result in unavoidable impacts through land disturbance and the exclusion of other land uses now or in the future.

Utility and other right-of-way crossings are common to linear projects such as roads, railroads, and pipelines. Land areas for the Caliente rail alignment, construction camps, quarries, and access roads would cross or overlap up to 34 existing or proposed utility rights-of-way. Land areas for the proposed railroad facilities could also overlap existing or proposed utility rights-of-way. This situation would be typical for other linear rights-of-way. Impacts from the crossings would be minimized by using standard engineering procedures and appropriate design details.

5.2.2.2.6 Other BLM Land-Management Actions

The Federal Land Policy Management Act of 1976 (Public Law 94-579) mandates the BLM to manage its public lands from a multiple-use perspective. The Federal Land Policy Management Act specifically mentions balancing renewable and nonrenewable resources, including but not limited to recreation, range, timber, minerals, watershed, wildlife, fish, natural, scenic, scientific, and historic values. Therefore, the BLM mission to manage the lands to meet multiple-use objectives is challenging, because many of the resources and associated values often conflict.

Within the context of the Caliente region of influence, the BLM planning process and management goals and objectives within their plans are key determinants of the compatibility of the proposed railroad with other projects in the Caliente region of influence. Because the BLM is and will remain the major land manager in and around the Caliente region of influence, BLM land-management goals, objectives, and subsequent land-management actions will largely determine if and how new projects and activities occur.

BLM objectives and goals within the resource management plans can serve to encourage or restrict activities in certain locations. Areas needing special management attention (such as Areas of Critical Environmental Concern) are also identified in the planning process to protect and prevent irreparable damage to important historical, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards. Multiple-use management goals and objectives become more challenging as cumulative development and land-use changes encroach on open land in the Caliente region of influence.

The proposed railroad would cross several BLM planning areas. The Las Vegas, Tonopah, and Ely (pending) Resource Management Plans would be applicable to the proposed location of the Caliente rail alignment. When approved and finalized, the Ely District Resource Management Plan will serve as the initial effort to implement the Eastern Nevada Landscape Restoration Project, which is eastern Nevada's regional program to put into practice the national BLM priority to revitalize the ecological condition of the Great Basin through the Great Basin Restoration Initiative (DIRS 184767-BLM 2007, all).

These programs and resource management plans require a number of public and private partnerships and a collaborative approach to land management and planning. Grazing operations are a major BLM land-management program in the Caliente region of influence. Grazing results in both direct and indirect cumulative impacts to vegetation, habitats, and wildlife in the Caliente rail alignment region of influence. The environmental impacts associated with grazing operations are a function of the location, timing, intensity, duration, and frequency of grazing. Grazing animals directly affect plant communities through trampling and nutrient redistribution. The most noticeable impacts occur around waters, salt blocks, fence lines, and other areas where animals concentrate. With proper grazing management, these concentration areas are limited in extent and mitigated regularly through management procedures such as movement of salt blocks and water hauls. While grazing can stimulate growth of some plants and provide other benefits, it can also reduce plant abundance, density, and vigor, especially in sandy soils.

Ultimately, BLM land-management efforts and content of the resource management plans will play a major role in the magnitude, location, and extent of direct, indirect, and cumulative impacts in the Caliente region of influence, and in the relative balance among multiple uses and resource values chosen for the public lands. DOE recognizes the importance of these land-management actions and encourages readers to review specific resource management plans for more detailed information.

5.2.2.2.7 Urbanization and Economic Development Initiatives

Even without the increased urbanization and economic development caused by the BLM land disposals or expansion of the Las Vegas metropolitan complex northward into the Caliente region of influence, the urbanized areas in the Caliente region of influence have generally planned for and solicited ways to grow and increase urbanization. Concepts such as industrial-park development, airport expansion, increased retail opportunities, and housing are prominent goals of the public and private sectors in the Caliente region of influence.

The Coyote Springs development and the Toquop Township (24 kilometers [15 miles] northwest of Mesquite in southern Lincoln County) are examples of potential major community development sites. The Coyote Springs development has entered its initial development phase and is planned to include a full suite of homes, zoning regulations, services, and infrastructure in direct association with the BLM land sales of the 53 square kilometers (13,000 acres) of public land resulting from the Lincoln County Land Act of 2000. This trend is likely to continue, with land-use and ownership changes and potential land-use conflicts becoming an increasing issue and challenge for the future.

5.2.2.2.8 Land Use and Ownership Conclusion

Although there are a large number of existing and proposed projects in the Caliente region of influence, there would not be any major land use conflicts, nor would there be a major change in the balance of land use types within the Caliente region of influence. Because the majority of the land in the region of influence is managed by the BLM, protective measures and BLM management actions would allow for the continuation of grazing as a significant land use, as well as the continuation of recreation, rights-of-way, energy and mineral development projects. The cumulative impacts on local-scale private land use and ownership from the proposed railroad and other existing and reasonably foreseeable projects could be moderate to large, particularly in the City of Caliente and the Town of Goldfield. Cumulative impacts of reasonably foreseeable projects and rights-of-way on public land would be small on a regional scale, as they would only affect a small percentage of public land. However, DOE is committed to working with the BLM and the landowners to ensure that impacts to both public and private land uses are minimized.

5.2.2.3 Aesthetic Resources

Cumulative impacts to aesthetic resources from the proposed railroad and other regional activities would primarily result from modifications to natural ***viewsheds***. The natural setting of the Caliente region of influence includes vast and expansive viewsheds typical of much of the western United States. The open spaces and wide vistas offer interesting cloud, weather, and landscape interactions. Existing activities in the Caliente region of influence also make up the existing man-made viewshed, as opposed to the natural viewshed (for example, the Nevada Test Site or the Nevada Test and Training Range). Human activity disturbs the natural viewsheds when land alterations, such as buildings, roads, vegetation removal, power lines, equipment, and vehicles, create contrast with the natural environment. Any activity that disturbs substantial areas of land can result in visual impacts from fugitive dust and ground scars. Additionally, most man-made structures are designed and built for their functionality and safety, not for their visual appeal. For example, projects with construction-related equipment, facilities, and activities can include the presence of workers, camps, vehicles, machinery, and laydown yards, which serve functional purposes but tend to have negative impacts on visual quality.

The presence of the proposed railroad would be an identifiable change to the regional viewsheds and would create a noticeable contrast with natural visual attributes from some observation points. The passage of a train would attract the attention of an observer, both because of the noise associated with the train and the contrast with the landscape, especially if the train were to fall in the foreground or middle ground of the observer's viewshed. Visual impacts of passing trains would be temporary, but visual impacts of the track would be long term from some observation points.

Visual resources within the region of influence have been considered through application of the BLM Visual Resource Management System (see Sections 3.2.3 and 4.2.3 and Appendix D of this Rail Alignment EIS). This system identifies and classifies the BLM-administered lands within established visual resource management objectives, and proposed activities are evaluated within the visual resource management framework to consider consistency with the visual resource management objectives. Without restoration and reclamation efforts, ground disturbances in the regional environment would last for long periods; even with restoration and reclamation, in some places, it could take several years for vegetation patterns to be indistinguishable from surrounding undisturbed areas. The magnitude and extent of potential visual impacts would vary based on the number of viewers affected, distance and atmospheric conditions of viewing, degree of visual contrast compared to existing visual attributes, viewer sensitivity to the visual changes, and compatibility with existing land uses. BLM generally requires disturbed areas be restored and reclaimed as part of project approval.

For the Caliente rail alignment, analysis using the BLM Visual Resource Management System indicated that the proposed railroad could be inconsistent with visual resource management objectives during construction in the areas of the Caliente-Indian Cove Staging Yard, the conveyor crossings to the

Caliente-Indian Cove and Upland Staging Yards, Garden Valley, and in some other sites of rock cuts and fills during construction and operations. As shown in Appendix D, lands that have restrictive visual resource management objectives (Class I and Class II) are not prevalent in the region of influence. Other proposed projects would also impact the viewshed in the Caliente region of influence, including the proposed Yucca Mountain Repository, power plants, transmission lines, solar energy facilities, the Department of Justice detention facility, and other infrastructure.

There would be no known interactions of the proposed railroad with other reasonably foreseeable activities that would affect a Class I or Class II area in the Caliente region of influence. The proposed railroad would, however, cause small to moderate impacts to a small proportion of the Class III and Class IV land near the Tonopah, Beatty, and Armargosa Valley areas visible from U.S. Highway 95 in the vicinity of a number of proposed solar and wind projects (see Section 5.2.1.3.1). The cumulative impacts to aesthetic resources caused by the proposed project and other existing and reasonably foreseeable projects would likely be consistent with the BLM management objectives for these low visual value areas. The cumulative impacts to aesthetic resources from the proposed railroad and other existing and reasonably foreseeable projects could be small to moderate in the Caliente region of influence because of the potential impacts to the Class III and IV land.

5.2.2.4 Air Quality and Climate

Emissions of concern in the Caliente region of influence include ***fugitive dust*** and emissions resulting from the operation of machinery and equipment. Construction activities from proposed projects such as the Coyote Springs development project would involve surface disturbance and use of haul trucks that would generate fugitive dust. Fugitive dust is a type of nonpoint source air pollution (small airborne particles that do not originate from a specific point). These ***particulate matter*** emissions are regulated according to their size (aerodynamic diameter equal to or less than 2.5 micrometers [$PM_{2.5}$] and 10 micrometers or less [PM_{10}]). Fugitive dust is generally controlled during construction projects through the application of water, or in some cases, application of a chemical compound designed to minimize dust emissions. Most of the projects and activities, existing and proposed, identified in this analysis would generate some level of fugitive dust. The plumes associated with fugitive dust generation are often localized to the area being disturbed and are temporary. In arid areas such as the Caliente region of influence, generation and control of fugitive dust will always be a concern. Exhaust emissions from the operation of machinery and equipment include sulfur dioxide, oxides of nitrogen, volatile organic compounds, and carbon monoxide.

There is a comprehensive air quality permitting system in Nevada to evaluate and approve only those projects that are allowable within quantitative air quality thresholds. The Nevada Division of Environmental Control, Bureau of Air Pollution Control, has established and implemented air pollution control requirements in Nevada Revised Statutes 445B.100 through 445B.825, inclusive, and Nevada Revised Statutes 486A.010 through 486A.180, inclusive. The Bureau of Air Pollution Control has jurisdiction over air quality programs in all counties in the state except Washoe and Clark. The Bureau of Air Pollution Control also has jurisdiction over all fossil fuel-fired units in the state that generate steam for electrical production. The proposed railroad would be subject to the permitting requirements noted above, and would occur in air basins that are either in attainment or unclassifiable. The State of Nevada will not grant permits for activities that cannot show compliance with the applicable federal and state regulations.

The air quality impact analysis for the proposed railroad assessed potential impacts through several means including air quality modeling of maximum concentrations relevant to National Ambient Air Quality Standards. The analysis concluded that emissions during construction or operation of the railroad would be in conformance with applicable standards with the possible exception of the 24-hour National Ambient

Air Quality Standards for PM_{10}, which could be exceeded from quarry operations at South Reveille Valley during the construction phase. DOE would be required to prepare an application for a Dust Control Permit and a Surface Area Disturbance Permit Dust Control Plan and submit them to the Nevada Division of Environmental Protection Bureau of Air Pollution Control prior to quarry development. It is likely that the requirements of the plan would greatly reduce fugitive dust particulate matter emissions, thus reducing the possibility of exceeding National Ambient Air Quality Standards.

Construction and operation of the proposed railroad would also cause greenhouse gas emissions, primarily through the release of CO_2 emissions. However, the amount of CO_2 emissions would be very small compared to the total national emissions of CO_2. U.S. emissions represent about 24 percent of the total global CO_2 emissions. The estimate for the annual construction-related activity associated with the proposed railroad would increase the overall national CO_2 emissions by less than 1,105,852 metric tons (1,219,000 tons) (0.02 percent) over 2005 levels. The average operational year of the proposed railroad would increase overall national CO_2 emissions by about 85,275 metric tons (about 94,000 tons) (0.001 percent) over 2005 levels. Existing projects that contribute to air quality and greenhouse gas emissions impacts include operations at the Nevada Test Site, Nevada Test and Training Range, and Union Pacific Railroad. Nearly all of the activities described in Section 5.2.1 will involve CO_2 emissions. The construction of proposed projects could contribute to temporary air quality impacts, including the repository, the proposed Department of Justice detention facility, and the development of Coyote Springs. The operation of some proposed projects could contribute to air quality impacts, such as the Toquop power plant.

Unlike criteria pollutants, impacts of greenhouse gas emissions are global and cannot be attributed to any particular source, because greenhouse gases are well mixed throughout the global lower atmosphere such that anthropogenic climate change is directly related to the global concentration of CO_2 in the atmosphere. Local emissions are quantifiable and contribute cumulatively to global CO_2 concentrations. Construction and operation of the proposed railroad would increase the state's CO_2 emissions as well as global CO_2 concentrations. Neither the State of Nevada nor the Federal Government has CO_2 emissions caps, thresholds, or targets. CO_2 emissions from the Proposed Action would add to state and national emissions, making a relatively small incremental contribution to cumulative emissions of CO_2. DOE is not aware of any methodology to correlate CO_2 emissions from specific projects to any specific impact on global climate change.

The potential impacts from climate change have been identified and discussed by the Intergovernmental Panel on Climate Change (IPCC) in its fourth assessment report (DIRS 185132-IPCC 2007, all). This report describes an extensive peer review of analyses and a high degree of consensus on climate change issues among an international panel of contributing scientists. Studies such as the IPCC report support the premise that CO_2 emissions from the proposed project, together with global greenhouse gas emissions, would very likely have a cumulative impact on climate change. IPCC Working Group II identified the predicted consequences of climate change – specific to the project area, these include more frequent and intense heat waves and droughts; extended periods of high fire risk; and a decrease in mountain snow packs and an increase in winter flooding.

The cumulative impacts to air quality and climate from the proposed railroad and other existing and reasonably foreseeable projects would be small, but could approach moderate if the potential violation of the National Ambient Air Quality Standards noted above occurred.

5.2.2.5 Surface-Water Resources

5.2.2.5.1 Changes in Drainage, Infiltration Rates, and Flood Control

Construction of major projects in previously undeveloped areas often results in changes to natural drainage. Proposed construction projects in the Caliente region of influence include the Yucca Mountain Repository, the Coyote Springs development project, power plants, transmission lines, and other infrastructure. Construction could include regrading that would allow runoff from a number of minor drainage channels to collect in a single culvert or pass under a single bridge, which would result in water flowing from a single location on the downstream side rather than across a broader area. This would cause some localized changes in drainage patterns, but this probably would occur only in areas where natural drainage channels are small. Compaction of soil during construction could reduce water infiltration rates and change natural runoff and drainage patterns. However, some activities would disturb and loosen the ground for some time, which could cause higher infiltration rates.

Construction in washes or other flood-prone areas probably would reduce the area through which floodwaters naturally flow. This could result in water building up, or ponding, on the upstream side of crossings during flood events, and then slowly draining through the culverts or bridges. These alterations to natural drainage, sedimentation, and erosion would be unlikely to increase future flood damage, increase the impact of floods on human health and safety, or cause significant harm to the natural and beneficial values of the floodplains.

One special area of drainage/flooding concern, however, is the Meadow Valley Wash area near the City of Caliente. The Caliente alternative segment would start next to Meadow Valley Wash in an area where the wash is joined by Clover Creek, and travel up Meadow Valley alternatively running adjacent to, or crossing the wash. The Federal Emergency Management Agency has studied Meadow Valley Wash, Antelope Canyon Wash, and Clover Creek Wash for flooding potential within the corporate limits of the City of Caliente and for some portions of Lincoln County. One-hundred-year water-surface elevations and regulatory floodways have been established for these watercourses within the area studied. Encroachment into the floodway is prohibited unless it can be determined that such an encroachment into the floodway portion of the floodplain does not cause any increase in the water-surface elevations for these watercourses. The area has a history of flooding events that can affect the roads, trails, and Union Pacific rail lines. In January 2005, a substantial flooding event occurred in the Meadow Valley Wash area. The BLM is currently involved in a multi-agency evaluation of remedial actions to avoid drainage/flooding issues in the area. The presence of the proposed railroad in this area has raised concerns about the potential interaction of railroad operations with future flooding events; these concerns and issues are currently being evaluated through the multi-agency evaluation and appropriate measures to reduce direct, indirect, or cumulative impacts would be identified through that process.

The proposed railroad would pose new surface drainage challenges because of the existing characteristics of terrain, topography, soils, and physical features. Construction activities could temporarily block surface drainage channels, including the use of large amounts of soil and rock to develop the rail roadbed (subgrade), and construction of temporary access roads to reach construction initiation points and major structures, such as bridges, and to allow movement of equipment to the construction initiation points.

Other proposed construction projects that could impact drainage, infiltration rates, and flood control, include the solar energy facilities, the Department of Justice detention facility, and the development of Coyote Springs. Overall effects would generally be localized to each specific project, and these concerns and potential impacts are factored into project design considerations as standard engineering and construction operating procedures.

5.2.2.5.2 Wetlands

The Caliente alternative segment is adjacent to wetlands and some wetland fill would be unavoidable. DOE proposes to construct the Caliente alternative segment over the abandoned Union Pacific Rail roadbed to minimize filling wetlands. DOE would further avoid wetlands in the bottom of incised washes adjacent to the roadbed by shifting the roadbed away from the edge of the washes. New bridges would be constructed that span adjacent stream channels and avoid wetland areas. In addition, where the new rail roadbed crosses wetlands and other surface water features, DOE would avoid wetlands by increasing the slope and not constructing a permanent service road adjacent to the track through wetlands. The new rail roadbed would have a reduced footprint with a maximum width of about 17 meters (55 feet). Of the 0.096 square kilometer (23.8 acres) of wetlands delineated within the construction right-of-way, only 0.029 square kilometer (7.1 acres) would be filled to construct the rail line. By incorporating avoidance of these resources into final rail line engineering and design, adverse impacts to wetlands (and the functions of wetlands) and other surface-water resources from rail line construction would be reduced.

Based on the information available, such as the Toquop Energy Power Project Draft EIS and documentation concerning potential solar projects, existing and planned projects would not result in adverse impacts to wetlands. The BLM resource management plans that are applicable to the Caliente region of influence have objectives that include the maintenance and/or improvement of riparian and wetland areas.

DOE would mitigate loss of wetlands, as required under Section 404 of the Clean Water Act, by enhancing existing wetlands adjacent to or near the rail line that have been degraded by grazing and other impacts, or by creating new wetlands adjacent to or near the rail line. The acreage and placement of wetlands to be enhanced or created would be determined in coordination with the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency and would be based in part on the amount of wetlands that would have to be filled to construct the rail line, the function and quality of the wetlands that would be lost, and the likelihood of success of the methods used to enhance or replace wetlands. Other planned projects would be subject to the same requirements that ensure impacts to wetlands are minimized.

5.2.2.5.3 Spill and Contamination Potential

Major construction activities and other projects in the Caliente region of influence would use materials including petroleum products (fuels and lubricants) and coolants (antifreeze) necessary to operate construction equipment, and could include solvents used in cleaning or degreasing actions. A release or spill of contaminants to a stream or river would have the greatest potential for adverse environmental impacts; a release of contaminants to dry impermeable soil would have the least potential for adverse impacts. Spill-control and management plans (and standard operating procedures for the construction industry) would reduce the likelihood of spills. Railroad construction and operations along the Caliente rail alignment would be typical of major activities that use materials that could cause contamination through spills.

While the risk of a spill and associated water contamination cannot be totally eliminated, risks can be managed through regulatory controls.

5.2.2.5.4 Surface-Water Resources Conclusion

The cumulative impacts to surface-water resources from the proposed railroad and other existing or reasonably foreseeable projects would be small. Project planning and best management practices would help avoid or reduce potential impacts to changes in drainage, infiltration rates, and flood control from the proposed railroad or other ongoing or reasonably foreseeable future actions. DOE and other planned

projects would be subject to requirements that ensure impacts to wetlands are minimized, and BLM resource management plans have objectives that protect riparian and wetland areas. Spill-control and management plans would reduce the likelihood of spills and contamination from the proposed railroad and other projects.

5.2.2.6 Groundwater Resources

Increasing urbanization and other development in the Caliente region of influence presents the challenge of matching water supply with water demand. Because water availability is a potential resource constraint in the Caliente region of influence over time, water demand can be both competitive among potential users and controversial among users and the general public. To allocate water uses, the State of Nevada uses a water-permit application process coordinated by the State Engineer. Once granted, water rights in Nevada have the standing of both real and personal property. It is possible to buy or sell water rights and change the water's point of diversion, manner of use, and place of use by filing the appropriate application with the State Engineer. Overall, because the water permitting and allocation process considers the broad range of factors noted above, the process serves as a way to manage potential cumulative impacts of water demand and use within each basin.

Representative existing and reasonably foreseeable water users in the Caliente region of influence include:

- Agriculture, which consumes the most water in the Caliente region of influence. Within the state of Nevada, groundwater usage data compiled by the U.S. Geological Survey during calendar year 2000 indicates that approximately 46 percent of groundwater withdrawals in the State of Nevada were for irrigation, about 26 percent were for mining purposes, and the remainder were for drinking-water systems, geothermal production, and other uses. Domestic and irrigation use wells collectively comprise approximately 70 percent of groundwater wells recorded by the Nevada Division of Water Resources (NDWR) that are located within 1.6 kilometers (1 mile) of the Caliente rail alignment, with NDWR-listed municipal and quasi-municipal, stockwatering, and mining and milling use wells accounting for approximately 12 percent, 7 percent, and about 3 percent, respectively, of the NDWR-listed groundwater wells located within 1.6 kilometers of the Caliente rail alignment.
- The Draft EIS for the Toquop power plant (DIRS 185338-BLM 2007, p. 4-21) estimates future water needs associated with the proposed coal-fired power plant to be roughly 3.1 million cubic meters (2,500 acre-feet) per year.
- The Clark, Lincoln, and White Pine Groundwater Development Project (Southern Nevada Water Authority) (DIRS 175909-Hafen et al. 2003, all), which would result in water withdrawal and transfer of up to 250 million cubic meters (200,000 acre-feet) per year.
- The combined effects of the Lincoln County Land Act Groundwater Development Project and the Kane Springs Valley Groundwater Development Project (DIRS 175909-Hafen et al. 2003, all), which would produce approximately 6.17 million cubic meters (5,000 acre-feet) of water per year for delivery to the northern portion of the Coyote Spring Valley.
- Groundwater withdrawals, which, if approved, would be associated with the specific water-rights applications that have been submitted for proposed new municipal or irrigation wells in hydrographic areas 181, 208, and 172 (see Section 5.2.1.3.2).
- Recently constructed or planned power plants (water-cooled) in the Apex and Moapa areas, which require about 8 million to 9 million cubic meters (6,500 to 7,000 acre-feet) of water per

year. The air-cooled power plants in those areas require less than 123,000 cubic meters (100 acre-feet) of water per year.

- The Nevada Test Site, which uses about 830,000 cubic meters (673 acre-feet) of water per year.
- Grazing activity in the 38 allotments around the proposed Caliente rail alignment, which demands about 600,000 cubic meters (500 acre-feet) of water per year.
- The Yucca Mountain Repository, which would have demands ranging from about 218,000 to 527,000 cubic meters (176 to 427 acre-feet) of water per year between calendar years 2010 and 2013 (this represents the period of the highest water demand for the proposed railroad project). The repository would use approximately 76,700 to 397,000 cubic meters (62 to 322 acre-feet) of water per year in calendar year 2014 through completion of operation.

Excluding the large agricultural water use in the Caliente region of influence, cumulative water use for the projects described above could total more than 430 million cubic meters (350,000 acre-feet) per year. Overall, the share of water that would be committed to construction and operation of the proposed railroad would represent a small portion of water use in the Caliente region of influence, which would still be dominated by agriculture. Committed groundwater resources already exceed annual perennial yield values (a measure of available groundwater supply replenished each year through recharge) within some of the groundwater basins (hydrographic areas) that would be affected by the proposed railroad. Based on the proposed locations of new wells in specific hydrographic areas along the Caliente rail alignment, additional groundwater appropriations would be needed in 19 hydrographic areas. However, committed (cumulative) groundwater resources currently exceed estimated perennial yields in eight of these hydrographic areas (146, 149, 170, 173A, 203, 204, 228, and 229). One of these eight hydrographic areas (229) and two other hydrographic areas (144 and 145) the rail would cross have low perennial yields. Five of these areas are State of Nevada-designated groundwater basins. While designated groundwater basins are not considered closed to additional appropriations, the State Engineer could impose additional restrictions and preferred uses of the water in these designated basins.

A number of scenarios have been developed to assess the potential effects of the proposed railroad's contribution to cumulative water demand in the Caliente region of influence. The assumption used for developing these scenarios is that proposed railroad construction and operations water demands would be met through installing and withdrawing groundwater from new wells. Pumping in individual wells would occur primarily over 9 months to support construction, over 2 to 3 years at quarry sites, and over the rail system operations period for the rail facilities. Total water withdrawals associated with the proposed railroad could substantially exceed annual perennial yield values for hydrographic areas 145 and 229, and could represent approximately 99 percent of the annual perennial yield in hydrographic area 227A. In other areas, water withdrawals associated with the railroad could range from less than 1 percent to as high as 57 percent of the annual perennial yield value.

A proposed new irrigation well in Dry Lake Valley would have an average pumping rate of approximately 17,000 liters (4,488 gallons) per minute and would operate year round. This application is currently under protest (is assigned a status "RFP"). If this well application were to be approved and the well installed and used contemporaneously with a nearby proposed well location (location DLV3), analysis results indicate that the proposed new DLV3 well location would lie within the radius of influence of this irrigation well and the DLV3 well location would therefore not be viable. In that event, DOE could obtain the water required from one or more alternative proposed well locations from which the simultaneous pumping from that well location or locations and the proposed irrigation well would not impact each other's operations or water could be obtained from an existing water-rights holder to preclude cumulative impacts from occurring.

The proposed new municipal well that would be northeast of a DOE-proposed new well location (PahV9) in the Pahroc Valley hydrographic area would have an average pumping rate of up to 10,200 liters (2,690 gallons) per minute, and would operate year round. If this municipal well application, currently assigned a status of "RFA", were to be approved and the well installed and used contemporaneously with the DOE-proposed well(s) at location PahV9, analysis results indicate that, depending on the transmissivity (hydraulic conductivity) of the host consolidated rock unit aquifers involved, withdrawal of groundwater at a rate of up to approximately 920 liters (244 gallons) per minute from an equivalent single well at the PahV9 could either not, or might, impact pumping operations at the proposed new municipal well location, and vice versa. The 920-liter-per-minute pumping rate used in the analysis comprises the total withdrawal rate required for well locations PahV7, PahV8, and PahV9 combined and, therefore, represents a very conservative assumption. If hydraulic conductivities of the host aquifers are similar to values estimated in some published reports (such as DIRS 176852-Drici, Garey, and Buqo 1993, p. 56), the proposed municipal well and the DOE-proposed well(s) at location PahV9 would not be expected to impact each other's operations

Alternatively, if host aquifer hydraulic conductivity values were lower, if necessary, the average pumping rate imposed at location PahV9 could be restricted to a sufficiently low value (with the remainder of the required water acquired from locations PahV7 and/or PahV8), or some of the required amount of water could be obtained from an existing water-rights holder if needed, to preclude potential impacts resulting from simultaneous groundwater withdrawals from the PahV9 location and the proposed new municipal well location.

Water-rights applications have been submitted for two proposed municipal and domestic wells that would be in the proximity of two DOE-proposed new well locations in hydrographic area 208 (Section 5.2.1.3.2). These proposed water-rights locations have been assigned a status of "RFP" and have not yet been granted. Given the relatively long timeframes (minimum 20 years) estimated for completing the infrastructure components required for these wells and for application of the water to beneficial use, even if the applications were approved, these wells would likely be placed into use at a time beyond the proposed railroad's projected 4- to 10-year construction phase. Therefore, DOE did not evaluate potential cumulative impacts from these proposed future well locations.

The water-rights application that has been submitted for a proposed municipal well that would be approximately 1.2 kilometers (0.8 mile) southwest of a DOE-proposed new well location (GV10) in the Garden Valley hydrographic area (hydrographic area 172) has a listed status of "RFP." The well has an estimated time to construct of 5 years and an estimated time for application of the water to beneficial use of 10 years. If this well application were to be approved and the well installed and used contemporaneously with the DOE-proposed GV10 well(s), the GV10 well location would lie within the radius of influence of this municipal well; therefore, the GV10 well location would not be viable. In that event, the Department could obtain the required water from one or more alternative DOE-proposed wells from which the simultaneous pumping from that well(s) and the proposed municipal well would not impact each other's operations or obtain water from an existing water-rights holder to preclude cumulative impacts.

Three applications (NDWR Application Numbers 74816 through 74818) have been filed for commercial and mining and milling water rights that would be located in hydrographic area 229. However, as previously discussed (Section 5.3.1.3.7), these proposed water-rights locations are outside the region of influence considered for the new rail alignment wells proposed in hydrographic area 229. For this reason, no cumulative impacts would be expected to occur if these proposed water rights were to be approved and placed into operation at the same time as the proposed railroad wells in hydrographic area 229.

NDWR Application Number 71204, which has been filed for a proposed quasi-municipal water right that would be located in hydrographic area 227A, appears to be at the same location as an existing well (J-12) located in Jackass Flats and the application indicates that the proposed water-rights location is associated with a previously-constructed infrastructure component (Section 5.2.1.3.2). The J-12 well is proposed for use in supplying the repository and to support railroad construction in hydrographic area 227A, and the granting of separate and distinct water rights simultaneously for the repository/railroad construction and for quasi-municipal use is considered very unlikely to impossible occur given the established State Engineer's water-rights approval process in Nevada. For this reason, it is considered very unlikely to impossible that there would be a potential cumulative impact associated with this proposed water-rights location. By utilizing one or more specific approaches or a combination of approaches for obtaining groundwater for construction of the proposed railroad (including approaches that are tailored to a hydrographic area's unique groundwater conditions), potential cumulative impacts to groundwater resources would be minimized. New groundwater withdrawals could, depending on a number of site-specific factors, cause some decrease in the amount of water that might be available to an existing well having a water right, an existing domestic well, an existing spring or seep discharge, or other existing surface-water-right location or downgradient groundwater basin. These factors include the withdrawal rate at the proposed new well location; the hydrogeologic conditions present at the proposed pumping location and in the surrounding area; the location and characteristics of nearby groundwater resource features; and (for some locations) the timing of the proposed groundwater withdrawals with respect to the timing of existing pumping operations. Best management practices, including restricting the average groundwater withdrawal rate at some proposed well locations, using existing wells to obtain the amount of water needed (that is, by purchasing water) at some locations, or using other proposed groundwater-supply wells in the same general area for obtaining the required amount of water, would be implemented as required to minimize or avoid such impacts.

Overall, the needs of the proposed railroad would represent a small portion of the current cumulative water usage within the Caliente region of influence, which in some locations would continue to exceed perennial yield values. The cumulative impacts to groundwater resources from the proposed railroad and other existing and reasonably foreseeable projects could be moderate to large. Impacts of the proposed railroad would be minimized as discussed above and in Chapter 7.

5.2.2.7 Biological Resources

5.2.2.7.1 Habitat Loss and Fragmentation

The past, present, and reasonably foreseeable future actions in the Caliente region of influence would result in noticeable cumulative land disturbance. Existing activities at the Nevada Test and Training Range and the Nevada Test Site have already resulted in land disturbance, and proposed projects such as the various proposed rights-of-way and the Coyote Springs development project would continue this trend. Such land disturbances result in altered natural biological and ecological conditions, and directly serve to reduce the amount of natural land available as habitat and open space.

The primary adverse construction-related impacts to vegetation communities from ground disturbance are the physical destruction or removal of the vegetation, and the permanent or temporary removal or compaction of the topsoil or other growing medium for the plants. These effects would occur with any major activity resulting in ground disturbance, including the proposed railroad. As more activity occurs, the cumulative loss of vegetative communities and associated habitats would increase. Management of these effects would typically be considered in project planning and mitigation, including projects on BLM-administered land. Much of the emphasis in land management in the Caliente region of influence concerns the maintenance or reconstruction of healthy habitats, particularly in BLM-designated Areas of Critical Environmental Concern.

Habitat destruction leads to direct impacts such as wildlife injury and mortality, alteration of behavior and movement patterns, and the indirect impacts of reduced vegetative health, reduced biological diversity, and locally degraded ecological function. When extensive habitat fragmentation occurs, the individuals or populations of particular species may have difficulty surviving. In larger ecosystems where diversity and spatial heterogeneity still exist with fragmentation, there is evidence that fragmentation may have negative effects on some species of wildlife, but the issue is less critical at these larger scales. Habitat destruction arises from a number of sources, including projects that involve land disturbance, and land-management actions including wild horse and burro management. Though any project that causes disturbance of vegetation contributes to habitat fragmentation, linear projects that impose any degree of impediment to movements, like the proposed railroad, contribute to the potential effects. This effect is different for all species depending on habitat needs, migratory patterns, and adaptability. A number of utility and water rights-of-way are anticipated in the eastern portion of the proposed Caliente rail alignment, with many of these crossing the Caliente rail alignment.

As discussed in Chapter 7, measures to avoid, minimize, or otherwise reduce impacts generally include actions to reduce or avoid habitat fragmentation and loss. Such actions would include minimizing land disturbance, using existing roads, interim reclamation, combined roads/utility rights-of-way for pipelines and cables, noise reduction, centralization of facilities, and employee training and education.

In areas proposed for railroad operations purposes, the impacts to vegetation would typically be moderate in scope, and cumulatively add to habitat loss and fragmentation. In areas slated for short-term use during construction, such as construction camps, revegetation and reclamation efforts would result in replacement of topsoil, reseeding of native species, monitoring for success, and eventual return of a native vegetation community somewhat comparable to predisturbance conditions. Displacement of species from construction and operations would be short term.

5.2.2.7.2 Invasive Species and Noxious Weeds

Invasive species and noxious weeds naturally move into new areas over time, but this occurrence has been accelerated in many areas through human activity, either intentionally or by accident. In many cases these plants have been moved into North America from another continent. They have been accidentally introduced through contaminated grain or hay, or sometimes intentionally introduced for erosion control or as ornamentals. In addition, livestock and vehicles can cause invasive species and noxious weeds to spread, birds could carry seed, or the species can be brought in with contaminated fill dirt. Regardless of how they were introduced, invasive species and noxious weeds possess characteristics that allow them to compete aggressively with native vegetation. Invasive species and noxious weeds impact native plants, animals, and natural ecosystems by:

- Reducing biodiversity
- Altering hydrologic conditions
- Altering soil characteristics
- Altering fire intensity and frequency
- Interfering with natural succession
- Competing for pollinators
- Displacing rare plant species
- Replacing complex communities with single-species monocultures

From a cumulative impacts perspective, any time land is disturbed and native vegetation is lost there is an opportunity for noxious weeds to replace the native vegetation. While the BLM and other land owners/managers in the area have implemented programs to minimize this potential, invasion of noxious weeds cannot always be prevented. Therefore, coordinated multi-agency management actions and efforts

are needed to mitigate the effects from cumulative land disturbance. Management of noxious and invasive weeds is essential for restoration of native plant community health and resiliency. If noxious and invasive weeds were not managed, they would continue to gradually replace more desirable native species throughout the Caliente region of influence.

Linear disturbances such as pipelines, roads, utility corridors, or rail alignments that cross relatively undisturbed land have the potential to exacerbate the spread of these species into areas not previously affected. As the invasive or noxious weeds become established along the linear features they spread to adjacent areas, affecting the plant and animal communities beyond the actual disturbance, and are able to out-compete native species by responding more rapidly to the infrequent availability of water.

These impacts could occur as a result of railroad construction and operations and from existing or foreseeable projects, but strict adherence to best management practices would reduce the potential for impacts. DOE's commitment to monitor and control noxious weeds and invasive species is described in Section 2.2.3.2.1 and Table 7-1. DOE would develop a weed-management plan to meet the requirements of the BLM for monitoring and control of weeds, and would consult with other directly affected parties during the development of the plan. DOE would implement a program to monitor and control weeds prior to construction. That program would include an inventory of the alignment prior to construction, monitoring of disturbed sites, and control of weeds throughout construction and operations, and reclamation of disturbed sites no longer needed for operation of the railroad.

5.2.2.7.3 Special Status Species

Habitat for several special status species would be disturbed and individuals of several of the species could be harmed during construction and operation of the proposed railroad. Implementation of best management practices, making minor adjustments to site locations during final design, and conducting pre-construction clearance surveys would substantially reduce these potential impacts. Through the NEPA and permitting processes, each proposed project and land-management planning effort in the Caliente region of influence will face challenges for the protection of various special status species. There are a number of special status species that could be affected by cumulative impacts in the Caliente region of influence. Recent attention has focused on several specific species, including the desert tortoise and greater sage-grouse, as discussed below.

The Mojave population of the desert tortoise (*Gopherus agassizii*) is listed as threatened under the Endangered Species Act of 1973 (16 U.S.C. 1531 to 1544). It is found within the proposed Caliente rail alignment only in the southwesternmost 48 kilometers (30 miles), from the Beatty Wash area to Yucca Mountain (DIRS 101830-Bury et al. 1994, pp. 55 to 72). The desert tortoise is found in southern California, parts of southern Utah, and in the southern portions of Nevada, with the tortoises potentially affected by railroad construction and operations at the extreme northern extent of their range. While relative abundance of the tortoise is low in much of the Caliente region of influence, every action that could disturb soil or vegetation within the tortoise's range has potential cumulative impacts of loss or fragmentation of the species' habitat or the direct mortality of individual desert tortoises.

The BLM resource management plans sometimes place restrictions on other activities (such as grazing, wild horse and burro abundance, off-road vehicle use, mineral activities) so that desert tortoise or other special status species habitat can be protected. However, off-road vehicle use, shooting, and collecting of individuals continue to affect tortoise populations. Habitat protection efforts for the desert tortoise are coordinated among a number of federal, state, and local governmental agencies, with the cumulative impact perspective a major factor in determining allowable impacts to the tortoise. Restoration plans and habitat conservation plans also affect the required mitigation measures, best management practices, and standard operating procedures for the protection of the desert tortoise or other special status species.

In early 2005, the U.S. Fish and Wildlife Service completed its status review of the greater sage-grouse (*Centrocercus urophasianus*) throughout its range and determined that the species does not warrant protection under the Endangered Species Act at this time. The BLM would maintain habitats used by the greater sage-grouse in consideration of the priorities identified in the BLM National Sage-Grouse Conservation Strategy. This strategy considers that the greater sage-grouse has been substantially affected throughout the Great Basin by habitat loss due to residential development and the associated infrastructure; habitat degradation from heavy grazing, drought, and invasive and noxious weeds; habitat fragmentation from development of roads and other rights-of-way; and other activities throughout the Caliente region of influence. A number of projects within the Caliente region of influence, including the potential for wind-energy projects and associated infrastructure, have the potential to directly affect this species in a number of areas. The proposed Caliente rail alignment passes near a small portion of previously used sage-grouse habitat, but it is not expected that the project would have direct, indirect, or cumulative impacts on this species.

Private landowners, corporations, state or local governments, or other non-federal landowners who wish to conduct activities on their land that might incidentally harm (or "take") wildlife listed as endangered or threatened must first obtain an incidental take permit from the U.S. Fish and Wildlife Service. To obtain a permit, the applicant must develop a Habitat Conservation Plan designed to offset any harmful effects the proposed activity might have on the species. Multi-species Habitat Conservation Plans are underway in two places in the Caliente region of influence: (1) the Coyote Springs area, and (2) in southern Lincoln County in the area of the recent BLM land disposal. Additionally, there is a single species (desert tortoise) Habitat Conservation Plan being developed in the Pahrump area of Nye County. These plans would support development of private lands while accounting for the potentially affected species.

No major effects on special status species are projected to result from construction and operation of the proposed railroad along the Caliente rail alignment. DOE would conduct any required consultation with the U.S. Fish and Wildlife Service in accordance with the Endangered Species Act. There is a substantial regulatory framework, to which all projects are subject, that serves to evaluate and protect special status species.

5.2.2.7.4 Wildfires

Wildfires are a major environmental concern throughout the Caliente region of influence due to the generally dry climate and the increasing presence of invasive plant species. When they occur, wildfires have a significant and long-term impact on vegetation, wildlife, other natural resources, and human safety. The most important biological effects of fires include:

- Loss of native plant communities
- Decreased stability of watershed and soils
- Decreased or degraded wildlife habitat
- Increase in potential for invasive species spread
- Overall disruptions to ecological function

Sources of regional wildfires are both natural (for example, lightning) and human caused. With increased activity and population growth in the Caliente region of influence, the potential for future human-caused fires increases. Because the BLM administers most of the land in the Caliente region of influence, the BLM has primary fire-avoidance and fire-fighting responsibilities. DOE would implement fire-avoidance best management practices, as described in Chapter 7. DOE would consult with the BLM on any further fire-avoidance strategies that might be needed. Fire-avoidance best management practices have been added to Table 7-1. These practices include control of brush and weeds along the rail roadbed,

monitoring to identify overheated wheel bearings, and development of water sources at sidings to be used to control or minimize potential fires.

5.2.2.7.5 Biological Resources Conclusion

The cumulative impacts to biological resources from the proposed railroad and other existing and reasonably foreseeable projects could be small to moderate. As described above and in Chapter 7, mitigation measures would be implemented during the construction and operations phases to address impacts related to habitat loss and fragmentation, the introduction and spread of invasive species and noxious weeds, and the increased likelihood of wildfires. All existing and proposed projects, federal, state, or private, are subject to regulations that protect special status species, and protective habitat conservation plans are already underway for many of the proposed projects in the Caliente region of influence. The BLM manages most of the lands in the Caliente region of influence and has programs in place to minimize impacts to biological resources.

5.2.2.8 Noise and Vibration

As described in Section 4.2.8, no vibration impacts would result from the proposed railroad because of the localized and short-term nature of the vibration sources. No cumulative vibration impacts are expected, and therefore are not analyzed in this section. The Union Pacific Railroad is the predominant ***Class 1 commercial railroad*** in Nevada and has operated in the state for many years. Noise associated with Union Pacific Railroad operations is part of the existing environment, specifically in the area of Caliente where the presence of the railroad is very evident. The sounds associated with the Union Pacific Railroad in and near the City of Caliente include wayside noise (noise generated by the cars and locomotives) and horn sounding. The individual operating rules of each railroad require train engineers to sound horns when approaching most grade crossings. Horn sounding is generally not required at private crossings. Wayside noise and horn sounding are common in Caliente and other portions of the existing Union Pacific Railroad routes.

The Toquop Energy Project could involve a new short rail spur of about 50 kilometers (30 miles) in an isolated part of Lincoln County south of Caliente. This spur would connect with the Union Pacific Railroad system but would be in an area that would not have any identifiable noise receptors.

Transportation of spent nuclear fuel and high-level radioactive waste casks along the Caliente rail alignment would result in as many as eight one-way trips per week. Train activity associated with supply and maintenance of the Yucca Mountain Repository is also proposed (as many as seven one-way trips per week), as is Caliente rail alignment maintenance activity (about two one-way trips per week), for a total of about 17 one-way trips per week.

During construction, the completed portions of the rail line could also be used to deliver ballast to construction areas.

Construction and operation of a railroad along the Caliente rail alignment would introduce railroad noise into areas of the Caliente rail alignment region of influence that previously had none. This could result in annoyance for some people.

In the Caliente region of influence, other possible sources of noise include occasional testing activities at the Nevada Test and Training Range and sonic booms from aircraft-related military activities in the airspace above the region of influence. These events would likely be short term and localized. Additionally, the U.S. Air Force has proposed to base 36 F-35 aircraft at Nellis Air Force Base, and to conduct an additional 17,280 annual airfield operations at Nellis Air Force Base by 2022, and an

additional 51,840 annual sortie operations in the Nevada Test and Training Range. If this proposed action is implemented, that could create additional noise sources.

There is a large amount of existing Union Pacific rail traffic (25 trains per day) relative to the small increase in rail traffic due to the Proposed Action (2.9 trains per day). Because operational horn sounding would occur at the Caliente Youth Center access road, the cumulative impacts of noise would be noticeable in adjacent areas. From the proposed operations rail activity, three receptors in this area would experience adverse impacts at 65 DNL with a 3 dBA increase. From the proposed construction rail activity, 34 receptors in this area would experience adverse impacts at 65 DNL with a 3 dBA increase.

The cumulative impacts to noise from the proposed railroad and other existing and reasonably foreseeable projects could be moderate to large because of the receptors that would experience adverse impacts and the existing and proposed noise sources.

5.2.2.9 Socioeconomics

The economy in the Caliente region of influence has traditionally been based on mineral development and livestock grazing. However, the economy in the region of influence is changing, just as land uses are changing. New economic drivers include services, retirement communities, and tourism, including recreation opportunities.

While the proposed railroad would be a major development in the Caliente region of influence, its long-term economic development potential would be limited and would primarily be related to construction activities. This pattern of larger magnitude, short-term construction impacts followed by relatively small, long-term operations impacts for linear projects (for example, pipelines and transmission lines) is not uncommon in the Caliente region of influence. If the Shared-Use Option were chosen and implemented, there would be greater potential for positive economic development benefits compared to the Proposed Action. If the Proposed Action is implemented, DOE would establish a monitoring program to evaluate future impacts and potential mitigation, including those from shared use.

Population growth in the Caliente region of influence is projected to occur in existing residential areas such as Caliente and Tonopah, but also in new areas such as Coyote Springs and the BLM land disposal areas in Lincoln County. It is uncertain if there is sufficient economic development growth potential in these areas to support all of the desired growth. It is possible that some areas would grow at the expense of other areas, or that recently developed plans for growth turn out to be unrealistic. Provision of housing to meet market demand is a private-sector activity, with the private-housing sector assumed to build to the needed level to meet housing demand at the appropriate locations. One of the factors that will affect how and where growth occurs is the availability of infrastructure to support the growth. Beyond the traditional infrastructure needs like roads, sewer, water, and public buildings, modern infrastructure such as the availability of fiber-optic lines might also affect growth patterns. For example, the availability of fiber-optic lines or other high-technology infrastructure is likely to be a substantial growth discriminator for both businesses and individuals. The locations of and extent to which factors such as fiber-optic lines would ultimately affect growth cannot be projected at this time.

The recent and potential future BLM land disposals have the potential to provide land for private-sector projects such as housing, industrial or commercial facilities, or other developments. In addition to the growth opportunities presented by the BLM land disposals, the proposed Coyote Springs community would be comprised of about 170 square kilometers (43,000 acres), about two-thirds of which would be in Lincoln County and one-third of which would be in Clark County. As envisioned, the development would be a series of neighborhoods with villages nestled between open-space corridors. It is planned to consist of both second-home residents and commuters to Las Vegas (about 80 kilometers [50 miles]

away), with initial plans to focus on a role as a destination vacation location. At final build-out, the development could provide about 47,500 residential housing units. However, the development has not procured sufficient water rights for build-out, and the ability to reach its build-out objectives is primarily dependent on water availability.

As part of the Shared-Use Option analysis for this Rail Alignment EIS, the existing decisionmakers for Lincoln, Nye, and Esmeralda Counties, and the City of Caliente clearly stated their objective to grow and develop with additional business enterprises. Esmeralda County is working on a plan to relocate the Goldfield airport to a point west of the community, and develop a light industrial/manufacturing complex adjacent to the airport. The City of Caliente is working on the redevelopment of a 0.24-square-kilometer (60-acre) industrial park south of the city, and Lincoln County is working aggressively to attract new business from Southern California and Las Vegas to the area. To facilitate Crater Flat development, Nye County is requesting that the BLM designate these lands for disposal. If that occurs, potential new employment may occur.

The State of Nevada has developed population projections for the Caliente region of influence (DIRS 178807-Hardcastel 2006, all) as follows:

- Esmeralda County is projected to have a small decrease in population from 2005 to 2026
- Lincoln County is projected to add only about 2,000 persons from 2005 to 2026
- Nye County is projected to add more than 32,000 persons from 2005 to 2026

The Nevada State Demographer develops population projections for Nevada counties, which are always subject to change with new information. For example, the full potential growth from Coyote Springs and the BLM land disposals in Lincoln County over the next 20 years would increase population growth beyond the State Demographer's projections for Lincoln County.

Nye County's projected growth continues a recent trend, with growth in Pahrump very evident over the past several years. Growth in Pahrump is being driven by low-cost land, proximity to the Las Vegas metropolitan area, and relocation of retirees to the area. Growth in Nye County is also linked directly to existing and future Yucca Mountain Site operations. See Section 5.5 for more information on the Nye County Perspective.

As discussed in Section 4.2.9 of this Rail Alignment EIS, DOE used an economic model to estimate potential socioeconomic impacts of the proposed rail line (DIRS 182251-REMI 2007, all). The model includes consideration of construction and operations employment and wages, project-related spending, and other parameters that could affect the socioeconomic environment. The model included a future baseline of socioeconomic parameters that would represent a cumulative impacts baseline without the proposed railroad (see Table 3-60 of this Rail Alignment EIS).

Consistent with the methodology established in the Yucca Mountain FEIS (DIRS 155970-DOE 2002, p. 4-43), most of the construction workers for the proposed railroad are assumed to be residents of Clark County. This assumption is made because the construction sectors in Nye, Lincoln, and Esmeralda Counties are not large enough to provide enough workers for construction activities. Therefore, it is not surprising that Clark County is projected to attain the largest levels of construction-related employment, income, and spending effects from the proposed project, followed by Nye, Lincoln, and Esmeralda Counties. Lincoln County would experience the largest employment percentage increase during construction with an estimated increase of about 6 percent above baseline conditions.

Employee locations for the operations phase would follow the same general pattern and relative magnitude of the construction phase, but there would be fewer operations jobs than construction jobs.

Gains in employment during the operations phase would be felt most strongly in Lincoln County, where the peak percentage change in average annual employment is projected to be 4 percent above baseline conditions during full operations. Esmeralda County is the only other county in the region of influence projected to experience more than a 1-percent change in average annual employment at any point during the operations phase (3-percent change).

Population changes that would result from railroad construction and operations are also projected to generally follow this pattern. During the construction phase, the upper bound of increase to population would be about 2 percent or less of the future cumulative population baseline in all four counties. The operations phase population change would have the largest percentage increase compared to the cumulative baseline in Lincoln County (about a 3-percent average annual increase over the baseline).

Strains on housing infrastructure during the construction phase would not be anticipated, because most construction workers could be housed in construction camps at strategic locations along the proposed Caliente rail alignment, rather than in nearby communities. Contractors might elect to use commercially available facilities for housing construction personnel at locations such as Caliente, Tonopah, Goldfield, Beatty, and Pahrump. There would be enough vacant housing in these locations to absorb both construction and operations personnel.

Some infrastructure impacts would be expected where construction activities or operations facilities were near communities. For example, construction workers, including those from the proposed railroad, could strain the existing health-care service capacity in the Caliente region of influence, particularly in Caliente, Goldfield, and Tonopah. The operations-related population gains could also result in identifiable effects on health and education-related services.

The road network in the Caliente region of influence generally consists of two-lane highways and unpaved roads. In rural, less populated parts of the Caliente region of influence, roads are adequate to handle existing and projected future traffic flow. However, the array of new and proposed activities throughout the Caliente region of influence would have the potential to strain parts of the existing roadway infrastructure.

Railroad project-related road traffic would result in small increases in some areas but construction of the proposed railroad itself would not materially affect traffic volumes on local roads because most construction materials would be transported using rail, and most construction employees and contractors would be housed in construction camps linked to the work site by access roads. Cumulative traffic levels in the region would likely continue to increase as overall regional growth and development occurs.

Any road improvement and maintenance responsibilities in the region of influence are handled by the Nevada Department of Transportation through a Statewide Transportation Plan and a Statewide Transportation Improvement Program. The Statewide Transportation Improvement Program includes a 3-year list of federally funded and regionally important non-federally funded transportation projects and programs consistent with the goals and strategies of the Statewide Transportation Plan. Routine highway improvements and maintenance projects for the period 2006 through 2015 have been identified for Lincoln, Nye, and Esmeralda Counties as part of the Nevada Department of Transportation planning processes. The level of cumulative traffic changes would generally not be sufficient for major upgrades of regional roads.

While there is some limited potential for induced growth impacts, the specific locations and scope of these actions is unknown at this time, and any such actions are projected to be small. The cumulative impacts to socioeconomics from the proposed railroad and other existing and reasonably foreseeable projects could be moderate because of the numerous planned development projects in the Caliente region of influence.

5.2.2.10 Occupational and Public Health and Safety

5.2.2.10.1 Nonradiological Health and Safety

Throughout the Caliente region of influence, existing and reasonably foreseeable activities (such as the construction of pipelines, transmission lines, and other infrastructure) have the potential to result in occupational injuries or fatalities including, but not necessarily limited to sources such as tripping, being cut on equipment or material, dropping heavy objects, and catching clothing in moving machine parts, and other types of accidents. Other occupational risks include biological hazards, dust and soils hazards, air quality hazards, transportation accidents, and noise hazards. Biological hazards include potential human health effects from rodent-borne diseases, soil-borne diseases, insect-borne diseases, and venomous animals. Dust and soils hazards include potential human health effects from exposure to inhalable soils and dusts containing hazardous constituents, and potential occupational encounters with unexploded ordnance.

While occupational injuries or fatalities are unavoidable with human activity, the public and private facilities within the Caliente region of influence are highly regulated. There is a substantial regulatory framework for occupational health and safety, with the Occupational Safety and Health Administration programs and regulations forming the basis for protection of workers. Through DOE Order 440.1A, *Worker Protection Management for DOE Federal and Contractor Employees*, the Department has prescribed the Occupational Safety and Health Act Standards that contractors are to meet in their work at government-owned, contractor-operated facilities. The Department of Labor, Bureau of Labor Statistics, measures occupational incident rates, including total recordable cases, lost workday cases, and fatalities, associated with the work environment.

There are no data on injury/illness incident rates for the Caliente region of influence, but injury/illness incidence rates in Nevada are generally higher than those in the United States as a whole. The economic segments with the highest injury/illness incidence rates in Nevada are construction and goods-producing industries.

Additional traffic is a concern with the construction phases of reasonably foreseeable projects. The construction phase of a project not only brings construction workers to the work sites, but also means an increase in slow-moving and bulky traffic involving the transportation of construction equipment. Use of trucks for hauling hazardous or other dangerous materials is also an increasing concern as traffic increases on the road network.

The construction and operation of the Yucca Mountain Repository would result in increased traffic, and the level of service along U.S. Highway 95 near Gate 510 to the Nevada Test Site would drop from level of service B to level of service D, which indicates high-density traffic but still stable conditions (DIRS 185463-Facanha 2008, all). To minimize traffic impacts at the entrance to the Yucca Mountain Site, a new interchange with U.S. Highway 95 at the site entrance has been proposed for both traffic flow and safety reasons. DOE also plans to work closely with the Nevada Department of Transportation should it find it necessary to implement mitigative actions along U.S. Highway 95. Increased traffic would not necessarily mean an increase in the rate of traffic accidents, but the number of accidents would increase if the rate of traffic accidents stayed the same and traffic increased. Therefore, transportation safety concerns would increase and there could be an increased workload for traffic-accident responders in the Caliente region of influence with the cumulative growth in traffic.

Under DOE's Proposed Action, nonradiological occupational health and safety of transportating an estimated 9,500 casks are projected as follows:

- Construction and operations activities for the Caliente rail alignment are projected to result in approximately 880 recordable incidents, approximately 520 lost workday accidents, and approximately three fatalities.
- Vehicular-related fatalities related to worker commuting are projected to result in an estimated 14 vehicular-related fatalities for the Caliente rail alignment.
- Rail-related accidents and rail-related fatalities related to the movement of cask trains, maintenance trains, and supply trains are projected to result in 16 rail-related accidents and two rail-related fatalities for the Caliente alignment.

Under Module 1, up to 21,909 casks would be transported to the repository by rail and under Module 2, 33,909 casks would be transported to the repository by rail. To estimate the cumulative health and safety impacts of Modules 1and 2, the impacts of the Proposed Action were increased by the ratio of the number of casks transported in the Module versus the Proposed Action. For Module 1, the nonradiological health and safety impacts noted above would increase by an additional 65 percent over the impacts under the Proposed Action. For Module 2, nonradiological health and safety impacts would increase by 119 percent over the impacts under the Proposed Action.

5.2.2.10.2 Radiological Health and Safety

Existing and reasonably foreseeable future activity (such as the Nevada Test Site and Yucca Mountain Repository activity managed by DOE) in the Caliente region of influence involves the storage, handling, transportation, use, and disposal of radioactive materials and wastes. There is an extensive regulatory framework associated with transportation safety, and the proposed railroad would operate in compliance with these laws and regulations. For example, DOE complies with U.S. Department of Transportation regulations regarding the transportation of radioactive materials. DOE also uses U.S. Environmental Protection Agency protective action guides (identifying projected dose levels at which specified actions should be taken) and actions designed to limit doses and impacts in the event of a transportation accident resulting in releases of radioactive material. The regulatory framework and implementation of appropriate standard operating procedures would reduce the potential for accidents. Coordination of plans for proposed railroad construction and operations with local emergency response providers would be important to limit the potential for accidents, and for an effective response to an accident should one occur.

Under assumed conditions, there is a small risk of radiological impacts to workers and the general public from external radiation exposure during normal operations and incident-free transportation. Staff at the Nevada Test Site and the Yucca Mountain Repository would be separate, and it is not anticipated that there would be cumulative exposures to workers from both operations. The modes of transportation of radioactive wastes for the Nevada Test Site (shipment by truck) and the Yucca Mountain Repository (shipment by rail) would differ. The Repository SEIS is evaluating the reasonably foreseeable scenarios for Inventory Modules 1 and 2. The capacity of the proposed repository is statutory-limited to 70,000 metric tons (77,000 tons) of heavy metal of spent nuclear fuel and high-level radioactive waste, and any other waste that would not be accepted by the proposed repository would be evaluated in a separate analysis. Regardless of the number of shipments, the proposed railroad construction and operations would not be affected. The radiological risk relationships among the repository, the proposed Caliente rail alignment, and Nevada Test Site operations are summarized below.

As part of the Repository SEIS process, DOE estimated that, under assumed conditions, 8.1 and 12 latent cancer fatalities for repository workers could result from Yucca Mountain Repository construction, operations, monitoring, and closure for Modules 1 and 2 respectively. For workers along the rail line, DOE estimated that there could be 1.2 latent cancer fatalities for Module 1, and 1.7 latent cancer fatalities

for Module 2. The projected population within the repository region of influence is 120,000 people. The region of influence for the Yucca Mountain Repository extends 84 kilometers (52 miles) to the northwest from the repository site boundary along the rail corridor, approximately to Scottys Junction; the remainder of the Caliente rail alignment is outside of the Yucca Mountain Repository region of influence. Population within the area where the rail alignment region of influence and the Yucca Mountain Repository region of influence coincide (between the repository boundary and the Scottys Junction area) would receive radiation dose from both the repository and from railroad operations. For members of the public, DOE estimated that, under assumed conditions, 18 and 27 latent cancer fatalities could result from Yucca Mountain Repository construction, operations, monitoring, and closure for Modules 1 and 2, respectively. For members of the public along the Caliente rail alignment, DOE estimated that 0.00034 latent cancer fatality for Module 1, and 0.00052 latent cancer fatality for Module 2 could occur from transportation of spent nuclear fuel and high-level radioactive waste.

The estimated radiological dose to members of the public from Nevada Test Site operations in 2005 was 0.2 millirem per year; the maximum radiation dose was 2.3 millirem per year at the northwest corner of the Nevada Test Site boundary. Dose at off-site populated locations between 20 and 80 kilometers (12 to 50 miles) from this location would experience much lower radiation doses due to wind dispersion (*Nevada Test Site Environmental Report 2005* [DIRS 182285-Wills 2006, Table 8-4, p. 8-2]). The collective population dose from Nevada Test Site operations was below 0.6 person-rem in 2004 (*Nevada Test Site Environmental Report 2005* [DIRS 182285-Wills 2006, Table 8-3, p. 8-8]).

5.2.2.11 Utilities, Energy, and Materials

5.2.2.11.1 Utilities

From a cumulative impacts perspective within the Caliente region of influence, utility crossings are and will continue to be commonplace, with little impact other than minor ground disturbance. The proposed railroad project would contribute to regional utility and other right-of-way crossings, which are common to linear projects such as roads, railroads, and pipelines. Land areas for the rail line, construction camps, quarries, and access roads would cross or encroach upon existing or proposed utility rights-of-way in a variety of locations. Land areas for railroad operations support facilities could also encroach upon existing or proposed utility rights-of-way. This situation would be typical for other rights-of-way in the region of influence, which would have hundreds of utility and other right-of-way crossings for the various existing and reasonably foreseeable projects in the region.

Many regional activities, including the proposed railroad, would increase demands on public water systems, wastewater systems, telecommunications systems, electric power systems, and other utilities. Lincoln County Power District No. 1 is a general improvement district that supplies power to about 800 customers, totaling more than 72,000 megawatt-hours per year (DIRS 185100-Nevada State Office of Energy 2007, p. 46). Its maximum peak load has been 16 megawatts. All of this power normally comes from the Hoover Dam, although a supplemental agreement with Nevada Power Company allows Lincoln County Power District No. 1 to buy extra energy when Colorado River levels are too low to support demand. Although demand has remained relatively steady over the past several years (growing by 1 to 2 percent per year), Lincoln County Power District No. 1 has plans to increase long-term supply by buying into the planned coal-fired Intermountain Power Project plant in Delta, Utah. This plant could be running as early as 2010, and Lincoln County would purchase 15 megawatts of additional capacity (DIRS 175509-Kahn 2005, all).

As described in Section 5.2.1.3.1:

- The BLM has received 11 right-of-way permit applications for solar energy facilities in Nye County.

- The BLM has received three permit applications for site-specific wind energy site testing and monitoring rights-of-way for individual meteorological towers and instrumentation facilities in Nye County.

- The BLM has received two applications for a wind energy site testing and monitoring right-of-way for a larger site testing and monitoring project area in Nye and Esmeralda Counties.

The 11 applications related to solar energy could result in the construction and operation of solar power plants. The 5 applications related to wind energy are specific to testing and research, but could eventually lead to the construction and development of wind power sources. All of these proposed projects could offset the power needs of exiting and proposed projects in the Caliente region of influence. impacts from utility crossings would be minimized by using standard engineering procedures and appropriate design details and because regional service providers are projected to be able to adjust to any increasing demand for utilities from existing and planned projects in the Caliente region of influence.

5.2.2.11.2 Energy and Materials Usage

Large projects such as pipelines, transmission lines, and power plants that could occur within the Caliente region of influence require materials and energy to construct and operate. Energy and material resources necessary for construction or operation of these projects are often obtained within regional or, in some cases, national markets.

For this Rail Alignment EIS, DOE analyzed cumulative energy and materials supply and demand from a regional perspective. Energy and materials (for example, steel and concrete) that would be needed for construction and operation of the proposed railroad and other proposed projects are not constrained in regional markets, and the proposed railroad and other proposed projects needs would represent a small percentage of the cumulative annual materials use within the Caliente region of influence.

While the regional markets for various construction-related materials and energy sources will continue to grow as the region develops, there is no evidence of potential limits to growth from constrained material or energy supplies.

5.2.2.11.3 Utilities, Energy, and Materials Conclusion

Supply and demand for energy and material resources (including steel and concrete) are not expected to be impacted in the Caliente region of influence because of the small percentage of the cumulative annual materials the proposed railroad and other projects would need. Utilities are not expected to be impacted due to the numerous planned power plant projects, including solar and wind energy facilities. The cumulative impacts to utilities, energy, and materials from the proposed railroad and other existing and reasonably foreseeable projects would be small.

5.2.2.12 Hazardous Materials and Waste

5.2.2.12.1 DOE Waste-Management Activities

DOE has had existing waste-management programs at the Nevada Test Site for several decades. While Site missions have changed over time (with an emerging focus on national security, energy, and environmental issues), waste management and disposal at the Site has been one of the primary long-term land uses. There are two active waste-management and disposal sites on the Nevada Test Site:

- Area 5 occupies 2.9 square kilometers (720 acres) and is in Frenchman Flat north of Mercury, Nevada.
- Area 3 occupies 0.53 square kilometer (130 acres) north of Mercury in Yucca Flat.

Environmental restoration efforts are under way at various locations throughout the Nevada Test Site. The Nevada Test Site waste-management program currently includes management and disposal operations for hazardous waste, mixed waste, and low-level radioactive waste. Transportation of the waste is accomplished by truck from both on-site and off-site sources. There are no plans for Nevada Test Site activities to include use of the proposed Caliente rail alignment for shipment of wastes.

The proposed railroad would not contribute to cumulative impacts associated with DOE waste-management activities on the Nevada Test Site.

5.2.2.12.2 Sanitary and Construction Wastes

As the populated areas in the Caliente region of influence expand, the volume of sanitary waste generated will also expand. Project proponents are legally required to dispose of nonhazardous and nonradiological construction and other solid waste in appropriately permitted solid waste landfills. Nevada has 24 operating municipal landfills with a combined capacity to accept more than 11,000 metric tons (12,000 tons) of waste per day. While there is sufficient capacity to accept waste for the state of Nevada as a whole, the number of operating landfills has decreased substantially over the past 15 years, and there are some areas, such as Pahrump, that may have limited capacity in the future.

Construction- and operations-related waste that would be associated with the proposed railroad would add only a fraction of a percent to the total waste stream in the state. If there were a constraint to landfill capacity at some future time, additional land would be needed to expand or open a new landfill. Because of the scarcity of private land in the Caliente region of influence, any land used for this purpose might need to come from BLM-administered federal land. As an alternative to local government landfill provision, private companies can also be expected to seek business opportunities to provide solid-and hazardous-waste management, transportation, and disposal.

DOE would store and use hazardous materials (such as oil, gasoline and solvents) during the construction phase, and would control and manage these materials in accordance with the extensive federal and state regulatory framework. Other major projects would have similar waste streams, and project plans and requirements would call for disposal of such wastes in permitted facilities and materials management according to accepted industry practices.

5.2.2.12.3 Hazardous Materials and Waste Conclusion

The cumulative impacts to hazardous materials and waste from the proposed railroad and other existing and reasonably foreseeable projects would be small. Restoration activities are underway to address past DOE waste-management activities, and impacts based on potential future activities would be addressed by DOE. Landfill capacity should not be exceeded based on the proposed railroad or any other existing or planned projects and their associated sanitary and construction wastes in the Caliente region of influence.

5.2.2.13 Cultural Resources

Cultural resources include historic and archeological sites, buildings, structures, landscapes, and objects. Most reasonably foreseeable projects in the Caliente region of influence will involve at least some ground disturbance. With that ground disturbance, cultural resources could be destroyed, damaged, or discovered

for recovery or mitigation. As part of the evaluation of proposed projects on federal land, the existing regulatory framework requires that cultural resources be identified and protected. With information on the location of a proposed project, and the estimated extent of ground disturbance, cultural resource specialists can be called on to perform appropriate surveys and inventories of cultural resources in the potentially disturbed area. Once discovered, the sites of cultural resources are kept confidential to reduce the potential for vandalism or theft of the resources.

Because cultural resources are typically on or below the ground, they can be damaged by other activities such as off-highway vehicle use. As the major land manager in the Caliente region of influence, the BLM has an extensive cultural resource management program and manages federal land with protection of cultural resources as a key management objective. Once ground is disturbed and facilities are constructed on the land, the opportunity for identification of cultural resources is usually lost. Therefore, the BLM and other land managers in the area (like DOE on the Nevada Test Site and the U.S. Air Force on the Nevada Test and Training Range) employ cultural resource specialists and involve tribal representatives, as appropriate. Commonly, mitigation for any ground disturbance in the Caliente region of influence includes the involvement of these cultural resource specialists as potential cultural resources are discovered. Other activities occurring on federal land, such as off-road vehicle use and rock collecting, can cause unintended adverse impacts to cultural resources. Mission activities occurring at the Nevada Test Site, the Nevada Test and Training Range, and the Yucca Mountain Repository also can cause unintended adverse impacts to cultural resources.

The problem of vandalism to and theft of cultural resources is prevalent throughout the western United States. The Ely District Proposed Resource Management Plan (DIRS 184767-BLM 2007, p. 3.9-5) notes that the trend of degradation to cultural resource sites is increasing at a rapid rate as the population increases in the Caliente region of influence. Land-management agencies such as the BLM make extensive attempts to protect cultural resource locations, but the areas to be managed are often so vast that patrols by law enforcement are not effective in protecting these sites. DOE, the BLM, and other federal agencies in the Caliente region of influence are committed to public education and employee training regarding the protection of cultural resources.

Visitors could also be drawn to the area for purposes of curiosity and sight-seeing. Based on the extent of cultural resource site finds within BLM-administered land and the Nevada Test Site, and data collected to date on the Caliente rail alignment, there could be a large number of cultural resources in the Caliente region of influence. For example, the Ely District Proposed Resource Management Plan (DIRS 184767-BLM 2007, p. 3.9-1) notes that approximately 12,000 cultural resource sites covering a time span of more than 10,000 years have been identified within the Ely District. It is likely that only a portion of any currently undiscovered sites would ultimately be found eligible for the *National Register of Historic Places*.

The railroad would be a major new construction project introduced into a remote area. Beyond the implications of ground disturbance and permanent and temporary use areas, railroad construction and operations would bring employees, visitors, and equipment into an area where prior access was limited. If right-of-way roads remain open to the public, there could be an increase in off-road vehicles traveling along newly constructed roads and illegal use of lands. As the number of visitors increases, so does the potential for vandalism and damage to cultural resources. There is an extensive regulatory framework to manage and protect cultural resources.

The cumulative impacts to cultural resources from the proposed railroad and other existing and reasonably foreseeable projects would be small because the Department would conduct intensive field surveys and implement mitigation measures, including avoidance. Other project proponents would be subject to the same regulatory framework and BLM policies and procedures.

5.2.2.14 Paleontological Resources

Regional protection, management, and impact issues in relation to paleontological resources are similar to those for cultural resources. Any type of ground disturbance could disturb or destroy known or yet identified paleontological resources. Impacts to paleontological resources would generally be measured by physical damage to fossil-bearing formations through excavation or surface disturbance. The primary cumulative impact mechanisms that could affect paleontological resources include excavations or surface disturbances associated with approval and implementation of BLM rights-of-way, off-highway vehicle use, minerals development, land disposals, and special designations. Many BLM management activities, however, serve to protect and mitigate impacts to paleontological resources. As noted in the Ely District Proposed Resource Management Plan (DIRS 184767-BLM 2007, p. 4.10-1), knowledge of the outcrop pattern of geologic units, and the kinds and quality of the fossils produced by such units, is a critical management tool for land-use decisionmaking where fossils might be involved. Potential effects on paleontological resources from ground disturbance would continue to be a major regional concern for the BLM from both resource management planning and rights-of-way evaluation perspectives.

Paleontological resources are considered valuable and are collected in the Caliente region of influence for their cultural, scientific, and recreational values. Therefore, these resources are sometimes removed from federal lands. While common invertebrate fossils such as plants, mollusks, and trilobites can be collected for personal use in reasonable quantities, the lack of regular site monitoring and public education about fossil collecting has led to increased illegal commercial taking of paleontological resources. Paleontological resources are also vulnerable to intentional or unintentional vandalism. The specific locations of some identified paleontological resources are kept confidential to avoid vandalism or theft.

The most likely locations of currently unknown paleontological resources can be identified based on geological characteristics, and potential impacts can be avoided or minimized through careful project planning and implementation. The cumulative impacts to paleontological resources from the proposed railroad and other existing and reasonably foreseeable projects would be small because most formations the rail line would cross are volcanic and would not contain paleontological resources. DOE also expects that other planned construction projects would avoid and minimize impacts where possible.

5.2.2.15 Environmental Justice

Environmental justice impacts result when high and adverse human-health or environmental impacts fall disproportionately on low-income and minority populations. If high and adverse impacts are found to have disproportionate impacts on environmental justice populations as compared to the general population in the area, the impacts would be mitigated to the extent practicable by the federal agencies involved in the Proposed Action.

Based on individual and group values, beliefs, and goals among stakeholders and other interested parties, there are different perspectives on the potential effects of activities in the Caliente region of influence on low-income or minority populations. The American Indian Resource Document (DIRS 174205-Kane et al. 2005) discusses cultural resources, American Indian values and their relationship to environmental justice, and broader American Indian values. DOE considers the American Indian Writers Subgroup conclusions to be responsible opposing viewpoints for purposes of its environmental justice responsibilities.

DOE has concluded that there are no identifiable human-health or environmental impacts associated with the proposed railroad that are high and adverse and that would disproportionately affect low-income or minority populations, nor has the Department identified any special pathways for impacts (such as subsistence hunting and gathering) in the Caliente region of influence. If, during the development of the

inventory described in Section 4.2.13.4, additional cultural resources related primarily to American Indian interests were discovered that could not be avoided, then the magnitude of environmental justice impacts might also be larger and disproportionately high and adverse. Similarly, if during development of ethnographic studies special pathways were identified, then the magnitude of environmental justice impacts might be larger. Other existing and reasonably foreseeable projects do not appear to have disproportionately high and adverse impacts to low-income or minority populations, but cumulative impacts of all projects, including cultural impacts, are uncertain.

5.3 Mina Rail Alignment

Sections 5.3.1 to 5.3.2 summarize the projects and activities considered in the cumulative impacts analysis for the Mina rail alignment. Figure 5-3 shows the locations of these major projects and activities, including the:

1. Naval Air Station Fallon
2. Federal actions on the Walker River Paiute Reservation
3. Hawthorne Army Depot
4. Walker River Basin Restoration
5. Monte Cristo's Castle (proposed state park)
6. Timbisha Shoshone Trust Lands (federal land transfer)
7. Yucca Mountain Repository
8. Nevada Test Site
9. Nevada Test and Training Range
10. Department of Justice Detention Facility

This section also considers other relevant projects and actions that are not depicted on the map, such as:

- BLM planning and management actions – A variety of BLM past, present, and reasonably foreseeable actions are located within the three BLM management areas (Carson City, Battle Mountain, and Las Vegas) relevant to the Mina rail alignment.
- Various rights-of-way – Many future utility or other rights-of-way and their specific routes are not known. In October 2007 DOE and the BLM issued the *Draft Programmatic Environmental Impact Statement of the Designation of Energy Corridors on Federal Land in the 11 Western States* (DOE/EIS-0386), which analyzes the potential designation of energy corridors on federal land in western states (DIRS 185274-DOE 2007, all). A number of energy corridors proposed in the Draft EIS run through the state of Nevada (See Figure 5-3); one of these corridors would be located near the proposed Mina rail alignment (See Figure 5-3). The proposed energy corridor in western Nevada would enter the state north of Reno and travel southeast toward Las Vegas. This alignment would consist of both existing and new rights-of-way, and would parallel the proposed Mina rail alignment along nearly its entire length, crossing or overlapping the rail alignment in a number of locations.
- Energy and mineral development activities.
- Other regional economic development plans and activities within Nye, Esmeralda, Lyon, and Mineral Counties.

The Mina rail alignment ranges in length from about 469 to 502 kilometers (281 to 312 miles), depending on the alternative segments considered. As a linear project, land disturbance and other direct impacts would be most likely to occur within the relatively narrow construction and operations rights-of-way. However, there could be other direct and indirect impacts for some resources outside the rights-of-way.

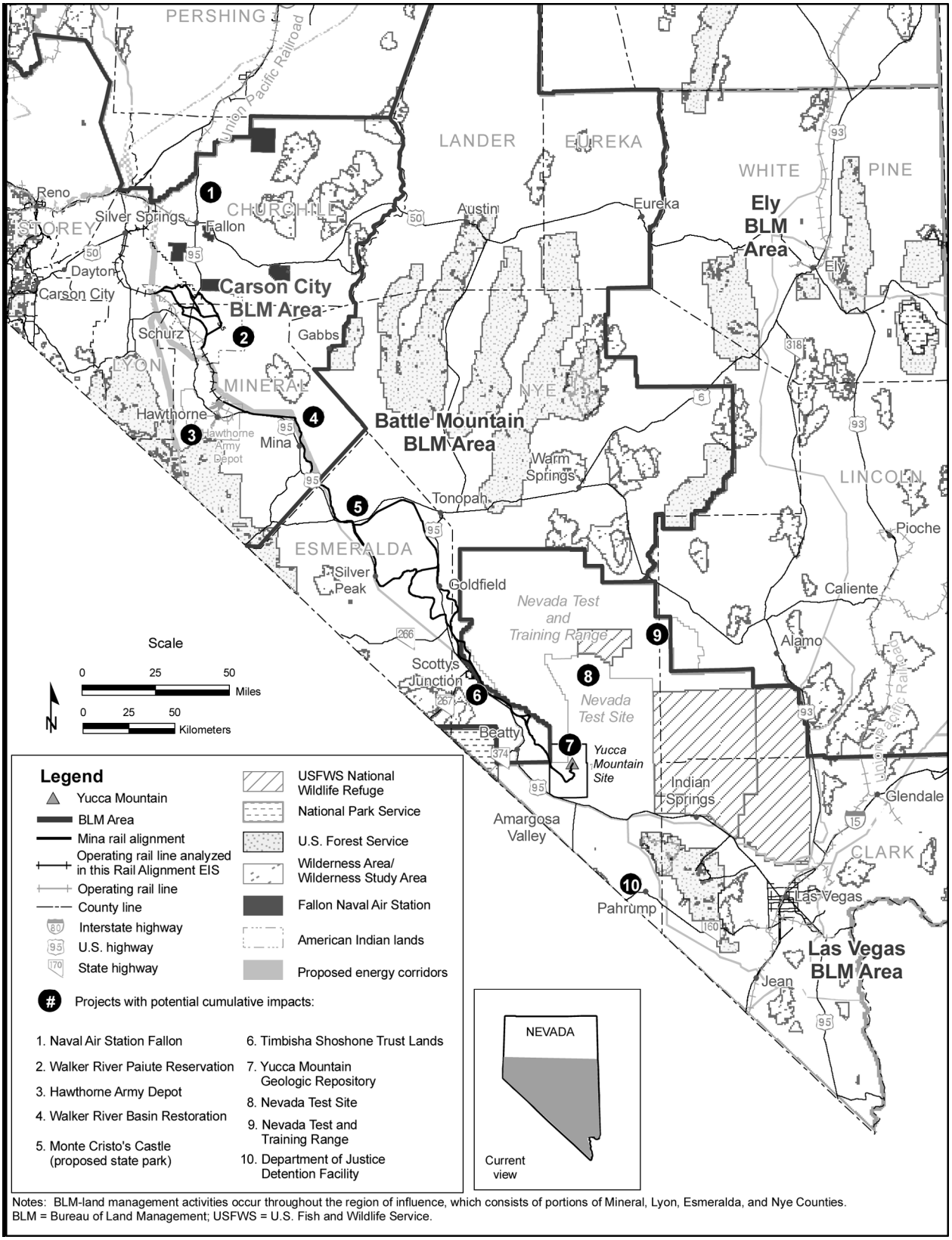

Figure 5-3. Major reasonably foreseeable future actions and continuing activities in the Mina region of influence.

To evaluate the potential for cumulative impacts, DOE identified and reviewed public and private actions in the Mina region of influence to determine if the impacts associated with these actions could coincide in time or space with potential impacts from railroad construction and operations. In some cases, similar actions have been grouped together and listed by category of action.

5.3.1 PROJECTS AND ACTIVITIES INCLUDED IN THE CUMULATIVE IMPACTS ANALYSIS – MINA RAIL ALIGNMENT

5.3.1.1 Past and Present Actions

The descriptions of existing (baseline) environmental conditions (Chapter 3) and impacts (Chapter 4) associated with the various environmental resource regions of influence for the Mina rail alignment considered in this Rail Alignment EIS include the relationships between proposed railroad construction, operations, and abandonment and past and present actions such as:

- Operations at major federal facilities such as the Yucca Mountain Repository, Nevada Test and Training Range, Nevada Test Site, Hawthorne Army Depot, and Naval Air Station Fallon
- BLM resource management planning and land-management uses
- Traditional land uses such as grazing, mining, and recreation
- Military operations
- Walker River Basin restoration activities
- Residential, commercial, and industrial development activities associated with growth in the Mina region of influence, including the Pahrump area and the Reno-Carson City area adjacent to the northern portion of the Mina rail alignment.

Reasonably foreseeable future actions and the continuation of existing actions in the Mina rail region of influence were also considered. Figure 5-3 shows the locations of reasonably foreseeable projects and continuing activities in the Mina region of influence.

5.3.1.2 Reasonably Foreseeable Future and Continuing Federal Actions

Sections 5.3.1.2.1 through 5.3.1.2.9 describe reasonably foreseeable future and continuing federal agency actions that could result in cumulative impacts when combined with the impacts of constructing and operating a railroad along the Mina rail alignment.

5.3.1.2.1 Yucca Mountain Repository

The Proposed Action in this Rail Alignment EIS is directly related to the proposed geologic repository at Yucca Mountain, which is a reasonably foreseeable project that would have potential cumulative impacts in the Mina region of influence (see Figure 5-3, Project #7). The repository would disturb about 6.5 square kilometers (1,600 acres) of land, most of which would be on the Nevada Test Site. In the Yucca Mountain FEIS (DIRS 155970-DOE 2002, all) and the Repository SEIS (DOE/EIS-0250F-S1), DOE proposes to construct, operate, monitor, and eventually close a geologic repository for the disposal of 70,000 metric tons (77,000 tons) of heavy metal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain in Nye County, Nevada. DOE proposes to dispose of spent nuclear fuel and high-level radioactive waste in the repository using the natural geologic features of the mountain and engineered barriers as a total system to help ensure long-term isolation of the materials from the accessible environment. As analyzed in the Repository SEIS, the repository design and associated construction and operation plans require the following:

- DOE spent nuclear fuel and high-level radioactive waste would be placed in disposable canisters at the DOE sites, and as much as 90 percent of the commercial spent nuclear fuel would be placed in transportation, aging, and disposal (TAD) canisters at the commercial sites prior to shipment. The remaining commercial spent nuclear fuel (about 10 percent) would be transported to the repository in dual-purpose canisters (canisters suitable for storage and transportation), or would be uncanistered.

- Most spent nuclear fuel and high-level radioactive waste would be transported from 72 commercial and four DOE sites to the repository in Nuclear Regulatory Commission-certified transportation casks placed on trains dedicated only to these shipments. Some shipments, however, would be transported to the repository by truck over the Nation's highways.
- At the repository, DOE would conduct waste handling activities to manage thermal output of the commercial spent nuclear fuel and to package the spent nuclear fuel into TAD canisters. The disposable canisters and TAD canisters would be placed into waste packages for disposal in the repository. A waste package is a container that consists of the barrier materials and internal components in which DOE would place the canisters that contained spent nuclear fuel and high-level radioactive waste.
- DOE would place approximately 11,000 waste packages, containing no more than a total of 70,000 metric tons (77,000 tons) of heavy metal, of spent nuclear fuel and high-level radioactive waste in the repository at Yucca Mountain.
- The surface and subsurface facilities and associated infrastructure, such as the on-site road and water distribution networks and emergency response facilities, would be constructed in phases to accommodate the expected receipt rates of spent nuclear fuel and high-level radioactive waste.
- DOE also would construct a four-lane access road that would extend from U.S. Highway 95 to the existing access road at Gate 510. This access road might be constructed using a phased approach, with initial construction of two lanes, and the road being widened later. The Department would also build a suitable intersection at U.S. Highway 95.
- DOE assumes that the following facilities would be constructed outside the repository land withdrawal area: a training facility near Yucca Mountain to support the Project Prototype Testing and the Operator Training and Qualification programs; temporary accommodations for construction workers; a proposed Sample Management Facility to consolidate, upgrade, and improve storage and warehousing for scientific samples and materials; and a marshalling yard and warehouse, a proposed facility that would consolidate material shipment and receipt into a 0.2-square-kilometer (50-acre) facility to allow for off-site receipt, transfer, and staging of materials required to perform construction activities at the Yucca Mountain site.

The Nuclear Regulatory Commission, through its licensing process, would regulate repository construction, operations, monitoring, and closure. Repository operations would only begin after the Commission granted DOE a license to receive and possess spent nuclear fuel and high-level radioactive waste. DOE has recently submitted an application seeking construction authorization.

The Yucca Mountain FEIS and the Repository SEIS evaluate the cumulative impacts of two additional inventories, Modules 1 and 2. Under Module 1, DOE would emplace all of the projected spent nuclear fuel and high-level radioactive waste in Yucca Mountain. Inventory Module 1 includes all projected commercial spent nuclear fuel from currently licensed reactors (about 130,000 metric tons [about 143,000 tons]) (DIRS 182343-BSC 2006, all), all DOE spent nuclear fuel (about 2,500 metric tons [about 2,800 tons]) (DIRS 155970-DOE 2002, all) and all high-level radioactive waste (approximately 36,000 canisters) (DIRS 182702-Koutsandreas 2007, all). Under Module 2, DOE would emplace all of Inventory Module 1 plus other radioactive materials that could require disposal in a geologic repository

The Repository SEIS evaluates two disposal cases for Inventory Modules 1 and 2 that evaluate the effects of potential future recycling of spent nuclear fuel on the cumulative impacts in the Repository SEIS. Because Modules 1 and 2 exceed the NWPA disposal limit of 70,000 metric tons (77,000 tons) of heavy metal considered in the Repository SEIS, the emplacement of any such waste at Yucca Mountain would require legislative action by Congress. DOE also acknowledges that prior to disposal of spent nuclear fuel and high-level radioactive waste in excess of 70,000 metric tons of heavy metal, appropriate regulatory authorizations would be obtained from the Nuclear Regulatory Commission, including any necessary amendments to DOE's license for the operation of the Yucca Mountain Repository. As shown in the Repository SEIS, the number of shipments through Nevada in the cases involving recycling would be less than that currently evaluated. Therefore, this cumulative impacts analysis only considers the base case without recycling.

Inventory Module 1 or 2 could have cumulative impacts on the operation of the proposed railroad. Regarding potential cumulative impacts from Inventory Module 1 or 2, there would be no cumulative construction impacts because the need for a new railroad would not change; that is, whichever rail alignment DOE selected in which to build the proposed railroad would also be used to transport Module 1 or 2 inventories. Cumulative operations impacts could result because of the increased number of shipments for Module 1 or 2.

DOE is preparing the *Disposal of Greater-Than-Class-C Low-Level Radioactive Waste Environmental Impact Statement* (DOE/EIS-0375) (72 *FR* 40135, July 23, 2007). That EIS will address the disposal of wastes with concentrations greater than Class C, as defined in U.S. Nuclear Regulatory Commission regulations at 10 CFR Part 61, and DOE low-level radioactive waste and transuranic waste having characteristics similar to Greater-Than-Class-C waste and that otherwise do not have a path to disposal. DOE proposes to evaluate alternatives for Greater-Than-Class-C low-level waste disposal in a geologic repository, in intermediate depth boreholes, and in enhanced near-surface facilities. Candidate locations for these disposal facilities are the Idaho National Laboratory, the Los Alamos National Laboratory and Waste Isolation Pilot Plant in New Mexico, the Nevada Test Site and the proposed Yucca Mountain Repository, the Savannah River Site in South Carolina, the Oak Ridge Reservation in Tennessee, and the Hanford Site in Washington. DOE will also evaluate disposal at generic commercial facilities in arid and humid locations. The Repository SEIS evaluates the potential cumulative impacts of disposal of these wastes at Yucca Mountain as a reasonably foreseeable action, which are included in Inventory Module 2. The emplacement of commercial Greater-Than-Class-C waste could require either legislative action or a determination by the Nuclear Regulatory Commission to classify these materials as high-level radioactive waste.

DOE is preparing the *Programmatic Environmental Impact Statement for the Global Nuclear Energy Partnership* (DOE/EIS-0396). GNEP is a domestic and international program designed to support expansion of nuclear energy production worldwide while advancing nonproliferation goals and reducing the impacts of spent nuclear fuel disposal. Some of the GNEP programmatic alternatives involve the recycling of commercial spent nuclear fuel. The Repository SEIS evaluates the potential impacts that GNEP could have on the repository. As mentioned earlier, any potential recycling of commercial spent nuclear fuel as a result of GNEP programmatic alternatives would only reduce the number of shipments to the repository; therefore, this program would not have additional cumulative impacts beyond those of Inventory Modules 1 or 2.

5.3.1.2.2 Nevada Test Site (Continuation of Activities)

The Nevada Test Site, adjacent to the Nevada Test and Training Range, engages in a number of defense-related material and management activities, waste management, environmental restoration, and non-defense research and development (see Figure 5-3, Project #8). The Nevada Test Site was established in

1951 as the Nation's proving ground for developing and testing nuclear weapons. The site is on land administratively held by the BLM, but the Nevada Test Site land was withdrawn for use by the Atomic Energy Commission and its successors (including DOE). At present, the DOE National Nuclear Security Administration manages the site. It consists of about 3,200 square kilometers (800,000 acres) of land, and the proposed railroad would use about 4.1 square kilometers (1,000 acres) of this land.

The *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (DIRS 101811-DOE 1996, all) described existing and projected future actions at the Nevada Test Site. That EIS was followed by a *Supplement Analysis for the Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (DIRS 162638-DOE 2002, all). DOE activities at the Nevada Test Site include stockpile stewardship and management (helping ensure the U.S. nuclear weapon stockpile is safe, secure, and reliable), materials disposition (removal of nuclear materials in a safe and timely manner), and nuclear emergency response. Activities at the Nevada Test Site since the 1996 EIS and 2002 supplement analysis have continued to support these missions in accordance with federal law, DOE policies and missions, and NEPA requirements. There are a number of other programmatic DOE waste-management initiatives that can affect current and potential future operations at the Nevada Test Site, many of which require NEPA analyses. The Nevada Test Site also produces annual environmental reports that describe program activities and related environmental issues and activities.

In December 2007, the DOE National Nuclear Security Administration published the *Draft Complex Transformation Supplemental Programmatic Environmental Impact Statement* (Complex Transformation Supplemental PEIS [formerly known as the Complex 2030 SEIS]; DOE/EIS-0236-S4) (DIRS 185273-DOE 2007, all). The Supplemental PEIS analyzes the potential environmental impacts of reasonable alternatives to continue transformation of the U.S. nuclear weapons complex under the National Nuclear Security Administration's vision of the complex to be smaller, more responsive, efficient, and secure. As part of the proposed action, activities could take place at Los Alamos National Laboratory, the Nevada Test Site, the Pantex Plant, the Y-12 National Security Complex, White Sands Missile Range, Lawrence Livermore National Laboratory, and the Savannah River site. The Supplemental PEIS identified no significant potential environmental impacts to any resource area, including land use and air quality, among others.

DOE manages several types of radioactive and hazardous waste (low-level radioactive waste, mixed low-level waste, transuranic waste, high-level radioactive waste, and hazardous waste) generated by past and present nuclear defense research activities at many DOE sites across the United States, including the Nevada Test Site. The Department manages each of those waste types separately because they have different components, levels of radioactivity, and regulatory requirements. DOE needs facilities like the Nevada Test Site to manage its radioactive and hazardous wastes to maintain safe, efficient, and cost-effective control of these wastes; comply with applicable federal and state laws; and protect public health and safety and the environment. In the *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (DIRS 101816-DOE 1997, all) DOE evaluated the environmental impacts of managing the five waste types. The Nevada Test Site will continue to be a major facility involved in DOE waste-management programs, including serving as a disposal site for certain waste types generated off the site, and for on-site wastes primarily from environmental restoration and remediation activities.

The Nevada Test Site is a candidate disposal location for Greater-Than-Class-C low-level radioactive waste, which is currently being examined in the *Disposal of Greater-Than-Class-C Low-Level Radioactive Waste Environmental Impact Statement* (DOE/EIS-0375). That DOE EIS will address the disposal of wastes with concentrations greater than Class C, as defined in Nuclear Regulatory Commission regulations at 10 CFR Part 61, and DOE low-level radioactive waste and transuranic waste having characteristics similar to Greater-Than-Class-C low-level waste and that might not have an

identified path to disposal. DOE proposes to evaluate alternatives for Greater-Than-Class-C low-level waste disposal in a geologic repository, in intermediate-depth boreholes, and in enhanced near-surface facilities.

Table 5-1 lists and briefly describes recent environmental assessments that describe Nevada Test Site operations, which includes a description of the *Draft Supplement Analysis for the Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada, DOE/EIS-0243-SA-03* (DIRS 185437-DOE 2008, all).

5.3.1.2.3 BLM Resource Planning and Management

The presence of public land administered by the BLM is a very important factor affecting how and where activities occur within the Mina region of influence. Many private and federal projects, including the proposed railroad, would involve use of BLM-administered federal land. Therefore, these projects would require BLM-issued right-of-way grants before they could proceed. Right-of-way grants have two general forms: linear (applicable to such projects as transmission lines, railroads, and pipelines), and nonlinear (applicable to projects at one specific location). Rights-of-way on BLM-administered land are extensive in the region and vary tremendously in size and scope of activity.

The BLM administers most of the public lands along the proposed Mina rail alignment. The BLM manages these lands through a multiple-use concept (which means managing public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people) in accordance with the Federal Lands Policy and Management Act of 1976 (43 U.S.C. 1732, *et seq*.) and other federal legislation. The proposed Mina rail alignment crosses three BLM planning areas (Carson City, Battle Mountain, and Las Vegas). The Carson City Field Office manages its federal lands through a consolidated resource management plan developed in 2001. The Carson City Field Office was previously divided into eight planning units, all of which were consolidated into the 2001 Carson City Resource Management Plan. The Battle Mountain and Las Vegas planning areas are operating under resource management plans adopted in 1998 and 1997, respectively (DIRS 176043-BLM 1998, all; DIRS 173224-BLM 1997, all). There are many land uses on BLM-administered federal land in the region of influence, with grazing use being a major source of activity.

As directed by federal legislation, the BLM Carson City Field Office may issue leases for geothermal resources located in multiple areas within the Mina region of influence. The development of any geothermal resources would be guided by BLM land and resource management policies and procedures established in the applicable resource management plans.

5.3.1.2.4 Walker River Paiute Reservation (Federal Actions)

The Walker River Paiute Reservation consists of more 130 square kilometers (323,000 acres) of land between Yerington, Nevada, and Walker Lake (See Figure 5-3, Project #2). Although the Reservation is recognized as a sovereign entity under the non-federal actions discussion below, federal agencies could also be taking actions on the Reservation. The Bureau of Indian Affairs operates the Weber Dam and Weber Reservoir, which impounds water from the Walker River just north of the community of Schurz for use on the Reservation. Constructed in the 1930s, the dam needs several repairs and modifications to address a number of deficiencies identified as a result of inspections and a safety analysis conducted in the 1980s under the Bureau of Indian Affairs Dam Safety Maintenance and Repair Program, created as part of the Indian Dams Safety Act. Additionally, the U.S. Fish and Wildlife Service is involved in recovery efforts for the threatened Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*). Lahontan cutthroat trout are stocked in Walker Lake and occur in the Walker River upstream to Weber Reservoir. Weber Dam currently blocks movement further upstream, and prevents spawning by cutthroat trout; however, in the near future a fish ladder might be developed at that dam to allow fish movement.

Reestablishment of a self-sustaining population of Lahontan cutthroat trout in the Walker River system is a prerequisite for recovery of this species (see also Section 5.3.1.3.4 below).

5.3.1.2.5 Nevada Test and Training Range (Continuation of Activities)

The U.S. Air Force operates the Nevada Test and Training Range in south-central Nevada (see Figure 5-3, Project #9), a national test and training facility for military equipment and personnel consisting of approximately 12 million square kilometers (3 million acres). Military training maneuvers and jet aircraft are commonly visible in the Mina region of influence. In 2005, the U.S. Air Force designated the Indian Springs Air Force Auxiliary Airfield to Creech Air Force Base and expanded its mission and infrastructure 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.

The 1,600-square-kilometer (390,000-acre) BLM-administered National Wild Horse Management Area is within the boundary of the Nevada Test and Training Range. More than 3,200 square kilometers (800,000 acres) of the Nevada Test and Training Range comprise the Desert National Wildlife Range. The U.S. Air Force and the U.S. Fish and Wildlife Service jointly manage this area.

In the *Renewal of the Nellis Air Force Range Land Withdrawal: Legislative Environmental Impact Statement* (DIRS 103472-USAF 1999, all), the U.S. Air Force addressed potential environmental consequences of extending the land withdrawal in order to continue using the Nevada Test and Training Range lands for military use. Activities at the Nevada Test and Training Range change, as necessary, to meet military test and training needs.

In 2004, the BLM prepared a resource management plan for about 8,900 square kilometers (2.2 million acres) of withdrawn public lands within the Nevada Test and Training Range (DIRS 178102-BLM 2004, all). The plan guides the management of the affected Nevada Test and Training Range natural resources 20 years into the future (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.

See Table 5-2 for a list and brief description of recent environmental assessments that describe Nevada Test and Training Range operations.

5.3.1.2.6 Hawthorne Army Depot

The Hawthorne Army Depot occupies approximately 590 square kilometers (147,000 acres) in Mineral County, Nevada (see Figure 5-3, Project #3). Hawthorne Army Depot was commissioned in 1930 as a Naval Ammunition Depot, transferred to the Army in October 1977, and renamed Hawthorne Army Ammunition Plant. It was converted to a government-owned, contactor-operated installation in December 1980. In 1994, the name changed back to the Hawthorne Army Depot. Control of Hawthorne Army Depot is maintained by the U.S. Army, which is responsible for the plans, installation, operation, and equipment of the Depot. The mission of Hawthorne Army Depot is to support the Army, Air Force, and Navy. It also has the capabilities to receive, maintain, store, and issue ammunition and explosive ordnance items. The Hawthorne Army Depot also has the responsibility to renovate, recover, or dispose of unserviceable ammunition and explosives. These latter operations are referred to as demilitarization activities.

The primary ordnance areas at Hawthorne Army Depot extend over 400 square kilometers (100,000 acres) that cross U.S. Highway 95. This area is surrounded on its northeast, east, south, and west sides by fencing and on its north and northwest sides by a boundary line that includes a portion of Walker Lake. The southern one-third of Walker Lake is within the ordnance area. The Mount Grant watershed is in the northwest part of the installation. This watershed consists of about 180 square kilometers (45,000 acres),

and is a resource that Hawthorne Army Depot maintains to supply its primary potable water needs. Hawthorne Army Depot has 2,572 buildings and structures, which are comprised of offices, production buildings, ammunition storage magazines, and warehouses. The Depot is bordered by public grazing lands administered by the BLM, and the installation completely surrounds the town of Hawthorne. Hawthorne Army Depot is planning to construct a rail siding, known as the Wabuska Spur, which would increase the Depot's outloading capacity.

5.3.1.2.7 Naval Air Station Fallon

Naval Air Station Fallon is in the Lahontan Valley of west-central Nevada, approximately 113 kilometers (70 miles) east of Reno and 10 kilometers (6 miles) southeast of the city of Fallon (See Figure 5-3, Project #1). Naval Air Station Fallon administers approximately 32 square kilometers (7,900 acres) of withdrawn and acquired land associated with the air station and approximately 95 square kilometers (234,000 acres) of land associated with the Fallon Range Training Complex. The Fallon Range Training Complex airspace overlies portions of Washoe, Lyon, Churchill, Pershing, Mineral, Nye, Lander, and Eureka Counties, most of which is BLM-administered public land.

In January of 2000, the Navy and BLM issued the *Final Environmental Impact Statement: Proposed Fallon Range Training Complex Requirements Naval Air Station Fallon, Nevada* (DIRS 182891-USN and BLM 2000, all). The Naval Strike and Air Warfare Center at Naval Air Station Fallon proposes to implement changes at the Fallon Range Training Complex to meet Chief of Naval Operations-mandated training requirements resulting from the real world threat environment. The proposed changes would allow the Navy to update and consolidate Navy training on public and Navy-administered lands and to update existing airspace overlying these lands. The changes evaluated in the EIS include developing new fixed and mobile electronic warfare sites, developing new tracking instrumentation subsystem sites, developing additional targets at two of its training ranges, laying fiber-optic cable to two training ranges, utilizing Navy-administered lands in Dixie Valley for close-air-support training, performing Hellfire missile and high altitude weapons delivery training at two of its training ranges, and changes to special-use airspace. The EIS provided a comprehensive evaluation of the environmental impacts, including cumulative impacts, associated with the Navy's proposed changes.

5.3.1.2.8 Timbisha Shoshone Trust Lands (Federal Action)

The Secretary of the Interior issued a draft report to Congress (DIRS 103470-Timbisha Shoshone Tribe [n.d.], all) describing a plan to establish trust lands for people of the Timbisha Shoshone Tribe in portions of the Mojave Desert in eastern California and southwestern Nevada (See Figure 5-3, Project #6). On November 1, 2000, the President signed Bill S. 2102 (Public Law 106-423) to provide a permanent land base for the Timbisha Shoshone Tribe within its ancestral homeland in five separate parcels. Lands in the designated area for tribal purposes were then identified, including land parcels containing water rights. The parcel near Scottys Junction (about 11 square kilometers [2,800 acres]) is approximately 3.2 kilometers (2 miles) from the proposed Mina rail alignment. The Timbisha Shoshone Tribe is actively evaluating economic development opportunities on this Scottys Junction parcel, although no one is residing there at this time. *The Final Legislative Environmental Impact Statement for the Timbisha Shoshone Homeland* (DIRS 154121-DOI 2000, all) stated that expected development for the trust lands would include a service station/convenience store, a gift/souvenir shop, and single-family detached housing units.

5.3.1.2.9 Department of Justice Proposed Detention Facility

The U.S. Department of Justice Office of the Federal Detention Trustee and the U.S. Marshals Service determined that there is a need to house federal detainees at a facility located in proximity to Las Vegas. In March 2008, the Department of Justice published the *Final Environmental Impact Statement for the*

Proposed Contractor Detention Facility, Las Vegas, Nevada Area (DIRS 185475-DOJ 2008, all). The agency preferred alternative identified in the EIS is a 0.49-square-kilometer (120-acre) site approximately 110 kilometers (68 miles) northwest of downtown Las Vegas, in Pahrump at 2250 East Mesquite Avenue. Development of the proposed facility would take about 12 to 15 months, and would employ 200 to 250 people.

5.3.1.3 Reasonably Foreseeable Future Non-Federal Actions

Non-federal and private actions in the Mina region of influence primarily involve mineral resource development projects, Walker River Paiute Tribal activities, and some residential and general economic development initiatives and efforts. As previously noted, many of these privately sponsored projects would interact with the BLM land-management policies and procedures through the need to acquire right-of-way grants to initiate proposed activities on BLM-administered land.

5.3.1.3.1 Walker River Paiute Reservation

The Walker River Paiute Reservation consists of over 130 square kilometers (323,000 acres) of land between Yerington, Nevada and Walker Lake (see Figure 5-3, Project #2). The 2000 census reported a population of 853 people residing on the Reservation. The rural community of Schurz is the only community within the boundaries of the Reservation. Land use on the Reservation consists primarily of open range used for cattle grazing or other agricultural activities. The Department of Defense Branchline from Wabuska extends south through the Reservation to its termination point at the Hawthorne Army Depot.

5.3.1.3.2 Power Plants, Transmission Lines, Pipelines, and Other Infrastructure

There are transmission lines, pipelines, and telecommunications infrastructure within the Mina region of influence, which holds the potential for wind, solar, and geothermal energy development, although the magnitude and specific locations of these energy development projects are not known. As indicated in Section 5.3.1.2.3, the BLM may issue geothermal leases within the Mina region of influence. The approval of any leases and subsequent development of geothermal resources would be subject to environmental review and would be guided by BLM resource management plans.

The BLM has designated certain corridors in the area that should be used for most utility purposes; however, use of other BLM-administered land requiring new right-of-way grants has traditionally been considered on a case-by-case basis. As previously noted, in October 2007 DOE and the BLM issued the *Draft Programmatic Environmental Impact Statement of the Designation of Energy Corridors on Federal Land in the 11 Western States* (DOE/EIS-0386), which analyzes the potential designation of energy corridors on federal land in western states (DIRS 185274-DOE 2007, all). Proposed energy corridors in the Mina region of influence are described in Section 5.3 and depicted in Figure 5-3.

The BLM has received 11 right-of-way permit applications for solar energy facilities in Nye County. The applications are in varying stages of completion. The following are descriptions of the eight solar energy applications being evaluated by the BLM Las Vegas Field Office.

- Solar Millennium LLC applied in November 2007 for a right-of-way permit for about 3.4 square kilometers (840 acres) of BLM land in Amargosa Valley in the Anvil Farm Road area. The applicant is proposing to build and operate a 150- to 350-megawatt solar parabolic trough electric power plant (DIRS 185368-Seley 2008, all).
- Solar Millennium LLC applied in November 2007 for a right-of-way permit for about 17 square kilometers (4,100 acres) of BLM land in Amargosa Valley in the Amargosa Farm Road area. The

applicant is proposing to build and operate a 150- to 350-megawatt solar parabolic trough electric power plant (DIRS 185368-Seley 2008, all).

- Solar Investments LLC applied in March 2007 for a right-of-way permit for about 89 square kilometers (22,000 acres) of BLM land northwest of the Big Dune Area of Critical Environmental Concern and abutting U.S. Highway 95. The applicant is proposing to construct and operate a 1,000-megawatt solar thermal energy facility in the Big Dune area of Nye County (DIRS 185368-Seley 2008, all).
- Solar Investments LLC applied in February 2007 for a right-of-way permit for about 53 square kilometers (13,000 acres) of BLM land east of the Big Dune Area of Critical Environmental Concern and abutting U.S. Highway 95. The applicant is proposing to construct and operate a 1,000-megawatt solar thermal energy facility in Amargosa (DIRS 185368-Seley 2008, all).
- Solar Investments LLC applied in March 2007 for a right-of-way permit for about 53 square kilometers (13,000 acres) of BLM land south of the Beatty Airfield, near the town of Beatty. The applicant is proposing to construct and operate a 1,000-megawatt solar thermal energy facility (DIRS 185368-Seley 2008, all).
- Pacific Solar Investments, Inc. applied in December 2007 for two right-of-way permits, one for about 30 square kilometers (7,500 acres), and one for about 31 square kilometers (7,700 acres), for BLM land in the Amargosa Desert adjacent to the Big Dune Area of Critical Environmental Concern and south of U.S. Highway 95. The applicant is proposing to construct and operate 500-megawatt parabolic trough plants, known as the proposed Amargosa South and North Plants (DIRS 185368-Seley 2008, all).
- Ausra NV 1 LLC applied in March 2008 for a right-of-way permit for about 28 square kilometers (7,000 acres) of BLM land near the Ash Meadows Wildlife Refuge in the Johnnie/Amargosa area. The applicant is proposing to construct and operate a compact linear Fresno reflector power plant, where the first phase would be 400 megawatts and the second phase would be 200 megawatts (DIRS 185368-Seley 2008, all).

The following are descriptions of the three solar energy applications being evaluated by the BLM Battle Mountain Field Office.

- Solar Millennium LLC applied in November 2007 for a right-of-way permit for about 10 square kilometers (2,500 acres) of BLM land just west of the Beatty Airport, near the town of Beatty. The applicant is proposing to build and operate a 150- to 350-megawatt solar parabolic trough electric power plant (DIRS 185368-Seley 2008, all).
- Solar Millennium LLC applied in November 2007 for a right-of-way permit for about 19 square kilometers (4,800 acres) of BLM land near the Tonopah Airport. The applicant is proposing to build and operate a 150- to 350-megawatt solar parabolic trough electric power plant (DIRS 185368-Seley 2008, all).
- Tonopah Solar Energy LLC applied in March 2008 for a right-of-way permit for about 31 square kilometers (7,700 acres) of BLM land at Mud Lake near the Tonopah Airport. The applicant is proposing to build and operate a 100-megawatt power tower (DIRS 185368-Seley 2008, all).

The BLM has received three permit applications for site-specific wind energy site testing and monitoring rights-of-way for individual meteorological towers and instrumentation facilities in Nye County.

- Desert Research Institute applied in May 2003 for a right-of-way permit for about 0.01 square kilometer (1.6 acres) of BLM land in the Smokey Valley area of Nye County (DIRS 185367-Seley 2008, all).
- Desert Research Institute applied in June 2006 for a right-of-way permit for about 2.1×10^{-3} square kilometer (0.52 acre) of BLM land in the Royston Hills, Lower Smokey Valley area of Nye County (DIRS 185367-Seley 2008, all).
- Round Mountain Gold Corporation applied in August 2007 for a right-of-way permit for about 4.1×10^{-3} square kilometer (1 acre) of BLM land in the Round Mountain area of Nye County (DIRS 185367-Seley 2008, all).

The BLM has received two applications for a wind energy site testing and monitoring right-of-way for a larger site testing and monitoring project area in Nye and Esmeralda Counties.

- Greenwing Pacific Energy Corporation applied in August 2007 for a right-of-way permit for about 30 square kilometers (7,400 acres) of BLM land west of the town of Beatty and abutting State Route 374 (DIRS 185367-Seley 2008, all).
- Clipper Windpower Development Company, Inc. applied in October 2004 for a right-of-way permit for about 32 square kilometers (8,000 acres) of BLM land in the Montezuma Range area of Esmeralda County (DIRS 185367-Seley 2008, all).

DOE and BLM have also issued a Notice of Intent in response to Executive Order 13212, *Actions to Expedite Energy-Related Projects*, and Title II, Section 211 of the Energy Policy Act of 2005 (73 *FR* 30908, May 29, 2008). DOE and BLM have identified utility-scale solar energy development as a potentially critical component in meeting these mandates. DOE and BLM are considering the development and implementation of agency-specific programs related to solar energy development in six western states (Arizona, California, Colorado, New Mexico, Nevada, and Utah). DOE proposes to develop a solar energy program of environmental policies and mitigation strategies that would apply to the deployment of DOE supported solar energy projects on BLM-administered lands or other Federal, State, tribal, or private lands. The BLM would establish its own environmental policies and mitigation strategies to use when making decisions on whether to issue rights-of-way for utility-scale solar energy development projects on public lands administered by the BLM. Until the determination of the locations of the proposed solar energy development projects in the EIS, the possibility of cumulative impacts, if any, with the Caliente or Mina regions of influence is unknown.

5.3.1.3.3 Mining

The Mina region of influence contains a variety of mineral resources, with mining claims filed in accordance with BLM requirements and several operating mines. Establishment of mining claims on federal land do not necessarily ever lead to actual development of mining operations on those sites. Major cumulative impact issues involving mining projects include potential land-use conflicts and wastes from operations. Mineral resource locations of note within the Mina region of influence include:

- Nevada Western Silica Corporation holds mining claims for a large, high-grade silica deposit near Lida Junction, south of Goldfield in Esmeralda County. There are at least 24 million cubic meters (32 million cubic yards) of silica on site. Both the Caliente and Mina rail alignments pass within 2.4 kilometers (1.5 miles) of the claims.
- Chemetall Foote Corporation runs an operation in Silver Peak, Nevada, that mines lithium carbonate. The company pumps lithium-rich groundwater to the ground surface and then collects the lithium powder as the water evaporates. Chemetall Foote Corporation pumps the groundwater on to dry lake

beds in the Clayton Valley to facilitate the evaporation process. Once removed from the water, the raw lithium material is processed in an on-site plant into market-ready, lithium-containing products.

- Metallic Ventures Gold holds mining claims near Goldfield in an historic district that produces high-grade gold. The project is currently in the pre-feasibility stage of development.

Mining activities are expected to continue within the Mina rail alignment. Mining activities are heavily regulated and must comply with all applicable environmental laws, rules, and regulations. The BLM has an extensive regulatory framework for mineral resource development on federal lands that strives to balance mining activities and mineral extraction with other resource management goals.

5.3.1.3.4 Walker River Basin Restoration

The decline in water quality throughout the Walker River Basin, particularly in Walker Lake, and concerns related to the Lahontan cutthroat trout, have resulted in organized restoration efforts throughout the basin (See Figure 5-3, Project #4). Walker Lake water levels have dropped substantially since the late 1800s. In addition to the declining water level, levels of total suspended solids have also increased in Walker Lake. The increasing total dissolved solids levels along with other physical, biological, and chemical conditions in the watershed and lake have stressed fisheries and other aquatic life in the lake, changing the resident fish population. The Walker Lake Working Group is a nonprofit organization building public support for developing a long-term solution to protect the lake without jeopardizing the upstream community. The Group has developed a restoration strategy focused on three objectives: (1) reestablishment of spawning runs of the Lahontan cutthroat trout; (2) providing sufficient water so that levels of total dissolved solids are low enough to support the Walker Lake ecosystem; and (3) acquiring and transferring water rights for environmental and recreational purposes.

5.3.1.3.5 Monte Cristo's Castle (Proposed State Park)

In 2005, a new state park was proposed near Blair Junction (See Figure 5-3, Project #5). If approved, the park would be known as Monte Cristo's Castle and would highlight the unique geology of the area. As proposed, the park would include approximately 23 square kilometers (5,800 acres) of land located just north of the intersection of U.S. Highway 95 and State Route 265 at Blair Junction. As currently envisioned, the proposed park would include hiking areas and interpretive trails with displays about the unique geologic formations in the area. The Nevada State Legislature in June 2007 provided for establishment of the state park, which would be on land currently administered by the BLM. To transfer the land to the State of Nevada for establishment of the state park, the BLM would conduct an environmental assessment and other work required as part of the Recreation and Public Purpose Lease process.

5.3.1.3.6 Other Regional Economic Development

Cumulative impacts issues associated with regional economic development actions include socioeconomic effects and overall growth in the region of influence. South and east of the Carson City/Reno area, several regional economic development initiatives are ongoing or planned in the northern portion of the Mina region of influence. For example, a county-owned airport near the community of Silver Springs, Nevada, plans to expands its operations, pave its runway, and promote the development of nearby industrial parks totaling approximately 3.8 square kilometers (950 acres). Western Nevada Rail Park is approximately 56 kilometers (35 miles) east of Reno along Alternate U.S. Highway 50. When complete, the rail park would include roughly 1 square kilometer (240 acres) of industrial park serviced by the Union Pacific Railroad Mainline. A master-planned community is being developed near the community of Dayton, Nevada. The development contains approximately 12 square kilometers (2,900 acres) consisting of approximately 2,300 single family homes, 0.02 square kilometer (4 acres) of multi-

family units, 0.11 square kilometer (27 acres) of commercial land, 1 square kilometer (240 acres) of industrial land, and 0.08 square kilometer (20 acres) for a resort/casino and an improved airstrip that is approximately 1,600 meters (5,400 feet) long. Infrastructure, including new elementary, middle, and high schools, fire station, municipal water and wastewater utilities, community center, and a health and fitness center, is already in place to support this development. Industrial parks in the Hazen area are also being developed, including a 9.3-square-kilometer (2,300-acre) development along the existing Union Pacific Railroad Mainline. As the Reno and Carson City metropolitan areas continue to grow and expand, additional privately sponsored developments can be expected within the northern portion of the Mina region of influence.

Additionally, major transportation corridors such as U.S. Highway 95 through the Mina region of influence into both the Reno and Las Vegas areas will continue to grow and expand, and present additional regional economic development opportunities. A perceived need for support to the Nevada Test Site has led to designation of the Nevada Science and Technology Corridor by the Economic Development Authority for Nye County. The Science and Technology Corridor extends from Indian Springs in Clark County in the south to Tonopah in the north, passing through the Pahrump Valley, Mercury (an entrance to the Nevada Test Site), Amargosa Valley, Beatty, and Goldfield, with industrial park and technology initiatives associated with the Tonopah Aeronautics and Technology Park, the Nevada Science and Technology Park in Amargosa Valley, and the Pahrump Center for Technology Training and Development. The locations and nature of specific future development opportunities are not known and are not considered to be reasonably foreseeable for the purposes of this analysis.

Nye County has completed a *Yucca Mountain Project Gateway Area Concept Plan* with proposed activities for the area around the entrance to the proposed repository site (DIRS 182345-Giampaoli 2007, all). This plan presents Nye County's conceptual, multi-phased land-use guidance for communities adjacent to and near the site entrance area. Nye County proposed this plan with the objective that land development occurs in an orderly and consistent manner and to increase opportunities for industrial and commercial development beneficial to the repository program. Nye County views this plan as a starting point for development of the infrastructure, institutional capacity, and facilities to support the proposed repository. The county developed the plan to use and manage existing initiatives while expanding and improving the area. To facilitate Crater Flat development, Nye County will nominate these lands for disposal in the BLM resource management plan amendment process. More information on the Nye County perspective is available in Section 5.5 of this Rail Alignment EIS.

5.3.1.3.7 Proposed Future Water-Rights Locations

As described in Section 5.2.1.3.2, applications (NDWR Application Numbers 74816 through 74818, all having an assigned status of "RFA") have been filed for one commercial and two mining and milling water rights that would be located in hydrographic area 229. However, as previously discussed in Section 5.2.1.3.2, all of these proposed water-rights locations are outside the region of influence considered for the new rail alignment wells proposed in hydrographic area 229.

As also described in Section 5.2.1.3.2, NDWR Application Number 71204, which has been filed for a proposed quasi-municipal water right that would be located in hydrographic area 227A, appears to be at the same location as an existing well (J-12) located in Jackass Flats. The application indicates that the proposed water-rights location is associated with a previously-constructed infrastructure device. The requested diversion rate for this proposed water right is 4.47 million cubic meters (3,620 ***acre-feet)*** per year, which is equivalent to an average pumping rate of approximately 8,500 liters (2,224 gallons) per minute; however, the requested annual duty that is identified for this proposed water right in the NDWR water-rights database is 0 ***acre-feet*** per year.

5.3.2 POTENTIAL CUMULATIVE IMPACTS – MINA RAIL ALIGNMENT

The Mina rail alignment is located in portions of Esmeralda, Nye, Lyon, and Mineral Counties. Most of the land in the Mina region of influence is undeveloped, although much of it has been affected by human activity such as ranching, mining, and recreation.

Potential cumulative impacts are often discussed herein within the context of the existing regulatory framework (primarily federal and state laws and regulations) and the BLM resource management planning goals and objectives. For example, the existing regulatory frameworks for water and air consider a regional and cumulative impacts perspective, in that regulatory decisions consider the potential effects from other projects as well as a proposed action. As the primary regional land manager, BLM planning and management actions consider the cumulative effects for many resources through stated planning goals and objectives, which often are based on quantitative criteria.

The following analysis of the cumulative impacts associated with the Mina rail alignment is organized by resource area, with Sections 5.3.2.1 through 5.3.2.15 summarizing potential cumulative impacts in the same order of resource discussions in Chapters 3 and 4 of this Rail Alignment EIS.

5.3.2.1 Physical Setting

5.3.2.1.1 Disturbance of Physical Resources

Physical resources consist of resources, conditions, and characteristics such as physiography, soils, and geology. As construction of any project in the area occurs, there would be a potential for changes to the physical setting because land would be disturbed through activities such as cuts and fills and construction of new structures such as buildings and bridges. The proposed railroad would be one of many new sources of change to physical resources that would continue the trend of increasing land disturbance and modifications of the natural physical environment. In large-scale projects that involve substantial ground disturbance, natural features are considered in project design, construction, operations, and potential abandonment plans, which would tend to limit direct, indirect, and cumulative impacts.

The proposed railroad would disturb only a small percentage of land in the Mina region of influence. The total area that would be disturbed during the construction phase would range from 40 to 48 square kilometers (9,900 to 12,000 acres) (DIRS 180874-Nevada Rail Partners 2007, p. B-3). The Mina rail alignment construction right-of-way would occupy between 111 and 124 square-kilometers (27,500 to 30,700 acres) of land.

Existing and reasonably foreseeable projects and activities would cause disturbance of physical resources. About 530 square kilometers (130,000 acres) of land has been disturbed from the construction of U.S. Air Force facilities at the Nevada Test and Training Range. The repository would disturb about 6.3 square kilometers (1,600 acres) of land, most of which would be on the Nevada Test Site. The preferred alternative for the proposed Department of Justice detention facility is a 0.49-square kilometer (120-acre) site. The BLM has received 11 right-of-way permit applications for solar energy facilities in Nye County, totaling of approximately 360 square kilometers (90,000 acres), a portion of which could be disturbed if the facilities are constructed..

5.3.2.1.2 Known or Potentially Contaminated Soils

The major sources of existing soil contamination problems in the Mina region of influence are mining, the Nevada Test Site, and the Hawthorne Army Depot. Mining activities in the region have occurred for many years, and most wastes resulted from past operations when there was little or no regulatory framework requiring waste management and cleanup. The problems associated with the Nevada Test Site

have been described in recent NEPA documentation (DIRS 101811-DOE 1996, all; DIRS 162638-DOE 2002, all; DIRS 185437-DOE 2008, all). Historic contamination of soils resources on the Nevada Test Site is primarily from radioactive-waste management sites and past nuclear testing activities. Environmental restoration and remediation is occurring at contaminated Nevada Test Site locations in accordance with the facility's Environmental Restoration Program, but much of the contamination is long term and the land and soil are not restorable to useful condition. For most of the contaminated soils within the Nevada Test Site boundary, DOE is planning only a characterization and long-term monitoring program. Contaminated areas on the Nevada Test Site are generally defined and access is restricted for reasons of safety and security.

In April 1996, a Federal Facility Agreement and Consent Order was entered into by and among the State of Nevada, acting by and through the Department of Conservation and Natural Resources, Division of Environmental Protection, the United States Department of Energy, and the United States Department of Defense. The purpose of the Consent Order was to identify sites of potential historic contamination due to Nevada Test Site operations and implement proposed corrective actions based on public health and environmental considerations. The Consent Order identifies Corrective Action Units, which are groupings of Corrective Action Sites that delineate and define areas of concern for contamination. Offsite Corrective Action Sites include the Central Nevada Test Area and Project Shoal.

Corrective Action Units within the off-site Corrective Action Sites that address surface contamination are 416 and 417. Closure Reports were submitted to the Nevada Division of Environmental Protection on February 13, 1998, for Corrective Action Unit 416, and on June 27, 2002, for Corrective Action Unit 417 indicating that the site remediation process was complete. Based on the work conducted under the Consent Order, the potential for workers or the public to be exposed to contamination due to fallout during railroad construction and operations in any of the rail corridors would be unlikely. DOE has not identified any information identifying similar contamination off the Nevada Test Site in the vicinity of the proposed rail corridors. The Hawthorne Army Depot has an Installation Restoration Program that outlines proposed future investigations and remedial actions at each Solid Waste Management Unit at the installation and other areas of concern. A total of 123 Defense Site Environmental Tracking System sites have been identified on Hawthorne Army Depot property. Soil and groundwater contamination issues exist with the primary contaminants of concern being compounds associated with explosives and heavy metals. Environmental restoration and remediation is ongoing at a number of sites. Other sites have achieved the status of "no further remedial action planned." Contaminated areas on the Hawthorne Army Depot are generally defined and access is restricted for reasons of safety and security.

The proposed railroad could result in very localized contamination of soils through occasional spills (such as fuel, oil, and solvents). However, such incidents would be minor in scope and quickly mitigated in accordance with plans and regulations. All existing and foreseeable projects would be subject to the same regulations. Spills of any hazardous materials are possible from some of the projects described in this section; however, the current regulatory framework to manage and control hazardous materials and wastes ensures that actions are in place to minimize any impacts. Contaminated soils or spills can affect other resources such as water resources, biological resources, and land use. Spills of any hazardous materials are possible with regional activities, but the current regulatory framework to manage and control hazardous materials and wastes ensures that actions are in place to minimize any impacts. While any potential impacts associated with hazardous materials and wastes from current and future mining operations in the region are controlled through the existing regulatory framework, mining wastes from old mining extraction and processing activities, especially in the Goldfield area, remain a concern related to soil contamination.

5.3.2.1.3 Physical Setting Conclusion

The cumulative impacts on physical resources from the proposed railroad and other existing and reasonably foreseeable projects would be small. The disturbance of physical resources would be small due to the small percentage of land that the rail alignment would disturb and due to best management practices used during construction of the railroad and other planned projects in the Mina region of influence. Although other projects have affected and could affect soil contamination, cumulative impacts related to contamination of soils would likely be small because of the ongoing restoration and remediation to address past actions, and the implementation of spill prevention and control plans for potential future actions.

5.3.2.2 Land Use and Ownership

Many of the past, present, and reasonably foreseeable future actions in the Mina region of influence result in land-use changes. Land-use change can also alter land ownership, land-management responsibilities, and preclude future activities from these areas. The vast majority of the land for the proposed Mina rail alignment and associated facilities would be on BLM-administered public land in Lyon, Mineral, Esmeralda, and Nye Counties. The BLM manages more than 45,000 square kilometers (11 million acres) in those four counties. Grazing is a significant land use on public lands in and around the proposed Mina rail alignment. Section 5.3.1 describes existing and proposed projects that could impact land use in the Mina region of influence.

The proposed Mina rail alignment would disturb up to 124 square kilometers (31,000 acres) of BLM land, most of which would be within the construction right-of-way. Therefore, the proposed Mina rail alignment would directly affect about 0.25 percent of the BLM-administered land in the four counties. This disturbance would include construction and operation of the rail line, facilities, quarries, water wells, construction camps, and access roads. The Mina rail alignment would cross up to 15 separate grazing allotments. These 15 grazing allotments constitute about 11,700 square kilometers (2.9 million acres) of BLM-administered land. The approximate disturbance area associated with the proposed Mina rail alignment would constitute less than 1 percent of the land within those 15 grazing allotments. Within this regional perspective of nearby existing and reasonably foreseeable land uses and land ownership, the commitment of land for the proposed Mina rail alignment and associated facilities would constitute a small proportion of overall cumulative land commitment. Use of private land for the proposed rail line would be small, and the rail line would not displace existing or planned land uses on private lands over a substantial area, nor would it substantially conflict with applicable land-use plans or goals.

5.3.2.2.1 Existing or Potential Land-Use Conflicts

The Federal Government administers most of the land in the Mina region of influence, with the BLM, DOE, and the Department of Defense (Air Force and Army) acting as the major federal land managers. The Mina region of influence also includes Walker River Paiute Reservation lands. Private land holdings are small, and generally associated with Chemetall Foote Corporation's lithium mine near Silver Peak and other towns in the Mina region of influence. Traditional land uses in most of the Mina region of influence that would be directly and indirectly affected include grazing, mining, and wildlife management. Much of this land is not extensively disturbed, although it has been modified through activity such as grazing and mining.

Over time, human activity in the area, while relatively minor on a regional basis, has begun to change the natural and traditional conditions, and land-use conflicts occasionally result from this human activity. The Nevada Test Site and Nevada Test and Training Range lands have been withdrawn for special purpose and use. Both of these areas are inaccessible to the general public and land use is that of "dominant use," in which the specific DOE and U.S. Air Force missions, respectively, for these lands have ultimate priority over all other potential land uses. Hawthorne Army Depot and Naval Air Station

Fallon lands were also withdrawn for special use, are inaccessible to the general public, and land use is that of "dominant use," in which the specific Army and Navy missions, respectively, for these lands have ultimate priority over all other potential land uses. Walker River Paiute Reservation lands are managed by a sovereign tribal government and used by Reservation inhabitants accordingly. Around these primary regional land uses are other uses, including mineral development, recreation, urban development, and rights-of-way for various infrastructure. All of these activities and land uses result from a much more intensive land usage involving human activity.

Railroad construction and operations along the Mina rail alignment could have direct and indirect conflicts with grazing uses, access to grazing infrastructure, access to mineral resources, recreational resources, other linear rights-of-way (for example, utility corridors), and wildlife movement patterns in some locations. Potential indirect impacts from the rail line outside the construction right-of-way would include potential fragmentation of grazing allotments, particularly where the rail line would act as a barrier and "isolate" a portion of land. However, DOE would work with affected grazing permittees and the BLM to mitigate adverse impacts to land both inside and outside the construction right-of-way. As described in Chapter 7, Best Management Practices and Mitigation, DOE would work with the permittees and the BLM to develop interim grazing management plans and allotment management plans, which could include compensation or range improvements for the direct loss of crops, pastures, rangelands, or reductions in animal unit months.

Between 1980 and 2004, there has been an almost 30 percent reduction in authorized animal unit months state-wide. Table 5-3 illustrates the animal unit month reductions in BLM districts between 1960 and 2004. Within the Carson City District over that period, animal unit month decreased approximately 13 percent. The Tonopah District experienced the largest decline over that period, at 34 percent. A 2001 study of grazing trends on federal lands in Nevada revealed that one-third of animal unit month reductions were the result of permit violations or for resource protection reasons. These reasons included: trespass violations, non-payment, exceeding standards or guidelines, carrying capacity estimates, threatened and endangered species conflicts, wildlife conflicts, and wild horse competition (DIRS 176949-Resource Concepts 2001, p. 60). Other reasons for reductions include transfer of ownership and changes in class of livestock grazed.

Wildland fire has also contributed to losses in animal unit months in Nevada. For example, the 6,500-square kilometer (1.6 million-acre) fire of 1999 contributed to the loss of over 133,000 animal unit months across five of Nevada's northern counties (DIRS 185481-Riggs, Brazeale, and Myer 2001, pp. 39-40). The losses due to fires may be considered temporary in the sense that plant life would eventually recover naturally or be replanted, although the process of restoring land to its former grazing capacity could take years.

While the number of animal unit months authorized in the state has declined over time, livestock grazing is an important land use both historically and socioeconomically to Nevada that will continue on federal lands. Through their respective resource management plans, each BLM district office aims to manage the land to allow grazing in a manner and at levels consistent with multiple use, sustained yield and the standards for rangeland health. As illustrated in Table 5-3, although there are decreases in animal unit months since 1980 levels, there was an increase between 1999 and 2004 in the Carson City District. Subsequently, the authorized grazing levels in the Mina region of influence may continue to fluctuate based on a variety of factors, including: BLM management goals and actions, permittee decisions, wildlife levels and use, and even natural processes, like rainfall levels, spread of invasive species, and wildland fire.

The proposed railroad could reduce animal unit months in the Mina region of influence by less than 2 percent (maximum of 190 animal unit months lost over 7 active allotments). Land disturbance from other

proposed rights-of-way or projects on federal lands could also reduce animal unit months in the Mina region of influence, although with the use of best management practices, these reductions would be minimal.

Under the *Draft Programmatic Environmental Impact Statement of the Designation of Energy Corridors in the 11 Western States* (DOE/EIS-0386), corridors would be identified and designated as necessary and to expedite applications to construct or modify oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities. Routes studied in the energy corridor EIS would cross BLM-managed lands within the Tonopah and Carson City Districts. As a programmatic analysis, potential losses in animal unit months along proposed corridors in Nevada or within the BLM districts crossed by the proposed rail corridors were not quantified. Furthermore, additional rights-of-way for electric lines associated with solar and wind energy projects could also disturb forage within grazing allotments. However, corridor development for electric transmission lines and buried pipelines would be generally compatible with many land uses, including livestock grazing. Nevertheless, impacts could result in areas where permanent loss of forage occurs, although these impacts could be avoided or minimized through coordination with BLM on best management practices and mitigation measures.

Existing activities and proposed projects on other federally-operated land in the study area, like the Hawthorne Army Depot, Naval Air Station Fallon, Nevada Test Site and Nevada Test and Training Range, do not have active grazing programs and would not affect grazing levels in the study area in the foreseeable future. Projects on privately-owned land, such as the Department of Justice proposed Detention Facility in Pahrump, would have no impact on grazing activities.

5.3.2.2.2 Energy and Mineral Development

Existing and potential future energy and mineral development occurs in various locations throughout the Mina region of influence. In addition to the traditional energy and mineral development (primarily hard-rock mining and industrial mineral development), more recently this development includes geothermal and wind resources. The BLM administers energy and mineral development, evaluates and approves various proposed mineral development operations, and evaluates and approves geothermal energy development projects on federal lands proposed by private companies. Today's energy development environment includes a mix of old and new, involving both nonrenewable and renewable energy resource development.

Because of the scope and extent of typical mining operations, mineral resources that become actual operating mines could result in environmental and land-use issues. Within the Mina region of influence, most mining and energy-development activities would occur on federal lands, and the BLM will have a major role in mitigating and monitoring potential effects through its mining and reclamation requirements, NEPA, and other elements of the regulatory framework. Mineral exploration will continue to occur in many parts of the Mina region of influence, and some level of conflict from mining exploration and development with other land uses could be unavoidable. Today's energy development environment includes a mix of old and new, involving both nonrenewable and renewable resource development. As described in Section 5.3.1.3.2, solar and wind-energy development on the BLM-administered lands could be one of the biggest changes in the future landscape. The BLM has received 11 right-of-way permit applications for solar energy facilities in Nye County, totaling of approximately 360 square kilometers (90,000 acres).

Any potential conflict of the proposed railroad with energy and mineral development would be small to moderate in scope and occur in localized areas, and the effects of any such conflicts would be addressed through the existing regulatory framework and BLM policies and plans. All existing and foreseeable projects would be subject to regulatory requirements and BLM policies and plans related to energy and mineral development.

5.3.2.2.3 BLM Land Sales and Other Disposals

While specific initiatives for land disposals in the Mina region of influence have not yet been developed, the BLM Carson City Field Office has plans to designate for potential future disposal approximately 750 square kilometers (180,000 acres) of public lands in the area including: lands that are difficult and uneconomic to manage (for example, scattered parcels south of Hawthorne and in Smith and Mason Valleys, checkerboard lands near Fernley, Silver Springs, and the Carson sink); land that would support community expansion (such as land west of Yerington, land surrounding the towns of Luning, Mina, Sodaville, Fallon, Gabbs, Reno, Verdi, and lands east of Montgomery Pass, near Honey Lake Valley and Dixie Valley); lands with possible agricultural potential (for example, Smith Valley, Mason Valley, Honey Lake Valley, and Edwards Creek); and lands along the East Walker River identified for exchange to benefit Bureau programs.

Approximately 1,214 square kilometers (300,000 acres) have been identified for potential disposal in the vicinity of Goldfield, about 23 square kilometers (5,800 acres) have been identified for potential disposal near Scottys Junction, and 160 square kilometers (39,000 acres) have been identified for potential disposal near Beatty. Land disposal areas have also been identified near Coaldale Junction, Blair Junction, Silver Peak, and Millers. To facilitate Crater Flat development, Nye County is requesting that the BLM designate these lands for disposal.

The proposed railroad right-of-way, where it intersects areas of possible land disposal, could preclude at least portions of those areas from future disposal. However, the land area used by the railroad would be relatively small in comparison to the areas available for disposal, and the railroad could potentially be a beneficial feature that aids future commercial development along the rail line under the Shared-Use Option.

5.3.2.2.4 Recreational Land Use

Public lands in the Mina region of influence provide a number of diverse recreation opportunities, and the BLM has designated certain lands as recreation management areas. Dispersed recreation, the principal opportunities available within the Mina region of influence, requires a variety of sites but needs no special facilities. These opportunities include caving, photography, automobile touring, backpacking, bird watching, fishing, hunting, primitive camping, hiking, rock climbing, and competitive and noncompetitive off-highway vehicle events. An example of increasing interest in recreation areas is the proposal for the Monte Cristo's Castle as a state park near Blair Junction; this park would highlight the unique geology of the area and include hiking areas and interpretive trails with displays about the geologic formations in the area.

The BLM has a major role in recreation opportunities in the Mina region of influence. BLM field offices regularly evaluate new opportunities for recreational resources that would provide both passively and actively managed recreation opportunities. There are many such areas that BLM has designated for recreational use, such as a campground and other day-use facilities at Walker Lake, attracting about 35,000 visitors per year. Other forms of dispersed recreation in the region of influence include hunting, camping, and off-highway vehicle use. Increased demand for off-highway vehicle use from the increasing regional population, including the Las Vegas and Reno-Carson City areas, is expected to continue. Many areas of BLM-administered land in Clark County previously used for off-highway vehicle recreation have been closed, causing a shift in use into other BLM areas. As growth and development occur in the Mina region of influence, recreational resources will continue to be in demand, but the potential for conflict with recreational resources also will increase. Recreational resource locations, quality, and availability will evolve as the Mina region of influence changes.

The Pahrump area is growing very rapidly for a variety of reasons. Both developed and undeveloped recreational opportunities in the area are abundant, with very easy access to public lands for activities such as hiking, camping, sightseeing, and rockhounding. The town of Pahrump is planning for development of approximately 6 square kilometers (1,500 acres) to be called the Last Chance Park on lands currently managed by the BLM and already used for various types of recreation. The plans include construction of access roads, restrooms, parking areas, and turn-outs, as well as the placing of signs, bike racks, benches, a pole-and-cable fence, trash cans and picnic tables. Much of the park would be dedicated to equestrian, hiking, and biking paths, with the remainder allotted to all-terrain vehicle motorized use. Potential environmental impacts and issues will be identified and assessed through the NEPA process.

DOE has sited the proposed Mina rail alignment to avoid Wilderness Areas and other major recreational resources to the maximum extent practicable. There would be limited direct interaction of the railroad with recreational resources.

5.3.2.2.5 BLM Rights-of-Way

As urbanization and other development occur in the Mina region of influence, the need for utility and other rights-of-way will increase. The BLM has developed certain preferred corridors over federal lands that it uses to the maximum extent possible for linear rights-of-way, such as for utilities. This keeps many right-of-way purposes together in one location instead of spreading them out over more dispersed areas.

The land-use changes authorized by a BLM right-of-way grant would also have the potential to impact other resource areas as those land-use changes occur. Before approval of right-of-way applications, the BLM will evaluate the impacts of the projects through appropriate NEPA evaluation. Use of land for right-of-way purposes is consistent with BLM regulations and planning processes, and any land-use changes or disturbances associated with those rights-of-way are mitigated to the extent possible and according to BLM policies. As required for the issuance of rights-of-way, the project proponent would prepare and submit to the BLM a Plan of Development for each proposed right-of-way. The Plan of Development would describe the methods and procedures to be used to construct the Proposed Action on the right-of-way, including site-specific stipulations, terms, and conditions to satisfy all BLM requirements. Certain rights-of-way are long term in nature and result in unavoidable impacts through land disturbance and the exclusion of other land uses now or in the future.

Utility and other right-of-way crossings are common to linear projects such as roads, railroads, and pipelines. Land areas for the Mina rail alignment, construction camps, quarries, and access roads would cross or overlap existing or proposed utility rights-of-way in approximately 22 to 29 locations. Land areas for railroad operations support facilities could also overlap existing or proposed utility rights-of-way. This situation would be typical for other linear rights-of-way. Impacts from the crossings would be minimized by using standard engineering procedures and appropriate design details.

5.3.2.2.6 Other BLM Land-Management Actions

The Federal Land Policy Management Act of 1976 (Public Law 94-579) mandates the BLM to manage its public lands from a multiple-use perspective. The Federal Land Policy Management Act specifically mentions balancing renewable and nonrenewable resources, including but not limited to recreation, range, timber, minerals, watershed, wildlife, fish, natural, scenic, scientific, and historic values. Therefore, the BLM mission to manage the lands to meet multiple-use objectives is challenging, because many of the resources and associated values often conflict.

Within the context of the Mina region of influence, the BLM planning process and management goals and objectives within their plans are key determinants of the compatibility of the proposed railroad with other

projects in the region of influence. As noted in Section 5.3.1, there are many continuing and reasonably foreseeable activities that involve the BLM. Because the BLM is and will remain the major land manager in and around the Mina region of influence, BLM land-management goals, objectives, and subsequent land-management actions will largely determine if and how new projects and activities occur.

BLM objectives and goals within the resource management plans can serve to encourage or restrict activities in certain locations. Areas needing special management attention (such as Areas of Critical Environmental Concern) are also identified in the planning process to protect and prevent irreparable damage to important historical, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards. Multiple-use management goals and objectives become more challenging as cumulative development and land-use changes encroach on open land in the Mina region of influence.

The proposed railroad would cross three BLM planning areas (Carson City, Battle Mountain, and Las Vegas). Each BLM field office manages lands within its administrative boundaries according to one or more management framework plans or resource management plans. The Carson City, Battle Mountain, and Las Vegas plans would be applicable to the Mina rail alignment. These programs and resource management plans require a number of public and private partnerships and a collaborative approach to land management and planning.

Grazing operations are a major BLM land-management program in the Mina region of influence. Grazing results in both direct and indirect cumulative impacts to vegetation, habitats, and wildlife. Environmental impacts associated with grazing operations are a function of the location, timing, intensity, duration, and frequency of grazing. Grazing animals directly affect plant communities through trampling and nutrient redistribution. The most noticeable impacts occur around waters, salt blocks, fence lines, and other areas where animals concentrate. With proper grazing management, these concentration areas are limited in extent and mitigated regularly through management procedures such as movement of salt blocks and water hauls. While grazing can stimulate growth of some plants and provide other benefits, it can also reduce plant abundance, density, and vigor, especially in sandy soils.

Ultimately, BLM land-management efforts and the content of resource management plans will play a major role in the magnitude, location, and extent of direct, indirect, and cumulative impacts in the Mina region of influence, and in the relative balance among multiple uses and resource values chosen for the public lands. DOE recognizes the importance of these land-management actions and encourages readers to review specific resource management plans for more detailed information. As discussed in Chapter 2 of this Rail Alignment EIS, the proposed railroad would be subject to BLM decisions and approval, and any effects of the railroad on BLM resource management planning, land-management activities, and BLM-managed natural resources would be implemented by the BLM as appropriate.

5.3.2.2.7 Urbanization and Economic Development Initiatives

In response to increased economic development goals, the urbanized areas in the Mina region of influence have generally planned for and solicited ways to grow and develop. Concepts such as industrial-park development, airport expansion, increased retail opportunities, and housing are prominent goals of the public and private sectors in the Mina region of influence. Several regional economic development initiatives are ongoing or planned in the northern portion of the Mina region of influence. This trend is likely to continue, with land-use and ownership changes and potential land-use conflicts becoming an increasing issue and challenge for the future. However, it is likely that the rural nature of the overall Mina region of influence will remain largely in tact.

5.3.2.2.8 Land Use and Ownership Conclusion

Although there are a large number of existing and proposed projects in the Mina region of influence, there would not be any major land use conflicts, nor would there be a major change in the balance of land use types within the Mina region of influence. Because the majority of the land in the region of influence is managed by the BLM, protective measures and BLM management actions would allow for the continuation of grazing as a significant land use, as well as the continuation of recreation, rights-of-way, energy and mineral development projects. The cumulative impacts to local-scale private land use and ownership from the proposed railroad and other existing and reasonably foreseeable projects could be moderate to large, particularly within the Walker River Paiute Reservation and the Town of Goldfield. Cumulative impacts of reasonably foreseeable projects and rights-of-way on public land would be small on a regional-scale, as they would only affect a small percentage of public land. However, DOE is committed to working with the BLM and landowners to ensure that impacts to both public and private land uses are minimized.

5.3.2.3 Aesthetic Resources

Cumulative impacts to aesthetic resources from construction and operation of a railroad along the Mina rail alignment and other regional activities would primarily result from modifications to natural viewsheds. The natural setting of the Mina region of influence includes vast and expansive viewsheds typical of much of the western United States. The open spaces and wide vistas offer interesting cloud, weather, and landscape interactions. Existing activities in the Mina region of influence also make up the existing man-made viewshed, as opposed to the natural viewshed (for example, the Nevada Test Site and the Nevada Test and Training Range). Human activity disturbs the natural viewsheds when land alterations, such as buildings, roads, vegetation removal, power lines, equipment, and vehicles, create contrast with the natural environment. Any activity that disturbs substantial areas of land can result in visual impacts from fugitive dust and ground scars that create a contrast with the surrounding environment and draw the viewer's attention. Additionally, most man-made structures are designed and built for their functionality and safety, not for their visual appeal or compatibility with the visual character of the landscape. For example, projects with construction-related equipment, facilities, and activities can include the presence of workers, camps, vehicles, machinery, and laydown yards, which serve functional purposes but tend to have negative impacts on visual quality. The likely addition of explosives bunkers at the Hawthorne Army Depot and projected wind-energy development are examples of other long-term visual changes that are reasonably foreseeable. Each type of project has its unique visual features, but generally, new projects would not be consolidated into any specific location within the region of influence.

While the area has a history of railroad use, the presence of a railroad and associated train traffic would be an identifiable change to the regional viewsheds and would create a noticeable contrast with natural visual attributes from some observation points. The passage of a train would attract the attention of an observer, both because of the noise associated with the train and the contrast with the landscape, especially if the train were to fall in the foreground or middle ground of the viewshed. Visual impacts of passing trains would be temporary, but visual impacts of the track would be long term from some observation points.

Visual resources within the region of influence have been considered through application of the BLM Visual Resource Management System (see Sections 3.3.3 and 4.3.3 and Appendix D of this Rail Alignment EIS). This system identifies and classifies the BLM-administered lands within established visual resource management objectives, and proposed activities are evaluated within the visual resource management framework to consider consistency with the visual resource management objectives. Without restoration and reclamation efforts, ground disturbances in the regional environment would last for long periods; even with restoration and reclamation, in some places, it could take several years for

vegetation patterns to be indistinguishable from surrounding undisturbed areas. The magnitude and extent of potential visual impacts would vary based on the number of viewers affected, distance and atmospheric conditions of viewing, degree of visual contrast compared to existing visual attributes, viewer sensitivity to the visual changes, and compatibility with existing land uses. The BLM generally requires disturbed areas be restored and reclaimed as part of project approval.

For the Mina rail alignment, analysis using the Visual Resource Management System indicated that the proposed railroad would potentially be inconsistent with visual resource management objectives during construction in the areas of the Schurz alternative segment 6 crossing of U.S. Highway 95 (construction), and in the areas of some cuts and fills (during construction and operations). As shown in Appendix D, lands that have potentially restrictive visual resource management objectives (Class I and Class II) are not prevalent in the region of influence. Other proposed projects would also impact the viewshed in the Mina region of influence, including the proposed Yucca Mountain Repository, power plants, transmission lines, solar energy facilities, the Department of Justice detention facility, and other infrastructure.

There would be no known interactions of the proposed railroad with other reasonably foreseeable activities that would affect a Class I or Class II area in the Mina region of influence. The proposed railroad would, however, cause small to moderate impacts to a small proportion of the Class III and Class IV land near the Tonopah, Beatty, and Armargosa Valley areas visible from Highway 95 in the vicinity of a number of proposed solar and wind projects (see Section 5.3.1.3.2). The cumulative impacts to aesthetic resources caused by the proposed project and these reasonably foreseeable projects in this area would likely be consistent with the BLM management objectives for these low visual value areas. The cumulative impacts to aesthetic resources from the proposed railroad and other existing and reasonably foreseeable projects could be small to moderate in the Mina region of influence because of the potential impacts to the Class III and IV land.

5.3.2.4 Air Quality and Climate

Emissions of concern in the Mina region of influence include fugitive dust and emissions resulting from the operation of machinery and equipment. Construction activities from proposed projects such as power plants and transmission lines would involve surface disturbance and use of haul trucks that would generate fugitive dust. Fugitive dust is a type of nonpoint source air pollution (small airborne particles that do not originate from a specific point). These particulate matter emissions are regulated according to their size (aerodynamic diameter equal to or less than 2.5 micrometers [$PM_{2.5}$] and 10 micrometers or less [PM_{10}]). Fugitive dust is generally controlled during construction projects through the application of water, or in some cases, application of a chemical compound designed to minimize dust emissions. Most of the projects and activities, existing and planned, identified in this analysis would generate some level of fugitive dust. The plumes associated with fugitive dust generation are often localized to the area being disturbed and are temporary. In arid areas such as the Mina region of influence, generation and control of fugitive dust will always be a concern. Exhaust emissions from the operation of machinery and equipment include sulfur dioxide, oxides of nitrogen, volatile organic compounds, and carbon monoxide.

There is a comprehensive air quality permitting system in Nevada to evaluate and approve only those projects that are allowable within quantitative air quality thresholds. The Nevada Division of Environmental Control, Bureau of Air Pollution Control, has established and implemented air pollution control requirements in Nevada Revised Statutes 445B.100 through 445B.825, inclusive, and Nevada Revised Statutes 486A.010 through 486A.180, inclusive. The Bureau of Air Pollution Control has jurisdiction over air quality programs in all counties in the state except Washoe and Clark. The Bureau of Air Pollution Control also has jurisdiction over all fossil fuel-fired units in the state that generate steam for electrical production. The proposed railroad would be subject to the permitting requirements noted above, and would occur in air basins that are either in attainment or unclassifiable. The State of Nevada

will not grant permits for activities that cannot show compliance with the applicable federal and state regulations.

The air quality impact analysis for the proposed railroad assessed potential impacts through several means, including air quality modeling of maximum concentrations relevant to National Ambient Air Quality Standards. The analysis concluded the emissions during construction or operation of the railroad would be in conformance with applicable standards, with the exception of the 24-hour standard for both PM_{10} and $PM_{2.5}$ near the construction right-of-way at Mina and Schurz during the relatively short construction period, and at the Staging Yard at Hawthorne and the potential Garfield Hills quarry. DOE would be required to prepare an application for a Dust Control Permit and a Surface Area Disturbance Permit Dust Control Plan and submit them to the Nevada Division of Environmental Protection Bureau of Air Pollution Control prior to the quarry and Staging Yard development. It is likely that the requirements of the plan would reduce fugitive dust emissions, thus reducing the possibility of exceeding National Ambient Air Quality Standards.

Construction and operation of the proposed railroad would also cause greenhouse gas emissions, primarily through the release of CO_2 emissions. However, the amount of CO_2 emissions would be very small compared to the total national emissions of CO_2. U.S. emissions represent about 24 percent of the total global CO_2 emissions. The estimate for the annual construction-related activity associated with the proposed railroad would increase the overall national CO_2 emissions by less than 995,177 metric tons (1,097,000) tons (0.02 percent) over 2005 levels. The average operational year of the proposed railroad would increase overall national CO_2 emissions by about 66,224 metric tons (about 73,000 tons) (0.001 percent) over 2005 levels. Existing projects that contribute to air quality and greenhouse gas emissions impacts include operations at the Nevada Test Site, Nevada Test and Training Range, and Naval Air Station Fallon. Nearly all of the activities described in Section 5.2.1 will involve CO_2 emissions. The construction of proposed projects could contribute to temporary air quality impacts, including the repository and the proposed Department of Justice detention facility. The operation of some proposed projects could contribute to air quality impacts, such as the Toquop power plant.

Unlike criteria pollutants, impacts of greenhouse gas emissions are global and cannot be attributed to any particular source, because greenhouse gases are well mixed throughout the global lower atmosphere such that anthropogenic climate change is directly related to the global concentration of CO_2 in the atmosphere. Local emissions are quantifiable and contribute cumulatively to global CO_2 concentrations. Construction and operation of the proposed railroad would increase the state's CO_2 emissions as well as global CO_2 concentrations. Neither the State of Nevada nor the Federal Government has CO_2 emissions caps, thresholds, or targets. CO_2 emissions from the Proposed Action would add to state and national emissions, making a relatively small incremental contribution to cumulative emissions of CO_2. DOE is not aware of any methodology to correlate CO_2 emissions from specific projects to any specific impact on global climate change.

The potential impacts from climate change have been identified and discussed by the Intergovernmental Panel on Climate Change (IPCC) in its fourth assessment report (DIRS 185132-IPCC 2007, all). This report describes an extensive peer review of analyses and a high degree of consensus on climate change issues among an international panel of contributing scientists. Studies such as the IPCC report support the premise that CO_2 emissions from the proposed project, together with global greenhouse gas emissions, would very likely have a cumulative impact on climate change. IPCC Working Group II identified the predicted consequences of climate change – specific to the project area, these include more frequent and intense heat waves and droughts; extended periods of high fire risk; and a decrease in mountain snow packs and an increase in winter flooding.

The cumulative impacts to air quality and climate from the proposed railroad and other existing and reasonably foreseeable projects would be small, but could approach moderate if the potential violation of the National Ambient Air Quality Standards noted above occurred.

5.3.2.5 Surface-Water Resources

5.3.2.5.1 Changes in Drainage, Infiltration Rates, and Flood Control

Construction of major projects in previously undeveloped areas often results in changes to natural drainage. Proposed construction projects in the Mina region of influence include the Yucca Mouantain Repository, power plants, transmission lines, and other infrastructure. Construction could include regrading that would allow runoff from a number of minor drainage channels to collect in a single culvert or pass under a single bridge, which would result in water flowing from a single location on the downstream side rather than across a broader area. This would cause some localized changes in drainage patterns, but this probably would occur only in areas where natural drainage channels are small. Compaction of soil during construction could reduce water infiltration rates and change natural runoff and drainage patterns. However, some activities would disturb and loosen the ground for some time, which could cause higher infiltration rates.

Construction in washes or other flood-prone areas probably would reduce the area through which floodwaters naturally flow. This could result in water building up, or ponding, on the upstream side of crossings during flood events, and then slowly draining through the culverts or bridges. These alterations to natural drainage, sedimentation, and erosion would be unlikely to increase future flood damage, increase the impact of floods on human health and safety, or cause significant harm to the natural and beneficial values of the floodplains.

Insufficient inflow from the Walker River into Walker Lake would continue to jeopardize Walker Lake's future as a viable fishery, with or without the proposed railroad. If developed, the proposed railroad would not result in further inflow reductions into Walker Lake. Mitigation measures that could be implemented by the U.S. Fish and Wildlife Service or other entities could improve the chances for a viable fishery in the lake in future years.

As a long linear project of up to 502 kilometers (312 miles) long, the proposed railroad would pose new surface drainage challenges because of the existing characteristics of terrain, topography, soils, and physical features. Construction activities that could temporarily block surface drainage channels include moving large amounts of soil and rock to develop the rail roadbed (subgrade) and constructing temporary access roads to reach construction initiation points and major structures, such as bridges, and to allow movement of equipment to the construction initiation points.

Proposed construction projects that could impact drainage, infiltration rates, and flood control include the solar energy facilities and the Department of Justice Detention Facility. Overall effects would generally be localized to each specific project, and these concerns and potential impacts are factored into project design considerations as standard engineering and construction operating procedures.

5.3.2.5.2 Wetlands

The Department of Defense Branchline is south of the Walker River west of the town of Schurz. All Schurz alternative segments must connect to that branchline west of Schurz and cross the river to avoid the town and proceed to the east of Walker Lake. The wetlands along this reach of the Walker River are too wide to be completely spanned and therefore bridge piers must be placed in the wetlands. DOE would minimize impacts by constructing a bridge over the Walker River and its associated wetlands. The bridge would be about 300 meters (1,000 feet) long with 12-meter (40-foot) pier spacing. The only

permanent fill would be the concrete pilings required to support the bridge piers. Using these methods, the only permanent fill or loss of wetlands would be a total of about 20 square meters (0.005 acre) for emplacement of about 10 piers in wetlands for Schurz alternative segments 1 and 4, or 28 square meters (0.007 acre) for emplacement of about 14 piers for Schurz alternative segments 5 and 6. By maximizing avoidance in this way, DOE would avoid filling of wetlands to the maximum extent practicable. There are no practicable design or construction options that would allow DOE to completely avoid impacting wetlands along the Mina rail alignment.

Based on the information available, such as the Toquop Energy Power Project Draft EIS and documentation concerning potential solar projects, existing and planned projects would not result in adverse impacts to wetlands. The BLM resource management plans that are applicable to the Mina region of influence have objectives that include the maintenance and/or improvement of riparian and wetland areas.

DOE would mitigate loss of wetlands, as required under Section 404 of the Clean Water Act, by enhancing existing wetlands adjacent to or near the rail line that have been degraded by grazing and other impacts, or by creating new wetlands adjacent to or near the rail line. The acreage and placement of wetlands to be enhanced or created would be determined in coordination with the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency and would be based in part on the amount of wetlands that would have to be filled to construct the rail line, the function and quality of the wetlands that would be lost, and the likelihood of success of the methods used to enhance or replace wetlands. Other planned projects would be subject to the same requirements that ensure impacts to wetlands are minimized.

5.3.2.5.3 Spill and Contamination Potential

Major construction activities and other projects in the Mina region of influence would use materials including petroleum products (fuels and lubricants) and coolants (antifreeze) necessary to operate construction equipment, and could include solvents used in cleaning or degreasing actions. A release or spill of contaminants to a stream or river would have the greatest potential for adverse environmental impacts; a release of contaminants to dry impermeable soil would have the least potential for adverse impacts. Other projects would face similar situations. Spill-control and -management plans (and standard operating procedures for the construction industry) would reduce the likelihood of spills. Construction and operation of the proposed railroad would be typical of major activities that use materials that could cause contamination through spills.

While the risk of a spill and associated water contamination cannot be totally eliminated, risks can be managed through regulatory controls.

5.3.2.5.4 Surface-Water Resources Conclusion

The cumulative impacts to surface-water resources from the proposed railroad and other existing or reasonably foreseeable projects would be small. Project planning and best management practices would help avoid or reduce potential impacts to changes in drainage, infiltration rates, and flood control from the proposed railroad or other ongoing or reasonably foreseeable future actions. DOE and other planned projects would be subject to requirements that ensure impacts to wetlands are minimized, and BLM resource management plans have objectives that protect riparian and wetland areas. Spill-control and management plans would reduce the likelihood of spills and contamination from the proposed railroad and other projects.

5.3.2.6 Groundwater Resources

Existing and proposed future development within the Mina region of influence presents the challenge of matching water supply with water demand. Because water availability is a potential resource constraint in the Mina region of influence over time, water demand can be both competitive among potential users and controversial among users and the general public. To allocate water uses, the State of Nevada uses a water-permit application process coordinated by the State Engineer. Once granted, water rights in Nevada have the standing of both real and personal property. It is possible to buy or sell water rights and change the water's point of diversion, manner of use, and place of use by filing the appropriate application with the State Engineer. Overall, because the water permitting and allocation process considers the broad range of factors noted above, the process serves as a way to manage potential cumulative impacts of water demand and use within each basin.

Representative existing and reasonably foreseeable water uses in the Mina region of influence include:

- Public-supply/municipal, agricultural (stock watering), and mining and milling use wells collectively comprise approximately 74 percent of groundwater wells recorded by the Nevada Division of Water Resources (NDWR) that are located within 1.6 kilometers (1 mile) of the Mina rail alignment, with NDRW-listed domestic wells and irrigation wells accounting for approximately 22 percent, and about 2 percent, respectively, of the NDWR-listed groundwater wells located within 1.6 kilometers of the Mina rail alignment.
- The Nevada Test Site uses about 830,000 cubic meters (673 acre-feet) of water per year.
- The Yucca Mountain Repository demands would range from about 218,000 to 527,000 cubic meters (176 to 427 acre-feet) of water per year between calendar years 2010 and 2013, which represents the period of the highest water demand for the Mina rail alignment project. The repository would use approximately 76,700 to 397,000 cubic meters (62 to 322 acre-feet) of water per year in calendar year 2014 through completion of operation.

It is estimated that rail construction along the Mina would use up to about 7.34 million cubic meters (5,950 acre-feet) of water, with about 80 percent of that water use occurring in the first 2 years of construction. About 23,000 cubic meters (17 acre-feet) of water would be needed annually during the operations phase. DOE would obtain water for construction and operation of the railroad from proposed new wells installed in various water basins along the Mina rail alignment.

Committed groundwater resources in the Mina region of influence already exceed annual perennial yield values (a measure of available groundwater supply replenished each year through recharge) within some of the groundwater basins (hydrographic areas) that would be affected by the proposed railroad. Based on the proposed locations of new wells in specific hydrographic areas along the proposed Mina rail alignment, additional groundwater appropriations would be needed in 19 hydrographic areas. However, committed (cumulative) groundwater resources currently exceed estimated perennial yields in eight of these hydrographic areas (146, 149, 170, 173A, 203, 204, 228, and 229). One of these eight hydrographic areas (229) and two other hydrographic areas (144 and 145) that the Mina rail alignment would cross have low perennial yields. Five of these areas are State of Nevada-designated groundwater basins. While designated groundwater basins are not considered closed to additional appropriations, the State Engineer could impose additional restrictions and preferred uses of the water in these designated basins.

A number of scenarios have been developed to assess the potential effects of the proposed railroad's contribution to cumulative water demand in Mina region of influence. Groundwater would need to be appropriated in 18 hydrographic areas. The assumption used for developing these scenarios is that water demands for railroad construction and operations along the Mina rail alignment would be met through

installing and withdrawing groundwater from new wells, with pumping in individual wells at a constant rate occurring primarily over 9 months to support all rail line construction water needs, over 2 to 3 years at quarry sites, and over the railroad operations period for facilities. Depending on the specific combination of alternative segments, total water withdrawals associated with the proposed railroad could exceed annual perennial yield values for hydrographic areas 123, 144, and 229, and could be as high as 48 percent, 57 percent, 82 percent, 87 percent, and 99 percent of the annual perennial yield in hydrographic areas 145, 228, 110A, 121B, 227A, respectively. In other areas, water withdrawals associated with the railroad would range from less than 1 percent to as high as approximately 28 percent of the annual perennial yield value.

The three applications (NDWR Application Numbers 74816 through 74818) that have been filed for commercial and mining and milling water rights that would be located in hydrographic area 229 are outside the region of influence considered for the new rail alignment wells proposed in hydrographic area 229 (Section 5.3.1.3.7). For this reason, no cumulative impacts would be expected to occur if these proposed water rights were to be approved and placed into operation at the same time as the proposed railroad wells in hydrographic area 229.

NDWR Application Number 71204, which has been filed for a proposed quasi-municipal water right that would be located in hydrographic area 227A, appears to be at the same location as an existing well (J-12) located in Jackass Flats and the application indicates that the proposed water-rights location is associated with a previously-constructed infrastructure device (Section 5.2.1.3.7). The J-12 well is proposed for use in supplying the repository and to support railroad construction in hydrographic area 227A, and granting of separate and distinct water rights simultaneously for the repository/railroad construction and for quasi-municipal use is considered very unlikely (to impossible) to occur given the established State Engineer's water-rights approval process in Nevada. For this reason, it is considered very unlikely to impossible that there could be a cumulative impact associated with this proposed water-rights location. By utilizing a combination of one or more specific approaches or methods to obtain water for construction (including methods that are tailored to a hydrographic area's unique groundwater conditions), potential cumulative impacts to groundwater resources would be minimized. New groundwater withdrawals could, depending on a number of site-specific factors, cause some decrease in the amount of water that might be available to an existing well having an water right, an existing domestic well, an existing spring or seep discharge, or other existing surface-water-right location or downgradient groundwater basin. These factors include the withdrawal rate at the proposed new well location; hydrogeologic conditions present at the proposed pumping location and in the surrounding area; the location and characteristics of nearby groundwater resource features; and (for some locations) the timing of the proposed groundwater withdrawals with respect to the timing of existing pumping operations. Best management practices, including restricting the average groundwater withdrawal rate at some proposed well locations, using existing wells to obtain the amount of water needed (that is, by purchasing water) at some locations, or using other proposed groundwater-supply wells in the same general area for obtaining the required amount of water, would be implemented as required to minimize or avoid such impacts.

Overall, the needs of the proposed railroad would represent a small portion of the current cumulative water usage within the Mina region of influence, which in some locations would continue to exceed perennial yield values. The cumulative impacts to groundwater resources from the proposed railroad and other existing and reasonably foreseeable projects could be moderate to large, but impacts of the proposed railroad would be minimized as discussed above and in Chapter 7.

5.3.2.7 Biological Resources

5.3.2.7.1 Habitat Loss and Fragmentation

Past, present, and reasonably foreseeable future actions in the Mina region of influence would result in noticeable cumulative land disturbance. Existing activities at Nevada Test and Training Range, the Nevada Test Site, Naval Air Station Fallon, and the Hawthorne Army Depot have already resulted in land disturbance and substantial changes to existing biological resources, and proposed projects such as the various proposed industrial parks and master-planned communities in the northern portion of the Mina region of influence would continue this trend. Such land disturbances result in altered natural biological and ecological conditions, and directly serve to reduce the amount of natural land available as habitat and open space.

The primary adverse construction-related impacts on vegetation communities from ground disturbance would be the physical destruction or removal of vegetation, and the permanent or temporary removal or compaction of topsoil or other growing medium for the plants. These effects would occur with any major activity resulting in ground disturbance, including the proposed railroad. As more activity occurred, the cumulative loss of vegetative communities and associated habitats would increase. Management of these effects would typically be considered in project planning and mitigation, including projects on BLM-administered land. Much of the emphasis in land management in the Mina region of influence concerns the maintenance or reconstruction of healthy habitats, particularly in BLM-designated Areas of Critical Environmental Concern.

Habitat destruction would lead to direct impacts such as wildlife injury and mortality, alteration of behavior and movement patterns, and the indirect impacts of reduced vegetative health, reduced biological diversity, and locally degraded ecological function. When extensive habitat fragmentation occurs, the individuals or populations of particular species could have difficulty surviving. In larger ecosystems where diversity and spatial heterogeneity still exist with fragmentation, there is evidence that fragmentation may have negative effects on some species of wildlife, but the issue is less critical at these larger scales. Habitat destruction arises from a number of sources, including projects that involve land disturbance, and land-management actions including wild horse and burro management. Though any project that causes disturbance of vegetation contributes to habitat fragmentation, linear projects that impose any degree of impediment to movements, like the proposed railroad, amplify the potential effects. This effect is different for all species depending on habitat needs, migratory patterns, and adaptability. A number of utility and water rights-of-way are anticipated in portions of the proposed Mina rail alignment, with many of these crossing the Mina rail alignment.

As discussed in Chapter 7, measures to avoid, minimize, or otherwise reduce impacts generally include actions to reduce or avoid habitat fragmentation and loss. Such actions would include minimizing land disturbance, using existing roads, interim reclamation, combined roads/utility rights-of-way for pipelines and cables, noise reduction, centralization of facilities, and employee training and education.

The Hawthorne Army Depot has an Integrated Natural Resources Management Plan (DIRS 181899-USAF 2007, all), which is being used to ensure that natural resource conservation and Army mission activities are integrated and are consistent with federal stewardship requirements on mission lands. The plan describes an ecosystem-management approach that provides guidance to avoid the impacts of habitat loss and fragmentation, conserve biodiversity, and improve and enhance natural resource integrity while supporting sustainable economies and communities.

In areas proposed for railroad operations purposes, the impacts to vegetation would typically be moderate in scope, and cumulatively add to habitat loss and fragmentation. In areas slated for short-term use during the construction phase, such as construction camps, revegetation and reclamation efforts would result in

replacement of topsoil, reseeding of native species, monitoring for success, and eventual return of a native vegetation community to conditions comparable to predisturbance conditions. Displacement of species from construction and operations would be short term.

5.3.2.7.2 Invasive Species and Noxious Weeds

Invasive species and noxious weeds naturally move into new areas over time, but this occurrence has been accelerated in many areas through human activity, either intentionally or unintentionally. In many cases, these plants have been moved into North America from another continent. They have been accidentally introduced through contaminated grain or hay, or sometimes intentionally introduced for erosion control or as ornamentals. In addition, livestock and vehicles can cause invasive species and noxious weeds to spread, birds could carry seed, or the species can be brought in with contaminated fill dirt. Regardless of how they were introduced, invasive species and noxious weeds possess characteristics that allow them to compete aggressively with native vegetation. Invasive species and noxious weeds impact native plants, animals, and natural ecosystems by:

- Reducing biodiversity
- Altering hydrologic conditions
- Altering soil characteristics
- Altering fire intensity and frequency
- Interfering with natural succession
- Competing for pollinators
- Displacing rare plant species
- Replacing complex communities with single-species monocultures

From a cumulative impacts perspective, any time land is disturbed and native vegetation is lost there is an opportunity for noxious weeds to replace the native vegetation. While the BLM and other land owners/ managers in the area have implemented programs to minimize this potential, invasion of noxious weeds cannot always be prevented. Therefore, coordinated multi-agency management actions and efforts are needed to mitigate the effects from cumulative land disturbance. Management of noxious and invasive weeds is essential for restoration of native plant community health and resiliency. If noxious and invasive weeds were not managed, they would continue to gradually replace more desirable native species throughout the Mina region of influence.

Linear disturbances such as pipelines, roads, utility corridors, or rail alignments that cross relatively undisturbed land have the potential to exacerbate the spread of these species into areas not previously affected. As the invasive or noxious weeds become established along the linear features they spread to adjacent areas, affecting the plant and animal communities beyond the actual disturbance, and are able to out-compete native species by responding more rapidly to the infrequent availability of water.

These impacts could occur as a result of railroad construction and operations and from existing or foreseeable projects, but strict adherence to best management practices should reduce the potential for impacts. DOE's commitment to monitor and control noxious weeds and invasive species is described in Section 2.2.3.2.1 and Table 7-1. DOE would develop a weed-management plan that would meet the requirements of the BLM for monitoring and control of weeds, and would consult with other directly affected parties during the development of the plan. DOE would implement a program to monitor and control weeds prior to construction. That program would include an inventory of the alignment prior to construction, monitoring of disturbed sites, and control of weeds throughout construction and operation, and reclamation of disturbed sites no longer needed for operation of the railroad.

5.3.2.7.3 Special Status Species

Habitat for several special status species would be disturbed, and several of those special status species could be harmed during railroad construction and operations along the Mina rail alignment. Through the NEPA and permitting processes, each proposed project and land-management planning effort in the Mina region of influence will face challenges for the protection of various special status species. There are a number of special status species that could be affected by cumulative impacts in the Mina region of influence. Recent attention has focused on several specific species, including the desert tortoise and Lahontan cutthroat trout, as discussed below.

The Mojave population of the desert tortoise (*Gopherus agassizii*) is listed as threatened under the Endangered Species Act of 1973 (16 U.S.C. 1531 to 1544). It is found within the proposed Mina rail alignment only in the southwesternmost 48 kilometers (30 miles), from the Beatty Wash area to Yucca Mountain (DIRS 101830-Bury et al. 1994, pp. 55 to 72). The desert tortoise is found in southern California, parts of southern Utah, and in the southern portions of Nevada, with the tortoises potentially affected by railroad construction and operations at the extreme northern extent of their range. While relative abundance of the tortoise is low in much of the Mina region of influence, every action that could disturb soil or vegetation within the tortoise's range has potential cumulative impacts of loss or fragmentation of the species' habitat or the direct mortality of individual desert tortoises.

The threatened Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) is stocked in Walker Lake and occurs upstream to Weber Reservoir. Weber Dam currently blocks movement further upstream, and prevents spawning by cutthroat trout. However, in the near future, a fish ladder might be developed at that dam to allow fish movement. Reestablishment of a self-sustaining population of Lahontan cutthroat trout in the Walker River system is a prerequisite for recovery of this species. With mitigation, the construction activities along the Mina rail alignment would have minimal effects on the trout, but the existing problem with Weber Dam blocking movement of the trout further upstream would remain.

The BLM resource management plans sometimes place restrictions on other activities (such as grazing, wild horse and burro abundance, off-road vehicle use, mineral activities) so that desert tortoise or other special status species habitat can be protected. However, off-road vehicle use, shooting, and collecting of individuals continue to affect tortoise populations. Habitat protection efforts for the desert tortoise are coordinated among a number of federal, state, and local governmental agencies, with the cumulative impact perspective a major factor in determining allowable impacts to the tortoise. Restoration plans and habitat conservation plans also affect the required mitigation measures, best management practices, and standard operating procedures for the protection of the desert tortoise or other special status species.

Private landowners, corporations, state or local governments, or other non-federal landowners who wish to conduct activities on their land that might incidentally harm (or "take") wildlife listed as endangered or threatened must first obtain an incidental take permit from the U.S. Fish and Wildlife Service. To obtain a permit, the applicant must develop a Habitat Conservation Plan, designed to offset any harmful effects the proposed activity might have on the species. Multi-species Habitat Conservation Plans are underway in two places in southern Lincoln County in the area of the recent BLM land disposal. Additionally, there is a single species (desert tortoise) Habitat Conservation Plan being developed in the Pahrump area of Nye County. These plans would support development of private lands while accounting for the potentially affected species.

No major effects on special status species are projected to result from construction and operation of the proposed railroad along the Mina rail alignment. DOE would conduct any required consultation with the U.S. Fish and Wildlife Service in accordance with the Endangered Species Act. There is a substantial regulatory framework, to which all projects are subject, that serves to evaluate and protect special status species.

5.3.2.7.4 Wildfires

Wildfires are a major environmental concern throughout the Mina region of influence due to the generally dry climate and the increasing presence of invasive plant species. When they occur, wildfires have a significant and long-term impact on vegetation, wildlife, other natural resources, and human safety. The most important biological effects of fires include:

- Loss of native plant communities
- Decreased stability of watershed and soils
- Decreased or degraded wildlife habitat
- Increase in potential for invasive species spread
- Overall disruptions to ecological function

Sources of regional wildfires are both natural (for example, lightning) and human caused. With increased activity and population growth in the Mina region of influence, the potential for future human-caused fires increases. Because the BLM administers most of the land in the Mina region of influence, the BLM has primary fire-avoidance and fire-fighting responsibilities.

DOE would implement fire-avoidance best management practices, as described in Chapter 7. DOE would consult with the BLM on any further fire-avoidance strategies that might be needed. Fire-avoidance best management practices have been added to Table 7-1. These practices include control of brush and weeds along the rail roadbed, monitoring to identify overheated wheel bearings, and development of water sources at sidings to be used to control or minimize potential fires.

5.3.2.7.5 Biological Resources Conclusion

The cumulative impacts to biological resources from the proposed railroad and other existing and reasonably foreseeable projects could be small to moderate. As described above and in Chapter 7, mitigation measures would be implemented during the construction and operations phases to address impacts related to habitat loss and fragmentation, the introduction and spread of invasive species and noxious weeds, and the increased likelihood of wildfires. All existing and proposed projects, federal, state, or private, are subject to regulations that protect special status species, and protective habitat conservation plans are already underway for many of the proposed projects in the Mina region of influence. BLM manages most of the lands in the Mina region of influence and has programs in place to minimize impacts to biological resources.

5.3.2.8 Noise and Vibration

As described in Section 4.3.8, no vibration impacts would result from the proposed railroad because of the localized and short-term nature of the vibration sources. No cumulative vibration impacts are expected, and therefore are not analyzed in this section.

In the Mina region of influence, there is an existing branchline extending from Hazen, Nevada, to the Hawthorne Army Depot. The noise associated with railroad operations is part of the existing environment, specifically in the Schurz area where the railroad's presence is very evident. The sounds associated with the existing branchline include wayside noise (noise generated by the cars and locomotives), and horn sounding. The individual operating rules of each railroad require train engineers to sound horns when approaching most grade crossings. Horn sounding is generally not required at private crossings. Wayside noise and horn sounding are common in Schurz and along other portions of the existing branchline.

Hawthorne Army Depot is planning to construct a rail siding, known as the Wabuska Spur, which would increase the Depot's outloading capacity. Increased rail capacity could cause increases in overall rail traffic on the existing branchline and could result in more wayside noise and horn sounding events more frequently near Hawthorne.

The proposed transportation of spent nuclear fuel and high-level radioactive waste casks would result in as many as eight one-way trips per week along the Mina rail alignment. Train activity associated with supply and maintenance of the Yucca Mountain Repository is also proposed along the completed railroad (as many as seven one-way trips per week), as is rail line maintenance activity (about two one-way trips per week), for a total of about 17 one-way trips per week. During the construction phase, completed portions of the rail line would also be used to deliver ballast to construction areas.

In the Mina region of influence, other possible sources of noise include occasional testing activities at the Nevada Test and Training Range and sonic booms from aircraft-related military activities in the airspace above the region of influence. These events would likely be short term and localized. Additionally, the U.S. Air Force has proposed to base 36 F-35 aircraft at Nellis Air Force Base, and to conduct an additional 17,280 annual airfield operations at Nellis Air Force Base by 2022, and an additional 51,840 annual sortie operations in the Nevada Test and Training Range. If this proposed action is implemented, that could create additional noise sources.

The proposed railroad would introduce or expand noise sources into areas of the Mina region of influence that previously had very limited railroad noise. This could result in incremental annoyance effects for some people. Analysis of rail operations noise indicates that eight receptors would be included in the 65 DNL contours in Silver Springs and one receptor would be included in Wabuska. These nine receptors would experience an adverse noise impact because they would be exposed to 65 DNL and a 3 dBA increase.

While adverse noise effects would increase for some people in the Mina region of influence, railroad construction and operations along the Mina rail alignment would substantially reduce noise impacts for people in Schurz, because the existing rail line through Schurz would be eliminated and replaced by one of Schurz alternative segments. This would provide a substantial reduction in annoyance effects for people in Schurz.

The cumulative impacts to noise from the proposed railroad and other existing and reasonably foreseeable projects could be moderate to large because of the receptors that would experience adverse impacts and the existing and proposed noise sources.

5.3.2.9 Socioeconomics

The economy in the Mina region of influence has traditionally been based on mineral development, military operations and support, and livestock grazing. These activities will continue to be the primary economic drivers in the Mina region of influence. Additionally, the expansion of the Reno-Carson City metropolitan area in the northern reaches of the Mina region of influence will continue to occur, providing additional economic inputs. While a railroad in the Mina rail alignment would be a major development in the region of influence, its long-term economic development potential would be limited and would primarily be related to construction activities. If the Shared-Use Option were chosen and implemented, there would be greater potential for positive economic development benefits compared to the Proposed Action. If the Proposed Action is implemented, DOE would establish a monitoring program to evaluate future impacts and potential mitigation, including those from shared use.

Population growth in the Mina region of influence has generally been stagnant in much of the area. However, growth and development is desired by many in the region. It is uncertain if there is sufficient

economic development growth potential in these areas to support the desired growth. It is possible that some areas would grow at the expense of other areas, or that recently developed plans for growth turn out to be unrealistic. Provision of housing to meet market demand is a private-sector activity, with the private housing sector assumed to build to the needed level to meet housing demand at the appropriate locations. One of the factors that will affect how and where growth occurs is the availability of infrastructure to support the growth. Beyond the traditional infrastructure needs like roads, sewer, water, and public buildings, modern infrastructure such as the availability of fiber-optic lines might also affect growth patterns. For example, the availability of fiber-optic lines or other high-technology infrastructure is likely to be a substantial growth discriminator for both businesses and individuals. The locations of and extent to which factors such as fiber-optic lines would ultimately affect growth cannot be predicted at this time.

The potential future BLM land disposals identified in Section 5.3.2.2.4, if implemented, could have the potential to provide land for private-sector projects such as housing, industrial or commercial facilities, or other developments. In contrast to specific developments proposed on BLM land disposals in the Caliente region of influence, such growth in the Mina region of influence is not currently planned and the market for this type of developmental stimulus is uncertain.

The State of Nevada has developed population projections for the Mina region of influence (DIRS 178807-Hardcastle 2006, all) as follows:

- Esmeralda County is projected to have a small decrease in population from 2005 to 2026.
- Nye County is projected to add more than 32,000 people from 2005 to 2026.
- Lyon County is projected to add more than 41,000 people from 2005 to 2026.
- Mineral County is projected to have a small decrease in population from 2005 to 2026.

The Nevada State Demographer develops population projections for Nevada counties, which are always subject to change with new information.

Nye County's projected growth continues a recent trend, with growth in Pahrump very evident over the past several years. Growth in Pahrump is being driven by low-cost land, proximity to the Las Vegas metropolitan area, and relocation of retirees to the area. Growth in Nye County is also linked directly to existing and future Yucca Mountain Site operations. Nye County may also develop the Crater Flat area, resulting in potential new employment. See Section 5.5 for more information on the Nye County perspective.

Growth in Lyon County is due largely to its proximity to Carson City and Reno. Although Churchill County is generally excluded from the regions of influence for all resource areas, DOE considered the cumulative impacts of the Matthews Ranch Project, a planned development of approximately 9.3 square kilometers (approximately 2,300 acres) of commercial, industrial, and residential structures, including more than 100,000 homes. DOE does not expect any cumulative impacts to Churchill County or the Matthews Ranch Project.

As discussed in Section 4.3.9, Socioeconomics, DOE used an economic model to estimate potential socioeconomic impacts of the proposed railroad (DIRS 182251-REMI 2007, all). The model includes consideration of construction and operations employment and wages, project-related spending, and other parameters that could affect the socioeconomic environment. The model included a future baseline of socioeconomic parameters that would represent a cumulative impacts baseline without the proposed railroad.

Consistent with the methodology established in the Yucca Mountain FEIS (DIRS 155970-DOE 2002, p. 4-43), most of the construction workers for the proposed railroad are assumed to be residents of Clark County. This assumption is made because the construction sectors in Nye, Esmeralda, Lyon and Mineral

Counties are not large enough to provide sufficient workers for the construction activities. Under this scenario, Clark County is projected to attain the largest levels of construction-related employment, income, and spending effects from the proposed project, followed by Mineral, Nye, Esmeralda, and Lyon Counties. Mineral County would experience the largest employment percentage increase during construction with an estimated increase of about 6 percent above baseline conditions.

The socioeconomic analysis also considers a second scenario, which assumes that half of the construction workers for the proposed railroad reside in the combined Washoe County-Carson City area, and the other half reside in Clark County. This second scenario is considered because Washoe County and Carson City might be more likely than Clark County to supply construction workers for the northern portions of the Mina rail alignment. With this second scenario, the beneficial economic effects on Clark County would obviously be reduced, while the Washoe County-Carson City area would gain some of these beneficial aspects of the proposed railroad project. In any case, the overall effects of the proposed railroad along the Mina rail alignment on the Clark County or Washoe County economies would still be relatively small.

Employee locations for the operations phase would follow the same general pattern and relative magnitude of the construction phase, but there would be fewer operations jobs than construction jobs. Gains in employment during the operations phase would be felt most strongly in Esmeralda County, where the peak percentage change in average annual employment is projected to be 6.3 percent above baseline conditions during full operations. Mineral County is the only other county in the region of influence projected to experience more than a 1-percent change in average annual employment at any point during the operations phase (2.6 percent).

Population changes that would result from construction and operation of the proposed railroad are also projected to generally follow this pattern. During the construction phase, the upper bound of increase to population would be about 3 percent or less of the future cumulative population baseline in all four counties. The operations phase population change would have the largest percentage increase compared to the cumulative baseline in Esmeralda County (about 7-percent average annual increase over the baseline). There are no projected impacts to population on the Walker River Paiute Reservation.

Strains on housing infrastructure during the construction phase would not be anticipated because most construction workers could be housed in construction camps at strategic locations along the proposed Mina rail alignment, rather than in nearby communities. Contractors might elect to use commercially available facilities for housing construction personnel at locations such as Hawthorne, Tonopah, Goldfield, Beatty, and Pahrump. There would be enough vacant housing stock in these locations to absorb both construction and operations personnel.

Some infrastructure impacts would be expected where construction activities or operations facilities were near communities. For example, construction workers, including those from the proposed Mina rail alignment, could strain the existing health-care service capacity in the Mina region of influence, and particularly in Hawthorne, Goldfield, and Tonopah. The operations-related population gains could also result in identifiable effects on health and education-related services.

The road network in the Mina region of influence generally consists of two-lane highways and unpaved roads. U.S. Highway 95 is the major north-south highway in the region of influence. In rural, less populated parts of the Mina region of influence, roads are adequate to handle existing and projected future traffic flow. However, the array of new and proposed activities throughout the Mina region of influence would have the potential to strain parts of the existing roadway infrastructure.

Railroad project-related road traffic would result in small increases in some areas but railroad construction would not materially affect traffic volumes on local roads because most construction materials would be transported using rail, and most construction employees and contractors would be

housed in construction camps linked to the work site by access roads. There could be some traffic delays at existing rail-highway grade crossings, and grade separation might be necessary for some crossings in Churchill, Lyon, and Mineral Counties. However, cumulative traffic levels in the region would likely continue to increase as overall regional growth and development occurs.

Any road improvement and maintenance responsibilities in the region of influence are handled by the Nevada Department of Transportation through a Statewide Transportation Plan and a Statewide Transportation Improvement Program. The Statewide Transportation Improvement Program includes a 3-year list of federally funded and regionally important non-federally funded transportation projects and programs consistent with the goals and strategies of the Statewide Transportation Plan. Routine highway improvements and maintenance projects for the period 2006 through 2015 have been identified for Lyon, Mineral, Esmeralda, and Nye Counties as part of the Nevada Department of Transportation planning processes. The level of cumulative traffic changes would generally not be sufficient for major upgrades of regional roads.

While there is some potential for induced growth impacts, the specific locations and scope of these actions is unknown at this time, and any such actions are projected to be small. The cumulative impacts to socioeconomics from the proposed railroad and other existing and reasonably foreseeable projects could be moderate because of the numerous planned development projects in the Mina region of influence.

5.3.2.10 Occupational and Public Health and Safety

5.3.2.10.1 Nonradiological Health and Safety

Throughout the Mina region of influence, existing and reasonably foreseeable activities (such as the construction of pipelines, transmission lines, and other infrastructure) have the potential to result in occupational injuries or fatalities including, but not necessarily limited to sources such as tripping, being cut on equipment or material, dropping heavy objects, and catching clothing in moving machine parts, and other types of accidents. Other occupational risks include biological hazards, dust and soils hazards, air quality hazards, transportation accidents, and noise hazards. Biological hazards include potential human health effects from rodent-borne diseases, soil-borne diseases, insect-borne diseases, and venomous animals. Dust and soils hazards include potential human health effects from exposure to inhalable soils and dusts containing hazardous constituents, and potential occupational encounters with unexploded ordnance.

While occupational injuries or fatalities are unavoidable with human activity, public and private facilities within the Mina region of influence are highly regulated. There is a substantial regulatory framework for occupational health and safety, with the Occupational Safety and Health Administration programs and regulations forming the basis for protection of workers. Through DOE Order 440.1A, *Worker Protection Management for DOE Federal and Contractor Employees*, the Department has prescribed the Occupational Safety and Health Act Standards that contractors are to meet in their work at government-owned, contractor-operated facilities. The Department of Labor, Bureau of Labor Statistics, measures occupational incident rates, including total recordable cases, lost workday cases, and fatalities, associated with the work environment.

There are no data on injury/illness incident rates for the Mina region of influence; however, injury/illness incidence rates in Nevada generally run higher than those in the United States as a whole. The economic segments with the highest injury/illness incidence rates in Nevada are construction and goods-producing industries.

The construction and operation of the Yucca Mountain Repository would result in increased traffic, and the level of service along U.S. Highway 95 near Gate 510 to the Nevada Test Site would drop from level of service B to level of service D, which indicates high-density traffic but still stable conditions (DIRS 185463-Facanha 2008, all). To minimize traffic impacts at the entrance to the Yucca Mountain Site, a new interchange with U.S. Highway 95 at the site entrance has been proposed for both traffic flow and safety reasons. DOE also plans to work closely with the Nevada Department of Transportation should they find it necessary to implement mitigative actions along U.S. Highway 95. Increased traffic would not necessarily mean an increase in the rate of traffic accidents, but the number of accidents would increase if the rate of traffic accidents stayed the same and traffic increased. Therefore, transportation safety concerns would increase and there could be an increased workload for traffic-accident responders in the Mina region of influence with the cumulative growth in traffic.

From a transportation safety standpoint, railcars loaded with live munitions and ordnance currently travel between Wabuska and the Hawthorne Army Depot. A railroad along the Mina rail alignment would reduce health and safety risks associated with accidents involving existing rail traffic because the trains would be routed away from the populated community of Schurz via one of the Schurz alternative segments.

Under DOE's Proposed Action, nonradiological occupational health and safety impacts of transporting an estimated 9,500 casks are projected as follows:

- Construction and operations activities for the Mina rail alignment are projected to result in approximately 800 recordable incidents, approximately 470 lost workday accidents, and approximately two fatalities.
- Vehicular-related fatalities related to worker commuting are projected to result in an estimated 13 vehicular-related fatalities for the Mina rail alignment.
- Rail-related accidents and rail-related fatalities related to the movement of cask trains, maintenance trains, and supply trains are projected to result in 16 rail-related accidents and one rail-related fatality for the Mina rail alignment.

Under Module 1, up to 21,909 casks would be transported to the repository by rail; and under Module 2, 33,909 casks would be transported to the repository by rail. To estimate the cumulative health and safety impacts of Modules 1 and 2 the impacts of the Proposed Action were increased by the ratio of the number of casks transported in the Module versus the Proposed Action. For Module 1, the nonradiological health and safety impacts noted above would increase by an additional 65 percent over the impacts under the Proposed Action. For Module 2, nonradiological health and safety impacts would increase by 119 percent over the impacts under the Proposed Action.

5.3.2.10.2 Radiological Health and Safety

Existing and reasonably foreseeable future activity (such as the Nevada Test Site and Yucca Mountain Repository activity managed by DOE) in the Mina region of influence involves the storage, handling, transportation, use, and disposal of radioactive materials and wastes. There is an extensive regulatory framework associated with transportation safety, and the proposed railroad would operate in compliance with these laws and regulations. For example, DOE complies with U.S. Department of Transportation regulations regarding the transportation of radioactive materials. DOE also uses U.S. Environmental Protection Agency protective action guides (identifying projected dose levels at which specified actions should be taken) and actions designed to limit doses and impacts in the event of a transportation accident resulting in releases of radioactive material. The regulatory framework and implementation of appropriate standard operating procedures would reduce the potential for accidents. Coordination of

plans for proposed railroad construction and operations with local emergency response providers would be important to limit the potential for accidents, and for an effective response to an accident should one occur.

Under assumed conditions, there is a small risk of radiological impacts to workers and the general public from external radiation exposure during normal operations and incident-free transportation. Staff at the Nevada Test Site and the Yucca Mountain Repository would be separate, and it is not anticipated that there would be cumulative exposures to workers from both operations. The modes of transportation of radioactive wastes for the Nevada Test Site (shipment by truck) and the Yucca Mountain Repository (shipment by rail) would differ. The Repository SEIS is evaluating the reasonably foreseeable scenarios for Inventory Modules 1 and 2. The capacity of the proposed repository is statutory-limited to 70,000 metric tons (77,000 tons) of heavy metal of spent nuclear fuel and high-level radioactive waste, and any other waste that would not be accepted by the proposed repository would be evaluated in a separate analysis. Regardless of the number of shipments, the proposed railroad construction and operations would not be affected. The radiological risk relationships among the repository, the proposed Mina rail alignment, and Nevada Test Site operations are summarized below.

As part of the Repository SEIS process, DOE estimated that, under assumed conditions, 8.1 and 12 latent cancer fatalities for repository workers could result from Yucca Mountain Repository construction, operations, monitoring, and closure for Modules 1 and 2, respectively. For workers along the rail line, DOE estimated that there could be 1.2 latent cancer fatalities for Module 1, and 1.7 latent cancer fatalities for Module 2. The projected population within the repository region of influence is 120,000 people. The region of influence for the Yucca Mountain Repository extends 84 kilometers (52 miles) to the northwest from the repository site boundary along the rail corridor, approximately to Scottys Junction; the remainder of the Mina rail alignment is outside of the Yucca Mountain Repository region of influence. Population within the area where the rail alignment region of influence and the Yucca Mountain repository region of influence coincide (between the repository boundary and the Scottys Junction area) would receive radiation dose from both the repository and from railroad operations. For members of the public, DOE estimated that, under assumed conditions, 18 and 27 latent cancer fatalities could result from Yucca Mountain Repository construction, operations, monitoring, and closure for Modules 1 and 2, respectively. For members of the public along the Mina rail alignment, DOE estimated that 0.0020 latent cancer fatality for Module 1, and 0.0030 latent cancer fatality for Module 2 could occur from transportation of spent nuclear fuel and high-level radioactive waste.

The estimated radiological dose to members of the public from Nevada Test Site operations in 2005 was 0.2 millirem per year; the maximum radiation dose was 2.3 millirem per year at the northwest corner of the Nevada Test Site boundary. Dose at off-site populated locations between 20 and 80 kilometers (12 to 50 miles) from this location would experience much lower radiation doses due to wind dispersion (*Nevada Test Site Environmental Report 2005* [DIRS 182285-Wills 2006, Table 8-4, p. 8-2]). The collective population dose from Nevada Test Site operations was below 0.6 person-rem in 2004 (*Nevada Test Site Environmental Report 2005* [DIRS 182285-Wills 2006, Table 8-3, p. 8-8]).

5.3.2.11 Utilities, Energy, and Materials

5.3.2.11.1 Utilities

From a cumulative impacts perspective within the Mina region of influence, utility crossings are and will continue to be commonplace with little impact other than minor ground disturbance. Utility and other right-of-way crossings are common to linear projects such as roads, railroads, and pipelines. Land areas for the proposed rail line, construction camps, quarries, and access roads would cross or encroach upon existing or proposed utility rights-of-way in a variety of locations. Land areas for operations support

facilities could also encroach upon existing or proposed utility rights-of-way. This situation would be typical for other rights-of-way in the region.

Many regional activities, including the proposed railroad, would increase demands on public water systems, wastewater systems, telecommunications systems, electric power systems, and other utilities.

As described in Section 5.3.1.3.2:

- The BLM has received 11 right-of-way permit applications for solar energy facilities in Nye County.
- The BLM has received three permit applications for site-specific wind energy site testing and monitoring rights-of-way for individual meteorological towers and instrumentation facilities in Nye County.
- The BLM has received two applications for a wind energy site testing and monitoring right-of-way for a larger site testing and monitoring project area in Nye and Esmeralda Counties.

The 11 applications related to solar energy could result in the construction and operation of solar power plants. The 5 applications related to wind energy are specific to testing and research, but could eventually lead to the construction and development of wind power sources. All of these proposed projects could offset the power needs of existing and proposed projects in the Mina region of influence. Impacts from utility crossings would be minimized by using standard engineering procedures and appropriate design details and because regional service providers are projected to be able to adjust to any increasing demand for utilities from existing and planned projects in the Mina region of influence.

5.3.2.11.2 Energy and Materials Usage

Large projects such as pipelines, transmission lines, and power plants, that could occur within the Mina region of influence require materials and energy to construct and operate. Energy and material resources necessary for construction or operation of these projects are often obtained within regional or, in some cases, national markets.

For this Rail Alignment EIS, DOE analyzed cumulative energy and materials supply and demand from a regional perspective. Energy and materials (for example, steel and concrete) that would be needed for construction and operations of the proposed railroad and other proposed projects are not constrained in regional markets, and the proposed railroad and other proposed project needs would represent a small percentage of the cumulative annual materials use within the Mina region of influence.

While the regional markets for various construction-related materials and energy sources will continue to grow as the region develops, there is no evidence of potential limits to growth from constrained material or energy supplies.

5.3.2.11.3 Utilities, Energy, and Materials Conclusion

Supply and demand for energy and material resources (including steel and concrete) are not expected to be impacted in the Mina region of influence because of the small percentage of the cumulative annual materials the proposed railroad and other projects would need. Utilities are not expected to be impacted due to the numerous planned power plant projects, including solar and wind energy facilities. The cumulative impacts to utilities, energy, and materials from the proposed railroad and other existing and reasonably foreseeable projects would be small.

5.3.2.12 Hazardous Materials and Waste

5.3.2.12.1 DOE Waste-Management Activities

DOE has had existing waste-management programs at the Nevada Test Site for several decades. While the Site missions have changed over time (with an emerging focus on national security, energy, and environmental issues), waste management and disposal at the Site has been one of the primary long-term land uses. There are two active waste-management and disposal sites on the Nevada Test Site:

- Area 5 occupies 2.9 square kilometers (720 acres) and is in Frenchman Flat north of Mercury, Nevada.
- Area 3 occupies 0.53 square kilometer (130 acres) north of Mercury in Yucca Flat.

Environmental restoration efforts are under way at various locations throughout the Nevada Test Site. The Nevada Test Site waste-management program currently includes management and disposal operations for hazardous waste, mixed waste, and low-level radioactive waste. Transportation of the waste is accomplished by truck from both on-site and off-site sources. There are no plans for Nevada Test Site activities to include use of the proposed Mina rail alignment for shipment of wastes.

The proposed railroad would not contribute to cumulative impacts associated with DOE waste-management activities on the Nevada Test Site.

5.3.2.12.2 Sanitary and Construction Wastes

As the populated areas in the Mina region of influence expand and grow, the volume of sanitary waste generated will also expand. Project proponents are legally required to dispose of nonhazardous and nonradiological construction and other solid waste in appropriately permitted solid waste landfills. Nevada has 24 operating municipal landfills with a combined capacity to accept more than 11,000 metric tons (12,000 tons) of waste per day. While there is sufficient capacity to accept waste for the state of Nevada as a whole, the number of operating landfills has decreased substantially over the past 15 years, and there are some areas, such as Pahrump, that may have limited capacity in the future.

Construction- and operations-related waste that would be associated with the proposed railroad would add only a fraction of a percent to the total waste stream in the state. If there were a constraint to landfill capacity at some future time, additional land would be needed to expand or open a new landfill. Because of the relative scarcity of private land in the Mina region of influence, any land used for this purpose might need to come from BLM-administered federal land. As an alternative to local government landfill provisions, private companies can also be expected to seek business opportunities to provide solid- and hazardous-waste management, transportation, and disposal.

DOE would store and use hazardous materials (such as oil, gasoline and solvents) during the construction phase, and would control and manage these materials in accordance with the extensive federal and state regulatory framework. Other major projects would have similar waste streams, and project plans and requirements would call for disposal of such wastes in permitted facilities and materials management according to accepted industry practices.

5.3.2.12.3 Hazardous Materials and Waste Conclusion

The cumulative impacts to hazardous materials and waste from the proposed railroad and other existing and reasonably foreseeable projects would be small. Restoration activities are underway to address past DOE waste-management activities, and impacts based on potential future activities would be addressed

by DOE. Landfill capacity should not be exceeded based on the proposed railroad or any other existing or planned projects and their associated sanitary and construction wastes in the Mina region of influence.

5.3.2.13 Cultural Resources

Cultural resources include historic and archeological sites, buildings, structures, landscapes, and objects. Most reasonably foreseeable projects in the Mina region of influence will involve at least some ground disturbance. With that ground disturbance, cultural resources could be destroyed, damaged, or discovered for recovery or mitigation. As part of the evaluation of proposed projects on federal land, the existing regulatory framework requires that cultural resources be identified and protected. With information on the location of a proposed project and the estimated extent of ground disturbance, cultural resource specialists can be called on to perform appropriate surveys and inventories of cultural resources in the potentially disturbed area. Once discovered, the sites of cultural resources are kept confidential to reduce the potential for vandalism or theft of the resources.

Because cultural resources are typically on or below the ground, they can be damaged by other activities such as off-highway vehicle use. As the major land manager in the Mina region of influence, the BLM has an extensive cultural resource management program and manages federal land with protection of cultural resources as a key management objective. Once ground is disturbed and facilities are constructed on the land, the opportunity for identification of cultural resources is usually lost. Therefore, the BLM and other land managers in the area (for example, DOE on the Nevada Test Site and the U.S. Air Force on the Nevada Test and Training Range) employ cultural resource specialists and involve tribal representatives, as appropriate. Commonly, mitigation for any ground disturbance in the Mina region of influence includes the involvement of these cultural resource specialists as potential cultural resources are discovered. Other activities occurring on federal land, such as off-road vehicle use and rock collecting, can cause unintended adverse impacts to cultural resources. Mission activities occurring at the Nevada Test Site, the Nevada Test and Training Range, and the Yucca Mountain Repository also could cause unintended adverse impacts to cultural resources.

The problem of vandalism to and theft of cultural resources is prevalent throughout the western United States. Land-management agencies such as the BLM make extensive attempts to protect locations of cultural resources, but the areas to be managed are often so vast that patrols by law enforcement are not effective in protecting these sites. DOE, the BLM, and other federal agencies in the Mina region of influence are committed to public education and employee training regarding the protection of cultural resources.

Visitors may also be drawn to the area for purposes of curiosity and sight-seeing. Based on the extent of cultural resource site finds on BLM-administered land and on the Nevada Test Site, and data collected to date on the proposed Mina rail alignment, there could be a large number of cultural resources in the Mina region of influence. Also, it is likely that only a portion of any currently undiscovered sites would ultimately be found eligible for the *National Register of Historic Places*.

The proposed railroad would be a major new construction project introduced into a remote area. Beyond the implications of ground disturbance and permanent and temporary use areas, railroad construction and operations would bring employees, visitors, and equipment into an area where prior access was limited. If right-of-way roads remain open to the public, there could be an increase in off-road vehicles traveling along newly constructed roads and illegal use of lands. As the number of visitors increases, so does the potential for vandalism and damage to cultural resources. There is an extensive regulatory framework to manage and protect cultural resources.

The cumulative impacts to cultural resources from the proposed railroad and other existing and reasonably foreseeable projects would be small because the Department would conduct intensive field surveys and implement mitigation measures, including avoidance. Other project proponents would be subject to the same regulatory framework and BLM policies and procedures.

5.3.2.14 Paleontological Resources

Regional protection, management, and impact issues relative to paleontological resources are similar to those of cultural resources. Any type of ground disturbance could disturb or destroy known or unknown paleontological resources. Impacts to paleontological resources would generally be measured by physical damage to fossil-bearing formations through excavation or surface disturbance. The primary cumulative impact mechanisms that could affect paleontological resources include excavations or surface disturbances associated with approval and implementation of BLM rights-of-way, off-highway vehicle use, minerals development, land disposals, and special designations. Many BLM management activities, however, serve to protect and mitigate impacts to paleontological resources. Knowledge of the outcrop pattern of geologic units, and the kinds and quality of the fossils produced by such units, is a critical management tool for land-use decision-making where fossils might be involved. Potential effects on paleontological resources from ground disturbance would continue to be a major regional concern of the BLM from both resource management planning and rights-of-way evaluation perspectives. Most formations the rail line would cross are volcanic and would not contain paleontological resources.

Any paleontological resources are considered valuable and are often collected for their cultural, scientific, and recreational values. Therefore, these resources are sometimes removed from federal lands. While common invertebrate fossils such as plants, mollusks, and trilobites can be collected for personal use in reasonable quantities, the lack of regular site monitoring and public education about fossil collecting has led to increased illegal commercial taking of paleontological resources. Paleontological resources are also vulnerable to intentional or unintentional vandalism. The specific locations of some identified paleontological resources are kept confidential to avoid vandalism or theft.

The most likely locations of currently unknown paleontological resources can be identified based on geological characteristics, and potential impacts can be avoided or minimized through careful project planning and implementation. Most formations the rail line would cross are volcanic and would not contain paleontological resources. The cumulative impacts to paleontological resources from the proposed railroad and other existing and reasonably foreseeable projects would be small because most formations the rail line would cross are volcanic and would not contain paleontological resources. DOE also expects that other planned construction projects would avoid and minimize impacts where possible.

5.3.2.15 Environmental Justice

Environmental justice impacts result when high and adverse human-health or environmental impacts fall disproportionately on low-income and minority populations. If high and adverse impacts are found to have disproportionate impacts on environmental justice populations as compared to the general population of the area, the impacts would be mitigated to the extent practicable by the federal agencies involved in the Proposed Action.

Based on individual and group values, beliefs, and goals, there is a difference in perspective as to the potential effects of activities in the Mina region of influence on low-income and/or minority populations among the different stakeholders and other interested parties. The American Indian Resource Document (DIRS 174205-Kane et al. 2005) discusses cultural resources, American Indian values and their relationship to environmental justice, and broader American Indian values. DOE considers the American

Indian Writers Subgroup conclusions to be responsible opposing viewpoints for purposes of its environmental justice responsibilities.

The largest concentration of low-income or minority populations along the Mina rail alignment occurs in Mineral County and on the Walker River Paiute Reservation. The corridor would cross American Indian tribal lands, with the four Schurz alternative segments almost entirely on the Walker River Paiute Reservation (DIRS 180222-BSC 2006, all). There are approximately 1.4 square kilometers (350 acres) of Reservation lands in the corridor (DIRS 180222-BSC 2006, all). The population of the Reservation, estimated to be 853 persons in 2000, is low income and consists mainly of American Indians, a minority population. The poverty rate in Mineral County is 15 percent, which exceeds the rate of poverty (11 percent) in the State of Nevada, while the poverty rate of Walker River Paiute Reservation residents is 32 percent, nearly three times the rate of poverty in the state. The only moderate or large impacts that were identified relate to noise impacts from construction. These impacts would not occur on the Walker River Paiute Reservation; therefore, there would be no high and adverse effects that would disproportionately affect a low-income or minority community and there are no special pathways that would result in disproportionately high and adverse effects to low-income or minority communities.

DOE has concluded that there are no identifiable human-health or environmental impacts associated with the proposed railroad that are high and adverse and that would disproportionately affect low-income or minority populations, nor has the Department identified any special pathways for impacts (such as subsistence hunting and gathering) in the Mina region of influence. If, during the development of the inventory described in Section 4.3.13.4, additional cultural resources related primarily to American Indian interests were discovered that could not be avoided, then the magnitude of environmental justice impacts might also be larger and disproportionately high and adverse. Similarly, if during development of ethnographic studies special pathways were identified, then the magnitude of environmental justice impacts might be larger. Other existing and reasonably foreseeable projects do not appear to have disproportionately high and adverse impacts to low-income or minority populations, but cumulative impacts of all projects, including cultural impacts, are uncertain.

5.4 Combined Repository and Nevada Rail Transportation Impacts

This section presents the total estimated environmental impacts for the proposed construction, operations, monitoring, and closure of the repository combined with the environmental impacts from the proposed Nevada transportation activities. As construction along the rail alignment approached the physical location of the repository and its surface facilities, the potential for impacts to overlap would increase.

Table 5-6 provides an overview of the total combined impacts of the proposed repository and railroad in Nevada within overlapping regions of influence. In most instances, DOE evaluated the potential impacts qualitatively and judged them to be small. However, there are several air quality and groundwater impacts from the repository and the railroad actions that DOE was able to sum and quantify:

- Air Quality. The air quality impacts from simultaneous construction of the proposed repository and of the railroad and associated rail facilities would not produce criteria pollutant concentrations that exceeded the regulatory limit at the boundary of the analyzed repository land withdrawal area.
- Groundwater. Groundwater withdrawals would occur for both the repository and railroad actions from the same hydrographic area, specifically area 227A, Jackass Flats. DOE has analyzed water demand from both actions to gauge overall impacts to groundwater resources in the Jackass Flats area. The highest combined annual water demand for railroad and repository activities would be below the Nevada State Engineer's ruling of perennial yield (the amount that can be withdrawn annually without depleting reserves) for the Jackass Flats hydrographic area. The combined demand would also be lower than the lowest estimated perennial yield for the western two-thirds of this

hydrographic area. Coupled with the demand for Nevada Test Site activities in Jackass Flats, the total annual water demand would exceed the lowest estimated value of perennial yield for the western two-thirds of the hydrographic area during only one year. However, this estimated total combined water demand would still be below estimated values of perennial yield for the entire hydrographic area for all years. The combined repository and railroad actions would withdraw groundwater that would otherwise move into aquifers of the Amargosa Desert, but the combined water demand for the railroad, the repository, and Nevada Test Site activities in Jackass Flats would have, at most, small impacts on the availability of groundwater in the Amargosa Desert area in comparison with the quantities of water already being withdrawn there.

Table 5-6. Summary of combined repository and Nevada railroad impacts (page 1 of 3).

Resource area	Summary of repository and Nevada rail transportation impacts that occur within overlapping regions of influence
Land use and ownership	About 4.6 square miles (12 square kilometers) of disturbed land; 230 square miles (600 square kilometers) of land withdrawn from public use.
Air quality	Nye County is the only location where Nevada rail transportation impacts would overlap the repository region of influence. The Nevada rail transportation emissions would be distributed over the entire county and only the southern portion of the emissions from Nye County would be within the repository region of influence. Modeled concentrations of criteria pollutants at the boundary of the repository land withdrawal area would not exceed regulatory limits during simultaneous construction of the repository and railroad. Concentrations of all criteria pollutants except for particulate matter would be less than 6 percent of the regulatory limit. Concentrations of $PM_{2.5}$ would not exceed 37 percent, and concentrations of PM_{10} would not exceed 87 percent of the regulatory limit. The simultaneous operation of the repository and railroad would not exceed regulatory limits.
Hydrology	
Surface water	At least two of the drainage channels and floodplains (Busted Butte Wash and Drill Hole Wash) the rail line would cross would also be affected by construction of repository surface facilities.
Groundwater	Water identified for rail line construction includes 572 acre-feet (over 4 years) plus 6 acre-feet per year for operations, all from the same groundwater basin as for repository activities. A peak annual water demand of 470 acre-feet would result from the combined Nevada rail transportation and repository needs, assuming primary construction periods did not overlap. The average annual water demand for the combined construction period would be 400 acre-feet. All of the combined water demand levels would be below the lowest estimate of the groundwater basin's perennial yield (580 acre-feet). The year of highest water demand would not result in a well drawdown that could affect the nearest public or private wells. Modeling for the Yucca Mountain FEIS showed small to moderate impacts from the Proposed Action groundwater withdrawals that are still applicable. The model's assumed withdrawal rate of 430 acre-feet per year is lower than the peak water demand, but over the life of the project, is still conservatively high.
Biological resources and soils	Loss of up to 4.6 square miles (12 square kilometers) of desert soil, habitat, and vegetation, but no loss of rare or unique habitat or vegetation; adverse impacts to individual threatened desert tortoises and loss of a small amount of low-density tortoise habitat, but no adverse impacts to the species as a whole; reasonable and prudent measures would minimize impacts.
Cultural resources	Small potential for impacts; including three National Register-eligible prehistoric sites; opposing American Indian viewpoint.
Socioeconomic	
New jobs (percent of workforce in affected counties	Peak increases would be small, less than 1 percent in the region, Clark County, and Nye County when construction of the repository and the railroad overlap.
Peak real disposable income	For repository: In Clark County (2034), $58.3 million; in Nye County (2035) $27.5 million. For railroad: In Clark County (2011) $100.6 million; in Nye County (2012) $9.6 million.

Table 5-6. Summary of combined repository and Nevada railroad impacts (page 2 of 3).

Resource area	Summary of repository and Nevada rail transportation impacts that occur within overlapping regions of influence
Peak incremental gross regional product	For repository: In Clark County (2034), $98.7 million; in Nye County (2034) $68.9 million. For railroad: In Clark County (2012), $154.5 million; in Nye County (2012), $42.8 million.
Occupational and public health and safety	
Public, radiological	
Maximally exposed individual (probability of a latent cancer fatality)	2.9×10^{-4} (repository) 1.3×10^{-4} (transportation)
Population (latent cancer fatalities)	8.0
Public, nonradiological	
Fatalities due to emissions	Small; exposures well below regulatory limits.
Workers (involved and noninvolved)	
Radiological (latent cancer fatalities)	4.4 to 4.9
Nonradiological fatalities (includes commuting traffic fatalities)	56 to 59
Maximum reasonably foreseeable transportation accident (latent cancer fatalities)	0.012 (rural area) to 9.4 (urban area)
Accidents	
Public, radiological	
Maximally exposed individual (probability of a latent cancer fatality)	2.6×10^{-10} to 2.1×10^{-5} (repository accidents)
Population (latent cancer fatalities)	9.0×10^{-7} to 1.9×10^{-2} (repository accidents)
Workers, radiological	5.8×10^{-4} to 3.5 rem (3.5×10^{-7} to 2.1×10^{-3} latent cancer fatality) (repository accidents)
Noise and vibration	Impacts to public would be small due to large distances from the repository to residences; workers exposed to elevated noise levels; controls and protection would be used as necessary.
Aesthetics	The exhaust ventilation stacks on the crest of Yucca Mountain could be seen as an adverse aesthetic impact by American Indians. If the Federal Aviation Administration required beacons atop the stacks, they could be visible for a great distance, especially west of Yucca Mountain.

Table 5-6. Summary of combined repository and Nevada railroad impacts (page 3 of 3).

Resource area	Summary of repository and Nevada rail transportation impacts that occur within overlapping regions of influence
Utilities, energy, materials, and site services	Use of materials would be small in comparison to regional use; some effect on public water systems and public wastewater-treatment facilities due to population growth from construction and operations employment; annual fossil-fuel use would be less than 7 percent of statewide use during construction and less than 2 percent of statewide use during operation; electric power delivery system to the Yucca Mountain Site would have to be enhanced.
Waste and hazardous materials	Small impacts from nonhazardous waste (solid and industrial waste) disposal to regional solid waste facilities. Small impacts from use of hazardous materials. Small impacts from hazardous-waste disposal to regional licensed hazardous waste facilities. Small impacts from low-level radioactive waste disposal to a DOE low-level waste disposal site, an Agreement State site, or a Nuclear Regulatory Commission-licensed site.
Environmental justice	No high and adverse impact to population as a whole; no specific pathways for minority populations; therefore no high and adverse impacts to minorities and low-income populations; opposing American Indian viewpoint.
Manufacturing repository components	Not applicable.
Airspace restrictions	Small impacts to airspace use; airspace restriction could be lifted once operations have been completed.

5.5 Nye County Viewpoint

The viewpoints of the City of Caliente, Esmeralda County, and Lincoln County are located in Chapter 7. The text in this section was provided by Nye County, and DOE has inserted their text verbatim in this Rail Alignment EIS and the Rail Corridor SEIS. Nye County has also provided its viewpoints on mitigation, which is located in Chapter 7 of this EIS.

This section presents the perspective of Nye County as a cooperating agency for the Rail Corridor SEIS and Rail Alignment EIS on the cumulative impacts of the proposed rail corridor and rail alignment. The discussion summarized herein is based on input provided by Nye County's ranching sector and the county's own analyses of the likely impacts of transportation-related activities. It includes a discussion on the region of influence, impacts of past and present actions, reasonably foreseeable future actions, direct impacts, indirect impacts, cumulative adverse impacts, and ends with the perspective of Nye County on mitigation measures.

As the situs county for the repository and associated facilities, Nye County would be the funnel through which all waste shipments would converge for disposal, regardless of the final mode or method of transportation, or the route selected. While Nye County supports the successful construction and safe operation of the repository and the associated transportation systems, it requires that necessary steps be taken to protect the long-term interests of the county and its residents.

Nye County prefers the mostly rail transport of waste and a phased construction schedule in which DOE would construct the rail line and upgrade roads in the vicinity of Yucca Mountain prior to the beginning of repository construction. Nye County also prefers a through-going route with shared use. From the

Nye County perspective, impacts, both beneficial and adverse, associated with the proposed transportation alternatives would be cumulative. To remind the reader, according to Section 1508.7 of NEPA, "cumulative impacts" are impacts on the environment that result from incremental impacts of an action when added to other 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.

Region of Influence – From the perspective of Nye County, the region of influence may include Nye County in its entirety as well as the region surrounding the county. The county recognizes that the region of influence considered for analysis of cumulative impacts will vary, depending upon which element of the affected environment is being evaluated, and should be based on the region in which impacts may reasonably be expected to occur. For physical setting, cultural resources, noise, and biological resources, for example, the region of influence may be limited to those areas that would be disturbed during construction, operation, and maintenance of the rail line, access roads, well pads, and ballast quarries. The region of influence for air quality includes all topographic basins through which the rail line would be routed. The region of influence for surface-water and groundwater resources includes any hydrographic basins where actions would be taken and any basins to which they are tributary. The region of influence for socioeconomic impacts includes all towns, private lands, grazing allotments, and public roads that would be affected as a result of construction and operation of the rail line, or that are in proximity to the rail line.

Impacts of Past and Present Actions – Past and present actions by federal, state, and local agencies and private entities in Nye County are categorized into four broad areas: 1) land withdrawals and designations; 2) construction and maintenance of the existing transportation networks; 3) grazing and wildlife management policies and actions; and 4) congressional mandates regarding land and resource uses.

To date, more than 2.6 million acres within Nye County have been withdrawn for various federal missions and more than 59,000 acres have been designated for conservation, wildlife, or preservation. These land withdrawals and designations have resulted in significant limitations on transportation routes because of the lack of public rights-of-way across withdrawn lands. For example, it is not possible for Nye County citizens in the southern part of the county to travel to the northern part of the county without traveling a circuitous route through Esmeralda County, or Clark and Lincoln Counties. Similarly, shipments of forage, mineral commodities, and common freight cost more to transport within the county because of the limited transportation corridors. In addition, a significant loss of productivity from the lands that have been withdrawn or designated for special protection has occurred because of mandated cessation of mining and grazing activities.

Past construction of roads, rail lines, and utility corridors has resulted in adverse impacts on land, water, air quality, cultural resources, rangeland sustainability, and wildlife. Significant land areas have been disturbed, air and water quality have been degraded, and large areas of natural habitat have been altered or destroyed. In such cases, however, the potential adverse impacts are frequently offset by the benefits (such as additional transportation routes and utility access) to the county and its residents.

Resource management, protection, and preservation mandates and management policies related to these mandates have resulted in adverse impacts through the imposition of restrictions on water, mineral entries, and ranching activities with a corresponding decrease in long-term productivity from those lands and losses of potential tax revenues. The implementation of a number of federal mandates, including the Endangered Species Act, Federal Land Policy and Management Act, National Wilderness Act, Public Rangelands Improvement Act, and the Wild and Free Roaming Horse and Burro Act have resulted in reductions in land open to grazing and direct competition for forage between cattle and feral species.

Reasonably Foreseeable Future Actions – Reasonably foreseeable future actions in Nye County include both federal and non-federal actions that are expected to occur by the year 2050. Federal actions include the construction of the transportation network for waste shipments to Yucca Mountain; the continued operations at the Nevada Test Site and the Nevada Test and Training Range; implementation of resource management and general management plans for national parks, wildlife refuges, and public lands; and construction, operation, and closure of a high-level nuclear waste repository at Yucca Mountain.

The identification of reasonably foreseeable actions by government and the private sector is based on estimates of future population, land development patterns, and the availability of additional natural resources. These include new restrictions on land use through the designation of new Areas of Critical Environmental Concern, additional designations of Wilderness lands, the development of one or more new mines, the construction of renewable energy projects, and the construction of new energy transmission lines. See Sections 5.2.1.3.1 and 5.3.1.3.2 for more information.

Direct Impacts – The direct impacts of the Proposed Action would include the disturbance of land for the construction and maintenance of the rail line and construction and maintenance of related access roads, increased traffic during construction and operation of the rail line, the spread of noxious weeds and invasive species, reductions in rangeland carrying capacity, and disturbances to cattle operations through fencing, disruption of existing ranch roads, and the elimination of some roads as viable routes for cattle movement. Other direct impacts would include the localized lowering of water levels in the vicinity of water supply wells used for construction and operation of the rail line, increased livestock mortality rates, increased costs of transportation of forage and cattle, increased noise, impacts on air quality and visual resources, and degradation of surface-water quality.

Indirect Impacts – Indirect impacts would include decreased ranch revenues and associated taxes, the increased vulnerability of water supplies to any transportation-related accidents or sabotage events, decreased ranch values, and increased costs for noxious weed abatement. Other indirect impacts may include decreases in land values due to stigma associated with the wastes being transported and the proximity of the land to rail routes with their associated environmental impacts. Although Nye County does not perceive any stigma from the Proposed Action at this time, public perception and the stigma associated with nuclear waste transportation and disposal could attach to the county and affect property values as noted, adding to cumulative impacts from the Proposed Action.

Cumulative Adverse Impacts – The most important cumulative adverse impact from past federal actions related to land use and transportation would be the loss of additional land to the dedicated rights-of-way for the rail line and associated roads. More than 2 million acres of land in Nye County have been placed off-limits for grazing, new transportation routes, mining, and water resource development. The land required for the rail line would result in incremental increases in restrictions on transportation and resource development.

Nye County would incur significant increased costs in its battle to control noxious weeds and invasive species because of the large acreages of disturbed lands that would be incrementally added to those lands that have already been disturbed. Another major category of cumulative adverse impacts would be on the economic viability of the county's livestock industry. Increased operations costs and livestock mortality rates, coupled with decreases in range carrying capacity, livestock reproduction rates, and increased forage costs, could cripple some of the marginal ranching operations that are struggling to continue, and erode the profitability of more viable operations. This would be an adverse cumulative socioeconomic impact.

The last major category of adverse impacts would be a result of congressional mandates and federal policies with respect to land and resource use. Early federal policies led to the settlement and development of Nye County and the beneficial as well as adverse impacts resulting from mining,

ranching, farming, and urbanization that followed the implementation of these policies. Later federal policies, aimed at environmental protection, led to significant constraints on the development of resources needed to sustain the economic viability of the county. Compliance with these more recent federal policies has resulted in reductions in employment in some sectors, increased costs for development of water and land resources, decreased tax revenues, and loss of long-term productivity for large areas within Nye County. The Proposed Action would result in further environmental degradation, impose additional constraints on resource utilization, and incrementally add to the significant adverse impacts that have already occurred.

Mitigation Measures – From Nye County's perspective, most impacts could be addressed and mitigated through implementation of various measures. Given the failure to adequately mitigate the significant adverse impacts of past and current federal actions and policies, it is imperative from Nye County's perspective that the Record of Decision for this Rail Alignment EIS clearly identify the full spectrum of appropriate mitigation measures, whether or not DOE has the jurisdictional authority for implementation of the mitigating measures. Identification and implementation of such measures could be facilitated through consultation and cooperation between the county and DOE as part of an adaptive management program. With a memorandum of understanding/consultation and cooperation agreement, Nye County will assist DOE in the identification of environmental and socioeconomic impacts and their significance, and then cooperatively plan and develop effective mitigation measures. Some mitigation measures need to be started several years before the repository and rail construction and operations start (for example, road construction and worker training programs). As the situs jurisdiction for the Yucca Mountain Project, including the repository and a substantial portion of either of the proposed rail lines, Nye County has a tremendous stake in the NEPA process and will continue to participate as a cooperating agency to protect the safety, environmental values, and economic well-being of the residents of Nye County.

6. STATUTORY, REGULATORY, AND OTHER APPLICABLE REQUIREMENTS

This chapter identifies the permits and approvals, Federal Government and State of Nevada regulations, and Executive and DOE Orders that could apply to construction and operation of the proposed railroad.

Glossary terms are shown in ***bold italics***.

During proposed ***railroad*** construction and operations, the U.S. Department of Energy (DOE or the Department) would comply with applicable requirements, and has developed and is implementing a comprehensive approach to the permitting and approval processes that would ensure compliance.

As illustrated in Figure 6-1, compliance with regulatory requirements is the second step in the DOE approach to avoiding, minimizing or reducing environmental ***impacts***.

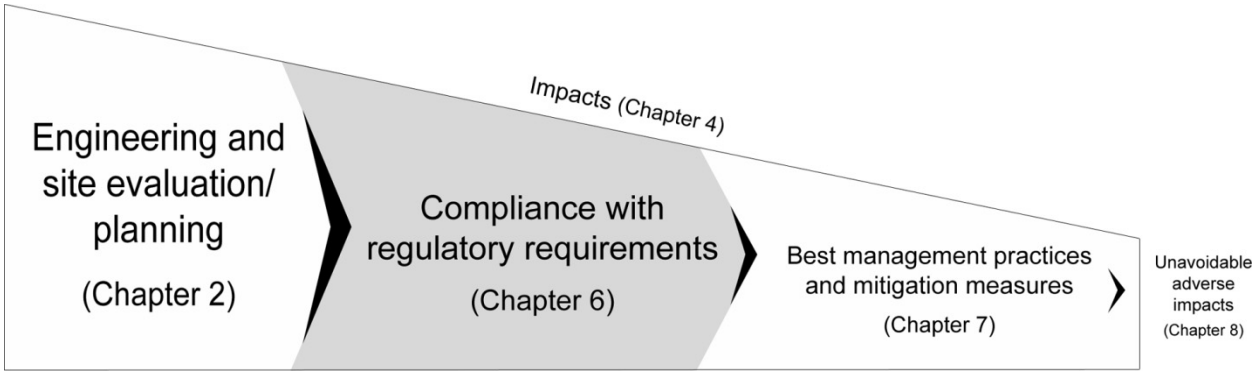

Figure 6-1. Multi-step approach to avoid, minimize, or reduce environmental impacts.

The chapter is organized as follows:

- Section 6.1 summarizes statutes and regulations that establish or affect DOE authority to construct and operate the proposed railroad.
- Section 6.2 identifies Surface Transportation Board (STB) requirements.
- Section 6.3 summarizes statutes and regulations that establish environmental protection requirements that could apply to construction and operation of the railroad.
- Section 6.4 identifies potentially applicable DOE Orders.
- Section 6.5 identifies U.S. Department of the Interior, Bureau of Indian Affairs, requirements.
- Section 6.6 identifies U.S. Department of the Interior, Bureau of Land Management (BLM), requirements.
- Section 6.7 identifies U.S. Army requirements.

Appendix A provides copies of the applicable *Federal Register* (*FR*) notices. Appendix B describes interagency, intergovernmental, and stakeholder interactions.

6.1 Statutes and Regulations Establishing or Relating to DOE Authority to Propose, Construct, and Operate a Railroad in Nevada for Shipment of Spent Nuclear Fuel and High-Level Radioactive Waste to the Repository at Yucca Mountain

This section summarizes the statutes and regulations that establish or affect DOE authority to propose, construct, and operate the proposed railroad.

6.1.1 NUCLEAR WASTE POLICY ACT, AS AMENDED (42 UNITED STATES CODE [U.S.C.] 10101 *et seq.*)

The Nuclear Waste Policy Act, as amended (NWPA), establishes the Federal Government's responsibility for the ***disposal*** of ***spent nuclear fuel*** and ***high-level radioactive waste*** and generators' responsibility to bear the costs of disposal. The NWPA identified the ***Yucca Mountain Site*** in Nye County, Nevada, as the only site to be studied as a potential location for a ***geologic repository***. As part of its obligations under the NWPA, DOE is responsible for developing a system to transport spent nuclear fuel and high-level ***radioactive*** waste to the repository. On April 8, 2004, DOE published *Record of Decision on Mode of Transportation and Nevada Rail Corridor for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, NV* (69 *FR* 18557) announcing the selection, both nationally and in the State of Nevada, of the mostly rail scenario analyzed in 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* 155970 (DIRS 155970-DOE 2002, all) as the mode of transportation for shipping spent nuclear fuel and high-level radioactive waste to Yucca Mountain and selected the Caliente ***rail corridor*** to evaluate alignments for a ***rail line***.

6.1.2 YUCCA MOUNTAIN DEVELOPMENT ACT OF 2002 (PUBLIC LAW 107-200)

On February 15, 2002, President George W. Bush approved the Secretary of Energy's recommendation of Yucca Mountain as the site for the development of a repository for the disposal of spent nuclear fuel and high-level radioactive waste. The House of Representatives approved the Yucca Mountain Site on May 8, 2002, as did the Senate on July 9, 2002. This approval of the site at Yucca Mountain became known as the Yucca Mountain Development Act, which the President signed into law on July 23, 2002. This Act is a joint resolution of the House of Representatives and Senate approving the site at Yucca Mountain, Nevada, for the development of a repository for the disposal of spent nuclear fuel and high-level radioactive waste, pursuant to the Nuclear Waste Policy Act of 1982, as amended.

6.1.3 ATOMIC ENERGY ACT, AS AMENDED (42 U.S.C. 2011 *et seq.*)

The Atomic Energy Act of 1954, as amended, provides fundamental jurisdictional authority to DOE and the U.S. Nuclear Regulatory Commission (NRC) over governmental and commercial use of nuclear materials. This Atomic Energy Act ensures proper management, production, possession, and use of radioactive materials. In accordance with the Atomic Energy Act, DOE established a system of requirements issued as DOE Orders.

The Atomic Energy Act gives the Nuclear Regulatory Commission specific authority to regulate the possession, transfer, ***storage***, and disposal of nuclear materials, and aspects of transportation packaging design for radioactive materials, including testing for packaging certification. Nuclear Regulatory Commission regulations applicable to the transportation of radioactive materials (10 Code of Federal Regulations [CFR] Parts 71 and 73) require that shipping ***casks*** meet specified performance criteria under both normal transport and hypothetical ***accident*** conditions. DOE and Nuclear Regulatory Commission

regulations applicable to protection against ***radiation*** (10 CFR Parts 20 and 835) address occupational ***dose*** limits, public dose limits, survey and monitoring procedures, ***exposure*** controls, respiratory protection and controls, precautionary procedures, and related topics. DOE would comply with all applicable radiation protection regulations during operation of the proposed railroad.

6.2 Surface Transportation Board Requirements

The STB has exclusive jurisdiction over the construction, acquisition, and operation of common-carrier railroads pursuant to the Interstate Commerce Act (as amended by the ICC Termination Act of 1995 [Public Law 104-88, 109 Stat. 803 (1995)]). To operate the proposed railroad under the Shared-Use Option, DOE would have to apply for a "certificate of public convenience and necessity" issued under 49 U.S.C. 10901 or under 49 U.S.C. 10502. The regulations prescribing how to apply for a certificate to construct and operate a rail line are provided in 49 CFR Part 1150.

The STB has jurisdiction over common-carrier rail lines that are part of the interstate rail network. This jurisdiction includes facilities and structures that are an integral part of rail transportation [49 U.S.C. 10501(b); 49 U.S.C. 10102(9)]. Section 10501(b) also states that "the remedies provided under this part are exclusive and preempt the remedies provided under federal and state law." The purpose of Section 10501(b) is to prevent a patchwork of local regulation from unreasonably interfering with interstate commerce. Thus, Section 10501(b) does not permit dual state and federal regulation of railroads or activities related to rail transportation at railroad facilities. This statutory framework, with supporting case law, supports the STB broad preemption authority.

The STB preemption authority applies to state or local regulation of matters directly related to the STB, and state or local pre-clearance or permitting requirements – such as zoning ordinances and environmental and land-use permitting requirements – that could be used to deny or defeat a railroad's ability to conduct its operations. Thus, a local or state body cannot deny a carrier the right to construct, develop, and maintain facilities or conduct operations, because this denial would create irreconcilable conflict with the STB's exclusive jurisdiction over such facilities and operations.

While exempt from traditional permitting, zoning, and land-use processes for railroad operations, railroads such as the one DOE proposes are not necessarily exempt from other applicable laws. The states retain the police powers reserved by the 10th Amendment of the U.S. Constitution. Pursuant to the Commerce Clause, Article I, Section 8 of the U.S. Constitution, states can take appropriate actions to protect public health and safety so long as their actions do not regulate operations or unreasonably interfere with interstate commerce.

STB environmental regulations are set forth in 49 CFR Part 1105. These rules require consideration of various environmental statutes, including the National Environmental Policy Act (NEPA), the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 *et seq*.), and the Energy Policy and Conservation Act (42 U.S.C. 6361; Public Law 94-163). These rules combine the STB's former environmental and energy regulations; revise and clarify environmental and historic requirements; require service of environmental reports on certain state, federal, and local agencies; and reclassify and clarify the types of actions for which environmental and other historic reports and analyses are required. For railroads providing service to commercial interests, these regulations enable applicants, interested parties, and STB environmental staff to better identify and more expeditiously resolve environmental concerns associated with proposed actions. If DOE implemented the Shared-Use Option, this Rail Alignment environmental impact statement (EIS) is intended to satisfy the STB environmental analysis requirements provided for in 49 CFR Parts 1105 and 1150.

If DOE implemented the ***Shared-Use Option*** as part of the ***Proposed Action***, the Department would have to obtain a certificate of public convenience and necessity to construct and operate the railroad from the STB. Although DOE has not made a decision whether to construct and operate a railroad, DOE filed an application for a certificate of public convenience and necessity with the STB on March 17, 2008 (DIRS 185339-Vandeberg 2008, all). As part of its review process, the STB must consider the environmental effects of railroad construction and operations. The STB Section of Environmental Analysis is responsible for preparing the appropriate NEPA documentation for railroad construction and operations cases under the jurisdiction of the STB. If any NEPA documentation were required in addition to this Rail Alignment EIS to support an STB decision on whether to issue a certificate of public convenience and necessity, that additional NEPA documentation would be prepared by the STB. If DOE did not select the Shared-Use Option, the STB would have no regulatory authority related to the Proposed Action. The Shared-Use Option involves operating the proposed railroad as a common-carrier railroad – one that holds itself out to the public for service and has an obligation to provide rail service to any and all shippers that request service along that line.

6.3 Potential Statutes, Regulations, and Executive Orders Regarding Environmental Protection Requirements

This section summarizes, according to environmental topic, the statutes, regulations, and Executive Orders that set environmental protection requirements that could apply to construction and operation of the proposed railroad.

Table 6-1 is organized by environmental topic and is a comprehensive summary of the regulatory actions DOE could take for construction and operation of the proposed railroad. This table lists the permits, licenses, approvals, statutes or regulations, and agency associated with each regulatory action. Table 6-2 lists applicable federal codified regulations, Executive Orders, and other documents and directives.

Table 6-1. Potential permits, licenses, and approvals necessary for construction and operation of the proposed railroad in the State of Nevada (page 1 of 4).

Regulatory action	Statute or regulation[a]	Agency	Activity
Air Quality			
Air quality operating permit	NAC 445B.287 *et seq.*	Nevada Division of Environmental Protection	Demonstrate control of surface disturbances and emissions of criteria pollutants.
Water Quality and Use			
Stormwater discharge permit and other National Pollutant Discharge Elimination System permits	40 CFR Part 122 NAC 445A.266	U.S. Environmental Protection Agency Nevada Division of Environmental Protection	Control of stormwater discharges and point-source discharges.
Temporary permit to work in waterways (rolling stock permit)	NRS 445A.485 NAC 445A.266 through 445A.272	Nevada Division of Environmental Protection	Work in waterways of the state.
Section 404 regulates discharge dredge or fill materials to waters of the United States	Clean Water Act, Section 404 33 CFR Part 323	U.S. Army Corps of Engineers	Discharge dredge or fill materials into waters of the United States for bridges and culverts in interstate streams, dry washes, and wetlands.

Table 6-1. Potential permits, licenses, and approvals necessary for construction and operation of the proposed railroad in the State of Nevada (page 2 of 4).

Regulatory action	Statute or regulation[a]	Agency	Activity
Water Quality and Use (continued)			
Section 401, water quality certification by State of Nevada	Clean Water Act, Section 401 40 CFR 131	U.S. Army Corps of Engineers Nevada Division of Environmental Protection, Bureau of Water Quality Planning	Section 401 review requires state certification prior to issuance of Section 404 permit to discharge dredge or fill materials to waters of the United States. The request is made by U.S. Army Corps of Engineers to Nevada Division of Environmental Protection, Bureau of Water Quality Planning, to certify that the proposed activity will not violate state or federal water standards.
Water appropriation permit	NRS 533.324 through 533.435	Nevada State Engineer	Drill wells or use existing wells to withdraw groundwater to support rail construction.
Underground water and wells	NAC 534	Nevada State Engineer	Drill wells and use wells to withdraw groundwater to support rail construction.
Septic/sewage disposal permit	40 CFR Part 122 NAC 445A.810 through 445A.925 NAC 444.750 through 444.828	U.S. Environmental Protection Agency Nevada Division of Environmental Protection	Construct and operate temporary or permanent sanitary-sewage collection systems for construction camps and railroad operations facilities.
Hazardous Materials			
Hazardous materials storage permit	NAC 459 NAC 477.323	Nevada State Fire Marshal	Store and use hazardous materials, including explosives, associated with construction and operation of the proposed railroad.
Hazardous waste generation, storage, transportation, and disposal permit	Resource Conservation and Recovery Act (42 U.S.C. 6962), Subtitle C 40 CFR Part 261 40 CFR Part 262 40 CFR Part 263 40 CFR Part 264 40 CFR Part 268 40 CFR Part 270 40 CFR Part 273 40 CFR Part 279 NRS 459.400 to 459.600	U.S. Environmental Protection Agency Nevada Division of Environmental Protection	Transport, handle, treat, store, and dispose of Resource Conservation and Recovery Act hazardous wastes used during railroad construction and operations.

Table 6-1. Potential permits, licenses, and approvals necessary for construction and operation of the proposed railroad in the State of Nevada (page 3 of 4).

Regulatory action	Statute or regulation[a]	Agency	Activity
Hazardous Materials (continued)			
Hazardous waste transportation approval, exemption, or permit	Hazardous Materials Transportation Act (49 U.S.C. 1801) 49 CFR Parts 171 to 180	U.S. Department of Transportation	Shipment of hazardous waste, including spent nuclear fuel and high-level radioactive waste.
Type B package approval	10 CFR Part 71	U.S. Nuclear Regulatory Commission	Shipment of spent nuclear fuel and high-level radioactive waste.
Cultural Resources			
Protection of cultural resources and development of programmatic agreement	National Historic Preservation Act (16 U.S.C. 470 *et seq.*) The Archaeological Resources Protection Act (16 U.S.C. 470aa *et seq.*) The Antiquities Act (16 U.S.C. 431 through 433) The American Indian Religious Freedom Act (42 U.S.C. 1996) The Native American Graves Protection and Repatriation Act (25 U.S.C. 3001 *et seq.*) 36 CFR Part 79 36 CFR Part 800	Advisory Council on Historic Preservation Nevada State Historic Preservation Office	Protect cultural resources; applicable to all activities that disturb the land.
Ecology and Habitat			
Endangered species consultation	50 CFR Part 402	U.S. Fish and Wildlife Service	Protect listed threatened and endangered species and designated critical habitat; applicable to all activities that disturb the habitat of threatened and endangered species.
Land and Water Use			
Free-use permit for sand and gravel	43 CFR Part 3600	Bureau of Land Management	Use sand, stone, and gravel from public lands during construction of the rail line.

Table 6-1. Potential permits, licenses, and approvals necessary for construction and operation of the proposed railroad in the State of Nevada (page 4 of 4).

Regulatory Action	Statute or Regulation[a]	Agency	Activity
Land and Water Use (continued)			
Right-of-way reservations	43 CFR Part 2800	Bureau of Land Management	Obtain rights-of-way for access to land that is needed for construction, operation, and access to the rail line, roads, construction camps, borrow pits, and other facilities.
Permit for a ***public water system***	NAC 445A.602 through 445A.612	Nevada Division of Environmental Protection	Construct and operate a public water-supply system at construction camps and some railroad operations facilities.
Construction			
Communication system authorization	Communications Act 47 CFR Part 17 47 CFR Part 24	Federal Communications Commission	Construct and operate a radio system and install fiber optics.
Operating permit for construction/labor camps	NRS 444.130 *et seq.*	Nevada State Health Division	Maintain specified conditions for construction and labor camps in Nevada.
Permit to cross state highways (occupancy permit)	NRS 408.423 NRS 408.423 through 408.427 NAC 703.455	Nevada Department of Transportation Nevada Public Utilities Commission	Construct rail line across a state highway or occupy a highway right-of-way. Applies also to construction of access roads, water pipelines, and other infrastructure that would intersect highway rights-of-way.

a. CFR = Code of Federal Regulations; NAC = Nevada Administrative Code; NRS = Nevada Revised Statutes.

Table 6-2. Potentially applicable federal regulations and Executive Orders (page 1 of 11).

Regulation/Order	Title	Subject
Regulation[a]		
7 CFR Part 658	Farmland Protection Policy Act	Law minimizes the extent to which federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses.
10 CFR Part 20	Standards for Protection Against Radiation	Standards for protection against ionizing radiation resulting from activities conducted under licenses issued by the Nuclear Regulatory Commission.
10 CFR Part 34	Licenses for Industrial Radiography and Radiation Safety Requirements for Industrial Radiographic Operations	Requirements for the issuance of licenses for the use of sealed sources containing byproduct material and radiation safety requirements for persons using sealed sources in industrial radiography.
10 CFR Part 71	Packaging and Transportation of Radioactive Material	Requirements for packaging, preparation for shipment, and transportation of licensed fissile material.

Table 6-2. Potentially applicable federal regulations and Executive Orders (page 2 of 11).

Regulation/Order	Title	Subject
10 CFR Part 73	Physical Protection of Plants and Materials	Requirements for the establishment and maintenance of a physical protection system which have capabilities for the protection of special nuclear material.
10 CFR Part 75	Safeguards on Nuclear Material–Implementation of U.S./International Atomic Energy Agency Agreement	Establishes a system of nuclear material accounting and nuclear material control to implement the agreement between the United States and the International Atomic Energy Agency for the Application of Safeguards in the United States.
10 CFR Part 830	Nuclear Safety Management	Standards for governing the conduct of DOE contractors, DOE personnel, and other persons conducting activities (including providing items and services) that affect the safety of DOE nuclear facilities.
10 CFR Part 835	Occupational Radiation Protection	Radiation protection standards, limits, and program requirements for protecting individuals from ionizing radiation resulting from the conduct of DOE activities.
10 CFR Part 860	Trespassing on Department of Energy Property	Requirements for the protection and security of facilities, installations and real property subject to the jurisdiction or administration, or in the custody of, DOE.
10 CFR Part 1010	Conduct of Employees	Standards for conduct of employees of DOE, excluding employees of the Federal Energy Regulatory Commission.
10 CFR Part 1021	National Environmental Policy Act Implementing Procedures	Establishes the procedures that DOE shall use to comply with section 102(2) of the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4332(2)) and the Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA (40 CFR parts 1500-1508). To be used in conjunction with the CEQ regulations.
10 CFR Part 1022	Compliance with Floodplain/Wetland Environmental Review Requirements	Policy and procedures for discharging DOE responsibilities under Executive Order 11988 and Executive Order 11990, including: DOE policy regarding the consideration of floodplain and wetland factors in DOE planning and decisionmaking; and DOE procedures for identifying proposed actions located in a floodplain or wetland, providing opportunity for early public review of such proposed actions, preparing floodplain or wetland assessments, and issuing statements of findings for actions in a floodplain.
25 CFR Part 162	Leases and Permits	Policies and procedures for lease of tribal lands, Bureau of Indian Affairs.

Table 6-2. Potentially applicable federal regulations and Executive Orders (page 3 of 11).

Regulation/Order	Title	Subject
25 CFR Part 169	Rights-of-Way Over Indian Lands	Procedures, terms, and conditions under which rights-of-way over and across tribal land, individually owned land, and government-owned land may be granted.
29 CFR Part 1910	Occupational Safety and Health Standards	Standards for industry and business for occupational safety and health.
29 CFR Part 1926	Safety and Health Regulations for Construction	Standards for safety and health for construction activities.
29 CFR Part 1960	Recordkeeping and Reporting	Basic program elements for occupational safety and health programs and related matters for federal employees.
33 CFR Part 323	Permits for Discharges of Dredged or Fill Material into Waters of the United States	Policies, practices, and procedures to be followed by the Army Corps of Engineers to review of applications for permits to authorize the discharge of dredged or fill material into waters of the United States pursuant to Section 404 of the Clean Water Act.
36 CFR Part 79	Curation of Federally-Owned and Administered Archaeological Collections	Standards, procedures, and guidelines to be followed by federal agencies to preserve collections of prehistoric and historic material remains, and associated records, recovered under the authority of the Antiquities Act, the Reservoir Salvage Act, Section 110 of the National Historic Preservation Act, or the Archaeological Resources Protection Act.
36 CFR Part 296	Protection of Archaeological Resources: Uniform Regulations	Standards and procedures for federal land managers to provide protection for archaeological resources, located on public lands and Indian lands of the United States.
36 CFR Part 800	Protection of Historic and Cultural Properties	Procedures for federal agencies to meet statutory responsibilities for historic preservation concerns with the needs of historic properties.
40 CFR Part 50	National Primary and Secondary Ambient Air Quality Standards	National primary and secondary ambient air quality standards.
40 CFR Part 60	Standards of Performance for New Stationary Sources	Air standards of performance for new stationary sources.
40 CFR Part 61	National Emission Standards for Hazardous Air Pollutants	Emission standards for hazardous air pollutants.
40 CFR Part 63	National Emission Standards for Hazardous Air Pollutants for Source Categories	Emission standards for hazardous air pollutants for source categories.

Table 6-2. Potentially applicable federal regulations and Executive Orders (page 4 of 11).

Regulation/Order	Title	Subject
40 CFR Part 68	Chemical Accident Prevention Provisions	List of regulated substances and threshold quantities, and accident prevention regulations, the petition process for adding or deleting substances to the list of regulated substances, the requirements for owners or operators of stationary sources concerning the prevention of accidental releases, and the state accidental release prevention programs.
40 CFR Part 112	Oil Pollution Prevention	Procedures, methods, equipment, and other requirements to prevent the discharge of oil from non-transportation-related onshore and offshore facilities into or upon the navigable waters of the United States or adjoining shorelines.
40 CFR Part 122	EPA Administered Permit Programs: The National Pollutant Discharge Elimination System	Permit programs for the National Pollutant Discharge Elimination System that requires permits for the discharge of "pollutants" from any "point source" into "waters of the United States."
40 CFR Part 125	Criteria and Standards for National Pollutant Discharge Elimination System	Criteria and standards for technology-based treatment requirements for permits under the National Pollutant Discharge Elimination System.
40 CFR Part 131	Water Quality Standards	Requirements and procedures for developing, reviewing, revising, and approving water quality standards by the states for Section 404 Permits for Discharges of Dredged or Fill Material into Waters of the United States.
40 CFR Part 136	Guidelines for Establishing Test Procedures for Analysis of Pollutants	Guidelines for test procedures for analysis of pollutants to be used to perform measurements of waste constituents specified for a state having an approved National Pollutant Discharge Elimination System program.
40 CFR Part 141	National Primary Drinking Water Regulations	Primary standards for public drinking water supplies, including maximum contaminant levels, sampling and analysis, monitoring and reporting, and recordkeeping requirements.
40 CFR Part 142	National Primary Drinking Water Regulations Implementation	Regulations for the implementation and enforcement of the national primary drinking water regulations contained in 40 CFR Part 141.
40 CFR Part 143	National Secondary Drinking Water Regulations	Secondary standards for public drinking water supplies that primarily affect the aesthetic qualities relating to the public acceptance of drinking water.
40 CFR Part 260	Hazardous Waste Management System: General	Definitions of terms, general standards, and overview information applicable to parts 260 through 265 and 268 that sets forth the requirements for hazardous waste generators, transporters, or owners or operators of treatment, storage, or disposal facilities.

Table 6-2. Potentially applicable federal regulations and Executive Orders (page 5 of 11).

Regulation/Order	Title	Subject
40 CFR Part 261	Identification and Listing of Hazardous Waste	Standards and criteria for identifying the characteristics of hazardous waste and for listing hazardous waste.
40 CFR Part 262	Standards Applicable to Generators of Hazardous Waste	Standards for generators of hazardous waste.
40 CFR Part 263	Standards Applicable to Transporters of Hazardous Waste	Standards for transporters of hazardous waste.
40 CFR Part 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	Standards for hazardous waste treatment, storage, and disposal facilities.
40 CFR Part 265	Interim Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	Interim standards for hazardous waste treatment, storage, and disposal facilities.
40 CFR Part 268	Land Disposal Restrictions	Identifies hazardous wastes that are restricted from land disposal and defines treatment requirements for which an otherwise prohibited waste may be land disposed.
40 CFR Part 270	EPA Administered Permit Programs: The Hazardous Waste Permit Program	Hazardous waste permit requirements, including application requirements, standard permit conditions, and monitoring and reporting requirements.
40 CFR Part 273	Standards for Universal Waste Management	Requirements for managing universal waste, including batteries, pesticides, thermostats, and lamps.
40 CFR Part 279	Standards for the Management of Used Oil	Standards for used oil generators, transporters, transfer facilities, collection centers, and processors and re-refineries.
40 CFR Part 302	Designation, Reportable Quantities, and Notification	Standards for designation, reportable quantities, and notification requirements for hazardous substances.
40 CFR Part 355	Emergency Planning and Notification	Establishes the list of extremely hazardous substances, threshold planning quantities, and facility notification responsibilities necessary for the development and implementation of state and local emergency response plans.
40 CFR Part 370	Hazardous Chemical Reporting: Community Right-to-Know	Reporting requirements that provide the public with important information on the hazardous chemicals in their communities for the purpose of enhancing community awareness of chemical hazards and facilitating development of state and local emergency response plans.

Table 6-2. Potentially applicable federal regulations and Executive Orders (page 6 of 11).

Regulation/Order	Title	Subject
40 CFR Part 372	Toxic Release Chemical Reporting: Community Right-to-Know	Requirements for informing the public and the communities surrounding covered facilities about the release of toxic chemicals under Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986.
40 CFR Part 503	Standards for the Use or Disposal of Sewage Sludge	General requirements, pollutant limits, management practices, and operational standards for the final use or disposal of sewage sludge generated during the treatment of domestic sewage in a treatment works.
40 CFR Parts 1500 through 1508	Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act	Regulations applicable to and binding on all federal agencies for implementing the procedural provisions of the National Environmental Policy Act.
41 CFR Part 101	Federal Property Management Regulations	Introductory material concerning the Federal Property Management Regulations System: its content, types, publication, authority, applicability, numbering, deviation procedure, as well as agency consultation, implementation, and supplementation.
43 CFR Part 3	Preservation of American Antiquities	Permit requirements for the preservation of ruins, archeological sites, historic and prehistoric monuments and structures, objects of antiquity, historic landmarks, and other objects of historic and scientific interest.
43 CFR Part 7	Protection of Archaeological Resources	Implementing provisions of the Archaeological Resources Protection Act of 1979, as amended, by establishing uniform definitions, standards, and procedures to be followed by federal land managers in providing protection for archaeological resources, located on public lands and Indian lands of the United States.
43 CFR Part 1600	Planning, Programming, Budgeting	Establishes a process for the development, approval, maintenance, amendment, and revision of resource management plans, and the use of existing plans for public lands administered by the Bureau of Land Management.
43 CFR Part 2300	Land Withdrawals	Procedures implementing the Secretary of the Interior's authority to process federal land withdrawal applications and, where appropriate, to make, modify, or extend federal land withdrawals.
43 CFR Part 2800	Rights-of-Way, Principles and Procedures; Rights-of-Way Under the Federal Land Policy and Management Act	Grants for necessary transportation or other systems and facilities which are in the public interest and which require the use of public lands for the purposes identified in 43 U.S.C. 1761, and administering, amending, assigning, renewing, and terminating them.

Table 6-2. Potentially applicable federal regulations and Executive Orders (page 7 of 11).

Regulation/Order	Title	Subject
43 CFR Part 3100	Oil and Gas Leasing	Procedures for oil and gas leasing in public domain lands. Issuances of leases, associated fees and bonds, lease transfers, extensions, and terminations are covered under this regulation.
43 CFR Part 3600	Mineral Materials Disposal	Procedures for the exploration, development, and disposal of mineral material resources on the public lands, and for the protection of the resources and the environment.
43 CFR Part 3620	Free Use of Petrified Wood	Terms and conditions for persons collecting limited quantities of petrified wood for noncommercial purposes consistent with the preservation of significant deposits as a public recreational resource.
47 CFR Part 17	Construction, Marking, and Lighting of Antenna Structures	Standards for construction, marking, lighting, maintenance, and inspection of antenna structures.
47 CFR Part 24	Personal Communications Services	Conditions under which portions of the radio spectrum are made available and licensed for personal communications.
49 CFR Part 40	Procedures for Transportation Workplace Drug and Alcohol Testing Programs	Procedures for conducting workplace drug and alcohol testing for the federally regulated transportation industry.
49 CFR Part 107	Hazardous Materials Program Procedures	Procedures and permits for the transportation of hazardous materials.
49 CFR Part 171	General Information, Regulations, and Definitions	General information, regulations, and definitions for the safe and secure transportation of hazardous materials in commerce.
49 CFR Part 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements	Listing and classification of materials that the Department of Transportation has designated as hazardous materials for purposes of transportation and prescribes the requirements for shipping papers, packaging, marking, labeling, and transport vehicle placarding applicable to the shipment and transportation of those materials.
49 CFR Part 173	Shippers–General Requirements for Shipments and Packaging	Requirements for preparing hazardous materials for shipment by air, highway, rail, or water, and inspection, testing, and retesting responsibilities for persons who retest, recondition, maintain, repair, and rebuild containers used or intended for use in the transportation of hazardous materials.
49 CFR Part 174	Carriage By Rail	Handling, loading, and operating requirements for transport of hazardous and radioactive materials by rail.
49 CFR Part 177	Carriage By Public Highway	Requirements for transportation of hazardous materials by private, common, or contract carriers by motor vehicle, including hazardous materials training.

Table 6-2. Potentially applicable federal regulations and Executive Orders (page 8 of 11).

Regulation/Order	Title	Subject
49 CFR Part 178	Specifications for Packaging	Manufacturing and testing specifications for packaging and containers used for the transportation of hazardous materials in commerce.
49 CFR Part 179	Specifications for Tank Cars	Specifications for tanks that are mounted on or form part of a tank car and which are to be marked with a Department of Transportation specification.
49 CFR Part 180	Continuing Qualification and Maintenance of Packaging	Requirements for the maintenance, reconditioning, repair, inspection, and testing of packaging, and any other function having an effect on the continuing qualification and use of a packaging.
49 CFR Part 210	Rail Noise Emission Compliance Regulations	Inspection and testing requirements for railcars for compliance with the Railroad Noise Emission Standards established by the Environmental Protection Agency in 40 CFR part 201.
49 CFR Part 213	Track Safety Standards	Minimum safety requirements for railroad track that is part of the general railroad system of transportation.
49 CFR Part 214	Railroad Workplace Safety	Minimum federal safety standards for railroad employees involved in railroad inspection, maintenance, and construction activities.
49 CFR Part 215	Railroad Freight Car Safety Standards	Minimum federal safety standards for railroad freight cars.
49 CFR Part 217	Railroad Operating Rules	Railroad operating rules and practices with respect to trains and other rolling equipment in the railroad industry, and each railroad is required to instruct its employees in operating practices.
49 CFR Part 218	Railroad Operating Practices	Minimum requirements for railroad operating rules and practices. Each railroad may prescribe additional or more stringent requirements in its operating rules, timetables, timetable special instructions, and other special instructions.
49 CFR Part 219	Control of Alcohol and Drug Use	Minimum federal safety standards for control of alcohol and drug use by rail line employees.
49 CFR Part 220	Railroad Communications	Wireless and radio communication procedures for trains and rail line workers.
49 CFR Part 221	Rear End Marking Device–Passenger, Commuter, and Freight Trains	Minimum requirements governing highly visible marking devices for the trailing end of the rear car of all passenger, commuter, and freight trains.
49 CFR Part 223	Safety Glazing Standards–Locomotives, Passenger Cars, and Cabooses	Minimum requirements for glazing materials in order to protect railroad employees and railroad passengers from injury as a result of objects striking the windows of locomotives, cabooses, and passenger cars.

Table 6-2. Potentially applicable federal regulations and Executive Orders (page 9 of 11).

Regulation/Order	Title	Subject
49 CFR Part 225	Railroad Accidents/Incidents: Reports, Classification, and Investigations	Reporting, classification, and investigation procedures for rail line accidents and incidents.
49 CFR Part 228	Hours of Service of Railroad Employees	Records and reporting requirements for railroad employees hours of service and construction of sleeping quarters.
49 CFR Part 229	Railroad Locomotive Safety Standards	Minimum safety requirements for locomotives.
49 CFR Part 231	Railroad Safety Appliance Standards	Safety standards for locomotives and railcars.
49 CFR Part 232	Brake System Safety Standards for Freight and Other Non-Passenger Trains and Equipment	Requirements for railroad power brakes and drawbars for freight and other nonpassenger trains.
49 CFR Part 233	Signal Systems Reporting Requirements	Reporting requirements for railroad signal systems.
49 CFR Part 234	Grade Crossing Signal System Safety	Inspection, testing, and maintenance requirements for rail crossing signal systems.
49 CFR Part 235	Instructions Governing Applications for Approval of a Discontinuance or Material Modification of a Signal System or Relief from the Requirements of Part 236	Provides applications for approval to discontinue or materially modify block signal systems, interlockings, traffic control systems, automatic train stop, train control, or cab signal systems, or other similar appliances, devices, methods, or systems.
49 CFR Part 236	Rules, Standards, and Instructions Governing the Installation, Inspection, Maintenance, and Repair of Signal and Train Control Systems, Devices, and Appliances	Rules, standards and instructions for the installation, inspection, maintenance, and repair of signal and train control systems, devices, and appliances.
49 CFR Part 240	Qualification and Certification of Locomotive Engineers	Qualification and certification requirements for locomotive engineers.
49 CFR Part 395	Hours of Service of Drivers	Hours of service requirements for drivers of commercial motor vehicles.
49 CFR Part 1005	Principles and Practices for the Investigation and Voluntary Disposition of Loss and Damage Claims and Processing Salvage	Principles and practices for the investigation and voluntary disposition of loss and damage claims and processing salvage.

Table 6-2. Potentially applicable federal regulations and Executive Orders (page 10 of 11).

Regulation/Order	Title	Subject
49 CFR Part 1035	Bills of Lading	Requirements for uniform bills of lading.
49 CFR Part 1104	Filing with the Board-Copies-Verification-Service-Pleadings	Requirements for filing of pleading and other documents with the Surface Transportation Board.
49 CFR Part 1105	Procedures for Implementation of Environmental Laws	Procedures for implementation of environmental laws by the Surface Transportation Board.
49 CFR Part 1150	Certificate to Construct, Acquire, or Operate Railroad Lines	Administrative practices and procedures to obtain certification for construction, acquisition, or operation of railroad lines.
50 CFR Part 15	Wild Bird Conservation Act	Standards for the protection of wild birds.
50 CFR Part 17	Endangered and Threatened Wildlife and Plants	Standards for the protection of endangered and threatened wildlife and plants.
50 CFR Part 402	Interagency Cooperation–Endangered Species Act of 1973, as Amended	Interprets and implements the Endangered Species Act of 1973, as amended.
Executive Orders		
Executive Order 11514	*Protection and Enhancement of Environmental Quality*	The Federal Government shall provide leadership in protecting and enhancing the quality of the Nation's environment to sustain and enrich human life. Federal agencies shall initiate measures needed to direct their policies, plans, and programs so as to meet national environmental goals.
Executive Order 11593	*Protection and Enhancement of the Cultural Environment*	The Federal Government shall provide leadership in preserving, restoring, and maintaining the historic and cultural environment of the Nation and institute procedures to assure that federal plans and programs contribute to the preservation and enhancement of non-federally owned sites, structures, and objects of historical, architectural or archaeological significance.
Executive Order 11988	*Floodplain Management*	Federal agencies shall provide leadership and take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for acquiring, managing, and disposing of federal lands and facilities.
Executive Order 11990	*Protection of Wetlands*	Federal agencies shall provide leadership and shall take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities for acquiring, managing, and disposing of federal lands and facilities.
Executive Order 12088	*Federal Compliance with Pollution Control Standards*	Federal agencies are responsible for compliance with applicable pollution control standards.

Table 6-2. Potentially applicable federal regulations and Executive Orders (page 11 of 11).

Regulation/Order	Title	Subject
Executive Order 12898	*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*	Federal agencies shall make achieving ***environmental justice*** part of their missions by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on ***minority populations*** and ***low-income populations***.
Executive Order 13007	*Indian Sacred Sites*	In managing federal lands, each executive branch agency with statutory or administrative responsibility for the management of federal lands shall accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and avoid adversely affecting the physical integrity of such sacred sites.
Executive Order 13112	*Invasive Species*	Federal agencies shall prevent the introduction of invasive species and provide for their control, and to minimize the economic, ecological, and human health impacts that invasive species cause.
Executive Order 13132	*Federalism*	Establishes policy to guarantee the division of governmental responsibilities between the national government and the states, and to ensure that the principles of federalism guide the executive departments and agencies in the formulation and implementation of policies.
Executive Order 13175	*Consultation and Coordination with Indian Tribal Governments*	Federal agencies shall establish regular and meaningful consultation and collaboration with Indian tribal governments in the development of regulatory practices on federal matters that significantly or uniquely affect their communities, to reduce the imposition of unfunded mandates upon Indian tribal governments, and to streamline the application process for and increase the availability of waivers to Indian tribal governments.
Executive Order 13186	*Responsibilities of Federal Agencies to Protect Migratory Birds*	The United States recognizes that migratory birds are of great ecological and economic value to this country and to other countries. They contribute to biological diversity and bring tremendous enjoyment to millions of Americans who study, watch, feed, or hunt these birds throughout the United States and other countries. The United States has recognized the critical importance of this shared resource by ratifying international, bilateral conventions for the conservation of migratory birds.
Executive Order 13423	*Strengthening Federal Environmental, Energy, and Transportation Management*	Federal agencies must conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions in an environmentally, economically and fiscally sound, integrated, continuously improving, efficient, and sustainable manner.

a. CFR = Code of Federal Regulations.

Table 6-3 lists applicable State of Nevada codes and statutes. Sections 6.3.1 through 6.3.9 are organized by environmental topic and describe the laws, regulations, Executive Orders, State of Nevada codes and statutes, and regulatory actions potentially applicable to construction and operation of the proposed railroad facilities.

Table 6-3. Potentially applicable State of Nevada codes and statutes (page 1 of 3).

Code or statute[a]	Title	Subject
NAC 408	Highways and Roads Installation and Relocation of Facilities and Encroachments	Requirements for design and location, permits, etc.
NAC 444 - Sanitation		
NAC 444.550 through 444.566	Labor Camps	Standards for living and sleeping quarters; cooking and eating, sanitary, and laundry facilities; lighting; and operating permits
NAC 444.8618	Disposal of Hazardous Waste Hazardous Waste Generator Identification Number	Information concerning an application for EPA identification number
NAC 444.850 through 444.8746	Disposal of Hazardous Waste	Standards of practice, variances, and administrative penalties
NAC 445A	Water Controls	Permits, certification of laboratories to analyze substances in water, water pollution control, public water systems, and underground injection control
NAC 445A.226 through 445A.22755	Action Levels for Contaminated Sites	Remediation standards and monitoring requirements for soil, groundwater, and surface-water contamination
NAC 445A.228 through 445A.263	Discharge Permits	Requirements, establishment of effluent limitations, schedules of compliance, inspection, sampling, and monitoring
NAC 445A.266 through 445A.272	General Permits	Requirements for discharge and procedures for application for general permits
NAC 445A.305 through 445A.340	Diffuse Sources	Administration of controls by municipality, determination of new sources of water pollution, state and local handbooks of best management practices, and requirements for permits to construct or grade and for logging
NAC 445A.345 through 445A.348	Notification of Release of Pollutant	Notice required and use of information in criminal prosecution
NAC 445A.591 through 445A.6731	Drinking Water Systems	Operation of ***community water system*** or nontransient water system; permits to operate privately owned systems; certification of operators; and design, construction, operation, and maintenance
NAC 445A.810 through 445A.925	Underground Injection Control Permits	Permits and construction, operation, monitoring, and abandonment
NAC 445B.001 through 455B.899	Air Pollution Control	Permits, air emissions control program, clean air mercury rule program, and emissions from engines
NAC 445C.010 through 445C.120	Environmental Requirements	Requirements to enter into and contents of an environmental audit agreement
NAC 459	Hazardous Materials	Hazardous materials

Table 6-3. Potentially applicable State of Nevada codes and statutes (page 2 of 3).

Code or statute[a]	Title	Subject
NAC 459.952 through 459.95528	Regulation of Highly Hazardous Substances and Explosives	Requirements, permits, hazard assessments, prevention programs, emergency response programs, and enforcement
NAC 459.975 through 459.991	Transportation of Hazardous Materials on Public Highways	Transportation of hazardous materials on public highways permits
NAC 459.9912 through 459.99184	Planning for and Responding to Discharge of Hazardous Materials	Emergency planning funding for local emergency planning committees, funding for state agencies, and payment of fees
NAC 459.9921 through 459.999	Storage Tanks	Storage tank requirements, registration, monitoring, and corrective action
NAC 472	State Forester Firewarden	Fire retardant roofing materials
NAC 477.010 and 477.290	State Fire Marshal – General Provisions	Definitions and severability
NAC 477.323	Permit to Store Hazardous Material	Permit required; issuance, expiration, renewal, suspension, reinstatement and revocation of permit; fees; criminal investigation; plan for termination
NAC 477.710	Use of Explosives in Blasting	Certificate required; qualifications; exemptions; renewal of certificate; fees
NAC 477.920	Miscellaneous Requirements	Fire suppression systems in buildings in rural areas
NAC 503	Hunting, Fishing, and Trapping Miscellaneous Protective Measures	Classification and taking of wildlife; possession, transportation, importation, exportation, and release of wildlife; hunting and trapping generally; raptors; fishing; depredation; and dredging permits
NAC 504.520	Alteration of a Stream System or Watershed	Approval of Department required to alter stream system or watershed to detriment of wildlife habitat; application for approval
NAC 527	Protection and Preservation of Timbered Lands, Trees, and Flora	Nevada Natural Heritage Program, permits, compliance with plan, revocation of permit, and protection of cacti and yucca
NAC 534	Underground Water and Wells	License to drill well; duties of well drillers; drilling, construction, and plugging of wells and boreholes; waivers; and enforcement
NAC 555	Control of Insects, Pests, and Noxious Weeds	Classification of weeds, weed control districts, regulation of nurseries and nursery stock, custom application of pesticides, certified applicators, and rodent control districts
NAC 586.018	Pesticides	Restricted-use pesticides: Application by or under supervision of certified applicator
NAC 703	Public Utilities Commission of Nevada	Application for privileges, rights, and authority and practice before the public utilities commission
NAC 705	Railroads	Standards and requirements for health and safety and transportation of hazardous materials by rail
NRS 408	Highways, Roads, and Transportation Facilities	Planning; financing highways and roads; improvement of county roads; state highway system; and construction, improvement, and maintenance of highways

Table 6-3. Potentially applicable State of Nevada codes and statutes (page 3 of 3).

Code or statute[a]	Title	Subject
NRS 383.150 through 383.190	Protection of Indian Burial Sites	Procedures upon discovery of an Indian burial site
NRS 444.130 through 444.200	Sanitation/Construction and Labor Camps	Requirements for conditions
NRS 444.440 through 444.620	Collection and Disposal of Solid Waste	Collection and disposal of solid waste
NRS 444.570 through 444.650	Disposal of Solid Waste	Disposal of solid waste and sewage
NRS 445A	Water Controls	Concentration of fluoride in water, water pollution control, and public water systems
NRS 445B	Air Pollution	State environmental commission, local hearing board, provisions for enforcement, program for control of air pollution, penalties, and control of emissions from engines
NRS 459.400 through 459.600	Disposal of Hazardous Waste	Disposal of hazardous waste
NRS 533.324 through 533.455	Appropriation of Public Waters: Applications, Permits and Certificates	Environmental permits and transfer of water from county of origin to another county
NRS 704	Regulation of Public Utilities Generally	Rates and schedules, general standards and practices, etc.
NRS 705	Railroads and Monorails	Railroads and monorails

a. NAC = Nevada Administrative Code; NRS = Nevada Revised Statutes.

6.3.1 NATIONAL ENVIRONMENTAL POLICY ACT, AS AMENDED (42 U.S.C. 4321 *et seq.*)

The National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321 *et seq.*), requires federal agencies to integrate environmental values into their decision-making process by considering the environmental impacts of proposed federal actions and reasonable ***alternatives*** to those actions. The Act establishes policy, sets goals (in Section 101), and provides means (in Section 102) for carrying out the policy. Section 102(2) contains action-forcing provisions to ensure that federal agencies follow the letter and spirit of the Act. For major federal actions significantly affecting the quality of the human ***environment***, Section 102(2)(C) of NEPA requires federal agencies to prepare a detailed statement that includes the environmental impacts of the proposed action and other specified information. DOE promulgated regulations (10 CFR Part 1021) and issued DOE Order 451.1B, National Environmental Policy Act Compliance Program, to ensure compliance with Section 102(2) of NEPA.

DOE would construct and operate the proposed railroad in compliance with NEPA and promulgated DOE regulations.

6.3.2 HAZARDOUS MATERIALS PACKAGING, HANDLING, AND TRANSPORTATION (49 CFR PARTS 172 AND 173; 10 CFR PARTS 71 AND 73)

The ***shipment*** of ***nuclear waste*** is highly regulated and subject to the utmost scrutiny. DOE follows the strict U.S. Department of Transportation and U.S. Nuclear Regulatory Commission transportation rules, including the use of Commission-certified transportation casks, advance route approvals and notification,

and shipment escorts. The Department also tracks its shipments by satellite 24 hours a day. DOE follows these precautions carefully now and will follow others that might be required in the future, whether by the U.S. Congress, the Department of Transportation, or the Nuclear Regulatory Commission.

In addition, the Department would follow DOE Order 460.1B, which establishes safety requirements for the proper packaging and transportation of DOE/National Nuclear Security Administration off-site shipments and on-site transfers of hazardous materials and for modal transport.

The Department of Transportation is responsible for developing and implementing transportation-safety standards for hazardous materials in commerce, including radioactive materials. The Department of Transportation has established standards and requirements for packaging, transporting, and handling radioactive materials for all modes of transportation (49 CFR Parts 172 and 173). The regulations also specify safety requirements for vehicles and transportation operations, training for personnel who perform handling and transportation of hazardous materials, and liability insurance requirements for carriers. For all spent nuclear fuel and high-level radioactive waste shipments, DOE would meet the requirements for identification, labeling, packaging, marking, placarding, and preparation of shipping papers set forth by the Department of Transportation in 49 CFR Parts 172 and 173.

The Nuclear Regulatory Commission regulates the packaging- and transportation-related operations of its licensees, including commercial shippers of radioactive materials. It sets design and performance standards for packaging (***shipping casks***) that contain materials with high levels of ***radioactivity***.

The Department of Transportation, by agreement with the Nuclear Regulatory Commission, accepts the Commission standards of 10 CFR Part 71 for certain types of packaging. The Commission also establishes safeguards and security regulations to minimize the possibility of theft, diversion, or attack on shipments of radioactive materials (10 CFR Part 73).

6.3.2.1 Hazardous Materials Transportation Act, as Amended (49 U.S.C. 1801)

The Hazardous Materials Transportation Act of 1975, as amended (49 U.S.C. 1801), gives the U.S. Department of Transportation authority to regulate the transport of hazardous materials in commerce, including radioactive materials. Under these regulations, the Department of Transportation regulates the interstate and intrastate shipment of hazardous materials in commerce, including spent nuclear fuel and high-level radioactive waste, by land, air, and navigable water. As outlined in a 1979 memorandum of understanding with the U.S. Nuclear Regulatory Commission (44 *FR* 38690, July 2, 1979), the Department of Transportation specifically regulates carriers of spent nuclear fuel and the conditions of transport such as routing, handling, storage, and vehicle and driver requirements. It also regulates the labeling, classification, and marking of transportation packages for radioactive materials.

Department of Transportation regulations include requirements for carriers, drivers, vehicles, routing, packaging, labeling, marking, placarding of vehicles, shipping papers, training, and emergency response. The requirements specify the maximum ***dose rate*** associated with radioactive material shipments and the maximum allowable levels of radioactive surface ***contamination*** on packages and vehicles. Department of Transportation regulations also include requirements to protect the health and safety of transportation workers. DOE carefully follows Department of Transportation regulatory standards, and will follow or exceed others that may be established by the Department of Transportation in the future.

6.3.2.2 Low-Level Radioactive Waste Policy Act, as Amended (42 U.S.C. 2021b *et seq.*)

In 1980 Congress passed the Low-Level Radioactive Waste Policy Act to establish federal policy on nuclear waste disposal, the foundation of which is the idea that the states are responsible for the disposal of ***low-level radioactive waste*** generated within their borders (except for certain federal waste). The desire to restrict access to disposal facilities was a driving force behind the adoption of the 1980 Act and the subsequent Low-Level Radioactive Waste Policy Act of 1985, as amended (42 U.S.C. 2021b *et seq.*).

The 1985 amendments clarified the right of Congressionally approved compacts to control access to their disposal facilities. This Act gives states the responsibility to dispose of low-level radioactive waste generated within their borders and allows them to form compacts to establish facilities to serve a group of states. The Act provides that the facilities will be regulated by the U.S. Nuclear Regulatory Commission or by states that have entered into agreements with the Commission under Section 274 of the Atomic Energy Act. The Act also requires the Commission to establish standards for determining when ***radionuclides*** are present in waste streams in sufficiently low concentrations or quantities as to be "below regulatory concern." Whereas Congress maintains authority over the disposal of high-level nuclear waste and ***transuranic waste***, states are responsible for low-level radioactive waste, which, unlike spent nuclear reactor fuel or high-level radioactive waste, emits a low level of radiation that decays fairly rapidly. Most low-level radioactive waste (97 percent) does not require special ***shielding*** during handling or transportation for the protection of workers or the surrounding community, and it can include such things as contaminated clothing, tools, or equipment.

6.3.2.3 U.S. Nuclear Regulatory Commission Radioactive Material Packaging and Transportation (10 CFR Parts 71 and 73)

Pursuant to 10 CFR Part 71, the U.S. Nuclear Regulatory Commission regulates the packaging and transport of spent nuclear fuel for its licensees. Under an agreement with the Department of Transportation, the Commission sets standards for certain types of packaging of radioactive materials, including spent nuclear fuel and high-level radioactive waste. These wastes must be transported in packages that meet Type B packaging standards, which require that packages be designed and built to retain their radioactive contents in both normal and accident conditions. Under Section 180(a) of the NWPA, all shipments of spent nuclear fuel or high-level radioactive waste to a repository would be in packages certified for such purposes by the Nuclear Regulatory Commission.

The demonstration of compliance with these requirements applies a combination of calculation methods, computer modeling techniques, and physical testing to the design features of the package. DOE would present the results of the analyses and tests to the Nuclear Regulatory Commission in a safety analysis report for packaging. The Commission would review the safety analysis report, and if approved, would then issue a certificate of compliance to allow spent nuclear fuel or high-level radioactive waste to be shipped to the repository.

The regulations at 10 CFR Part 73 govern safeguards and physical security during the transit of shipments of spent nuclear fuel and specify requirements for carrier personnel, communications, advance notification of shipments, escorts, and route planning for such shipments. As required by Section 180(b) of the NWPA, all shipments by DOE to a repository would abide by Nuclear Regulatory Commission regulations on advance notification. DOE carefully follows the Department of Transportation and the Nuclear Regulatory Commission transportation rules and will follow or exceed others that may be established by the Nuclear Regulatory Commission in the future.

6.3.2.4 Emergency Planning and Community Right-to-Know Act (42 U.S.C. 1001 *et seq.*)

Under Subtitle A of the Emergency Planning and Community Right-to-Know Act of 1986 (42 U.S.C. 1001 *et seq.*), which is also known as the Superfund Amendments and Reauthorization Act, Title III, federal agencies must provide information on hazardous and toxic chemicals to state emergency response commissions, local emergency planning committees, and the U.S. Environmental Protection Agency. The goal of providing this information about inventories of specific chemicals used or stored, and descriptions of releases that could occur at work sites, is to ensure that emergency plans are sufficient to respond to unplanned releases of hazardous substances. The Emergency Planning and Community Right-to-Know Act, codified at 40 CFR Parts 302 through 372, requires agencies to provide reports on material safety data sheets, emergency and ***hazardous chemical*** inventory, and toxic chemical releases to appropriate local, state, and federal agencies. These regulations also require facilities that store, dispense, use, or handle extremely hazardous materials in excess of specified thresholds, to report quantity data to specific agencies and organizations. Nevada Administrative Code, Chapters 459 and 477, establish the permitting requirements for highly hazardous substances and hazardous materials, respectively.

6.3.3 AIR QUALITY

6.3.3.1 Clean Air Act, as Amended (42 U.S.C. 7401 *et seq.*)

The Clean Air Act of 1970, as amended (42 U.S.C. 7401 *et seq.*), is intended to "protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population." The Act requires:

- Federal agencies with jurisdiction over any property or endeavor that might result in the discharge of air pollutants to comply with "all federal, state, interstate, and local requirements" related to the control and abatement of air pollution in accordance with 42 U.S.C. 7401, Section 118.
- The Environmental Protection Agency to establish national ambient air quality standards to protect public health from any known or anticipated adverse effects of a regulated pollutant (42 U.S.C. 7409).
- The Environmental Protection Agency to establish national standards of performance for new or modified stationary sources of atmospheric pollutants (42 U.S.C. 7411) and the evaluation of specific emission increases to prevent a significant deterioration in ***air quality*** (42 U.S.C. 7470).

6.3.3.2 National Primary and Secondary Ambient Air Quality Standards (40 CFR Part 50)

Under the Clean Air Act, the Environmental Protection Agency has established national ***ambient air*** quality standards at 40 CFR Part 50 to protect the public health and the environment. The national ambient air quality standards identify six pollutant types as criteria pollutants: ***nitrogen dioxide***, ***ozone***, lead, ***carbon monoxide***, ***particulate matter***, and ***sulfur dioxide***. The Environmental Protection Agency calls these "criteria" air pollutants because it regulates them from the development of human health-based and/or environmentally based criteria (science-based guidelines) in setting permissible levels.

The Clean Air Act specifically regulates emissions of hazardous air pollutants, including radionuclides, through the national emission standards for ***hazardous air pollutants*** program (40 CFR Parts 61 and 63).

6.3.3.3 Nevada Revised Statutes: Air Pollution (Title 40, Chapter 445B)

Nevada Revised Statutes, Chapter 445B, Air Pollution, and regulations in the Nevada Administrative Code implement state and federal Clean Air Act provisions, identify the requirements for permits for each air pollution source unless it is specifically exempted, and identify ongoing monitoring requirements. DOE would need operating permits from the Nevada Division of Environmental Protection, Bureau of Air Pollution Control, for the control of gaseous and particulate emissions from construction and operation of the proposed railroad.

6.3.4 WATER QUALITY

6.3.4.1 Clean Water Act, as Amended (33 U.S.C. 1251 *et seq.*)

The Clean Water Act regulates the discharge of pollutants into the Nation's surface waters, including lakes, rivers, streams, ***wetlands***, and coastal areas. Passed in 1972 and amended in 1977 and 1987, the Clean Water Act was originally known as the Federal Water Pollution Control Act. The Clean Water Act is administered by the U.S. Environmental Protection Agency, which sets water quality standards, handles enforcement, and helps state and local governments develop their own pollution control plans. The purpose of the Clean Water Act of 1977 (33 U.S.C. 1251 *et seq.*) is to "restore and maintain the chemical, physical, and biological integrity of the Nation's water." The U.S. Environmental Protection Agency delegated the State of Nevada the authority to implement and enforce most programs in the state under the Clean Water Act; exceptions include those addressed by Section 404 of the Act, which is administered by the U.S. Army Corps of Engineers, and described in this section.

This Act prohibits the "discharge of toxic pollutants in toxic amounts" to navigable ***waters of the United States***. Section 313 of the Act requires all departments and agencies of the Federal Government engaged in any activity that might result in a discharge or runoff of pollutants to surface waters to comply with federal, state, interstate, and local requirements. The Act applies to activities at and along the Caliente ***rail alignment*** and the Mina rail alignment that could affect waterways. Under the Clean Water Act, the State of Nevada sets water quality standards, and the U.S. Environmental Protection Agency and the State of Nevada regulate and issue permits for point-source discharges as part of the National Pollutant Discharge Elimination System permitting program. The Environmental Protection Agency regulations for this program are codified at 40 CFR Part 122, and Nevada rules for this program are codified at Nevada Administrative Code, Chapter 445A. If construction or operation of the proposed railroad in Nevada would result in point-source discharges, DOE would need to obtain a National Pollutant Discharge Elimination System permit from the Nevada Division of Environmental Protection, Bureau of Water Pollution Control.

Section 402(p) of the Clean Water Act requires the Environmental Protection Agency to establish regulations and requires individual states to issue permits for stormwater discharges associated with industrial activity, including construction activities that could disturb 20,000 or more square meters (5 or more acres) (40 CFR Part 122). Stormwater discharge permits are designed to control the degradation of surface water and ***groundwater*** primarily from erosion and sedimentation. Nevada rules for this program are codified at Nevada Administrative Code, Chapter 445A. Stormwater permits issued from the Nevada Bureau of Water Pollution Control regulate the discharge of stormwater from facilities. The Proposed Action includes rail line ***construction and operations support facilities*** that would have discharges of stormwater. DOE would need to obtain permits for these discharges. Additionally, construction and operation of septic and sanitary-sewage collection systems would require permits from the Nevada Bureau of Water Pollution Control.

Jurisdictional waters of the United States are subject to regulation by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act. Jurisdictional waters of the United States include navigable

and interstate waters, intrastate waters with a connection to interstate commerce and tributaries to such waters, and wetlands that are adjacent to waters of the United States. Section 404 of the Clean Water Act established a program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands. Construction activities, such as those for the proposed railroad, that would impact waters of the United States are regulated under this program.

The basic premise of the Section 404 permitting program is that no discharge of dredged or fill material into jurisdictional waters will be permitted if a practicable alternative exists that is less damaging to the aquatic environment, or the Nation's waters would be significantly degraded. In other words, it must be demonstrated that, to the extent practicable, steps have been taken to avoid impacts and that potential impacts on jurisdictional waters have been minimized and compensation is provided for any remaining unavoidable impacts (if required). Proposed activities are regulated through a permit review process.

An evaluation under Section 404(b)(1) of the Clean Water Act would analyze and describe the potential impacts from any proposed discharges of dredged or fill material into jurisdictional waters that would result from construction and operation of the proposed railroad. To complete the 404(b)(1) analysis, DOE would be required to identify the appropriate and applicable steps that would be taken during construction to minimize potential adverse impacts. These steps would include actions taken to reduce the potential for increased erosion and subsequent sedimentation and to ensure that any downstream water would not experience increases in sediment loading or turbidity that would threaten the beneficial use of that stream.

DOE plans to seek authorization pursuant to Section 404(r) of the Clean Water Act for the discharge of dredged or fill material in connection with the construction of the railroad. Section 404(r) provides that the discharge of dredged or fill material as part of the construction of a federal project specifically authorized by Congress is not prohibited by or otherwise subject to regulation under Section 404, and other specified sections of the Clean Water Act, if information on the effects of such discharge, including consideration of the guidelines developed under Subsection 404(b)(1) of the Act, is included in an EIS for such project and submitted to Congress before the actual discharge and prior to either authorization of such project or an appropriation of funds for such construction. DOE estimates that it would seek authorization pursuant to Section 404(r) following issuance of a Record of Decision selecting a rail alignment and prior to actual discharge of dredged or fill material in connection with construction of the railroad and prior to an appropriation of funds for such construction. Sections 401 and 405 of the Water Quality Act of 1987 and Public Law 100-4 added Section 402(p) to the Clean Water Act. Section 401 provides states with the opportunity to review and approve, condition, or deny all federal permits or licenses that might result in a discharge to state or tribal waters, including wetlands. The major federal permit subject to Section 401 review is a Section 404 permit. Every applicant for a Section 404 permit must request state certification that the proposed activity will not violate state or federal water quality standards. Construction of the proposed railroad would require the discharge of dredged or fill materials for bridges and culverts into United States waters via interstate streams and dry ***washes***. DOE would follow the requirements of Section 401, as appropriate, in requesting state certification. The proposed construction activities would not exceed State of Nevada water quality standards or otherwise violate a state requirement.

6.3.4.2 Safe Drinking Water Act, as Amended (42 U.S.C. 300 *et seq.*)

The Safe Drinking Water Act of 1974, as amended (42 U.S.C. 300(f) *et seq.*), gives the U.S. Environmental Protection Agency the responsibility and authority to regulate public drinking-water supplies by establishing drinking-water standards, delegating authority for enforcement of drinking-water standards to the states, and protecting ***aquifers*** from pollution hazards. The Nevada Division of Environmental Protection, Bureau of Safe Drinking Water, is the state agency responsible for enforcement. Environmental Protection Agency regulations for this program are codified at

40 CFR Part 141, and Nevada rules for this program are codified at Nevada Administrative Code, Chapter 445A. Operating permits are required for public water distribution systems, which are classified as a public water supply if each serves 15 connections or 25 people for more than 60 days per year. Because public water distribution systems would be located along the rail line at ***construction camps*** and railroad operations support facilities, DOE would have to obtain operating permits for these systems.

6.3.4.3 Nevada Revised Statutes: Water Controls (Title 40, Chapter 445A)

Nevada Revised Statutes, Chapter 445A, Water Controls, classifies the waters of the state, establishes standards for the quality of all waters in the state, and specifies permit and notification provisions for stormwater discharges and for other discharges to the waters of the state according to provisions of the Clean Water Act of 1977 (33 U.S.C. 1251 *et seq.*) and the Safe Drinking Water Act of 1974 (42 U.S.C. 300 *et seq.*). These statutes and regulations in the Nevada Administrative Code set drinking water standards, specifications for certification, and conditions for issuance of variance and exemptions; set standards and requirements for the construction of wells and other water-supply systems; establish the different classes of wells and aquifer exemptions; and establish requirements for well operation and monitoring, plugging, and abandonment activities.

Additionally, the Nevada Division of Environmental Protection, Bureau of Water Pollution Control, requires a temporary permit to work in waterways of the state (that is, a rolling stock permit) before using equipment in waters of the state, including dry washes, that could directly discharge pollutants into waters of the state. Construction of the rail line would require installation of drainage ***culverts*** or bridges to cross some of the washes and streambeds and other construction activities in channels. DOE would have to obtain a permit for such work.

6.3.4.4 Nevada Revised Statutes: Adjudication of Vested Water Rights, Appropriation of Public Waters; Underground Water and Wells (Title 48, Chapters 533 and 534)

Nevada Revised Statutes, Chapters 533 and 534, and accompanying regulations in the Nevada Administrative Code, Chapters 533 and 534, establish permitting procedures for appropriating public waters of the state, including underground waters for beneficial use. The withdrawal of underground water in Nevada requires a permit from the Nevada State Engineer. DOE intends to meet water needs through construction of new wells and would need to apply for water rights with the Nevada State Engineer for construction of wells along the proposed rail alignment.

6.3.4.5 Floodplain Management and Protection of Wetlands (Executive Orders 11988 and 11990)

Executive Order 11988 requires federal agencies to ensure that the agency evaluates the potential effects of any proposed action on ***floodplains***; to ensure that planning programs and budget requests reflect consideration of flood hazards and floodplain management; and to prescribe procedures to implement the policies and requirements of the Order. Federal agencies are required to reduce risk of flood damage; minimize the impact of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains.

Executive Order 11990 requires that federal agencies "…take action to minimize the destruction, loss, or degradation of wetlands," and to consider wetland protection in decision making. It should be noted that exclusion of isolated (nonjurisdictional) wetlands is not indicated in the Executive Order.

DOE issued regulations that implement these Executive Orders (10 CFR Part 1022, Compliance with Floodplain/Wetlands Environmental Review Requirements). In accordance with this regulation, specifically 10 CFR 1022.11(d), DOE must prepare a floodplain assessment for proposed actions that would take place in floodplains and a wetlands assessment for proposed actions that would take place in wetlands. DOE must also avoid to the extent possible the long- and short-term adverse impacts associated with the destruction of wetlands and the occupancy and modification of floodplains and wetlands, and avoid direct and indirect support of floodplain and wetlands development wherever there is a practicable alternative.

To meet the requirements of 10 CFR Part 1022, Appendix F, Floodplain and Wetlands Assessment, includes a detailed analysis of floodplains and wetlands within the Caliente and Mina rail alignments regions of influence.

6.3.5 POLLUTION PREVENTION AND CONTROL

6.3.5.1 Pollution Prevention Act (42 U.S.C. 13101 *et seq.*)

The Pollution Prevention Act of 1990 (42 U.S.C. 13101 *et seq.*) establishes a national policy for waste management and pollution control that focuses first on source reduction, and then on environmentally safe waste recycling, treatment, and disposal. Executive Order 13423, *Strengthening Federal Environmental, Energy, and Transportation Management,* directs federal agencies to implement sustainable practices for pollution and waste prevention and recycling.

6.3.5.2 Comprehensive Environmental Response, Compensation, and Liability Act, as Amended (42 U.S.C. 9601 *et seq.*)

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act (42 U.S.C. 9601 *et seq.*), authorizes the U.S. Environmental Protection Agency to require responsible site owners, operators, arrangers, and transporters to clean up releases of hazardous substances, including certain radioactive substances. Under this Act, the Environmental Protection Agency has the authority to regulate hazardous substances at rail line construction zones in the event of a release or a "substantial threat of a release." DOE would report any releases greater than reportable quantities of hazardous substances (as codified in 40 CFR Part 302 under the Comprehensive Environmental Response, Compensation, and Liability Act) to the National Response Center, extremely hazardous substances (as codified in 40 CFR Part 355 under the Emergency Planning and Community Right-to-Know Act) to the State Emergency Response Commission contacts for Nevada, and substances classified as both hazardous and extremely hazardous to both the National Response Center and the State Emergency Response Commission contacts for Nevada. Nevada Administrative Code, Sections 445A.226 through 445A.22755, provide action levels for contaminated sites, including levels for groundwater, surface water, and soil. In the event of a release of hazardous substances during construction and operation of the proposed railroad, DOE would clean up releases in a manner that complies with the Comprehensive Environmental Response, Compensation, and Liability Act, as amended.

6.3.5.3 Resource Conservation and Recovery Act, as Amended (42 U.S.C. 6901 *et seq.*)

The treatment, storage, and disposal of hazardous and nonhazardous waste is regulated by the provisions of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976 and the Hazardous and Solid Waste Amendments of 1984 (42 U.S.C. 6901 *et seq.*), and applicable state laws. Environmental Protection Agency regulations implementing the ***hazardous waste*** portions of the

Resource Conservation and Recovery Act define hazardous wastes and specify requirements for their transportation, handling, treatment, storage, and disposal (40 CFR Parts 260 through 272). Immediate response actions and cleanup of spills are specified in 40 CFR Part 263.

Subtitle C of the Resource Conservation and Recovery Act requires that Resource Conservation and Recovery Act hazardous wastes be characterized and managed. DOE would track the amount of hazardous wastes that would be generated each month during proposed railroad construction and operations, including a log of materials and weight of all generated hazardous wastes. DOE would monitor waste-generator status and would comply in accordance with the applicable Subtitle C regulations. Nevada Administrative Code, Sections 444.850 to 444.8746, are the governing requirements for wastes generated under Subtitle C.

Subtitle D of the Resource Conservation and Recovery Act sets forth definitions, methods of disposal, and special requirements for solid-waste collection, transportation standards, and classification of landfills. Subtitle D focuses on state and local governments as the primary planning, regulating, and implementing entities for the management of nonhazardous solid waste, such as household garbage and nonhazardous industrial solid waste. The governing requirements for wastes generated in Nevada under Subtitle D are Nevada Revised Statutes, Sections 444.440 to 444.620, and Nevada Administrative Code, Sections 444.570 to 444.7499. DOE plans to dispose of solid waste from railroad construction and operations at commercial or municipal landfill facilities that meet Subtitle D requirements.

6.3.5.4 Federal Insecticide, Fungicide, and Rodenticide Act, as Amended (7 U.S.C. 136 *et seq.*)

The primary focus of the Federal Insecticide, Fungicide, and Rodenticide Act of 1948, as amended (7 U.S.C. 136 *et seq.*), and the Act's implementing regulations (40 CFR Parts 152 through 186), is to provide federal control of pesticide distribution, sale, and use. The Nevada Pesticides Act, Nevada Administrative Code, Chapter 586, and Nevada Revised Statutes, Sections 586.010 through 586.450, also regulate pesticide distribution and use, and require registration with the state. DOE would comply with federal and state laws in the application and storage of pesticides during construction and operation of the proposed railroad.

6.3.5.5 Noise Control Act, as Amended (42 U.S.C. 4901 *et seq.*)

Section 4 of the Noise Control Act of 1972, as amended (42 U.S.C. 4901 *et seq.*), directs federal agencies to carry out programs in their jurisdictions "to the fullest extent within their authority" and in a manner that furthers a national policy of promoting an environment free from noise that jeopardizes health and welfare. This law provides requirements related to noise that would be generated by construction and operations activities associated with the proposed railroad. The STB, a cooperating agency on this Rail Alignment EIS, has environmental review regulations for noise analysis (49 CFR 1105.7e(6)) with the following criteria:

- An increase in noise exposure as measured by day-night average noise level of 3 ***A-weighted decibels*** or more.
- An increase to a noise level of 65 A-weighted decibels day-night average noise level or greater.

DOE used these environmental review regulations to analyze potential train noise for this Rail Alignment EIS.

6.3.5.6 Strengthening Federal Environmental, Energy, and Transportation Management (Executive Order 13423)

Executive Order 13423 sets goals for federal agencies in the areas of energy efficiency, acquisition, renewable energy, toxics reductions, recycling, renewable energy, sustainable buildings, electronics stewardship, fleets, and water conservation. In addition, this Order requires more widespread use of Environmental Management Systems as the framework in which to manage and continually improve these sustainable practices. DOE would comply with the provisions of this Order during construction and operation of the proposed railroad.

6.3.6 CULTURAL RESOURCES

To meet federal historic preservation laws and regulations and NEPA (40 CFR 1500 through 1508) mandates, DOE would identify and evaluate all cultural resources in the regions of influence along the Caliente rail alignment and the Mina rail alignment, including prehistoric, historic, and American Indian, and assess the potential for adverse impacts during construction and operation of the proposed railroad. The National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 *et seq.*), is the primary source of regulatory requirements for the protection of cultural resources (see Section 6.3.6.1). Sections 6.3.6.2 through 6.3.6.8 describe other sources of regulatory requirements.

6.3.6.1 National Historic Preservation Act, as Amended (16 U.S.C. 470 *et seq.*)

The National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 *et seq.*), provides for the placement of sites with significant national historic value on the *National Register of Historic Places*. It requires no permits or certifications. In this Rail Alignment EIS, DOE evaluated proposed railroad construction activities that could have a potential effect on historic resources pursuant to a programmatic agreement with the BLM, the STB, and the Nevada State Historic Preservation Office (DIRS 176912-Wenker et al. 2006, all). The programmatic agreement provides that, prior to commencement of any ground-disturbing construction activities, an appropriate level of field investigation including on-the-ground intensive surveys, evaluations of all recorded resources on the *National Register of Historic Places*, assessments of adverse effects, and applicable ***mitigation*** of identified impacts be completed. The BLM manages most of the land over which DOE would construct the proposed railroad; therefore, relevant provisions of the programmatic agreement would apply. Additionally, in cooperation with the BLM and the STB, the programmatic agreement requires DOE to make a good faith effort to consult with tribes and identify affected ethnic groups, to identify properties of traditional religious and cultural importance, inform the consulting parties of the eligibility of properties for listing on the *National Register of Historic Places*, and suggest appropriate treatment to avoid adverse impacts to historic properties. Appendix B of this Rail Alignment EIS describes the consultation process.

6.3.6.2 American Antiquities Act (16 U.S.C. 431 *et seq.*)

The American Antiquities Act of 1906 (16 U.S.C. 431 *et seq.*) protects historic and prehistoric ruins, monuments, and objects of antiquity including vertebrate paleontological resources, on federally owned or controlled lands. If historic or prehistoric ruins or objects were found during construction of the proposed railroad, DOE would follow provisions of this Act to minimize or mitigate adverse effects.

6.3.6.3 Archaeological Resources Protection Act, as Amended (16 U.S.C. 470aa *et seq.*)

The Archaeological Resources Protection Act of 1979, as amended (16 U.S.C. 470aa *et seq.*), requires a permit for excavation or removal of archaeological resources from publicly held or American Indian

lands. The Act requires that excavations further archaeological knowledge in the public interest, and that the resources removed remain the property of the United States. Requirements of this Act would apply to any proposed excavation activity that resulted in identification of archaeological resources.

6.3.6.4 Native American Graves Protection and Repatriation Act (25 U.S.C. 3001 *et seq.*)

The Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001 *et seq.*) directs the Secretary of the Interior to guide the repatriation of federal archaeological collections and collections that are culturally affiliated with American Indian tribes and held by museums that receive federal funding. Actions required by this law include establishing a review committee with monitoring and policy-making responsibilities, developing regulations for repatriation, including procedures for identifying lineal descent or cultural affiliation needed for claims, overseeing museum programs designed to meet the inventory requirements and deadlines of this law, and developing procedures to handle unexpected discoveries of graves or grave artifacts during activities on federal or tribal land. DOE would follow the provisions of this Act if any excavations associated with the proposed railroad construction led to unexpected discoveries of American Indian graves or grave artifacts.

6.3.6.5 American Indian Religious Freedom Act (42 U.S.C. 1996)

The American Indian Religious Freedom Act of 1978 (42 U.S.C. 1996) reaffirms American Indian religious freedom under the First Amendment of the U.S. Constitution, and establishes policy to protect and preserve the inherent and Constitutional right of American Indians to believe, express, and exercise their traditional religions. This law ensures the protection of sacred locations and access of American Indians to those sacred locations and traditional resources that are integral to the practice of their religions. It also establishes requirements that would apply to American Indian sacred locations, traditional resources, or traditional religious practices potentially affected by construction and operation of the proposed railroad.

6.3.6.6 Protection and Enhancement of the Cultural Environment (Executive Order 11593)

Executive Order 11593 directs federal executive agencies to locate, catalog, and nominate properties under their jurisdiction or control to the *National Register of Historic Places*. DOE would follow the provisions of this Order during construction of the proposed railroad.

6.3.6.7 Indian Sacred Sites (Executive Order 13007)

Executive Order 13007 directs federal agencies, to the extent permitted by law and not inconsistent with agency missions, to avoid adverse effects to sacred sites and to provide access to those sites to American Indians for religious practices. The Order directs agencies to plan projects in a manner that allows protection of and access to sacred sites to the extent compatible with the project. DOE would follow the provisions of this Order during construction and operation of the proposed railroad.

6.3.6.8 Consultation and Coordination with Indian Tribal Governments (Executive Order 13175)

Executive Order 13175 directs federal agencies to establish regular and meaningful consultation and collaboration with tribal governments in developing federal policies that have tribal implications, to strengthen U.S. government-to-government relationships with American Indian tribes, and to reduce the imposition of unfunded mandates on tribal governments. DOE has and will continue to follow the

provisions of this Order during construction and operation of the proposed railroad through regular consultation with the Consolidated Group of Tribes and Organizations, which consists of officially appointed tribal representatives who are responsible for presenting their respective tribal concerns and perspectives to DOE.

6.3.7 BIOLOGICAL RESOURCES

6.3.7.1 Endangered Species Act, as Amended (16 U.S.C. 1531 *et seq.*)

The Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*), provides for the conservation of ***threatened*** and ***endangered species*** and the ***ecosystems*** upon which those species rely. If construction or operation of the proposed railroad could affect threatened or endangered species, or their designated critical ***habitat***, DOE would be required to assess the potential impact and develop measures to minimize the impact. If there would be potential adverse impacts to a listed species or designated critical habitat, DOE would be required to consult formally with the U.S. Fish and Wildlife Service in compliance with Section 7 of the Act. As part of the Section 7 consultation, DOE would have to prepare a Biological Assessment and provide it to the Fish and Wildlife Service. The Fish and Wildlife Service would then prepare a Biological Opinion making a determination as to whether the Proposed Action would jeopardize the continued existence of the species under consideration. If the Fish and Wildlife Service rendered a non-jeopardy opinion, but a finding that some individuals could be killed or otherwise harmed incidentally by the Proposed Action, the Fish and Wildlife Service could determine that such losses are not prohibited, so long as measures outlined in a permit to incidentally take a listed species were followed. The permit would include limits on the taking of a listed species and its designated critical habitat and mandatory terms and conditions for minimizing the take. Regulations implementing the applicable interagency consultation process of the Endangered Species Act are codified at 50 CFR Part 402.

Since the publication of the Draft Rail Alignment EIS, DOE submitted on March 13, 2008 to the Fish and Wildlife Service a *Biological Assessment of the Effects on Threatened and Endangered Species of Constructing and Operating a Railroad from Caliente, Nevada, to Yucca Mountain*, and requested initiation of formal consultation as required by Section 7 of the Endangered Species Act. DOE anticipates completing consultation and obtaining a biological opinion and incidental take permit from the Fish and Wildlife Service by September 2008.

If the Fish and Wildlife Service determines that the proposed federal action jeopardizes a listed species or adversely modifies its designated critical habitat, the Secretary of the Interior suggests alternatives to the proposed action that would not violate the action. Then federal agencies must decide whether to modify the project as suggested, abandon it, or file an application for an exemption. Regulations that describe the exemption process are found in 50 CFR Parts 450 through 453.

6.3.7.2 Fish and Wildlife Coordination Act, as Amended (16 U.S.C. 661 *et seq.*)

The Fish and Wildlife Coordination Act of 1934, as amended (16 U.S.C. 661 *et seq.*), promotes effectual planning and cooperation between federal, state, public, and private agencies for the conservation and rehabilitation of the Nation's fish and wildlife, and authorizes the U.S. Department of the Interior to provide assistance. The Act requires that when a department or agency of the U.S. Government modifies the waters, or channel of a body of water, the department or agency must consult with the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and the state agency that administers wildlife resources in the affected state. DOE consultation with appropriate federal and State of Nevada agencies regarding construction and operation of the proposed railroad would be in compliance with the requirements of this Act.

6.3.7.3 Migratory Bird Treaty Act, as Amended (16 U.S.C. 703 *et seq.*)

The Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. 703 *et seq.*), protects birds that have common migration patterns between the United States, Canada, Mexico, Japan, and Russia. It also regulates the take and harvest of migratory birds. All species of birds found along the proposed rail alignments are protected by the Migratory Bird Treaty Act with the exceptions of European starlings (*Sturnus vulgaris*), rock doves (pigeons; *Columba livia*), and house sparrows (*Passer domesticus*), and any game species having legal harvest seasons set by the Nevada Department of Wildlife. DOE would implement methods during proposed railroad construction and operations, including surveys for nesting birds and restrictions on the timing of construction, to prevent the take of migratory birds.

6.3.7.4 Bald and Golden Eagle Protection Act, as Amended (16 U.S.C. 668 through 668d)

The Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. 668 through 668d), makes it illegal to take, pursue, molest, or disturb bald eagles (American, *Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*), their nests, or their eggs anywhere in the United States (Sections 668 and 668c). The U.S. Department of the Interior regulates activities that might adversely affect bald and golden eagles.

6.3.7.5 Wild Free-Roaming Horses and Burros Act, as Amended (16 U.S.C. 1331 *et seq.*)

The Wild Free-Roaming Horses and Burros Act of 1971, as amended (16 U.S.C. 1331 *et seq.*), requires the protection, management, and control of wild free-roaming horses and burros on ***public lands***. The Act states that "wild free-roaming horses and burros shall be protected from capture, branding, harassment, or death; and to accomplish this they are to be considered in the area where presently found, as an integral part of the natural system of the public lands." DOE would construct and operate the railroad in compliance with the provisions of this Act.

6.3.7.6 National Wildlife Refuge System Administration Act, as Amended (16 U.S.C. 668dd)

The National Wildlife Refuge System Administration Act of 1966, as amended (16 U.S.C. 668dd), provides guidelines for the administration and management of lands, including "wildlife refuges, areas for the protection and conservation of fish and wildlife that are threatened with extinction, wildlife ranges, game ranges, wildlife management areas, or waterfowl production areas." If use of lands for the proposed railroad could affect lands in the National Wildlife Refuge System, DOE would consult with the U.S. Fish and Wildlife Service. Regulations implementing the Act are codified at 50 CFR Parts 25 and 27 through 29.

6.3.7.7 Nevada Revised Statutes: Protection and Preservation of Timbered Lands, Trees, and Flora (Title 47, Chapter 527)

Nevada Revised Statutes, Chapter 527, specifies protection of the indigenous flora of the State of Nevada. If the state determines that a species or subspecies of native flora is threatened with extinction, that species or subspecies is to be placed on the state list of fully protected species. No member of the species or subspecies may be taken or destroyed unless an authorized state official issues a special permit.

6.3.7.8 Nevada Revised Statutes: Hunting, Fishing, and Trapping; Miscellaneous Protective Measures (Title 45, Chapter 503)

Nevada Revised Statutes, Chapter 503, Hunting, Fishing, and Trapping, Miscellaneous Protective Measures, and Nevada Administrative Code, Chapter 503, Sections 010 through 104, specify procedures for the classification and protection of wildlife. No member of a species classified as protected may be hunted, taken, or possessed without first obtaining a permit or written authorization from the Nevada Department of Wildlife.

6.3.7.9 Nevada Revised Statutes: Control of Insects, Pests, and Noxious Weeds (Title 49, Chapter 555)

Nevada Revised Statutes, Chapter 555, Control of Insects, Pests, and Noxious Weeds, specifies the laws by which the Nevada Department of Agriculture designates and regulates ***noxious weeds*** and pests. Clearing vegetation and disturbing the soil during construction would create habitat for colonization by noxious weeds present along the rail line. DOE would minimize such impacts, in compliance with the provisions in this Nevada Statute, by developing and implementing a weed management program, which could include reclamation of disturbed areas that would enhance the recovery of native vegetation and reduce colonization by exotic species.

6.3.7.10 Invasive Species (Executive Order 13112)

Executive Order 13112 directs federal agencies to act to prevent the introduction of, or to monitor and control, nonnative or invasive plant species, to provide for restoration of ***native plant species***, to conduct research, to promote educational activities, and to exercise care in taking actions that could promote the introduction or spread of ***invasive species***. DOE would minimize such impacts, in compliance with the provisions in this Executive Order, by developing and implementing a weed management program.

6.3.7.11 Responsibilities of Federal Agencies to Protect Migratory Birds (Executive Order 13186)

Executive Order 13186 requires federal agencies to avoid or minimize the negative impacts of their actions on migratory birds and to take active steps to protect birds and their habitats. The Order directs each federal agency whose action has, or is likely to have, a negative impact on migratory bird populations to develop an agreement with the U.S. Fish and Wildlife Service to conserve those birds. The Order directs agencies to avoid or minimize the impact on migratory bird populations, to take reasonable steps that include restoring and enhancing bird habitats, to prevent or abate pollution that would affect birds, and to incorporate migratory bird conservation into agency planning processes when possible. The Order also requires environmental analyses of federal actions to evaluate effects of those actions on migratory birds, to control the spread and establishment in the wild of exotic animals and plants that could harm migratory birds and their habitats, and either to provide advance notice of actions that could result in the taking of migratory birds or to report annually to the U.S. Fish and Wildlife Service on the numbers of each species taken during the conduct of agency actions. Section 4.12 of this Rail Alignment EIS, Biological Resources, discusses potential impacts to migratory birds. DOE would implement methods during proposed railroad construction and operations, including surveys for nesting birds and restrictions on the timing of construction, to prevent the take of migratory birds.

6.3.8 LAND USE

Land uses that could be affected by the proposed railroad are under the jurisdiction of federal, state, county, and municipal plans and policies. Lincoln, Nye, and Esmeralda Counties have land-use plans (*Lincoln County Master Plan* [DIRS 185538-Lincoln County 2007, all]; *Adoption of the Nye County Comprehensive Plan* [DIRS 147994-McRae 1994, all]; *Master Plan Esmeralda County, Nevada* [DIRS 176770-Duval et al. 1976, all]). Approximately 99 percent of the lands along the Caliente and Mina rail alignments are BLM-administered public lands. The BLM administers the uses of lands along the Caliente rail alignment through ***resource management plans*** including the *Tonopah Resource Management Plan and Record of Decision* (DIRS 173224-BLM 1997, all), the *Draft Ely Resource Management Plan* (when it is finalized; DIRS 174518-BLM 2005, all), and the *Record of Decision for the Approved Las Vegas Resource Management Plan and Final Environmental Impact Statement* (DIRS 176043-BLM 1998, all). The BLM administers the uses of lands along the Mina rail alignment through the *Carson City Field Office Consolidated Resource Management Plan* (DIRS 179560-BLM 2001, all), the *Tonopah Resource Management Plan and Record of Decision* (DIRS 173224-BLM 1997, all), and the *Record of Decision for the Approved Las Vegas Resource Management Plan and Final Environmental Impact Statement* (DIRS 176043-BLM 1998, all).

6.3.8.1 Federal Land Policy and Management Act (43 U.S.C. 1701 *et seq.*)

The Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701 *et seq*.) established procedures for acquiring access to public lands. The regulations regarding ***withdrawals*** of public-domain land from public use, as codified in 43 CFR Part 2300, and the establishment of right-of-way reservations, as codified in 43 CFR Part 2800, primarily govern access to, and use of, BLM-administered lands. Section 6.6 describes this Act.

6.3.8.2 Materials Act (30 U.S.C. 601 *et seq.*)

The Materials Act of 1947 (30 U.S.C. 601 *et seq.*) authorizes land-management agencies such as the BLM to make common varieties of sand, stone, and gravel from public lands available to federal and state agencies under a ***free-use permit***. Regulations implementing the Materials Act are codified at 43 CFR Part 3600. To use common varieties of sand, stone, and gravel from public lands during construction of the proposed railroad, DOE would obtain free-use permits from the BLM.

6.3.8.3 Taylor Grazing Act, as Amended (43 U.S.C. 315 *et seq.*)

The Taylor Grazing Act of 1943, as amended (43 U.S.C. 315 *et seq.*), establishes processes by which the BLM grants and administers grazing rights. Regulations implementing the Taylor Grazing Act are codified at 43 CFR Parts 2300 and 4100 and include provisions for the agency to consider in administering grazing rights.

6.3.8.4 Farmland Protection Policy Act (7 U.S.C. 4201 *et seq.*)

The Farmland Protection Policy Act of 1981 (7 U.S.C. 4201 *et seq.*) seeks to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion to nonagricultural uses of farmlands with soils that are identified as prime and unique or of statewide and local importance. To comply with this law, DOE has coordinated with the U.S. Department of Agriculture, Natural Resources Conservation Service, to identify ***prime farmlands*** that could be affected by the proposed action and to evaluate impacts to those lands. Regulations implementing the Farmland Protection Policy Act are codified at 7 CFR Part 658.

6.3.8.5 Uniform Relocation Assistance and Real Property Acquisition Policies Act (42 U.S.C. 4651 *et seq.*)

The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (42 U.S.C. 4651 *et seq.*) encourages and expedites the acquisition of real property by agreements with owners; avoids litigation, including condemnation actions where possible, and relieves congestion in the courts; provides for consistent treatment of owners; and promotes public confidence in federal land-acquisition practices. For those portions of the rail line that would cross private land, DOE could negotiate a long-term lease with the landowner or transfer the land to federal ownership in accordance with this Act.

6.3.8.6 General Mining Law, as Amended (30 U.S.C. 22 through 54)

The Mining Law of 1872, as amended (30 U.S.C. 29; 43 CFR 3860) (30 U.S.C. 22 through 54), was one of a number of public land laws passed by Congress in the late 1800s to encourage settlement, development, and private ownership of the public-domain lands in the western United States. The Mining Law of 1872 enables public citizens and the mining industry the right to claim, settle on, develop mineral resources, and acquire title to public lands administered by the BLM and the U.S. Forest Service (an agency of the U.S. Department of Agriculture).

The Mining Law Administration program managed by the BLM involves primarily the last three elements: recordation, maintenance (annual work/surface management), and mineral patents. Surface management on National Forest System lands is administered by the Forest Service.

6.3.9 CONSTRUCTION- AND OPERATIONS-RELATED STATUTES AND REGULATIONS

6.3.9.1 Communications Act, as Amended (47 U.S.C. 308 *et seq.*)

The Communications Act of 1934, as amended by the Telecommunications Act of 1996 (47 U.S.C. 308 *et seq.*), and regulations of the Federal Communications Commission require an agency to obtain Federal Communications Commission permission to construct a private broadcasting system. DOE would need to obtain permission to use an assigned frequency, and the Federal Communications Commission would have to approve the design and location of the system prior to construction. The communication system for the proposed railroad would consist of a fiber-optic cable along the length of the line with broadcasting antenna located within the ***operations right-of-way*** at sufficient intervals to allow complete coverage of train-to-dispatch radio communications. DOE would obtain Federal Communications Commission approval to construct and operate this radio system and install a fiber-optics line.

6.3.9.2 Construction Camp Permits (Title 40, Chapter 444.130; NAC 444.550 through 444.566)

The Nevada State Health Division specifies conditions and requires permits for construction and labor camps in Nevada (Nevada Revised Statutes, Chapter 444.130 *et seq.*, and Nevada Administration Code, Chapters 444.550 through 444.566). These statutes and regulations are designed to maintain sanitary and healthy conditions at construction and labor camps in Nevada. They would apply to the design and operation of construction camps that DOE would establish during construction of the proposed railroad.

6.3.9.3 Occupancy Permits to Cross State Highways

The Nevada Department of Transportation and the Nevada Public Utilities Commission regulate rail crossings of public highways. The Nevada Department of Transportation requires an occupancy permit to

place a facility (including a railway) within a right-of-way of a state highway (Nevada Administrative Code, Section 408.427). The Public Utilities Commission must approve the placement of railroad tracks across public highways prior to construction of the tracks (Nevada Administrative Code, Section 703.455). DOE would have to obtain similar approvals for construction of access roads, water pipelines, and other ***infrastructure*** that would intersect highway rights-of-way.

In addition, the final decision about intersection non-county maintained or state roads and crossings on public land would be made by the BLM, in consultation with counties, as a part of any ***right-of-way grant*** for the construction and operation of the rail line. The final decision regarding county and state public roads on public land would be made by the affected counties and the state.

6.4 U.S. Department of Energy Orders

Under the authority of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 through 2259), DOE is responsible for establishing a comprehensive health, safety, and environmental program for its activities and facilities. DOE has established a framework for managing its facilities through the promulgation of regulations and the issuance of DOE Orders that set forth policies, programs, and procedures for implementing activities. DOE Orders are a component of DOE Directives that also include Policies, Notices, Manuals, and Guides, all of which are intended to direct, guide, inform, and instruct employees in the performance of their jobs, and enable them to work effectively within the Department and with agencies, contractors, and the public. Table 6-4 lists DOE Orders that could be relevant to construction and operation of the proposed railroad.

Table 6-4. Potentially applicable DOE Orders (page 1 of 2).

Order number and date of last revision	Subject	Description[a]
151.1C 11/02/05	Comprehensive Emergency Management System	Establishes requirements for emergency planning, preparedness, response, recovery, and readiness assurance activities and describes the approach for effectively integrating these activities under a comprehensive, all-emergency concept.
231.1A 06/03/04	Environment, Safety, and Health Reporting	Establishes the requirements procedures for information with environmental protection, safety, or protection significance for DOE operations.
252.1 11/19/99	Technical Standards	Requires that appropriate voluntary consensus standards (codes and standards) be selected, used, and adhered to for the design, testing, etc., of the proposed railroad.
413.3 07/28/06	Project Management	Demonstrates that DOE will support the development of documentation for the critical-decision process.
414.1C 06/17/05	Quality Assurance	Establishes an effective quality assurance management system using the performance requirements of this Order, coupled with technical standards, where appropriate.
420.1B 12/22/05	Facility Safety	Where no specific requirements are specified concerning natural phenomena hazard mitigation, requires model building codes or national consensus industry standards to be used in the design of the proposed railroad facilities.
430.1B 09/24/03	Life-Cycle Asset Management, Building Codes, and Value Engineering	Establishes procedures to follow in all phases of the management of DOE facilities.

Table 6-4. Potentially applicable DOE Orders (page 2 of 2).

Order number and date of last revision	Subject	Description[a]
430.2A 04/15/02	Energy Management	Requires design for the proposed railroad to be in compliance with the energy management plan, sustainable design, and water efficiency required by this Order.
440.1A 03/27/98	Worker Protection Management for DOE, Federal and Contractor Employees, and Fire Protection	Establishes a comprehensive worker protection program that ensures that DOE and its contractor employees have an effective worker protection program to reduce or prevent injuries, illnesses, and accidental losses by providing DOE, federal, and contractor workers with a safe and healthful workplace.
450.1 01/03/07	Environmental Protection Program	Establishes DOE policy to conduct its operations in an environmentally safe and sound manner and to conduct its activities in compliance with applicable laws and regulations through implementation of environmental management systems at DOE sites.
451.1B[b] 09/28/01	NEPA Compliance Program	Establishes DOE requirements and responsibilities for complying with NEPA.
460.1B 4/4/03	Packaging and Transportation Safety	Establishes requirements and assigns responsibilities for the safe transport of hazardous materials, hazardous substances, hazardous wastes, and radioactive materials.
460.2A 12/22/04	Transportation and Packaging Management	Establishes DOE polices and requirements to supplement applicable laws, rules, regulations, and other DOE Orders for materials, transportation and packaging operations.
470.2B 10/31/02	Independent Oversight and Performance Assurance Program	Prescribes the requirements and responsibilities to enhance safeguards and security; cyber security; emergency management; environment, safety, and health programs; and other critical functions by providing an independent evaluation of the adequacy of DOE policy and the effectiveness of line management performance.
470.4 08/26/05	Safeguards and Security System Design	Requires the design of the proposed railroad facilities to provide site-specific safeguards and security protection or to tailor the physical protection elements in a number of areas, as described in the Order.
5400.5 01/07/93	Protection of Public from Radiation Risks	Establishes standards and requirements for operations of DOE and DOE contractors for protection of members of the public and the environment against undue risk from radiation.
5480.19 10/23/01	Conduct of Operations Requirements for DOE Facilities	Provides requirements and guidelines for departments to use in developing directives, plans, and procedures for conducting operations at DOE facilities that should result in improved quality and uniformity of operations.

a. DOE = U.S. Department of Energy; NEPA = National Environmental Policy Act.
b. DOE Order 451.1B was modified by a DOE Notice (DOE N 451.1, 10/6/06).

6.5 Bureau of Indian Affairs Requirements

The regulations at 25 CFR Part 169 prescribe the procedures, terms, and conditions under which the U.S. Department of the Interior, Bureau of Indian Affairs, may grand rights-of-way over and across tribal land, individually owned land, and Federal Government-owned land; subsection 169.23 outlines that rights-of-way for railroads shall not exceed 50 feet in width on each side of the centerline of the railroad, except where there are heavy ***cuts*** and ***fills***, when they shall not exceed 100 feet in width. The regulations at 25 CFR Part 162 identify the conditions and authorities under which the Bureau of Indian Affairs may lease certain interests in Indian land and Federal Government land.

6.6 Bureau of Land Management Requirements

As a cooperating agency, the BLM may adopt this Rail Alignment EIS for the disclosure and analysis of potential environmental impacts, as required by NEPA.

The Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701 *et seq*.) established procedures for acquiring access to public lands. The regulations regarding withdrawals of public-domain land from public use, as codified at 43 CFR Part 2300, and the establishment of right-of-way reservations, as codified at 43 CFR Part 2800, primarily govern access to, and use of, BLM-administered lands. Construction and operation of a proposed railroad along either the Caliente rail alignment or the Mina rail alignment would require access to BLM-administered lands through application to the BLM for a right-of-way grant. A right-of-way grant is an instrument issued pursuant to Title V of the Federal Land Policy and Management Act authorizing the use of a right-of-way over, upon, under, or through public lands for construction, operation, maintenance, and termination of a project. DOE submitted a right-of-way application to the BLM on March 4, 2008 (DIRS 185486-Larson 2008, all). The right-of-way application includes public land required for the rail line, access roads, construction camps, water wells, and other facilities that would be part of the proposed railroad. The BLM may adopt this Rail Alignment EIS as authorized by 40 CFR 1506.3 to satisfy NEPA requirements for the right-of-way application. The BLM will determine whether to grant a right-of-way for the construction and operation of the DOE-proposed railroad.

The BLM-authorized officer considers whether the application is in compliance with the purpose for which the public lands are managed and the public interest. The Federal Land Policy and Management Act requires the authorized officer, prior to issuing a right-of-way grant or temporary-use permit, to perform the following tasks:

- Complete an environmental analysis in accordance with NEPA using the Council on Environmental Quality regulatory provisions for implementing NEPA (40 CFR Parts 1500 through 1508) as the review guidelines.
- Determine compliance of the applicant's proposed plan with applicable federal and state laws.
- Consult with all other federal, state, and local agencies having an interest.
- Take any other action necessary to fully evaluate and make a decision to approve or deny the application and prescribe suitable terms and conditions for the grant (reservation) or permit.

The BLM-authorized officer may hold public meetings on an application for a right-of-way grant if it is determined that such meetings are appropriate and that sufficient public interest exists to warrant the time and expense for such meetings.

Requirements of the application for a right-of-way grant are outlined at 43 CFR 2802.3. Requirements include a description of the proposal and a map (aerial photo or equivalent) showing the approximate location of the proposed right-of-way and facilities on public lands and existing improvements adjacent to the proposal. The BLM-authorized officer may require the applicant to submit additional information such as a description of the ***common segments*** and ***alternative segments*** considered; a statement of need and economic feasibility of the proposal; and a statement of the environmental, social, and economic effects of the proposal.

The regulations specify that all right-of-way grants assigned under 43 CFR Part 2800 contain terms, conditions, and stipulations as required by the authorized officer regarding extent, duration, survey,

location, construction, operations, maintenance, use, and termination. Stipulations typically include the following requirements:

- Restoration, revegetation, and curtailment of erosion of the surface of the land, or any other rehabilitation measure determined necessary
- Assurance that activities in connection with the grant or permit do not violate applicable air- and water-quality standards or related facility siting standards established by or pursuant to applicable federal or state law
- Controls or prevention of damage to scenic, aesthetic, cultural, and environmental values including damage to fish and wildlife habitat, damage to federal property, and hazards to public health and safety
- Compliance with state standards for public health and safety, environmental protection and siting, construction, operations, and maintenance, when those standards are more stringent than federal standards

The Federal Land Policy and Management Act, by which the government accomplishes most federal land withdrawals, contains a detailed procedure for application, review, and study by the BLM of the withdrawal of public domain land. The BLM submits the application to the Secretary of the Interior for approval of the terms and conditions of withdrawal. Withdrawals accomplished through the Act remain valid for no longer than 20 years unless extended after further review and approval by the Secretary of the Interior.

On December 19, 2003, DOE submitted *Application for Administrative Land Withdrawal for Potential Rail Corridor* (DIRS 177745-Arthur 2003, all) to the BLM, pursuant to Section 204 of the Federal Land Policy and Management Act. The purpose of the application was to withdraw 1,249 square kilometers (308,600 acres) of public land encompassing the Caliente rail corridor from ***surface entry*** and new ***mining claims*** for 20 years to evaluate the land for potential construction and operation of the proposed railroad. On December 29, 2003, the BLM issued a notice in the *Federal Register* of the proposed land withdrawal (*Notice of Proposed Withdrawal and Opportunity for Public Meeting*; *Nevada*, 68 *FR* 74965).

The notice segregated the land from surface entry and mining for a period of up to 2 years to allow a ***case file*** containing various studies and analyses to be prepared to support a final decision on the withdrawal application. The action would not transfer the land to DOE control. The BLM would continue to manage the withdrawal area in compliance with BLM resource management plans. In a May 21, 2004, Notice of Public Meetings, the BLM invited the public to submit written comments and gave notice of two public scoping meetings on the proposed land withdrawal and possible land-use plan amendments (*Notice of Public Meetings; Notice of Intent to Amend the Caliente Management Framework Plan, Schell Management Framework Plan, Tonopah Resource Management Plan,* and the *Las Vegas Resource Management Plan; Nevada*; 69 *FR* 29323). Separately from this Rail Alignment EIS, DOE prepared and released an environmental assessment in December 2005, *Environmental Assessment for the Proposed Withdrawal of Public Lands Within and Surrounding the Caliente Rail Corridor, Nevada* (DIRS 176452-DOE 2005, all), proposing the continued segregated effect of the land by withdrawing the land for a preferred period of 10 years. On December 28, 2005, the BLM withdrew the requested lands, subject to valid existing rights, from settlement, sale, location, or entry under general land laws, including the U. S. mining laws (30 U.S.C. Chapter 2), but not from leasing under the mineral leasing laws (for example, the Mineral Leasing Act of 1920*,* as amended [30 U.S.C. 181 *et seq.*]), for a period of 10 years (70 *FR* 76854).

DOE initiated a further application for land withdrawal and requested that the Secretary of the Interior withdraw a total of 842 square kilometers (208,037 acres) of public lands from surface entry and mining

through December 27, 2015. Thereby the BLM issued a notice on January 10, 2007 in the *Federal Register* of this application by DOE (*Notice of Proposed Withdrawal and Opportunity for Public Meeting; Nevada*; 72 *FR* 1235). This notice included an additional 278 square kilometers (68,646 acres) of public lands for evaluation along the Caliente rail corridor, and 564 square kilometers (139,391 acres) of public lands for the purpose of evaluating the potential construction, operation, and maintenance of a rail line along a suite of alternative segments and common segments referred to by the DOE as the "Mina Route." The expiration date for this proposed withdrawal is the same (December 27, 2015) as in the earlier December 28, 2005 BLM land withdrawal.

Implementation of the Proposed Action along the Caliente rail alignment or the Mina rail alignment would require a BLM right-of-way grant for use and access to BLM-administered lands that would be disturbed for rail line construction and operation. The BLM may issue a right-of-way grant for temporary or long-term use of land, and before issuing a right-of-way grant, must complete an environmental analysis in accordance with the National Environmental Policy Act of 1969. As a cooperating agency in the preparation of this Rail Alignment EIS, the BLM may adopt this document as authorized by 40 CFR 1501 to satisfy the NEPA requirements for the right-of-way application.

6.7 U.S. Army Requirements

The U.S. Army is a consulting agency to DOE in the preparation of this Rail Alignment EIS. Under the Mina Implementing Alternative (the nonpreferred alternative), DOE would need to construct and operate the ***Staging Yard*** on the Hawthorne Army Depot in Mineral County. DOE would do so in conformance with existing permits issued to the Hawthorne Army Depot by the State of Nevada, Division of Environmental Protection. Table 6-5 lists the permits for the main site at the Hawthorne Army Depot.

Table 6-5. Permits for the Hawthorne Army Depot main site at Hawthorne, Nevada, issued by the State of Nevada, Division of Environmental Protection.[a]

Permit	Type	Permit number
Class I, Title V, Main Base	Air	AP9711-0863.01
Class I Construction, hazardous waste generator	Air	AP9711-1145
Class I Construction, Bulk Energetics Demilitarization System	Air	AP9711-1489
Wastewater, Plasma Ordnance Demilitarization System	Groundwater	NEV2003516
Wastewater, Western Area Demilitarization Facility	National Pollutant Discharge Elimination System	NV0021946
Stormwater	Clean Water Act	NVR050000
Treatment storage and disposal system, storage open burn, incineration	Resource Conservation and Recovery Act, C	HW0017
Solid-waste and fill	Resource Conservation and Recovery Act, D	Waiver No. SWMI-09-68
Solid-waste landfill	Resource Conservation and Recovery Act, D	SW-1209702
Drinking water	Solid Waste Disposal Act	MI-0357-12C
Water Treatment Facility	Groundwater	NEV2004524

a. Source: DIRS 181385-Millsap 2007, all.

7. BEST MANAGEMENT PRACTICES AND MITIGATION

This chapter describes the preliminary best management practices DOE would implement to help avoid impacts to environmental resources and the measures the Department would consider to mitigate adverse impacts from constructing and operating the proposed railroad under the Caliente Implementing Alternative or the Mina Implementing Alternative, as appropriate. Mitigation measures include only those actions that would be above and beyond compliance with statutory and regulatory requirements and implementation of best management practices DOE has incorporated into the Proposed Action.

Glossary terms are shown in ***bold italics***.

In response to comments on the Draft EIS, DOE significantly revised Chapter 7. Change bars, which are used in other sections of this EIS to indicate where changes since publication of the Draft EIS have occurred, are not included in Chapter 7 because they would appear throughout the section and would not assist the reader in identifying substantive changes to the chapter.

During planning and design of the proposed railroad, the U.S. Department of Energy (DOE or the Department) used various engineering and site evaluation and planning measures to avoid, minimize, or otherwise reduce environmental ***impacts***. These measures included the elimination of certain ***alternative segments*** as unreasonable and moving the location of specific segments. The Department took many of these actions in response to comments received during the scoping periods and the Draft EIS comment period for this Rail Alignment Environmental Impact Statement (EIS). As the environmental analyses have progressed, DOE has refined the Caliente ***rail alignment*** and the Mina rail alignment to avoid certain sensitive environmental features and reduce potential impacts to sensitive areas by limiting the project's ***footprint*** in such areas. Chapter 2 and Appendix C describe this process.

As described in Chapter 2 and shown in Figure 7-1, early engineering and site evaluation and planning undertaken during preparation of this Rail Alignment EIS represent a preliminary step toward avoiding, minimizing, or otherwise reducing the environmental impacts of the Proposed Action.

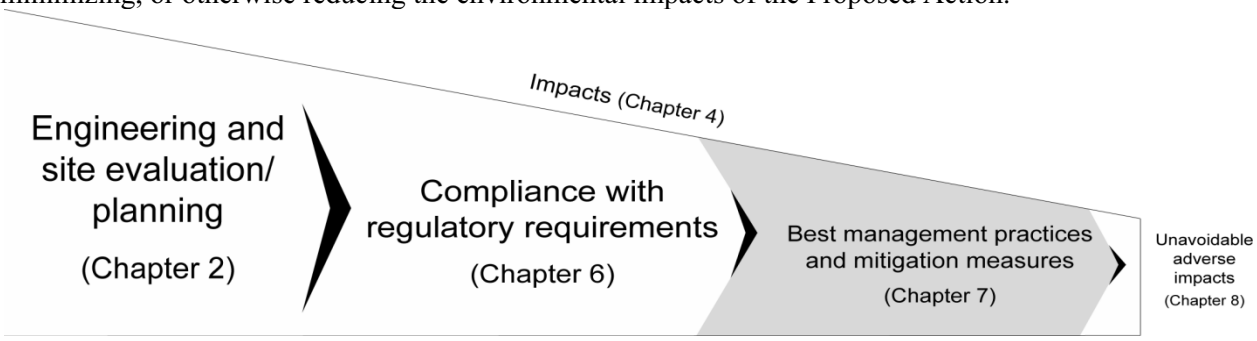

Figure 7-1. Multi-step approach to avoid, minimize, or reduce environmental impacts.

In addition, DOE recognizes that it must also comply with applicable environmental requirements (see Chapter 6) during construction and operation of the railroad. The Department has incorporated a variety of preliminary best management practices to comply with the requirements. These best management practices have been incorporated into the ***Proposed Action*** and would further reduce the environmental impacts of constructing and operating the proposed ***railroad***.

Lastly, DOE also has identified, preliminarily, various ***mitigation*** measures that would further avoid, minimize, rectify, reduce, or compensate for any remaining adverse environmental impacts. DOE regards mitigation measures as activities or actions that would be above and beyond the best management practices.

7.1 Longer-Term Process for Development and Implementation of Best Management Practices and Mitigation Measures

Policy

DOE's policy is to work closely with directly affected parties to ensure, to the extent practicable, that adverse environmental impacts are avoided, and if unavoidable, minimized or reduced. In those instances in which Departmental efforts to minimize or reduce adverse impacts are insufficient, directly affected parties would be compensated.

DOE views the preliminary best management practices and mitigation measures discussed in Sections 7.1 and 7.2, respectively, as representing the initial step in a longer-term, iterative process to further develop, detail, and eventually implement these practices and measures. DOE considers the process to be "longer-term" in that the preliminary best management practices and mitigation measures identified in this Rail Alignment EIS would be further developed and detailed through (1) the regulatory compliance process, such as that associated with DOE's right-of-way application with the Bureau of Land Management (BLM) or DOE's application for a certificate of public convenience and necessity with the Surface Transportation Board (STB); (2) development of the final design and associated specifications, such as that associated with the selection of specific seed mixes and application techniques for reclaiming disturbed land; and (3) consultation with directly affected parties, such as grazing permittees and local communities through which the rail line would pass. The process is iterative in that DOE intends to consult with directly affected parties as the practices and measures advance from the conceptual to the more detailed, as engineering of the proposed rail line advances from preliminary through final design, and during implementation and monitoring of their effectiveness (see Figure 7-2).

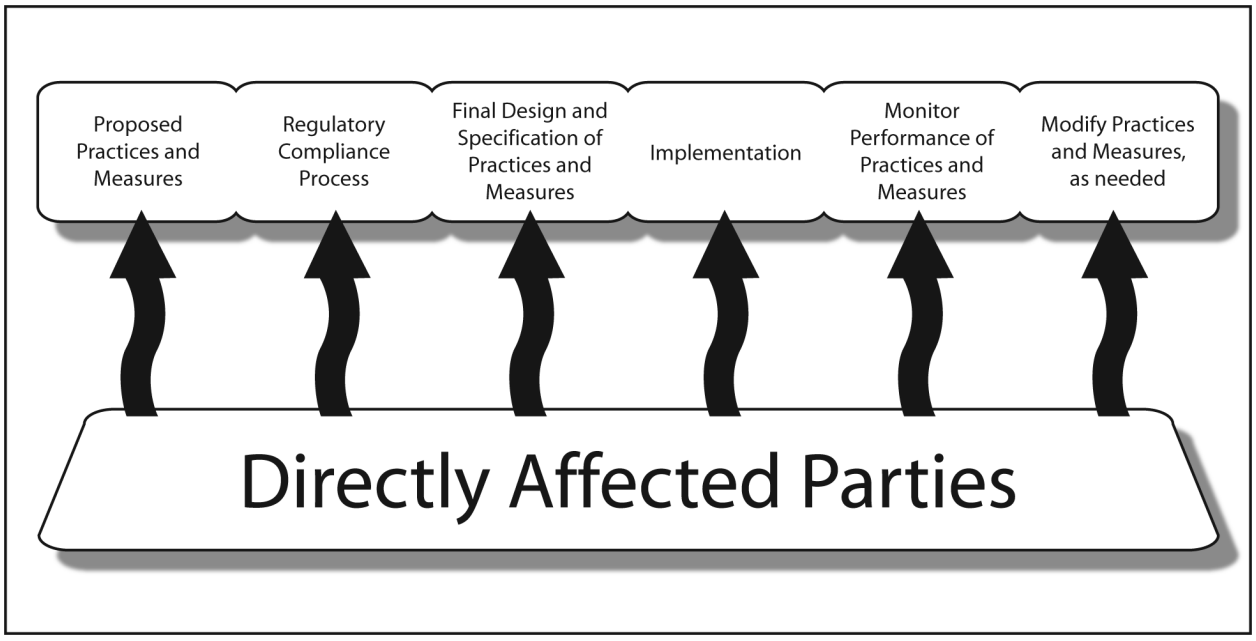

Figure 7-2. Longer-term process for best management practice and mitigation development and implementation.

This process is based, in part, on the use of an adaptive management approach described herein as – consider the magnitude of potential impacts, mitigate, implement, monitor, and adapt. Using this approach, DOE can respond to unanticipated changes in local conditions or subsequently developed information, for example, and thus make cost-effective adjustments to its best management practices and mitigation measures, as necessary. A similar adaptive management approach was developed as part of the Nevada Test Site Resource Management Plan (DIRS 103226-DOE 1998, all).

In undertaking this process, DOE would:

1. Consider the magnitude of the potential adverse environmental impacts, based on the environmental conditions (affected environment), and analyses of this Rail Alignment EIS.

2. Develop detailed best management practices and mitigation measures in response to these adverse impacts. In this step, DOE also would identify the desired outcome of these practices and measures, and identify associated performance measures by which DOE could determine the effectiveness of such practices and measures during their implementation.

3. Identify monitoring protocols to determine the effectiveness of these practices and measures given the desired outcome. Prior to developing these protocols, DOE would undertake additional studies to further assess the then-current baseline conditions (affected environment), as appropriate. The protocols would be developed to distinguish between changes in conditions due to DOE's action and those from other causes.

4. Consider the cost of implementation, as well as monitoring, when developing the final practices and mitigation measures.

5. Determine the need to adapt or modify the best management practices and mitigation measures, based on performance (outcome) monitoring, after such practices and measures have been implemented.

6. Determine the extent to which the regulatory community and other directly affected parties find such mitigation measures, and their associated monitoring protocols and performance measures to be acceptable (see Section 7.1.1 below).

Since completion of the Draft Rail Alignment EIS, DOE has furthered the process by submitting applications for a right-of-way to the BLM, and for a certificate of public convenience and necessity to construct and operate the railroad as a common carrier to the STB. The BLM regulations (43 Code of Federal Regulations [CFR] 2305.12) require a grantee (DOE) to comply with all stipulations that the BLM may require in granting a right-of-way. Further, the BLM's National Environmental Policy Act (NEPA) handbook (DIRS 182299-BLM 1988, all) indicates that "stipulations [mitigation measures] which will become part of the Bureau's authorization should be attached to the ROD [Record of Decision] or incorporated by reference." Accordingly, as part of the right-of-way application process, DOE has provided the preliminary practices and measures shown in Tables 7-1 and 7-2 to the BLM to (1) determine if these practices and measures are consistent with the BLM's policies and approaches, and (2) agree to a framework on how to implement these practices and measures. Based on further consultation with the BLM, these practices and measures may need to be revised and the right-of-way application amended.

The ICC Termination Act of 1995 (49 United States Code [U.S.C.] 10901(c)) authorizes the STB to issue a certificate for the construction and operation of a railroad if it is consistent with the public convenience and necessity. This Act further provides that the STB may approve any application as filed (or with modifications), and may require compliance with conditions that are necessary to the public interest. The STB typically requires mitigation measures (conditions) when issuing certificates for the construction and operation of a railroad. DOE has provided the preliminary practices and measures shown in Tables 7-1

and 7-2 to the STB to facilitate their review of DOE's application, and to determine if these practices and measures are consistent with the STB's policies and approaches. In response to this initial effort, DOE has incorporated several additional best management practices and mitigation measures. Based on further consultation with the STB, additional practices and measures may need to be revised for the application to construct and operate the railroad. The STB could also impose additional mitigation conditions, beyond those proposed by DOE, in any final decision granting DOE with the authority to construct and operate the proposed railroad as a common carrier.

7.1.1 MITIGATION ADVISORY BOARD(S)

The Department would undertake this mitigation process in consultation with federal, state, and local regulatory authorities having jurisdiction over the construction and operation of the railroad, and in consultation with directly affected parties. To that end, DOE is proposing to charter one or more Mitigation Advisory Boards, each to be led by the governmental entities through which the rail line would pass, to provide independent advice and recommendations to assist DOE, the BLM, and the STB in developing, implementing, and monitoring best management practices and mitigation measures during the construction and operation of the railroad. DOE would determine in the future the exact construction of the boards and the processes under which they would operate. DOE would also invite the BLM and the STB to serve as ex-officio members.

7.1.2 CONSULTATION PROCESS WITH AMERICAN INDIAN TRIBES

American Indian tribes, as sovereign nations, are afforded a special relationship with the Federal Government through a trust responsibility to address the special interests of tribes by consulting on a government-to-government basis. In addition, the National Historic Preservation Act and the programmatic agreement between DOE, the Surface Transportation Board, and the Nevada State Historic Preservation Office requires American Indian involvement in the cultural resources management program for the rail alignment. DOE has received numerous comments from Americans Indians on the Rail Alignment EIS that address many tribal interests and issues associated with the Proposed Action.

Tribal issues have a basis in American Indian culture, including holistic values and spiritual beliefs of the natural environment. DOE intends to conduct an ethnographic evaluation of the rail alignment area and to integrate tribal perspectives with archaeological studies for a more detailed cultural resources management program along the rail alignment. Through specific best management practices and mitigation measures, tribal perspectives will be addressed in an appropriate manner (cultural resources sections of Tables 7-1 and 7-2).

As discussed in Section 3.4, DOE has supported a Native American Interaction Program (NAIP) since the late 1980s that addresses tribal issues associated with the Yucca Mountain Repository site and more recently, the Nevada rail program. Tribal representatives from tribes in Nevada, California, Arizona, and Utah have formed the Consolidated Group of Tribes and Organizations (CGTO) as an informal coalition for interacting with DOE. The CGTO consists of tribal individuals representing Western Shoshone, Southern Paiute, and Owens Valley Paiute and Shoshone ethnic groups. Interactions between DOE and the CGTO have contributed to a government-to-government consultation process for DOE programs associated with the Yucca Mountain Project. DOE will use the existing CGTO process for oversight of tribal involvement in the implementation of applicable best management practices and mitigation measures.

The CGTO will act as an advisory board that meets periodically to help identify study parameters for implementation by smaller groups of tribal representatives. It is expected that Americans Indians will be involved in archaeological studies to ensure cultural sensitivities are addressed, and ethnographic

evaluations addressing detailed tribal perspectives. Results of these studies will be routed through the CGTO prior to report preparation and dissemination.

7.2 Best Management Practices

As part of the Proposed Action, DOE would implement appropriate best management practices to prevent or minimize environmental impacts. Table 7-1 lists, but does not limit, such practices. Some of the preliminary best management practices listed in Table 7-1 would change depending on the requirements included in permits and ***right-of-way grants*** applicable to construction and operation of the proposed railroad, and as a result of consultations with directly affected parties. The table identifies the affected resource area(s) for each best management practice, the requirement(s) the practice would support (see Chapter 6), and the purpose of the practice.

Best management practices: Practices, techniques, methods, processes, and activities commonly accepted and used throughout the construction and railroad industries that DOE would implement as part of the Proposed Action to facilitate compliance with applicable requirements and that provide an effective and practicable means of preventing or minimizing the adverse impacts of an action on human health and the environment.

7.3 Mitigation

7.3.1 MITIGATION MEASURES

Mitigation (40 CFR 1508.20) includes:

Avoiding the impact altogether by not taking a certain action or parts of an action.

Minimizing impacts by limiting the degree or magnitude of the action and its implementation.

Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.

Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.

Compensating for the impact by replacing or providing substitute resources or environments.

Table 7-2 summarizes mitigation measures that DOE is considering for potential impacts along the proposed railroad. Each mitigation measure is linked to an identified potential impact, and is either location specific or global (applicable to the entire appropriate ***region of influence***), depending on the level of knowledge and degree of certainty regarding the extent, duration, and location of the potential impact. As discussed above in Section 7.1, mitigation measures would continue to evolve with project development and would change or become more specific and refined in a mitigation action plan following a Record of Decision for this Rail Alignment EIS (see Section 7.3.3). Consistent with the definition of mitigation described above, the mitigation measures identified in Table 7-2 include only those actions that would be above and beyond compliance with statutory and regulatory requirements and implementation of best management practices DOE has incorporated into the Proposed Action.

7.3.2 Mitigation Process Examples

The following examples are provided to demonstrate how the mitigation process would apply to directly affected parties. Example 1 shows the general process DOE and the proposed Mitigation Advisory Board(s) would follow after the identification of a potential impact by a directly affected party. This

Example 1: General Mitigation Process

Raising Concerns Pertaining to Mitigation *How would the directly affected party raise a mitigation issue?*	Directly affected parties who would be impacted by DOE actions pertaining to construction or operation of the railroad may raise those issues with DOE. Issues should be communicated in writing and should quantify the magnitude of the impact to the extent possible. Directly affected parties would also be invited to propose mitigations or solutions to the impact. Directly affected parties with similarly situated concerns may choose to approach DOE collectively. The group may request that a concern common to several stakeholders be addressed as a group mitigation and request that implementation be applied in the same manner for all directly affected parties. DOE would inform the Mitigation Advisory Board(s) and other ex-officio members of all mitigation issues, and DOE would request the Mitigation Advisory Board(s) advice, as appropriate.
Analysis of Impacts *What would DOE do with mitigation issues raised by directly affected parties?*	Once an impact is identified, DOE would study an issue and ensure that there would be a full understanding of the issue and the impacts. DOE would make a good faith effort to quantify the impacts, establish metrics, and implement a long-term monitoring program, if appropriate. DOE would discuss concerns directly with directly affected parties in those instances where an impact is unique to the directly affected party. In situations where an impact is common to many directly affected parties, DOE may communicate with those directly affected parties collectively. DOE would use advice and recommendations from the Mitigation Advisory Board(s), as appropriate to each situation. For matters pertaining to railroad design and train operations, DOE would be informed by railroad industry practices. DOE would examine the practices of Class I railroads, shortline railroads, and commercial organizations engaged in the construction and operation of railroads. DOE would seek to understand the mitigation concern raised by the directly affected party in the context of industry best practices, and how mitigation of comparable impacts has been implemented on other rail infrastructure projects. As part of this process, DOE would also consult with the Federal Railroad Administration (FRA) and the Surface Transportation Board (STB) to understand the regulatory framework associated with the impact.
Examples of Mitigation *Illustrations of the process DOE would follow in developing mitigation.*	There are a number of potential impacts related to railroad design, construction, and operations that may be identified by directly affected parties. Examples of these potential impacts are as follows: ➢ Design of grade crossings and crossing guards ➢ Location and design of turnouts and sidings ➢ Impacts related to noise and train whistles ➢ Issues pertaining to train speed and safety of operations ➢ Design of fire protection systems In each of the above cases, DOE would review industry practices and follow FRA regulations in formulating an appropriate response, which may include additional best management practices or mitigation measures. By way of example, the following three case studies provide an illustration of how DOE would address concerns pertaining to train operations:

Example 1: General Mitigation Process (continued)

Case 1: A directly affected party identifies a concern pertaining to safety at a new grade crossing because trucks would have to cross the railroad to complete routine ranch management activities.	In this scenario, DOE would review the type of road, the proposed grade crossing, and the projected traffic levels. DOE would then consult with industry experts to learn how this type of road with a particular projected traffic volume has been protected elsewhere in the United States. DOE would consult with FRA to understand the regulations pertaining to grade-crossing protection. DOE, in consultation with directly affected parties, may elect to install a crossbuck marking without signals, a signaled crossing without gates, or a fully signaled and gated crossing guard. In this scenario, the decision would likely be based largely on the projected traffic volume at the crossing. DOE would ensure that the crossing protection was at least equal to comparable industry practice nationwide.
Case 2: A directly affected party identifies a concern pertaining to train noise that may occur while trains are idling on a rail siding. The directly affected party is concerned that train idling during the night would disturb residents and cattle grazing operations in the adjacent area.	In this scenario, DOE would review the location of rail sidings to ensure that trains idling in wait mode, particularly during evening hours, would not be heard by local residents. If DOE determined that the location of the rail siding would likely disturb local residents, a good faith effort would be employed to relocate the siding. If the location of the siding cannot be changed without impacting the efficiency of train operations, DOE would consider the installation of engineered sound barriers as mitigation.
Case 3: A directly affected party identifies a concern pertaining to train noise from train whistles. The directly affected party is concerned that blowing the train horn at grade crossings, particularly during the night, would disturb residents.	Trains are required by law to blow a whistle when approaching a grade crossing. FRA has a process to exempt railroads from blowing horns if appropriate compensatory safety measures are in place. In this scenario, DOE would review the location of the grade crossing, measure the magnitude of disturbance to local residents, and determine whether the instant case is a candidate for designation as a whistle-free zone. If it is determined that the location would benefit from a whistle-free zone and compensating safety measures can be installed, DOE would petition FRA for approval to establish a whistle-free zone at that location.
Response to Mitigation Concern *How would DOE communicate its intentions to directly affected parties?*	Once the DOE has studied the issue and quantified the impacts as described above, DOE would implement a design solution or operating policy that is responsive to minimizing or eliminating the impact. This mitigation would be understood in the context of industry practice, it would be consistent with mitigation of similarly situated conditions on other rail projects, and would be fully compliant with the applicable regulatory framework. Directly affected parties would receive a written response from DOE indicating the mitigation decision and the solution.

example also includes several case studies to show how DOE may respond to specific operational impacts. Example 2 describes the mitigation process DOE would use when evaluating and addressing impacts to a particular resource area, namely, ranching and grazing. Other types of potential impacts would be handled through similar mitigation processes that would be adjusted as appropriate to address specific impacts.

Example 2: Grazing and Ranching Specific Mitigation Process

Raising Concerns Pertaining to Mitigation *How would the directly affected party, such as a directly affected rancher, raise a mitigation issue to DOE?*	Ranchers who would be impacted by DOE actions pertaining to construction or operation of the railroad may raise those issues with DOE. Preferably, issues should be communicated in writing and should quantify the magnitude of the impact to the extent possible. (Many ranchers have already provided input that DOE would use. Ranchers are invited to provide additional or updated input.) Ranchers would also be invited to propose mitigations or solutions to the impact. Ranchers with similarly situated concerns may choose to approach DOE collectively. The group may request that a concern common to several ranchers be addressed as a group mitigation and request that implementation be applied in the same manner for all ranchers.
Analysis of Impacts *What would DOE do with mitigation issues raised by directly affected parties, such as directly affected ranchers?*	For ranching and grazing matters, DOE would work with the affected ranchers, the BLM, and the Mitigation Advisory Board(s) to understand all ranching mitigation concerns, the impacts related to each concern, and how potential mitigations may be implemented. DOE would begin developing solutions for the types of concerns as part of the preliminary design work. DOE and the BLM would also work with each affected rancher to guide the development of workable mitigation measures for that rancher's unique situation. *As an example, where the railroad would cross an existing stock water pipeline, mitigation may include methods to maintain water to the stock during all phases of construction, building good protection for the pipeline under the railroad, and making provisions for any maintenance of the pipeline that may be needed in the future. DOE recognizes that this simple example would be expanded to include other mitigations that may be needed to effectively maintain stock along with provision of water.*
Response to Mitigation Concern *How would DOE communicate its intentions to directly affected parties, such as ranchers?*	DOE and the BLM would discuss concerns directly with ranchers in those instances where an impact is unique to the rancher. In situations where an impact is common to many ranchers, DOE may communicate with those ranchers collectively in a public forum. Once DOE has studied the issue and quantified the impacts as described above, DOE would consult with the BLM and the STB, and study the issue as described above. The ranchers would receive a written response from DOE indicating the mitigation decision and the solution. DOE would implement a design solution or operating policy that is responsive to minimizing or eliminating the impact. This mitigation would be understood in the context of typical agricultural practices, it would be consistent with mitigation of similarly situated conditions on other rail projects, and would be fully compliant with the BLM applicable regulatory framework. Where a design solution is not possible to fully mitigate the impact, compensatory mitigation strategies, encouraged by Council on Environmental Quality (CEQ) regulations for implementing NEPA, would be formulated.

7.3.3 MITIGATION ACTION PLAN

DOE regulations at 10 CFR 1021.331 require the preparation of a mitigation action plan, if DOE identifies mitigation commitments in a Record of Decision. DOE anticipates that its Record of Decision based on this Rail Alignment EIS would include a description of the process described above in Section 7., identify and commit to best management practices and mitigation measures based on those of Tables 7-1 and 7-2, commit to the preparation of a Mitigation Action Plan, and identify the extent to which all practicable means to avoid or minimize environmental harm from the alternative selected have been adopted.

The Mitigation Action Plan would contain:

- An introduction describing the basis, function, and organization of the plan
- A summary of the impacts to be mitigated
- A description of specific mitigation measures
- A description of the Mitigation Action Plan monitoring and reporting system that DOE would implement to ensure that elements of the plan were met and were effective
- A schedule for actions and identification of the responsible parties

The Mitigation Action Plan would be developed in consultation with the proposed Mitigation Advisory Board(s).

7.4 Local Government Viewpoints

7.4.1 CITY OF CALIENTE VIEWPOINT

The City of Caliente is located in southeastern Nevada approximately 150 miles north of Las Vegas via U.S. Highway 93. Situated in Lincoln County, Caliente is readily accessible via truck and the Union Pacific Railroad Mainline to many of the population centers in the growing southwestern United States. The meadow area around the junction of Meadow Valley Wash and Clover Creek was originally settled in the early 1860s. The area became known as "Culverwell," after some local ranchers who owned a major portion of what is now the City of Caliente. Caliente, Nevada, is home to some tremendous geothermal resources. In fact, the city derives its name from the hot springs that can be found in the area.

Caliente has provided services to the Union Pacific Railroad in its various forms since the original mainline track was laid in 1906. For more than 40 years, Caliente was one of the major division points on the railroad line. The railroad still figures prominently in the character of Caliente. The Union Pacific Railroad Station is the best known of Caliente's buildings. It no longer serves as a train station, but it is still a community hub, housing the Caliente Chamber of Commerce and City Hall. A number of Union Pacific trains still rumble through town every day, reminding visitors and residents of the town's roots.

Through its ups and downs, Caliente has progressed from a purely agricultural community to a bustling steam engine service center to the business center of Lincoln County. Incorporated in 1941 and lying on the main north-south highway of eastern Nevada, U.S. Highway 93 North, Caliente is a convenient rest-stop for all traveling to destinations from Jackpot on the North to Las Vegas on the South. Caliente is also a very pleasant mountain home to both newcomers and those who have lived in Caliente for seven or eight generations.

It is anticipated that approximately 90 percent of all shipments destined for Yucca Mountain, Nevada, will pass through the City of Caliente. It is imperative that DOE's planning and implementation schedules allow for sufficient lead time to ensure that the necessary community and transportation

infrastructure and sufficient public health and safety equipment and personnel are in place prior to commencing the shipping campaign. Furthermore, to the extent allowable by law, DOE is encouraged to provide the maximum amount of local control over the funding necessary to upgrade infrastructure, improve training, and hire personnel. Provided all the necessary equipment, training, personnel, and infrastructure are provided in a timely manner, the City of Caliente is confident that the overall risk to its citizens will be reduced from the existing level of risk its citizens experience. Presently, a high number of hazardous material shipments regularly pass through the City of Caliente. The added emergency response capabilities that should result from the implementation of the Yucca Mountain Project transportation campaign would enable the City of Caliente to be more prepared to respond effectively to a suite of potential emergencies.

The citizens of Caliente, as some of the most affected populations, should receive significant economic benefit from the project to help offset the burden they will share with the other citizens of the rail-affected jurisdictions. The City of Caliente lies within a U.S. Small Business Administration-designated HubZone area. This designation allows firms located within the HubZone to obtain preference when competing for federal contracts. The City of Caliente encourages DOE to consider the HubZone designation for firms located within the city and to adopt other policies and practices that provide an advantage to firms located within the city and within the boundaries of other rail-affected jurisdictions to help compensate for the unequal impacts the citizens of these jurisdictions will experience.

The City of Caliente encourages DOE to promptly identify and begin negotiations with private citizens who will be directly impacted by the proposed construction and operation of a railroad within the Caliente rail alignment. To the extent that mitigation is not possible, the City of Caliente encourages DOE to fairly compensate property owners for the loss of the use of their property, including portions of their property that are not directly impacted but are of no value to the property owner due to the direct impacts of the construction and operation of the railroad.

The City of Caliente is fully committed to helping make the Caliente rail alignment a success for its citizens, its business people, DOE, and the Nation.

7.4.2 ESMERALDA COUNTY VIEWPOINT

This perspective provides the viewpoint of Esmeralda County on the Proposed Action as a cooperating agency for the Rail Corridor SEIS and Rail Alignment EIS.

Esmeralda County believes that land within the county will directly be affected through disturbance created by construction and operation of the proposed rail line, facilities, quarries, water wells, construction camps, and access roads.

Esmeralda County believes that the Proposed Action by DOE in this Rail Alignment EIS of potential impacts has been reasonably addressed. However, Esmeralda County believes once additional planning, engineering, and construction begin, other potential impacts will be identified, creating the possibility of differences of opinion between Esmeralda County and DOE. Consequently, potential impacts presented in this Rail Alignment EIS should be continuously assessed and evaluated through an appropriate monitoring program.

Esmeralda County is a cooperating agency in the preparation of this Rail Alignment EIS, and as a local jurisdiction is affected by the Proposed Action. Esmeralda County believes that if the Proposed Action is implemented, it should include environmental monitoring, including monitoring of socioeconomic factors. Esmeralda County believes it would be beneficial for the federal agencies and the local government to partner in order to monitor, assess, and evaluate conditions within and adjacent to the Nevada rail alignment within Esmeralda County before and as activities related to rail construction and

operations take place. Through this process Esmeralda County can be of assistance to DOE in the identification of any potential impacts, whether significant or not, and cooperatively develop effective and efficient mitigations, as appropriate, through ongoing adaptive management.

Esmeralda County believes that an adaptive management plan should be put into place, such as recommended by the Council on Environment Quality's NEPA Task Force, in *Modernizing NEPA Implementation* (2003), and its direction on how to predict, mitigate, implement, monitor, and adapt. This has been suggested by other affected jurisdictions and Esmeralda County is in full agreement that an adaptive management plan would specifically address mitigation activities associated with the rail line on an ongoing basis. It would specifically address the management of monitoring and mitigation activities associated with construction, operation, and maintenance of the rail line and related access roads and facilities, while recognizing the need for identification of non-rail/transportation-related environmental and socioeconomic pressures that could intensify potential rail/transportation-related impacts.

Esmeralda County proposes initiating mutual consultation and cooperation through formalized agreements between the county and DOE that will constructively engage DOE in assisting and identifying the resource areas that will be susceptible to further impacts.

Esmeralda County is one of four local jurisdictions in Nevada that hosts the DOE preferred rail line for the transportation of high-level radioactive waste and spent nuclear fuel to a geologic repository at Yucca Mountain. Esmeralda County intends to work constructively with DOE and the other jurisdictions along the rail alignment for the purpose of developing and implementing policy that protects public safety, the environment and associated natural resources, minimizes adverse economic impacts, and maximizes economic opportunities associated with the rail line.

7.4.3 LINCOLN COUNTY VIEWPOINT

This section presents the viewpoint of Lincoln County as a cooperating agency and rail-head for the Caliente rail alignment to the Yucca Mountain Site.

Lincoln County would be the division point from the Union Pacific Railroad Mainline to the Caliente rail alignment for all rail shipments of spent nuclear and high-level radioactive waste bound for the Yucca Mountain Site. Construction and operation by DOE of the Caliente rail alignment and related facilities is but one of many large projects that taken together will change dramatically the character of Lincoln County. Planning is underway for residential developments located in the southern portions of Lincoln County, which would add an estimated 150,000 new dwelling units and approximately 300,000 to 400,000 new residents over the next 40 to 50 years (the current county population is less than 5,000 people). An approximate 1,600-megawatt coal-fired power plant is being proposed in southern Lincoln County that would add appreciably to the county's tax base. The Southern Nevada Water Authority and the Lincoln County Water District are in the midst of planning and design of projects to pump and transmit large quantities of groundwater from northern Lincoln County to locations in southern Lincoln County. Several high-voltage electrical energy transmission lines are being proposed to cross Lincoln County. Working cooperatively with the BLM, Lincoln County is identifying public land adjacent to all principal communities in the county for disposal by the Federal Government to enable community expansion.

In the shadow of this future change, the traditional backbone industry of the Lincoln County economy, agriculture, struggles to adjust to ever-increasing costs of production, government regulation, and growing demands for nonagricultural use of public land resources in the county. Wilderness designation has already served to restrict uses of approximately 780,000 acres of public land in the county. Lincoln County residents, many of whom have resided in the area all of their lives and whose pioneer families settled the area, feel the shadow of change creeping over their rural communities where the rural social

fabric has been woven out of a familiarity with and ability to depend upon others in the community; a sense of security owing to little crime; and the ability to enjoy the largely unspoiled public lands in the region; among other important attributes. Residents of Lincoln County own homes, farms, businesses, and ranches comprised of what is a very limited private land base in an otherwise federally administered landscape. Indeed, of Lincoln County's 10,600 plus square miles, private land constitutes less than 2 percent of the land area. Private land is the glue upon which the economy and social structure of Lincoln County is founded. Public land serves to support nearly every facet of economy and the daily lives of Lincoln County residents. Together, private and public land resources in Lincoln County converge in a synergistic manner to support customs and practices which define Lincoln County as a highly desirable place to live, work, and recreate. If the Caliente rail alignment is to be constructed and operated, it should be done so in a manner and along an alignment that serves to effectively avoid and minimize, to the extent practicable, impacts to private landowners and public land users.

The Caliente rail alignment will result in a wide variety of impacts to private and public land resources in Lincoln County. Construction and operation of the rail line to Yucca Mountain will impact the way of life and the livelihoods of Lincoln County residents. If properly identified and fully evaluated, many of the potential impacts may be avoided or minimized through design and implementation of appropriate mitigation measures. To the extent that potential impacts are not fully identified and properly evaluated, unanticipated consequences of the construction and operation of the rail line and related facilities may be pervasive.

If the Caliente rail alignment is to be built and operated, Lincoln County believes that all impacts, regardless of their apparent significance, must be mitigated. The county believes that no owner of private property or user of public land should be left to contend with any unmitigated consequence of the Caliente rail alignment. If the Caliente rail alignment is to be constructed and operated, all impacted parties must be kept whole through various means, including, as a last resort, compensation. Where the Caliente rail alignment crosses private property, recognition that the portion of the private parcel not under the actual rail easement or right-of-way may be left partially, if not wholly, unable to support its former land use. Any such loss of use must be recognized and mitigated.

Finally, Lincoln County is concerned that mitigation for impacts to private and public land resources be designed, funded, and implemented as soon after a decision to construct and operate the Caliente rail alignment is made. For many types of impacts, implementation of mitigation during pre-construction phases of the project will be required to ensure that consequences of construction are effectively avoided or minimized. This may require that mitigation be planned, funding secured, and implementation completed 3 to 4 years prior to the start of construction on the rail line and related facilities. Recognition of the spatial aspects of impact and the temporal dimensions of mitigation success will be key to keeping the residents of Lincoln County whole.

7.4.4 NYE COUNTY VIEWPOINT

This section presents the viewpoint of Nye County on the Proposed Action as a cooperating agency for the Rail Corridor SEIS and Rail Alignment EIS, and the situs county of the Yucca Mountain Repository.

As discussed in the Nye County perspective on cumulative impacts presented in Section 5.5, the county believes that the majority of the direct, indirect, and cumulative impacts of past and ongoing federal actions, as well as those incremental impacts that can be reasonably expected to occur if the Proposed Action were implemented, can be effectively mitigated. It is imperative from Nye County's perspective that the Record of Decision for this Rail Alignment EIS clearly identify the full spectrum of appropriate mitigation measures, whether or not DOE has the jurisdictional authority for implementation of the mitigation measures.

Nye County believes that DOE's evaluation in this Rail Alignment EIS of potential impacts from the Proposed Action has been adequately rigorous. Because of differences in perspective between DOE and Nye County, however, coupled with uncertainty about future conditions, the county believes that the conclusions about potential impacts presented in this Rail Alignment EIS should be continuously assessed and evaluated through an appropriate monitoring program.

Nye County believes that the most prudent course of action, should the Proposed Action be implemented, would be to include an aggressive and comprehensive program of environmental monitoring, including monitoring of socioeconomic factors. Nye County is a local jurisdiction significantly affected by the Proposed Action and is a cooperating agency in the preparation of this Rail Alignment EIS. Nye County's view is that there is mutual benefit for the federal and local government in partnering to monitor, assess, and evaluate conditions at and around the Nevada rail alignment before and as activities related to rail construction and operations take place. In this way, Nye County can assist DOE in the identification of any potential impacts, whether significant or not, and cooperatively develop effective and efficient mitigations, as appropriate, through ongoing adaptive management.

The Council on Environmental Quality's NEPA Task Force, in *Modernizing NEPA Implementation* (2003), recommended the use of an adaptive management approach (predict, mitigate, implement, monitor, and adapt). DOE can take action with an adaptive management plan in place to account for unanticipated changes in local conditions or subsequent information that might affect the original environmental and socioeconomic conclusions that were presented in this Rail Alignment EIS. Using the recommended adaptive management approach, DOE would be able to make cost-saving adjustments when the Proposed Action and mitigation strategies are implemented. The ability to adjust when necessary, and to have a strategy in place for such adjustments, would provide management flexibility when constraints and opportunities are encountered.

The adaptive management plan would be designed and implemented as part of the Proposed Action. As indicated by its title, the plan is meant to be "adaptive." The plan would be modified, if necessary, to address inefficiencies in approach or changes in environmental and socioeconomic conditions. Monitoring data collected as part of the planned activities would be analyzed and reviewed regularly to ensure early detection of potential issues.

The initial adaptive management plan would be based on the existing environmental conditions described in this Rail Alignment EIS and the current knowledge of resources in the vicinity of the proposed rail alignment. The initial plan would be focused on the establishment of environmental and socioeconomic baseline conditions and management of the monitoring and mitigation activities associated with the rail line. It would specifically address the management of monitoring and mitigation activities associated with construction, operation, and maintenance of the rail line and related access roads and facilities, while recognizing the need for identification of non-rail/transportation-related environmental and socioeconomic stressors that could exacerbate potential rail/transportation-related impacts.

Nye County proposes to constructively engage DOE to assist in identifying the resource areas that it believes will be susceptible to further impacts. Such identification would be based on the county's perspective on cumulative impacts as presented in Section 5.5, and on the results of DOE's analyses presented in the body and appendices of this Rail Alignment EIS. Nye County believes that such mutual consultation and cooperation should be documented through formal agreements. Nye County also believes that it would be beneficial to both DOE and the county if the adaptive management approaches for both rail and repository activities within Nye County were integrated.

Table 7-1. Best management practices and their relationships to applicable requirements[a,b] (page 1 of 26).

Best management practice	Related environmental resource area(s)	Associated requirement(s)[c]	Purpose	Project phase[d]
Physical setting best management practices				
[1] Eliminate new quarry access roads by removing pavement and regrading road to original contours following construction. Restore quarry walls to a 3-to-1 grade for public safety. Revegetate remaining disturbed areas, monitor to determine whether reclamation standards are being met, and remediate sites that do not meet success criteria.	Physical Setting Biological Resources Surface-Water Resources	NAC 445 – Water Controls NAC 519A – Reclamation of Land Subject to Mining 43 CFR Part 2800 – Rights-of-Way, Principles and Procedures; Rights-of-Way Under the Federal Land Policy and Management Act and the Mineral Leasing Act	Restoration of quarry sites. Minimize erosion.	Post-construction
Land use best management practices				
[2] Obtain and comply with the terms and conditions of all right-of-way grants from the appropriate federal agency for the rail line crossing public lands prior to initiating construction activities.[e]	Land Use and Ownership	43 CFR Part 2800 – Rights-of-Way, Principles and Procedures; Rights-of-Way Under the Federal Land Policy and Management Act and the Mineral Leasing Act	Minimize impacts to public lands.	Pre-construction Construction
[3] Verify the location of underground mine shafts and tunnels. In the event that either a borehole or obvious surface subsidence indicates the potential presence of a void, further investigations, such as additional boreholes, and use of ground-penetrating radar and/or seismic analysis, would be conducted to determine the extent of the feature. When voids are identified, appropriate engineering solutions would be developed to prevent damage to underground mines and the railroad.	Land Use and Ownership Utilities, Energy, and Materials Occupational and Public Health and Safety	NAC 455 – Excavations and Demolitions	Prevent damage to underground mines or the railroad.	Pre-construction Construction

Table 7-1. Best management practices and their relationships to applicable requirements[a,b] (page 2 of 26).

Best management practice	Related environmental resource area(s)	Associated requirement(s)[c]	Purpose	Project phase[d]
Land use best management practices (continued)				
[4] Notify potentially affected utility owners prior to construction and coordinate with the owners to avoid or minimize impacts to utilities. Consult with utility owners to design the rail line so that utilities are protected to the extent practicable during construction activities. Contact Nevada Underground Service Alert or use methods to locate and mark underground facilities prior to construction.	Land Use and Ownership Utilities, Energy, and Materials Occupational and Public Health and Safety	NAC 455 – Excavations and Demolitions	Prevent and minimize damage to utilities, disturbances to utility service, and injuries to workers.	Pre-construction Construction
[5] Develop a procedure for train workers to document the injury or death of livestock that is the direct result of construction and operations activities. The procedure would also specify payment procedures, such as how to calculate fair market value, to compensate for the loss of or injury to livestock.	Land Use and Ownership	NRS 705.150 through 705.200	Compensate for activities that result in mortality or injury to livestock.	Construction Operations
Air quality best management practices				
[6] Maintain construction equipment to ensure that exhaust and muffler systems and other pollution-control devices are in good working condition. Regularly inspect equipment to ensure that pollution-control devices are working properly.	Air Quality Occupational and Public Health and Safety	40 CFR Parts 61 and 63 – National Emission Standards for Hazardous Air Pollutants Noise Control Act of 1972 (42 U.S.C. 4901 *et seq.*) 49 CFR Part 229.121 – Federal Railroad Administration Regulation 30 CFR Part 62 – Mine Safety and Health Administration Regulation	Minimize exhaust emissions.	Construction

Table 7-1. Best management practices and their relationships to applicable requirements[a,b] (page 3 of 26).

Best management practice	Related environmental resource area(s)	Associated requirement(s)[c]	Purpose	Project phase[d]
Air quality best management practices (continued)				
[7] Use proven technologies to reduce idling time of trains when practicable. Meet Environmental Protection Agency emissions standards for diesel-electric railroad locomotives when purchasing and rebuilding locomotives.	Air Quality Utilities, Energy, and Materials	40 CFR Parts 61 and 63 – National Emission Standards for Hazardous Air Pollutants	Minimize exhaust emissions and fuel required for operations.	Construction Operations
[8] Conduct routine monitoring for occupational dust exposure during construction activities that would potentially expose workers, such as ballast placement and quarry construction. Apply engineering controls such as the application of water for dust suppression and washing the ballast before placement. Employ an industrial hygienist to take mineral dust measurements to identify potential exposure. Implement the use of personal protective equipment, such as respirators, and other measures to reduce occupational exposure to silica in the event aforementioned activities are not effective in reducing such exposure.	Occupational and Public Health and Safety	29 CFR 1910 – Occupational Safety and Health Standards	Prevent exposure to crystalline silica, erionite, or cristobalite.	Construction Operations
[9] Implement fugitive dust suppression per applicable permits, such as spraying water, applying crusting agents, or using other approved measures, to minimize fugitive dust emissions created during construction. Apply the minimum amount of water necessary to ensure that use of water does not promote growth of weeds or result in excessive groundwater use.	Aesthetic Resources Air Quality Occupational and Public Health and Safety Groundwater Resources	40 CFR Part 50 – National Primary and Secondary Ambient Air Quality Standards 29 CFR 1910 *et seq.* – Occupational Health and Safety Standards	Meet ambient air quality standards. Minimize groundwater use.	Construction Operations
[10] Supplement petroleum use with renewable energy sources, such as bio-diesel fuel, when feasible and not cost-prohibitive.	Utilities, energy, and materials	Executive Order 13123 – *Greening the Government Through Efficient Energy Management*	Reduce greenhouse gas emissions.	Construction Operations

Table 7-1. Best management practices and their relationships to applicable requirements[a,b] (page 4 of 26).

Best management practice	Related environmental resource area(s)	Associated requirement(s)[c]	Purpose	Project phase[d]
Surface water best management practices				
[11] Coordinate with local floodplain administrators to ensure that streambed and floodplain crossings are designed to minimize impacts. DOE would incorporate hydraulic modeling into the engineering design process to ensure that crossings would be designed to limit adverse impacts.	Surface-Water Resources	10 CFR Part 1022 – Compliance with Floodplain and Wetlands Environmental Review Requirements	Minimize impacts to water bodies and floodplains.	Pre-construction
[12] Obtain and comply with all federal permits, including the Clean Water Act Section 404 permit, required by the U.S. Army Corps of Engineers, for alteration to, or encroachment of, wetlands or streams prior to initiation of any construction and reconstruction. Additionally, DOE would obtain appropriate permits from the State of Nevada, including National Pollution Discharge Elimination System permits, for impacts to surface-water resources in the state.	Land Use and Ownership Groundwater Resources Surface-Water Resources	33 CFR 322 – Permits for Structures or Work in or Affecting Navigable Waters of the United States Clean Water Act of 1977 (33 U.S.C. 1251 *et seq.*) NRS 445A.300 through 445A.730 – Nevada Water Pollution Control Law 40 CFR Part 122 – EPA Administered Permit Programs: The National Pollutant Discharge Elimination System	Minimize impacts to water bodies and floodplains.	Pre-construction Construction

Table 7-1. Best management practices and their relationships to applicable requirements[a,b] (page 5 of 26).

Best management practice	Best management practice	Best management practice	Best management practice	Best management practice
Surface water best management practices (continued)				
[13] Prepare, submit, and implement a stormwater pollution prevention plan. This plan would be prepared consistent with state and federal standards for construction activities and would detail practices employed to minimize soil loss and degradation to nearby water resources. Such practices could include those listed in the Best Management Practices Handbook developed by the Nevada Division of Environmental Protection and the Nevada Division of Conservation Districts (DIRS 176309-NDEP 1994, all), and the Storm Water Quality Manuals Construction Site Best Management Practices Manual developed by the Nevada Department of Transportation (DIRS 176307-NDOT 2004, all).	Surface-Water Resources	40 CFR Part 122 – EPA Administered Permit Programs: The National Pollutant Discharge Elimination System Clean Water Act of 1977 (33 U.S.C. 1251 *et seq.*) NRS 445A.300 through 445A.730 – Nevada Water Pollution Control Law	Control site runoff and minimize erosion.	Pre-construction Construction
[14] Position temporary pipelines to prevent obstructing or redirecting surface runoff and to prevent obstructing natural drainage channels.	Surface-Water Resources	Clean Water Act of 1977 (33 U.S.C. 1251 *et seq.*) 33 CFR Part 323 – Permits for Discharges of Dredged or Fill Material into Waters of the United States NAC 445A – Water Controls	Prevent flooding or surface-water ponding.	Construction

Table 7-1. Best management practices and their relationships to applicable requirements[a,b] (page 6 of 26).

Best management practice	Best management practice	Best management practice	Best management practice	Best management practice
Surface water best management practices (continued)				
[15] Establish staging and laydown areas for construction material and equipment away from streambeds and wetlands and in areas that are not environmentally sensitive. Avoid clearing vegetation between the staging area and the streambeds or wetlands. When construction activities, such as culvert and bridge work, require work in streambeds, conduct these activities, to the extent practicable, during anticipated minimum-flow conditions. Maintain current drainage patterns to the extent practicable. Prohibit construction vehicles from driving in or crossing streambeds at locations other than established crossing points. Place heavy equipment on mats when working in wetlands or use other methods to minimize soil disturbance in wetlands.	Physical Setting Surface-Water Resources Biological Resources	10 CFR Part 1022 – Compliance with Floodplain/Wetlands Environmental Review Requirements Clean Water Act of 1977 (33 U.S.C. 1251 et seq.) NAC 445A – Water Controls Fish and Wildlife Coordination Act (16 U.S.C. 661 through 666c)	Minimize project-related increases in turbidity and impacts to waters of the United States.	Construction
[16] Implement erosion- and sediment-control measures prior to and during construction.	Surface-Water Resources Biological Resources	Clean Water Act of 1977 (33 U.S.C. 1251 *et seq.*)	Minimize erosion.	Construction
[17] Use a minimum-width rail line footprint when practicable. DOE would limit disturbance within the construction right-of-way in the areas where it could not avoid wetlands by constructing the rail line on the abandoned roadbeds (that is, the Union Pacific Railroad roadbed), designing bridges to span wetlands adjacent to washes that are crossed, avoiding wetlands in the bottom of incised washes adjacent to the roadbed by shifting the roadbed away from the edge of the washes, constructing the rail roadbed with a 2:1 slope, and by not constructing access roads adjacent to the track through wetlands.	Aesthetic Resources Surface-Water Resources Biological Resources	10 CFR Part 1022 – Compliance with Floodplain/Wetlands Environmental Review Requirements Clean Water Act of 1977 (33 U.S.C. 1251 *et seq.)*	Minimize impacts to wetlands and sensitive habitats.	Construction

Table 7-1. Best management practices and their relationships to applicable requirements[a,b] (page 7 of 26).

Best management practice	Related environmental resource area(s)	Associated requirement(s)[c]	Purpose	Project phase[d]
Surface water best management practices (continued)				
[18] Ensure that any fill placed below the ordinary high water line of wetlands and streams is clean and free of fine materials to the extent practicable. DOE would use fill from local sources where practicable. All stream crossing points would be returned to their pre-construction contours to the extent practicable, and the crossing banks reseeded or replanted with native species following construction.	Physical Setting Surface-Water Resources Biological Resources	NAC Chapter 504 – Wildlife Management and Propagation Clean Water Act of 1977 (33 U.S.C. 1251 *et seq.*)	Protect surface-water quality and floodplains.	Construction Post-construction
[19] Select herbicide products, which control weeds, that are approved by the Environmental Protection Agency and would minimize impacts to water bodies and wildlife. Instruct licensed pesticide professionals to apply the smallest effective amount of herbicide to reduce the risk of contamination from runoff and leaching. Adhere to herbicide labeling requirements. Plan to treat between weather fronts (calms) and at the appropriate time of day to avoid high winds, to prevent or minimize drift off of the right-of-way onto adjacent areas, and to avoid potential stormwater runoff. Establish buffer widths based on herbicide- and site-specific criteria to minimize impacts to water bodies and ensure that only herbicides determined to be acceptable for use around water bodies would be applied within 150 feet (45.7 meters) of perennial streams, rivers, and wetlands.	Surface-Water Resources Biological Resources	Federal Insecticide, Fungicide, and Rodenticide Act of 1948 (7 U.S.C. 136 *et seq.*) BLM Manual 9011 – Chemical Pest Control NAC 555 – Control of Insects, Pests, and Noxious Weeds	Minimize impacts to water bodies and wildlife.	Construction Operations
Groundwater usage best management practices				
[20] Use storage tanks, ponds (temporary holding reservoirs), or inflatable bladders along the rail alignment to help manage water demand, such as to control groundwater withdrawal rates and pumping timetables.	Surface-Water Resources Groundwater Resources	NRS 533.324 through 533.435 – Water Appropriation Permit NRS 533.440 – Reservoirs	Maximize water-use efficiency.	Construction

Table 7-1. Best management practices and their relationships to applicable requirements[a,b] (page 8 of 26).

Best management practice	Related environmental resource area(s)	Associated requirement(s)[c]	Purpose	Project phase[d]
Groundwater usage best management practices (continued)				
[21] Provide alternate sources of water or relocate existing wells if DOE action prevents access to wells, springs, or other surface or groundwater sources with existing water rights. Any action to change the location of an existing water diversion would require the approval of the well owner and/or the holder of the water right associated with that diversion point and would require permission from the State of Nevada.	Groundwater Resources	NRS 533.325 through 533.435 – Application to State Engineer for Permit	Ensure continued access to wells and groundwater.	Construction
[22] Use treated wastewater effluent (gray water) produced at the construction work camps for dust suppression and soil compaction to reduce the demands placed on groundwater resources.	Groundwater Resources	NAC 534 – Underground Water and Wells NRS 533.324 through 533.435 – Water Appropriation Permit	Minimize aquifer drawdown.	Construction
[23] If groundwater modeling indicates that pumping from a proposed well may affect existing wells, springs, or other water sources, limit the well pumping rates, obtain (purchase) additional water from water-rights holder(s), or relocate the proposed well. If necessary, negotiate with the water-rights holder and landowners to access and monitor water levels in existing wells or monitor discharge rates to springs, where appropriate, to verify the effects, if any, of the proposed groundwater withdrawal on those wells or springs.	Groundwater Resources	NAC 534 – Underground Water and Wells NRS 533.324 through 533.435 – Water Appropriation Permit	Minimize reductions in flow rates to existing wells or reductions in discharge rates to springs.	Construction Post-construction

Table 7-1. Best management practices and their relationships to applicable requirements[a,b] (page 9 of 26).

Best management practice	Related environmental resource area(s)	Associated requirement(s)[c]	Purpose	Project phase[d]
[24] Conduct surveys for the presence of sensitive species and their habitats before and during construction, as required by right-of-way permits to identify impacts and mitigation measures as needed. Use a minimum-width rail line footprint implementing 2:1 side slopes when practicable.	Physical Setting	43 CFR Part 2800 – Rights-of-Way, Principles and Procedures; Rights-of-Way Under the Federal Land Policy and Management Act and the Mineral Leasing Act	Minimize impacts to sensitive species and their habitats.	Pre-construction Construction
[25] Minimize groundbreaking or land-clearing activities during the nesting period for migratory birds. If groundbreaking or land-clearing activities must be conducted during the bird nesting season, DOE would conduct surveys for migratory bird nests prior to any of those activities. All activities that would harm nesting migratory birds or result in nest abandonment would be prohibited.	Biological Resources	Migratory Bird Treaty Act (16 U.S.C. 703 *et seq.*) Bald and Golden Eagle Protection Act (16 U.S.C. 668 through 668d)	Avoid harm to migratory birds, their nests, and their young.	Pre-construction
[26] Develop and implement a worker education program that would include training to prevent the intentional or unintentional take of sensitive or protected plant and animal species (such as desert tortoises, State of Nevada game species, or wild horses and burros.) Training would also educate construction personnel to relevant elements of the desert tortoise program pursuant to the biological opinion issued by the FWS.	Biological Resources	Endangered Species Act of 1973, as Amended (16 U.S.C. 1531 *et seq.*)	Minimize impacts to sensitive or protected plant and animal species.	Pre-construction Construction

Table 7-1. Best management practices and their relationships to applicable requirements[a,b] (page 10 of 26).

Best management practice	Related environmental resource area(s)	Associated requirement(s)[c]	Purpose	Project phase[d]
Biological resources best management practices (continued)				
[27] Limit the area disturbed during construction to the extent practicable. For example, limit grading activities to the area immediately under construction and limit ground disturbance to areas necessary for construction activities. Identify limits of disturbance on maps and in the field, and convey to construction personnel.	Physical Setting Surface-Water Resources Groundwater Resources Biological Resources Paleontological Resources	40 CFR Part 122, EPA Administered Permit Programs: The National Pollutant Discharge Elimination System 10 CFR Part 1022 – Compliance with Floodplain/Wetlands Environmental Review Requirements Clean Water Act of 1977 (33 U.S.C. 1251 *et seq.*)	Minimize erosion, ground disturbance, and disturbance to sensitive environments.	Pre-construction Construction
[28] Conduct surveys of native vegetation, weeds, and soil conditions within areas to be disturbed prior to construction. Use this information to develop and implement a habitat restoration plan, which would focus on habitats that are not addressed as part of wetland mitigation (such as winterfat, sage, conifer, riparian habitats). Restoration plans would include criteria for determining whether vegetation has been successfully restored on sites.	Physical Setting Biological Resources Aesthetic Resources	50 CFR Part 402 – Interagency Cooperation – Endangered Species Act of 1973, as Amended Ely Resource Management Plan and Environmental Impact Statement (Ely RMP/Final EIS)	Minimize impacts to sensitive habitats and species. Promote effective restoration efforts.	Pre-construction Construction Post-construction
[29] Conduct surveys for the presence of sensitive wildlife species and their habitats before and during construction, as required by right-of-way permits.	Biological Resources	43 CFR Part 2800 – Rights-of-Way, Principles and Procedures; Rights-of-Way Under the Federal Land Policy and Management Act and the Mineral Leasing Act	Minimize impacts to sensitive wildlife species.	Pre-construction Construction Post-construction

Table 7-1. Best management practices and their relationships to applicable requirements[a,b] (page 11 of 26).

Best management practice	Related environmental resource area(s)	Associated requirement(s)[c]	Purpose	Project phase[d]
Biological resources best management practices (continued)				
[30] Develop and implement a weed-management plan to control noxious weeds and invasive species. Survey the rail line and associated facilities for weeds as necessary and control weeds as required. The plan would meet the requirements of the BLM for monitoring and control of weeds, and DOE would consult with other directly affected parties during the development of the plan. That program will include an inventory of the alignment prior to construction, monitoring of disturbed sites and control of weeds throughout construction and operations, and reclamation of disturbed sites no longer needed for operation of the railroad. It also will include education of personnel on weed identification, the manner in which weeds spread, areas and habitats at high risk of infestation, and methods for treating infestations. Trucks and equipment arriving from other locations with known invasive vegetation problems would be inspected and cleaned. Use of approved herbicides and other pest-management techniques would be in compliance with the BLM manual. Criteria would be developed to demonstrate successful weed management.	Surface-Water Resources Groundwater Resources Biological Resources Occupational and Public Health and Safety	NAC 555 – Control of Insects, Pests, and Noxious Weeds Executive Order 13112 – Invasive Species Federal Insecticide, Fungicide, and Rodenticide Act of 1948 (7 U.S.C. 136 et seq.) BLM Manual 9011 – Chemical Pest Control	Prevent introduction of and minimize adverse impacts from insects, pests, and noxious weeds.	Pre-construction Construction Operations
[31] Remove and stockpile topsoil for application during reclamation of disturbed areas. Stabilize topsoil stockpiles to prevent erosion. If the topsoil were to be stockpiled for more than 1 year, seed with native plant species. Periodically monitor and maintain the stability of the stockpile to minimize erosion.	Physical Setting Biological Resources Surface-Water Resources	43 CFR Part 2800 – Rights-of-Way, Principles and Procedures; Rights-of-Way Under the Federal Land Policy and Management Act and the Mineral Leasing Act 40 CFR Part 122 – EPA Administered Permit Programs: The National Pollutant Discharge Elimination System	Minimize erosion and promote revegetation with native species.	Pre-construction Construction Operations

Table 7-1. Best management practices and their relationships to applicable requirements[a,b] (page 12 of 26).

Best management practice	Related environmental resource area(s)	Associated requirement(s)[c]	Purpose	Project phase[d]
Biological resources best management practices (continued)				
[32] Develop and implement site-specific plans for restoring and revegetating disturbed areas. Those plans will meet the requirements of the BLM and will be developed in consultation with other directly affected parties. The plans will include quantitative criteria for determining whether vegetation has been successfully restored. Disturbed areas not required for operation of the rail line would be revegetated with native species. Steep slopes may be covered with angular rock fragments to prevent erosion. Weed-free straw and mulch would be used for revegetation and restoration activities. To the extent practicable, all stream/wash crossing points would be returned to their pre-construction contours and reseeded or replanted with native species immediately following construction. If weather or season precludes the prompt reestablishment of vegetation, measures such as mulching or control blankets would be used to prevent erosion until reseeding can be completed. Soil and vegetation would be monitored after reclamation and sites experiencing soil erosion or not meeting the planned success criteria would be remediated by reseeding or other appropriate methods.	Physical Setting Aesthetic Resources Biological Resources Surface-Water Resources	43 CFR Part 2800 – Rights-of-Way, Principles and Procedures; Rights-of-Way Under the Federal Land Policy and Management Act and the Mineral Leasing Act The Fish and Wildlife Coordination Act of 1934 (16 U.S.C 661 through 666c) Endangered Species Act of 1973, as Amended (16 U.S.C. 1531 *et seq.*) Executive Order 13112 – *Invasive Species*	Prevent long-term loss of and damage to wildlife resources. Prevent introduction of invasive or exotic species. Reduce the visual scope of disturbed areas.	Pre-construction Construction Post-construction

Table 7-1. Best management practices and their relationships to applicable requirements[a,b] (page 13of 26).

Best management practice	Related environmental resource area(s)	Associated requirement(s)[c]	Purpose	Project phase[d]
Biological resources best management practices(continued)				
[33] During construction, use temporary barricades, fencing, and/or flagging to demarcate sensitive habitats; contain project-related impacts to the area within the construction right-of-way. When practicable, locate staging areas in previously disturbed sites or in the construction right-of-way, and avoid sensitive habitat areas. Fence off areas of habitat for sensitive species or other special resources, such as wetlands, prior to ground-disturbing activities. Inform project workers of all resource protection goals.	Physical Setting Surface-Water Resources Biological Resources	Clean Water Act of 1977 (33 U.S.C. 1251 *et seq.*) Endangered Species Act of 1973, as Amended (16 U.S.C. 1531 *et seq.*)	Minimize impacts to sensitive habitats and species.	Construction
[34] Comply with the Biological Assessment and the Biological Opinion (which would be prepared by the U.S. Fish and Wildlife Service) for this project. For example, implement management actions in areas of desert tortoise habitat pursuant to the biological opinion issued by the FWS, such as limiting vehicle access and speed restrictions, proper equipment storage, project area demarcation, fire suppression, litter control, agency notification, and habitat restoration. For areas within the desert tortoise range, employ qualified desert tortoise biologists to monitor for the presence of desert tortoises to ensure they are not inadvertently harmed during construction. Cease activities that may endanger desert tortoises if a tortoise is found on a project site and resume only after the biologist ensures that the tortoise is not in danger or after the tortoise has been moved to a safe area.	Biological Resources	Endangered Species Act of 1973, as Amended (16 U.S.C. 1531 *et seq.*) Ely Resource Management Plan and Environmental Impact Statement (Ely RMP/Final EIS)	Minimize impacts to sensitive habitats and species.	Construction Operations

Table 7-1. Best management practices and their relationships to applicable requirements[a,b] (page 14 of 26).

Best management practice	Related environmental resource area(s)	Associated requirement(s)[c]	Purpose	Project phase[d]
Noise and vibration best management practices				
[35] Inspect regularly and maintain construction equipment to ensure that noise-control devices are in good working condition. Administer a hearing conservation program in accordance with the Occupational Safety and Health Administration requirements.	Air Quality Noise and Vibration Occupational and Public Health and Safety	40 CFR Parts 61 and 63 – National Emission Standards for Hazardous Air Pollutants and Noise Control Act of 1972 (42 U.S.C. 4901 *et seq.*) 29 CFR Part 1910.95 – Occupational Noise Exposure 49 CFR Part 229.121 – Federal Railroad Administration Regulation 30 CFR Part 62 – Mine Safety and Health Administration Regulation	Minimize noise from construction equipment.	Construction
[36] Implement construction activities with the goal of minimizing, to the extent practicable, construction-related noise and vibration disturbances near any residential or other sensitive areas. Consult with affected communities regarding the project construction schedule, including the hours during which construction takes place, to minimize, to the extent practicable, noise disturbances near residential or other sensitive areas.	Noise and Vibration Occupational and Public Health and Safety	Noise Control Act of 1972 (42 U.S.C. 4901 *et seq.*) 49 CFR Part 210, Railroad Noise Emission Compliance Regulations	Minimize rail line construction-related noise and vibration.	Construction
[37] Comply with Federal Railroad Administration regulations establishing decibel limits for train operations.	Noise and Vibration	49 CFR Part 210 – Railroad Noise Emission Compliance Regulations	Minimize rail line construction and operations noise and vibration.	Operations

Table 7-1. Best management practices and their relationships to applicable requirements[a,b] (page 15 of 26).

Best management practice	Related environmental resource area(s)	Associated requirement(s)[c]	Purpose	Project phase[d]
Socioeconomics best management practices				
[38] Follow DOE procurement policies and hiring practices.	Socioeconomics	48 CFR Chapter 1 – Federal Acquisition Regulation Executive Order 11246	Ensure equal opportunity policies and procurement practices are followed.	Pre-construction Construction Operations
Occupational and public health and safety best management practices				
[39] Develop and implement an Ordnance and Explosives Safety Construction Support Program applicable to construction activities. Include ordnance and explosives training for all construction personnel working in the areas designated by the U.S. Department of Defense (DoD) as being at risk of containing unexploded ordnance.	Hazardous Materials and Waste Occupational and Public Health and Safety	DoD Directive 4715.11 – Environmental and Explosives Safety Management on DoD Active and Inactive Ranges Within the United States 29 CFR Parts 1910.120 and 1926.65 – Hazardous Waste Operations and Emergency Response Standard	Identify and minimize hazards related to unexploded ordnance on DoD property.	Pre-construction Construction
[40] Develop and implement a safety program and provide training to enable workers to avoid the most common accidents.	Occupational and Public Health and Safety	DOE Order O 440.1A, Worker Protection Management for DOE Federal and Contractor Employees 29 CFR Part 1926, Safety and Health Regulations for Construction 29 CFR Part 1960, Basic Program Elements for Federal Employee Occupational Safety and Health Programs and Related Matters	Prevent common safety accidents.	Pre-construction Construction Operations

Table 7-1. Best management practices and their relationships to applicable requirements[a,b] (page 16 of 26).

Best management practice	Related environmental resource area(s)	Associated requirement(s)[c]	Purpose	Project phase[d]
Occupational and public health and safety best management practices (continued)				
[41] Coordinate with the Nevada Department of Transportation, counties, and affected communities to develop and implement a program for installation of temporary notification signs or message boards at public grade crossings, determined by the state and/or county announcing the commencement of rail line operations. The format and lettering of these signs would comply with the U.S. Department of Transportation (DOT), Federal Highway Administration's Manual on Uniform Traffic Control Devices, and would be in place no less than 30 days before, and 6 months after, completion of construction activities in the area. As an alternative, DOE would coordinate with the Nevada Department of Transportation to develop a mutually satisfactory media campaign to be conducted by the Department throughout the counties and communities surrounding the rail line providing information and notice to the public of changes along its existing system and commencement of operations along its new rail line. This campaign would include the use of different media (radio, television, newspaper, public meetings, and the like) and may include such things as public-service announcements, advertisements, or legal notices.	Occupational and Public Health and Safety	23 CFR Part 655, Subpart F – Traffic Control Devices on Federal-Aid and Other Streets and Highways	Inform the public regarding the new rail line and commencement of operations.	Pre-construction Construction Operations
[42] Minimize disturbance around areas of underground utilities. Ensure that work crossing any buried utility line would not be started until material and equipment were available for immediate use. Complete work as quickly as possible; keep exposure of existing utilities to a minimum. Install underground utility crossings within protective casings buried in trenches beneath the rail line and surround the utility line with appropriate backfill material.	Utilities, Energy, and Materials Occupational and Public Health and Safety Land Use and Ownership	NAC 455 – Excavations and Demolitions NAC 704A – Facilities Placed Underground	Prevent inadvertent disruption to utilities and ensure future functionality and safety. Prevent injury to DOE contractors.	Construction

Table 7-1. Preliminary best management practices and their relationships to applicable requirements[a,b] (page 17 of 26).

Best management practice	Related environmental resource area(s)	Associated requirement(s)[c]	Purpose	Project phase[d]
Occupational and public health and safety best management practices (continued)				
[43] In undertaking construction, use materials and safety practices recommended by the American Railway Engineering and Maintenance-of Way-Association (AREMA) and the recommended standards for track construction in the AREMA Manual for Railway Engineering. Assure that roadway approaches and grade crossings are constructed according to the standards of the American Association of State Highway and Transportation Officials design manual, applicable rules, guidelines, or statutes, and the AREMA standards. Maintain the track and crossings and provide for track inspection in compliance with AREMA and FRA requirements.	Occupational and Public Health and Safety	49 CFR Part 213 – Track Safety Standards	Avoid accidents associated with the railroad.	Construction Operations
[44] Properly maintain the rail line. Maintenance would include trimming vegetation within the railroad right-of-way that obscures visibility of oncoming trains and assuring that rail, railroad ties, track fastenings, and ballast material are in good repair, and that warning devices operate properly and are legible.	Occupational and Public Health and Safety	49 CFR Part 213 – Track Safety Standards 49 CFR Part 236 – Rules, Standards, and Instructions Governing the Installation, Inspection, Maintenance, and Repair of Systems, Devices, and Appliances	Avoid accidents associated with the railroad.	Construction Operations
[45] Install reflective material on the back of all passive crossing warning devices, such as crossbucks, on the new and existing rail line. Reflective material would be installed so that headlights from vehicles approaching the grade crossing on the opposite side of the rail line will strike the material and illuminate it to provide a continual illumination in the absence of a passing train and a flashing appearance when a train is passing due to the space between railcars.	Occupational and Public Health and Safety	23 CFR Part 655, Subpart F – Traffic Control Devices on Federal-Aid and Other Streets and Highways	Avoid train collisions.	Construction Operations

Table 7-1. Best management practices and their relationships to applicable requirements[a,b] (page 18 of 26).

Best management practice	Related environmental resource area(s)	Associated requirement(s)[c]	Purpose	Project phase[d]
Occupational and public health and safety best management practices (continued)				
[46] For each of the public grade crossings on the new and existing rail line, provide and maintain permanent signs prominently displaying both a toll-free telephone number and a unique grade-crossing identification number for the public to report any accidents or any malfunctions of grade-crossing warning devices. The toll-free number would be answered 24 hours per day by DOE's personnel or their contractors.	Occupational and Public Health and Safety	23 CFR Part 655, Subpart F – Traffic Control Devices on Federal-Aid and Other Streets and Highways	Avoid accidents associated with the railroad.	Construction Operations
[47] Consult with appropriate federal and state transportation agencies to determine the final design and other details of the grade-crossing protections. Maintain new and existing rail line and grade-crossing warning devices according to FRA track-safety standards.	Occupational and Public Health and Safety	49 CFR Part 236 – Rules, Standards, and Instructions Governing the Installation, Inspection, Maintenance, and Repair of Systems, Devices, and Appliances	Avoid accidents near grade crossings.	Pre-construction Construction Operations
Occupational and public health and safety: emergency response (continued)				
[48] Provide information regarding construction plans and schedules to fire departments and other local emergency planning agencies prior to construction. Communicate updates and changes in the construction plans to these parties as needed.	Occupational and Public Health and Safety	40 CFR Part 355 – Emergency Planning and Notification	Facilitate local emergency response planning and community awareness.	Pre-construction

Table 7-1. Best management practices and their relationships to applicable requirements[a,b] (page 19 of 26).

Best management practice	Related environmental resource area(s)	Associated requirement(s)[c]	Purpose	Project phase[d]
Occupational and public health and safety: emergency response (continued)				
[49] Develop and implement emergency response plans for use during construction and operations. Emergency response plans may address, but are not limited to, accidents, injuries, civil unrest, or acts of violence. Ensure that appropriate agencies and individuals are notified in case of an emergency. Provide the emergency response plans to appropriate state and local entities prior to any rail construction activities. Ensure such plans delineate the roles and responsibilities of all parties.	Hazardous Materials and Waste Occupational and Public Health and Safety	DOE Order O 151.1C – Comprehensive Emergency Management System 40 CFR Part 370 – Hazardous Chemical Reporting: Community Right-to-Know 40 CFR Part 355 – Emergency Planning and Notification	Facilitate emergency response planning and efficiently respond to emergencies.	Pre-construction Construction Operations
[50] Provide fire departments and local emergency response agencies a toll-free number for the DOE contact who will be available to answer questions or attend meetings for the purpose of informing emergency-service providers about the project construction and operations. Revise this information, including changes in construction schedule, as appropriate. Before the start of operations, contact any local emergency response agencies to provide them with information concerning the proposed operations to allow them to incorporate the information into local response plans.	Hazardous Materials and Waste Occupational and Public Health and Safety	40 CFR Part 355 – Emergency Planning and Notification 49 CFR Part 172 – Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements NAC 705 – Railroads	Facilitate communication to ensure efficient emergency response planning.	Pre-construction Construction Operations

Table 7-1. Preliminary best management practices and their relationships to applicable requirements[a,b] (page 20 of 26).

Best management practice	Related environmental resource area(s)	Associated requirement(s)[c]	Purpose	Project phase[d]
Occupational and public health and safety: emergency response (continued)				
[51] Provide technical assistance and funds to Nevada for training for public safety officials of appropriate units of local government and American Indian tribes through whose jurisdiction spent nuclear fuel or high-level radioactive waste would be transported. Training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations.	Hazardous Materials and Waste Occupational and Public Health and Safety	The Nuclear Waste Policy Act of 1982 (42 U.S.C. 10101 *et seq.*)	Facilitate emergency response planning and enhance emergency response capabilities.	Construction Operations
Occupational and public health and safety: fire prevention				
[52] Develop and implement a plan for fire prevention and suppression and, in the case of a fire, subsequent land restoration, including natural habitats, during construction and operation of the rail line prior to construction.	Hazardous Materials and Waste Occupational and Public Health and Safety	DOE O 420.1 – Facility Safety 43 CFR Part 2800 – Rights-of-Way, Principles and Procedures; Rights-of-Way Under the Federal Land Policy and Management Act and the Mineral Leasing Act Ely Resource Management Plan and Environmental Impact Statement (Ely RMP/Final EIS)	Prevent and minimize damage from potential fires.	Pre-construction Construction Operations

Table 7-1. Preliminary best management practices and their relationships to applicable requirements[a,b] (page 21 of 26).

Best management practice	Related environmental resource area(s)	Associated requirement(s)[c]	Purpose	Project phase[d]
Occupational and public health and safety: fire prevention (continued)				
[53] Prevent, control, or suppress fires resulting from construction or operations using methods such as vegetation controls along the rail roadbed, developing water sources at sidings to fight fires, monitoring railcars to identify overheated wheel bearings, using spark arrestors on exhaust stacks, requiring fire extinguishers suitable for flammable liquid fires, and installing low-spark brake shoes.	Occupational and Public Health and Safety Socioeconomics	Ely Resource Management Plan and Environmental Impact Statement (Ely RMP/Final EIS)	Prevent and minimize damage from potential fires.	Construction Operations
[54] Obtain burning permits, if applicable, prior to open burning. Open burning would only be used if no other reasonable means of solid waste disposal were available. DOE would comply with the requirements of burning permits, such as notifying local fire departments, counties, and tribal governments, if applicable, prior to open burning activities.	Air Quality Hazardous Materials and Waste	NAC 445B – Air Controls NAC 444 – Sanitation	Minimize impacts from open fires.	Construction Operations
Hazardous materials and waste best management practices				
[55] Develop a spill prevention and countermeasures control plan for petroleum products and other hazardous materials prior to construction. Ensure that equipment is available to respond to spills. In the event of a reportable spill, comply with the spill prevention plan and applicable federal, state, and local regulations pertaining to spill containment and appropriate cleanup. For example, make the required notifications to the appropriate federal and state environmental agencies in the event of a reportable hazardous materials release.	Hazardous Materials and Waste Occupational and Public Health and Safety Biological Resources Surface-Water Resources Groundwater Resources	40 CFR Part 112 – Oil Pollution Prevention 40 CFR Part 263 – Standards Applicable to Transporters of Hazardous Waste 40 CFR Part 302 – Designation, Reportable Quantities, and Notification	Prevent release of oil and chemicals and minimize adverse environmental effects in the event of a spill.	Pre-construction Construction Operations

Table 7-1. Best management practices and their relationships to applicable requirements[a,b] (page 22 of 26).

Best management practice	Related environmental resource area(s)	Associated requirement(s)[c]	Purpose	Project phase[d]
Hazardous materials and waste best management practices (continued)				
[56] Establish and implement a centralized procurement and distribution program to purchase, track, distribute, and manage hazardous and toxic materials. Implement a Hazardous Material Management Program to review hazardous and toxic material requisitions and purchases; and to recommend feasible nonhazardous, biodegradable, or less-toxic substitutes, such as nonhazardous solvents, paints, and cleaning materials.	Hazardous Materials and Waste	Executive Order 13423 – Strengthening Federal Environmental, Energy, and Transportation Management	Reduce the production of hazardous wastes.	Pre-construction Construction Operations
[57] Develop and implement an Environmental Management System and a Pollution Prevention/Waste Minimization Program, which would include an evaluation of alternatives to eliminate, reduce, or minimize the amounts of hazardous materials used and hazardous wastes generated. As part of the Environmental Management System, regularly perform Pollution Prevention Opportunity Assessments.	Hazardous Materials and Waste	Executive Order 13423 – Strengthening Federal Environmental, Energy, and Transportation Management	Reduce the production of wastes.	Pre-construction Construction Operations
[58] Salvage and store extra materials not used as ballast for the rail alignment and use for other construction activities such as regrading during quarry reclamation or during maintenance of the rail line.	Hazardous Materials and Waste	Executive Order 13423 – Strengthening Federal Environmental, Energy, and Transportation Management	Reduce the generation of wastes and contamination of environmental media.	Construction
[59] Dispose of drill cuttings through land application.	Hazardous Materials and Waste	Executive Order 13423 – Strengthening Federal Environmental, Energy, and Transportation Management	Prevent overburdening local landfill facilities with waste.	Construction

Table 7-1. Best management practices and their relationships to applicable requirements[a,b] (page 23 of 26).

Best management practice	Related environmental resource area(s)	Associated requirement(s)[c]	Purpose	Project phase[d]
Hazardous materials and waste best management practices (continued)				
[60] Comply with state and federal, including the U.S. Department of Transportation and Environmental Protection Agency, hazardous material regulations when handling, storing, or disposing of hazardous materials. DOE would dispose of all materials that cannot be reused in accordance with applicable waste-management regulations.	Hazardous Materials and Waste	Resource Conservation and Recovery Act (42 U.S.C. 6962), Subtitle C 49 CFR Parts 171 and 180 NRS 459.400 to 459.600	Assure appropriate handling and disposal of hazardous waste.	Construction Operations
[61] Inspect equipment for fuel, lube oil, hydraulic, or antifreeze leaks. If leaks are found, repair or replace leaking equipment. Clean the spill as outlined in the Spill Prevention, Control, and Countermeasures Plan.	Hazardous Materials and Waste Occupational and Public Health and Safety Surface-Water Resources Groundwater Resources Biological Resources	Pollution Prevention Act of 1990 (42 U.S.C. 133)	Minimize accidental discharge of pollutants.	Construction Operations
[62] Practice preventive maintenance, use recycled oil, and use oil additives that improve engine and oil performance.	Hazardous Materials and Waste	Executive Order 13423 – Strengthening Federal Environmental, Energy, and Transportation Management	Increase the number of lubricating-oil changes to reduce leaks and drips and poor engine performance.	Construction Operations

Table 7-1. Best management practices and their relationships to applicable requirements[a,b] (page 24 of 26).

Best management practice	Best management practice	Best management practice	Best management practice	Best management practice
Hazardous materials and waste best management practices (continued)				
[63] Use biodegradable water-based solvents where practicable, substitute nonhazardous surfactants for hazardous surfactants for equipment cleaning, and reuse spent solvents. Paint only when necessary and use less-toxic, less-volatile paints.	Hazardous Materials and Waste	Executive Order 13423 – Strengthening Federal Environmental, Energy, and Transportation Management	Reduce the production of ***hazardous wastes***.	Construction Operations
[64] Inspect and replace worn or damaged components. Use sealed components.	Hazardous Materials and Waste	Executive Order 13423 – Strengthening Federal Environmental, Energy, and Transportation Management	Reduce the production of wastes.	Construction Operations
[65] Reduce packaging wastes by purchasing supplies in bulk; purchase recycled or recyclable goods; and reuse waste paper and Styrofoam™ as packaging materials and fillers.	Hazardous Materials and Waste	Executive Order 13423 – Strengthening Federal Environmental, Energy, and Transportation Management	Eliminate excessive resource use and trash generation.	Construction Operations
[66] Use environmentally preferable products such as recovered materials (recycled-content products) and bio-based products (energy, industrial, and consumer products made from renewable biological resources such as wood, agricultural residues, and fiber crops). Purchase materials and equipment designated as long life, energy efficient, and sustainable if they are reasonably cost-effective and available.	Hazardous Materials and Waste	Executive Order 13423 – Strengthening Federal Environmental, Energy, and Transportation Management	Eliminate excessive resource use and trash generation.	Construction Operations

Table 7-1. Best management practices and their relationships to applicable requirements[a,b] (page 25 of 26).

Best management practice	Related environmental resource area(s)	Associated requirement(s)[c]	Purpose	Project phase[d]
Hazardous materials and waste best management practices (continued)				
[67] Store and dispose of biosolids (sludge), allowing them to dry according to applicable requirements. DOE would dispose of biosolids at a licensed facility in accordance with all applicable requirements.	Hazardous Materials and Waste	40 CFR Part 503 – Standard for the Use or Disposal of Sewage Sludge	Ensure proper treatment and disposal of wastes.	Construction Operations
Cultural resources best management practices (also see Section 7.1.1)				
[68] Comply with the Programmatic Agreement and Identification Plan that has been developed through the Section 106 consultation process under the National Historic Preservation Act. For example, conduct field surveys (an intensive BLM Class III inventory) of the construction right-of-way, as described in the Programmatic Agreement (see Appendix M).	Cultural Resources American Indian Interests	National Historic Preservation Act (16 U.S.C. 470 *et seq.*) 36 CFR Part 800 – Protection of Historic Properties	Minimize impacts to American Indians and cultural resources.	Pre-construction Construction Operations
[69] Continue to solicit input from tribal representatives through the Native American Interaction Program to identify the potential for impacts to cultural resources, discuss potential solutions, and avoid or minimize adverse impacts. Provide for direct tribal involvement in cultural resource field survey and monitoring activities.	Cultural Resources American Indian Interests	National Historic Preservation Act (16 U.S.C. 470 *et seq.*) Programmatic Agreement Executive Order 13175 – Consultation and Coordination with Indian Tribal Governments	Minimize impacts to cultural resources and American Indian interests.	Pre-construction Construction Operations

Table 7-1. Best management practices and their relationships to applicable requirements[a,b] (page 26 of 26).

Best management practice	Related environmental resource area(s)	Associated requirement(s)[c]	Purpose	Project phase[d]
Cultural resources best management practices (also see Section 7.1.1)				
[70] Comply with regulatory requirements that protect American Indian interests. For example, consult with American Indian tribes and protect their access to public lands that contain American Indian cultural resources.	Cultural Resources American Indian Interests	American Indian Religious Freedom Act of 1978 (42 U.S.C. 1996) Executive Order 13175 – Consultation and Coordination with Indian Tribal Governments Executive Order 13007 – Indian Sacred Sites	Minimize impacts to cultural resources and maintain access to sacred American Indian sites.	Pre-construction Construction Operations

a. Best management practices are the practices, techniques, methods, processes, and activities commonly accepted and used throughout the construction and railroad industries that DOE would implement as part of the Proposed Action to ensure compliance with applicable requirements and that provide an effective and practicable means of preventing or minimizing the adverse impacts of an action on human health and the environment.

b. Requirements include laws, statutes, codes, regulations, orders, and relevant BLM resource management plans. DOE commits to appropriate best management practices that support implementation of such requirements and specific compliance requirements in project-related activities and approvals.

c. CFR = Code of Federal Regulations; DoD = U.S. Department of Defense; EPA = U.S. Environmental Protection Agency; NAC = Nevada Administrative Code; NRS = Nevada Revised Statutes; RMP = Resource Management Plan; U.S.C. = United States Code.

d. Project phase refers to the phase in which the best management practice is developed and implemented.

e. For the purposes of this table, construction activities include all aspects associated with construction of the railroad, including but not limited to the rail line, ancillary facilities, access roads, road upgrades, well sites, and quarry development.

Table 7-2. Preliminary measures to mitigate potential environmental impacts of constructing and operating the proposed railroad (page 1 of 12).

Project phase[a]	Nature of potential impact	Mitigation measure	Location
Monitoring and enforcement			
[1] Construction Operations	NA	If there is a material change in the facts or circumstances upon which the STB relied in imposing specific environmental mitigation conditions, and upon petition by any party who demonstrates such material change, the STB may review the continuing applicability of its final mitigation, if warranted.	Overall project and surrounding area, as determined in consultation with the STB.
[2] Construction Operations	NA	DOE shall retain a third-party contractor to assist the STB's Section of Environmental Analysis (SEA) in the monitoring and enforcement of mitigation measures on an as-needed basis until DOE has completed project-related construction activities, as well as any oversight period the STB imposes.	Overall project and surrounding area, as determined in consultation with the STB.
[3] Construction Operations	NA	To ensure DOE's compliance with the environmental mitigation conditions that may be imposed by the STB, DOE shall submit to SEA reports on no less than a quarterly basis for the duration of the oversight period, documenting the status of its mitigation implementation for each condition. The oversight period in this case shall be for the duration of construction and for the first 2 years of project-related rail operations, or any term the STB may impose.	Overall project and surrounding area, as determined in consultation with the STB.
Physical setting mitigation measures (see Sections 4.2.1 and 4.3.1)			
[4] Pre-construction	Disturbance or damage to national geodetic monuments	Identify geodetic control monuments potentially located within disturbed areas. If construction activities could disturb national geodetic monuments, DOE would notify the Office of the Director of the National Oceanic and Atmospheric Administration (NOAA), National Geodetic Survey, no less than 90 days in advance of any activities in the specified area. If relocation of the monument is required, DOE would consult with the NOAA to develop mitigation that could include compensation for the cost of monument relocation.	Site-specific as determined by consulting with NOAA.

Table 7-2. Preliminary measures to mitigate potential environmental impacts of constructing and operating the proposed railroad (page 2 of 12).

Project phase[a]	Nature of potential impact	Mitigation measure	Location
Land use mitigation measures (see Sections 4.2.2 and 4.3.2)			
[5] Construction	Land-use conflict in areas with active mines and mining claims	Notify nearby mining lessees/claimants and consult with owners of active local mines and ***mining claims*** to ensure that impacts to mine-related operations are minimized during construction activities. Where feasible, reduce construction right-of-way in mining areas to minimize impacts to mining claims.	Site-specific dependent upon the locations of mining claims and active mines. DOE would work with the BLM and mining lessees/claimants/owners to identify these areas.
[6] Construction	Loss of private land	Provide compensation to private landowners for long-term use and access to their land. Consult with affected property owners to develop agreements that would be mutually beneficial.	Site-specific (that is, private land parcels that are directly affected by the railroad) as determined through coordination with the landowner.
[7] Construction	Damage and restricted access to private property	Consult with affected property owners to redress any damage to the property caused by construction. In residential, business, and industrial areas, project-related equipment and materials would be stored in established storage areas or within the right-of-way, and entrances and exits for these properties would not be obstructed by construction, except as required to move equipment. Parking of equipment or vehicles, or storage of materials along driveways or in parking lots would be prohibited unless agreed to by the property owner.	Site-specific as determined by consulting with residential and business property owners.
[8] Construction	Damage to county roads	Compensate affected counties or maintain roads on a more frequent basis, if justified by additional or unanticipated damage resulting from DOE construction.	Site-specific as determined by county roads that are directly impacted.

Table 7-2. Preliminary measures to mitigate potential environmental impacts of constructing and operating the proposed railroad (page 3 of 12).

Project phase[a]	Nature of potential impact	Mitigation measure	Location
Land use mitigation measures (see Sections 4.2.2 and 4.3.2) (continued)			
[9] Construction Post-construction	Temporary road closures and disruptions of ranching operations	During the construction phase, roads may be temporarily closed to facilitate the construction by obtaining permission from BLM or local authorities, or by acquiring access to private land. During this period, DOE would minimize road closures to the extent practicable and provide alternative access to areas impacted by road closure. Alternative access may include temporary roads or detours to other existing roads. Detours would be one mile or less and, where practicable, be in effect only during off-peak hours. DOE would design crossings that are capable of allowing ranching vehicles (for example, pickup trucks with horse trailers) and agricultural vehicles to cross over the rail line. DOE would inform the public of road closures through various media outlets and would minimize trains blocking grade crossings throughout its system, to the extent practicable. Once the construction phase is completed, land disturbed to create temporary roads would be remediated to its original state.	Site-specific dependent upon the locations of road closures and through coordination with local authorities, Nevada land managers, BLM , permittees, Forest Service, and landowners.
[10] Construction Operations	Potential interference with maintenance of rangeland improvements	Provide timely access to a permittee's allotment to allow the permittee to maintain rangeland improvements within the right-of-way. For safety reasons, access would be provided on a scheduled basis, whenever possible. Access would be provided to the permittee, their work crews, and equipment needed to maintain rangeland improvements.	Site-specific as determined through coordination with permittees and BLM.
[11] Construction Operations	Financial loss on farms and ranches	Provide compensation or range improvements for the direct loss of crops, pastures, rangelands, or reductions in animal unit months.	Site-specific (that is, ranches that are directly affected by the railroad) as determined through coordination with permittees and the BLM.

Table 7-2. Preliminary measures to mitigate potential environmental impacts of constructing and operating the proposed railroad (page 4 of 12).

Project phase[a]	Nature of potential impact	Mitigation measure	Location
Land use mitigation measures (see Sections 4.2.2 and 4.3.2) (continued)			
[12] Construction Operations	Disruption to ranching operations and adverse impacts to range improvements	Protect existing ranching improvements in their pre-construction state, such as maintaining the integrity of existing fences, roads, infrastructure, and waterlines, or provide reasonably equivalent improvements such as relocating existing infrastructure and water sources.	Site-specific (that is, ranches that are directly affected by the railroad) as determined through coordination with permittees and the BLM.
[13] Construction Operations	Disruption to ranching operations and cattle movement	Provide temporary feed, water, and assistance in cattle movement during rail line construction for livestock that may be physically isolated from normal feed and water sources. Temporary feed, water, and/or assistance in cattle movement could continue for a short time after construction is completed as cattle adjust to the new rail line.	Site-specific (that is, ranches that are directly affected by the railroad) as determined through coordination with permittees and the BLM.
[14] Construction Operations	Disruption of cattle movement and potential injury to cattle	Construct culverts, bridges, and cattle guards to facilitate or prevent the movement of cattle to support grazing management plans.	Site-specific (that is, ranches that are directly affected by the railroad) as determined through coordination with permittees and the BLM.
[15] Construction Operations	Disruption to ranching operations and cattle movement	Support the development of interim grazing management plans and allotment management plans to mitigate construction and operations impacts on grazing operations. The plans would address how grazing operations would be conducted during construction. The plan would also include practices for communication and interactions regarding DOE activities that could directly impact grazing permittees or farmers, such as providing project-related reconstruction and construction schedules to allow them to determine whether they should continue to crop or graze in right-of-way areas or discontinue such activities due to impending construction activities.	Site-specific (that is, ranches that are directly affected by the railroad) as determined through coordination with permittees and the BLM.

Table 7-2. Preliminary measures to mitigate potential environmental impacts of constructing and operating the proposed railroad (page 5 of 12).

Project phase[a]	Nature of potential impact	Mitigation measure	Location
Land use mitigation measures (see Sections 4.2.2 and 4.3.2) (continued)			
[16] Construction Operations	Potential water ponding near the rail line resulting in increased cattle-train strikes	Design the rail line to avoid the ponding of water, through grading or other construction techniques, to avoid attracting cattle or wildlife near the rail line. Monitor the rail line post-construction to look for evidence of ponding of water. Construct additional culverts or fencing if necessary to avoid ponding of water and subsequent congregation of livestock near the rail line.	Site-specific (that is, ranches that are directly affected by the railroad) as determined through coordination with permittees and the BLM.
[17] Operations	Impacts from new access roads	Work with the BLM, ranchers, local residents, counties, and contractors to place new access roads in areas where the roads could be left after construction to provide potential future benefit to the local population. If the construction roads have no long-term benefit to the local population, they would be restored and revegetated. DOE would also place new access roads in areas that avoid sensitive habitats and grazing areas to the extent practicable.	Site-specific as determined by the locations of road closures.
Aesthetics mitigation measures (see Sections 4.2.3 and 4.3.3)			
[18] Construction	Visual impacts associated with the contrast between new soil in fill areas and existing landscape	Select soil types consistent in color with pre-construction adjacent soils for filling surface layers to the extent practicable. DOE would acquire these materials from local sources to help maintain the natural and visual environment.	Project-wide.
[19] Construction Operations	Visual impacts associated with the contrast between the rail line and existing landscape	Construct low, rolling earthwork berms with soils and vegetation that match the surroundings to mask the linear track from viewers in specific locations in Garden Valley where the track would otherwise cause a moderate contrast in Class II lands.	Site-specific locations in Garden Valley as determined in coordination with the BLM.[b]
[20] Construction Operations	Visual impacts associated with the contrast between project structures and surrounding landscape	Use non-contrasting, non-reflecting paint on structures and facilities in use during construction or operations. Where practicable, use fencing and/or vegetation to screen facilities from viewers around communities and in other visually sensitive areas.	Project-wide.

Table 7-2. Preliminary measures to mitigate potential environmental impacts of constructing and operating the proposed railroad (page 6 of 12).

Project phase[a]	Nature of potential impact	Mitigation measure	Location
Aesthetics mitigation measures (see Sections 4.2.3 and 4.3.3) (continued)			
[21] Construction Post-construction Operations	Visual impacts associated with the visibility of nighttime lighting	Minimize the effect of nighttime lighting by limiting its use near sensitive areas, and by requiring contractors to use directional lighting to shield viewers in these situations. On permanent structures, use downcast lighting, shielded lighting, or lower-wattage bulbs.	Project-wide.
[22] Post-construction	Visual impacts associated with the contrast caused by fresh rock cuts	Coat strongly contrasting cuts on rocks created by the construction of the rail line with a substance to add an artificial patina mimicking similar adjacent, naturally weathered areas of rock.	Project-wide.
Air quality mitigation measures (see Sections 4.2.4 and 4.3.4)			
[23] Operations	Reduction in air quality within the local area of quarry construction	Acquire access to additional land and move the public access (fence line) farther away from the quarries.	Site-specific quarry locations.
Groundwater mitigation measures (see Sections 4.2.5 and 4.3.5)			
[24] Post-construction	Access to groundwater wells	Prior to abandonment of groundwater wells, investigate whether there are other parties (for example, ranchers, the BLM, county governmental agencies) interested in using groundwater wells to obtain water or monitor groundwater conditions, and work with those parties to ensure they can use the wells upon completion of the railroad. Those interested parties would be responsible for following Nevada laws to obtain water rights and, if necessary, would also be responsible for obtaining a right-of-way from the BLM.	Site-specific as determined through consultation with ranchers, the BLM, county governmental agencies, and other entities.

Table 7-2. Preliminary measures to mitigate potential environmental impacts of constructing and operating the proposed railroad (page 7 of 12).

Project phase[a]	Project phase[a]	Project phase[a]	Project phase[a]
Biological resources mitigation measures (see Sections 4.2.7 and 4.3.7)			
[25] Pre-construction Construction Operations	Loss or disturbance to wildlife and their habitat	In areas where the rail line will disrupt the movements of big game, develop under- or overpass designs to protect wildlife. Considerations for under- or overpass locations would include providing access to wildlife water sources. Develop additional water sources for wildlife to replace those lost, adversely affected, or rendered inaccessible to wildlife due to new rail line construction if suitable alternative sources are not available to wildlife.	Specific locations as determined in consultation with land and wildlife management agencies.
[26] Pre-construction Construction Post-construction	Loss and disturbance to sensitive bird species, such as raptors and migratory birds	Conduct a survey for sensitive bird species (such as raptors and migratory bird nests) prior to the initiation of construction. DOE would minimize disturbance to active nests until after active nesting has been completed for the season to the extent practicable and would develop and implement appropriate actions to compensate for sensitive bird species nests removed or destroyed during construction.	Site-specific as determined through coordination with land and wildlife management agencies.
[27] Construction	Injury or loss of wildlife that are attracted to areas of active construction	Install fencing around temporary water storage reservoirs, or otherwise block access to temporary water storage reservoirs in areas where wildlife may be attracted to active construction sites.	Specific locations as warranted and determined through coordination with land and wildlife management agencies.

Table 7-2. Preliminary measures to mitigate potential environmental impacts of constructing and operating the proposed railroad (page 8 of 12).

Project phase[a]	Nature of potential impact	Mitigation measure	Location
Noise and vibration mitigation measures (see Sections 4.2.8 and 4.3.8)			
[28] Pre-construction	Increased noise levels due to train operations	Develop cooperative solutions to local concerns prior to construction; be available for public meetings; and conduct periodic public outreach; and assist communities and other entities in establishing Quiet Zones. Such assistance may include coordination with the FRA[b] for identification of appropriate supplemental and alternative safety measures at grade crossings where Quiet Zones are desired; identifying potential sources of funding; providing assistance preparing funding applications and grant requests; and coordinating with representatives of potential lending organizations. DOE would provide the name and phone number of a point of contact to mayors and other appropriate local officials in each community through which the new and existing rail line passes.	Site-specific as determined through consultation with affected communities, farmers, ranchers, businesses, landowners, agencies, and American Indian tribes.
[29] Pre-construction Construction	Elevated noise and vibration levels from construction activities	Develop and implement a Construction Noise and Vibration Control Plan to minimize construction noise and vibration within the communities along the rail line prior to initiating construction. DOE would designate a noise control officer/engineer to develop the plan, whose qualifications would include at least 5 years' experience with major construction noise projects, and board certification membership with the Institute of Noise Control Engineering or registration as a Professional Engineer in Mechanical Engineering or Civil Engineering.	Site-specific as determined through consultation with the STB.
[30] Construction Operations	Elevated noise levels from operations such as locomotive warning horns	Apply for a Quiet Zone. Install quad gates or other supplementary safety measures to provide the level of warning necessary to allow the communities to request a waiver from the Federal Railroad Administration of the requirement to sound the horn at at-grade crossings.	Locations that would experience adverse noise impacts and as warranted by the FRA.

Table 7-2. Preliminary measures to mitigate potential environmental impacts of constructing and operating the proposed railroad (page 9 of 12).

Project phase[a]	Nature of potential impact	Mitigation measure	Location
Noise and vibration mitigation measures (see Sections 4.2.8 and 4.3.8) (continued)			
[31] Construction	Elevated noise levels resulting from construction activities	Limit major noise producing activities, such as blasting and pile driving, near sensitive receptors.	Specific locations as warranted.
[32] Construction	Elevated noise and vibration levels from construction activities	Install continuously welded rail to the extent practicable in construction of the rail line. Install and properly maintain rail and rail roadbeds according to the AREMA standards to minimize noise and vibration.	Site-specific as determined through consultation with the STB.
[33] Construction Operations	Elevated noise levels from construction and operations activities	Ensure that curves in the track are lubricated where doing so would reduce noise for residential or other sensitive receptors.	Site-specific as determined through consultation with the STB.
[34] Construction Operations	Elevated noise levels from construction and operations activities	Inspect railcar wheels to maintain wheels in good working order and minimize the development of wheel flats (areas where a round wheel becomes no longer round but has a flat section, leading to a clanking sound when a railcar passes). Prior to the start of operations, DOE would inspect the rail for rough surfaces and grind these surfaces to provide a smooth rail surface during operations.	Project-wide.

Table 7-2. Preliminary measures to mitigate potential environmental impacts of constructing and operating the proposed railroad (page 10 of 12).

Project phase[a]	Nature of potential impact	Mitigation measure	Location
Socioeconomics mitigation measures (see Sections 4.2.9 and 4.3.9)			
[35 Construction	Overburdened community services and degraded infrastructure	Reduce impacts on local roads, infrastructure, and community services by directing trucks to travel during off-peak hours, transporting construction materials by rail, providing fire-prevention equipment, and by developing and implementing an emergency response plan. If there are additional burdens on local services and infrastructure, DOE would work with local counties to acquire some additional infrastructure, equipment, and/or personnel for the duration of the construction period, if demonstrated to be required to meet DOE's needs. It might be possible for the residual equipment acquired to support the construction effort (such as police cruisers, fire trucks, and equipment) to be transferred to the counties if applicable law and regulations allow.	Overall project area.
[36] Construction	Overextended community services and potential negative impacts of construction camps on communities	Establish policies that define expectations for environmental compliance and employee conduct, staff construction camps with security personnel to ensure compliance with such policies, and require training of all workers prior to the beginning of work. Establish personnel policies intended to minimize recreational activity outside of the construction camps, avoid the creation of new trails, and avoid damage to property, wildlife, and cattle. Encourage workers not to move families to prevent overcrowding at schools and potential overburdening of other community services and infrastructure. Work with existing communities to convert construction camps into facilities that provide lasting benefits to the communities and counties, or, to close the camps as sections of the rail line are completed. If additional services are required, DOE would work with local communities and counties to determine if there are mutually beneficial actions or improvements, such as water system improvements, cell towers, fiber-optic connections, and upgrades to some of the electrical grid to provide required power.	Construction camp sites.

Table 7-2. Preliminary measures to mitigate potential environmental impacts of constructing and operating the proposed railroad (page 11 of 12).

Project phase[a]	Nature of potential impact	Mitigation measure	Location
Occupational and public health and safety mitigation measures (see Sections 4.2.10 and 4.3.10)			
[37] Construction	Damage from fires	Have fire-fighting personnel, a source of water, and fire-fighting equipment at the camps and construction areas to respond to fire emergencies.	Construction camp sites.
[38] Construction	Hantavirus infection of workers	Implement procedures for decontamination of any rodent excreta encountered by construction workers during construction.	Overall project area.
[39] Construction	Traffic delays for emergency vehicles	During construction at grade crossings, when practicable, maintain at least one open lane of traffic at all times or provide for detours and associated signage, as appropriate, to allow for the quick passage of emergency or other vehicles.	At grade crossings and as determined through consultation with the STB.[b]
[40] Construction Operations	Train collisions	Coordinate with other rail carriers to establish a procedure regarding reported accidents and grade-crossing device malfunctions.	Site-specific as determined through consultation with the STB and where the rail line is close to another rail carrier's crossing.
[41] Construction Operations	Human health risks attributed to ***seismic*** activities	During the construction and operations phases, adopt American Railway Engineering and Maintenance-of-Way Association guidelines and implement monitoring procedures to reduce the potential for structural damage and human exposure to seismic hazards. DOE would utilize seismic monitoring with regional networks; early warning systems to identify track disruption; and track inspections immediately before transit of the trains in the event of seismic activity.	Site-specific as determined through seismic and geotechnical investigations.
[42] Construction Operations	Overextended local emergency response systems	Upgrade local community emergency response systems and capabilities. This could include additional trained personnel, provision of equipment, and upgrades to medical facilities, fire departments, and emergency response providers and associated infrastructures.	Project-wide.

Table 7-2. Preliminary measures to mitigate potential environmental impacts of constructing and operating the proposed railroad (page 12 of 12).

Project phase[a]	Nature of potential impact	Mitigation measure	Location
Hazardous materials and waste (see Sections 4.2.12 and 4.3.12)			
[43] Construction	Overburdened local landfill facilities with waste	Determine which landfills solid and ***industrial and special wastes*** would be sent to during the construction phase and balance the distribution. Send manageable quantities of ***solid waste*** to local landfills or send the waste to the larger Apex Landfill. If necessary, working with local communities to develop additional disposal capacity that would provide additional waste capacity for the community and DOE.	Project-wide.
[44] Construction	Public exposure to herbicides	Notify affected landowners to the extent practicable at least 48 hours prior to initiating herbicide applications. Notifications could include, for example, posting a notice on the project web site, publishing the schedule in local newspapers, posting flyers at community centers or public schools, or holding discussions during community meetings with the Mitigation Advisory Board(s).	Project-wide.
[45] Construction Operations	Spill fuel or other hazardous materials on or near environmentally sensitive areas	Refuel locomotives and construction equipment at designated refueling locations. Exercise care during refueling to prevent overflows and in no event refuel in a location where an inadvertent spill would enter a watercourse, wetland, or other environmentally sensitive area.	Project-wide.
Cultural resources mitigation measures (see Sections 4.2.13 and 4.3.13)			
[46] Pre-construction Construction	Adverse impacts to American Indian interests, culture, and spiritual beliefs.	Conduct a systematic ethnographic evaluation of the rail alignment to be integrated with cultural resource survey efforts. Study will add to the ethnographic understanding of the region through incorporating direct tribal representative involvement and will result in information that documents potential, additional mitigation measures for protection of American Indian interests.	Overall project area and surrounding region

a. Project phase refers to the phase in which the mitigation measure is developed and implemented.
b. BLM = Bureau of Land Management; DOE = Department of Energy; FRA = Federal Railroad Administration; SHPO = State Historic Preservation Office; STB = Surface Transportation Board.

8. UNAVOIDABLE ADVERSE IMPACTS; SHORT-TERM USES AND LONG-TERM PRODUCTIVITY; IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

In accordance with the National Environmental Policy Act (NEPA), Section 102 (42 U.S.C. 4332), and the Council on Environmental Quality (CEQ) NEPA implementing regulations (40 CFR 1502.16), this chapter addresses:

- Any adverse environmental impacts DOE would not be able to avoid if the Department implemented the Proposed Action along the Caliente rail alignment or the Mina rail alignment.
- The relationship between local short-term uses of the environment within the Caliente rail alignment or Mina rail alignment region of influence and the maintenance and enhancement of long-term productivity.
- Any irreversible and irretrievable commitments of resources if DOE implemented the Proposed Action along the Caliente rail alignment or the Mina rail alignment.

Glossary terms are shown in ***bold italics***.

8.1 Caliente Rail Alignment

During the engineering and site evaluation and planning phase for the proposed ***railroad***, the U.S. Department of Energy (DOE or the Department) considered many factors to avoid or minimize potential environmental ***impacts*** (see Chapter 2), and would continue to consider these factors during the final design phase. DOE would meet all applicable regulatory requirements during proposed railroad construction and operations along the Caliente ***rail alignment***, and would implement an array of best management practices to ensure compliance with requirements (see Chapter 7, Best Management Practices and Mitigation). Also as described in Chapter 7, DOE could implement measures to mitigate any impacts remaining after final design and compliance with regulatory requirements and implementation of best management practices.

An **irreversible commitment** of resources represents a loss of future options. It applies primarily to nonrenewable resources, such as minerals or cultural resources, and to those factors that are renewable only over long time spans, such as soil productivity.

An **irretrievable commitment** of resources represents opportunities that are foregone for the period of the proposed action. Examples include the loss of production, harvest, or use of renewable resources. The decision to commit the resources is reversible, but the utilization opportunities foregone are irretrievable.

However, there could be unavoidable adverse impacts; impacts to short-term uses and long-term productivity resources; and/or irreversible and irretrievable commitment of resources, for example:

- DOE could mitigate most potential impacts described in Chapter 4, but there would be some unavoidable impacts, for example, on the use of grazing land.
- Railroad construction would involve ground-disturbing activities that would result in localized ***short-term impacts***

to soil, water use, and ***habitat***. These resources would recover over time, and long-term productivity would not be affected.

- An irreversible commitment of resources such as consumption of fossil fuel, and an irretrievable commitment such as a loss of habitat.

This chapter summarizes and consolidates information from Chapter 4, Environmental Impacts, and Chapter 7, Best Management Practices and Mitigation.

8.1.1 UNAVOIDABLE ADVERSE IMPACTS

Engineering and site evaluation and planning are the first steps in undertaking a ***proposed action***. Next follows compliance with all laws, regulatory requirements, and stipulations and conditions of associated permits to minimize environmental and health-related impacts. Best management practices are implemented to maintain compliance with these requirements. Where analyses identify potential environmental impacts, ***mitigation*** measures are implemented to avoid, minimize, rectify, reduce, or compensate for those impacts. Finally, unavoidable adverse impacts may arise where there are no reasonably practicable mitigation measures to entirely eliminate impacts, and there are no reasonably practicable ***alternatives*** to the proposed project that would meet the purpose and need of the action, eliminate the impact, and not cause other or similar significant adverse impacts. Figure 8-1 illustrates how unavoidable adverse impacts may arise and identifies the chapters of this Rail Alignment ***Environmental Impact Statement*** (EIS) where the topic areas shown are discussed.

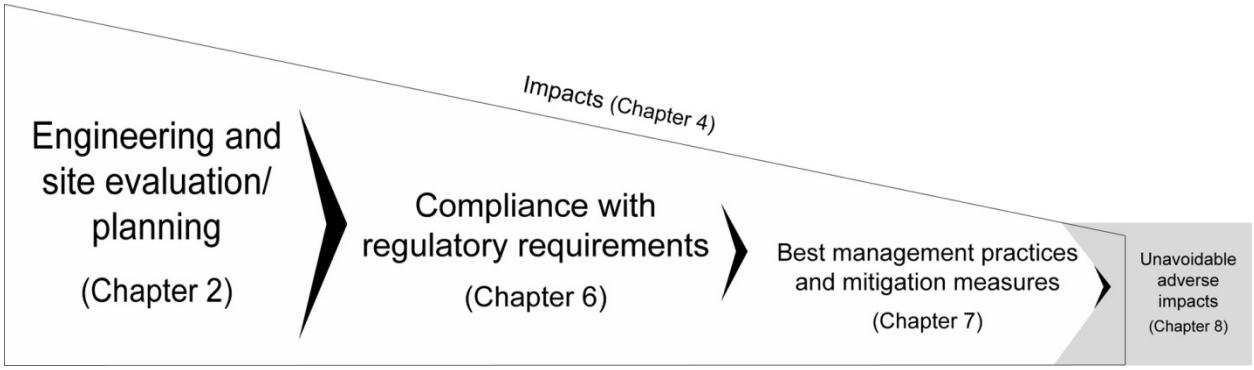

Figure 8-1. How unavoidable adverse impacts might arise.

Unavoidable adverse impacts would not vary substantially among alternative segments along the Caliente rail alignment, or by implementation of the ***Shared-Use Option***. Sections 8.1.1.1 to 8.1.1.15 describe unavoidable adverse impacts, if any, for each environmental resource area evaluated in this Rail Alignment EIS.

8.1.1.1 Physical Setting

Construction of the proposed railroad along the Caliente rail alignment would lead to permanent alterations in topography in the ***rail line construction right-of-way*** as a result of ***cuts*** and ***fills*****,** and in the locations of potential quarry sites. Cuts and fills would also alter local drainage patterns, and would remain after a possible future abandonment of the railroad. Cuts and fills associated with construction of any of the ***alternative segments*** could result in the loss of topsoil, and an increased potential for erosion. No mineral deposits would be removed; nevertheless, a rail line could unavoidably restrict access to such deposits. The Goldfield alternative segments would cross ***mining areas*** and could displace minerals or limit the boundaries for mining if mineral resources extended under the rail alignment. There would be potential impacts to isolated pockets of unused land classified as ***prime farmland*** along the Caliente or

Eccles alternative segment and Caliente ***common segment*** 1. As required under the Farmland Protection Policy Act (7 United States Code [U.S.C.] 4201 *et seq.*), which directs federal agencies to identify and quantify adverse impacts of federal programs on farmlands, DOE has coordinated with the Natural Resources Conservation Service to minimize any potential conversion of land classified as prime farmland to nonagricultural uses. The 1.13 square kilometers (280 acres) of prime farmland soils along Caliente common segment 1 are in relatively isolated areas in Lincoln and Nye Counties (DIRS 182843-DOE 2007, plates 55 to 60, 79, and 107 to 109), and at present is not being used for agricultural production. Lincoln County has about 1,600 square kilometers (400,000 acres) and Nye County has 610 square kilometers (150,000 acres) of prime farmland soils (DIRS 184079-Natural Resources Conservation Service 2007, all). Esmeralda County does not have any soils classified as prime farmland. The amount of prime farmland soils within the Caliente rail alignment construction right-of-way would be less than 0.1 percent of the total prime farmland soils in Lincoln and Nye Counties. Construction activities within the construction right-of-way would result in local soil compaction, which could impact the natural revegetation rate and vegetation types over time.

Any permanent alterations in topography that could not be mitigated could be viewed as unavoidable adverse impacts. As described in Section 4.2.1.2.1, topographic impacts due to major cut and fill and other earthwork processes would primarily occur along the Goldfield alternative segments and common segment 6, and around Bennett Pass, Goldfield Hills, Beatty, and Yucca Mountain. Tables 4-2 to 4-9 in Section 4.2.1 list specific amounts of disturbed surface areas for the Caliente rail alignment alternative segments, common segments, and ***construction and operations support facilities***. Any impacts to physical setting, although unavoidable, would be small.

8.1.1.2 Land Use and Ownership

Use of land along the Caliente rail alignment for construction and operation of the proposed railroad and railroad construction and operations support facilities would involve some long-term changes in land use. Approximately 99 percent of the land DOE would use for this project would be public land, which would be managed as a right-of-way grant obtained from the U.S. Department of the Interior, Bureau of Land Management (BLM). While the proposed railroad would generally conform to BLM resource management plans, DOE would need to implement best management practices and mitigation measures to avoid, minimize, or mitigate adverse impacts to Areas of Critical Environmental Concern along Caliente common segment 1 and the Eccles alternative segment, as well as impacts to active grazing allotments along the alignment. The BLM manages public land to provide for multiple use. The multiple-use mandate set forth in the Federal Land Policy and Management Act would continue to apply to the ***public lands*** within the right-of-way, but railroad construction and operations could limit certain future land uses that pose operational or safety conflicts, such as large-scale surface mining. Construction and operation of the proposed railroad along the Caliente rail alignment would directly impact grazing allotments by transecting pastures and potentially hindering livestock access to forage and water resources. DOE and the BLM would work with allotment permittees to implement revised allotment management plans and other mitigation measures to minimize adverse impacts on grazing operations. Even with mitigation, some adverse impacts to the use of grazing land could be unavoidable, such as loss of grazing areas immediately adjacent to the rail line.

DOE would need to gain access to some private lands. Assuming a ***nominal*** 61-meter (200-foot) operations right-of-way on either side of the centerline of the rail line, private land would make up about 1 percent of private land compared to the total amount of land that would be required for the project, although there would be long-term changes to land use on that private land. Implementation of the Caliente alternative segment would require the demolition or relocation of three structures/residences along the former Prince and Pioche railroad right-of-way, and would remove some parking area from the Caliente Hot Springs Motel. Private land along common segment 1, the Goldfield alternative segments,

and Oasis Valley alternative segment 1 would also be accessed. All private landholders that are identified as directly affected parties would be invited to take part in the process outlined in Chapter 7.

Construction and operation of the proposed railroad along the Caliente rail alignment would not displace existing or planned land uses over a large area nor conflict with county or local land-use plans or goals. Therefore, any impacts to land use and ownership, although unavoidable, would be small overall, although the long-term impacts to private land could be perceived as high by individual landowners affected by the proposed railroad. Tables 4-23 to 4-30 in Section 4.2.2 summarize potential impacts to land use and ownership for each alternative segment, common segment, and railroad construction and operations support facility.

8.1.1.3 Aesthetic Resources

The ***region of influence*** for aesthetic resources is the ***viewshed*** around all Caliente rail alignment alternative segments, common segments, and railroad construction and operations support facilities, and any additional ***sidings*** that would be added under the Shared-Use Option. Operation of the proposed railroad along the Caliente rail alignment would remain consistent with BLM visual resource management objectives, under which areas of high visual value (Classes I and II) are managed to minimize contrast levels, and areas of lower visual value (Classes III and IV) are allowed higher contrast levels. There would be unavoidable visual changes associated with the proposed railroad. Contrast levels would be such that BLM visual resource management objectives would be met, including in specific locations such as Garden Valley, which is classified as a visually sensitive Class II area in the *Ely Proposed Resource Management Plan Final Environmental Impact Statement* (DIRS 184767-BLM 2007, all).

8.1.1.4 Air Quality

Construction and operation of the proposed railroad along the Caliente rail alignment would cause unavoidable emissions of some ***criteria air pollutants***. Air pollutant concentrations would not exceed the National ***Ambient Air Quality Standards*** during construction and operation of the proposed railroad, with the possible exception of the 24-hour standard for ***particulate matter*** with an aerodynamic diameter less than or equal to 10 micrometers (***PM_{10}***) that DOE modeled as exceeded during quarry operations in South Reveille Valley during rail line construction. However, DOE will be required to obtain a Surface Area Disturbance Permit Dust Control Plan, issued by the State of Nevada, Department of Environmental Protection, prior to quarry development. DOE anticipates that compliance with the requirements of this plan to reduce ***fugitive dust*** emissions would decrease the possibility of exceedance of the ***air quality*** standard—for example, the requirement for cessation of all operations when winds make control of fugitive dust difficult (this was a mitigating attribute not accounted for in the modeling that DOE undertook). DOE could further reduce the possibility of exceeding the 24-hour standards for PM_{10} at a public boundary during quarry operations by acquiring additional land and moving public access farther away.

The highest increase in air pollutant emissions would occur during the construction phase. During the operations phase, the highest increase would occur in the vicinity of the railroad operations support facilities. Fugitive dust emissions from construction-vehicle traffic on unpaved roads, surface disturbance (such as grading, scraping, bulldozing, wind erosion, and quarry excavation activities), and operation of concrete batch plants could cause unavoidable temporary impacts to air quality that, although within permissible limits, could not be completely mitigated. Table 4-53 in Section 4.2.4 summarizes impacts to air quality, which are projected to be small during both construction and operation, with the possible exception in the vicinity of the South Reveille Valley quarry.

Therefore, any impacts to air quality, although unavoidable, would be small.

8.1.1.5 Surface-Water Resources

Regrading, cut and fill activities, and structures such as box ***culverts*** would cause localized changes in drainage patterns along the Caliente rail alignment construction right-of-way. Construction of the proposed ***Staging Yard*** and ***Interchange Yard***, whether along the Caliente or Eccles alternative segment, would require channelization of natural drainage surface waters to keep water out of railroad operations support facility sites. Changes in drainage patterns could result in changes in erosion and sedimentation rates or locations. Construction in ***washes*** or other flood-prone areas could reduce the area through which floodwaters naturally flow, resulting in water buildup or ponding on the upstream side of crossings during floods that would slowly drain through the culverts or bridges.

DOE evaluated potential impacts to surface waters by identifying areas where there are drainage channels or water resources. DOE expects adverse impacts associated with altered drainage patterns to be small. While some changes would be unavoidable, DOE would take steps to ensure the alterations to natural drainage, sedimentation, and erosion would not increase future flood damage, increase the impact of floods on human health and safety, or cause identifiable harm to the functions and values of ***floodplains***. Because hydraulic structures and conveyance systems would be designed to safely convey 50-year or 100-year design storms and minimize concentration of flow, impacts associated with drainage conveyance would be small. The Department would minimize impacts to surface-water resources through the implementation of engineering design standards and best management practices that include erosion control measures. The Caliente alternative segment is adjacent to ***wetlands*** and some wetland fill would be unavoidable. The total amount of wetlands that would be permanently filled to construct the rail roadbed and the Upland Staging Yard option would be approximately 0.035 square kilometer (8.7 acres), 0.034 square kilometer (8.5 acres) of which are likely regulated under Section 404 of the Clean Water Act. Approximately 0.22 square kilometer (54.1 acres) of wetlands would be filled to construct the rail roadbed and the Indian Cove Staging Yard option. The Eccles alternative segment Interchange Yard would require approximately 0.033 to 0.043 square kilometer (8.2 to 11 acres) of Clover Creek to be filled to elevate the site out of the floodplain. A total of 560 square meters (0.14 acre) of waters of the United States would be filled to construct the Eccles alternative segment Staging Yard. DOE would minimize adverse impacts to wetlands (and the functions served by wetlands) and other surface-water resources.

Because of the steps that DOE would take to reduce the potential for sediment loadings from soil disturbance, DOE does not expect adverse impacts to water quality of surface waters along the proposed rail alignment that would interfere with any beneficial use of the water, which is a primary criterion applied by the State of Nevada environmental standards (Nevada Administrative Code 445A.121).

8.1.1.6 Groundwater Resources

Withdrawal of ***groundwater*** from multiple wells for construction of the proposed railroad would cause a short-term local depletion in the amount of groundwater available within the affected portions of aquifers due to the increased ***demand*** placed on the host ***aquifer*** at each new well location. Groundwater withdrawal could decrease the amount of water available to a nearby existing well, spring, seep, or other surface-water-right location and/or, in theory, decrease the amount of water available for underflow to a downgradient basin. The impacts of groundwater withdrawals from the proposed water-supply wells at the range of groundwater pumping that would be required for the railroad would be localized in nature, small in magnitude compared to existing groundwater inventories, and primarily temporary. Impacts analysis results indicate that short-term withdrawal of water from new water wells at the proposed withdrawal rates could, in some instances, if unmitigated, have some unavoidable impact on an existing

well, spring, seep, or other surface-water-right location. In those instances, one or more best management practices or mitigation measures are proposed to preclude impacts on existing groundwater users and uses. These best management practices include the use of a staggered pumping schedule at the new well location, pumping the new well location at a (lower) rate not exceeding a maximum pumping rate determined through analysis to not cause an impact on the existing groundwater resource feature, use of existing wells to obtain the amount of water needed (that is, by purchasing water), or use of other proposed water-supply wells in the same general area at a sufficient distance from existing wells or springs, seeps, or other surface-water-right locations to preclude the impact. Review of published information on the occurrence and movement of groundwater beneath hydrographic areas that would be crossed by the Caliente rail alignment, information on inter-basin groundwater flow characteristics for hydrographic areas in Nevada, and data on existing wells, springs, seeps, and other surface-water-right locations downgradient of the proposed alignment indicates that the likelihood of the proposed groundwater withdrawals impacting downgradient hydrographic areas is very low. Over time, because the amount of groundwater that would be withdrawn represents a fractionally small percentage of the available groundwater in storage, and the withdrawals would be limited primarily to the construction phase, DOE anticipates that this water would be replenished through the natural water cycle following the construction phase. Some of the water used for compaction would return to groundwater aquifers. For these reasons, DOE expects that there would be no adverse ***long-term impacts*** to existing groundwater resources.

8.1.1.7 Biological Resources

There could be unavoidable, short-term, construction-related adverse impacts to wildlife, special status species, protected game species, and wild horses and burros. There would be the potential for unavoidable impacts to ***threatened*** or ***endangered species*** during rail line construction. Potential impacts to desert tortoise would be small from minor losses of habitat from the footprint of the rail line and fragmentation from the bisection of the tracks through connected habitat. There could be localized and minor losses of potential roosting and foraging habitat for the southwestern willow flycatcher and western yellow-billed cuckoo.

DOE determined that there would be unavoidable impacts to ***riparian*** and water-related habitats from construction of the Caliente alternative segment and either of the potential Staging Yard locations (Indian Cove and Upland), and the Eccles alternative segment. Unavoidable impacts to wildlife and wild horses and burros from the operation of the rail line could result in collisions of wildlife with trains and short-term disruption of activities (such as foraging, nesting, and roosting). Although such impacts would be unavoidable, these long-term impacts would be considered small. Other unavoidable impacts could include possible changes to predator/prey interactions due to the construction of towers and other structures that would provide new perch habitat for raptors and other predatory birds.

There could be some unavoidable impacts to special status wildlife or plant species. For example, project activities could result in small but unavoidable adverse impacts to:

- Non-critical habitat for the federally threatened Mojave population of the desert tortoise (*Gopherus agassizii*)
- Habitat for the BLM-designated sensitive southwestern toad (Bufo microscaphus) near the Caliente and Eccles alternative segments
- Individual BLM-designated sensitive plants and their habitats, including the Schlesser pincushion (*Sclerocactus schlesseri*) and the Schlesser Pincushion Area of Critical Environmental Concern along Caliente common segment 1; the White River catseye (*Cryptantha welshii*) along the Caliente and Eccles alternative segments, and Garden Valley 1, 2, 3, and 8 alternative segments; the Eastwood

milkweed (*Asclepias eastwoodiana*) near Caliente common segment 3 and along Goldfield alternative segments 1, 3, and 4; and the Nevada dune beardtongue (*Penstemon arenarius*) near Caliente common segment 3 and along common segment 5

- Habit for the Chuckwalla lizard (*Sauromalus ater*) documented in the southeastern foothills of Yucca Mountain, adjacent to common segment 6

Nevertheless, DOE has concluded that there would be a small loss of habitats, and potential loss of individual species from trains and construction traffic. Although such impacts would be unavoidable, long-term impacts would be small.

8.1.1.8 Noise and Vibration

Railroad operations along the Caliente rail alignment would lead to an unavoidable increase in ***ambient noise*** from passing trains in areas of Nevada that are mostly uninhabited. Noise from trains might be noticeable as new noise in residential areas near the rail line in Caliente and Goldfield. Because there is already a substantial amount of train activity in Caliente, additional train noise would be less noticeable there than in other areas where there is no train activity and no train noise at present. Train noise during the construction phase would cause 34 receptors to be adversely impacted. These would be temporary adverse impacts because of the temporary nature of the construction phase. During the operations phase, three receptors would be adversely impacted by train noise. For these receptors, DOE would consider mitigation, such as the development of a Quiet Zone, stationary warning horns, or building sound insulation treatments. A Quiet Zone refers to specific grade crossings that have sufficiently upgraded safety measures such that locomotive warning horns do not have to be sounded.

During the construction and operations phases, vibration levels would not exceed the Federal Transit Administration criteria. During rail line construction, DOE estimated that noise levels at certain receptor locations near the City of Caliente would be higher than Federal Transit Administration construction noise guidelines. This unavoidable impact would be temporary.

8.1.1.9 Socioeconomics

Construction and operation of the proposed railroad along the Caliente rail alignment would unavoidably impact population, housing, employment, and public services in Lincoln, Nye, Esmeralda, and Clark Counties; traffic; and, to a small extent, local current agriculture, ranching, and mining activities.

Socioeconomic changes during the construction phase would include a brief elevation in project-related employment, temporary population increases, and immediate impact on existing levels of public services (health care, transportation, fire protection, and law enforcement) where construction activities were concentrated near communities. DOE determined that the greatest impacts would be economic, and although unavoidable, would be viewed as beneficial and not adverse. As outlined in Section 4.2.9, Socioeconomics, construction-related impacts in Lincoln, Esmeralda, and Nye Counties would result in small increases in peak employment, increases in ***real disposable income***, and increases in ***gross regional product***. The project would generate vehicle trips during facilities construction, both from the movement of materials and from workers traveling to and from the work sites. DOE analyzed highway ***levels of service*** by looking at traffic volume in terms of design hour and peak hour flow during a 4- to 10-year construction phase, and determined that there would be some unavoidable impacts from construction of the ***Rail Equipment Maintenance Yard*** and Cask Maintenance Facility at Yucca Mountain to traffic on U.S. Highway 95 near the entrances to the ***Yucca Mountain Site***. This effect would degrade the level of service during peak traffic hours. However, this level would represent high density but stable traffic flow and constitute a small, but unavoidable, impact. This unavoidable impact would be temporary, lasting only as long as the construction phase (4 to 10 years, with the peak period limited to 2 years).

Impacts to traffic during railroad operations would be considerably lower than construction-related impacts. DOE determined that Rail Equipment Maintenance Yard operations would affect traffic on U.S. Highway 95 near the entrances to the Yucca Mountain Site. However, this level would represent high density but stable traffic flow, and constitute a small, but unavoidable, impact. Elsewhere, there would be no impacts or changes to highway levels of service during the railroad operations phase.

Socioeconomic changes during railroad operations would include increases in project-related employment (particularly associated with railroad operations support facilities); slight long-term population increases; moderate pressure on available housing, and fire-protection and health services in Lincoln County and southern Nye County; and continued small impacts on mining, ranching, and agriculture. DOE determined that the greatest economic gains would arise in Lincoln County.

8.1.1.10 Occupational and Public Health and Safety

The possibility of nonradiological industrial hazards (such as exposure to physical hazards, chemicals, dust, and pathogens) causing injury or illness to workers during construction and operations would not be completely unavoidable. However, the potential for such impacts would be very small. DOE has estimated that there could be approximately three fatalities associated with all such hazards during construction and 50 years of railroad operations.

There could be radiological impacts to workers and the public from ***incident-free transportation*** and facility operations. While the impact would be very small, radiological impacts would not be completely unavoidable. DOE estimated that approximately 0.34 ***latent cancer fatality*** would result to workers from incident-free transportation and facility operations, and that approximately a maximum of 0.00013 latent ***cancer*** fatality would result to the public from incident-free transportation and facility operations.

There could be radiological impacts from rail ***accidents*** involving casks. Radiological impacts from accidents are estimated to result in up to 0.0000013 latent cancer fatality.

There could be radiological impacts from sabotage events involving casks. If a sabotage event occurred in a suburban area, the collective ***radiation dose*** to the population is estimated to be 1,800 ***person-rem***, and in a rural area 4.7 person-rem. The total latent cancer fatalities for people exposed during a sabotage event in a suburban area is estimated to be 1.1, and in a rural area to be 0.0028.

By their very nature, roadway accidents are considered unavoidable; however, the projected number of roadway accidents that could be attributed to construction and operation of the proposed railroad would be very small. DOE assessed the potential transportation safety impacts of vehicle traffic on roadways associated with constructing and operating the rail line and facilities. DOE determined that there could be up to six fatalities on roadways for the 335 million vehicle-kilometers (200 million vehicle-miles) traveled over the construction phase, and up to eight fatalities on roadways for the 460 million vehicle-kilometers (288 million vehicle-miles) traveled during the 50-year operations phase.

Also by their nature, rail line accidents are considered unavoidable; however, the projected number of rail accidents that would be attributed to construction and operation of the railroad would be very small. DOE determined that there could be up to one fatality associated with the construction and operations phases. DOE also assessed the potential transportation safety impacts of rail traffic on the rail line and at ***at-grade crossings*** during the construction and operations phases. The Department estimated that over the construction phase and 50-year operations phase, approximately 13 rail-related accidents could be expected to occur for the entire set of estimated train movements.

8.1.1.11 Utilities, Energy, and Materials

Some interfacing with existing utility rights-of-way, in particular electric utility lines, would be unavoidable. Temporary unavoidable impacts to utilities during the construction phase could include possible short-term service interruptions as service was switched from existing electric-power lines, telecommunication lines, and water pipelines to new lines crossing the proposed railroad, or to lines that were relocated to avoid railroad construction activities.

The two principal electric providers in the project region, Nevada Power Company and Sierra Pacific Power Company, can currently meet peak load demands of 6,300 megawatt and 1,800 megawatts, respectively, through generating capacity or power-purchase capabilities. In 2007, their electricity sales were estimated to be 23 million megawatt-hours and 8.6 million megawatt-hours, respectively. In addition, the smaller Valley Electric Association, Inc. and Lincoln County Power District No. 1 are local area power purchasers and resellers. Over the 4- to 10-year construction phase, the electrical power providers in the project region would have adequate generating capacity or power-purchase capabilities (see Section 3.2.11) to supply the project during peak demand without disrupting service to the providers' respective coverage areas. Therefore, although energy use would be unavoidable, anticipated electricity demand to meet construction and operations needs would be modest and would not adversely impact other regional needs for electric power.

As described in Section 4.2.11.2.1.3, DOE estimated that annual consumption of diesel fuel during the railroad construction phase would be 117 million liters (31 million gallons) (DIRS 182825-Nevada Rail Partners 2007, Appendix D, Table D-5b), which would represent 6.5 percent of diesel fuel used annually in Nevada. As described in Section 4.2.11.2.2.2, DOE estimated that over an anticipated 50-year operations lifecycle, 119 million liters (31.5 million gallons) of diesel fuel would be consumed and the annual consumption rate would peak at 4.3 million liters (1.1 million gallons) (DIRS 182825-Nevada Rail Partners 2007, Appendix D, Table D-5a), a rate which is less than 0.25 percent of the current annual vehicular diesel fuel usage in Nevada. Although the use of fuel would be unavoidable, its use during either construction or operations would not adversely affect the capacity of national and regional fuel producers and distributors.

The need for construction materials, primarily steel, concrete, and aggregate, would be unavoidable, but would represent a small fraction of available materials (see Table 4-136). The regional and national impacts of meeting such needs would be small. Materials needed during the operations phase would be much less than during the construction phase, remaining considerably below available capacity.

8.1.1.12 Hazardous Materials and Waste

The generation of some general ***solid wastes***, special wastes (construction debris, used tires, and other materials with specific management requirements), and hazardous materials would be unavoidable, primarily during the construction phase. DOE would handle all wastes in accordance with applicable regulations, and would implement best management practices and pollution prevention/waste minimization programs. As described in Section 4.2.12, DOE estimated that 2,300 metric tons (2,500 tons) per year of nonhazardous solid waste (for example, general household waste) would be generated during the construction phase, for a daily rate of about 6.3 metric tons (6.9 tons). Nonrecyclable wastes would be disposed of, which would raise the total amount disposed of in the four-county area of Lincoln, Nye, Esmeralda, and Clark by up to approximately 0.054 percent. In addition, DOE estimated that construction activities would generate approximately 4,020 metric tons (4,380 tons) of ***industrial and special wastes*** per year, for an approximate daily rate of 11 metric tons (12 tons), which would result in an increase of approximately 0.094 percent in waste receipt at local landfills.

DOE estimated that 180 metric tons (198 tons) per year or 0.5 metric ton (0.55 ton) per day of nonhazardous solid waste would be generated at railroad operations support facilities, which would raise the total amount disposed of in the four-county area by less than 0.01 percent. There would be disposal capacities to accept the small amounts of Class A ***low-level radioactive wastes*** generated from the ***Cask Maintenance Facility*** of 3,200 to 7,900 cubic meters (113,000 to 280,000 cubic feet) over the up to 50-year lifetime of this project (DIRS 181425-MTS 2007, p. 6).

Although the use of disposal facilities would be unavoidable, existing disposal facilities have ample capacity to handle all additional wastes.

8.1.1.13 Cultural Resources

Because of the length of the Caliente rail alignment and the complexity associated with engineering a feasible alignment, DOE used a phased cultural resource identification and evaluation approach, as described in 36 Code of Federal Regulations (CFR) 800.4(b)2, to identify specific cultural resources as is fully described in Section 4.2.13. DOE has surveyed approximately 20 percent of the area for cultural resources. Based on cultural resources already identified, it is reasonable to conclude that there may be undiscovered cultural resources in the Caliente region of influence. The number and extent of identified cultural resource sites throughout the Caliente rail alignment region of influence will continue to increase as more surveys and inventories of potentially disturbed land are completed.

Nevertheless, railroad construction could cause unavoidable disturbance or destruction of cultural resources. Disturbance or destruction could occur during ground-disturbing activities along the rail alignment, at quarries, along temporary access roads, at ***borrow sites***, at temporary ***construction camps***, and at railroad operations support facilities. During construction, larger numbers of workers in the vicinity of the construction camps could increase the potential for impacts to nearby cultural resources. Excavation and other construction-related ground-disturbing activities could unearth additional cultural materials that were either thought, based on previous archaeological surveys, to occur only at ground surface, or were previously undetected because they were completely underground.

Railroad construction and operations could also lead to unavoidable changes in cultural landscapes, such as changes to ***ethnographic***, rural historic, and historic viewscapes. Cultural landscapes include historic-period Western Shoshone villages and surrounding use areas in the Oasis Valley, the Goldfield area, and Stone Cabin and Reveille Valleys; early ranching operations in the Stone Cabin and Reveille Valleys, and the Mormon settlement of Meadow Wash Valley; and the Goldfield, Clifford, and Reveille Mining Districts.

DOE would further modify the rail alignment, as necessary, to avoid discovered cultural resources. Based on preliminary information and sample surveys, any impacts would likely range from small to moderate because of an extensive effort to avoid or mitigate them.

8.1.1.14 Paleontological Resources

As described in Section 4.2.14, there is a paleontological resource site approximately 4.8 to 8 kilometers (3 to 5 miles) south of where Caliente common segment 1 would cross Bennett Pass, but because of its distance from the rail line, there would be no impacts to the site. There are no other known paleontological resources at or near the remaining portions of the Caliente rail alignment, nor do these areas have a strong potential to contain important paleontological resources. While there could be a potential to uncover previously unknown ***fossils*** during railroad construction, DOE would consult with the BLM to develop appropriate measures to minimize damage to paleontological resources during

project-related construction if fossils were found. DOE has not identified any unavoidable adverse impacts.

8.1.1.15 Environmental Justice

DOE determined that constructing and operating the proposed railroad along the Caliente rail alignment would not result in disproportionately high and adverse human-health, environmental, ecological, or cultural impacts on ***minority populations*** or low-income communities, including American Indian tribes, from construction and operation of a railroad along the Caliente rail alignment. DOE has not identified impacts, unavoidable or otherwise, in the context of ***environmental justice***.

8.1.2 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

Council on Environmental Quality regulations that implement the procedural requirements of the National Environmental Policy Act (NEPA) require consideration of "the relationship between short-term uses of man's ***environment*** and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). This includes using " … all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generation of Americans" (NEPA, Section 101, 42 U.S.C. 4331).

This section discusses the short-term use of the environment and the maintenance of its long-term productivity. Chapter 4 provides more detailed discussions of the impacts and resource utilization associated with the Proposed Action and the Shared-Use Option. Construction and operation of the proposed railroad would require short-term uses of land and other resources. Any long-term loss of productivity in disturbed areas would be small. The land-cover types along the proposed rail alignment are widely distributed throughout the region of influence and any loss of vegetation in the disturbed area along the rail alignment would have little impact on the regional productivity of plants and animals. Future long-term land uses such as grazing or mining would not be precluded by the short-term use of the land for the proposed rail line. The relationships between short-term uses and long-term productivity would not be meaningfully altered if either the Proposed Action or Shared-Use Option were implemented, or by the selection of alternative segments within the Caliente rail alignment ***implementing alternative***.

Wetlands or waters that would be filled would not recover in the short term and long-term productivity would be lost permanently. To the extent practicable, DOE would minimize such fill by optimizing final engineering and design and use a minimum-width construction right-of-way whenever possible. Approximately 0.035 square kilometer (8.7 acres) would be permanently filled to construct the rail roadbed and the Upland Staging Yard option. Approximately 0.22 square kilometer (54.1 acres) of wetlands would be filled to construct the rail roadbed and the Indian Cove Staging Yard option. The Eccles alternative segment Interchange Yard would require approximately 0.033 to 0.043 square kilometer (8.2 to 11 acres) of Clover Creek to be filled to elevate the site out of the floodplain, and 560 square meters (0.14 acre) of waters of the United States would be filled to construct the Eccles alternative segment Staging Yard.

Productivity loss for soils should be limited to the disturbed areas affected by land clearing, grading, and construction. Most disturbed areas not permanently maintained for railroad operations would recover over time, although recovery and a return to natural productivity could be slow for disturbed biological communities in an ***arid*** environment. DOE would revegetate disturbed areas with appropriate native species. Potentially productive soils characterized as prime farmland along Caliente common segment 1

and the Caliente and Eccles alternative segments are found only in isolated pockets and cannot support farming. Therefore, the minimal loss of these soils would not impact long-term productivity.

The areas used for temporary construction camps would likely recover in the short term because they would be unused after construction activities ceased. DOE would implement restoration activities to encourage natural vegetation to grow on these sites. The Department might eventually abandon the proposed railroad and its operations support facilities, although it is unlikely that the rail ***roadbed*** would ever be completely dismantled. The proposed railroad and these facilities could be turned over to commercial carriers, especially if the Shared-Use Option were selected, and could continue to aid economic productivity in the region. Under the Shared-Use Option, the proposed railroad could increase transportation opportunities and lower transportation costs in the region.

The short-term withdrawal of water from the temporary construction wells could have a small impact on groundwater availability. However, DOE has projected that drawdowns would be sufficiently small to preclude impacts on flow rates or discharge rates at existing productive water-supply wells or springs. There would be no long-term impacts to groundwater resource productivity because the construction wells would only be used for a short time.

8.1.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

NEPA Section 102 (42 U.S.C. 4332) and Council on Environmental Quality regulations that implement the procedural requirements of NEPA (40 CFR 1502.16) require that environmental analyses include identification of: "… any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented." An irreversible commitment of resources represents a loss of future options. It applies primarily to nonrenewable resources, such as minerals or cultural resources, and to those factors that are renewable only over long time spans, such as soil productivity, whereas an irretrievable commitment of resources represents opportunities that are foregone for the period of the proposed action. Examples include the loss of production, harvest, or use of renewable resources. The decision to commit the resources is reversible, but the utilization opportunities foregone are irretrievable.

This section describes irreversible and irretrievable commitments of resources associated with implementation of the Proposed Action along the Caliente rail alignment. Sections 8.1.3.1 to 8.1.3.15 discuss resource commitments that could be irreversible and irretrievable. Irreversible and irretrievable commitments of resources would not meaningfully vary among alternative segments along the Caliente rail alignment, or by implementation of the Shared-Use Option.

8.1.3.1 Physical Setting

Construction of the rail line and construction and operations support facilities along the Caliente rail alignment could displace mineral deposits. Perlite is a locally important mineral that occurs in the area of the Caliente and Eccles alternative segments. Although no minerals would be removed, placement of the rail line could displace perlite and reduce its availability for mining, if there was perlite within the construction right-of-way. The Goldfield alternative segments would cross mining areas and could displace minerals or limit the boundaries for mining if mineral resources extend under the rail alignment. If these circumstances occurred and options for future use of minerals were limited, there would be an irreversible commitment of resources.

8.1.3.2 Land Use and Ownership

Construction and operation of the proposed railroad would require the commitment of land for placement of the rail line, support facilities, and access roads. If at a future date DOE were to abandon the railroad, although much of the construction material might be removed, it is not likely that all of the natural landscape would be restored. Areas requiring extensive earth movement or mineral extraction, such as project-related quarries and areas of large volumes of cut and fill, would likely be irreversibly altered. If DOE decided to abandon the railroad, it would relinquish its right-of-way and the BLM would continue to manage the land. Where DOE would need to gain access to private lands for the proposed railroad, the Department would dispose of purchased land pursuant to DOE Order O 430.1B, *Real Property Asset Management*, or would return leased land to the lessee.

8.1.3.3 Aesthetic Resources

DOE determined that the long-term visual contrast of operating the proposed railroad would range from weak to strong (with mitigation in Garden Valley) as a result of the presence of the rail line and marks on rock, soil, and vegetated landscape from cuts, fills, well pads, and access roads (see Section 4.2.3). The railroad would remain consistent with BLM visual resource management objectives where areas of high visual value are managed to minimize contrast levels, as well as in areas of lower visual value that are allowed higher contrast levels. Where land commitment was irreversible, aesthetic impacts would sometimes remain irreversible.

8.1.3.4 Air Quality

DOE did not identify any associated irreversible and irretrievable commitments of resources along the Caliente rail alignment.

8.1.3.5 Surface-Water Resources

The Caliente alternative segment is adjacent to wetlands and some wetland fill would be unavoidable. This could result in an irretrievable commitment of resources along the Caliente rail alignment. Approximately 0.035 square kilometer (8.7 acres) would be permanently filled to construct the rail roadbed and the Upland Staging Yard option. Approximately 0.22 square kilometer (54.1 acres) of wetlands would be filled to construct the rail roadbed and the Indian Cove Staging Yard option. The Eccles alternative segment Interchange Yard would require approximately 0.033 to 0.043 square kilometer (8.2 to 11 acres) of Clover Creek, a water of the United States, to be filled to elevate the site out of the floodplain, and 560 square meters (0.14 acre) of waters of the United States would be filled to construct the Eccles alternative segment Staging Yard.

8.1.3.6 Groundwater Resources

DOE estimated that a total of approximately 7.5 million cubic meters (6,100 ***acre-feet***) of water would be required to construct the rail line and railroad construction and operations support facilities (DIRS 180922-Nevada Rail Partners 2007, Section 4.4.1), most of which would be obtained through the construction of new water wells. Over time, because the amount of groundwater withdrawn represents a fractionally small percentage of the available groundwater in storage, and the withdrawals would be limited primarily to the railroad construction period, it is anticipated that this water would be replenished through the natural water cycle following the railroad construction phase. The use of groundwater could be considered as an irretrievable commitment of resources during the construction phase.

8.1.3.7 Biological Resources

The areas that would be occupied by the rail line, railroad construction and operations support facilities, and access roads would be irreversibly removed from natural habitat for the life of the proposed railroad. In addition, the disturbances of the desert soil surfaces in areas of temporary construction activity could result in changes that would be irreversible over the long term. The permanent conversion of vegetation resources and wildlife habitat along the rail line and at construction and operations support facilities could represent an irreversible commitment of biological resources for the life of the proposed railroad and beyond if, following abandonment, DOE did not restore these resources, or if former vegetation cover and composition did not recover. Losses of wildlife during railroad construction and operations would represent an irretrievable commitment of biological resources.

Impacts to riparian and water-related habitats from construction of the Caliente alternative segment and either of the potential Staging Yard locations (Indian Cove and Upland), the Eccles alternative segment, and the Interchange Yard could represent an irreversible rather than irretrievable commitment of resources if, following abandonment, DOE did not restore these resources. However, during rail line final design, DOE would make adjustments to minimize such impacts (see Appendix F).

8.1.3.8 Noise and Vibration

DOE did not identify any associated irreversible and irretrievable commitments of resources along the Caliente rail alignment.

8.1.3.9 Socioeconomics

DOE did not identify any associated irreversible and irretrievable commitments of resources along the Caliente rail alignment.

8.1.3.10 Occupational and Public Health and Safety

As discussed in Section 8.1.1.10, nonradiological industrial hazards (such as exposure to chemicals, dust, and pathogens) could cause injury or illness to workers during railroad construction and operations; however, DOE estimated the ***risk*** as approximately three fatalities. Radiological impacts to workers (0.34 latent cancer fatality) and the general public (up to 0.00013 latent cancer fatality) could occur from incident-free transportation. DOE assessed the potential transportation safety impacts of movement on roadways, the rail line, at railroad operations support facilities, and at grade crossings associated with railroad construction and operations. DOE estimated there would be six vehicular-related fatalities during construction and approximately eight during operations. DOE estimated there would be approximately one rail-related fatality associated with the construction and operations phases.

8.1.3.11 Utilities, Energy, and Materials

As described in Section 4.2.11, DOE estimated that annual consumption of diesel fuel during the construction phase would be 117 million liters (31 million gallons) (DIRS 182825-Nevada Rail Partners 2007, Appendix D, Table D-5b). Over an anticipated 50-year operations lifecycle, 119 million liters (31.5 million gallons) of diesel fuel would be consumed, and if the Shared-Use Option was implemented during the operations period, a total of 394 million liters (104 million gallons) would be consumed (DIRS 182825-Nevada Rail Partners 2007, Appendix D, Table D-5a). Fossil fuel consumed would be irreversible, and any portion of fuel consumed that was bio-fuel would be considered irretrievable. DOE has established an 8-megawatt power requirement (which includes a 30-percent reserve) for the Rail

Equipment Maintenance Yard and Cask Maintenance Facility (DIRS 181033-Hamilton-Ray 2007, all). Fossil fuel or nuclear resources that generated that electricity would be irreversible.

As described in Section 4.2.11, construction of the railroad would require an estimated 82,000 metric tons (90,000 tons) of steel and 450,000 metric tons (500,000 tons) of concrete. Approximately 1,020,000 concrete railroad ties would be required for track construction. The estimated requirement for railroad ***ballast*** would be approximately 3.2 million metric tons (3.5 million tons), and approximately 2.7 million metric tons (3 million tons) for ***subballast*** (DIRS 180875-Nevada Rail Partners 2007, Section 3.1.1, p. 3-1). Use of these materials would not be considered an irretrievable commitment of resources, because they could be recovered and recycled if DOE eventually abandoned the rail line.

8.1.3.12 Hazardous Materials and Waste

DOE did not identify any associated irreversible and irretrievable commitments of resources along the Caliente rail alignment, other than the irreversible loss of land used for landfills.

8.1.3.13 Cultural Resources

Cultural resources (archeological, historical, and ethnographic) are nonrenewable resources and any loss would be irreversible. At this time DOE cannot fully characterize potential effects on cultural resources along the Caliente rail alignment or the magnitude of these effects.

8.1.3.14 Paleontological Resources

At this time DOE has not identified any impacts to paleontological resources along the Caliente rail alignment, but any impact that could occur would be irreversible.

8.1.3.15 Environmental Justice

DOE determined that constructing and operating the proposed railroad along the Caliente rail alignment would not cause high or adverse impacts to or fall disproportionately on minority or ***low-income populations***. Thus, DOE did not identify any associated irreversible and irretrievable commitments of resources along the Caliente rail alignment that would present an environmental justice concern.

8.2 Mina Rail Alignment

During the engineering and site evaluation and planning phase for the proposed railroad, DOE considered many factors to avoid or minimize potential environmental impacts (see Chapter 2), and would continue to consider these factors during the final design phase. DOE would meet all applicable regulatory requirements during proposed railroad construction and operations along the Mina rail alignment, and would implement an array of best management practices to ensure compliance with requirements (see Chapter 7, Best Management Practices and Mitigation). Also as described in Chapter 7, DOE could implement measures to mitigate any impacts remaining after final design and compliance with regulatory requirements and implementation of best management practices.

However, there could be unavoidable adverse impacts; impacts to short-term uses and long-term productivity resources; and/or irreversible and irretrievable commitment of resources, for example:

- DOE could mitigate most potential impacts described in Chapter 4, but there would be some unavoidable impacts, for example, on the use of grazing land.

- Railroad construction would involve ground-disturbing activities that would result in localized short-term impacts to soil, water use, and habitat. These resources would recover over time, and long-term productivity would not be affected.
- An irreversible commitment of resources such as consumption of fossil fuel, and an irretrievable commitment such as a loss of habitat.

This chapter summarizes and consolidates information from Chapter 4, Environmental Impacts, and Chapter 7, Best Management Practices and Mitigation.

8.2.1 UNAVOIDABLE ADVERSE IMPACTS

Engineering and site evaluation and planning are the first steps in undertaking a proposed action. Next follows compliance with all laws, regulatory requirements, and stipulations and conditions of associated permits to minimize environmental and health-related impacts. Best management practices are implemented to maintain compliance with these requirements. Where analyses identify potential environmental impacts, mitigation measures are implemented to avoid, minimize, rectify, reduce, or compensate for those impacts. Finally, unavoidable adverse impacts may arise where there are no reasonably practicable mitigation measures to entirely eliminate impacts, and there are no reasonably practicable alternatives to the proposed project that would meet the purpose and need of the action, eliminate the impact, and not cause other or similar significant adverse impacts.

Unavoidable adverse impacts would not vary substantially among alternative segments along the Mina rail alignment, or by implementation of the Shared-Use Option. Sections 8.2.1.1 to 8.2.1.15 describe unavoidable adverse impacts, if any, for each environmental resource area evaluated in this Rail Alignment EIS.

8.2.1.1 Physical Setting

Construction of the proposed railroad along the Mina rail alignment would lead to permanent alterations in topography in the rail alignment construction right-of-way as a result of cuts and fills, and in the locations of potential quarry sites. Cuts and fills would also alter local drainage patterns, and would remain after a possible future abandonment of the railroad. Cuts and fills associated with construction of any of the alternative segments could result in the loss of topsoil, and an increased potential for erosion. No mineral deposits would be removed; nevertheless, a rail line could unavoidably restrict access to such deposits. As required under the Farmland Protection Policy Act (7 U.S.C. 4201 *et seq.*), which directs federal agencies to identify and quantify adverse impacts of federal programs on farmlands, DOE has coordinated with the Natural Resources Conservation Service to minimize any potential conversion of land classified as prime farmland to nonagricultural uses. Less than 0.1 percent of soils along the Mina rail alignment are classified as prime farmlands, all of which occur on the Walker River Paiute Reservation. There are 0.011 square kilometer (2.7 acres) of prime farmland along Schurz alternative segment 1, 0.012 square kilometer (3 acres) along Schurz alternative segment 4, and 0.014 square kilometer (3.5 acres) along each of Schurz alternative segments 5 and 6; at present these soils are not farmed. The Walker River Paiute Reservation contains approximately 5.5 square kilometers (1,400 acres) of prime farmland soils; thus, construction of the Mina rail alignment would remove less than 1 percent of prime farmland soils on the Reservation from possible future productive use. Construction activities within the construction right-of-way would result in local soil compaction, which could impact the natural revegetation rate and vegetation types over time.

Any permanent alterations in topography that could not be mitigated could be viewed as unavoidable adverse impacts. As described in Section 4.3.1.2.1, topographic impacts due to major cut-and-fill and other earthwork processes would occur primarily along the Montezuma alternative segments, specifically

along Montezuma alternative segment 1. In addition, impacts from major cut-and-fill and other earthwork processes also would occur around the Calico Hills and Terrill Mountains, the Goldfield Hills, Beatty, and Yucca Mountain. As described in Section 4.3.1.2.1.1, the total area that would be disturbed during construction of the proposed rail line and construction and operations support facilities would range from approximately 40 to 48 square kilometers (9,900 to 12,000 acres). Tables 4-146 to 4-151 in Section 4.3.1 list specific amounts of disturbed surface areas for the Mina rail alignment alternative segments, common segments, and construction and operations support facilities. Any impacts to physical setting, although unavoidable, would be small.

8.2.1.2 Land Use and Ownership

Use of land along the Mina rail alignment for construction and operation of the proposed railroad would involve some long-term changes in land use. Approximately 88 percent of the land DOE would use for this project would be public land that would be managed as a right-of-way grant obtained from the BLM. The railroad would not conflict with applicable BLM resource management plans. The BLM manages public land to provide for multiple uses. The multiple-use mandate set forth in the Federal Land Policy and Management Act would continue to apply to the public lands within the right-of-way, but railroad construction and operations could limit certain future land uses that pose operational or safety conflicts, such as large-scale surface mining.

Construction and operation of the proposed railroad along the Caliente rail alignment would directly impact grazing allotments by transecting pastures and potentially hindering livestock access to forage and water resources. DOE and the BLM would work with allotment permittees to implement revised allotment management plans and other mitigation measures to minimize adverse impacts on grazing operations. Even with mitigation, some adverse impacts to the use of grazing land could be unavoidable, such as loss of grazing areas immediately adjacent to the rail line.

The railroad would also require access to land within the Hawthorne Army Depot and the Walker River Paiute Reservation. This access would require separate right-of-way agreements with the U.S. Army and the Walker River Paiute Tribe, respectively. Approximately 0.6 percent of the Hawthorne Army Depot's land would be required for the construction and operation of the railroad, although railroad construction and operations would not conflict with current or planned land uses on the Depot. The Walker River Paiute Tribe determined they would not consent to a right-of-way for the project. However, if this consent was granted, the railroad would utilize approximately 0.5 percent of their Reservation's land, resulting in an unavoidable loss of a small amount of the Reservation's grazing and farming land.

DOE would need to gain access to some private lands. Assuming a nominal 61-meter (200-foot) operations right-of-way on either side of the centerline of the rail line, private land would make up less than 1 percent of private land compared to the total amount of land that would be required for the project, although there would be long-term changes to land use on that private land. All private landholders that are identified as directly affected parties would be invited to take part in the process outlined in Chapter 7. Construction and operation of the proposed railroad would not displace existing or planned land uses over a large area or conflict with BLM, county, or local land-use plans or goals. Therefore, any impacts to land use and ownership, although unavoidable, would be small overall, although the long-term impacts to private land could be perceived as high by individual landowners affected by the proposed railroad. Tables 4-162 to 4-167 in Section 4.3.2 summarize potential impacts to land use and ownership for each alternative segment, common segment, and railroad construction and operations support facility.

8.2.1.3 Aesthetic Resources

The region of influence for aesthetic resources is the viewshed around all Mina rail alignment alternative segments, common segments, and railroad construction and operations support facilities, and any additional sidings that would be added under the Shared-Use Option. Operation of the proposed railroad along the Mina rail alignment would remain consistent with BLM visual resource management objectives, under which areas of high visual value (Classes I and II) are managed to minimize contrast levels, and areas of lower visual value (Classes III and IV) are allowed higher contrast levels. There would be unavoidable visual changes associated with the proposed railroad. Contrast levels would be such that BLM visual resource management objectives would be met for BLM-administered lands and impacts would be comparable on non-BLM-administered land.

8.2.1.4 Air Quality

Construction and operation of the proposed rail line and operations support facilities along the Mina rail alignment would cause unavoidable emissions of some criteria air pollutants. However, air pollutant concentrations would not exceed National Ambient Air Quality Standards for construction or operation of the railroad and associated facilities, with the exception of the 24-hour standards for both particulate matter with an aerodynamic diameter of 10 micrometers or less (PM_{10}) and an aerodynamic diameter of 2.5 micrometers or less (***$PM_{2.5}$***) that DOE modeled as exceeded near the construction right-of-way at Mina and Schurz during the short (less than 6 months) construction period, and at the Staging Yard at Hawthorne and the potential Garfield Hills quarry. However, DOE will be required to obtain a Surface Area Disturbance Permit Dust Control Plan, issued by the State of Nevada, Department of Environmental Protection, prior to development of the quarry and construction of the Staging Yard. DOE anticipates that compliance with the requirements of this plan to reduce fugitive dust emissions would decrease the possibility of ***ambient air*** quality standards exceedances—for example, the requirement for cessation of all operations when winds make control of fugitive dust difficult (this was a mitigating attribute not accounted for in the modeling that DOE undertook). DOE could further reduce the possibility of exceeding the 24-hour standard for PM_{10} at a public boundary by acquiring additional land and moving public access farther away.

The highest increase in air pollutant emissions would occur during the construction phase, and the highest increase in air emissions from railroad operations would occur in the vicinity of the operations support facilities. The highest increase in criteria air pollutant emissions would be for ***nitrogen oxides*** in Esmeralda County during the construction phase, where emissions could be 3,570 metric tons (3,940 tons) per year higher than the 2002 county-wide emissions of nitrogen oxides. However, these emissions would be distributed over the entire length of the rail alignment in the county and no air quality standard would be exceeded. Fugitive dust emissions from construction-vehicle traffic on unpaved roads, surface disturbance (such as grading, scraping, bulldozing, wind erosion, and quarry excavation activities), and operation of concrete batch plants could cause unavoidable temporary impacts to air quality that, although within permissible limits, could not be completely mitigated. Table 4-199 in Section 4.3.4 summarizes impacts to air quality, which are projected to be small during both construction and operations, except temporarily during construction near the construction right-of-way at Mina and Schurz, the Staging Yard at Hawthorne, and the Garfield Hills quarry.

Therefore, any impacts to air quality, although unavoidable, would be small.

8.2.1.5 Surface-Water Resources

Regrading, cut and fill activities, and structures such as box culverts would cause localized changes in drainage patterns throughout the Mina rail alignment construction right-of-way. Changes in drainage

patterns could result in changes in erosion and sedimentation rates or locations. Construction in washes or other flood-prone areas could reduce the area through which floodwaters naturally flow, resulting in water buildup or ponding on the upstream side of crossings during floods that would slowly drain through the culverts or bridges.

There are no practicable design or construction options that would allow DOE to avoid impacting wetlands when constructing a bridge over the Walker River and its associated wetlands. The wetlands along this reach of the Walker River are too wide to be completely spanned, and therefore bridge piers must be placed in the wetlands. DOE would avoid filling of wetlands to the maximum extent practicable, and the only permanent loss of wetlands would be a total of about 20 square meters (0.005 acre) for emplacement of about 10 piers in wetlands for Schurz alternative segments 1 and 4, or 28 square meters (0.007 acre) for emplacement of about 14 piers for Schurz alternative segments 5 and 6.

DOE evaluated potential impacts to surface waters by identifying areas where there are drainage channels or other water resources. While some changes would be unavoidable, DOE would take steps to ensure the alterations to natural drainage, sedimentation, and erosion would not increase future flood damage, increase the impact of floods on human health and safety, or cause identifiable harm to the functions and values of floodplains. Because hydraulic structures and conveyance systems would be designed to safely convey 50-year or 100-year design storms and minimize concentration of flow, impacts associated with drainage conveyance would be small. The Department would minimize impacts to surface-water resources through the implementation of engineering design standards and best management practices that include erosion control measures.

Therefore, any impacts to surface-water resources, although unavoidable, would be small.

8.2.1.6 Groundwater Resources

Withdrawal of groundwater from multiple wells for construction of the proposed railroad could cause a short-term local depletion in the amount of groundwater available within the affected portions of aquifers due to the increased demand placed on the host aquifer at each new well location. Groundwater withdrawal could decrease the amount of water available to a nearby existing well, spring, seep, or other surface-water-right location, and/or, in theory, decrease the amount of water available for underflow to a downgradient basin. The impacts of groundwater withdrawals from the proposed water-supply wells at the range of groundwater pumping rates that would be required for the railroad would be localized in nature, small in magnitude compared to existing groundwater inventories, and primarily temporary. Impacts analysis results indicate that short-term withdrawal of water from new water wells at the proposed withdrawal rates could, in some instances, if unmitigated, have some unavoidable impact on an existing well, spring, seep, or other surface-water-right location. In those instances, one or more best management practices or mitigation measures are proposed to preclude impacts on existing groundwater users and uses. These best management practices include the use of a staggered pumping schedule at the new well location, pumping the new well location at a (lower) rate not exceeding a maximum pumping rate determined through analysis to not cause an impact on the existing groundwater resource feature, use of existing wells to obtain the amount of water needed (that is, by purchasing water), or use of other proposed water-supply wells in the same general area at a sufficient distance from existing wells or springs, seeps, or other surface-water-right locations to preclude the impact. Review of published information on the occurrence and movement of groundwater beneath hydrographic areas that would be crossed by the Mina rail alignment, information on inter-basin groundwater flow characteristics for hydrographic areas in Nevada, and data on existing wells, springs, seeps, and other surface-water-right locations downgradient of the proposed alignment indicates that the likelihood of the proposed groundwater withdrawals impacting downgradient hydrographic areas is very low. Over time, because the amount of groundwater that would be withdrawn represents a fractionally small percentage of the

available groundwater in storage, and the withdrawals would be limited primarily to the construction phase, DOE anticipates that this water would be replenished through the natural water cycle following the construction phase. Some of the water used for compaction would return to groundwater aquifers. For these reasons, DOE expects that there would be no adverse long-term impacts to existing groundwater resources.

8.2.1.7 Biological Resources

There could be unavoidable, short-term, adverse impacts to wildlife, special status species, protected game species, and wild horses and burros. There would be the potential for unavoidable impacts to threatened or endangered species during the construction phase. Potential impacts to desert tortoise would be small because of fragmentation of habitat. There would be the potential for impacts to threatened or endangered species during construction. Unavoidable impacts to wildlife and wild horses and burros from railroad operations would consist of potential collisions of wildlife with trains and short-term disruption of activities (such as foraging, nesting, and resting). Other unavoidable impacts could include possible changes to predator/prey interactions due to the construction of towers and other structures that would provide new perch habitat for raptors and other predatory birds.

There could be some unavoidable impacts to special status wildlife or plant species. For example, project activities could result in small to moderate but unavoidable adverse impacts to:

- Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*), as a result of construction of a bridge crossing the Walker River
- Non-critical habitat for the federally threatened Mojave population of the desert tortoise (*Gopherus agassizii*)
- Western snowy plover (*Charadrius alexandrinus nivosus*) along Mina common segment 1
- Northern goshawk (*Accipiter gentilis*) along Montezuma 1 and 2, and the potential North Clayton quarry
- Ferruginous hawk (*Buteo regalis*) along Montezuma 1, 2, and 3, and the potential North Clayton quarry

Nevertheless, DOE has concluded that there would be a small loss of habitats, and potential loss of species from trains and construction traffic. Although such impacts would be unavoidable, long-term impacts would be small.

Construction of additional access roads would make ***herd management areas*** more accessible, which would then indirectly, but unavoidably, increase the loss of wild horses, burros, and desert tortoises from human interaction. However, DOE has determined that such impacts would be small and would have a small impact on management strategies within herd management areas. The overall ***indirect impact*** would be small.

8.2.1.8 Noise and Vibration

Railroad operations along the Mina rail alignment would lead to an unavoidable increase in ambient noise from passing trains in areas of Nevada that are mostly uninhabited. Noise from trains might be noticeable as new noise in residential areas near the rail line in Silver Springs, Silver Peak, Mina, and Goldfield. Because there is already some train activity in Silver Springs, additional train noise would be less noticeable there than in other areas where there is no train activity and no train noise at present. During the construction and operations phases, vibration levels would not exceed the Federal Transit

Administration criteria. During the construction phase, noise levels along the Mina rail alignment would be lower than Surface Transportation Board noise impact criteria, other than noise impacts at Silver Spring and Wabuska that would be considered as unavoidable temporary adverse impacts. During the operations phase, estimated noise levels at nine receptor locations at Silver Springs and Wabuska would be higher than impact criteria; therefore, there would be unavoidable adverse noise impacts associated with railroad operations at those locations. Under the Mina Implementing Alternative, DOE would investigate mitigation methods for these nine receptors.

8.2.1.9 Socioeconomics

Construction and operation of the proposed railroad along the Mina rail alignment would unavoidably impact population, housing, employment, and public services in Lyon, Mineral, Esmeralda, Nye, and Clark Counties; traffic; and, to a small extent, local current agriculture, ranching, and mining activities.

Socioeconomic changes during the construction phase would include a brief elevation in project-related employment, temporary population increases, and immediate impact on existing levels of public services (health care, transportation, fire protection, and law enforcement) where construction activities were concentrated near communities. DOE determined that the greatest impacts would be economic, and although unavoidable, would be viewed as beneficial and not adverse. As outlined in Section 4.3.9, DOE demonstrated that construction-related impacts in Lyon, Mineral, Esmeralda, and Nye Counties would result in small increases in peak employment, increases in real disposable income, and increases in gross regional product. The project would generate vehicle trips during facilities construction, both from the movement of materials and from workers traveling to and from the work sites. DOE analyzed highway levels of service by looking at traffic volume in terms of the peak hour flow during a 4- to 10- year construction period. DOE determined that there would be some unavoidable impacts from construction of the Rail Equipment Maintenance Yard and Cask Maintenance Facility at Yucca Mountain to traffic on U.S. Highway 95 near the entrances to the Yucca Mountain Site. This effect would degrade the level of service during peak traffic hours. However, this level would represent high density but stable traffic flow and constitute a small, but unavoidable, impact. This unavoidable impact would be temporary, lasting only as long as the construction phase (4 to 10 years, with the peak period limited to 2 years).

Impacts to traffic during railroad operations would be considerably lower than construction-related impacts. DOE determined that Rail Equipment Maintenance Yard operations would affect traffic on U.S. Highway 95 near the entrances to the Nevada Test Site; however, this level would represent high density but stable traffic flow, and constitute a small, but unavoidable, impact. Elsewhere, there would be no impacts or changes to highway levels of service during the operations phase.

Socioeconomic changes during the operations phase would include increases in project-related employment (particularly associated with railroad operations support facilities); slight long-term population increases; moderate pressure on available housing, and fire-protection and health services in southern Nye County; and continued small impacts on mining, ranching and agriculture. DOE determined that the greatest economic gains would arise in Mineral, Esmeralda, and Nye Counties.

8.2.1.10 Occupational and Public Health and Safety

The possibility of nonradiological industrial hazards (such as exposure to physical hazards, chemicals, dust, and pathogens) causing injury or illness to workers during construction and operations would not be completely unavoidable. However, the potential for such impacts would be very small. DOE has estimated that there would be approximately two fatalities associated with all such hazards during rail line and facility construction and 50 years of railroad operations.

There could be radiological impacts to workers and the public from incident-free transportation and facility operations. While the impact would be very small, radiological impacts would not be completely unavoidable. DOE estimated that approximately 0.35 latent cancer fatality would result to workers from incident-free transportation and facility operations, and that up to 0.00085 latent cancer fatality would result to the public from incident-free transportation and facility operations.

There could be radiological impacts from rail accidents involving casks. Radiological impacts from accidents are estimated to result in up to 0.0000077 latent cancer fatality.

There could be radiological impacts from sabotage events involving casks. If a sabotage event occurred in a suburban area, the collective radiation dose to the population is estimated to be 4,700 person-rem, and in a rural area 35 person-rem. The total latent cancer fatalities for people exposed during a sabotage event is estimated to be 2.8 in a suburban area and 0.021 in a rural area.

By their nature, roadway accidents are considered unavoidable; however, the projected number of roadway accidents that would be attributed to construction and operation of the proposed rail line and facilities would be very small. DOE assessed the potential transportation safety impacts of vehicle traffic on roadways associated with constructing and operating the rail line and facilities. DOE determined that there could be six fatalities on roadways for the 315 million vehicle-kilometers (190 million vehicle-miles) traveled over the construction period, and seven fatalities on roadways for the 420 million vehicle-kilometers (263 million vehicle-miles) traveled during the 50-year operations phase.

Also by their nature, railway accidents are considered unavoidable; however, the projected number of rail accidents that could be attributed to construction and operation of the rail line and facilities would be very small. DOE determined that there could be up to one fatality associated with the construction and operations phases. DOE also assessed the potential transportation safety impacts of rail traffic on the rail line and at at-grade crossings during the operations phase. The Department estimated that over the 50-year operations phase, 14 rail-related accidents could be expected to occur for the entire set of estimated train movements.

8.2.1.11 Utilities, Energy, and Materials

Some interfacing with existing utility rights-of-way, in particular electric utility lines, would be unavoidable. Temporary unavoidable impacts to utilities during the construction phase could include possible short-term service interruptions as service was switched from existing electric-power lines, telecommunication lines, and water pipelines to new lines crossing the rail line, or to lines that were relocated to avoid railroad construction activities.

The two principal electric providers in the project region, Nevada Power Company and Sierra Pacific Power Company, can currently meet peak load demands of 6,300 megawatts and 1,800 megawatts, respectively, through generating capacity or power-purchase capabilities. In 2007, their electricity sales were estimated to be 23 million megawatt-hours and 8.6 million megawatt-hours, respectively. In addition, the smaller Valley Electric Association, Inc., is a local area power purchaser and reseller. Over the 4- to 10-year construction phase, the electrical power providers in the project region would have adequate generating capacity or power-purchase capabilities (see Section 3.3.11) to supply the project during peak demand without disrupting service to the providers' respective coverage areas. Therefore, although energy use would be unavoidable, anticipated electricity demand to meet construction and operations needs would be modest and would not adversely impact other regional needs for electric power.

As described in Section 4.3.11.2.1.3, DOE estimated that annual consumption of diesel fuel during the construction phase would be 109 million liters (28.8 million gallons), which would represent 6 percent of

diesel fuel used annually in Nevada (DIRS 180874- Nevada Rail Partners 2007, Appendix D, Table D-5b). As described in Section 4.3.11.2.2.2, DOE estimated that over an anticipated 50-year operations lifecycle, 119 million liters (31.5 million gallons) of diesel fuel would be consumed, and the annual consumption rate would peak at 4.3 million liters (1.1 million gallons), a rate which is less than 0.25 percent of the current annual vehicular diesel fuel usage in Nevada. Although the use of fuel would be unavoidable, its use during either construction or operations would not adversely affect the capacity of national and regional fuel producers and distributors.

The need for construction materials, primarily steel, concrete, and aggregate, would be unavoidable, but would represent a small fraction of available materials (see Table 4-285). The regional and national impacts of meeting such needs would be small. Materials needed during the operations phase would be much less than during the construction phase, remaining considerably below available capacity, and impacts would not be adverse.

8.2.1.12 Hazardous Materials and Waste

The generation of some general solid wastes, special wastes (construction debris, used tires, and other materials with specific management requirements), and hazardous materials would be unavoidable, primarily during railroad construction. DOE would handle all wastes in accordance with applicable regulations, and would implement best management practices and pollution prevention/waste minimization programs. As described in Section 4.3.12, DOE estimated that 2,300 metric tons (2,500 tons) per year of nonhazardous solid waste (such as general household waste) would be generated during the construction phase, for a daily rate of about 6.3 metric tons (6.9 tons). Nonrecyclable wastes would be disposed of, which would raise the total amount disposed of in the four-county area of Mineral, Nye, Esmeralda, and Clark Counties by approximately 0.054 percent. In addition, DOE estimated that construction activities would generate approximately 12,000 metric tons (13,100 tons) of industrial and special wastes per year, for an approximate daily rate of 33 metric tons (36 tons), which would result in an increase of approximately 0.28 percent in waste receipt to local landfills.

DOE estimated that 170 metric tons (190 tons) per year or 0.45 metric ton (0.5 ton) per day of nonhazardous solid waste would be generated at railroad operations support facilities, which would raise the total amount disposed of in the four-county area by less than 0.01 percent. There would be disposal capacities to accept the small amounts generated of Class A low-level radioactive wastes from the Cask Maintenance Facility of 3,200 to 7,900 cubic meters (113,000 to 280,000 cubic feet) over the up to 50-year lifetime of this project (DIRS 181425-MTS 2007, Table 2).

Although the use of disposal facilities would be unavoidable, existing disposal facilities have ample capacity to handle all additional wastes.

8.2.1.13 Cultural Resources

Because of the length of the Mina rail alignment and the complexity associated with engineering a feasible alignment, DOE used a phased cultural resource identification and evaluation approach, as described in 36 CFR 800.4(b)2, to identify specific cultural resources as is fully described in Section 4.3.13. DOE has surveyed approximately 20 percent of the area for cultural resources. Based on cultural resources already identified, it is reasonable to conclude that there may be undiscovered cultural resources in the Mina region of influence. The number and extent of identified cultural resource sites throughout the Mina rail alignment region of influence will continue to increase as more surveys and inventories of potentially disturbed land are completed.

Nevertheless, construction activities could cause unavoidable disturbance or destruction of cultural resources. Disturbance or destruction could occur during ground-disturbing activities along the Mina rail alignment, at quarries, along temporary access roads, at borrow sites, at temporary construction camps, and at railroad operations support facilities. During construction, larger numbers of workers in the vicinity of the construction camps could increase the potential for impacts to nearby cultural resources. Excavation and other construction-related ground-disturbing activities could unearth additional cultural materials that were either thought, based on previous archaeological surveys, to occur only at ground surface, or were previously undetected because they were completely underground.

Railroad construction and operations could also lead to unavoidable changes in cultural landscapes, such as changes to ethnographic, rural historic, and historic viewscapes. Cultural landscapes include historic-period Northern Paiute use of the Walker River and Walker Lake areas; historic-period Western Shoshone villages and surrounding use areas in the Oasis Valley and Goldfield areas; and historic mining in the Luning, Mina, and Goldfield districts.

DOE would further modify the rail alignment, as necessary, to avoid discovered cultural resources. Based on preliminary information and sample surveys, any impacts would likely range from small to moderate because of an extensive effort to avoid or mitigate them.

8.2.1.14 Paleontological Resources

DOE has not identified paleontological resources at or close to the Mina rail alignment, nor do these areas have a strong potential to contain important paleontological resources. While there could be a potential to uncover previously unknown fossils during railroad construction, DOE would consult with the BLM to develop appropriate measures to minimize damage to paleontological resources during project-related construction if fossils were found. DOE has not identified any unavoidable adverse impacts.

8.2.1.15 Environmental Justice

DOE determined that constructing and operating the proposed railroad along the Mina rail alignment would not result in disproportionately high and adverse human-health, environmental, ecological, or cultural impacts on minority populations or low-income communities, including American Indian tribes, from construction and operation of a rail line along the Mina rail alignment. DOE has not identified impacts, unavoidable or otherwise, in the context of environmental justice.

8.2.2 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

Council on Environmental Quality regulations that implement the procedural requirements of NEPA require consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). This includes using " … all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generation of Americans" (NEPA, Section 101, 42 U.S.C. 4331).

This section discusses the short-term use of the environment and the maintenance of its long-term productivity. Chapter 4 provides more detailed discussions of the impacts and resource utilization associated with the Proposed Action and the Shared-Use Option. Construction and operation of the proposed railroad would require short-term uses of land and other resources. Any long-term loss of productivity in disturbed areas would be small. The land-cover types along the proposed rail alignment

are widely distributed throughout the region of influence and any loss of vegetation in the disturbed area along the rail alignment would have little impact on the regional productivity of plants and animals. Future long-term land uses such as grazing or mining would not be precluded by the short-term use of the land for the proposed rail line. The relationships between short-term uses and long-term productivity would not be meaningfully altered if either the Proposed Action or Shared-Use Option were implemented, or by the selection of alternative segments within the Mina corridor.

There are no practicable design or construction options that would allow DOE to avoid impacting wetlands when constructing a bridge over the Walker River and its associated wetlands. DOE would avoid filling of wetlands to the maximum extent practicable, and the only permanent loss of wetlands would be a total of about 20 square meters (0.005 acre) for emplacement of about 10 piers in wetlands for Schurz alternative segments 1 and 4, or 28 square meters (0.007 acre) for emplacement of about 14 piers for Schurz alternative segments 5 and 6.

Productivity loss for soils should be limited to the disturbed areas impacted by land clearing, grading, and construction. Most disturbed areas not permanently maintained for railroad operations would recover over time, although recovery and a return to natural productivity could be slow for disturbed biological communities in an arid environment. DOE would revegetate disturbed areas with appropriate native species. There are 0.011 square kilometer (2.7 acres) of prime farmland along Schurz alternative segment 1, 0.012 square kilometer (3 acres) along Schurz alternative segment 4, and 0.014 square kilometer (3.5 acres) along each of Schurz alternative segments 5 and 6; at present these soils are not farmed, and the minimal loss of these unfarmed soils would not impact long-term productivity.

The areas used for temporary construction camps would likely recover in the short term because they would be unused after construction activities ceased. DOE would implement restoration activities to encourage natural vegetation to grow on these sites. The Department might eventually abandon the proposed rail line and its operations support facilities, although it is unlikely that the rail roadbed would ever be completely dismantled. The proposed rail line and these facilities could be turned over to commercial carriers, especially if the Shared-Use Option were selected, and could continue to aid economic productivity in the region. Under the Shared-Use Option, the proposed rail line could increase transportation opportunities and lower transportation costs in the region.

The short-term withdrawal of water from the temporary construction wells could have a small impact on groundwater availability. However, DOE has projected that drawdowns would be sufficiently small to preclude impacts on flow rates or discharge rates at existing productive water-supply wells or springs. There would be no long-term impacts to groundwater resource productivity because the construction wells would only be used for a short time.

8.2.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

NEPA Section 102 (42 U.S.C. 4332) and Council on Environmental Quality regulations that implement the procedural requirements of NEPA (40 CFR 1502.16) require that environmental analyses include identification of "… any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented." An irreversible commitment of resources represents a loss of future options. It applies primarily to nonrenewable resources, such as minerals or cultural resources, and to those factors that are renewable only over long time spans, such as soil productivity, whereas an irretrievable commitment of resources represents opportunities that are foregone for the period of the proposed action. Examples include the loss of production, harvest, or use of renewable resources. The decision to commit the resources is reversible, but the utilization opportunities foregone are irretrievable.

This section describes irreversible and irretrievable commitments of resources associated with implementation of the Proposed Action along the Mina rail alignment. Sections 8.2.3.1 to 8.2.3.15 discuss resource commitments that could be irreversible and irretrievable. Irreversible and irretrievable commitments of resources would not meaningfully vary among alternative segments along the Mina rail alignment, or by implementation of the Shared-Use Option.

8.2.3.1 Physical Setting

Construction of the rail line and railroad construction and operations support facilities along the Mina rail alignment could displace mineral deposits. Although no minerals would be removed, placement of the rail line could displace mineral deposits and reduce their availability for mining, if any were found within the construction right-of-way. If these circumstances occurred and options for future use of minerals were limited, there would be an irreversible commitment of resources.

8.2.3.2 Land Use and Ownership

Construction and operation of the proposed railroad would require the commitment of land for placement of the rail line, support facilities, and access roads. If at a future date DOE were to abandon the railroad, although much of the construction material might be removed, it is not likely that all of the natural landscape would be restored. Areas requiring extensive earth movement or mineral extraction, such as project-related quarries and areas of large volumes of cut and fill, would likely be irreversibly altered. If DOE decided to abandon the railroad, it would relinquish its right-of-way and the BLM, the Walker River Paiute Tribe, and Department of Defense at the Hawthorne Army Depot would continue to manage their land. Where DOE would need to gain access to private lands for the proposed railroad, the Department would dispose of purchased land pursuant to DOE Order O 430.1B, *Real Property Asset Management*, or would return leased land to the lessee.

8.2.3.3 Aesthetic Resources

DOE determined that the long-term visual contrast of operating the proposed railroad would range from weak to strong as a result of the presence of the rail line and marks on rock, soil, and vegetated landscape from cuts, fills, well pads, and access roads (see Section 4.3.3). The rail alignment would remain consistent with BLM visual resource management objectives where areas of high visual value are managed to minimize contrast levels, as well as in areas of lower visual value that are allowed higher contrast levels. Where land commitment was irreversible, aesthetic impacts would sometimes remain irreversible.

8.2.3.4 Air Quality

DOE did not identify any associated irreversible and irretrievable commitments of resources along the Mina rail alignment.

8.2.3.5 Surface-Water Resources

The only permanent loss of wetlands would be a total of about 20 square meters (0.005 acre) for emplacement of about 10 piers in wetlands for Schurz alternative segments 1 and 4, or 28 square meters (0.007 acre) for emplacement of about 14 piers for Schurz alternative segments 5 and 6 when constructing a bridge over the Walker River. This could result in a small irreversible commitment of resources.

8.2.3.6 Groundwater Resources

DOE estimated that a total of approximately 7.34 million cubic meters (5,950 acre-feet) of water would be required to construct a railroad along the Mina rail alignment (DIRS 180875-Nevada Rail Partners 2007, p. 4-4), and would be obtained through the construction of new water wells. Although this water would be consumed, this would not be an irretrievable commitment. Over time, because the amount of groundwater withdrawn represents a fractionally small percentage of the available groundwater in storage, and the withdrawals would be limited primarily to the railroad construction period, it is anticipated that this water would be replenished through the natural water cycle following the railroad construction phase. Some of the water used for compaction would return to groundwater aquifers. For these reasons, it is expected that there would be no adverse long-term impacts to existing groundwater resources.

8.2.3.7 Biological Resources

The areas that would be occupied by the rail line, railroad construction and operations support facilities, and access roads would be irreversibly removed from natural habitat for the life of the proposed railroad. In addition, the disturbances of the desert soil surfaces in areas of temporary construction activity could result in changes that would be irreversible over the long term. The permanent conversion of vegetation resources and wildlife habitat along the rail line and at construction and operations support facilities could represent an irreversible commitment of biological resources for the life of the railroad and beyond if, following abandonment, DOE did not restore these resources, or if former vegetation cover and composition did not recover. Losses of wildlife during railroad construction and operations would represent an irretrievable commitment of biological resources.

8.2.3.8 Noise and Vibration

DOE did not identify any associated irreversible and irretrievable commitments of resources along the Mina rail alignment.

8.2.3.9 Socioeconomics

DOE did not identify any associated irreversible and irretrievable commitments of resources along the Mina rail alignment.

8.2.3.10 Occupational and Public Health and Safety

As discussed in Section 8.2.1.10, nonradiological industrial hazards (such as exposure to chemicals, dust, and pathogens) could cause injury or illness to workers during railroad construction and operations; however, DOE estimated the risk as approximately two fatalities. Radiological impacts to workers (0.35 latent cancer fatality) and the general public (0.00085 latent cancer fatality) could occur from incident-free transportation. DOE assessed the potential transportation safety impacts of movement on roadways, the rail line, at operations support facilities, and at grade crossings associated with railroad construction and operation. DOE estimated that there would be six vehicular-related fatalities during construction, eight vehicular-related fatalities during operations, and up to one rail-related fatality during construction and operations.

8.2.3.11 Utilities, Energy, and Materials

As described in Section 4.3.11, DOE estimated that annual consumption of diesel fuel during the railroad construction phase would be 109 million liters (28.8 million gallons). Over an anticipated 50-year

operations lifecycle, 119 million liters (31.5 million gallons) of diesel fuel would be consumed, and if the Shared-Use Option was implemented during the operations period, a total of 349 million liters (92.2 million gallons) would be consumed (DIRS 180874-Nevada Rail Partners 2007, Appendix D, Table D-5a). Fossil fuel consumed would be irreversible, and any portion of fuel consumed that was bio-fuel would be considered irretrievable. DOE has established an 8 megawatt power requirement (which includes a 30-percent reserve) for the Rail Equipment Maintenance Yard and Cask Maintenance Facility (DIRS 181033-Hamilton-Ray 2007, all). Fossil fuel or nuclear resources that generated that electricity would be irreversible.

As described in Section 4.3.11, railroad construction would require an estimated 63,000 metric tons (69,000 tons) of steel and 373,000 metric tons (411,000 tons) of concrete. Approximately 776,000 concrete railroad ties would be required for track construction. The estimated requirement for rail line ballast would be approximately 2.5 million metric tons (2.8 million tons), approximately 2.2 million metric tons (2.4 million tons) for subballast (DIRS 180874-Nevada Rail Partners 2007, Section 3.1.1, p. 3-1). Use of these materials would not be considered an irretrievable commitment of resources because they could be recovered and recycled if DOE eventually abandoned the rail line.

8.2.3.12 Hazardous Materials and Waste

DOE did not identify any associated irreversible and irretrievable commitments of resources along the Mina rail alignment, other than the irreversible loss of land used for landfills.

8.2.3.13 Cultural Resources

Cultural resources (archeological, historical, and ethnographic) are nonrenewable resources and any loss would be irreversible. At this time, DOE cannot fully characterize potential effects on cultural resources along the Mina rail alignment or the magnitude of these effects.

8.2.3.14 Paleontological Resources

At this time DOE has not identified any impacts to paleontological resources along the Mina rail alignment, but any impact that could occur would be irreversible.

8.2.3.15 Environmental Justice

DOE determined that constructing and operating the proposed railroad along the Mina rail alignment would not cause high or adverse impacts to fall disproportionately on minority or low-income populations. Thus, DOE did not identify any associated irreversible and irretrievable commitments of resources along the Mina rail alignment that would present an environmental justice concern.

PREPARERS, CONTRIBUTORS, AND REVIEWERS

This chapter identifies the individuals who had key responsibilities in the preparation of the Nevada Rail Corridor SEIS and the Rail Alignment EIS, and summarizes their education and professional experience.

Preparers and Contributors

The U.S. Department of Energy (DOE or the Department) provided direction to the National Environmental Policy Act (NEPA) analysis team, which was responsible for developing the analytical methodology and alternatives, coordinating the work tasks, performing the impact analyses, and producing the documents. DOE is responsible for data quality, scope, content, issue resolution, and direction.

In addition, Bechtel SAIC Company, LLC, and its subcontractors prepared engineering-based documentation and information that was independently evaluated and incorporated into the Nevada Rail Corridor SEIS and the Rail Alignment EIS. DOE retained the responsibility for determining the appropriateness and adequacy of incorporating any data, analyses, and results of other work performed by these organizations into the SEIS and the EIS; the NEPA analysis team integrated this work in the documents.

The table below lists the names, education, experience summaries, and responsibilities of key personnel who managed, prepared, contributed to, and reviewed the Rail Corridor SEIS and the Rail Alignment EIS.

DOE and contractor personnel education, experience, and responsibilities in preparation of the Nevada Rail Corridor SEIS and the Rail Alignment EIS[a] (page 1 of 7).

Name	Education	Experience	Responsibilities
U.S. Department of Energy/Office of National Transportation			
Jane R. Summerson	Ph.D., Geology, 1991 M.S., Geobiology, 1985 M.A., Anthropology, 1978 B.A., Anthropology, 1977	17 years – waste management projects with the DOE office of Civilian Radioactive Waste Management	Nevada Rail Corridor SEIS/Rail Alignment Document Manager
Robert Black	M.P.A., Public Administration, 1984 M.N.S., Biological Sciences, 1977 B.S., Zoology, 1969	33 years – NEPA compliance; environmental studies; resource management	Technical reviewer
Robert Clark	B.S., Marine Engineering, 1981	25 years – nuclear design; construction; quality assurance; radioactive waste management	Rail line conceptual design; mitigation; technical reviewer
Ned B. Larson	M.S., Geotechnical Engineering, 1982 B.S., Civil Engineering, 1978	26 years – engineering and design of numerous civil structures; soil and rock mechanics investigations; design of facilities to dispose of hazardous and nuclear wastes; project management	Nevada Rail Federal Project Director

DOE and contractor personnel education, experience, and responsibilities in preparation of the Nevada Rail Corridor SEIS and the Rail Alignment EIS[a] (page 2 of 7).

Name	Education	Experience	Responsibilities
U.S. Department of Energy/Office of National Transportation (continued)			
David Lechel	M.S., Fisheries Biology, 1974 B.S. Fisheries Biology, 1972	29 years – preparing and managing preparation of NEPA documents (26 years on DOE NEPA work)	DOE consultant Assisted DOE to develop the construct of the Nevada Rail Corridor SEIS and the Rail Alignment EIS; performed independent review of sections of the draft and final documents
Narendra Mathur	M.S., Environmental Engineering, 1972	31 years – NEPA compliance and documentation; environmental, safety, and health compliance; environmental audits; environmental program management; environmental regulatory compliance	National transportation
Mark Vandeberg	B.S., Geology, 1984	23 years – geotechnical/ environmental projects; CERCLA site restoration; DOE FUSRAP program management; environmental compliance and permitting	Technical reviewer
Nevada Rail Corridor SEIS and Rail Alignment EIS Preparation Management Team			
Michael West Potomac-Hudson Engineering, Inc.	M.S., Environmental Engineering, 2001 B.S., Environmental Engineering, 1993	15 years – NEPA analysis; environmental studies; regulatory analysis; program management	Project Manager Project Controls Officer Deputy Quality Assurance Manager
Elizabeth Diller Potomac-Hudson Engineering, Inc.	B.S., Environmental Science, 2000	7 years – NEPA review and supporting studies; environmental management systems; regulatory compliance	Deputy Project Manager Project integration Lead, hazardous waste and materials, Chapter 6, Chapter 8, Appendix B
Lynne Gilman Potomac-Hudson Engineering, Inc.		36 years – document management; quality control	Document Production Manager Project and quality controls; reference traceability
Robert Peel URS Corporation	B.S., Geography, 1976	31 years – DOE and commercial nuclear projects; NEPA document management; environmental impact analysis; regulatory compliance	Deputy Project Manager Comment-Response Document

DOE and contractor personnel education, experience, and responsibilities in preparation of the Nevada Rail Corridor SEIS and the Rail Alignment EIS[a] (page 3 of 7).

Name	Education	Experience	Responsibilities
Nevada Rail Corridor SEIS and Rail Alignment EIS Preparation Management Team (continued)			
Neil Sullivan ICF International	M.S., Integrated Environmental Management, 1999 B.S., Human and Physical Geography, 1994	12 years – NEPA documentation for rail and other nonlinear projects; environmental program management; technical and policy analysis	Deputy Project Manager Lead, Rail Alignment EIS Chapter 1 Lead, Comment-Response Document
Judith Shipman Potomac-Hudson Engineering, Inc.	A.A., General Studies, 1991	32 years – NEPA documentation; document production coordination; editing; quality assurance	Document Manager Editorial lead Comment-Response Document
Nevada Rail Corridor SEIS and Rail Alignment EIS Preparation Team			
Stephanie Barrett ICF International	M.P.A., Environmental Policy, 1998 B.S., Geology, 1994	12 years – environmental policy analysis, including hazardous waste, land revitalization programs, and land-use impact for NEPA projects; 2.5 years – RCRA and groundwater contamination sampling and reporting	Analyst, Appendix C Project controls; quality assurance
John Bland Potomac-Hudson Engineering, Inc.	M.A., Economics, 1982 B.S., Mathematics, 1970	25 years – socioeconomic analysis; environmental program management development; emergency planning	Lead analyst, socioeconomics, environmental justice, and utilities, energy, and materials, Nevada Rail Corridor SEIS
Edward Carr ICF International	M.S., Atmospheric Science, 1983 B.S., Meteorology, 1979	20 years – air quality impact assessments; air quality modeling; emission inventory development; meteorological data collection and assessment	Lead analyst, air quality and climate
David Coate ICF International	M.S., Energy Technology, 1980 B.A., Mathematics, 1978 B.A., Physics, 1978 B.A., Chemistry, 1978	29 years – acoustics and vibrations analysis	Lead analyst, noise and vibration
Brian Colson URS Corporation	B.S., Geography, 2004	3 years – NEPA projects; various FEMA projects; energy projects; transportation projects for public and private sectors	Cartographer GIS analyst for biological, cultural, and groundwater resources
Charina Contreras Potomac-Hudson Engineering, Inc.		11 years – administrative and records support	Administrative record and references support
Theodore Coogan ICF International	B.S., Environmental Earth Science, 1986	24 years – marine geochemistry and geospatial sciences	GIS and mapping

DOE and contractor personnel education, experience, and responsibilities in preparation of the Nevada Rail Corridor SEIS and the Rail Alignment EIS[a] (page 4 of 7).

Name	Education	Experience	Responsibilities
Nevada Rail Corridor SEIS and Rail Alignment EIS Preparation Team (continued)			
Cristiano Facanha ICF International	Ph.D., Civil and Environmental Engineering, 2006 M.S., Civil and Environmental Engineering, 2003 M.S., Transportation Management, 1997 B.S., Industrial Engineering, 1995	10 years – transportation engineering, environmental engineering	Analyst, nonradiological transportation safety, and transportation delay (road and grade crossing)
Brian Harper URS Corporation	M.S., Nuclear Engineering, 2006 B.S., Chemical Engineering, 1997	4 years – radiological monitoring/analysis; investigation of nuclear fuel cycle impacts; groundwater and contaminant transport modeling	Analyst, water resources
Seth Hartley ICF International	M.S., Atmospheric Sciences, 2000 B.S., Physics, 1996	8 years – air pollution and air quality, particularly as related to transportation, as well as general numerical modeling, engineering, and data handling and analysis issues	Analyst, air quality and climate
Noah Herlocker URS Corporation	B.S. Ecology, 2000	7 years – wetlands delineation, function analysis, mitigation and monitoring.	Analyst, wetlands
Jennifer Kelly URS Corporation	B.S., Earth Science, 2004 B.A., Anthropology, 1993	4 years – environmental investigation projects; environmental remediation; groundwater and soil investigations; sampling and analysis reports	Analyst, groundwater resources
Michael Kelly URS Corporation	M.A., Anthropology, 1986 B.A., Anthropology, 1978	27 years – cultural resources management; Great Basin archaeology	Lead analyst, cultural resources and American Indian interests
Tanvi Lal ICF International	M.S.E.S., Environmental Conservation and Management, 2006 M.P.A., Environmental Economics and Policy, 2006 B.S., Life Sciences, 2001	2 years – NEPA analysis; environmental science; natural resource conservation; environmental economics	Project controls; quality assurance

DOE and contractor personnel education, experience, and responsibilities in preparation of the Nevada Rail Corridor SEIS and the Rail Alignment EIS[a] (page 5 of 7).

Name	Education	Experience	Responsibilities
Nevada Rail Corridor SEIS and Rail Alignment EIS Preparation Team (continued)			
Robert Lanza ICF International	M. Eng., Chemical Engineering, 1982 B.S., Chemical Engineering, 1980	26 years – NEPA document preparation and review, including NEPA documentation for proposed radioactive and hazardous waste-management units and radioactive and hazardous materials transportation projects	Lead analyst, occupational and public health and safety
Jeff Loney URS Corporation	B.S. Geology, 1974	33 years – subsurface and hydrological assessment for water supply and remedial action planning	Analyst, groundwater resources
Alistair Leslie Potomac-Hudson Engineering, Inc.	Ph.D., Chemistry, 1975 B.A., Physics and Chemistry, 1966	31 years – NEPA analysis, environmental regulation and compliance; electric-power generation and transmission; energy analysis; air pollution analysis; air quality legislation; atmospheric chemistry research	Senior Advisor
Jon Luellen URS Corporation	B.S., Geology, 1979 B.S., Physics, 1977	20 years – hydrogeologic investigations; site characterization; monitoring system design and implementation; site remediation; water resource assessments; nuclear disposal facility design and licensing	Lead analyst, groundwater resources
Anne Lundahl Potomac-Hudson Engineering, Inc.	B.S., Geology, 1988	19 years – NEPA analysis; site assessments/ investigations; site remediation; regulatory compliance assessments	Analyst, surface-water resources
Steven Maheras Battelle Memorial Institute	Ph.D., Health Physics, 1988 M.S., Health Physics, 1985 B.S., Zoology, 1982 Certified Health Physicist, 1992	20 years – transportation risk assessment and radiological assessment, environmental and occupational radiation protection	Analyst, radiological occupational health and safety, transportation
Sanjay Mawalkar	MBA, Decision Sciences/MIS, 1993 B.E., Chemical Engineering, 1986	14 years – software design and implementation	Analyst, transportation
Jamie Martin-McNaughton Potomac-Hudson Engineering, Inc.	B.S., Geology-Biology, 2003	5 years – NEPA analysis; geology and soils science	Lead analyst, physical setting, geology, soils
Aaron McKinnon Potomac-Hudson Engineering, Inc.		11 years – document production; graphics	Lead desktop publisher; graphics coordinator

DOE and contractor personnel education, experience, and responsibilities in preparation of the Nevada Rail Corridor SEIS and the Rail Alignment EIS[a] (page 6 of 7).

Name	Education	Experience	Responsibilities
Nevada Rail Corridor SEIS and Rail Alignment EIS Preparation Team (continued)			
Thomas I. McSweeney Battelle Memorial Institute	Ph.D., Chemical Engineering, 1967 M.A., Mathematics, 1964 M.S., Chemical Engineering, 1961 B.S., Chemical Engineering, 1960	40 years – transportation risk assessment and safety analysis	Analyst, transportation
Michelle Moser ICF International	M.S., Biological Sciences, 2005 B.S., Environmental Science, 2002	6 years – NEPA analysis; rulemaking support; ecological risk assessments	Lead analyst, mitigation and best management practices
Elena Nilsson URS Corporation	M.A., Anthropology, 1985 B.A., English, 1978	29 years – cultural resources management; NEPA document preparation for variety of federal projects, including rail construction; NEPA review and evaluations; Section 106 compliance	Analyst, cultural resources
Dautis Pearson URS Corporation	B.S., Biology, 1994	23 years – land management planning; interdisciplinary and interagency team leading and facilitation; NEPA document preparation	Analyst, biological resources
Dorothy Peterson, P.E. Potomac-Hudson Engineering, Inc.	M.S., Engineering Management, 1997 B.S., Engineering 1989	17 years – NEPA analysis; federal land-use planning; environmental cleanup, compliance, and management	Lead analyst, land use and ownership
Polly Quick ICF International	Ph.D., Anthropology, 1976 M.A., Anthropology, 1970 B.A., Anthropology, 1968	32 years – NEPA analysis; public participation	Lead analyst, aesthetics and socioeconomics
Jean Reynolds URS Corporation	M.S., Meteorology, 1967 B.S., Meteorology, 1965	19 years – meteorological research; 6 years – air quality permitting; NEPA analysis; program management, regulatory compliance, and waste management	Lead analyst, paleontological resources
Christine Ross Battelle Memorial Institute	AD, Microcomputer Management Specialist/Multimedia Specialist, 1999	8 years – GIS and computer mapping	Analyst, transportation
Erika Shelton Battelle Memorial Institute	B.S., Engineering Physics and Astronomy, 2007	1 year – transportation risk assessment	Analyst, transportation
Deborah Shinkle Potomac-Hudson Engineering, Inc.	B.A., Environmental Studies, 2002	7 years – GIS experience with 2 years NEPA/DOE, 4 years various DoD projects	GIS analyst, land-use resource Cartographer, environmental justice resource

DOE and contractor personnel education, experience, and responsibilities in preparation of the Nevada Rail Corridor SEIS and the Rail Alignment EIS[a] (page 7 of 7).

Name	Education	Experience	Responsibilities
Nevada Rail Corridor SEIS and Rail Alignment EIS Preparation Team (continued)			
Michael Smith ICF International	Ph.D., Sociology, 1998 M.A., Geography, 1994 B.A., Environmental Studies, 1991	15 years – NEPA document management and preparation; socioeconomic analysis	Analyst, cumulative impacts
Adam Teepe ICF International	M.S., Environmental Science and Management, 2004 B.S., Environmental Geology, 2001	4 years – environmental impact analysis	Lead, Rail Alignment EIS Chapter 2 Engineering interface Comment-Response Document
Nathan Wagoner ICF International	M.S., Human Dimensions of Ecosystem Science and Management, 2006 B.S., Natural Resources Integrated Policy and Planning, 2003	5 years – parks and recreation and visitor use characteristics	Analyst, aesthetics
Toni Washington Potomac-Hudson Engineering, Inc.		18 years – federal records management	Administrative record and technical reference coordination; records management
Mary Pakenham-Walsh URS Corporation	M.S,. Ecology B.S., Biology, 1991	16 years – ecology and environmental science, including wetlands delineation and mitigation planning	Analyst, wetlands
Jen Wennerlund URS Corporation	B.S., Geography, Cartography, Remote Sensing, Land Use Planning, 1987	19 years – geosciences, GIS analyst, manager; NEPA analysis for federal, state, and private projects	GIS Manager
Marcy Westover URS Corporation	B.S., Biology, 2000	7 years – natural resources; ecology; threatened and endangered species surveys; NEPA document preparation	Analyst, biological resources
Brian Whipple, P.E. Potomac-Hudson Engineering, Inc.	M.S., Information Science, 2003 B.S., Environmental Engineering, 1993	15 years – NEPA analysis; environmental remediation; engineering studies; regulatory compliance	Lead analyst, surface-water resources
Emily Whiteman URS Corporation	B.S., Civil Engineering, 2004	3 years – engineering and environmental impact analysis	Analyst, biological resources
Hovalin Woods ICF International	M.P.A., Environmental Policy and Management, 2001 B.S., Finance, 1999	8 years – NEPA analysis for rail projects and other linear projects, environmental management systems	Lead analyst, cumulative impacts
Audra Ziolkowski Potomac-Hudson Engineering, Inc.	B.A., Journalism/Mass Communications, English, 1995	12 years – editing, writing, proofreading, fact checking	Editor

a. BLM = Bureau of Land Management; CAD = computer-aided design; CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act; DoD = U.S. Department of Defense; DOE = U.S. Department of Energy; FEMA = Federal Emergency Management Agency; FUSRAP = Formerly Utilized Sites Remedial Action Program; GIS = geographic information system; NEPA = National Environmental Policy Act; RCRA = Resource Conservation and Recovery Act.

Reviewers

The DOE Yucca Mountain Project Office incorporated input into the preparation of the Nevada Rail Corridor SEIS and the Rail Alignment EIS from a number of other DOE offices that reviewed the document while it was under development. These offices included:

- The Office of Naval Reactors, Nuclear Energy
- The Office of Repository Development
- National Nuclear Security Administration, Nevada Operations Office

Cooperating Agencies

Cooperating agencies in the preparation of the Nevada Rail Corridor SEIS and the Rail Alignment EIS, who provided appropriate input or participated in document review and comment resolution processes, are as follows:

- U.S. Bureau of Land Management
- Surface Transportation Board
- U.S. Air Force
- Esmeralda County, NV
- Lincoln County, NV
- Nye County, NV
- City of Caliente, NV

Disclosure Statements

As required by federal regulations (40 Code of Federal Regulations 1506.5c), Potomac-Hudson Engineering, Inc., and its subcontractors have signed National Environmental Policy Act of 1969 (42 United States Code 4321) disclosure statements in relation to the work they performed on the Nevada Rail Corridor SEIS and the Rail Alignment EIS. These statements appear on the following pages.

Disclosure Statement

Environmental Impact Statement
Rail Alignment for the Nevada Transportation Project
DE-RP28-05RW12351

DEAR 952.209-8 ORGANIZATIONAL CONFLICTS OF INTEREST DISCLOSURE requires an offeror to provide a statement of any past (within the past twelve months), present, or currently planned financial, contractual, organizational, or other interests relating to the performance of the statement of work. The offeror is to provide a statement that no actual or potential conflict of interest or unfair competitive advantage exists with respect to the advisory and assistance services to be provided in connection with the instant contract or that any actual or potential conflict of interest or unfair competitive advantage that does or may exist with respect to the contract in question has been communicated as part of the statement.

"Financial interest or other interest in the outcome of the project" includes "any financial benefit such as a promise of future construction or design work in the project, as well as indirect benefits the contractor is aware of (e.g., if the project would aid proposals sponsored by the firm's other clients)". See 46 FR 18026-18031.

In accordance with these requirements, the entity signing below hereby certify as follows: (check either (a) or (b) and list items being disclosed if (b) is checked).

Financial Interest:

(a)	X	Has no past, present, or currently planned financial interest in the outcome of the project.
(b)		Has the following financial interest in the outcome of the project and hereby agree to mitigate to the extent necessary to preclude a conflict prior to award of this contract:
		1.
		2.
		3.

Contractual Interest:

(a)	X	Has no past, present, or currently planned contractual interest in the outcome of the project.
(b)		Has the following contractual interest in the outcome of the project and hereby agree to mitigate to the extent necessary to preclude a conflict prior to award of this contract:
		1.
		2.
		3.

Organizational Interest:

(a) X Has no past, present, or currently planned organizational interest in the outcome of the project.

(b) Has the following organizational interest in the outcome of the project and hereby agree to mitigate to the extent necessary to preclude a conflict prior to award of this contract:

1.

2.

3.

Other Interest:

(a) X Has no past, present, or currently planned other interest in the outcome of the project.

(b) Has the following other interest in the outcome of the project and hereby agree to mitigate to the extent necessary to preclude a conflict prior to award of this contract:

1.

2.

3.

Unfair Competitive Advantage:

To the best of my knowledge and belief, no unfair competitive advantage exists with regard to Potomac-Hudson Engineering, Inc.'s participation on the instant contract.

Certified by:

08/12/05

Signature Date

Fred Carey, Vice President

Name & Title (Printed)

Potomac-Hudson Engineering, Inc.

Company

Disclosure Statement

Environmental Impact Statement
Rail Alignment for the Nevada Transportation Project
DE-RP28-05RW12351

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"Financial interest or other interest in the outcome of the project" includes "any financial benefit such as a promise of future construction or design work in the project, as well as indirect benefits the contractor is aware of (e.g., if the project would aid proposals sponsored by the firm's other clients)". See 46 FR 18026-18031.

In accordance with these requirements, the entity signing below hereby certifies as follows: (check either (a) or (b) and list items being disclosed if (b) is checked).

Financial Interest:

(a)	X	Has no past, present, or currently planned financial interest in the outcome of the project.
(b)		Has the following financial interest in the outcome of the project and hereby agree to mitigate to the extent necessary to preclude a conflict prior to award of this contract:
		1.
		2.
		3.

Contractual Interest:

(a)	X	Has no past, present, or currently planned contractual interest in the outcome of the project.
(b)		Has the following contractual interest in the outcome of the project and hereby agree to mitigate to the extent necessary to preclude a conflict prior to award of this contract:
		1.
		2.
		3.

Organizational Interest:

(a) X Has no past, present, or currently planned organizational interest in the outcome of the project.

(b) Has the following organizational interest in the outcome of the project and hereby agree to mitigate to the extent necessary to preclude a conflict prior to award of this contract:

1.

2.

3.

Other Interest:

(a) X Has no past, present, or currently planned other interest in the outcome of the project.

(b) Has the following other interest in the outcome of the project and hereby agree to mitigate to the extent necessary to preclude a conflict prior to award of this contract:

1.

2.

3.

Unfair Competitive Advantage:

To the best of my knowledge and belief, no unfair competitive advantage exists with regard to ICF Incorporated's participation on the instant contract.

Certified by:

Michael Berg 8/10/05

Signature Date

Michael Berg, Senior Vice President

Name & Title (Printed)

ICF Incorporated, LLC

Company

Disclosure Statement

Environmental Impact Statement
Rail Alignment for the Nevada Transportation Project
DE-RP28-05RW12351

DEAR 952.209-8 ORGANIZATIONAL CONFLICTS OF INTEREST DISCLOSURE requires an offeror to provide a statement of any past (within the past twelve months), present, or currently planned financial, contractual, organizational, or other interests relating to the performance of the statement of work. The offeror is to provide a statement that no actual or potential conflict of interest or unfair competitive advantage exists with respect to the advisory and assistance services to be provided in connection with the instant contract or that any actual or potential conflict of interest or unfair competitive advantage that does or may exist with respect to the contract in question has been communicated as part of the statement.

"Financial interest or other interest in the outcome of the project" includes "any financial benefit such as a promise of future construction or design work in the project, as well as indirect benefits the contractor is aware of (e.g., if the project would aid proposals sponsored by the firm's other clients)". See 46 FR 18026-18031.

In accordance with these requirements, the entity signing below hereby certify as follows: (check either (a) or (b) and list items being disclosed if (b) is checked).

Financial Interest:

(a)	X	Has no past, present, or currently planned financial interest in the outcome of the project.
(b)		Has the following financial interest in the outcome of the project and hereby agree to mitigate to the extent necessary to preclude a conflict prior to award of this contract:

Contractual Interest:

(a)		Has no past, present, or currently planned contractual interest in the outcome of the project.
(b)	X	Has the following contractual interest in the outcome of the project and hereby agree to mitigate to the extent necessary to preclude a conflict prior to award of this contract:

California Institute of Technology
200 E. California Blvd., Pasadena CA 91125-0600
Nathan Niemy, PhD, (626) 395-6166
URS is completing development of Environmental Assessments of potential impacts of new geodetic monitoring stations to be installed by CalTech in southern Nevada and southeastern California. The stations will be used to monitor minute movements in the tectonic plates in the region so that the Department of Energy can evaluate potential performance of the Yucca Mountain repository. CalTech is installing the stations as a subcontract to the University of Nevada System on a grant from the DOE. URS' interest in the project will be completed in by the end of September, if not earlier.
URS POC: Danny Rakestraw
Client Contract Number: 26698733
Wilbur Smith Associates
201 Mission Street, Suite 1450, San Francisco CA, 94105
Justin Fox, Chief of Rail Studies, 415-495-6201 (Fax) 415-495-5305
As a subcontractor to Wilbur Smith Associates, URS evaluated potential economic benefits to the counties of Nye, Lincoln and Esmeralda from a new freight rail line to serve the federal geologic waste repository at Yucca Mountain, Nevada. This preliminary assessment involved quantifying the freight traffic that would be generated by the new rail line, or diverted from shipment via truck, and translating transportation cost savings into local economic benefit. Shippers and potential shippers throughout the rail corridor were interviewed regarding their interest in rail shipment, and the savings it would represent. In addition, URS assessed the potential benefits the three counties might gain via involvement in the planning, construction, ownership and operation of the railroad.

URS POC: D. Sanford Stadtfeld
Client Contract Number: None Assigned
Bechtel SAIC
1180 Town Center Drive, Las Vegas, NV 889144
Richard Pernisi, (702) 821-7720
Development of preclosure seismic design and posclosure performance assessment ground motions for the repository and surface facilities. Activities include geotechnical and geological site characterization and numerical modeling of earthquake ground motions.
URS POC Ivan Wong
Subcontract #QA-HC4-00443

Organizational Interest:

(a)	X	Has no past, present, or currently planned organizational interest in the outcome of the project.
(b)		Has the following organizational interest in the outcome of the project and hereby agree to mitigate to the extent necessary to preclude a conflict prior to award of this contract:

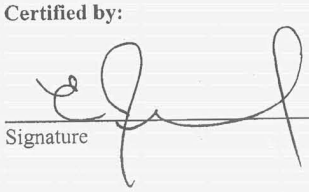
Other Interest:

(a)	X	Has no past, present, or currently planned other interest in the outcome of the project.

Unfair Competitive Advantage:

To the best of my knowledge and belief, no unfair competitive advantage exists with regard to URS Group Inc.'s participation on the instant contract.

Certified by:



Signature

August 11, 2005
Date

Edward Jennrich, Vice President
Name & Title (Printed)

URS Group, Inc
Company

Disclosure Statement

Environmental Impact Statement
Rail Alignment for the Nevada Transportation Project
DE-RP28-05RW12351

DEAR 952.209-8 ORGANIZATIONAL CONFLICTS OF INTEREST DISCLOSURE requires an offeror to provide a statement of any past (within the past twelve months), present, or currently planned financial, contractual, organizational, or other interests relating to the performance of the statement of work. The offeror is to provide a statement that no actual or potential conflict of interest or unfair competitive advantage exists with respect to the advisory and assistance services to be provided in connection with the instant contract or that any actual or potential conflict of interest or unfair competitive advantage that does or may exist with respect to the contract in question has been communicated as part of the statement.

"Financial interest or other interest in the outcome of the project" includes "any financial benefit such as a promise of future construction or design work in the project, as well as indirect benefits the contractor is aware of (e.g., if the project would aid proposals sponsored by the firm's other clients)". See 46 FR 18026-18031.

In accordance with these requirements, the entity signing below hereby certify as follows: (check either (a) or (b) and list items being disclosed if (b) is checked).

Financial Interest:

(a)	X	Has no past, present, or currently planned financial interest in the outcome of the project.
(b)		Has the following financial interest in the outcome of the project and hereby agree to mitigate to the extent necessary to preclude a conflict prior to award of this contract:
		1.
		2.
		3.

Contractual Interest:

(a)	X	Has no past, present, or currently planned contractual interest in the outcome of the project.
(b)		Has the following contractual interest in the outcome of the project and hereby agree to mitigate to the extent necessary to preclude a conflict prior to award of this contract:
		1.
		2.
		3.

Organizational Interest:

(a) X Has no past, present, or currently planned organizational interest in the outcome of the project.

(b) Has the following organizational interest in the outcome of the project and hereby agree to mitigate to the extent necessary to preclude a conflict prior to award of this contract:

1.

2.

3.

Other Interest:

(a) X Has no past, present, or currently planned other interest in the outcome of the project.

(b) Has the following other interest in the outcome of the project and hereby agree to mitigate to the extent necessary to preclude a conflict prior to award of this contract:

1.

2.

3.

Unfair Competitive Advantage:

To the best of my knowledge and belief, no unfair competitive advantage exists with regard to Image Associates, LLC participation on the instant contract.

Certified by:

Signature 8/11/05 Date

Diane L. Gunter, President

Name & Title (Printed)

Image Associates, LLC

Company

Disclosure Statement
Environmental Impact Statement
Rail Alignment for the Nevada Transportation Project
DE-RP28-05RW12351

DEAR 952.209-8 ORGANIZATIONAL CONFLICTS OF INTEREST DISCLOSURE requires an offeror to provide a statement of any pasts (within the past twelve months), present, or currently planned financial, contractual, organizational, or other interests relating to the performance of the statement of work. The offeror is to provide a statement that no actual or potential conflict of interest or unfair competitive advantage exists with respect to the advisory and assistance services to be provided in connection with the instant contract or that any actual or potential conflict of interest or unfair competitive advantage that does or may exist with respect to the contract in question has been communicated as part of the statement.

"Financial interest or other interest in the outcome of the project" includes "any financial benefit such as a promise of future construction or design work in the project, as well as indirect benefits the contractor is aware of (e.g., if the project would aid proposals sponsored by the firm's other clients)". See 46 FR 18026-18031.

In accordance with these requirements, the entity signing below hereby certify as follows: (check either (a) or (b) and list items being disclosed if (b) is checked).

Financial Interest:

✓ (a) Has no past, present, or currently planned financial interest in the outcome of the project.

(b) Has the following financial interest in the outcome of the project and hereby agree to mitigate to the extent necessary to preclude a conflict prior to award of this contract:
1.
2.
3.

Contractual Interest:

✓ (a) Has no past, present, or currently planned contractual interest in the outcome of the project.

(b) Has the following contractual interest in the outcome of the project and hereby agree to mitigate to the extent necessary to preclude a conflict prior to award of this contract:
1.
2.
3.

Organizational Interest:

(a) Has no past, present, or currently planned organizational interest in the outcome of the project.

(b) Has the following organizational interest in the outcome of the project and hereby agree to mitigate to the extent necessary to preclude a conflict prior to award of this contract:
1.
2.
3.

Other Interest:

(a) Has no past, present, or currently planned other interest in the outcome of the project.

(b) Has the following other interest in the outcome of the project and hereby agree to mitigate to the extent necessary to preclude a conflict prior to award of this contract:
1.
2.
3.

Unfair Competitive Advantage:

To the best of my knowledge and belief, no unfair competitive advantage exists with regard to Lechel Inc.'s participation on the instant contract.

Certified by:

David Lechel 05/08/08
Signature Date

David Lechel, Vice President
Name and Title (Printed)

Lechel Inc.
Company

Disclosure Statement
Environmental Impact Statement
Rail Alignment for the Nevada Transportation Project
DE-RP28-05RW12351
(Battelle Project No. G923500)

DEAR 952.209-8 ORGANIZATIONAL CONFLICTS OF INTEREST DISCLOSURE requires an offeror to provide a statement of any pasts (within the past twelve months), present, or currently planned financial, contractual, organizational, or other interests relating to the performance of the statement of work. The offeror is to provide a statement that no actual or potential conflict of interest or unfair competitive advantage exists with respect to the advisory and assistance services to be provided in connection with the instant contract or that any actual or potential conflict of interest or unfair competitive advantage that does or may exist with respect to the contract in question has been communicated as part of the statement.

"Financial interest or other interest in the outcome of the project" includes "any financial benefit such as a promise of future construction or design work in the project, as well as indirect benefits the contractor is aware of (e.g., if the project would aid proposals sponsored by the firm's other clients)". See 46 FR 18026-18031.

In accordance with these requirements, the entity signing below hereby certify as follows: (check either (a) or (b) and list items being disclosed if (b) is checked).

Financial Interest:

(a) **X** Has no past, present, or currently planned financial interest in the outcome of the project.

(b) Has the following financial interest in the outcome of the project and hereby agree to mitigate to the extent necessary to preclude a conflict prior to award of this contract:
1.
2.
3.

Contractual Interest:

(a) **X** Has no past, present, or currently planned contractual interest in the outcome of the project.

(b) Has the following contractual interest in the outcome of the project and hereby agree to mitigate to the extent necessary to preclude a conflict prior to award of this contract:
1.
2.
3.

DE-RP28-05RW12351
(Battelle Project No. G923500)

Organizational Interest:

(a) **X** Has no past, present, or currently planned organizational interest in the outcome of the project.

(b) Has the following organizational interest in the outcome of the project and hereby agree to mitigate to the extent necessary to preclude a conflict prior to award of this contract:
1.
2.
3.

Other Interest:

(a) **X** Has no past, present, or currently planned other interest in the outcome of the project.

(b) Has the following other interest in the outcome of the project and hereby agree to mitigate to the extent necessary to preclude a conflict prior to award of this contract:
1.
2.
3.

Unfair Competitive Advantage:

To the best of my knowledge and belief, no unfair competitive advantage exists with regard to Battelle Memorial Institute's participation on the instant contract.

Certified by:

Signature 5/15/08
Date

Scott G. Williams, Contracting Officer
Name and Title (Printed)

Battelle Memorial Institute
Company

GLOSSARY

DOE prepared this glossary to help readers understand information in the Nevada Rail Corridor SEIS and the Rail Alignment EIS. This glossary includes definitions of technical and regulatory terms common to DOE NEPA documents and explains these terms with their most likely meanings in the context of DOE NEPA documents, and in particular this document. To better aid the reader, a number of terms in this glossary emphasize their specific relationship to the proposed railroad project and to the Yucca Mountain Repository. DOE obtained each definition from an authoritative source (for example, a statute, regulation, DOE directive, dictionary, or technical reference book).

Terms in ***bold italics*** refer to other terms in the glossary.

100-year flood	A flood event of such magnitude that it occurs, on average, every 100 years; this equates to a 1-percent chance of its occurring in a given year. A base flood may also be referred to as a 100-year storm. The area inundated during the base flood is sometimes called the 100-year ***floodplain***.
136 RE rail	This term denotes rail with a nominal weight of 136 pounds per yard specified in English units, and is also specified as 132 metric tons per kilometer (234 tons per mile) for two-rail track.
500-year flood	A flood event of such magnitude that it occurs, on average, every 500 years; this equates to a 0.2-percent chance of its occurring in a given year.
50-year flood	A flood event of such magnitude that it occurs, on average, every 50 years; this equates to a 2-percent chance of its occurring in a given year.
accessible environment	For this ***environmental impact statement*** (EIS), all points on Earth outside the surface and subsurface area controlled over the long term for the ***repository***, including the atmosphere above the controlled area.
accident	An unplanned sequence of events that results in undesirable consequences. Examples in the Rail Alignment ***EIS*** include an inadvertent release of ***radiation*** from the ***casks*** or hazardous materials from their containers, train derailments, vehicular accidents, and construction-related accidents that could affect workers.
acre-foot	A unit commonly used to measure water volume. It is the quantity of water required to cover 4,047 square meters (1 acre) to a depth of 0.3048 meter (1 foot), and is equal to 1,233.5 cubic meters (325,851 gallons).
AERMOD (**A**MS/**E**PA **R**egulatory **Mod**el)	A short-range steady-state ***air quality*** dispersion model. The model incorporates air dispersion concepts based on the state-of-the-science understanding of planetary boundary layer turbulence structure and scaling concepts. On December 9, 2005, AERMOD became the U.S. Environmental Protection Agency's (EPA) preferred air dispersion model in place of ISC3.

AERMET (**AER**MOD **Met**eorological Preprocessor)	The meteorological preprocessor component of ***AERMOD***. Surface meteorological observations, hourly cloud-cover observations, and twice-a-day upper air sounds are "preprocessed" by AERMET into data used by AERMOD.
AERMAP (**AER**MOD **Map**s terrain Preprocessor)	The terrain preprocessor that uses data from the Digital Elevation Model Database and creates a file suitable for use within ***AERMOD***. This file contains elevation and hill-height scaling factors for each receptor for use by AERMOD.
aerosol	A suspension of tine, ***colloid***-size particles or liquid droplets in air. Fog and smoke are common examples of aerosols.
affected environment	For an ***EIS***, a description of the existing ***environment*** (site description) covering information that relates directly to the scope of the ***Proposed Action***, the ***No-Action Alternative***, and the ***implementing alternatives*** being analyzed; that is, the information necessary to assess or understand the ***impacts***. This description must contain enough detail to support the impact analysis. The information must highlight "environmentally sensitive resources," if present; these include ***floodplains*** and ***wetlands***, ***threatened*** and ***endangered species***, prime and unique agricultural lands, and property of historic, archaeological, or architectural significance.
Agreement State	A state that reaches an agreement with the U.S. Nuclear Regulatory Commission (NRC) to assume regulatory authority to license and regulate ***radioactive*** materials.
air quality	A measure of the concentrations of pollutants, measured individually, in the air.
alien species	With respect to a particular ***ecosystem***, any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem.
alkalinity	Acid-neutralizing capacity of a substance. High alkalinity conditions can promote metal ***corrosion***.
alluvial fan	A low, outspread, relatively flat-to-gently-sloping mass of loose rock material, shaped like an open fan or a segment of a cone, deposited by a stream where it issues from a narrow mountain valley on a plain or break valley.
alluvium	A general term for the sedimentary material deposited by flowing water.
alpha particle	A positively charged particle ejected spontaneously from the nuclei of some ***radioactive*** elements. It is identical to a helium ***nucleus*** and has a mass number of 4 and an electrostatic charge of +2. It has low penetrating power and a short range (a few centimeters in air). See ***ionizing radiation.***

alternative

One of two or more actions, processes, or propositions, from which a decisionmaker will determine the course to be followed. The National Environmental Policy Act, as amended, states that in preparing an ***EIS***, an agency "shall … study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources" [42 U.S.C. 4321, Title I, Section 102(E)]. The regulations of the Council on Environmental Quality that implement the National Environmental Policy Act indicate that the alternatives section is "the heart of the ***environmental impact statement***" (40 CFR 1502.14), and include rules for presentation of the alternatives, including no action, and their estimated impacts.

The Nevada Rail Corridor SEIS analyzes one alternative to the ***Proposed Action***, the ***No-Action Alternative***. Under the Nevada Rail Corridor SEIS No-Action Alternative, the U.S. Department of Energy (DOE or the Department) would not select a ***rail alignment*** within the Mina ***rail corridor*** for the construction and operation of a ***railroad***. As such, the No-Action Alternative provides a basis for comparison to the Proposed Action.

The Rail Alignment EIS analyzes one alternative to the Proposed Action – the No-Action Alternative – and two implementing alternatives under the Proposed Action – the Caliente Implementing Alternative and the Mina Implementing Alternative – for constructing, operating, and possibly abandoning a ***railroad*** for the shipment of ***spent nuclear fuel*** and ***high-level radioactive waste*** for long-term ***disposal*** in a ***geologic repository*** at Yucca Mountain. Under the No-Action Alternative, DOE would not construct the proposed railroad along the Caliente rail alignment or the Mina rail alignment.

alternative segments

Geographic region of the ***rail alignment*** for which multiple routes for the ***rail line*** have been identified. In the Rail Alignment ***EIS***, there are different alignments identified within the Caliente ***rail corridor*** and the Mina ***rail corridor*** that could minimize or avoid environmental ***impacts*** and reduce construction complexities.

ambient

(1) Undisturbed, natural conditions such as ambient temperature caused by climate or natural subsurface thermal gradients. (2) Surrounding conditions.

ambient air

The surrounding atmosphere, usually the outside air, as it exists around people, plants, and structures. It is not the air in the immediate proximity to emission sources.

ambient air quality standards

Standards established on a federal or state level that define the limits for airborne concentrations of designated ***criteria pollutants*** [***nitrogen dioxide***, ***sulfur dioxide***, ***carbon monoxide***, ***particulate matter*** with aerodynamic diameters less than 10 microns (PM_{10}), particulate matter with aerodynamic diameters less than 2.5 microns ($PM_{2.5}$), ***ozone***, and lead] to protect public health with an adequate margin of safety (primary standards) and to protect public welfare, including plant and animal life, visibility, and materials (secondary standards).

ambient noise	The sum of all sounds (noise is unwanted sound) at a specific location over a specific time.
animal unit month	(1) A standardized unit of measurement of the amount of forage necessary for the complete sustenance of one animal for 1 month. (2) A unit of measurement of grazing privileges that represents the privilege of grazing one animal for 1 month.
aquifer	A subsurface saturated rock unit (formation, group of formations, or part of a formation) of sufficient ***permeability*** to transmit ***groundwater*** and yield usable quantities of water to wells and springs.
aquitard	A rock unit or layer that stores water and allows it to move only at a very slow rate.
Areas of Critical Environmental Concern	Places within the public lands where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, and other natural systems, or processes or to protect life and safety from natural hazards.
arid	(1) Areas in which mean annual evaporation exceeds mean annual precipitation; (2) having insufficient rainfall to support agriculture; (3) the hyper-arid zone (arid index 0.03) comprising dry land areas without vegetation with the exception of a few scattered shrubs. Annual rainfall is low, rarely exceeding 100 millimeters (4 inches). In the arid zone (arid index 0.03-0.20), the native vegetation is sparse, being comprised of annual and perennial grasses and other herbaceous vegetation, and shrubs and small trees. There is high rainfall variability, with annual amounts ranging between 100 and 300 millimeters (4 and 12 inches).
at-grade crossing	Occurs when a roadway and a ***rail line*** cross paths at the same elevation.
atomic mass	The mass of a neutral atom, based on a relative scale, usually expressed in atomic mass units. See ***atomic weight.***
atomic nucleus	See ***nucleus***.
atomic number	The number of ***protons*** in an atom's ***nucleus***.
atomic weight	The relative mass of an atom based on a scale in which a specific carbon atom (carbon-12) is assigned a mass value of 12. Also known as relative ***atomic mass***.
A-weighted decibel scale	See ***decibel, A-weighted***.
Back Country Byway	A vehicle route that traverses scenic corridors utilizing secondary or back country road systems.

background radiation	***Radiation*** from cosmic sources, naturally occurring ***radioactive*** materials such as granite, and global fallout from nuclear testing.
ballast	The coarse rock that is placed under the ***railroad*** tracks to support the railroad ties and improve drainage along the ***rail line***.
barrier	Any material, structure, or condition (as a thermal barrier) that prevents or substantially delays the movement of water or ***radionuclides***.
basalt	A dark gray to black, dense to fine-grained, ***igneous*** rock.
baseline	The existing environmental conditions against which ***impacts*** of a ***proposed action*** and its ***alternatives*** can be compared.
berm	A mound or wall of earth.
beta particle	A negatively charged ***electron*** or positively charged positron emitted from a ***nucleus*** during ***decay***. Beta decay usually refers to a ***radioactive*** transformation of a ***nuclide*** by electron emission, in which the ***atomic number*** increases by 1 and the mass number remains unchanged. In positron emission, the atomic number decreases by 1 and the mass number remains unchanged. See ***ionizing radiation.***
bio-based products	Energy, industrial, and consumer products made from renewable biological resources such as wood, agricultural residues, and fiber crops.
BLM-designated sensitive species	Species not already conferred U.S. Bureau of Land Management (BLM) special status by virtue of being (1) a federally listed, proposed, or ***candidate species***, or (2) a State of Nevada listed species. BLM policy is to provide these species with the same level of protection that is provided for candidate species in BLM Manual 6840.06 C.
block-bounding fault	A high-angle, ***normal fault*** with relatively large displacement that bounds one or both sides of the fault-block mountains typical of the Basin and Range province.
blowing soil	A soil characteristic based on the soil survey classification of susceptibility of a given soil to wind erosion. The blowing soils characteristic identifies areas where fine-textured, sandy materials predominate and where uncontrolled soil disturbance could result in increased wind erosion.
boiling-water reactor (BWR)	A ***nuclear reactor*** that uses boiling water to produce steam to drive a turbine.
borehole	For the Rail Alignment ***EIS***, a hole drilled for purposes of collecting geotechnical information.
borosilicate glass	***High-level radioactive waste matrix*** material in which boron takes the place of the lime used in ordinary glass mixtures. See ***vitrification***.

borrow sites	Areas outside the ***nominal*** width of the ***rail line construction right-of-way*** where construction personnel could obtain materials to be used in the establishment of a stable platform (subgrade) for the rail track. Aggregate crushing operations could occur in these areas.
buffer car	A flatbed railcar that would be placed at the front of a ***cask*** train between the locomotive and the first ***cask car*** and at the back of the train between the last cask car and the ***escort car***. Federal regulations require the separation of a railcar carrying ***spent nuclear fuel*** and ***high-level radioactive waste*** from a locomotive, occupied caboose, carload of undeveloped film, or railcar carrying another class of hazardous material by at least one buffer car. These could be DOE railcars or, in the case of general freight service, commercial railcars.
caldera	An enlarged volcanic crater formed by explosion or collapse of the original crater.
cancer	A malignant tumor of potentially unlimited growth, capable of invading surrounding tissue or spreading to other parts of the body.
candidate species	Species for which the U.S. Fish and Wildlife Service has enough substantive information on biological status and threats to support proposals to list them as threatened or endangered under the Endangered Species Act. Listing is anticipated but has been precluded temporarily by other listing activities. See ***threatened species***, ***endangered species***.
canister	An unshielded metal container used as: (1) a pour mold in which molten vitrified ***high-level radioactive waste*** can solidify and cool; (2) the container in which DOE and electric utilities place intact ***spent nuclear fuel***, loose rods, or nonfuel components for shipping or ***storage***; or (3) in general, a container used to provide ***radionuclide confinement***. Canisters are used in combination with specialized overpacks that provide structural support, ***shielding*** or confinement for storage, transportation, and ***emplacement***. Overpacks used for transportation are usually referred to as transportation ***casks***; those used for emplacement in a ***repository*** are referred to as ***waste packages***.
carbon monoxide (CO)	A colorless, odorless, poisonous gas produced by incomplete fossil-fuel combustion; one of the six pollutants for which there is a national ***ambient air quality standard***.
carcinogen	An agent capable of producing or inducing ***cancer***.
carcinogenic	Capable of producing or inducing ***cancer***.
case file, BLM	A file typically including the following information: a report identifying the present users of the lands and how they would be affected; a report specifying water use for the project and how water would be obtained; an Environmental Assessment or ***EIS***; and floodplain and wetland impact statements. 43 CFR 2310.3-2 describes the required contents of a case file.

cask	A heavily shielded container that meets applicable regulatory requirements used to ship ***spent nuclear fuel*** or ***high-level radioactive waste***.
cask car	A railcar that would be used to transport ***casks*** of ***spent nuclear fuel*** or ***high-level radioactive waste***.
Cask Maintenance Facility	Processing location for empty transportation casks used to transport canistered fuel, including testing, inspection, maintenance, and decontamination.
casual use	Activities ordinarily resulting in no or negligible disturbance of the public lands, resources, or improvements, including surveying, marking routes, and collecting data to use to prepare grant applications.
Census County Division	A statistical subdivision of a county, established and delineated cooperatively by the U.S. Census Bureau and state, local, and tribal officials for data presentation purposes. Census County Divisions have been established in states that do not have minor civil divisions suitable for data presentation. In these cases, minor civil divisions have not been legally established, do not have governmental or administrative purposes, have boundaries that are ambiguous or change frequently, or generally are not well known to the public.
Class 1 Area (related to air quality)	A specifically designated area in which the degradation of ***air quality*** is stringently restricted (for example, many national parks, wilderness areas).
Class 1 commercial railroad	The Surface Transportation Board defines a Class 1 commercial railroad as one with an annual operating revenue exceeding $277.7 million.
Class 3 road	A light-duty, paved or improved road.
Class 4 road	An unimproved, unsurfaced road (includes track roads in back country).
Class I inventory (related to cultural resources)	A study of published and unpublished documents, records, files, registers, and other sources, resulting in analysis and synthesis of all reasonably available data.
Class II inventory (related to cultural resources)	A sample-oriented field inventory designed to locate and record, from surface and exposed profile indications, all cultural resource sites within a portion of a defined area to make possible an objective estimate of the nature and distribution of cultural resources in the entire defined area.
Class III inventory (cultural resources)	An intensive field survey designed to locate and record all cultural resource sites within a specified area. Upon completion of such an inventory, no further cultural resource inventory work is normally needed in the area.

clastic	Describing a rock or sediment composed mainly of broken fragments of preexisting minerals or rocks that have been transported from their places of origin.
cloudshine	***Irradiation*** of the human body by ***neutrons*** and ***gamma rays*** emitted by the passing plume of ***radioactive*** material.
collective dose	See ***population dose***.
colloid	Small particles in the size range of 10^{-9} to 10^{-6} meters that are suspended in a solvent. Naturally occurring colloids in ***groundwater*** arise from clay minerals.
colluvium	Loose earth material that has accumulated at the base of a hill through the action of gravity.
commercial spent nuclear fuel	Commercial nuclear fuel rods that have been removed from ***reactor*** use at civilian nuclear power plants that generate electricity. See ***spent nuclear fuel*** and ***DOE spent nuclear fuel***.
committed groundwater resource	Within a given hydrographic area, the total volume of permitted, certificated, and vested groundwater rights that are recognized by the State Engineer and have been approved for withdrawal in a ***hydrographic area*** in any given year.
common segment	Geographic region of the ***rail alignments*** for which a single route for the ***rail line*** has been identified.
community water system	A ***public water system*** that serves year-round residents of a community, subdivision, or mobile home park that has more than 15 service connections or an average of more than 25 residents for more than 60 days of the year.
Condition 1, 2, 3	BLM ranking of areas for their potential to contain paleontological resources: Condition 1 - Areas that are known to contain vertebrate ***fossils*** or noteworthy occurrences of invertebrate or plant fossils. Condition 2 - Areas with exposures of geological units or settings that have high potential to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils. Condition 3 - Areas that are very unlikely to produce vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils.
cone of depression	The lowering of the ***water table*** in a cone-shaped depression around a pumped well.
confinement	As it pertains to ***radioactivity***, the retention of ***radioactive*** material within some specified bounds. Confinement differs from containment in that there is no absolute physical ***barrier*** in the former.

construction and operations support facilities	Construction support facilities are the temporary facilities that would be used during the ***railroad*** construction phase (***construction camps***, quarries, some access roads, and some water wells). Operations support facilities are the permanent structures that would be used during the railroad operations phase (***Staging Yard***, ***Interchange Yard***, ***Maintenance-of-Way Facilities***, ***Rail Equipment Maintenance Yard***, ***Cask Maintenance Facility***, some access roads, and some water wells).
construction camps	Areas along the ***rail alignment*** that could be used as temporary residences for construction crews, material and equipment storage areas, and concrete production areas. Such camps would be used during rail line construction activities far from population centers.
construction right-of-way	Property obtained for construction of the proposed railroad. This right-of-way would have a ***nominal*** width of 150 meters (500 feet) on either side of the centerline of the ***rail alignment***, but would vary at specific locations to accommodate, for example, certain deep ***cuts*** and ***fills***, and construction of drainage controls. In addition, some facilities (such as quarries) would be outside the nominal width of the construction right-of-way, but DOE would also obtain rights-of-way in these areas. See ***operations right-of-way***.
contaminant	A substance that contaminates (pollutes) air, soil, or water. It could also be a hazardous substance that does not occur naturally or that occurs at levels greater than those occurring naturally in the surrounding ***environment***.
contamination	The intrusion of undesirable elements (unwanted physical, chemical, biological, or radiological substances, or matter that has an adverse effect) to air, water, or land.
convection	(1) Thermally driven ***groundwater*** flow or a heat-transfer mechanism for a gas phase. The bulk motion of a flowing fluid (gas or liquid) in the presence of a gravitational field, caused by temperature differences that, in turn, cause different areas of the fluid to have different densities (for example, warmer is less dense). (2) One of the processes that moves solutes in groundwater.
corrosion	The process of dissolving or wearing away gradually, especially by chemical action.
cosmic radiation	A variety of high-energy particles including ***protons*** that bombard the Earth from outer space. They are more intense at higher altitudes than at sea level, where the Earth's atmosphere is most dense and provides the greatest protection.
cosmogenic radionuclides	***Radioactive*** nuclides generated when the upper atmosphere interacts with many of the ***cosmic radiations***. Common cosmogenic ***radionuclides*** include carbon-14, tritium, and beryllium-7.

criteria pollutants — Six common pollutants (***ozone***, ***carbon monoxide***, ***particulate matter***, ***sulfur dioxide***, lead, and ***nitrogen dioxide***) known to be hazardous to human health and the ***environment***, and for which the U.S. Environmental Protection Agency sets National ***Ambient Air Quality Standards*** under the Clean Air Act. See ***toxic air pollutants***.

crustal extension — Descriptive of the slow movement off ***tectonic plates*** stretching Earth's outer layer of rocks.

culvert — A conduit for conveying surface water through an embankment.

cumulative impact — The ***impact*** on the ***environment*** that results from the incremental impact(s) of an action when added to other past, present, or reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

cut — Cutting away from the top of a slope to fill in at the bottom, thereby providing a suitable grade for the rail ***roadbed***. See ***fill***.

day-night average noise level — The energy average of ***A-weighted decibel*** sound levels over 24 hours, which includes an adjustment factor for noise between 10 p.m. and 7 a.m. to account for the greater sensitivity of most people to noise during the night. The effect of nighttime adjustment is that one nighttime event, such as a train passing by between 10 p.m. and 7 a.m., is equivalent to 10 similar events during the daytime.

decay (radioactive) — The process in which one ***radionuclide*** spontaneously transforms into one or more different radionuclides called ***decay products***.

decay product — A ***nuclide*** resulting from the ***radioactive decay*** of a parent isotope or precursor nuclide.

decay series — The ***radioactive decay*** of different discrete radioactive decay products as a chained series of transformations. Most radioactive elements do not decay directly to a stable state, but rather undergo a series of decays until eventually a stable isotope is reached.

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

decibel, A-weighted (dBA) — A frequency-weighted noise unit that corresponds approximately to the frequency response of the human ear and thus correlates well with loudness. It is widely used for traffic and industrial noise measurements.

dedicated train — A train that handles only one commodity. For the proposed ***railroad***, this separate train with its own crew would limit switching between trains of the railcars carrying ***spent nuclear fuel*** and ***high-level radioactive waste***.

demand (related to groundwater)	The amount (volume) of water needed to complete a specified action.
desert	***Arid***, barren land incapable of supporting any considerable population without an artificial water supply.
designated groundwater basin	A ***hydrographic area*** identified by the State of Nevada when permitted water rights approach or exceed the estimated ***perennial yield*** and the water resources are being depleted or require additional administration.
dip-slip fault	A ***fault*** in which the relative displacement is along the direction of dip of the fault plane. If the block above the fault has moved downward, it is a ***normal fault***; upward movement indicates a ***reverse fault***.
direct impact	Effect that results solely from the construction or operation of a ***proposed action*** without intermediate steps or processes. Examples include ***habitat*** destruction, soil disturbance, air emissions, and water use.
directly affected parties	Entities, such as private land owners, grazing permittees, and local communities through which the ***rail line*** would pass, that would be affected by construction and operation of the proposed ***railroad***.
disposal (of spent nuclear fuel and high-level radioactive waste)	The ***emplacement*** in a ***repository*** of ***spent nuclear fuel***, ***high-level radioactive waste***, or other highly ***radioactive*** material with no foreseeable intent of recovery, whether or not such emplacement permits the recovery of such waste, and the ***isolation*** of such waste from the ***accessible environment***.
disproportionately high and adverse environmental impacts	An environmental ***impact*** that is unacceptable or above generally accepted norms; these would include economic impacts of the ***Proposed Action***. A disproportionately high impact is one (or the ***risk*** of one) to a ***low-income population*** or ***minority population*** that significantly exceeds the impact to the general population. In assessing cultural and aesthetic impacts, agencies consider impacts that would have unique effects on geographically dislocated or dispersed low-income or minority populations.
distance zones	Landscape divisions based on their relative location to common viewpoints: foreground to middleground, background, and seldom seen. The foreground-middleground zone includes areas less than 5 to 8 kilometers (3 to 5 miles) away. The background zone includes areas visible beyond the foreground-middleground zone but usually less than 24 kilometers (15 miles) away. Areas not seen as foreground-middleground or background are in the seldom-seen zone.
DOE spent nuclear fuel	***Radioactive*** waste created by defense activities that consists of more than 250 different ***waste forms***. The major contributor to this waste form is the N-Reactor fuel currently stored at the Hanford Site. This waste form also includes 65 ***metric tons of heavy metal*** of ***naval spent nuclear fuel***.
dose (radioactive)	The amount of ***radioactive*** energy taken into (absorbed by) living tissues. See ***effective dose equivalent***.

dose equivalent	(1) The number (corrected for background) zero and above that is recorded as representing an individual's ***dose*** from external ***radiation*** sources or internally deposited ***radioactive*** materials; (2) the product of the absorbed dose in ***rads*** and a quality factor; (3) the product of the absorbed dose, the quality factor, and any other modifying factor. The ***dose equivalent*** quantity is used for comparing the biological effectiveness of different kinds of radiation (based on the quality of radiation and its spatial distribution in the body) on a common scale; it is expressed in ***rem***.
dose rate	The ***dose*** per unit time.
dose risk	The product of a ***radiation dose*** and the ***probability*** of its occurrence.
duty (related to groundwater)	The amount of water either appropriated or under consideration for appropriation by the Nevada State Engineer to a water rights holder in the State of Nevada. Duty is typically specified in terms of a total annual duty or total duty granted over a specified seasonal period to a water rights holder. A ***pending annual duty*** value represents an annual duty for which an appropriation application has been submitted to the State Engineer for consideration and that the State Engineer has classified as a pending annual duty value within a specified ***groundwater*** basin (***hydrographic area***), in accordance with Nevada Revised Statutes contained in Chapter 533 and pursuant to the application review process contained in Nevada Revised Statutes 533.370.
earthquake	A series of elastic waves in the crust of the Earth caused by abrupt movement easing strains built up along ***geologic faults*** or by volcanic action and resulting in movement of the Earth's surface.
ecoregion	A relatively discrete set of ***ecosystems*** characterized by certain plant communities or assemblages.
ecosystem	A community of organisms and their physical environment interacting as an ecological unit.
effective dose equivalent	Often referred to simply as ***dose***, it is an expression of the ***radiation*** dose received by an individual from external radiation and from ***radionuclides*** internally deposited in the body.
EIS	See ***environmental impact statement***.
electron	A stable elementary particle that is the negatively charged constituent of ordinary matter.
emplacement	The placement and positioning of ***waste packages*** in the ***repository***.
endangered species	A species that is in danger of extinction throughout all or a significant part of its range; a formal listing of the U.S. Fish and Wildlife Service under the Endangered Species Act.
endemic	Being native to one location only.

environment	(1) Includes water, air, and land and all plants and humans and other animals living therein, and the interrelationship existing among these. (2) The sum of all external conditions affecting the life, development, and survival of an organism.
environmental impact statement (EIS)	A detailed written statement that describes: "...the environmental impact of the ***proposed action***; any adverse environmental effects which cannot be avoided should the proposal be implemented; ***alternatives*** to the proposed action; the relationship between local short-term uses of man's ***environment*** and the maintenance and enhancement of long-term productivity; and any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented." Preparation of an EIS requires a public process that includes public meetings, reviews, and comments, as well as agency responses to the public comments.
environmental justice	The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies. Executive Order 12898, *Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations*, directs federal agencies to make achieving environmental justice part of their missions by identifying and addressing ***disproportionately high and adverse effects*** of agency programs, policies, and activities on ***minority populations*** and ***low-income populations***.
environmental resource areas	Areas examined for potential environmental ***impacts*** as part of the National Environmental Policy Act analysis process. Examples include ***air quality***, ***hydrology***, and biological resources.
ephemeral (creek, stream, wash, river, drainage)	A channel with a bed above the normal water table and only flows in direct response to precipitation or snowmelt within its drainage basin.
equivalent sound levels (L_{eq})	A single value of sound level for any desired duration (such as 1 hour), which includes all of the time-varying sound energy in the measurement period. L_{eq} correlates reasonably well with the effects of noise on people, even for wide variations in environmental sound levels and time patterns. It is used when only the durations and levels of sound, and not their times of occurrence (day or night), are relevant.
erionite	A natural fibrous zeolite in the rocks in and around Yucca Mountain that is listed as a known human ***carcinogen*** by recognized international agencies such as the International Agency for Research on Cancer.

erodes easily (soil characteristic)	A measure of the susceptibility of bare soil to be detached and moved by water. These soils, which tend to contain relatively high amounts of silts and ***loams***, have fair to poor erosion characteristics when disturbed.
escort cars	Railcars in which escort personnel would travel on trains carrying ***spent nuclear fuel*** or ***high-level radioactive waste***.
ethnographic	Describing the study and systematic recording of human cultures.
ethnographic landscape (ethnographic cultural landscape)	(1) A landscape containing a variety of natural or cultural resources that contemporary cultural groups define as meaningful because they are inextricably and traditionally linked to their own local or regional histories, cultural identities, beliefs, and behaviors. (2) A landscape that helps inform what it means to be a member of a particular culture, especially a culture (such as the American Indian culture) that is tied religiously to that landscape.
evapotranspiration	The combined processes of evaporation and plant ***transpiration*** that remove water from the soil and return it to the air.
exposure (to radiation)	The condition of being subject to the effects of or potentially acquiring a ***dose*** of ***radiation***. The incidence of radiation on living or inanimate material by ***accident*** or intent. Background exposure is the exposure to natural ***ionizing radiation***. Occupational exposure is the exposure to ionizing radiation that occurs during a person's working hours. Population exposure is the exposure to a number of persons who inhabit an area.
exposure pathway	The course a chemical or physical agent takes from the source to the exposed organism; describes a unique mechanism by which an individual or population can become exposed to chemical or physical agents at or originating from a release site. Each exposure pathway includes a source or a release from a source, an exposure point, and an exposure route.
fan piedmont	The area along the base of a mountain slope within a large ***alluvial fan***.
fan remnants	Parts of an older ***alluvial fan*** that remain after erosion has removed most of the fan.
fan skirt	The area along the base of the ***alluvial fan*** in a valley.
fault	A ***fracture*** or a fracture zone in crustal rocks along which there has been movement of the fracture's two sides relative to one another, separating one continuous rock stratum or vein into parts.
faulting	The movement of the Earth's crust that produces relative displacement of adjacent rock masses along a ***fracture***.
fill	The material used to fill the bottom of a slope with material cut away from the top of a slope, thereby providing a suitable grade for the rail ***roadbed***. (See ***cut***.)

Fiscal Year	A 12-month period to which a jurisdiction's annual budget applies and at the end of which its financial position and the results of its operations are determined. For example, the Fiscal Year for Clark and Nye Counties, the Cities of Las Vegas and North Las Vegas, the Towns of Tonopah and Pahrump, and the Clark County and Nye County School Districts is from July 1 through the following June 30; the federal Fiscal Year runs from October 1 through the following September 30.
fission	The splitting of a ***nucleus*** into at least two other nuclei, resulting in the release of two or three ***neutrons*** and a relatively large amount of energy.
fission products	***Radioactive*** or nonradioactive atoms produced by the ***fission*** of heavy atoms, such as uranium.
floodplain	The lowlands adjoining inland and coastal waters, and relatively flat areas and flood-prone areas of offshore islands, including, at a minimum, that area inundated by a 1-percent or greater chance flood in any given year. The base floodplain is defined as the 100-year (1.0-percent) floodplain. The critical action floodplain is defined as the 500-year (0.2-percent) floodplain. (See ***100-year flood***, ***50-year flood***, ***500-year flood***.)
fluvial	Of or pertaining to rivers or produced by the action of a stream or river.
footprint	The area that would be covered by the ***rail line*** or ***rail line construction and operations support facilities***. For certain of these facilities (for example, quarry sites), this would be the area inside the site fence line.
fossil	Fossils include the body remains, traces, and imprints of plants or animals that have been preserved in the Earth's crust since some past geologic or prehistoric time. Generally, to be considered a fossil, the remains must be older than recent in age (older than 10,000 years). Fossils are found in ***sedimentary rock***.
fracture	A general term for any break in a rock, or the act of breaking, whether or not it causes displacement, caused by mechanical failure from stress. Fractures include cracks, ***joints***, and ***faults***. Fractures can act as pathways for rapid ***groundwater*** movement.
free-use permit	An authorization to extract mineral materials from public lands at no charge. The BLM issues free-use permits to a federal or state agency when the materials are for use in a public project.
fuel assembly	A number of fuel elements held together by structural materials, used in a ***nuclear reactor***; sometimes called a fuel bundle.
fugitive dust	***Particulate matter*** composed of soil; can include emissions from haul roads, wind erosion of exposed soil surfaces, and other activities in which soil is removed or redistributed.

fugitive emissions	(1) Emissions that do not pass through a stack, vent, chimney, or similar opening where they could be captured by a control device. (2) Any air pollutant emitted to the atmosphere other than from a stack. Sources of fugitive emissions include pumps; valves; flanges; seals; area sources such as ponds, lagoons, landfills, piles of stored material (such as coal); and road construction areas or other areas where earthwork occurs.
gamma ray	The most penetrating type of radiant nuclear energy. It does not contain particles and can be stopped by dense materials such as concrete or lead. See ***ionizing radiation.***
geologic repository	A system for the ***disposal*** of ***radioactive*** waste in excavated geologic media, including surface and subsurface areas of operation, and the adjacent part of the geologic setting that provides ***isolation*** of the radioactive waste in a controlled area.
geotextiles	Fabrics manufactured from synthetic fiber that are used for soil reinforcement, to allow for drainage, and to control erosion.
graben	An elongated block of rock down-dropped along roughly parallel normal faults.
grade (related to a rail line)	The ratio of elevation change to the distance traveled by a train, expressed as a percent. For example, a 1-meter (3.28-foot) change in elevation over 100 meters (328 feet) of track is a 1-percent grade.
grade-separated crossing	Occurs when a roadway and a ***rail line*** cross paths and one passes over the other via an overpass or under the other via an underpass.
grant	Any authorization or instrument (for example, easement, lease, license, or permit) the BLM issues under Title V of the Federal Land Policy and Management Act (43 U.S.C. 1761 *et seq.*).
gray water	Non-industrial wastewater generated from domestic processes such as washing dishes, laundry, and bathing. Gray water gets its name from its cloudy appearance and from its status as being neither fresh nor heavily polluted.
grazing allotment	An area where one or more livestock operators graze their livestock. An allotment generally consists of federal land but may include parcels of private or state-owned land.
groundshine	The ***radiation dose*** received from an area on the ground where ***radioactivity*** has been deposited by a ***radioactive*** plume or cloud.
gross regional product	The dollar value of all final goods and services produced in a given year in a specific region (such as the ***region of influence***).
ground vibration	The rapid linear motion of a compression wave in the ground caused by a single or repeated force or impact to the ground, as in the action of a pile driver, or a tire hitting a bump or pothole in a road.

groundwater	Water contained in pores or fractures in either the ***unsaturated zone*** or ***saturated zone*** below ground level.
habitat	Area in which a plant or animal lives and reproduces.
half-life	The time in which half the atoms of a ***radioactive*** substance ***decay*** to another nuclear form. Half-lives range from millionths of a second to billions of years depending on the stability of the nuclei.
hardpan	A layer of hard subsoil that prevents the ***infiltration*** of water or roots.
hazardous air pollutant	An air pollutant not covered by ***ambient air quality standards*** but which may present a threat of adverse human-health effects or adverse environmental effects, and is specifically listed on the federal list of 189 hazardous air pollutants in 40 CFR 61.01.
hazardous chemical	As defined under the Occupational Safety and Health Act (Public Law 91-956) and the Emergency Planning and Community Right-to-Know Act (42 U.S.C. 116), a chemical that is a physical or health hazard.
hazardous pollutant	A ***hazardous chemical*** that can cause serious health and environmental hazards; listed on the federal list of hazardous air pollutants (Clean Air Act; 42 U.S.C. 7412). See ***toxic air pollutants***.
hazardous waste	Waste that appears on the list of hazardous materials prepared by the U.S. Environmental Protection Agency or a state or local regulatory agency, or if it has characteristics defined as hazardous by such agency. If the Environmental Protection Agency does not list a material as hazardous,, it can be considered a hazardous waste if it exhibits one of the four characteristics defined in 40 CFR Part 261 Subpart C: ignitability, corrosivity, reactivity, or toxicity.
herd management area (HMA)	Areas where wild horses and burros were found on public lands when the Wild and Free-Roaming Horses and Burros Act passed in 1971. The BLM evaluates each area to determine if there is adequate food, water, cover, and space to sustain healthy and diverse wild horse and burro populations over the long term. The areas that meet these criteria are then designated herd management areas in BLM land-use plans.
heritage tourism	Heritage tourism is “the business and practice of attracting and accommodating visitors to a place or area based especially on the unique or special aspects of that locale’s history, landscape (including trail systems), and culture.” (Section 7 of Executive Order 13287).
hertz	A unit of frequency equal to one cycle per second.
high-level radioactive waste	The highly ***radioactive*** material that resulted from the reprocessing of ***spent nuclear fuel***, including liquid waste produced directly in reprocessing, and any solid material derived from such liquid waste that contains ***fission products*** in sufficient concentrations.

hi-rail truck — A vehicle that is capable of traveling on roads or on railroad tracks.

historic tourism — Traveling to experience the places, artifacts, and activities that authentically represent the stories and people of the past and present.

hydric soil — Soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. Hydric soils are used to characterize ***wetland*** conditions.

hydrogeology — A study that encompasses the interrelationships of geologic materials and processes involving water.

hydrographic area — In reference to Nevada ***groundwater***, divisions of the state into groundwater basins and sub-basins based primarily on topographic features such as mountains and valleys. The state uses the map of hydrographic areas as the basis for water planning, management, and administration. (Because they are based heavily on topographic features, hydrographic area boundaries sometimes differ from groundwater basin designations developed from studies of inferred or measured groundwater flow patterns.)

hydrology — (1) The study of water characteristics, especially the movement of water. (2) The study of water, involving aspects of geology, oceanography, and meteorology.

igneous — (1) A type of rock formed from a molten, or partially molten, material. (2) An activity related to the formation and movement of molten rock either in the subsurface (plutonic) or on the surface (***volcanic***).

impact — For an ***EIS***, the positive or negative effect of an action (past, present, or future) on the natural ***environment*** (land use, ***air quality***, water resources, geological resources, ecological resources, aesthetic and scenic resources) and the human environment (***infrastructure***, economics, social, and cultural).

impact limiters — Devices attached to rail and truck ***shipping casks*** that would help absorb impact energy in the event of a collision.

implementing alternative — An action or proposition by DOE necessary to implement the ***Proposed Action*** and to enable the estimation of the range of reasonably foreseeable ***impacts*** of that action or proposition. In the Rail Alignment ***EIS***, there are two implementing alternatives under the Proposed Action:

1. The Caliente Implementing Alternative, under which DOE would construct and operate the proposed ***railroad*** from in or near the City of Caliente, Nevada, westward and then southward to Yucca Mountain.
2. The Mina Implementing Alternative (the nonpreferred alternative), under which DOE would construct and operate the proposed railroad from Hazen, Nevada, southeastward to Yucca Mountain. Under this implementing alternative, DOE would use the existing Union Pacific Railroad Hazen Branchline from Hazen to Wabuska, Nevada, and would not perform any construction activities along this portion of the rail alignment.

in attainment	The U.S. Environmental Protection Agency designates an area as being in attainment for a particular pollutant if ***ambient*** concentrations of that pollutant are below the National ***Ambient Air Quality Standards***.
in situ	In its natural position or place. The phrase distinguishes in-place experiments, conducted in the field or underground facility, from those conducted in the laboratory.
incident-free transportation	Routine transportation in which cargo travels from origin to destination without being involved in an ***accident***.
indirect impact	An effect that is related to but removed from a ***proposed action*** by an intermediate step or process. Examples include surface-water quality changes resulting from soil erosion at construction sites, and reductions in productivity resulting from changes in soil temperature.
industrial and special wastes	Construction debris and other ***solid waste***, such as tires, that have specific management requirements for permitted landfill disposal.
industry track	A ***siding*** used by a single shipper.
infiltration	The process of water entering the soil at the ground surface and the ensuing movement downward. Infiltration becomes percolation when water has moved below the depth at which it can return to the atmosphere by evaporation or ***evapotranspiration***.
infrastructure	Basic facilities, services, and installations needed for the functioning of a community or society, such as transportation and communication systems.
Interchange Yard	The ***sidings*** where railcars containing other materials (such as materials needed for construction and operation of the proposed ***railroad*** and the ***repository***) would be decoupled from Union Pacific Railroad trains.
intermittent stream/ intermittent drainage	A channel bed that fluctuates above or below the normal water table along its length, and may or may not have flow within it during any particular time or at any particular location. The presence of flow within the channel is determined by its channel elevation relative to the water table, precipitation events, or snowmelt within its drainage basin.
invasive plant species	An alien species, the introduction of which does or is likely to cause economic or environmental harm or harm to human health (Executive Order 13112).
ionizing radiation	(1) ***Alpha particles***, ***beta particles***, ***gamma rays***, ***X-rays***, ***neutrons***, high-speed ***electrons***, high-speed ***protons***, and other particles capable of producing ions. (2) Any ***radiation*** capable of displacing electrons from an atom or molecule, thereby producing ions.
irradiation	***Exposure*** to ***radiation***.

Isolate (related to cultural resources)	An isolated artifact occurrence that does not meet the minimum threshold to be designated a "site." Isolates are generally considered ineligible for the *National Register of Historic Places*.
isolation	Inhibiting the transport of ***radioactive*** material so that the amounts and concentrations of this material entering the ***accessible environment*** stay within prescribed limits.
isotropic	Identical in all directions.
joint	A non-tectonic fracture in the surface or linear opening in a rock.
latent	Present and capable of becoming, though not now visible, obvious, or active.
latent cancer fatality	A death that results from ***cancer*** that ***exposure*** to ***ionizing radiation*** caused. There typically is a ***latent period*** between the time of the radiation exposure and the time the cancer cells become active.
latent period	(1) The incubation period of a disease. (2) The interval between stimulation and response. (3) The interval between ***radiation exposure*** and the time a cancer becomes active.
level of service (roadway)	A qualitative measure describing operational conditions within a traffic stream, generally described in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety.
lithic scatters	Concentrations of waste flakes resulting from the manufacture of stone tools.
lithology	The study and description of the general, gross physical characteristics of a rock, especially sedimentary ***clastics***, including color, grain size, and composition.
loam	A soil composed of a mixture of clay, silt, sand, and organic matter.
locomotive sanding area	Area where a locomotive's sand box is filled. Trains use sand for traction.
long-term impact	In the Rail Alignment ***EIS***, ***impacts*** that could occur throughout and beyond the life of the ***railroad*** operations phase (up to 50 years).
lost workday cases	Incidents that result in injuries that cause the loss of work time.
low-income population	Defined in terms of U.S. Census Bureau annual statistical poverty levels, may consist of groups or individuals who live in geographic proximity to one another or who are geographically dispersed or transient (such as migrant workers or American Indians), where either type of group experiences common conditions of environmental exposure or effect.
low-level radioactive waste	***Radioactive*** waste that is not classified as ***high-level radioactive waste***, ***transuranic waste***, or byproduct tailings containing uranium or thorium from processed ore. Usually generated by hospitals, research laboratories, and certain industries.

maintenance-of-way activities	Activities to maintain the track, bridges, ***culverts***, grade crossings, signal equipment, and communications equipment along a ***rail line***.
matrix (geology)	The solid, but porous, portion of rock.
maximally exposed individual	A hypothetical individual whose location and habits result in the highest total radiological or chemical ***exposure*** (and thus ***dose***) from a particular source for all exposure routes pathways (for example, inhalation, ingestion, direct exposure).
maximum contaminant level	Under the Safe Drinking Water Act (Public Law 93-523), the maximum permissible concentrations of specific constituents in drinking water that is delivered to any user of a ***public water system*** that serves 15 or more connections and 25 or more people; the standards established as maximum contaminant levels consider the feasibility and cost of attaining the standard.
maximum reasonably foreseeable accident	An ***accident*** characterized by extremes of mechanical (impact) forces, heat (fire), and other conditions that would lead to the highest foreseeable consequences. In general, accidents with conditions that have a chance of occurring more often than 1 in 10 million in a year are considered to be reasonably foreseeable.
mesosphere	Belt of atmosphere, just above the ***stratosphere***, from 50 to 80 kilometers (30 to 50 miles) above the Earth's surface.
metamorphic rocks	Rocks that have undergone chemical or structural changes produced by an increase in heat and temperature or by replacement of elements by hot, chemically active fluids.
metric tons of heavy metal	Quantities of ***spent nuclear fuel*** without the inclusion of other materials such as cladding (the tubes containing the fuel) and structural materials. A metric ton is 1,000 kilograms (1.1 tons or 2,200 pounds). Uranium and other metals in spent nuclear fuel (such as thorium and plutonium) are called heavy metals because they are extremely dense; that is, they have high weights per unit volume.
mining area	Places where prospecting or mining is known to have occurred, or where concentrations of specific types of minerals are known to exist, but which were never included within an organized ***mining district***. Many of these areas, with continued use, have come to be called mining districts.
mining claim	The description by boundaries of real property in which metal ore and/or minerals may be located. A claim on public land must be filed with the BLM or other federal agency, and the claim must be "worked" by being mined or prepared for mining within a specific period of time. All mining claims are initially ***unpatented claims***, which give the right only for those activities necessary to exploration and mining, and last only as long as the claim is worked every year. The original mining law gave miners the opportunity to obtain patents (deeds from the government), much as farmers could obtain title under the Homestead Act. The owner of a patented claim can put it to any legal use.

mining district	An area usually designated by name with described or understood boundaries where minerals are found and mined under rules prescribed by the miners, consistent with the General Mining Law of 1872.
minority population	A community in which the percent of the population of a racial or ethnic minority is 10 points higher than the percent found in the population as a whole.
mitigation	Actions and decisions that (1) avoid ***impacts*** altogether by not taking a certain action or parts of an action, (2) minimize impacts by limiting the degree or magnitude of an action, (3) rectify the impact by repairing, rehabilitating, or restoring the ***affected environment***, (4) reduce or eliminate the impact over time by preservation and maintenance operations during the life of the action, or (5) compensate for an impact by replacing or providing substitute resources or environments.
mixed low-level waste	***Low-level radioactive waste*** mixed with ***hazardous wastes***; it must satisfy treatment, storage, and disposal regulations both as low-level radioactive waste and as hazardous waste.
movement corridor	A patch of wildlife ***habitat***, generally vegetated, that joins two or more larger areas of wildlife habitat.
native plant species	With respect to a particular ***ecosystem***, a species that, other than as a result of an introduction, historically occurred, or currently occurs in that ecosystem.
naval spent nuclear fuel	***Spent nuclear fuel*** discharged from reactors in surface ships, submarines, and training ***reactors*** operated by the U.S. Navy.
neutron	An atomic particle with no charge and an ***atomic mass*** of 1; a component of all atoms except hydrogen; frequently released as ***radiation***.
Nevada Railroad Control Center	A facility that would control all train movements, rail operations, and emergency response operations along the proposed ***railroad*** in Nevada to Yucca Mountain.
nitrogen dioxide	See ***nitrogen oxides***.
nitrogen oxides (oxides of nitrogen; $NO_{x)}$	Gases formed in great part from atmospheric nitrogen and oxygen when combustion occurs under conditions of high temperature and high pressure; a major air pollutant. Two primary nitrogen oxides, nitric oxide (NO) and ***nitrogen dioxide*** (NO_2), are noteworthy airborne ***contaminants***. Nitric oxide combines with atmospheric oxygen to produce nitrogen dioxide. Both nitric oxide and ***nitrogen dioxide*** can, in high concentration, cause lung ***cancer***. ***Nitrogen dioxide*** is a ***criteria pollutant***.
No-Action Alternative	Under the No-Action Alternative in the Nevada Rail Corridor SEIS, DOE would not construct and operate a railroad within the Mina ***rail corridor*** from Wabuska to ***Yucca Mountain***. Under the No-Action Alternative in the Rail Alignment ***EIS***, DOE would not implement the ***Proposed Action*** in the Caliente or the Mina rail corridor.

noise-sensitive receptor	A location where noise can interrupt on-going activities and can result in community annoyance, especially in residential areas. Examples of noise-sensitive receptors include schools, libraries, residences, retirement communities, and nursing homes.
Nominal	(1) Of, being, or relating to a designated or theoretical size that may vary from the actual. (2) According to plan.
nonattainment area	An area that does not meet the ***ambient air quality standard*** for one or more ***criteria pollutants***. Further designations (for example, serious, moderate) describe the magnitude of the nonattainment.
non-transient, non-community public water system	A ***public water system*** that is not a ***community water system*** and that regularly serves at least 25 of the same persons over 6 months per year.
non-native plant species	A species found in an area where it has not historically been found.
nonpoint source pollution	Pollution does not come from a single source but from many unidentifiable sources. An example of nonpoint source pollution would be urban runoff of items like oil, fertilizers, and lawn chemicals. As rainfall or snowmelt moves over and through the ground, it picks up and carries away natural and human-made pollutants. These pollutants are eventually deposited into natural bodies of water, such as lakes, rivers, wetlands, coastal waters, and underground sources of drinking water.
normal fault	A ***fault*** in which the relative displacement is along the direction of dip of the fault plane (***dip-slip fault***) where the block above the fault has moved downward in relation to the block below the fault. See ***reverse fault***.
notable drainage channels	In the Rail Alignment ***EIS***, channels with a stream order of 2 or greater based on Strahler's ordering system, with the National Hydrography Dataset as a base map.
noxious weeds	Any species of plant that is, or is likely to be, detrimental or destructive and difficult to control or eradicate.
nuclear radiation	***Radiation*** that emanates from an unstable ***atomic nucleus***.
nuclear reactor	A device in which a nuclear ***fission*** chain reaction can be initiated, sustained, and controlled to generate heat or to produce useful ***radiation***.
nuclear waste	Unusable by-products of nuclear power generation, nuclear weapons production, and research, including ***spent nuclear fuel*** and ***high-level radioactive waste***.

Nuclear Waste Technical Review Board	An independent body established within the Federal Government executive branch, created by the Nuclear Waste Policy Amendments Act of 1987 to evaluate the technical and scientific validity of activities undertaken by DOE, including ***site characterization*** activities and activities relating to the packaging or transportation of ***spent nuclear fuel*** or ***high-level radioactive waste***. Members of this Board are appointed by the President from a list prepared by the National Academy of Sciences.
nucleus	The central, positively charged, dense portion of an atom. Also known as ***atomic nucleus***.
nuclide	An ***atomic nucleus*** specified by its ***atomic weight***, ***atomic number***, and energy state; a ***radionuclide*** is a ***radioactive*** nuclide.
operations right-of-way	Property that would be obtained for operation of the proposed ***railroad***. This right-of-way would be a ***nominal*** width of 61 meters (200 feet) on either side of the centerline of the ***rail line***, but could vary at specific locations to accommodate, for example, access and maintenance roads, and drainage structures. In addition, some facilities (such as the ***Staging Yard***) would be outside the nominal width of the operations right-of-way, but DOE would also obtain rights-of-way in these areas. See ***construction right-of-way***.
ordinary high water mark	That line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas (33 CFR 328.3e).
other material	In the Rail Alignment ***EIS***, material related to the construction (for example, reinforcing steel and cement) and operation (for example, ***waste packages*** and fuel oil) of the ***repository***.
outcrop	The part of a rock formation that appears at the surface of the ground.
overburden	***Geologic*** material of any nature, consolidated or unconsolidated, that overlies a deposit of useful materials.
ozone (O_3)	The triatomic (three atoms in the molecule) form of oxygen; in the ***stratosphere***, ozone protects the Earth from the sun's ***ultraviolet radiation***, but in lower levels of the atmosphere, it is an air pollutant.
package plant	Modular ***wastewater treatment*** units that can be designed to be portable. Most package plants use some type of biological treatment, which can be based on aerobic, anaerobic, or anoxic conditions and use attached or suspended organisms. Other processes incorporated into package plants can include membrane filtration and disinfection by chlorine, ultraviolet light, or ***ozone***.

particulate matter	Fine liquid or solid particles such as dust, smoke, mist, fumes, or smog, found in air or emissions. See ***PM_{10}***.
peak particle velocity	The maximum instantaneous positive or negative peak of the vibration signal, measured as a distance per time (such as millimeters or inches per second). This measurement has been used historically to evaluate shock-wave type vibrations from actions like blasting, pile driving, and mining activities, and their relationship to building damage.
pending annual duty	See ***duty***.
perceived risk and stigma	DOE uses the term ***risk*** perception to mean how an individual perceives the amount of risk from a certain activity. Studies show that perceived risk varies with certain factors, such as whether the exposure to the activity is voluntary, the individual's degree of control over the activity, the severity of the exposure, and the timing of the consequences of the exposure. DOE uses stigma to mean an undesirable attribute that blemishes or taints an area or locale.
perennial stream	A stream that receives ***groundwater*** into its channel and its streambed is normally below the water table. During years with normal precipitation, a perennial stream will have constant flow.
perennial yield	The estimated quantity of ***groundwater*** that can be withdrawn annually from a ***hydrographic area*** without depleting the ***aquifer***. The Nevada State Engineer uses the perennial yield estimate as a guideline by which to limit groundwater allocations.
permeability	In general terms, the capacity of such mediums as rock, sediment, and soil to transmit liquid or gas. Permeability depends on the substance transmitted (oil, air, water, etc.) and on the size and shape of the pores, ***joints***, and ***fractures*** in the medium and the manner in which they interconnect. "Hydraulic conductivity" is equivalent to "permeability" in technical discussions relating to ***groundwater***.
permeable	Pervious; a permeable rock is a rock, either porous or cracked, that allows water to soak into and pass through it freely.
person-rem	A unit used to measure the ***radiation exposure*** to an entire group and to compare the effects of different amounts of radiation on groups of people; it is the product of the average ***dose equivalent*** (in ***rem***) to a given organ or tissue multiplied by the number of persons in the population of interest.
petroglyph	A carving or inscription on a rock; rock art.
pH	A measure of the relative acidity or ***alkalinity*** of a solution, expressed on scale from 0 to 14, with the neutral point at 7.0. Acid solutions have pH values lower than 7.0, and basic (that is, alkaline) solutions have pH values higher than 7.0.

plate girder bridge	A typical bridge constructed across short spans. It usually looks like a u-shape in cross section, with two steel plates supporting each side of the bridge.
playa	A nearly level area at the bottom of a ***desert*** basin that does not drain to a river and is temporarily covered with water from heavy rains or snowmelts. Normally a dry lakebed that may contain water in response to seasonally high runoff.
pluvial lakes	Lakes that increase in size and depth as a result of increased precipitation and decreased evaporation, characteristic of past environmental conditions that were cooler and wetter than today.
PM_{10}	All ***particulate matter*** with an aerodynamic diameter less than or equal to a nominal 10 micrometers. Particles less than this diameter are small enough to be breathable and could be deposited in lungs.
$PM_{2.5}$	All ***particulate matter*** with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers.
population dose	A summation of the ***radiation doses*** received by individuals in an exposed population; equivalent to ***collective dose***; expressed in ***person-rem***.
pressurized-water reactor (PWR)	A ***nuclear*** power ***reactor*** that uses water under pressure as a coolant. The water boiled to generate steam is in a separate system.
prime farmland	Land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses. It has the combination of soil properties, growing season, and moisture supply needed to produce sustained high yields of crops in an economic manner if it is treated and managed according to acceptable farming methods. In general, prime farmland has an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, an acceptable level of acidity or ***alkalinity***, an acceptable content of salt and sodium, and few or no rocks. Its soils are ***permeable*** to water and air. Prime farmland is not excessively eroded or saturated with water for long periods of time, and it either does not flood frequently during the growing season or is protected from flooding.
primordial radionuclides	***Radionuclides*** that originate mainly from the interiors of stars and are still present because their ***half-lives*** are so long that they have not yet completely ***decayed***.
probability	The relative frequency at which an event can occur in a defined period. Statistical probability is what happens in the real world and can be verified by observation or sampling. Knowing the exact probability of an event is usually limited by the inability to know, or compile the complete set of, all possible outcomes over time or space. Probability is measured on a scale of 0 (event will not occur) to 1 (event will occur).

Proposed Action	The activity proposed to accomplish a federal agency's purpose and need. An ***EIS*** analyzes the environmental ***impacts*** of a proposed action, which includes the project and its related support activities. The Proposed Action in the Nevada Rail Corridor SEIS is to construct and operate a railroad to connect the Yucca Mountain Repository to an existing ***rail line*** near Wabuska, Nevada (the Mina ***rail corridor***). The Proposed Action in the Rail Alignment EIS, is to determine an alignment (within a corridor) and construct and operate a ***railroad*** in Nevada to transport ***spent nuclear fuel***, ***high-level radioactive waste***, and other Yucca Mountain project materials to a ***repository*** at Yucca Mountain.
proton	An elementary particle that is the positively charged component of ordinary matter and, together with the ***neutron***, is a building block of all ***atomic*** nuclei.
public land order	An order affecting, modifying, or canceling a withdrawal or reservation that has been issued by the Secretary of the Interior pursuant to powers of the President delegated to the Secretary by Executive Order 9146 of April 24, 1942, or 9337 of April 24, 1943.
public lands	As defined in Public Law 94-79, public lands are any land and interest in land outside of Alaska owned by the United States and administered by the Secretary of the Interior through the BLM. In common usage, public lands may refer to all federal land no matter what agency has responsibility for its management.
public water system	A water system that provides water for human consumption for an average of at least 25 persons per day (or 15 or more service connections) and in use for at least 60 days each year.
pyroclastic	Of or relating to individual particles or fragments of ***clastic*** rock material of any size formed by volcanic explosion or ejected from a volcanic vent.
qualitative	With regard to a variable, a parameter, or data, an expression or description of an aspect in terms of non-numeric qualities or attributes. See ***quantitative***.
quantitative	A numeric expression of a variable. See ***qualitative***.
rad	A unit of absorbed ***radiation dose*** in terms of energy. One rad equals 100 ergs of energy absorbed per gram of tissue.
radiation	The emitted particles or ***photons*** from the nuclei of radioactive atoms. Some elements are naturally ***radioactive***; others are induced to become radioactive by ***irradiation*** in a reactor. Naturally occurring radiation is indistinguishable from induced radiation.
radioactive	Emitting ***radioactivity***.
radioactivity	The property possessed by some elements (for example, uranium) of spontaneously emitting ***alpha, beta***, or ***gamma rays*** by the disintegration of ***atomic*** nuclei.

radionuclide	See ***nuclide***.
radiotoxicity	Of, relating to, or being a ***radioactive*** substance that is toxic to living cells or tissues.
radius of influence	The distance from the well where the drawdown becomes insignificant and can be neglected.
rail alignment	An engineered refinement of a ***rail corridor*** in which DOE would identify the location of a ***rail line***. A rail alignment is comprised of ***common segments*** and ***alternative segments***.
rail corridor	As used in the Rail Alignment ***EIS***, a strip of land 400 meters (0.25 mile) wide through which DOE would identify an alignment (***rail alignment***) for the construction of a ***rail line*** in Nevada to a ***geologic repository*** at Yucca Mountain.
Rail Equipment Maintenance Yard	The rail yard that would be near the ***geologic repository*** and would temporarily store, service, and maintain railcars and locomotives in preparation for the return trip to the ***Staging Yard***.
rail line	An engineered feature incorporating the track, ties, ***ballast***, and ***subballast*** at a specific location.
rail route	Route from point of origin to the ***repository***.
railroad	A transportation system incorporating the ***rail line***, operations support facilities, railcars, locomotives, and other related property and infrastructure.
rain shadow	Effect that occurs when moist air is blown toward a mountain and the air rises, cools, and releases its moisture as rain or snow. When the air passes to the other side of the mountain, it is dry and does not release moisture. If the wind always blows the same way, the area on the dry side of the mountain is said to be in a rain shadow.
reactor	See ***nuclear reactor***.
real disposable income	The value of total income received after taxes; it is the income available for spending or saving; also referred to as ***real disposable personal income***.
real disposable personal income	See ***real disposable income***.
receptor	The location or recipient of an ***impact***.
recharge	The movement of water from an ***unsaturated zone*** to a ***saturated zone***.
Record of Decision	A document that provides a concise public record of a decision made by a government agency.

recordable cases	Occupational injuries or occupation-related illnesses that result in (1) a fatality, regardless of the time between the injury or the onset of the illness and death, (2) ***lost workday cases*** (nonfatal), and (3) the transfer of a worker to another job, termination of employment, medical treatment, loss of consciousness, or restriction of motion during work activities.
region of influence	The physical area that bounds the environmental, sociologic, economic, or cultural features of interest for the purpose of analysis.
rem	A unit of ***dose equivalent***. The dose equivalent in rems equals the absorbed dose in ***rads*** in tissue multiplied by the appropriate quality factor and possibly other modifying factors. Derived from roentgen equivalent man, referring to the dosage of ionizing ***radiation*** that will cause the same biological effect as one roentgen of ***X-ray*** or ***gamma ray*** exposure. One rem equals 0.01 sievert.
remediation	Action taken to permanently remedy a release or threatened release of a hazardous substance to the ***environment***, instead of or in addition to removal.
repository	See ***geologic repository***.
resource management plan	A land-use plan for public lands as described by the Federal Land Management and Policy Act. Among other things, it establishes land areas for limited, restricted, or exclusive use; allowable resource uses; resource condition goals and objectives; general management practices to achieve the goals; the need for more specific management plans for certain areas; general implementation sequences; and monitoring intervals and standards.
reverse fault	A ***fault*** in which the relative displacement is along the direction of the dip of the fault plane (***dip-slip fault***), and in which the block above the fault has moved upward in relation to the block below the fault.
right-of-way grant	Authorization from the BLM to use a specific portion of public land for construction and operation of the proposed ***railroad***. The land covered by the right-of-way grant would include the area of construction, known as the ***construction right-of-way*** and the area of operations known as the ***operations right-of-way***.
riparian	Of, on, or pertaining to, the bank of a river or stream, or of a pond or small lake.
riprap	Broken rocks or chunks of concrete used as foundation material or to protect embankments and gullies to control water flow or prevent erosion.
risk	The product of the ***probability*** that an undesirable event will occur multiplied by the consequences of the undesirable event.
roadbed	The earthwork foundation upon which the track, ties, ***ballast***, and ***subballast*** of a ***rail line*** are lain.

root mean-square velocity	An average or smoothed vibration amplitude, commonly measured over 1-second intervals. It is expressed on a log scale in decibels (VdB) referenced to 0.000001 (10^{-6}) inch per second and is not to be confused with noise ***decibels***.
sand sheets	Large, irregularly shaped, commonly thin, surficial mantles of windblown sand that lack the discernible slip faces that are common on dunes.
sanitary and industrial solid waste	***Solid waste*** that is neither ***hazardous*** nor ***radioactive.*** Sanitary waste streams include paper, glass, and discarded office material. State of Nevada waste regulations identify this waste stream as household waste.
sanitary waste	Domestic wastewater from toilets, sinks, showers, kitchens, and floor drains from restrooms, change rooms, and food preparation and storage areas.
saturated zone	The area below the ***water table*** where all spaces (***fractures*** and rock pores) are completely filled with water.
scenic quality	A measure of the visual appeal of a tract of land. Areas are rated from A to C based on key factors including landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications. An A rating is assigned to areas that combine the most outstanding characteristics of each category, whereas a C rating is assigned to areas common to the region.
screened (related to water wells)	The portion of a well that is screened is the interval in the well where the casing contains slots to let in the water from the primary (most productive) water-bearing zone or zones.
sedimentary rocks	Rock formed by the accumulation of sediment in water or land. Sandstone, chert, limestone, dolomite, shale, siltstone, and mudstone are types of sedimentary rocks that are found in the Great Basin. They are differentiated by chemistry, deposition, and texture.
seismic	Pertaining to, characteristic of, or produced by, earthquakes or earth vibrations.
seismicity	A ***seismic*** event or activity such as an ***earthquake*** or earth tremor; seismic action.
semi-desert	An ***arid*** area that has some of the characteristics of a ***desert*** but has greater annual precipitation.
sensitive receptors	As used in the Rail Alignment ***EIS***, any specific resource (population or facility) that would be more susceptible to the effects of the ***impact*** of implementing the ***Proposed Action*** than would otherwise be.
sensitive structures	Buildings or structures, usually old and of cultural value, or facilities that house vibration-sensitive equipment, that could be susceptible to ***ground vibrations,*** activities, or conditions causing ***ground vibrations***.
sensitivity levels	A measure of public concern for ***scenic quality***. Areas are ranked high, medium, or low based on types of users, amount of use, public interest, adjacent land uses, and whether they are special areas.

Shared-Use Option	An option under the ***Proposed Action***. DOE would allow commercial and other shippers to use the ***rail line*** for general freight shipments. General freight would include stone and other nonmetallic minerals, petrochemicals, waste materials (nonradioactive), or other commodities that private companies would ship or receive.
shielding	Any material that provides ***radiation*** protection.
shipment	The movement of a properly prepared (loaded, unloaded, or empty) ***cask*** from one site to another and associated activities to ensure compliance with applicable regulations.
shipping cask	A heavily shielded, massive container that meets regulatory requirements for shipping ***spent nuclear fuel*** and ***high-level radioactive waste***. See ***cask***.
short-term impact	In the Rail Alignment ***EIS***, ***impacts*** limited to the construction phase (4 to 10 years).
siding	A track that runs parallel to the main line for a short distance and is used for passing and overtaking trains to prevent backups and keep traffic flowing.
signal blocks	A ***rail line*** bounded on one end by an entry signal and on the other end by an exit signal. The proposed ***railroad*** would be divided into a number of signal blocks, which would allow for easier control of trains along the railroad.
site characterization	Activities associated with the determination of the suitability of the ***Yucca Mountain Site*** for a ***geologic repository***.
soft soils	Soils with saline conditions that limit the chemical and physical potentials of the soil and that could have negative effects on the vegetation-bearing capacity of the soil. These soils would have a higher potential for erosion until revegetation was complete.
soil recovery	The return of disturbed land to a relatively stable condition with a form and productivity similar to that which existed before any disturbance.
solid waste	For purposes of this analysis, defined as nonhazardous general household waste.
source term	Types and amounts of ***radionuclides*** that are the source of a potential release of ***radioactivity***.
special areas	Defined in BLM Visual Resource Inventory Manual 8410 as lands where measures must be taken to protect visual values. Special areas often include designated natural areas, ***Wilderness Study Areas***, scenic rivers, and scenic roads. Special areas are not necessarily unique or picturesque, but the management objective for a special area is to preserve its natural characteristics.

spent nuclear fuel

1. ***Nuclear reactor*** fuel that has been used to the extent that it can no longer effectively sustain a chain reaction.
2. Fuel that has been withdrawn from a nuclear reactor after ***irradiation***, the component elements of which have not been separated by reprocessing. For this project, this refers to:
   a. Intact, nondefective ***fuel assemblies***
   b. Failed fuel assemblies in ***canisters***
   c. Fuel assemblies in canisters
   d. Consolidated fuel rods in canisters
   e. Nonfuel assembly hardware inserted in ***pressurized-water reactor*** fuel assemblies
   f. Fuel channels attached to ***boiling-water reactor*** fuel assemblies
   g. Nonfuel assembly hardware and structural parts of assemblies resulting from consolidation in canisters

splay faults

Minor faults that branch off of a primary fault, or interconnect to form a fault zone.

spoils areas

Areas outside the ***rail corridor*** for the deposition of excavated materials from ***rail line*** development.

Staging Yard

The rail yard that would temporarily store, service, and maintain railcars and locomotives in preparation for a trip to the ***Rail Equipment Maintenance Yard*** inside the ***Yucca Mountain Site boundary*** near the ***repository*** operations area, or in preparation for return to the Union Pacific Railroad. Railcars containing ***casks*** would be decoupled from Union Pacific Railroad trains in preparation for the trip to the repository.

stakeholder

A person or organization with an interest in, or affected by, DOE actions (for example, representatives from federal, state, tribal, or local agencies; members of Congress or state legislatures; unions, educational groups, environmental groups, industrial groups; and members of the general public).

State-protected species

Animals classified under Nevada Administrative Code, Section 503.103, as meeting the Endangered Species Act definition or the State population being in danger of extinction. Under Nevada Administrative Code 527.020, a plant species is classified as being in danger of extinction if its survival requires assistance because of overexploitation, disease, or other factors or because its habitat is threatened with destruction, drastic modification, or severe curtailment.

stigma

See ***perceived risk and stigma***.

storage	The collection and containment of waste or ***spent nuclear fuel*** in a way that does not constitute ***disposal*** of the waste or spent nuclear fuel for the purposes of awaiting treatment or disposal capacity.
stratigraphy	The branch of geology that deals with the definition and interpretation of rock strata, the conditions of their formation, character, arrangement, sequence, age, distribution, and especially their correlation, by the use of ***fossils*** and other means of identification.
stratosphere	The atmospheric shell above the ***troposphere*** and below the ***mesosphere***. It extends from 10 to 20 kilometers (6 to 12 miles) to about 53 kilometers (33 miles) above the Earth's surface.
stratum	A sheet-like mass of ***sedimentary rock*** or earth of one kind lying between beds of other kinds.
subballast	A layer of crushed gravel that is used to separate the ***ballast*** and ***roadbed*** for the purpose of load distribution and drainage.
subgrade elevation	The elevation of the top of the ***subballast*** in the ***rail line***.
substrate	Basic surface on which a material adheres.
sulfur dioxide (SO_2)	A pungent, colorless gas produced during the burning of sulfur-containing fossil fuels. It is the main pollutant involved in the formation of acid rain. Coal- and oil-burning electric utilities are the major source of sulfur dioxide in the United States. Inhaled sulfur dioxide can damage the human respiratory tract and can severely damage vegetation. See ***criteria pollutants***, ***ambient air quality standards***.
sulfur oxides	A mixture of ***sulfur dioxide***, sulfur trioxide, and inorganic sulfites and sulfates. Sulfur dioxide combines with oxygen in the air to form sulfur trioxide and microscopic aerosol sulfite and sulfate particles, all of which are lung irritants. See ***criteria pollutants***, ***ambient air quality standards***.
surface entry	The appropriation of any non-federal interests or claims (other than mining claims), land sales, BLM land exchanges, state selections, Desert Land Entries, Indian Allotments, Carey Act selections, or any other like public land disposal actions. Surface entry does not include ***rights-of-way***, granted pursuant to Title V of the Federal Land Policy and Management Act, and other easements, leases, licenses, and/or use permits.
sustained yield	The amount of water that may be pumped from a ***hydrographic area*** during a specific period of time without affecting future yields. Equal to ***recharge***, and independent of economic feasibility and management objectives.
team track	A track on which rail cars would be placed for public use to load or unload freight.
tectonic plate	A piece of Earth's outer shell that moves across the mantle.

thermal desorption	The use of heat to remove an absorbed substance from a liquid or gas environment, including soil.
threatened species	A species that is likely to become an ***endangered species*** within the foreseeable future throughout all or a significant part of its range.
thrust fault	A *fault* that occurs when squeezing forces push the block above an inclined fault up in relation to the other block.
total employment	The sum of direct and indirect employment resulting from initiation of an activity. Direct employment consists of jobs performing the activity. Indirect employment consists of jobs in other activities supporting the direct employees. Also defined as composite employment.
total population	The sum of all people associated with direct and indirect employees and their families resulting from initiation of an activity.
toxic air pollutant	A ***hazardous chemical*** that can cause serious health and environmental hazards; listed on the federal list of ***hazardous air pollutants*** (Clean Air Act; 42 U.S.C. 7412).
traditional cultural property	A property that is eligible for inclusion in the *National Register of Historic Places* because of its association with cultural practices or beliefs of a living community that are rooted in that community's history, and are important in maintaining the continuing cultural identity of the community. Culture includes the traditions, beliefs, practices, lifeways, arts, crafts, and social institutions of any community, whether an American Indian tribe, a local ethnic group, or the people of the Nation as a whole. Properties can include buildings, structures, and sites; groups of buildings, structures, or sites forming historic districts; and individual objects.
transpiration	The process by which water enters a plant through its root system, passes through its vascular system, and is released into the atmosphere through openings in its outer covering. It is an important process for removal of water that has infiltrated below the zone where it could be removed by evaporation.
transuranic waste	Waste materials (excluding ***high-level radioactive waste*** and certain other waste types) contaminated with alpha-emitting ***radionuclides*** that are heavier than uranium with half-lives greater than 20 years and that occur in concentrations greater than 100 nanocuries per gram. Transuranic waste results primarily from treating and fabricating plutonium, and research activities at DOE defense installations.
troposphere	The lowest layer of the atmosphere; it contains about 95 percent of the mass of air in the Earth's atmosphere. The troposphere extends from the Earth's surface up to about 10 to 15 kilometers (7 to 9 miles).

tuff	***Igneous*** rock formed from compacted volcanic fragments from ***pyroclastic*** (explosively ejected) flows with particles generally smaller than 4 millimeters (about 0.16 inch) in diameter. Nonwelded tuff results when volcanic ash cools in the air sufficiently that it does not melt together, yet later becomes rock through compression.
ultraviolet radiation	Electromagnetic ***radiation*** with wavelengths from 4 to 400 nanometers. This range begins at the short wavelength limit of visible light and overlaps the wavelengths of long ***X-rays*** (some scientists place the lower limit at higher values, up to 40 nanometers). Also known as ultraviolet light.
uncertainty	A measure of how much a calculated or estimated value that is used as a reasonable guess or prediction might vary from the unknown true value.
unique farmland	Land other than ***prime farmland*** that is used for the production of specific high-value food and fiber crops such as citrus, tree nuts, olives, cranberries, fruits, and vegetables.
unpatented mining claim	See ***mining claim***.
unsaturated zone	The zone of soil or rock below the ground surface and above the ***water table***.
viewshed	A total field of vision or a vista. In particular, an area with visual boundaries seen from various points within the area.
vitrification	A waste treatment process that uses glass (for example, ***borosilicate glass***) to encapsulate or immobilize ***radioactive*** wastes.
volatile organic compound (VOC)	Organic chemical compounds that have high enough vapor pressures under normal conditions to significantly vaporize and enter the atmosphere.
volcanic rock	Rocks that have been ejected at or near the Earth's surface. ***Tuffs***, lava flows, volcanic breccias, basalt, andesite, and rhyolite are types of volcanic rocks that are found in the Great Basin. They are differentiated by chemistry and texture.
wash	The dry streambed of an ***intermittent*** or ***ephemeral stream***. In the Nevada Rail Corridor SEIS and the Rail Alignment ***EIS***, wash is used interchangeably with intermittent and ephemeral streams.
waste form	A generic term that refers to the different types of ***radioactive*** wastes.
waste package	A container that consists of the barrier materials and internal components into which DOE would place the ***canisters*** that contained ***spent nuclear fuel*** and ***high-level radioactive waste*** at the ***repository***.
waste packages	Two thick metal cylinders, one nested within the other. The inner cylinder would be made of stainless steel to provide structural strength. The outer cylinder would be made of a nickel alloy that is highly resistant to corrosion.

wastewater treatment	A process that typically involves three stages (called primary, secondary, and tertiary treatment). First, the solids are separated from the wastewater. Next, dissolved biological matter is progressively converted into a solid mass using indigenous water-borne bacteria. Finally, the biological solids are neutralized and then disposed of or reused, and the treated water can be disinfected chemically or physically (such as by lagooning and micro-filtration). The final effluent can be discharged into a natural surface-water body or other environment.
water table	(1) The upper limit of the ***saturated zone*** (the portion of the ground wholly saturated with water). (2) The upper surface of a zone of saturation above which most pore spaces and ***fractures*** are less than 100-percent saturated with water most of the time (***unsaturated zone***) and below which the opposite is true (saturated zone).
waters of the United States	Streams, drainages, or washes under the jurisdiction of the U.S. Army Corps of Engineers under the Clean Water Act as defined at 33 CFR 328.3a. The U.S. Army Corps of Engineers and U.S. Environmental Protection Agency regulate the placement of dredged or fill material into these waters. The definition incorporates channels with ***ephemeral*** and intermittent flow that exhibit specific physical features, including channel shape and surrounding vegetation, that would provide indications of an ***ordinary high water mark***.
wayside signal	Any signal of fixed location outside the train alongside the track.
welded tuff	A ***tuff*** deposited under conditions in which the particles making up the rock were heated sufficiently to cohere. In contrast to nonwelded tuff, welded tuff is denser, less porous, and more likely to be ***fractured*** (which increases ***permeability***).
wetland	Areas inundated or saturated by surface- or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.
Wilderness Study Area	Areas of public lands the BLM has formally identified as having wilderness characteristics. These areas are protected by Congress, until Congress either designates them as an official Wilderness Area or removes them from any wilderness designation.
wildlife guzzler	A water development for wildlife that relies on rainfall or snowmelt to recharge it, rather than springs or streams. Usually used where there are no other sources of water for wildlife.
withdrawal	Related to land use: Withholding an area of federal land from settlement, sale, location, or surface entry, under some or all of the general land laws, for the purpose of limiting activities under those laws to maintain other public values in the area or reserving the area for a particular public purpose or program. Related to water resources: Water diverted from the ground or diverted from a surface-water source for use.

worker year	Two-thousand hours of paid labor; a project requiring 1.5 worker years would take 3,000 hours to complete.
wye track	A triangular shaped arrangement of tracks with a switch at each corner. With a sufficiently long track leading away from each corner, a train of any length can be turned.
X-rays	Penetrating electromagnetic ***radiation*** having a wavelength much shorter than that of visible light. X-rays are identical to ***gamma rays*** but originate outside the ***nucleus***, either when the inner orbital ***electrons*** of an excited atom return to their normal state or when a metal target is bombarded with high-speed electrons.
Yucca Mountain Site	The area inside the ***Yucca Mountain Site boundary*** over which DOE has control.
Yucca Mountain Site boundary	The outer limit of the 600-square-kilometer (150,000-acre) area shown on figures in the Nevada Rail Corridor SEIS and the Rail Alignment ***EIS***, assumed, for purposes of analysis, to be the area of federal property set aside for the exclusive use of DOE for the ***repository*** project.

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