QA:N/A

TECHNICAL SUPPORT DOCUMENT— CORRIDOR-LEVEL INFORMATION FOR THE MINA, CARLIN, JEAN, AND VALLEY MODIFIED RAIL IMPLEMENTING ALTERNATIVES

Revision 0
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Management and Technical Support Services
A Yucca Mountain Project Support Organization

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1. INTRODUCTION

The purpose of this document is to support the preparation by the U.S. Department of Energy (DOE or the Department) of a supplement to the *Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (DOE 2002), which this document refers to as the FEIS. This document provides environmental information and defines the affected environment for the Mina Corridor and an update of environmental information for three of the corridors analyzed in the FEIS – Carlin, Jean, and Valley Modified. This information can be used to assess potential impacts from the construction and operation of a rail line in the Mina, Carlin, Jean, and Valley Modified corridors in the Rail Alignment Environmental Impact Statement. The potential rail corridors to Yucca Mountain analyzed in this document are depicted in Figure 1-1.

1.1 Bases for Evaluation

The bases for evaluation for the Mina Corridor are the *Mina Rail Route Feasibility Study* (BSC 2006a); baseline and affected environment information from federal, state, and local sources; public scoping comments; and design and engineering knowledge that DOE has derived from its analyses of the Caliente Corridor at the alignment level. The presentation of the Mina analyses is commensurate in its content and detail with the presentation of corridor-level information in the FEIS. Chapter 2 discusses the environmental attributes of the Mina Corridor as one of the bases that DOE will use to determine if the corridor warrants further detailed studies.

In addition to the supplement to the FEIS for the Mina Corridor, the DOE decided that it would update as appropriate the FEIS information and analyses for the Carlin, Jean, and Valley Modified rail corridors to determine if there are significant new circumstances or information relevant to environmental concerns (71 *FR* 60484). The Department has eliminated the Caliente-Chalk Mountain Corridor, which would intersect the Nevada Test and Training Range, from further review because of U.S. Air Force concerns that a rail line on the Range would interfere with its mission objectives (Garrish 2004). For clarity, any options within the Carlin, Jean, and Valley Modified corridors that would cross onto Nevada Test and Training Range are depicted in figures with dashed lines. Additionally, DOE has informed the Timbisha Shoshone Tribe that any corridor options that would cross the Tribe's Trust Lands have been eliminated from consideration (Sweeney 2004).

The review of the Carlin, Jean, and Valley Modified Corridors in Chapter 3 is commensurate in its content and detail with the presentation of corridor-level information in the FEIS. However, there is no intent to rewrite FEIS Sections 3.2.2, "Nevada Transportation," and 6.3.2, "Impacts of Nevada Rail Transportation Implementing Alternatives." To determine if any of the corridors warrants further detailed studies, the purpose of the review is to include new information that could change the range or magnitude of potential environmental impacts described in the FEIS.

In 1990, the *OCRWM Yucca Mountain Project Preliminary Rail Access Study* (YMP 1990) evaluated land use conflicts for 13 alternative corridors, including Mina and Cherry Creek, that could provide access to Yucca Mountain. The evaluation concluded that the Mina and Cherry Creek Corridors failed to meet Criterion 3 – "Avoid obvious or potential land-use conflict." In April 1995 and 1996, the *Nevada Potential Repository Preliminary Transportation Strategy Study 1* and *2*, respectively (CRWMS M&O 1995, 1996), determined that the Mina and Cherry Creek Corridors should receive a status of "Eliminated from Detailed Evaluation-Monitor." Although the FEIS did not discuss either of these corridors, DOE continued to monitor them for changes that could affect their feasibility.

In June 2006, DOE prepared *Verification of "Monitor" Status for the Cherry Creek Rail Route* (BSC 2006b). The purpose of the paper was to verify whether the original basis for placement of the Cherry Creek rail route on monitoring status remained valid. The Department concluded that the status of the Cherry Creek Corridor should continue as "Eliminated from Detailed Evaluation–Monitor" because of land use issues that included land ownership changes, track ownership changes, and potential conflicts.

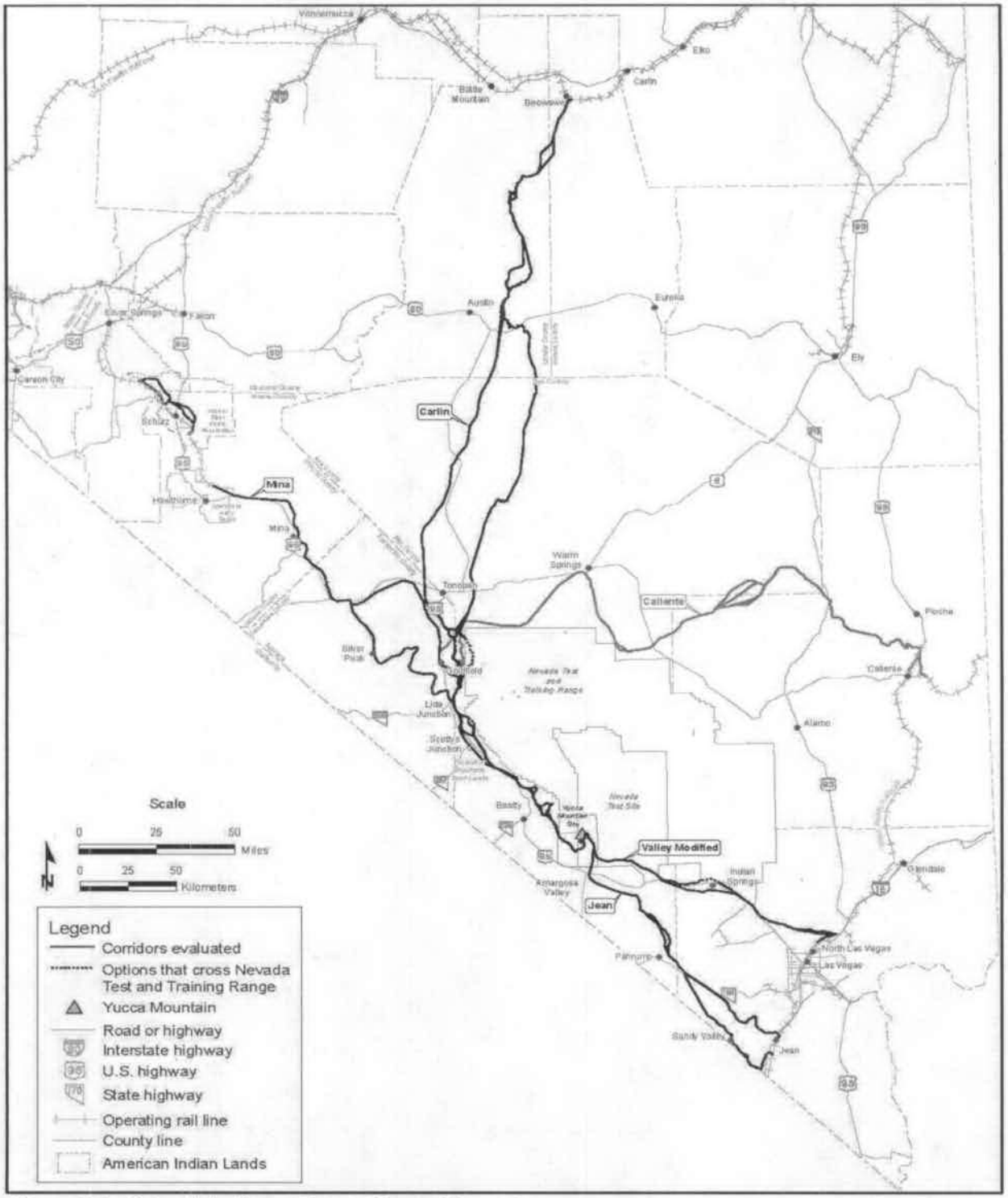

Figure 1-1. Potential rail corridors to Yucca Mountain.

1.2 Overview of Design Evolution

In the FEIS, DOE based its rail corridor design and associated construction and operations plans on standard railroad industry practices and in consideration of applicable regulations. Since issuing the FEIS, DOE has advanced its proposed design and associated plans to determine an alignment for the construction and operation of a railroad within the Caliente corridor (Nevada Rail Partners (NRP) 2007a). These current design and construction and operations plans, which meet standard industry practices and objectives, have advanced from those of the FEIS. The following engineering design details and associated operations plans have been used for purposes of evaluating the potential environmental attributes from constructing and operating a railroad in the respective corridors.

- More detailed aerial mapping and contour analysis of the Caliente rail corridor and its options
- Corridor options to avoid areas of environmental concern
- Use of material excavated from one area within the corridor to provide subballast for other areas; the use of any excess for widening the rail roadbed or development of a service road, thereby reducing the need for spoils areas
- Final grading requirements of slopes, installation of rock-fall protection devices, replacement of topsoil, revegetation and installation of other permanent erosion control systems, and an adjacent maintenance road within the corridor
- Changes to design criteria to now include a maximum horizontal curvature of 6 degrees with 2 percent compensated curves, use of 62-kilogram (136 lbs) rail and 30 centimeters (12 inches) of ballast, and a 9.4-meter (31-foot) top of cross section
- Use of a centralized train control signal system (monitoring equipment, signals, communications equipment) for train operations
- An increase in the number of trains of up to 17 trains per week during the operations phase
- An increase in the operations period of up to 50 years
- More detailed design of certain facilities that would interface with the Union Pacific Railroad near Caliente, Nevada.
- For Caliente, the average width land disturbed is 100 meters (325 feet) within the corridor based on conceptual rail alignment engineering and construction design.

To provide information for the Mina Corridor and to update the information on the Carlin, Jean, and Valley Modified Corridors, parameters that describe alignment characteristics (e.g., length of corridor and earthwork quantities) derived from Caliente analyses provided ratios to estimate the data at a corridor level. The ratios based on earthwork were applied to the corridors to estimate water demand in relation to the values for the Caliente Corridor. Ratios based on the length of the corridor were used to estimate steel use (main track rail) and concrete use (main track ties). This resulted in information for the Mina Corridor and updated material usage estimates for the Carlin, Jean, and Valley Modified Corridors.

Details regarding support facilities are not considered a discriminator at the corridor level and therefore are not addressed within this document. A detailed analysis of support facilities, to include locations, is addressed at the alignment level in the Rail Alignment Environmental Impact Statement (EIS).

1.3 Region of Influence

As described in Section 1.2., DOE evaluated environmental attributes for each resource area, while considering the evolution of engineering and design changes. Using the established baseline environment and affected environment, DOE defined a region of influence. Table 1-1 lists the region of influence for each resource area.

Table 1-1. Regions of influence for each resource area.

Resource area	Region of influence
Land use and ownership	Land use and ownership entirely or partially within the 400-meter-wide rail corridor. Includes land use and ownership outside the corridor that could incur cumulative impacts.
Air quality	The U.S. Environmental Protection Agency (EPA)-designated air basins through which the corridor would pass.
Hydrology	The 400-meter width of the corridor and a 1-kilometer-wide area along each side of the corridor.
	Surface Water: Areas near where construction would take place that would be susceptible to erosion, areas affected by permanent changes in flow, and areas downstream of construction that could be affected by eroded soil or potential spills of construction contaminants.
	Groundwater: Aquifers that would underlie areas of construction and operation and aquifers DOE could use to obtain water for construction and operations support.
Biological resources	Resources within the 400-meter-wide corridor and a 5-kilometer-wide area along each side of the corridor. Includes habitat (which include wetlands and riparian areas), sensitive species, and migratory ranges of big game animals and wild horses and burros that a rail line could affect.
Cultural resources	Coverage within the 400-meter-wide corridor. This area includes the area of potential disturbances that could have indirect impacts on cultural resources.
Occupational and public health and safety	*Traffic impacts:* The 400-meter width of the corridor and public highways used by workers and for shipments during construction and operations.
	Worker industrial safety impacts: The 400-meter-wide rail corridor.
	Incident-free radiological and nonradiological impacts: The 800-meter area on either side of the centerline of the rail corridor.
	Radiological impacts with respect to accidents: An area within an 80-kilometer radius from a potential occurrence location in the rail corridor.
Socioeconomics	Counties in Nevada that a potential rail line would traverse and the two areas where most workers would live, Clark County and Carson City/Washoe County area.
Noise and vibration	Inhabited commercial and residential areas where noise and vibration from rail line construction and operations could be a concern.
Aesthetic resources	The viewshed around the rail corridor.
Utilities, energy, and materials	The regional supply infrastructure that would support rail line construction and operations.
Waste management	Counties in Nevada that a potential rail line would traverse and that have existing municipal sanitary waste landfills; disposal facilities for other types of wastes.
Environmental justice	Locations of minority, low-income, and Native American populations along the rail corridor; this includes the regions of influence listed above.

2. MINA CORRIDOR

In the summer of 2006, DOE initiated a study to consider the feasibility of the Mina rail corridor. The study identified rail line options on the Walker River Paiute Reservation to bypass Schurz, around the Montezuma Range, north of Scottys Junction (referred to as Bonnie Claire), and in Oasis Valley. On October 13, 2006, after completing the preliminary evaluation of the feasibility of the Mina rail corridor, DOE announced its intent to expand the scope of the Rail Alignment EIS to include the Mina corridor (*Amended Notice of Intent to Expand the Scope of the Environmental Impact Statement for the Alignment, Construction, and Operation of a Rail Line to a Geologic Repository at Yucca Mountain, Nye County,NV*; 71 *FR* 60484). The Mina corridor analyzed within is based on the corridor and associated options presented in the feasibility study.

2.1 Description of the Mina Corridor

The Mina rail corridor would be from about 410 to 450 kilometers (255 to 280 miles) long, depending on the combination of options. However, construction of new rail line would range from between about 380 and 420 kilometers (240 and 260 miles) because the corridor would include the existing U.S. Department of Defense Branchline from Wabuska to the Hawthorne Army Depot in Hawthorne, Nevada (BSC 2006a).

Construction of a rail line in the Mina rail corridor would begin near Wabuska, Nevada, and proceed southeast across the Walker River Paiute Reservation, along one of three options that would bypass the town of Schurz. Figure 2-1 shows the Mina rail corridor and its options, which are described in Sections 2.1.1 through 2.1.4. Mina common corridor segment 1 would begin north of Hawthorne and would trend southeast before turning east at U.S. Highway 95. It would trend east along U.S. Highway 95 through Soda Springs Valley for approximately 40 kilometers (25 miles). Continuing to parallel U.S. Highway 95, the rail line would cross State Route 361 and turn south for approximately 64 kilometers (40 miles). It would pass Luning and Mina, which are along U.S. Highway 95. The rail line would then turn east before crossing U.S. Highway 95 with a grade-separated crossing in the area of Blair Junction and continuing for about 1.5 kilometers (1 mile) before joining the selected Montezuma option. Mina common corridor segment 1 would be approximately 150 kilometers (92 miles) long (which included 21 miles of existing DOD rail line (BSC 2006a). Near Blair Junction, the Mina rail corridor could follow two separate options (Montezuma options 1 and 2) that would go around the Montezuma Range and then move on to Lida Junction. Mina common corridor segment 2 would begin at the end of the selected Montezuma option and run roughly southeast as a single route for about 3.4 kilometers (2.1 miles) before reaching the Bonnie Clair area. At that point the corridor again could follow one of two separate options (Bonnie Clair options 1 and 2) until forming a single route in the vicinity of Scottys Junction. The corridor would then trend southeast to Oasis Valley, at which point it could follow one of two separate options (Oasis Valley options 1 and 2) through the Oasis Valley before turning north-northeast to Yucca Mountain as a single route. The region of influence for the Mina rail corridor extends to Hazen, Nevada, where shipments to Yucca Mountain would leave the Union Pacific Railroad Mainline.

2.1.1 Schurz Bypass Options

A May 2006 letter from the Tribal Council for the Walker River Paiute Tribe (Williams 2006) indicated that if DOE were to build a new rail line through the Reservation, the Tribe would prefer that the rail line avoid the town of Schurz. At present, an existing rail line travels through the middle of town. In response to the Tribe's letter, DOE identified three options to bypass Schurz, as shown in Figure 2-2. Schurz bypass option 1 would begin at the existing Department of Defense Branchline about 29 kilometers (18 miles) northwest of Schurz and pass along the eastern side of Sunshine Flat. From there, it

would pass east of Weber Reservoir and cross U.S. Highway 95 about 8 kilometers (5 miles) north of the intersection of U.S. Highway 95 and Alternate U.S. Highway 95. Schurz bypass 1 would be about 51 kilometers (32 miles) long and would reconnect with the Department of Defense Branchline about 13 kilometers (8 miles) south of Schurz (BSC 2006a).

Schurz bypass option 2 would also begin at the existing Department of Defense Branchline at the same point as Schurz bypass option 1. From there, it would pass east of Weber Reservoir and cross U.S. Highway 95 about 6.4 kilometers (4 miles) north of the intersection of Highway 95 and Alternate U.S. Highway 95. From there, it would trend to the southeast but stay to the east of Schurz and west of the location of Schurz bypass option 1 until it rejoined the existing Department of Defense Branchline about 13 kilometers (8 miles) south of Schurz. Schurz bypass option 2 would be about 50 kilometers (31 miles) long (BSC 2006a).

Schurz bypass option 3 would begin at the Department of Defense Branchline about 9.7 kilometers (6 miles) northwest of Schurz. It would cross U.S. Highway 95 about 8 kilometers (5 miles) north of the intersection of U.S. Highway 95 and Alternate U.S. Highway 95, at which point it would continue southeast to a point where it would rejoin the existing Department of Defense Branchline rail line about 13 kilometers (8 miles) south of Schurz. Schurz bypass option 3 would be about 50 kilometers (31 miles) long (BSC 2006a).

2.1.2 Montezuma Options

DOE identified two options that would begin near Blair Junction at the intersection of U.S. Highways 95 and State Road 265 and go around the Montezuma Range. Each would end at a point just east of Lida Junction. Montezuma option 1 would leave Blair Junction and parallel Nevada State Route 265 to the town of Silver Peak, where it would proceed east to follow the western side of Clayton Ridge. It would turn south approximately 16 kilometers (10 miles) before Railroad Pass, where it would turn east between the southern end of the Goldfield Hills and the Cuprite Hills. It would then cross U.S. Highway 95 and State Road 265 about 8 kilometers (5 miles) north of Lida Junction and, parallel to Highway 95, head south to a point just east of Lida Junction. Montezuma option 1 would be about 130 kilometers (83 miles) long (BSC 2006a).

Montezuma option 2, after leaving the intersection of U.S. Highways 95 and 6, would follow the abandoned rail roadbed of the former Tonopah and Goldfield Railroad east to the north of Lone Mountain, and then follow the rail roadbed south. It would cross Montezuma Valley south and then parallel U.S. Highway 95 as it approached the town of Goldfield. Montezuma option 2 would stay west of Goldfield and then trend southeast to a point just east of Lida Junction. Montezuma option 2 would be about 140 kilometers (84 miles) long (BSC 2006a).

2.1.3 Bonnie Claire Options

DOE is considering two options in the Bonnie Claire area, Bonnie Claire 2 and 3. Bonnie Claire option 2 would begin about 8 kilometers (5 miles) north of Stonewall Pass and trend east toward the Nevada Test and Training Range for about 4.8 kilometers (3 miles) before turning south for an additional 18 kilometers (11 miles). Bonnie Claire option 2 would generally follow the Nevada Test and Training Range boundary and end in Sarcobatus Flats north of Scottys Junction near the intersection of State Route 267 and U.S. Highway 95. Bonnie Claire option 2 would be approximately 19 kilometers (12 miles) long (BSC 2006a).

Bonnie Claire option 3 would begin about 8 kilometers (5 miles) north of Stonewall Pass. It would trend generally south, parallel to U.S. Highway 95 to the east. After approximately 9.7 kilometers (6 miles),

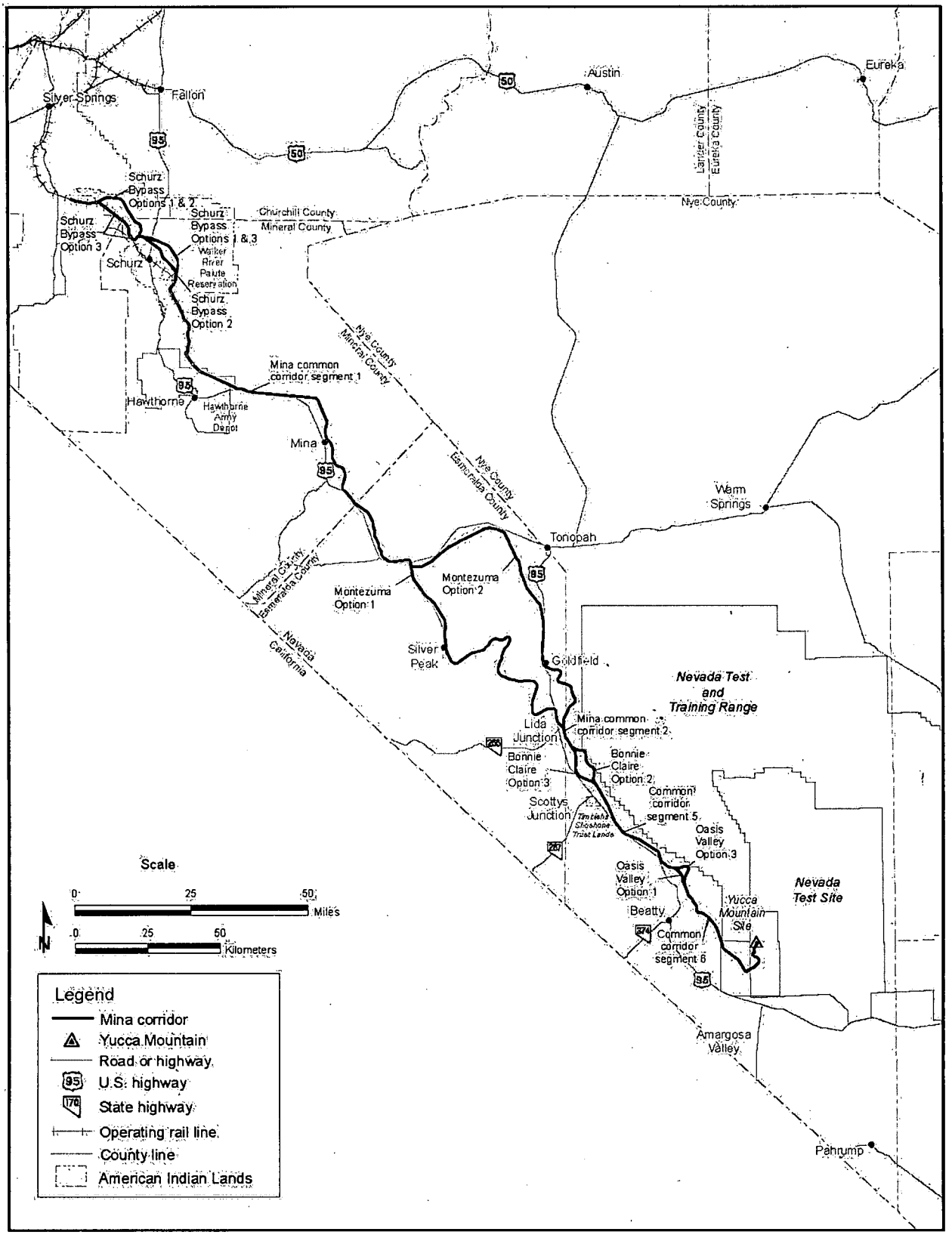

Figure 2-1. Mina Corridor and options.

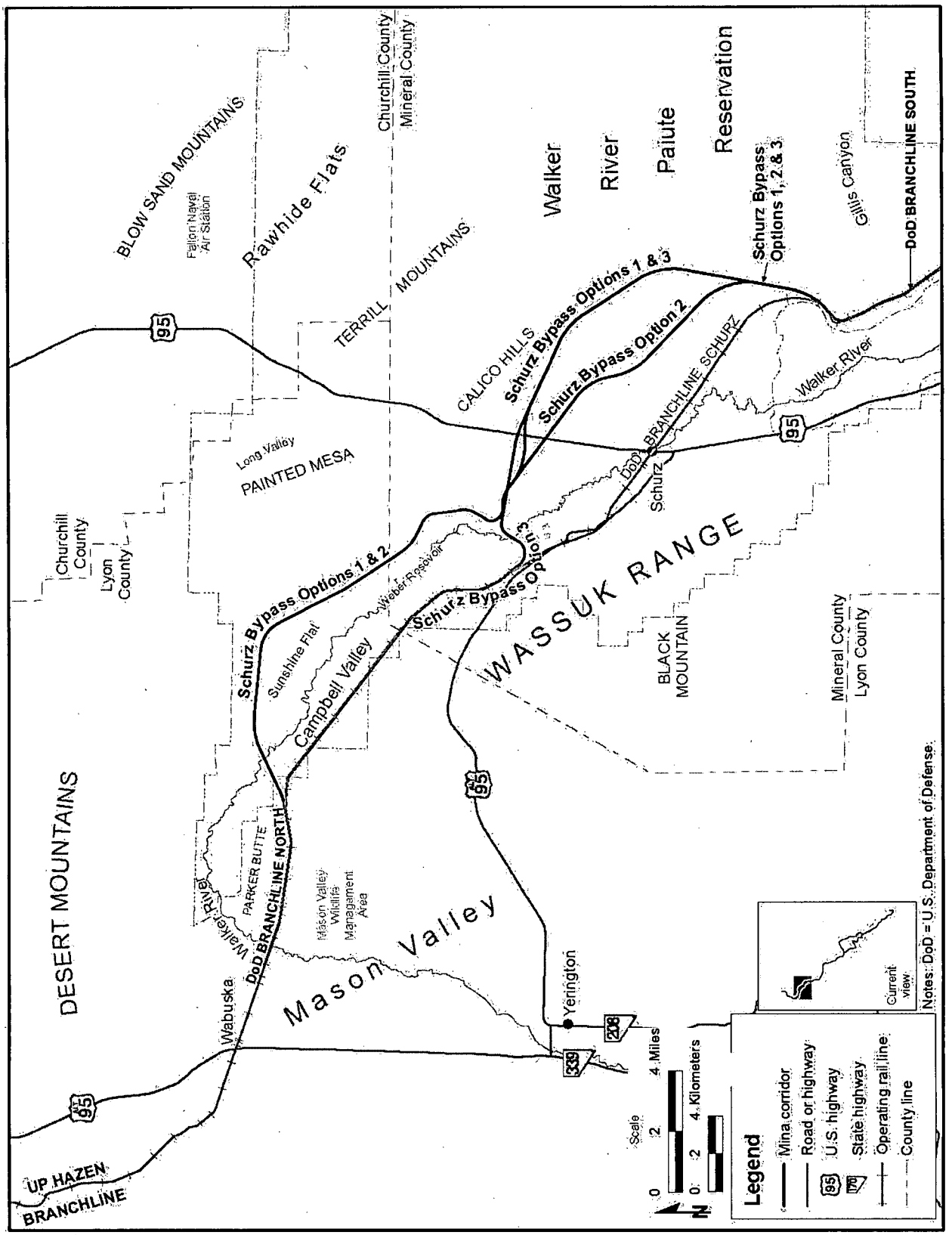

Figure 2-2. Schurz options.

Bonnie Claire option 3 would turn southeast and continue for another 9.7 kilometers (6 miles) through Sarcobatus Flats. It would end approximately 3.2 kilometers (2 miles) north of Scottys Junction near the intersection of State Route 267 and U.S. Highway 95. Bonnie Claire option 3 would be approximately 19 kilometers (12 miles) long (BSC 2006a).

2.1.4 Oasis Valley Options

DOE is considering two options in the Oasis Valley area, Oasis Valley 1 and 3. Oasis Valley 1 would begin about 3.2 kilometers (2 miles) north of Oasis Mountain, and run southeast. It would be approximately 9.7 kilometers (6 miles) long (BSC 2006a).

Oasis Valley option 3 would begin about 3.2 kilometers (2 miles) north of Oasis Mountain, and run generally east and then south before it crossed Oasis Valley farther to the east than Oasis Valley option 1. Oasis Valley option 3 would be about 14 kilometers (9 miles) long (BSC 2006a).

2.2 Affected Environment

2.2.1 LAND USE AND OWNERSHIP

2.2.1.1 Land Use and Ownership Methodology

In the FEIS, DOE determined that an evaluation of impacts to land use and ownership should identify the current ownership of the land that its activities could disturb, and the present and anticipated future uses of the land. The region of influence for land-use and ownership impacts was defined as land areas that would be disturbed or whose ownership or use would change as a result of the construction and operation of a rail line. In the FEIS, DOE evaluated land use and ownership in the 400-meter (0.25-mile)-wide corridor. The purpose of the 400-meter width was to provide sufficient space for final alignment to route the rail line around sensitive land features or engineering obstacles. The FEIS anticipated actual construction and operation in the corridor would mostly require less than about 61 meters (200 feet) of the 400-meter width. Upon further evaluation, DOE has since determined that actual construction in the corridor would likely require less than 300 meters (980 feet) of the 400-meter width. For Caliente, DOE's conceptual engineering shows an average of 100 meters (325 feet) would be needed for construction. This analysis uses the 400-meter-wide corridor width as was used in the FEIS.

The Bureau of Land Management (BLM) manages more than 45,000 square kilometers (11 million acres) in Lyon, Mineral, Esmeralda, and Nye Counties. Traditional land uses in most of the Mina rail corridor region of influence that would be directly and indirectly affected include grazing, mining, energy development, general recreation, utility rights-of-way, and wildlife management. Much of this land is not extensively disturbed, although it has been modified through activity such as grazing and mining.

Some BLM-managed lands have special designations which denote their use or what they have been set aside for. These include Wildlife Habitat Management Areas, Areas of Critical Environmental Concern, Wilderness Areas, and Wilderness Study Areas. Public lands in the Mina rail corridor region of influence provide a number of diverse recreation opportunities, and the BLM has designated certain lands as Special Recreation Management Areas.

Figures 2-3 and 2-4 show land ownership along the corridor and its options. The vast majority of the land used for the proposed Mina rail corridor and associated facilities would be on BLM-administered land in Lyon, Mineral, Esmeralda, and Nye Counties. The proposed Mina rail corridor would cross three BLM administrative areas; Las Vegas, Battle Mountain, and Carson City. Each BLM Field Office manages lands within its administrative boundaries according to one or more Management Framework Plans

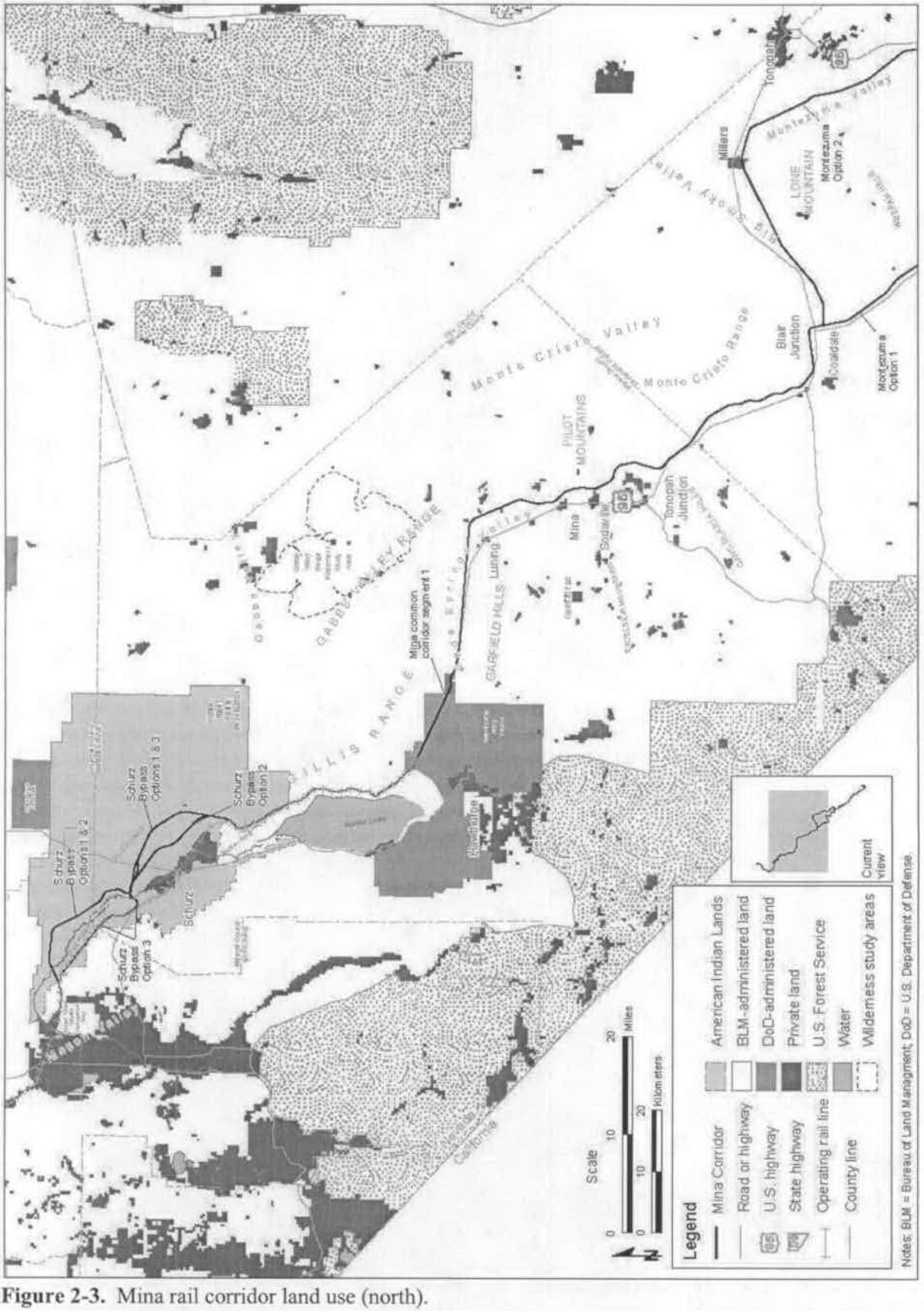

Figure 2-3. Mina rail corridor land use (north).

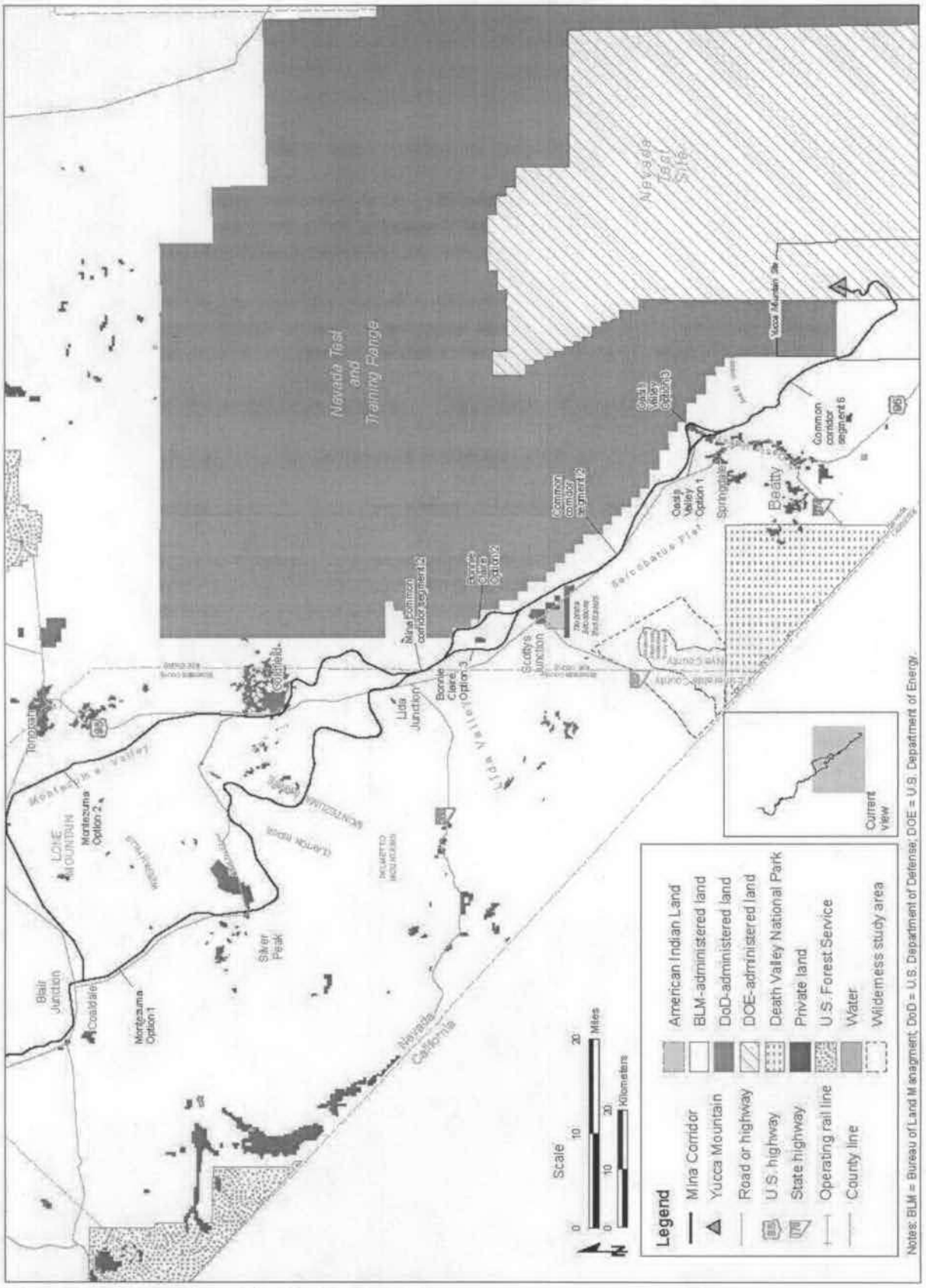

Figure 2-4. Mina rail corridor land use (south).

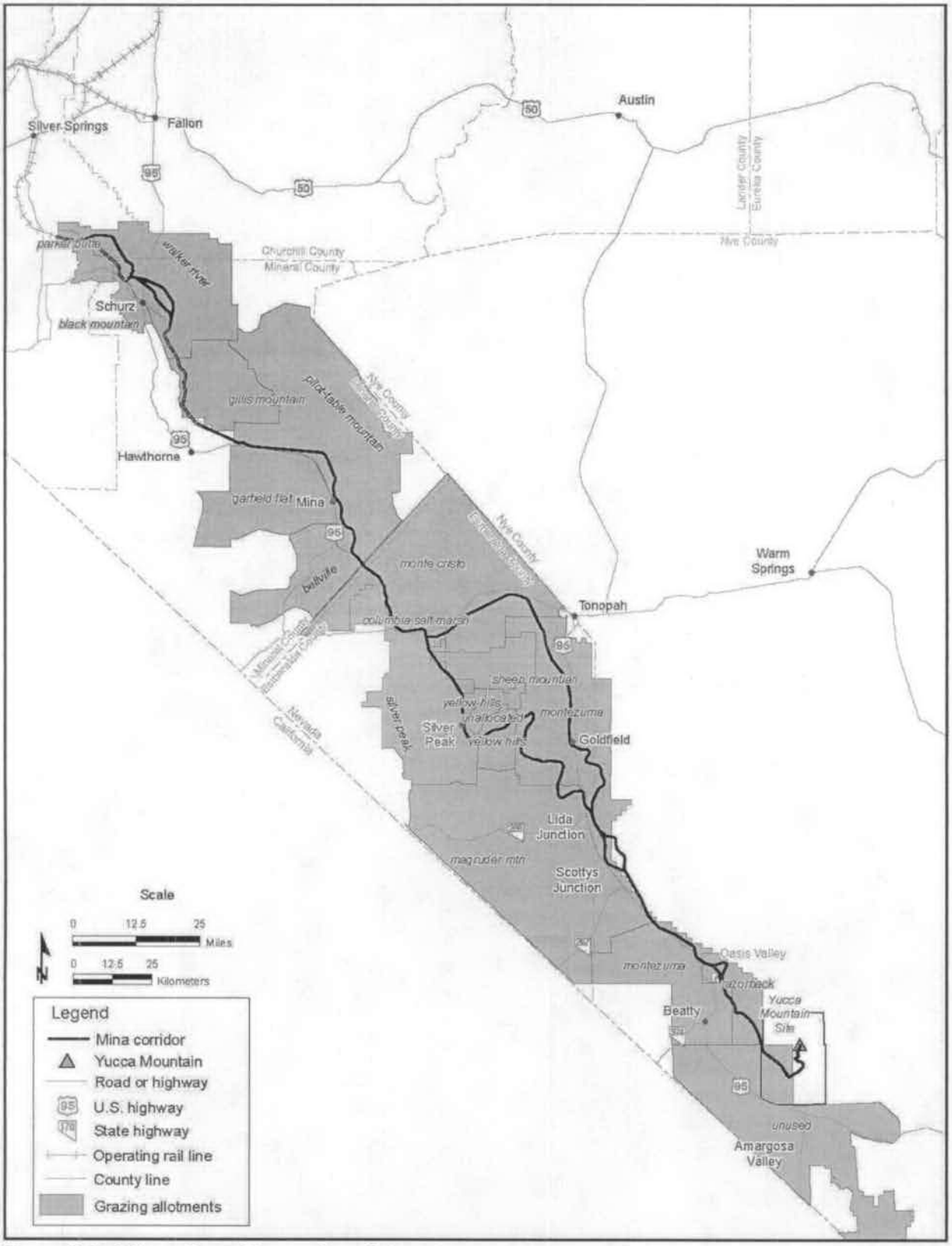

Figure 2-5. Mina rail corridor grazing allotments.

and/or Resource Management Plans. The Las Vegas, Tonopah, and Carson City plans would be applicable to the Mina rail corridor. In addition to BLM land, the range of potentially affected land ownership includes private land holdings (including land designated for commercial development), DOE lands, U.S. Department of Defense lands, and Tribal Trust lands and reservations.

To evaluate this resource area, DOE obtained data from the latest edition of BLM Master Title Plats and online land record databases, such as BLM LR2000 (BLM 2007a). The Department also evaluated county and state land records and information managed by other federal agencies, universities, or commercial developments.

In response to a DOE application for a public land order, the BLM has segregated specific lands encompassing the corridor from mineral and surface entry for two years (until January 10, 2009), as described in the *Notice of Proposed Withdrawal and Opportunity for Public Meeting; Nevada* (72 *Federal Register* 1235, January 10, 2007).

2.2.1.2 Land Use and Ownership Affected Environment

DOE evaluated land use and ownership in the 400-meter (0.25-mile)-wide corridor. Within the Mina Corridor, approximately 1 to 2 percent (1.6 to 2.7 square kilometers) is privately owned, with another 5 to 12 percent (12.5 to 20.1 square kilometers, depending on the option) on the Walker River Paiute Reservation (see Figures 2-3 and 2-4). Of the remaining land, approximately 3 percent (5.3 square kilometers), which is on the Nevada Test Site, is managed by DOE. Approximately 3 percent (4.7 square kilometers) has been withdrawn to the U.S. Department of Defense because the corridor passes through the Hawthorne Army Depot. The majority of the land within the Mina Corridor, approximately 80 to 85 percent (132.1 to 133.9 square kilometers [32,900 to 34,000 acres], depending on option) are BLM-administered public lands. Specifically, the BLM Carson City Field Office manages the land containing portions of the three Schurz Bypass options and the first half of Mina common corridor segment 1 in accordance with the *Carson City Field Office Consolidated Resource Management Plan* (BLM 2001). The remainder of the Schurz Bypass options are located on the Walker River Paiute Reservation. The corridor then traverses through land managed by the BLM Battle Mountain Field Office/Tonopah Field Station, with land use and management objectives governed by the *Tonopah Resource Management Plan and Record of Decision* (BLM 1997). The BLM Las Vegas Field Office manages the remaining land crossed by the corridor from approximately Beatty Wash to Yucca Mountain in accordance with the *Record of Decision for the Approved Las Vegas Resource Management Plan and Final Environmental Impact Statement* (BLM 1998).

The Mina rail corridor has options that have different land ownerships and projected disturbances. With this approach in mind, the construction of a rail line in the Mina corridor would begin near Wabuska, Nevada. From there, on the Walker River Paiute Reservation, the corridor proceeds southeast toward the town of Schurz. The three Schurz bypass options would be primarily on the Walker River Paiute Reservation. Schurz bypass options 1 and 2 would leave the existing Department of Defense Branchline approximately 29 kilometers (18 miles) northwest of Schurz, continue east of the Weber Reservoir, and cross U.S. Highway 95 east of Schurz. The first 1.8 kilometers (1.1 miles) of Schurz bypass options 1 and 2 would cross BLM-administered land; the remaining portions would cross the Walker River Paiute Reservation. Schurz bypass options 1 and 2 would not cross any private allotments on the Reservation (BSC 2006a). Both bypass options cross the Black Mountain grazing allotment (BLM 2005) (Figure 2-5).

Schurz bypass option 3 would be almost entirely on the Walker River Paiute Reservation. This option would come within 91 meters (300 feet) of a private allotment along the Walker River and, as it bypassed the town of Schurz, would be about 800 meters (0.5 mile) east of private allotments that are used for

agriculture and contain no private residences (BSC 2006a). Schurz bypass option 3 would also cross the Parker Butte Grazing Allotment (BLM 2005).

South of Schurz options 1, 2, and 3, the Mina rail corridor would include Mina common corridor segment 1, which would be approximately 150 kilometers (92 miles) long, with 34 kilometers (21 miles) on an existing Department of Defense-managed rail line. The remaining 110 kilometers (71 miles) of Mina common corridor segment 1 would cross predominantly BLM-administered public lands.

Due east of the Hawthorne Army Depot, Mina common corridor segment 1 would cross approximately 3.2 kilometers (2 miles) of private property. As it traveled south, the center of the corridor would be within 150 meters (500 feet) of three other private land parcels and then pass just to the east of private property in Soda Springs Valley, southeast of Luning, and near Sodaville. It would pass through a mineral material site (an area in which the BLM has granted temporary rights to another party to obtain materials such as sand and gravel) at Redlich Pass. Mina common corridor segment 1 would cross a portion of a mineral material site at Coaldale and Blair Junction and then pass through another mineral material site. In addition, it would cross the Gillis Mountain, Garfield Flat, Pilot-Table Mountain, Bellville, Monte Cristo, and Silver Peak grazing allotments (BLM 2005) and an allotment the BLM Battle Mountain District/Tonopah Field Office has designated as the Columbia Salt Marsh. Additionally, the corridor would also cross linear rights-of-way that include power transmission lines, telephones, State Route 361, U.S. Highway 95, water pipelines, and roads.

At this point, there are two options for the Mina rail corridor, Montezuma options 1 and 2, to bypass the Montezuma Range. From about 5.3 kilometers (3.3 miles) north to 4.8 kilometers (3 miles) south of Silver Peak, Montezuma option 1 would cross land the BLM has designated as suitable for disposal. Montezuma 1 would cross rights-of-way for power transmission lines, State Route 265, and access roads. Specifically, it would cross three mineral material sites at Goldfield Hills, touch one site at Lida Junction, and cross another at Scottys Junction. Montezuma option 1 would cross the Sheep Mountain, Silver Peak, Yellow Hills, Montezuma, and Magruder Mountain grazing allotments (BLM 2005). It would also cross an allotment the BLM Battle Mountain District/Tonopah Field Office has designated as the Columbia Salt Marsh, and another listed as an unallocated allotment. The BLM administers most of the land along Montezuma option 1, except for one small piece of private property near Silver Peak.

Montezuma option 2 would tend to follow an abandoned rail line of the former Tonopah and Goldfield Railroad through Montezuma Valley, bypassing Tonopah on the west side and continuing through the town of Goldfield to the south until it connected to Mina common corridor segment 2. As with Montezuma option 1, the BLM administers most of the land along Montezuma option 2; a small percentage of the land is privately owned. Montezuma option 2 would cross approximately 1.6 kilometers (1 mile) of a private allotment commonly called Millers. This property had been the location of a mill site for silver ore and a station on the former Tonopah and Goldfield Railroad; a portion of this property is of cultural significance (see Section 2.2.5). The BLM has designated lands to the east and west of this property as suitable for disposal. The corridor would cross over 40 privately-owned parcels of land near the community of Goldfield (Figure 2-6). Montezuma option 2 would cross rights-of-way for access roads, power transmission lines, and water pipelines. It would pass through two mineral material sites. Montezuma option 2 would also cross the Monte Cristo and Montezuma grazing allotments (BLM 2005) and an allotment the BLM Battle Mountain District/Tonopah Field Office has designated as the Columbia Salt Marsh.

Mina common corridor segment 2 would begin at the end of Montezuma option 1 or 2 at a point just east of Lida Junction. All of Mina common corridor segment 2 would cross BLM-administered land and the Montezuma and Razorback grazing allotments (BLM 2005).

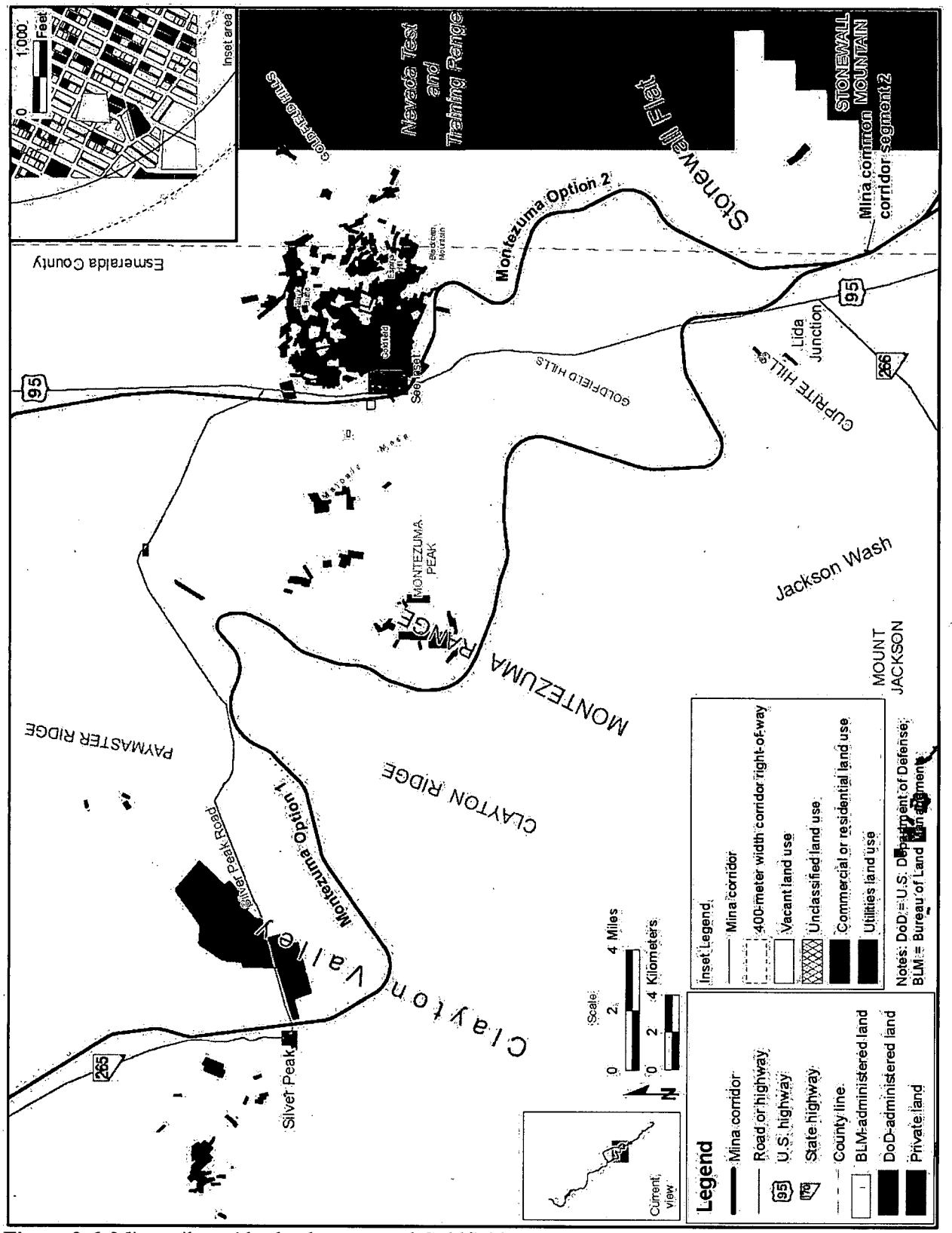

Figure 2-6. Mina rail corridor land use around Goldfield, NV.

The Mina rail corridor travels south into Bonnie Claire options 2 and 3, Mina common corridor segment 5, Oasis Valley options 1 and 3, and Mina common corridor segment 6. Bonnie Claire options 2 and 3 cross the Montezuma grazing allotment. Mina common corridor segment 5 would cross the Montezuma and Magruder Mountain grazing allotments. Oasis Valley options 1 and 3 would cross private property, and both would cross the Razorback grazing allotment. Mina common corridor segment 6 would cross the Montezuma and Razorback grazing allotments and a grazing allotment in Crater Flat west of Yucca Mountain the BLM has designated as unused (BLM 2005).

DOE queried information for unpatented mining claims from the BLM LR2000 database (BLM 2007a) using the legal description for the Mina rail corridor (meridian, township, range, and section) and plotted locations of unpatented mining claims by sections (Figures 2-7 and 2-8). Of these, the majority of unpatented mining claims are located within the Goldfield area along the corridor.

The Mina rail corridor and its options would not cross any Wilderness Areas or Wilderness Study Areas, Special Recreation Management Areas, or Areas of Critical Environmental Concern. The Mina corridor would cross areas used by the public for dispersed recreation, such as off-highway vehicle use and hunting.

The predominant land-use and ownership conflicts associated with the Mina rail corridor would involve private land holdings, the Walker River Paiute Reservation, the Hawthorne Army Depot, the Nevada Test Site, land the BLM has proposed as suitable for sale or disposal, unpatented mining claims, rights-of-way, and grazing allotments.

The construction of the proposed Mina rail corridor would disturb approximately 37 to 41 square kilometers (9,143 to 10,131 acres) of land, depending on the option selected. The Mina rail corridor would cross up to 15 separate grazing allotments. The approximate disturbance area associated with the proposed Mina rail corridor 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 corridor would constitute a minor proportion of overall land commitment. Private land affected for the proposed rail line would be approximately 1.6 to 2.7 square kilometers (395 to 667 acres), depending upon the option selected, which consists of primarily agricultural and mineral uses and contain no private residences.

The Mina rail corridor would cross public lands managed by the BLM Carson City Field Office, the Battle Mountain/Tonopah offices, and the Las Vegas Field Office. Each has a resource management plan that establishes goals and objectives for the management of resources, which include public land uses and designations (BLM 2001, BLM 1997, BLM-1998). The Mina rail corridor would not cross or affect any Wilderness Areas, Wilderness Study Areas, or areas of Critical Environmental Concern. The Mina rail corridor would be consistent with the goals and policies of the resource management plans in the BLM-administered areas through which it passes.

A rail line in the Mina rail corridor would cross private lands. If in locating the final alignment DOE could not avoid private lands, the Department would need to acquire access to them to construct and operate the railroad. If private property was divided by the rail line, access to the property could be disrupted.

The rail corridor would cross land on the Walker River Paiute Reservation. Construction and operation of a rail line on this land will require land agreements between the DOE, the Bureau of Indian Affairs, and the Walker River Paiute Tribe. Prior to construction, DOE would be required to obtain both the permission to survey for a right-of-way and a right-of-way grant in accordance with 25 CFR Part 169, "Rights-of-Way over Indian Lands." These regulations state that "Rights-of-way for railroads shall not

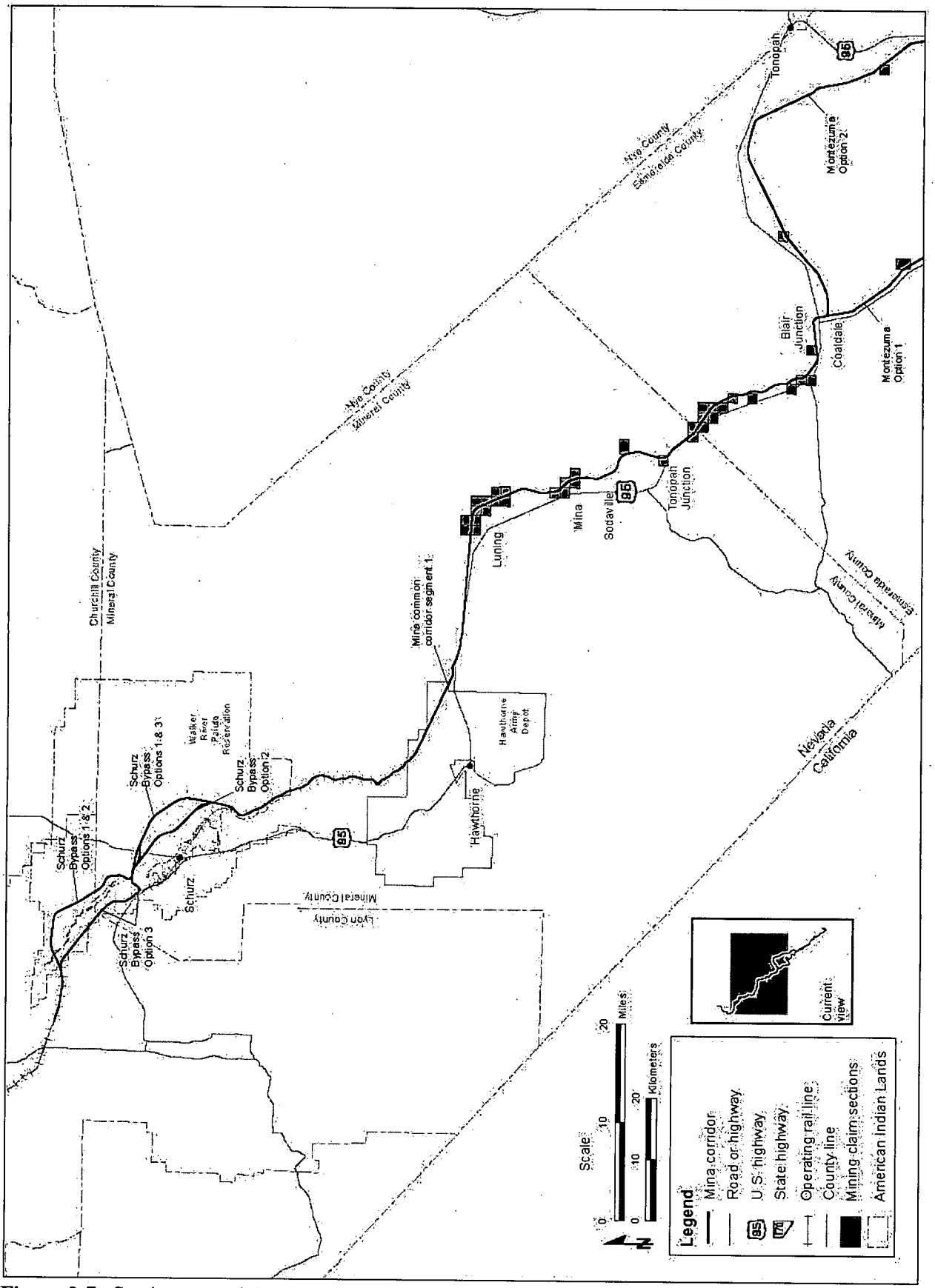

Figure 2-7. Sections containing unpatented mining claims within the Mina rail corridor (north).

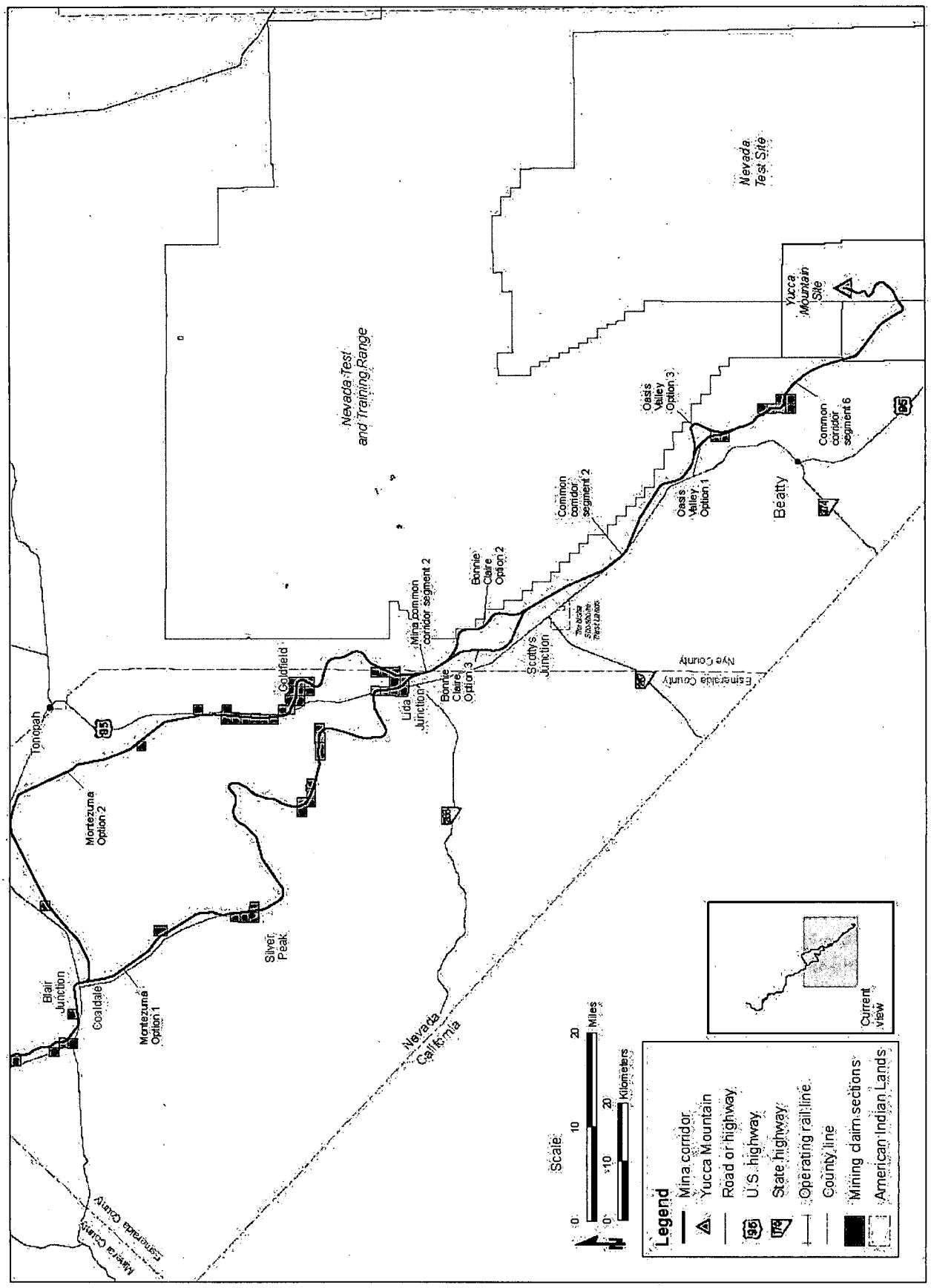

Figure 2-8. Sections containing unpatented mining claims within the Mina rail corridor (south).

exceed 15 meters (50 feet) in width on each side of the centerline of the road, except where there are heavy cuts and fills, when they shall not exceed 30 meters (100 feet) in width on each side of the road."

The Mina rail corridor would not cross any privately-held lands within the Reservation. Schurz option 3 is within 91 meters (300 feet) of a private allotment. This and other privately-held lands near Schurz option 3 are used for agriculture; there are no private residences on this land.

A portion of the Mina rail corridor, approximately 13 kilometers (8 miles) long, would cross through the Hawthorne Army Depot. A right-of-way grant to construct and operate a railroad through this area would require an agreement with the U.S. Department of Defense and the U.S. Army Corps of Engineers for the use of the land and the existing rail line.

Approximately 27 kilometers (17 miles) of Mina common corridor segment 6 of the Mina rail corridor would be within the boundaries of the Nevada Test Site, which is managed by the DOE. Construction of a rail line within this area would require land use authorization from the DOE Nevada Site Office and the BLM.

BLM would require the DOE to obtain a right-of-way grant to construct and operate a railroad on public land. DOE anticipates the right-of-way would have a nominal width of approximately 300 meters (980 feet) during construction, which is more than the 61-meter (200-feet)-wide corridor discussed in the FEIS, and within the 400-meter (0.25 mile)-wide corridor analyzed. The Department would adjust the width of the construction right-of-way where practicable to avoid or minimize land-use conflicts and restrictions. Construction and operation of the railroad in the Mina rail corridor through existing rights-of-way would require an evaluation of the impact to the road or utility or use of the right-of-way with both the right-of-way holder and the BLM.

Mining activities such as mine operations or exploration could be affected if access roads were temporarily blocked or altered, making development of a claim less profitable if access is altered. The 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. The implementation of several mining engineering practices in these areas could allow access to mining claims without affecting the claimant or the rail line, depending on the exact locations of the claims and access needs.

BLM has designated public land for disposal (sale) to allow for community expansion. While this designation provides the opportunity for disposal, it does not require it. Because disposal is a discretionary action, the BLM could choose not to dispose of these parcels if other priorities arose.

Grazing operations are a major BLM land-management program in the Mina rail corridor region of influence. Construction of the rail line would result in loss of forage. Because the corridor intersects grazing allotments, a rail line could create a barrier to livestock movement. Livestock could have difficulty accessing water if there was a deep cut or a high fill associated with the rail line. Ranch operations and livestock rotations could be disrupted. Livestock mortality could occur along roads used during rail line construction and operations and possibly by the train during operations.

Construction and operation of a rail line through the Mina corridor would impact access to land used by the public for recreation, requiring individuals to alter their access routes. Recreational events such as off-highway vehicle racing that have used courses which cross the Mina corridor would need to select alternate routes. Access to hunters, hikers, and others using the land crossed by the Mina corridor would be altered and could affect recreational experiences.

In relation to rail operations, train and track inspection and maintenance activities would be confined to areas disturbed by construction activities, so no additional disturbances would occur.

2.2.2 AIR QUALITY

2.2.2.1 Air Quality Methodology

This section provides information on the existing air quality status in areas through which the Mina rail corridor would pass: Lyon, Mineral, Esmeralda, and Nye Counties, a small portion of Churchill County, and the Walker River Paiute Reservation. It also provides background information on the general climate in the area. The region of influence includes the EPA-designated air basins through which the corridor would pass.

The Mina air quality evaluation used the same qualitative methods presented in the FEIS. The route was evaluated for identified nonattainment or maintenance areas. Criteria pollutants potentially generated by construction or operations activities were identified. Since no nonattainment or maintenance areas were identified, no detailed estimates of emission rates or comparisons to threshold levels for conformity were made.

2.2.2.2 Air Quality Affected Environment

If there is not enough air quality data to determine the status of a remote or sparsely populated area, then the EPA lists the area as unclassifiable. The EPA considers unclassifiable areas as any area that cannot be classified on the basis of available information as meeting or not meeting the national air quality standard for the pollutant. Unclassifiable areas are treated as attainment areas under the Clean Air Act and its implementing regulations. Most rural areas of the United States are either in attainment or unclassifiable for all pollutants. Federal standards for criteria pollutants are shown in Table 2-1. The Mina rail corridor would pass through rural parts of Nevada that are either in attainment or unclassifiable for criteria pollutant standards under the EPA.

Table 2-1. Federal Standards for Criteria Pollutants.

Pollutant	Averaging Time	NAAQS[1]	
		Primary[2]	Secondary[3]
Ozone (O_3)[4]	1-Hour	0.12 parts per million (ppm) (235 micrograms per cubic meter [$\mu g/m^3$])	Same as Primary Standard
	8-Hour	0.08 ppm	
Carbon Monoxide (CO)	8-Hour	9.0 ppm (10 $\mu g/m^3$)	None
	1-Hour	35 ppm (40 $\mu g/m^3$)	
Nitrogen Dioxide (NO_2)	Annual Average	0.053 ppm (100 $\mu g/m^3$)	Same as Primary Standard
	1-Hour	-	
Sulfur Dioxide (SO_2)	Annual Average	80 $\mu g/m^3$ (0.03 ppm)	-
	24-Hour	365 $\mu g/m^3$ (0.14 ppm)	-
	3-Hour	-	1300 $\mu g/m^3$ (0.5 ppm)
	1-Hour	-	-
Suspended Particulate Matter (PM_{10})	24-Hour	150 $\mu g/m^3$	Same as Primary Standard
	Annual Arithmetic Mean	50 $\mu g/m^3$	
Fine Particulate Matter ($PM_{2.5}$)[4]	24-Hour	65 $\mu g/m^3$	Same as Primary Standard
	Annual Arithmetic Mean	15 $\mu g/m^3$	
Lead (Pb)[5]	30-Day Average	-	-

Pollutant	Averaging Time	NAAQS[1]	
		Primary[2]	Secondary[3]
	Calendar Quarter	1.5 $\mu g/m^3$	Same as Primary Standard

[1] NAAQS (other than O_3, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The O_3 standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when 99 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact the EPA for further clarification and current federal policies.

[2] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

[3] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[4] New federal 8-hour ozone and fine particulate matter standards were promulgated by EPA on 18 July 1997. The federal 1-hour O_3 standard continues to apply in areas that violated the standard. On 15 April 2004 the EPA issued attainment designations for the 8-hour standard and described plans for the phase out of the 1-hour standard.

[5] The CARB has identified lead and vinyl chloride as "toxic air contaminants with no threshold level of exposure for adverse health effects determined." These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

Monthly climate summaries for Beatty and Goldfield (DRI 2007) indicate that the southern portions of the Mina rail corridor have the highest annual precipitation, with annual averages of about 16 centimeters (6.5 inches). The northern portions of the corridor through Mina, Hawthorne, Schurz, and Wabuska have less precipitation – about 11 to 13 centimeters (4.5 to 5 inches) annually. Goldfield, at an elevation of about 1,700 meters (5,700 feet) has the highest average annual snowfall – 38 centimeters (15 inches). Average annual snowfall for most of the rest of the corridor is 10 to 13 centimeters (4 to 5 inches). The southernmost portions of the corridor have even less snowfall. Average annual temperatures vary mainly by elevation – highest at the lower elevations such as Beatty at 1,000 meters (3,300 feet) and lowest at higher elevations such as Tonopah and Goldfield at 1,600 and 1,700 meters (5,400 and 5,700 feet), respectively.

Pollutants from construction equipment emissions would include carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter with diameters of 10 micrometers or less (PM_{10}), and 2.5 micrometers or less ($PM_{2.5}$). Construction activities such as surface disturbance and use of haul trucks in the Mina rail corridor region of influence would emit PM_{10} and $PM_{2.5}$ in the form of fugitive dust. Fugitive dust is a type of non-point source air pollution–small airborne particles that do not originate from a specific point. 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 corridor region of influence, generation and control of fugitive dust will always be a concern. DOE would implement mitigation measures to minimize emissions, reduce dust concentrations during construction activities, and meet current air quality standards for these pollutants.

During railroad operations, diesel locomotives would emit carbon monoxide, nitrogen dioxide, sulfur dioxide, PM_{10}, and $PM_{2.5}$ during approximately 17 trips each week (BSC 2005b). Fugitive dust emissions would be greatly reduced during railroad operations as excavation would cease and equipment traffic would be limited to maintenance vehicles.

2.2.3 HYDROLOGY

This section describes surface-water and groundwater resources, and potential impacts to those resources. The region of influence included surface-water and groundwater resources within the 400-meter (0.25-mile)-wide corridor and within a 1-kilometer (0.6-mile) region of influence along each side of the corridor. The region of influence for surface-water included areas near construction activities, areas that

would be affected by permanent changes in flow, and areas downstream of construction. The region of influence for groundwater included hydrographic regions.

The FEIS analyzed surface water resources within the 400-meter (0.25 mile) wide corridor and within 1 kilometer (0.6 miles) along each side of the corridor, and springs located within 5 kilometers (3 miles) along each side of the corridor. The attributes used to assess surface water were the potential for introduction and movement of contaminants, potential for changes to runoff and infiltration rates, alterations in natural drainage, and potential for flooding or dredging and filling actions to aggravate or worsen any of these conditions.

The FEIS analysis also addressed the potential for a change in infiltration rates that could affect groundwater, the potential for introduction of contaminants, the availability for use for construction, the potential for changing flow patterns and, if available, the potential that such use would affect other users.

Information was obtained from (1) the National Hydrography Dataset Waterbody geospatial data that the U.S. Geological Survey developed in cooperation with EPA (USGS 1999); (2) the Geographic Names Information System Nevada geospatial database developed by the U.S. Geological Survey and BLM (USGS and BLM 2003); and (3) the National Wetlands Inventory database managed by the U.S. Fish and Wildlife Service (FWS 2007a).

2.2.3.1 Hydrology Affected Environment

2.2.3.1.1 Surface Water

The analysis of surface-water resources in this section discusses proximity of the Mina rail corridor to playa lakes, seeps, springs, floodplains, wetlands, and perennial surface waters and is commensurate with the analyses in the FEIS. The National Wetlands Inventory identifies surface-water resources such as wetlands or lakes along the corridor and its options. For clarification, most lakes identified for the Mina rail corridor are actually playa lakes and are referred to as such within this section. In general, a playa lake forms in semiarid and arid environments when surface-water runoff fills a depression on the surface of the ground with water, creating a lake; it is seasonal. Wetlands typically occur where surface water collects or groundwater discharges, which makes the area wet for extended periods.

The National Wetlands Inventory indicates that the only perennial surface water the Mina rail corridor and its options would cross is the Walker River. Schurz Bypass options 1 or 2 would cross the Walker River just north of the Weber Reservoir, and Schurz Bypass option 3 would cross it just south of the Weber Reservoir.

Table 2-2 summarizes surface-water resources within the region of influence and their proximity to the Mina rail corridor.

Table 2-2. Surface-water resources along the Mina rail corridor.

Mina Corridor Option	Distance from corridor	Feature
Schurz (SBP1)	Within/crosses	Perennial stream/riparian area – corridor crosses the Walker River north of the Weber Reservoir.
Schurz (SBP1)	Within/crosses	Wetlands – corridor crosses and is adjacent to freshwater emergent wetland areas, where it crosses the Walker River.

Mina Corridor Option	Distance from corridor	Feature
Schurz (SBP 1&2)	0.5 km – 1.0 km	Perennial Lake/Pond – corridor is adjacent to Weber Reservoir.
Schurz (SBP 3)	Within/crosses	Perennial Stream – corridor crosses Walker River just north of the town of Schurz.
Schurz	4 km	Spring – Paiute Spring, and one unnamed spring, 3.0 km west of U.S. Highway 95, 10 km from the town of Schurz.
Schurz (SBP 1&3)	Within/crosses	Playas – corridor crosses five unnamed playas and is adjacent to several other unnamed playas in an unnamed valley, just south of the Calico Hills, approximately 8 km east of Schurz.
Schurz (SBP 1&2)	Within/crosses	Playas – corridor crosses two unnamed playas, approximately 4.5 km east of Schurz.
Schurz (SBP 1&3)	1.2 – 1.3 km	Springs - Double Springs and an unnamed spring, 10 km east of the town of Schurz in the Walker River Paiute Reservation.
Schurz (SBP 1)	0.1 – 1.0 km	Playas – playas, freshwater emergent wetland areas, and freshwater forested/shrub wetland areas adjacent to the corridor as all options come together joining up with the existing UP rail line. These areas are north of Walker Lake, adjacent to U.S. Highway 95, 7 km from the town of Schurz.
Schurz (SBP 1)	2.6 – 4. 3 km	Spring – three unnamed spring/seeps just north of Walker River, adjacent to U.S. Highway 95.
MCS 1	Within/crosses	Playas – corridor crosses two unnamed playas about 14- km east from the town of Hawthorne.
MCS 1	Within/crosses	Playas - corridor crosses large playas at the foot of the Garfield Hills along U.S. Highway 95, 20 km outside of Hawthorne.
MCS 1	0.5 km	Playa – corridor is adjacent to a playa in Soda Springs Valley, along U.S. Highway 95, about 23 km outside of Hawthorne.
MCS 1	1 km	Playa – corridor is adjacent to a large playa in Alkali Flat, just south of the town of Luning.
MCS 1	Crosses/encroaches	Playa – corridor encroaches and just crosses a large playa within the town of Mina.
MCS 1	3.5 km	Spring – Southern Pacific Spring, 5 km east of the town of Mina.
MCS 1	2.1-2.3 km	Springs – Soda Springs, including two unnamed springs, just north of the town of Sodaville, along U.S. Highway 95.
MCS 1	2.6 km	Springs - Martin Spring, and an unnamed spring, 6 km east from the town of Sodaville.
MCS 1	4.4 – 4.6 km	Springs - three unnamed springs at the base of the Pilot Mountains, east of Sodaville.
MCS 1	3.2 – 4.9 km	Springs – three unnamed springs within the Rhodes Salt Marsh, approximately 3 km along U.S. Highway 95.

Mina Corridor Option	Distance from corridor	Feature
MCS 1	0.2 km	Spring – corridor encroaches an unnamed spring 2 km north of Coaldale.
MN 2	Within/crosses	Playa – corridor crosses 2 large playas and one small one approximately 13 km east of Blair Junction, along U.S. Highway 95.
MN 2	Within/crosses	Small playas – corridor crosses and is adjacent to several small playas approximately 18 to 20 km from Blair Junction.
MN 2	Within/crosses	Playas – corridor crosses three small playas, totaling 1 acre, 10 km southwest of Tonopah.
MN2	1 km	Playa – Millers Pond, a small playa, is located adjacent to the corridor, along U.S. Highway 95, approximately 5 km from Millers.
MN 2	1.9 – 2.0 km	Springs – West Spring and three unnamed springs, 3 km northwest of the town of Goldfield.
MN 2	3.8 km	Springs – Sulphur Spring and two unnamed springs, 4 km west of Goldfield.
MN 2	0.9 km	Spring - Slaughterhouse Spring. 1.5 km west of Goldfield.
MN 2	Within/crosses	Spring - Rabbit Spring, and one unnamed spring, located within the outskirts of the town of Goldfield.
MN 2	0.4 km	Playa – large playa located adjacent to corridor, in Stonewall Flat, 3 km northeast of Lida Junction.
MN 1	0.5 km	Spring - Hot Springs, adjacent to the corridor, within the town of Silver Peak.
MN 1	0.9 km	Spring - Silver Peak Spring, adjacent to the corridor, within the town of Silver Peak.
MN 1	0.2 – 10.0 km	Pond – evaporative pond east of the corridor, just outside of Silver Peak, associated with the local mining operations.
MN 1	Within/crosses	Pond – corridor crosses mine tailing pond within the town of Silver Peak.
MN 1	4.6 – 4.7 km	Spring – two springs (Twin Springs), located 15 km northeast of Silver Peak.
MN 1	3.1 – 3.6 km	Spring – two unnamed springs near the peak of Montezuma Peak, in the Montezuma Range.
BC 3	Within/crosses	Playa – corridor crosses large playa within U.S. Highway 95, 6 km south of Lida Junction.
OV 1	0.4 – 4.5 km	Springs – 40+ springs in the area of Oasis Valley, between Springdale and Beatty, along U.S. Highway 95.
OV 3	0.2 km	Pond – perennial pond, Colson Pond, is adjacent to the corridor in Oasis Valley, 7 km from Springdale.
OV 3	Within/crosses	Spring – Warm Springs located adjacent to Colson Pond, within the corridor in Oasis Valley, 7 km from Springdale.

In addition to the surface water resources identified in Table 2-2, the following floodplains occur within the region of influence of the Mina rail corridor:

Montezuma 1:	Floodplain from Jackson Wash and Jackson Wash tributaries. Alkali Lake Playa floodplain (not mapped by the Federal Emergency Management Agency)
Montezuma 2:	The floodplain is located between Stonewall Mountains and Cuprite Hills and is associated with Stonewall Flat.
Bonnie Claire 3:	Floodplains extending up tributaries of the Lida Valley Alkali Flat Playa and up the Stonewall Pass wash from the Bonnie Claire Flat area of Sarocobatus Flat.
Common corridor segment 5:	Floodplain of the Amargosa River within Thirsty Canyon.
Oasis Valley 1:	Floodplain of the Amargosa River within Thirsty Canyon.
Oasis Valley 3:	Beatty Wash floodplain extending from the Amargosa River floodplain.
Common corridor segment 6:	Busted Butte Wash draining east side of Yucca Mountain to Fortymile Wash (rail line would cross wash and tributaries). Drill Hole Wash draining east side of Yucca Mountain to Fortymile Wash (wash and tributary crossed). Midway Valley Wash draining east side of Yucca Mountain to Drill Hole Wash, then to Fortymile Wash.

Construction of a rail line in previously undeveloped areas often results in changes to natural drainage. Construction could include re-grading 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. DOE would adhere to engineering design standards.

Rail line construction would affect floodplains, either through direct alteration of the stream-channel cross section that would affect the flow pattern of the stream, or through indirect changes in the amount of impervious surfaces and additional water volume added to the floodplain.

Construction could affect identified drainage areas (the alteration of natural drainage patterns and possible changes in erosion and sedimentation rates or locations). Construction in washes or other flood-prone areas could reduce the area through which floodwaters would naturally flow, which could cause water levels to rise at the upstream side of crossings. Sedimentation would be likely to occur on the upstream side of crossings in areas where the flow of water was restricted enough to cause ponding. DOE would manage sedimentation of this type under a regular maintenance program (DOE 2002).

The Mina rail corridor would be in a region where flash flooding is a primary concern. Although such flooding can be violent and hazardous, it is generally limited in its extent and duration, any damage would be expected to be confined to a small portion of the corridor.

Construction of a bridge over the Walker River could temporarily affect the quality and flow of the river. Bridge construction would occur during periods of low flow, and erosion control measures would be used. Construction of a bridge also would cause the temporary disturbance of freshwater emergent wetlands adjacent to the Walker River.

Installation of culverts or bridges at crossings of ephemeral streams along the corridor could alter drainage patterns and change erosion and sedimentation rates. This would be localized to the area immediately around the crossing and would be small because appropriate standards would be followed to design stream crossings to allow for the flow of flood waters and erosion control methods would be implemented during construction of those crossings. For the same reasons, alteration of drainages would be unlikely to increase future flood damage, increase the affect of floods on human health and safety, or cause harm to the natural and beneficial values of floodplains.

Some streams, adjacent wetlands, and ephemeral washes within the interstate Walker River and Death Valley hydrographic regions (Figure 2-9) could be regulated under Section 404 of the Clean Water Act. The Department would meet the requirements of that Act prior to constructing crossings of any regulated streams, wetlands, or washes, including conducting an evaluation of alternative crossing locations and designs.

The Mina corridor would cross three springs: Rabbit and Warm Springs, and another unnamed spring. All three are located along the outer edge of the Mina corridor. DOE would adjust the final alignment within this corridor, if selected, to avoid conducting surface disturbing activities that may impact these springs.

Construction activities could release and spread contaminants by precipitation or intermittent runoff events or, for options near surface water, possible release to the surface water, and the need for dredging or filling of ephemeral waters. Construction-related materials that could cause contamination would consist of petroleum products (fuels and lubricants) and coolants (antifreeze) necessary to support equipment operations.

Railroad operations in the Mina rail corridor would have little affect on surface waters beyond the permanent alterations to drainage during rail line construction. The road and rail beds would have runoff rates different from those of the natural terrain but the potentially affected areas in a single drainage system is relatively small size.

Maintenance of the rail line within the Mina corridor would require periodic inspections of flood-prone areas (particularly after flood events) to verify the condition of the track and drainage structures. When necessary, sediment accumulating in these areas would be removed and disposed of appropriately. Similarly, eroded areas encroaching on the track bed would be repaired.

2.2.3.1.2 Ground Water

The State of Nevada is divided into hydrographic regions (groundwater basins) and subbasins (hydrographic areas). The Mina rail corridor and its options would cross three hydrographic regions – Death Valley Basin (Region 14), Central (Region 10), and Walker River (Region 9). Figure 2-9 shows these hydrographic regions and their hydrographic areas. *Water Resources Assessment—Mina Rail Corridor* (Converse Consultants 2007) contains a quantitative overview of existing groundwater appropriations for each basin in the corridor and also includes details on the status, type of use, and approximate quantity of water currently used in each basin.

Table 2-3. Hydrographic basins the Mina rail corridor would cross.[a,b]

Hydrographic basin (and subbasin where applicable)	Length (kilometers)	Percentage of total	Designated
Alkali Spring Valley	8	1.9	No
Big Smoky Valley/Tonopah Flat	24	5.8	Yes

Hydrographic basin (and subbasin where applicable)	Length (kilometers)	Percentage of total	Designated
Clayton Valley	53	12.8	No
Columbia Salt Marsh Valley	30	7.2	No
Crater Flat	29	7.0	No
Fortymile Canyon/Jackass Flats	14	3.4	No
Lida Valley	51	12.4	No
Oasis Valley	23	5.7	Yes
Rhodes Salt Marsh Valley	17	4.2	No
Sarcobatus Flat	48	11.7	Yes
Soda Springs Valley/Eastern Part	29	7.2	Yes
Soda Springs Valley/Western Part	18	4.5	Yes
Walker Lake Valley/Schurz Subarea	51	12.5	No
Walker Lake Valley/Whiskey Flat-Hawthorne Subarea	15	3.7	Yes

a. To calculate water demand for each basin, multiply 5,600 acre-feet by the percentage of total.
b. Mina Basis of Analysis consists of Schurz bypass option 1, Montezuma option 1, Bonnie Claire option 3, Oasis Valley option 1, and four common corridor segments.

DOE estimated that the number of wells required to support construction of a rail line in the Mina rail corridor ranges from 86 to 108 wells at 60 to 77 sites, depending on corridor option. Of these, some locations might have two wells where production is anticipated to be low. Consistent with the groundwater resources analysis in the FEIS, DOE also assumed a 1-year period for construction activities in the vicinity of each well. The pumping of groundwater from multiple wells for rail line construction could cause a temporary decrease in groundwater resources resulting from the increased demand. Groundwater withdrawal could temporarily decrease the amount of water available for underflow to a downgradient basin or spring discharge. The Nevada State Engineer would need to approve water production from any well DOE proposed to install to support rail line construction. To grant approval, the State Engineer would have to determine that the short-term demand would not cause adverse impacts for other uses and users of the groundwater resource.

During the construction phase, there could be changes to infiltration rates, and new sources of contamination could migrate to groundwater. Construction activities would disturb and loosen the ground, which could produce greater infiltration rates. However, this situation would be short-lived as the access road and railbed materials became compacted and less porous. In either case, localized changes in infiltration would cause no noticeable change in the amount of recharge in the area.
If water is obtained from a source other than a newly installed well, such as transporting water in from another source, water would be obtained from appropriated sources. That is, the water would be from allocations that the Nevada State Engineer had previously determined did not adversely affect groundwater resources.

Railroad operations would have little affect on groundwater resources. Water needs along the corridor would be greatly reduced and limited to water needed for maintenance and to support a greatly reduced work force. Possible changes to recharge, if any, would be the same as those at the completion of construction.

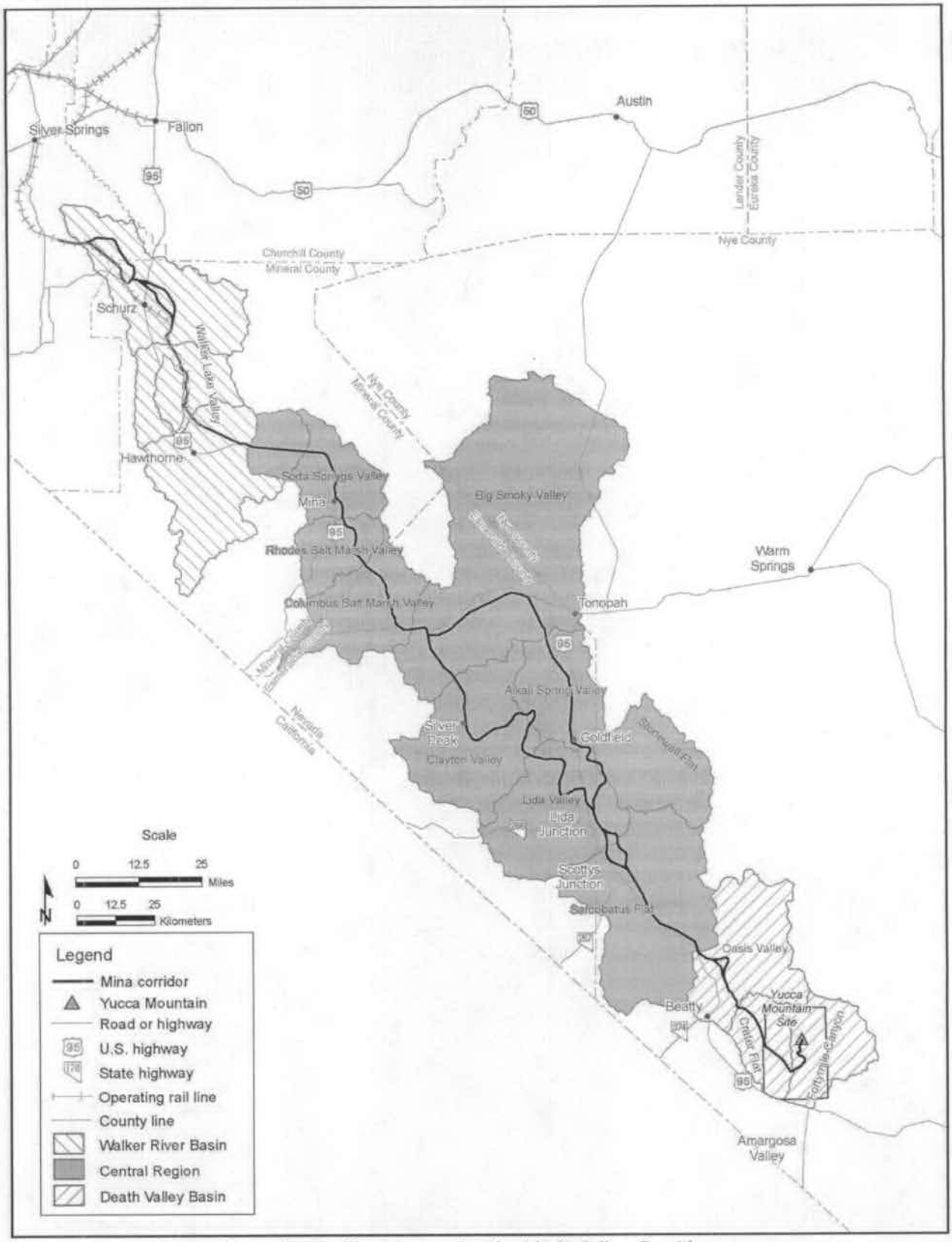

Figure 2-9. Hydrographic regions and areas associated with the Mina Corridor.

2.2.4 BIOLOGICAL RESOURCES AND SOILS

2.2.4.1 Biological Resources and Soils Methodology

This section describes biological resources along the Mina rail corridor. Consistent with the FEIS, DOE considered the potential for impacts to vegetation communities; special status species (plants and animals), including their habitat; springs, wetlands, and riparian areas; big game habitat; and wild horse and burro herd management areas that may occur within the 400-meter (0.25-mile)-wide corridor. The analysis considered special status species and big game habitat within a 5-kilometer (3 mile)-wide area along each side of the corridor that may be affected by construction of the rail line. DOE also analyzed springs and riparian areas that could be affected by permanent changes in surface-water flows (see Table 2-2). Finally, DOE characterized soils, including soils that may support prime farmland, within the 400-meter-wide corridor.

DOE obtained location records for special status species from a statewide database managed by the Natural Heritage Program (NNHP 2005) that contains records of incidental observations of rare or protected plants, fish, and wildlife species. Other information sources included (1) the *Carson City Field Office Consolidated Resource Management Plan* (BLM 2001); (2) the *Tonopah Resource Management Plan and Record of Decision* (BLM 1997); (3) the *Biological Field Findings Report for Potential Rail Alignments along the Mina Route* (URS 2006); (4) the *Mina Rail Route Feasibility Study* (BSC 2006a); (5) The National Hydrography Dataset Waterbody geospatial data that the U.S. Geological Survey developed in cooperation with the U.S. Environmental Protection Agency (USGS 1999); (6) the Geographic Names Information System Nevada geospatial database (USGS and BLM 2003); and (7) the BLM Wild Horse and Burro Management Area Maps (BLM 2006).

DOE used soil survey databases from the U.S. Department of Agriculture, Natural Resources Conservation Service (USDA 2006), to identify soil types and characteristics along the Mina rail corridor.

2.2.4.2 Biological Resources and Soils Affected Environment

Biological Resources

The following vegetation communities occur along the Mina rail corridor (URS 2006). Stabilized dunes, vegetated dunes, and sandy soils occur in isolated areas, primarily along the northern portions of the routes, and riparian vegetation occurs along the Walker River. Mixed salt desert scrub occurs at low elevations in flat valley bottoms or salt flats along the northern portions of the route to about the Montezuma Valley. The semi-desert shrub steppe community is found along portions of Montezuma option 2 west of Tonopah. Mojave mid-elevation mixed salt desert scrub occurs at the southern ends of Montezuma options 1 and 2 and inter-mountain sagebrush steppe occurs as Montezuma 1 crosses the Montezuma Mountain Range. Creosote-bursage, blackbrush, hopsage, and Mojave mixed scrub occur along the southern portions of the route from about Common Corridor Segment 2 to Yucca Mountain.

The corridor and its options would cross habitat for two species classified as threatened under the Endangered Species Act: desert tortoises (*Gopherus agasizii*) and Lahontan cutthroat trout (*Oncorhynchus clarkii henshawi*). The desert tortoise also is classified as threatened by Nevada (Nevada Administrative Code 503.080). About 50 kilometers (31 miles) of the southern portion of the corridor from Beatty Wash to Yucca Mountain is habitat for desert tortoises. The abundance of desert tortoises along this portion of the corridor is low to very low (BSC 2006a). The corridor would cross potential habitat for the Lahontan cutthroat trout at the Walker River north or south of Weber Reservoir. The Lahontan cutthroat trout occurs in Walker Lake and in the Walker River upstream to the Weber Reservoir during spawning. The upstream spawning migration of trout is blocked by the Weber Reservoir dam,

although the Bureau of Indian Affairs might build a fish ladder around that dam that will enable Lahontan cutthroat trout to migrate upstream of the dam. There are no areas classified as critical habitat for these threatened species within or near the corridor.

The Railroad Valley springfish (*Crenychthis nevadae*), which is federally and state (Nevada Administrative Code 503.065) classified as threatened, and the Sodaville milkvetch (*Atragalus lentiginousus Douglas var. sesquimetralis*), a species classified as critically endangered by Nevada (Nevada Administrative Code 527.010), occur in or near Soda Spring at Sodaville. This spring is about 2.1 kilometers (1.3 miles) from the Mina rail corridor (BSC 2006a; NNHP 2005). The federally and state-listed (Nevada Administrative Code 503.050) endangered Southwestern willow flycatcher (*Empidonax traillii extimus)* has been observed about 4.3 kilometers (2.7 miles) from the corridor north of Beatty along U.S. Highway 95 (NNHP 2005).

No plants species classified as sensitive by the BLM in Nevada have been found within the 400-meter (0.25-mile)-wide corridor. The following four BLM sensitive plant species have been observed within 5 kilometers (3 miles) of the corridor (URS 2006).

- Oryctes (*Oryctes nevadensis*) occurs about 4.8 kilometers from southern portion of the Schurz bypass options, 2.6 kilometers (1.6 miles) from the start of Mina Common Corridor Segment 1, and about 0.64 kilometers (0.4 miles) from Mina Common Corridor Segment 1 north of Mina.

- Eastwood milkweed (*Asclepias eastwoodiana*) has been found about 4.0 kilometers (2.5 miles) east of Montezuma option 1 north of Silver Peak and west of the Weepah Hills.

- Nevada dune beardtongue (*Penstemon arenarius*) has been found about 0.64 kilometers (0.4 miles) west of Mina Common Corridor Segment 6 in Sarcobatus Flats.

- Two populations of the black woollypod (*Astragalus funereus)* have been documented 0.1 and 0.48 kilometers (0.06 and 0.3 miles) outside of the corridor just south of Beatty Wash.

The Oasis Valley pyrg or springsnail (*Pyrgulopsis micrococcus*), a BLM sensitive species, has been observed in springs from about 1.8 to more than 4.8 kilometers (1.1 to 3 miles) west of Oasis Valley option 1 and Mina Common Corridor Segment 6 north of Beatty (NNHP 2005).

The state-protected Amargosa toad (*Bufo nelsoni*) (Nevada Administrative Code 503.075) occurs in numerous springs in Oasis Valley from 1.1 to more than 4.8 kilometers (0.7 to 3 miles) west of Oasis Valley option 1. The Oasis Valley speckled dace (*Rhinichthys osculus* ssp.), which also is state protected (Nevada Administrative Code 503.065), occurs more than 2.6 kilometers (1.6 miles) from Oasis Valley option 1 in the same areas.

Portions of Mina Common Corridor Segment 6 cross habitat for the chuckwalla (*Sauromalus ater*), a lizard classified as sensitive by the BLM in Nevada.

The Mina rail corridor crosses habitat for numerous birds classified as sensitive by the BLM in Nevada, including the western burrowing owl (*Athenes cunicularia*), peregrine falcon (*Falco peregrinus*), loggerhead shrike (*Lanius ludovicianus*), sage thrasher (*Oreoscotes montanus*), phainopepla (*Phainopepla nitens*), and Brewer's sparrow (*Spizella breweri*). Golden eagles (*Aquila chrysaetos*) are found throughout the corridor and bald eagles (*Haliaeetus leucocephalus*) winter along portions of the Walker River on the Walker River Paiute Reservation. These two species are protected under the Bald and Golden Eagle Protection Act. In addition, all migratory birds found along the corridor are protected under the Migratory Bird Treaty Act.

A documented occurrence of the fringed myotis (*Myotis thysanodes*), a BLM sensitive species and state-protected bat (Nevada Administrative Code 503.030), took place on the west edge of Jackass Flats about

5 kilometers (3 miles) from the corridor (NNHP 2005). Other BLM sensitive bats that may occur along the Mina rail corridor include the Townsend's big-eared bat (*Corynorhinus townsendii*); the spotted bat (*Euderma maculatum)*, a Nevada threatened species; the California myotis (*Myotis californicus*); the western small-footed bat (*Myotis ciliolabrum*); the western pipistrelle (*Pipistrellus hesperus*); and the state-protected pallid bat (*Antrozous pallidus*) (USR 2006). The corridor may cross habitat for other mammals classified as sensitive by the BLM in Nevada, including the pygmy rabbit (*Brachylagus idahoensis*), and the dark kangaroo mouse (*Microdipidops megacephalus albiventer*).

From Hawthorne to Redlich Pass, Mina Common Corridor Segment 1 would pass near areas designated by the BLM as desert bighorn sheep (*Ovis Canadensis nelsoni*) yearlong habitat, and Mina Common Corridor Segment 2 would pass near yearlong bighorn sheep habitat north of Lone Mountain. Mina Common Corridor Segment 6 would cross a bighorn sheep movement corridor in the Beatty Wash area. Portions of Mina Common Corridor Segment 1 from Thorne to Blair Junction would be within 5 kilometers (3 miles) of BLM designated yearlong habitat for pronghorn antelope (*Antilocapra americana*) and mule deer (*Odocoileus hemionus*). Montezuma option 2 would cross yearlong pronghorn antelope habitat in Montezuma Valley. Montezuma option 1 would cross yearlong mule deer habitat near Silver Peak and in the Montezuma Range, and Oasis Valley option 3 would cross seasonal mule deer habitat. Mountain lions (*Felis concolor*), which are also classified as a game species in Nevada, are found throughout southern and central Nevada (BLM 1998, BLM 1997, BLM 2001).

The Mina rail corridor would cross four wild horse and burro management areas – Montezuma Peak, Goldfield, Stonewall, and Bullfrog. The corridor would pass within 5 kilometers (3 miles) of the Garfield Flat, Silver Peak, and Pilot Mountain (or Dunlap) Herd Management Areas (BLM 2006).

The only riparian area crossed by the Mina rail corridor would be along the Walker River (Table 2-2). There are freshwater emergent wetlands and riparian habitat at both locations being considered for crossing that river. The only spring within the 400-meter (0.25-mile)-wide corridor is Rabbit Spring, which is on the upstream edge of the Montezuma option 2 corridor near Goldfield. Springs and seeps are listed in Table 2-2.

Construction of the Mina rail line would involve clearing of vegetation, excavation, and filling for subgrade within the 400-meter (0.25 mile)-wide corridor. Maximum land disturbance within this area is approximately 37 to 41 square kilometers (9,143 to 10,131 acres).

With the exception of riparian areas, none of the vegetation communities that occur along the Mina corridor are unique or rare in the region. A bridge would be constructed over the riparian area along the Walker River, which would minimize disturbance to that vegetation community. The total land area disturbed within all community types would be small compared to the existing area of Nevada that supports those communities.

Clearing vegetation and disturbing the soil would create habitat for colonization by noxious weeds and exotic plant species along the Mina corridor. This could result in an increase in abundance of exotic species along the corridor, which could result in suppression of native species and increased fuel loads for fire. Reclamation of disturbed areas would enhance the recovery of native vegetation and reduce colonization by exotics.

About 50 kilometers (31 miles) along the southern end of the corridor is desert tortoise habitat. Construction of the rail line would result in the permanent loss of desert tortoise habitat within the corridor. In addition, these activities could cause mortality of individual desert tortoises; however, their abundance is low in this area so losses would be few. Relocation of tortoises along the route prior to construction would minimize losses of individuals. The presence of the rail line could interfere with the normal movements of individual tortoises. DOE would consult with the U.S. Fish and Wildlife Service

(under Section 7 of the Endangered Species Act) regarding this species and would implement all terms and conditions required by the U.S. Fish and Wildlife Service.

The Lahontan cutthroat trout, a federally listed species, occurs in the Walker River downstream of the Weber Dam during spawning and may occur upstream of that dam in the future if a fish ladder is constructed. Construction of a bridge across the Walker River could increase turbidity and sedimentation, which would temporarily degrade the quality of water. Construction of the bridge would have to occur during periods of low flow, when the species would be rare or absent from the river. The bridge would not affect the ability of trout to migrate up the river.

The only other federally listed species near the corridor are the Southwestern willow flycatcher and the Railroad Valley springfish. There is no habitat for these species within the corridor and they would not be affected.

One population of the Sodaville milkvetch, a state protected plant species, occurs near springs that are about 2.1 kilometers (1.3 miles) from the corridor and would not be affected. There are no known populations of BLM sensitive plant species within the 400-meter (0.25-mile) corridor that could be directly or indirectly affected by land-clearing activites and construction of the Mina rail line. There are populations of four BLM sensitive plant species that have been documented within 5 kilometers (3 miles). DOE anticipates that corridor activities would not extend to these areas and therefore these populations would not be impacted by construction.

Two state protected species, the Amargosa toad and the Oasis Valley speckled dace, and one BLM protected species, the Oasis Valley pyrg or springsnail occur in springs outside the corridor, but within 5 kilometers (3 miles) in and near Oasis Valley. DOE anticipates that corridor construction activities would not extend to these areas.

Construction of the corridor could affect birds classified as sensitive by the BLM and other migratory birds through loss of suitable nesting and foraging habitat, and avoidance of construction activities by birds. Construction of the corridor could also affect BLM sensitive bat and other mammal species through loss of suitable habitat, and avoidance of construction activities. The area of permanent loss of habitat would be small compared to available habitat in the region crossed by the corridor.

This rail corridor crosses habitat for bighorn sheep, pronghorn antelope, mule deer, and mountain lions. It also crosses wild horse and burro management areas. Construction activities would reduce some habitat in these areas and have the potential to disrupt movement patterns of wild horses, burros, and game species. These animals would probably avoid contact with humans at construction locations and would temporarily move to other areas during construction.

Construction of the Schurz Bypass options would affect wetlands and riparian habitat during construction of the Walker River bridge. The affected wetland and riparian areas would be small compared to the total area of these community types along the corridor. Construction of the bridge would also cause temporary increases in sedimentation, but would not alter the natural flow or stream channel of the Walker River. Prior to initiation of any construction activities, DOE would consult with the U.S. Army Corps of Engineers to determine if a Section 404 permit under the Clean Water Act would be required.

The Mina corridor would cross three springs (Table 2-2): Rabbit and Warm Springs, and another unnamed spring. All three are located along the outer edge of the Mina corridor. DOE would adjust the final alignment within this corridor, if selected, to avoid conducting surface disturbing activities that may affect these springs.

Soils

The Farmland Protection Policy Act requires Federal agencies to take into account the adverse effects of their programs on the preservation of farmlands, including the conversion of prime farmland. DOE used the soil survey databases (USDA 2006) to locate soils along the corridor that are classified as supporting prime farmland. Less than 1 percent of the Mina rail corridor contains soils classified as prime farmland. Those soils are located on the Walker River Paiute Reservation.

A number of soil types occur throughout the Mina rail corridor. The soil types in the vicinity of the corridor can be classified in more general terms as sandy soils or dune areas, which are characteristically alkaline, salty, and basic, containing calcium carbonate, and light-colored soils. These soils also include rocky outcrops; talus slopes; and granitic and gravelly areas (URS 2006). The Schurz bypass options would pass through areas of primarily sandy soils and between Hawthorne and Blair Junction, the corridor would contain mostly areas of alluvial soils. Montezuma option 1 would pass through areas of fine-grained soils at the playa in Clayton Valley, and Montezuma option 2 would pass through areas consisting of primarily sandy soils. The remainder of the corridor, south of Lida Junction, would pass through areas of alluvial and rocky soils (BSC 2006a).

Other soil characteristics that are particularly relevant to the proposed rail corridor are classified erodes easily and blowing soil. Soil with either of these characteristics can be quite susceptible to erosion. The erodes easily characteristic is 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, tend to erode easily when disturbed. Approximately 19 percent of the Mina rail corridor has soils with this characteristic (USDA 2006). The blowing soil characteristic is based on the soil survey classification of susceptibility of a given soil to wind erosion. The blowing soil characteristic identifies areas where fine-textured, sandy materials predominate and where uncontrolled soil disturbance could result in increased wind erosion. Depending on the options, between 23 and 26 percent of the Mina rail corridor would have soils with the blowing soil characteristic (USDA 2006).

Less than 1 percent of soils along the proposed rail alignment are classified as prime farmland. These are located on the Schurz options on the Walker River Paiute Reservation. Soils throughout the corridor probably would be subject to an increase in erosion potential during construction. DOE would use dust suppression and other control measures to reduce this potential. As construction proceeded, the rail roadbed would be covered with ballast rock, which would virtually halt erosion from that area. As construction ended, disturbed areas (other than the railbed and access roads) would slowly recover. Other permanent erosion control systems would be installed as appropriate. Introduction of contaminants into the soil is also a potential concern. Proper control of hazardous materials during construction and prompt response to spills or releases would, however, reduce this concern.

Rail operations would not lead to additional habitat losses, although maintenance activities would prevent habitat recovery in the narrow band occupied by the rail line and access road. There could be loss of habitat due to inadvertent fires along the right-of-way from rolling equipment operations and maintenance activities. Although passing trains probably would cause mortality of individuals of some species, losses would be unlikely to affect regional populations because all species are widespread geographically.

Passing trains could disrupt wildlife, including game animals, horses, and burros, but such effects would be transitory. Noise from a train probably would disturb animals close to the track throughout operations, but this disturbance would diminish with distance from the track and over time as animals acclimated to daily disturbances from passing trains. The frequency of trains using the corridor (average of 17 one-way trains per week) indicates that disturbance of animals near the rail line would probably be minimal. Noise from the trains could cause animals to move away from the tracks and, possibly, cause changes in migratory patterns.

2.2.5 CULTURAL RESOURCES

2.2.5.1 Cultural Resources Methodology

Cultural resources include any historic and archaeological, sites, buildings, structures, landscapes, or objects resulting from or modified by human activity and can include mining, ranching, and linear features such as roads and trails. Cultural resources designated as historic properties warrant consideration with regard to potential adverse impacts resulting from proposed federal actions.

The region of influence for cultural resources is the 400-meter (0.25-mile)-wide corridor. This area includes the area of potential disturbances that could have indirect impacts on cultural resources. DOE conducted an archeological site file search using records from the Desert Research Institute, the Nevada Cultural Resources Information System, and archeological information repositories at the Harry Reid Center at the University of Nevada-Las Vegas, and the Nevada State Museum in Carson City.

2.2.5.2 Cultural Resources Affected Environment

In 2007, DOE conducted a records search for the Mina rail corridor for a width of 400 meters (0.25 miles). The proposed corridor would follow the existing Union Pacific Railroad Hazen Branchline for approximately 69 kilometers (43 miles). Several cultural resources eligible or potentially eligible for the *National Register of Historic Places* along this corridor include a portion of the Overland Stage Road and the Newlands Waterworks at Lahontan City. In addition, the existing rail line passes through Fort Churchill State Historic Park.

Class I records search identified several cultural resources sites along the Schurz options, some of which are eligible or potentially eligible for the *National Register of Historic Places*. These include the historic Rawhide Western Railroad grade and Reese River Road stage route, and several prehistoric sites. The proposed rail corridor would follow various lengths of some historic railroads between Hawthorne and Tonopah Junction, south toward Silver Peak, and intersect or follow many segments of the former Las Vegas and Tonopah line along the of Mina common corridor segment 2, south of Goldfield. In these locations, DOE would refurbish the historic rail beds for use with the proposed rail line. Eligible or unevaluated resources associated with the railroads include the Sodaville to Tonopah freight road, railroad stations, abandoned grades, construction-related features, workers' encampments, and resources associated with Luning, Mina, Coaldale, and other towns established along the rail lines.

A portion of the Mina rail corridor would run just south of Millers, a station on the Tonopah and Goldfield Railroad and a mill site for silver ore. The corridor would pass near known historic graves and the historic cemetery at Millers. In addition, the corridor would run adjacent to Cuprite, an unrecorded railroad station along the abandoned rail line of the former Bullfrog Goldfield Railroad near Ralston. The station had a post office and served the mining camps of Lida, Hornsilver, Bonnie Claire, and Tule Canyon in the early twentieth century. Also, a number of prehistoric sites, some of which are eligible or potentially eligible for the *National Register of Historic Places*, are located nearby.

A portion of the Mina rail corridor would run just west of the current boundary of the Goldfield Historic District, but early photographs of Goldfield reflect that the town extended west to the base of Malpais Mesa. To the north, a portion of the corridor would be just east of the Goldfield Cemetery, but there is historic confusion over some burial plot locations, so the actual boundary location is in question. The corridor would also run through the extensive historic Goldfield dump, which is National Register eligible. In addition, there is the potential for buried prehistoric sites at nearby springs, as evidenced by prehistoric rock art.

Other areas of the Mina rail corridor would be within 1.6 kilometers (1 mile) of several cultural resource sites, including a Western Shoshone village, petroglyphs near Beatty and Schurz, and Black Cone in Crater Flats, which ethnographers and American Indians have identified as places of religious significance or power (AIWS 1998).

The search for the Mina rail corridor identified 132 previously recorded archaeological sites (Table 2-4). The prehistoric and historic sites identified range in size from isolated artifacts and scatters of artifacts to town sites and transportation networks (such as stage roads and railroad grades). About 21 percent are considered to be eligible for inclusion on the National Register of Historic Places. There are 35 sites that have not been evaluated for their eligibility. Based on the results of DRI in their Class 1 search and the HRA Class 1 search, it appears that less than five percent of the rail corridor has been surveyed (URS 2007).

Table 2-4. Number of previously recorded cultural resource sites within the 400-meter (0.25-mile) area of the Mina rail corridor.[a]

National Register of Historic Places status	Prehistoric	Historic	Prehistoric and historic	Unknown	Total
Eligible	2	22	4	0	*28*
Not eligible	41	17	11	0	*69*
Unknown	15	15	2	3	*35*
Total	*58*	*54*	*17*	*3*	*132*

Prior to construction of a rail line, field surveys and potentially mitigation of cultural resources would be required. If cultural resources were encountered, a qualified archaeologist coordinating with the Nevada State Historic Preservation Officer and DOE would participate in directing activities to ensure that the resources would be properly protected or the impact mitigated. DOE would use procedures to avoid or reduce direct impacts to cultural resources in construction areas where surface-disturbing activities would occur.

Indirect impacts, such as non-project-related disturbances of archaeological sites by purposeful or accidental actions of project employees, could occur from construction activities as a result of increased access and increased numbers of workers near cultural resource sites. These factors would increase the probability for either intentional or inadvertent indirect impacts to cultural resources.

No additional direct or indirect impacts are anticipated to occur at archaeological and historic sites from the railroad operations.

2.2.6 OCCUPATIONAL AND PUBLIC HEALTH AND SAFETY

2.2.6.1 Occupational and Public Health and Safety Methodology

The analysis for occupational and public health and safety focused on traffic, worker industrial safety, incident-free radiological and nonradiological impacts, and radiological impacts with respect to accidents. To estimate transportation impacts, DOE defined the region of influence for the Mina rail corridor as beginning at the Hazen siding in Churchill County, Nevada, and ending at Yucca Mountain. The analysis does not consider transportation from the Nevada border to the Hazen siding.

The region of influence for each includes:

Traffic impacts: The 400-meter (0.25-mile) width of the rail corridor and public highways used by workers and for shipments during construction and operations.

Worker industrial safety impacts: The 400-meter- (0.25-mile)-wide rail corridor.

Incident-free radiological and nonradiological impacts: The 800-meter (0.50-mile) area on either side of the centerline of the rail corridor.

Radiological impacts with respect to accidents: An area within an 80-kilometer (50-mile) radius from a potential occurrence location in the rail corridor.

Information was obtained from the Bureau of Labor Statistics for 2005. The analysis also used the RADTRAN 5 computer program (Neuhauser and Kanipe 2000; Neuhauser, Kanipe, and Weiner 2000) and the RISKIND computer program (Yuan et al. 1995) where applicable.

2.2.6.2 Occupational and Public Health and Safety Affected Environment

During rail line construction and operations, common industrial hazards could cause health and safety impacts to workers. The categories of worker impacts include total recordable cases per 100 full time equivalents, lost-workday cases per 100 full time equivalents, and fatalities per 100 full time equivalents. Total recordable cases are occupational injuries or occupation-related illness 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) incidents that result in the transfer of a worker to another job, termination of employment, medical treatment, loss of consciousness, or restriction of motion during work activities.

Table 2-5 lists Bureau of Labor Statistics incident-rate statistics for 2005 used to estimate total recordable cases, lost workday cases, and fatalities for involved and noninvolved workers during construction and operation of the proposed rail corridor (BLS 2007a,b). For this analysis, involved workers are personnel who would be involved in construction or operations activities. Noninvolved workers are personnel who would be involved in management, administration, and security. The Bureau of Labor compiled the health and safety statistics by employment sectors; the sectors used for this analysis include Heavy and Civil Engineering Construction; Management of Companies and Enterprises; Transportation and Warehousing: Rail Transportation; and Support Activities for Transportation. Sectors analyzed for fatality incident statistics included Construction, Professional and Business Services, and Transportation and Warehousing.

Table 2-5. Incident-rate statistics for estimation of industrial safety impacts of rail line construction and operations.[a]

	Total recordable cases per 100 FTEs[b]		Lost workday cases per 100 FTEs		Fatalities per 100 FTEs	
Activity	Involved	Noninvolved	Involved	Noninvolved	Involved	Noninvolved
Construction	5.6	2.4	3.1	1.3	0.011	0.0035
Operations	2.5	2.4	1.9	1.3	0.018	0.0035

a. Sources: BLS 2007a,b
b. FTE = full-time equivalent; one full-time equivalent is 2,000 labor hours.

Industrial Safety

The estimated workforce needed to construct the rail line would be 6,500 worker-years (Holder 2007; Bland 2007a); with the assumption that there are 2,000 hours per worker-year. The analysis based the estimates of industrial safety impacts from railroad operations in the Mina rail corridor on about 60 full-time-equivalent workers each year, about 2,000 worker-years. Table 2-6 lists estimated industrial safety

impacts to workers during construction and the estimated industrial safety impacts of railroad operations based on Bureau of Labor Statistics (BLS 2007a,b) in the Mina rail corridor for up to 50 years.

Table 2-6. Impacts to workers from industrial hazards during rail line construction and operations in the Mina rail corridor.[a]

Group and industrial hazard category	Construction	Operations[b]	Total
Involved worker			
Total recordable cases[c]	300	37	337
Lost workday cases	170	28	198
Fatalities	0.6	0.26	0.86
Noninvolved worker			
Total recordable cases	30	12	42
Lost workday cases	16	6.4	22.4
Fatalities	0.04	0.02	0.06
Totals[d]			
Total recordable cases	330	49	379
Lost workday cases	180	35	215
Fatalities	0.6	0.3	0.92

a. Estimates of worker-years multiplied by accident rate (BLS 2007a,b).
b. Totals for railroad operations occurring up to a 50-year operations period.
c. Total recordable cases include injuries and illness.
d. Totals might differ from sums of values due to rounding.

Transportation

This analysis estimates the impacts associated with the transportation of construction material to the construction sites and to the commuting workers. There could be traffic fatalities and vehicle emission impacts during the movement of equipment and delivery of materials for construction, worker commutes to and from construction sites, and transport of water to construction sites. Table 2-7 lists the impacts of transportation during the construction phase.

Table 2-7. Transportation impacts during rail line construction in the Mina corridor.

Transportation impact category	Traffic fatalities	Number of cancers
Vehicle emission impacts (cancer fatality)		
Material delivery vehicles	–	0.04
Worker commuting	–	0.5
Transportation accidents (fatalities)		
Material delivery vehicles	0.3	–
Worker commuting	3.7	–
Total construction impacts of transportation	4.0	0.6

The transportation of spent nuclear fuel and high-level radioactive waste along the Mina rail corridor would result in radiological and nonradiological impacts to workers and the public. Radiological impacts would result from radiation the rail cask contents would emit during incident-free transportation, from radionuclides released from the cask during transportation accidents, or from radiation the cask contents emitted because of a loss of shielding during a transportation accident. Nonradiological impacts (vehicle emission-related fatalities) would result from diesel locomotives and fugitive dust, and from nonradiological transportation accidents that involved workers and members of the public.

To estimate transportation impacts, DOE defined the region of influence beginning at the Hazen siding in Churchill County, Nevada, and ending at Yucca Mountain. For incident-free transportation, the potential human health impacts for transportation workers and populations along the corridor were estimated. Transportation workers would include train crews, security escorts, workers at the staging yard, and workers who would be exposed at sidings when a train carrying loaded casks passed. Members of the public would include people living within 800 meters (0.5 mile) of the Mina rail corridor and around the staging yard. The analysis used the RADTRAN 5 computer program (Neuhauser and Kanipe 2000; Neuhauser, Kanipe, and Weiner 2000) and the RISKIND computer program (Yuan et al. 1995) to estimate these impacts.

For transportation accidents, DOE estimated radiological impacts for accidents that involved releases of radioactive material from the shipping casks, accidents that involved a reduction in the shielding of the shipping casks, and accidents in which no release of radioactive material and no deformation of shielding occurred. For these accidents, the analysis used the RADTRAN 5 program to estimate radiological accident risks (probability of occurrence times consequences) for a complete spectrum of accidents. In addition, DOE estimated the number of traffic fatalities that would result from nonradiological transportation accidents

Chapter 6 and Appendix J of the FEIS describe the methods and data DOE used to estimate the radiation doses for workers and members of the public. Since DOE completed the FEIS, the repository design and operational plans have evolved. There have also been changes to some of the data DOE used to estimate radiation doses and radiological impacts. These changes in include the use of updated latent cancer fatality conversion factors, radiation dosimetry, additional escorts, dedicated trains, 2000 Census data, shipment estimates, radionuclide inventories, exposure times and staffing estimates, and sabotage release fractions (MTS 2007).

Workers along the Mina Rail Corridor. During the shipment of spent nuclear fuel and high-level radioactive waste from the Hazen siding to the repository, workers on the train and as well as those working along the rail line would be exposed to direct radiation from 9,495 shipping casks. Table 2-8 lists the estimated radiation doses and impacts for involved workers. The estimated collective radiation dose for the operations phase would be 310 person-rem. The estimated number of latent cancer fatalities would be 0.18 (about 1 chance in 6 that there would be one cancer fatality in the exposed worker population) for a radiation-related latent cancer fatality in this group.

Table 2-8. Operations impacts of transportation for the Mina rail corridor.

Transportation impact category[a]	Traffic fatalities	Radiation dose (rem or person-rem)	Probability of LCF	Number of cancers
Incident free radiological impacts (LCFs)				
Public	–	1.4	–	0.00082
Maximally exposed individual		0.0078	0.0000047	–
Workers		550		0.33
Along corridor	–	310	–	0.18
At staging yard		250		0.15
Maximally exposed worker	–	17	0.01	–
Radiological accident (LCFs)		0.012	–	0.0000074
Vehicle emission impacts (cancer fatalities)				
Waste transportation	–	–	–	0.0034
Worker commuting	–	–	–	0.4
Transportation accidents (fatalities)				
Waste transportation	0.31	–	–	–
Worker commuting	3.3	–	–	–
Total operations impacts[b]	**3.6**	**–**	**–**	**0.7**

a. LCF = latent cancer fatality.
b. Totals might differ from sums due to rounding.

Workers at the Staging Yard. When shipping casks arrived at the staging yard, personnel would remove the railcars that carried the casks from the train, inspect them, and transfer them to the train for transport to Yucca Mountain. The escorts who had accompanied the shipping casks from their origin would be present during the inspection. For the purposes of this analysis, it was assumed these workers, inspectors, and escorts would be exposed to direct radiation from 9,495 shipping casks. In addition, the analysis assumed that noninvolved workers would be exposed to direct radiation during these activities.

The estimated collective radiation dose for involved and noninvolved workers at the staging yard would be 250 person-rem. The estimated number of latent cancer fatalities for these workers would be 0.15. Staging Yard and other facilities workers would participate in a radiation protection program and would not be exposed to radiation greater than the administrative control level for repository facilities of 0.5 rem per year (BSC 2005a). As previously stated, this requirement could limit the number of hours a worker would be able to work at the staging yard to fewer than 2,000 per year.

Maximally Exposed Workers. The maximally exposed worker would be a escort. This person would receive an estimated radiation dose of about 17 rem, based on a 0.5-rem-per-year radiation dose administrative control level (BSC 2005a). The estimated probability of a latent cancer fatality for a maximally exposed worker would be 0.01. Escorts and other railroad workers would participate in a radiation protection program and would not be exposed to radiation greater than the radiation dose administrative control level for repository facilities of 0.5 rem per year (BSC 2005a). In some cases, this requirement could limit escorts to work fewer than 2,000 hours per year on the railroad.

Members of the Public along the Mina Rail Corridor. During the shipment of spent nuclear fuel and high-level radioactive waste from the Hazen siding to Yucca Mountain, people along the rail line would be exposed to direct radiation from 9,495 shipping casks.

Table 2-8 lists the radiation impacts for members of the public along the Mina rail corridor. The estimated collective radiation dose over the operations phase for members of the public would be 1.4 person-rem. The estimated number of latent cancer fatalities would be 0.00082 (about 1 chance in 1,200 that there would be one cancer fatality in the group of exposed members of the public).

The maximally exposed individual would be a person who lived beside the railroad right-of-way. The estimated radiation dose for this individual would be 0.0078 rem over the operations phase. The estimated probability of a latent cancer fatality for this individual would be 0.0000047.

People along the Mina rail corridor would be exposed to diesel exhaust and fugitive dust from operation and maintenance of the rail line. Table 2-8 lists these nonradiological vehicle emission impacts. There could be 0.0034 fatalities from waste transportation and 0.4 fatalities from workers commuting.

Accidents. The potential risks of transportation would be associated with three types of accidents: (1) accidents that released radioactive material from the shipping cask, (2) accidents in which no release of radioactive material occurred but there was a deformation of shielding because of lead shield displacement, and (3) accidents in which no release of radioactive material and no deformation of shielding occurred. The impacts from these types of accidents are known as the radiological accident dose risk, and are quantified in terms of latent cancer fatalities. The impacts of traffic fatalities involving the casks were also estimated. Table 2-8 lists impacts from these types of accidents.

2.2.7 SOCIOECONOMICS

2.2.7.1 Socioeconomics Methodology

The Mina rail corridor would cross portions of Lyon, Mineral, Esmeralda, and Nye Counties and the Walker River Paiute Reservation. Most of the residential areas on the Reservation are within the boundaries of Mineral County, with a portion in Lyon County.

DOE evaluated the potential impacts to five socioeconomic variables and provided a profile of the existing socioeconomic conditions in the region of influence. The breadth and depth of the evaluation mirrors that of the original corridor-level analysis provided in the FEIS. The analysis includes the present and anticipated impacts to those variables. The region of influence for the socioeconomic analysis was defined as those Nevada counties which the proposed rail line (Mina) would cross, and the two areas where most workers would be expected to reside (the Carson City/Washoe County area and Clark County). A general profile of the Walker River Paiute Reservation was also developed. The analysis presented potential changes that would result from the construction and use of a rail line.

To evaluate this resource area, DOE obtained data from the U.S. Census Bureau, the Nevada State Demographer, and other local and state sources. In addition, the Department utilized estimates and projections from the socio-demographic forecasting software program REMI, version 9, to develop baselines. The use of these sources is consistent with the FEIS and in that the REMI projections include the same variables as those included in the FEIS.

2.2.7.2 Socioeconomics Affected Environment

2.2.7.2.1 Employment and Population

Table 2-9 lists population estimates and projections, anticipated for the 50-year operational period of the rail line through 2067, for the four counties the Mina rail corridor would cross. The table also lists population projections for Clark County and the Carson City/Washoe County area, because those jurisdictions, which represent the largest population centers in the southern and northern portions of the corridor, respectively, would potentially provide most of the rail line construction workers.

Table 2-9. Population baselines and projections for select Nevada counties and Nevada, 2005 to 2067.[a]

Jurisdiction/ year	2005	2010	2015	2020	2025	2030	2035	2067
Carson City/Washoe County	450,000	510,000	570,000	620,000	660,000	700,000	740,000	1,100,000
Lyon County	49,000	61,000	72,000	81,000	89,000	96,000	100,000	170,000
Mineral County	4,600	4,700	4,800	4,600	4,400	4,300	4,200	3,700
Esmeralda County	1,300	1,100	1,100	1,000	1,000	1,000	1,000	1,100
Nye County	41,000	52,000	61,000	68,000	73,000	78,000	84,000	131,000
Clark County	1,820,000	2,260,000	2,650,000	2,950,000	3,170,000	3,360,000	3,540,000	5,000,000
Nevada	2,540,000	3,060,000	3,540,000	3,900,000	4,190,000	4,430,000	4,680,000	6,650,000

[a]Source: NSDO 2006a.

Unless noted separately, all general demographic, social, economic and housing information was estimated by the U.S. Census Bureau during the 2000 decennial national census and was reported in the Census American FactFinder.

Carson City is composed of about 143 square miles. The persons per square mile density is 365.9, which is considerably more than the average population density in Nevada of 18.2. Carson City had about 21,000 housing units in 2000 and a population of 52,500 that year. Carson City is the metropolitan center nearest the Mina rail corridor starting point. Per capita income in Carson City, $20,943 was near the state's average in the last decennial census. Carson City's unemployment rate of 4.6 was lower than Nevada's unemployment rate of 6.2 percent in 2000.

Washoe County has a land area of 6,342 square miles and a population density of 53.5 persons per square mile, about three times the population density of the state. Washoe County had about 140,000 housing units in 2000 and a population of about 340,000. Washoe County has recently experienced strong growth; the 1990s saw an aggregate growth of nearly 33 percent and 2000-2005 saw an additional 16-percent growth in population. Per capita income in Washoe County was $24,277, about 10 percent higher than Nevada's per capita income that year. Washoe County unemployment rate in 2000 was 5.0 percent; lower than the state's unemployment rate of 6.2 percent.

The Carson City/Washoe County area had a population of about 450,000 in 2005. The economy in the Carson City/Washoe County area is dominated by the Services industry, in particular the Accommodations and Food Services sector. Services accounted for almost 42 percent of the area's employment in 2005. Table 2-10 displays information about the demographic, social, housing, and economic characteristics of the Carson City/Washoe County area in 2000.

Mineral County has about 3,756 square miles and a population density of 1.4 persons per square mile. The county experienced population declines in the 1990s. Mineral County continues to experience modest declines in population; its estimated 2005 population was 4,600. It was about 5,100 in 2000. Hawthorne, in Mineral County, had a 2000 estimated population of 3,100 persons and a 2005 estimated population of 3,000. In the Mina rail corridor, the U.S. Census Bureau identifies only the Hawthorne community as being urban. All other communities are classified as rural. Luning had an estimated 2000 population of 86 people and an estimated 2005 population of 87. Mina had a 2000 estimated population of 310 residents and an estimated 2005 population of 280 (NSDO 2006b). There are three major industries in Mineral County: Public Administration, Natural Resources/Mining/Utilities/and Construction and Services. Per capita income was estimated to be $16,952 in the last U. S. Census, about 77 percent of Nevada's per capita income. Unemployment in the county, 12.9 percent was twice Nevada's unemployment in 2000. The county had about 2,900 housing units and a 23 percent vacancy rate in that year. Table 2-10 displays information about the demographic, social, housing, and economic characteristics of the Mineral County in 2000.

Table 2-10. Demographic, social, housing, and economic characteristics for select Nevada counties, the Walker River Paiute Reservation, and Nevada.

	Washoe County	Clark County	Esmeralda County	Lyon County	Mineral[a] County	Nye County	Walker River Reservation	Nevada
2000 Population	340,000	1,380,000	970	35,000	5,100	32,000	850	2,000,000
Minority Population[b]	92,000	547,000	190	5,700	1,500	5,000	740	695,000
Percent Minority	27	40	20	17	30	15	87	35
Individuals in poverty, 2000	33,000	146,000	150	3,500	760	3,500	270	206,000

Percent in Poverty	10	11	15	10	15	11	32	11
Per Capita Income, 1999[c]	$24,277	$21,785	$18,971	$18,543	$16,952	$17,962	$10,092	$21,989
Housing Units	140,000	560,000	830	14,000	2,900	16,000	350	827,000
Housing Units Occupied	130,000	512,000	460	1,300	2,200	13,000	300	751,000
Percent Occupied	92	92	55	91	77	84	87	91
Individuals in civilian labor force	180,000	682,000	460	17,000	2,400	13,000	340	995,000
Employed individuals	170,000	637,000	440	15,000	2,100	12,000	260	933,000
Unemployed individuals	9,000	45,000	15	1,100	310	940	77	62,000
Individuals enrolled in school: K through 12	62,000	250,000	190	7,300	970	5,700	260	367,000

[a] Mineral County numbers include the Walker River Reservation

[b] Minority population is all individuals other than those who classify themselves as "white alone."
[c] Values, except per capita income, have been rounded to two or three significant places.

Due to the nature of the census data, Mineral County's estimated and projected population figures include residents of the Walker River Paiute Reservation. The Reservation had an estimated population of 810 persons in 1990 and an estimated population of 850 persons in 2000 (Bureau of the Census 2000a). There were about 350 housing units in 2000. Residents of the Reservation work primarily in retail trade, construction and manufacturing. The 2000 unemployment rate was 22.6 percent, more than 3.5 times the Nevada unemployment rate in the same year. At the last national census, per capita income on the Walker River Paiute Reservation, $10,092, was less than 50 percent of the Nevada per capita income in that year and about 60 percent of Mineral County per capita income. Table 2-10 displays information about the demographic, social, housing, and economic characteristics of the Walker River Paiute Reservation in 2000.

Lyon County is almost 2,000 square miles. The county has a population density of about 17.3 persons per square mile, reflecting the state's average density per square mile. There were about 14,300 housing units in 2000 while the population was about 34,500 persons. Lyon County grew almost as rapidly as Clark, Nye, and Washoe Counties. It had 49,000 residents in 2005, up from 21,000 in 1990 (NSDO 2006b). Services provided about 30 percent of the county's jobs, Retail and Wholesale Trade about 20 percent, and Public Administration about 15 percent of the jobs. Per capita income, $18,543, was about 14 percent lower than the state average in 2000. Unemployment was 6.9 percent, slightly higher than the state average. Table 2-10 displays information about the demographic, social, housing, and economic characteristics of the Lyon County in 2000.

Esmeralda County experienced declines in population in the 1990s. Esmeralda County reversed that trend in the twenty-first century, growing by approximately 20 percent from 2000 to 2005. An estimated 1,300 persons lived in Esmeralda County in 2005. In 2000, Goldfield, in Esmeralda County had an estimated population of 420 residents; in 2005, the estimated population was 440. Silver Peak had a 2000 estimated population of 160 people and a 2005 estimated population of 130 (NSDO 2006b). The 3,588-square-mile county has a population density of just 0.3 persons a square mile. The county had 833 housing units in 2000, but a 45 percent vacancy rate. The population in 2000 was about 971. Most jobs in Esmeralda County are in the Services industry or in the Public Administration industry which includes the state and local government sector. Esmeralda's per capital income was $18,971 in 2000. Unemployment in Esmeralda County, 3.3 percent was about 50 percent of Nevada's unemployment in 2000. Table 2-10 displays information about the demographic, social, housing, and economic characteristics of the Esmeralda County in 2000.

Nye County's land area is more than twice that of Clark County, about 18,146 square miles. The population per square mile is 1.8 persons per square mile, about a tenth of the state's average. Nye County had about 16,000 housing units and a population about 32,000 in 2000. Nye County joined the rapid population escalation by growing approximately 81 percent in the 1990s and another 25 percent from 2000 to 2005. The county's estimated population in 2005 was 41,000 persons. Nye County is dominated by one of the nation's fastest growing unincorporated communities, Pahrump. Growing in popularity as a residential destination, Pahrump had an estimated population of 33,000 people in 2005 (an increase of 37 percent in 5 years), which represents more than 80 percent of the county's total population that year. The Mina rail corridor would also pass near Beatty and Tonopah in Nye County. The estimated 2005 populations of Beatty and Tonopah were 1,000 persons and 2,600 persons respectively (NSDO 2006b). Nye County's economy is driven by the Services industry which accounts for 44 percent of the jobs in the county. Other major industries include Retail and Wholesale trade and the Transportation/Information/Finance/Accounting industry. The estimated per capita income in Nye County at the last national census, $17,962, was about 82 of the per capita income in Nevada. Unemployment was 7.1 percent, higher than the state's 6.2 percent. Table 2-10 displays information about the demographic, social, housing, and economic characteristics of the Nye County in 2000.

Clark County has a land area of almost 8,000 square miles and a population density of about 173.9 persons per square mile. Clark County had about 560,000 housing units in 2000 and a population of about 1,380,000 that year. Clark County's population grew even faster than that of Washoe County – a total of 81 percent in the 1990s and approximately 29 percent, to 1.8 million persons, by 2005. Clark County is the metropolitan center nearest the Mina rail corridor ending point. Per capita income in Clark County was $21,785, about the average of Nevada's that year. Unemployment in Clark County, 6.6 percent was slightly above the state's unemployment rate of 6.2 percent. The economy in Clark County is dominated by the Services industry, particularly the Accommodations and Food Services sector which account for almost 50 percent of the employment in the county. The Transportation/Information/ Finance/Accounting industry and the Trade industry, which is composed of retail and wholesale trade, are also major components of the economy. Table 2-10 displays information about the demographic, social, housing, and economic characteristics of the Clark County in 2000.

Table 2-10 lists characteristics of the four counties along the Mina rail corridor, the Walker River Paiute Reservation, Clark County, Washoe County, and the State of Nevada. The information in the table is the baseline for determining potential impacts to employment, population, existing housing stock, and demands on educational facilities and other public services. Table 2-11 displays information about the employment baselines in the counties that the Mina rail corridor would cross and information about Clark County and the Carson City/Washoe County area because most rail construction workers are expected to come from those areas. Information about the State of Nevada is provided for comparison purposes.

Table 2-11. Employment baseline projections in Nevada counties in the Mina rail corridor, 2005 to 2067[a]

Jurisdiction/Year	2005	2010	2015	2020	2025	2035	2067
Carson City/Washoe							
Employment baseline	310,000	330,000	360,000	370,000	380,000	410,000	580,000
Lyon							
Employment baseline	14,000	17,000	18,000	19,000	20,000	23,000	37,000
Mineral							
Employment baseline	2,500	2,400	2,500	2,300	2,300	2,300	2,100
Esmeralda							
Employment baseline	470	470	450	440	440	430	460
Nye							

Jurisdiction/Year	2005	2010	2015	2020	2025	2035	2067
Employment baseline Clark	17,000	19,000	21,000	22,000	23,000	25,000	37,000
Employment baseline Nevada	1,070,000	1,240,000	1,330,000	1,390,000	1,450,000	1,600,000	2,230,000
Employment baseline	1,520,000	1,720,000	1,830.00	1,920,000	2,000,000	2,180,000	3,031,000

Source: Bland 2007b

[a] Values less than 1 million are rounded to two significant figures; values greater than 1 million are rounded to three significant figures.

2.2.7.2.2 Economic Measures

Baseline economic measures are provided for the four counties that the Mina rail corridor would cross, as well as Clark County and the combined Carson City/Washoe area, and the State of Nevada. Clark County dominates all economic measures in the state and is located near the southern end of the Mina corridor. The metro Carson City/Washoe County area economy, near the northern end of the Mina corridor, is also much larger than the economies in the rural counties. Table 2-12 presents this information on three economic measures: state/local government spending, real disposable income, and gross regional product.

Table 2-12. Economic measures: baselines and projections for select Nevada counties and Nevada, 2005 to 2067[a]

	2005	2010	2015	2020	2025	2030	2035	2067
Carson City/Washoe								
State/Local Government Spending	1.90	2.17	2.56	2.89	3.18	3.47	3.77	5.85
Real Disposable Income	15.73	18.54	21.30	23.65	26.21	28.86	31.72	52.32
Gross Regional Product	23.00	27.72	33.96	39.31	44.85	51.00	57.82	103.07
Lyon County								
State/Local Government Spending	0.19	0.24	0.30	0.35	0.40	0.44	0.49	0.85
Real Disposable Income	0.94	1.17	1.37	1.55	1.74	1.94	2.18	4.19
Gross Regional Product	0.75	0.96	1.17	1.36	1.56	1.78	2.03	4.04
Mineral County								
State/Local Gov Spending	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Real Disposable Income	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13
Gross Regional Product	0.16	0.14	0.16	0.16	0.18	0.19	0.21	0.25
Esmeralda County								
State/Local Gov Spending	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Real Disposable Income	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.06
Gross Regional Product	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.06
Nye County								
State/Local Gov Spending	0.16	0.20	0.25	0.29	0.32	0.36	0.39	0.64
Real Disposable Income	1.00	1.25	1.44	1.61	1.78	1.97	2.20	3.97
Gross Regional Product	1.06	1.30	1.55	1.80	2.05	2.34	2.67	4.95
Clark County								
State/Local Gov Spending	6.55	8.47	10.55	12.15	13.44	14.63	15.79	23.31
Real Disposable Income	54.70	69.02	79.89	89.56	99.85	111.59	124.94	207.81
Gross Regional Product	86.68	109.56	131.60	151.93	173.08	197.33	224.63	393.79
Nevada								
State/Local Gov Spending	9.71	12.09	14.77	16.85	18.55	20.17	21.78	32.33

Real Disposable Income	77.40	95.70	110.27	123.18	136.95	152.28	169.52	279.58
Gross Regional Product	118.32	147.38	177.24	204.50	232.79	264.98	301.08	526.81

[a]All values are in 2006 dollars; in billions.
Source: Bland 2007b

2.2.7.2.3 Public Services

Health Care. Lyon, Mineral, Nye, and Esmeralda Counties have some health care facilities, although all four counties are federally designated as health professional shortage areas for primary, dental, and mental health care (State of Nevada 2005a; State of Nevada 2005b; State of Nevada [n.d.]a, and State of Nevada [n.d.]b). Health care services are concentrated in Clark County, particularly in the Las Vegas area.

There is a public health clinic on the Walker River Paiute Reservation in Schurz. This clinic is staffed full time with a doctor and a nurse (Gormsen and Merritt 2007). This facility also has emergency medical services and emergency medical technicians (Gormsen and Merritt 2007).

Education. Lyon, Mineral, and Nye counties have elementary, middle, and high schools. In Nye County, the Community College of Southern Nevada has a campus in Pahrump that provides postsecondary school education. There are elementary and middle schools in Esmeralda County; high-school students from Esmeralda County attend school in Tonopah, Nye County (DOE 2002, p. 3-156).

Fire Protection. Lyon, Mineral, Nye, and Esmeralda counties have career and/or volunteer fire departments. Currently, the Nevada Test Site provides fire protection services to the Yucca Mountain Site.

Law Enforcement. Lyon, Mineral, Nye, and Esmeralda counties have sheriff's offices, with a ratio of 1.6, 3.9, 2.2, and 5 officers to 1,000 residents, respectively. The Walker River Paiute Reservation has a police department with four law enforcement officers which yields a ratio of 3.4 officers per 1,000 residents.

Public Roadways. Because the Mina corridor is primarily in remote and rural areas, the rail line would cross paved highways and roads with low traffic, and low-usage unpaved roads, including county roads, private roads, and off-road vehicle trails. While many of the unpaved roads are important to the daily activities of landowners and ranchers in the area, these roads are not heavily traveled. The exception is the existing Union Pacific Railroad Branchline between Hazen and Wabuska, which crosses public roads with moderate traffic.

2.2.7.3 Construction

The following paragraphs discuss the potential socioeconomic impacts associated with the construction and operation of a railroad in the Mina rail corridor.

2.2.7.3.1 Employment and Population

The incremental changes above the employment and population baselines in Mineral County would be the result of indirect jobs created to meet the consumption needs of workers.

Mineral County had an estimated population of about 4,630 people and an employment baseline of 2,550 jobs in 2005. Mineral County would gain an estimated 45 residents as a result of the construction of a rail line in the Mina corridor, an increase of less than 1 percent over the population baseline. Mineral County

would gain an estimated 90 jobs in 2010, 70 jobs in 2011 and 2012, and 45 jobs over the baseline from 2013 to 2067. The 1-year spike in 2010 would be an increase of about 3.8 percent above the 2010 employment baseline. The average change of 45 jobs is an increase of about 1.8 percent above the employment baseline in 2013.

The estimated number of workers needed to construct a rail line in the corridor would be approximately 6,500 worker-years over a minimum 5-year construction period. The average construction workforce would be 1,900 workers through each of the first 3 years of construction, with a peak of about 2,100 workers. The workforce would fall to 520 and 340 in years 4 and 5, respectively.

The construction labor pool in Clark County, Carson City/Washoe County area and, to a lesser extent, Nye and Lyon Counties is large and would be able to provide most of the necessary number of construction workers. DOE estimates that about 50 percent of the workers would come from Clark County and about 50 percent would come from the Carson City/Washoe County area. Therefore, there will be limited in-migration due to the rail construction in these or other counties. The baseline projected population growth and development in Clark and Nye Counties (the escalating in-migration of retirees and other individuals) would lead to greater socioeconomic impacts on services, including schools. This projected population growth (unrelated to rail line construction activities) would mask any potential impacts from construction activities associated with the rail line.

Estimates for construction workers associated with the rail line and expected residential distribution patterns compared to applicable baselines in Esmeralda County would be small. Because of the very large base of available construction workers in the Carson City/Washoe County area and in Clark County and the large labor pool in Lyon and Nye Counties, DOE anticipates that very few workers would be likely to relocate to these communities.

Population increases associated with a workforce that supported the construction of a rail line in the Mina rail corridor is estimated to be small in relation to the baseline population in Clark County and in Lyon, Nye, and Washoe Counties. Incremental population increases are expected to be minimal because worker in-migration is expected to be minimal. Mineral County's incremental population increase of about 45 people is less than 1 percent of the population baseline.

Because of the temporary nature of a linear construction project, workers would not be likely to relocate their families to communities along the corridor. It is likely that workers would spend a portion of their wages on food, gasoline, and other incidentals, but would spend most earnings in the counties where they lived.

The analysis of Mineral County includes potential impacts to the population and employment baseline of the Walker River Paiute Reservation. There would be no change to the employment base from in-migrating workers and no change to population because there would be no change to the employment baseline. The nature of the construction activities is sufficiently short in duration and transitory in nature, that migration to Reservation land is considered unlikely.

Of the areas considered, the two most likely to experience changes in population from construction of a rail line in the Mina rail corridor are Clark County and the Carson City/Washoe County area, which are assumed to provide most of the construction workers. Estimates regarding the number of construction workers could affect employment, which in turn could result in changes to population baselines. Because the employment baselines in these areas are large, the expected employment increase of much less than 1 percent in Clark County and the Carson City/Washoe County area, respectively, are small relative to those baselines. Similarly, the population changes relative to the baselines are expected to be small. Any impacts would also be temporary. Additionally, impacts to county housing stocks and public education

would be small because permanent residential patterns would be unlikely to change because the workers and their families would continue to maintain a permanent residence in the counties where they lived, with the workers commuting to construction camps for workweek assignments and returning to their permanent residence at the week's end. When considered individually, impacts to population and employment baselines in Esmeralda and Mineral Counties would be larger than that of the other counties considered in this analysis but less than 1 percent. Esmeralda would experience a peak increase of about 20 persons in 2014, but those new residents would leave the county when the rail construction is completed. The county could gain as many as 20 jobs at the beginning of the construction period, but the proposed action would not contribute additional jobs after 2015. Impacts to schools and housing would be unlikely because the number of new residents in the counties as a result of rail line construction activities would be so small.

2.2.7.3.2 Economic Measures

The expected changes to economic measures attributable to the Mina corridor would peak about three years after construction activities begin. Changes to Gross Regional Product, Real Disposable Personal Income, and spending by state and local government would be less than 2 percent above the baselines. Because Clark County and the Carson City/Washoe County area would supply most of the workers and be the permanent residence of most of the workers, Nye and Mineral Counties would be unlikely to experience noticeable changes in the economic measures. Esmeralda County would experience a short term spike in real disposable personal income and in Gross Regional Product of 16.5 percent and 14.5 percent, respectively. Almost all of the incremental change would occur in the Accommodations and Food service industries. Spending by state and local governments would also have a short term, but moderate increase of 4.2 percent, as local governments increased over site personnel. The changes above the baselines would have no long-term effects on the economy.

Socioeconomic impacts attributable to the construction of a rail line in the Mina rail corridor would be small in the four counties the line would cross: Mineral, Lyon, Esmeralda, and Nye. The impacts would also be small in Clark County and in the Carson City/Washoe County area, the population centers where most workers would live. The impacts would be positive; jobs would be created, real disposal personal income would increase, Gross Regional Product would increase more quickly, and local and state governments would receive more revenue to provide citizen services.

2.2.7.4 Operations

The following paragraphs discuss the potential socioeconomic impacts associated with the operation of a railroad in the Mina rail corridor.

2.2.7.4.1 Employment and Population

Changes from baseline employment and population for some counties during railroad operations in the Mina rail corridor could induce socioeconomic impacts. There would be workers boarding the train as it enters the region and there would be escorts who would arrive with the cask trains. Regional workers would be needed for each train crew. There would be an estimate of 42 workers for railroad operations. Because these operations workers would live in the railhead county, the most discernable impacts to population and employment from railroad operations would likely occur in Mineral County. Mineral County would gain about 45 residents as a result of operations of a rail line in the Mina Corridor, an increase of less than 1 percent over the population baseline. Mineral County would gain about 45 jobs over the baseline from the operation of a rail line in the Mina Corridor. This would be about a 1.8 percent

increase over the employment baseline in 2015. Because the estimated operations workforce is small, increases in baseline population projections in the counties is not likely to change. No impacts to housing would be likely from train crew operators. Any changes to the employment and population baselines in Clark, Lyon, Nye, and Washoe Counties would be nearly imperceptible because of their large labor force and population base; current population growth in these counties would mask additional requirements for housing and public education. No impacts would be expected in Esmeralda County.

2.2.7.4.2 Economic Measures

Changes to economic measures would be expected to culminate in the final year of rail operations. The impacts to baseline Gross Regional Product, real disposable personal income, and spending by state and local governments would be less than 1 percent in Clark and Nye County and the Carson City/Washoe County area. In Mineral County, the impact of changes to economic baselines would be less than 2 percent. In Esmeralda County, the changes from the baseline would be very small when construction activities are concluded and measures return to the projected baselines.

Socioeconomic impacts attributable to the operations of a railroad in the Mina rail corridor would be small in the four counties the line would cross: Mineral, Lyon, Esmeralda, and Nye. The impacts would be small in Nye County and in Mineral County where most operations workers would live. The impacts would be positive; jobs would be created, real disposal personal income would increase, Gross Regional Product would increase more quickly, and local and state governments would receive more revenue to provide citizen services.

2.2.7.4.3 Public Services

Construction impacts to public services at the county level would likely be small because the population projections with the project show very limited increases in overall counts. An additional demand on local health care capacity would be the primary impact on public services. The area that is likely to experience the greatest impact is southern Nye County.

Railroad operations along the Mina rail alignment would result in small impacts to health care capacity in Lyon, Mineral, Nye, and Esmeralda Counties and on education infrastructure in southern Nye County (Pahrump). The exact extent of impacts to other public services would depend on the total number of workers and their residential locations, and operations activities in relation to existing system capacity. However, workers could create small to moderate impacts in the form of additional demand for fire-protection services in Lyon, Mineral, Nye, and Esmeralda Counties.

2.2.8 NOISE AND VIBRATION

2.2.8.1 Noise and Vibration Methodology

The FEIS analysis for noise considered typical day-night sound levels, the distance of the rail line from communities along the rail line, and estimated the impacts from the construction and operation of a railroad to these communities. The FEIS analysis for vibration considered typical background level of ground vibration, the number of trains, and the distance of the rail line from to historic structures or sites of cultural significance, and estimated the impacts from the operation of a railroad. For this analysis, DOE used the same methodology applied in the FEIS.

Consistent with the FEIS, the analysis used daytime and nighttime noise standards adopted by the State of Washington (Washington Administrative Code 173-58-040 to 173-60-040) for residential and commercial areas as benchmarks and for establishing the region of influence for potential impacts. To evaluate the

impacts of noise from construction and operational activities for receptors in the region of influence near transportation facilities and corridors, DOE used benchmarks of:

- 60 A-weighted decibels (dBA) for residential use (nighttime reduction to 50 dBA)
- 65 dBA for light commercial
- 70 dBA for industrial zones.

A limitation of 10 dBA above the benchmark is allowable if the duration is less than 5 minutes in an hour.

Consistent with the analysis conducted in the FEIS, DOE based the estimates of potential operations impacts from noise on the passage of a two-locomotive, 10-railcar train traveling at 80 kilometers (50 miles) per hour. Current estimates of train size are similar, with two to three locomotives and four to nine cask, buffer, and escort cars, with six railcars being typical (BSC 2005b).

In addition to noise, DOE assessed the frequency at which transportation noise from construction or operation of a transportation route could lead to complaints. It considered the proximity of transportation routes to centers of population and frequency of shipments. This same analysis also considered potential effects of ground vibration from trains. DOE evaluated the region of influence for vibration at 100 meters (about 330 feet).

2.2.8.2 Noise and Vibration Affected Environment

Most of the Mina rail corridor would pass through unpopulated BLM-administered public lands, which have average day-night sound levels of 22 A-weighted decibels (dBA) on calm days and up to 38 dBA on windy days (Brattstrom and Bondello 1983, p. 170). The corridor also would pass near rural communities where noise levels tend to be higher than those in unpopulated areas because of human activity and higher levels of transportation noise, with levels of 40 to 55 dBA typical in rural communities. Table 2-13 lists communities within 5 kilometers (3 miles) of the Mina rail corridor.

Table 2-13. Communities within 5,000 meters (3 miles) of the Mina Rail Corridor.

Community name	Distance (kilometers)
Goldfield	100
Silver Peak	300
Hawthorne	700
Mina	1,500
Schurz	1,800
Luning	2,700
Sodaville	2,700

In 2005, DOE conducted noise measurements in Goldfield. Ambient noise levels ranged from 30 to 44 dBA with a day-night sound level of 47 dBA. In March 2007, DOE conducted noise measurements near Silver Peak, Mina, and Schurz (Sullivan 2007). 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. The day-night sound levels ranged from 34 to 48 dBA, consistent with expectations for rural towns. The other rural communities along the corridor would likely have similar background noise levels.

Background vibration levels along the Mina rail corridor were nearly immeasurable, less than 50 vibration decibels (VdB, a measure of vibration amplitude).

For the most part, the Mina rail corridor would pass through areas that are remote from human habitation. Thus, the potential for noise impacts from the construction of a rail line would be limited. Nonetheless, some people could be affected, including persons living near the corridor, using nearby recreational areas, or living in nearby rural communities. However, construction noise would be transient and its sources would be gone when construction was complete.

Estimated noise levels from rail line construction would range from 62 to 74 dBA within 150 meters (500 feet) of the noise source and from 54 to 67 dBA at 600 meters (2,000 feet) (ICC 1992, p. 4-97). For communities less than 150 meters (492 feet) for the noise source, such as Goldfield, noise levels would exceed the benchmarks. Communities further from the source than 150 meters but closer than 600 meters (2,000 feet), such as Silver Peak and Hawthorne, would likely exceed the benchmarks. Communities greater than 600 meters from the noise source would generally be less than the benchmarks.

Consistent with the analysis conducted in the FEIS, DOE based the estimates of potential operations impacts from noise on the passage of a two-locomotive, 10-railcar train traveling at 80 kilometers (50 miles) per hour. The estimated noise level at 200 meters (660 feet) would be 62 dBA with the average sound level at 2,000 meters (6,600 feet) being 51 dBA (Hanson, Saurenman, and Towers 1998, pp. 1 to 8). This is near the nighttime noise benchmark for residential areas.

To estimate noise impacts during rail operations, the analysis assumed that trains would travel as fast as 80 kilometers (50 miles) an hour. The equivalent-continuous (average) sound level at 2,000 meters (6,600 feet) from a train consisting of two locomotives and 10 cars traveling at 80 kilometers an hour would be 51 dBA (Hanson, Saurenman, and Towers 1998, pp. 1 to 8), which is near the nighttime standard for residential areas (50 dBA). The estimated noise level at 200 meters (660 feet) would be 62 dBA (Hanson, Saurenman, and Towers 1998, pp. 1 to 8). This is slightly higher than the daytime standard for residential communities. In isolated regions, few people would be affected. In addition, trains traveling through or near communities would normally operate at reduced speed, so their noise levels would be lower. The combination of sparse population in the vicinity of the Mina rail corridor, remoteness of the rail line from populated areas, substantial diminishing of the level of train noise with distance, and infrequent passage of trains indicates that the potential for noise impacts would be low. In addition, DOE would limit operating speeds to the extent necessary to ensure safety and noise levels below those listed in accepted noise standards when it passes by Goldfield.

A typical background level of ground vibration is 52 VdB, and the human threshold for the perception of ground vibration is 65 VdB (Hanson, Saurenman, and Towers 1998, p. 46.17). Vibration is mainly of concern for human annoyance, damage to buildings, and interference to vibration-sensitive activities. There are no known vibration sensitive cultural resources within the region of influence such as historic structures that ground vibration could affect. Community locations are such that rail line vibration would likely not be a human annoyance impact. The average number of all trains per week would be 17 (BSC 2005b).

2.2.9 AESTHETICS

2.2.9.1 Aesthetics Methodology

The region of influence for aesthetics was based on a 400-meter (0.25) wide corridor and its viewshed. The analysis of potential impacts on aesthetic resources considered BLM ratings for land areas. The regions of influence included the landscapes along the rail corridor with aesthetic quality that construction and operations of a railroad could affect. The analysis considered impacts to the visual sensitivity ratings of viewsheds in Nevada and the BLM Visual Resource Management System objectives as described under BLM Handbook H-8431-1, Visual Resource Contrast Rating (BLM 1986).

The majority of land in the Mina rail corridor is under the jurisdiction of the BLM. BLM plans analyzed included the *Carson City Field Office Consolidated Resource Management Plan* (BLM 2001), the *Tonopah Resource Management Plan and Record of Decision* (BLM 1997), and the *Record of Decision for the Approved Las Vegas Resource Management Plan and Final Environmental Impact Statement* (BLM 1998).

To assist in the management of public lands under its control, the BLM has established land management guidelines based on the visual resources of an area. Visual resources include the natural and manmade physical features that give a particular landscape its character and value as an environmental factor. There are four visual resource classes. Classes I and II are the more highly valued. Class III is moderately valued, and Class IV is of least value.

The analysis stage involves determining whether the potential visual impacts from proposed surface-disturbing activities or developments will meet the management objectives for the area. A visual contrast rating process is used for this analysis, which involves comparison of the project features with the major features in the existing landscape using the basic design elements of form, line, color, and texture. BLM Handbook H-8431-1, *Visual Resource Contrast Rating* (BLM 1986) describes this process.

The BLM considers visual values and then assigns the area's visual resources to management classes with established objectives, as follows:

- **Class I:** To preserve the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention.
- **Class II:** To retain the existing character of the landscape. The level of change to the characteristic landscape should be low.
- **Class III:** To partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate.
- **Class IV:** To provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high.

As appropriate, BLM visual resource management criteria were applied to non-BLM lands to provide an idea of their aesthetic value.

2.2.9.2 Aesthetics Affected Environment

The BLM plans indicate most of the Mina rail corridor would be in Visual Resource Management Class IV areas except for an area within Montezuma option 1. Montezuma option 1 would cross a Class III area centered on Nevada Routes 265 from Blair Junction to Silver Peak, and would be within about 2 kilometers (1.2 miles) of Class II areas at Clayton Ridge and the southern portion of the Montezuma Range.

Applicable BLM Resource Management Plans (BLM 1997; BLM 1998; BLM 2001) show that most of the Mina rail corridor would be in Visual Resource Management Class III or IV lands, with the exception of a small section of existing rail line east of Walker Lake that crosses a Class II area. Other than east of Walker Lake, the proposed rail corridor in Churchill and Mineral Counties and on the Walker River Paiute Reservation would cross exclusively through areas considered Class III by default classification of the Carson City BLM office (DIRS 179571-Knight 2007, all). Montezuma Option 1 would cross a Class III area centered on State Route 265 from Blair Junction to Silver Peak, and would be within about 2 kilometers (1.2 miles) of Class II areas in the Montezuma Range and Clayton Ridge areas.

Approximately 10 kilometers (6 miles) of Mina Common Segment 6 would also be in Class III lands before it entered the Nevada Test Site.

The greatest impact on visual resources from the construction of a rail line would be the presence of workers, camps, vehicles, large earth-moving equipment, laydown yards, borrow areas, and dust generation. These activities, however, would have a short duration. The Mina rail corridor and options have all been affected to some extent by human activity. Only a limited portion of the overall construction time would be spent in one place; the exception to this would be places where major structures such as bridges would be built.

During operations, visual impacts would be due to the existence of the rail line. The passage of 17 trains per week would have a small impact.

Based on a review of the BLM plans (BLM 1997; BLM 1998; BLM 2001), the Mina rail corridor is in Visual Resource Management Class III and IV areas with only a small portion passing near a Class II area. Construction and operation of a railroad through the primarily Class III and IV areas along the Mina rail corridor would generally be consistent with the BLM visual resource management objectives for these areas.

2.2.10 UTILITIES, ENERGY, AND MATERIALS

2.2.10.1 Utilities, Energy, and Materials Methodology

The region of influence for utilities, energy, and materials includes the regional supply infrastructure that would support rail line construction and operations.

2.2.10.2 Utilities, Energy, and Materials Affected Environment

The Mina rail corridor passes through typically remote Nevada countryside but is within the southern Nevada supply chain for the commodities required during construction and operation.

This analysis evaluated the impact of utilities, energy, and materials for the construction and operation of the Mina rail corridor. These potential impacts include the consumption of motor fuel, steel, and concrete during the construction and operation of a railroad in the Mina rail corridor and the projected use of fuel, steel, and concrete due to construction in the corridor.

Electric power for construction would be initially supplied by portable generators. New power lines would be installed to provide power for construction services and would be extended, via underground distribution along the rail roadbed to meet all other construction and operational needs.

The major electrical providers in the project region, including the Nevada Power Company, Sierra Pacific Power Company, Valley Electric Association, Inc., and Lincoln County Power District No. 1 would have adequate generating capacity or power-purchase capabilities to supply the project during peak demand without disrupting service to the providers' respective coverage areas. Demand is expected to remain relatively stable in the serviced areas, increasing at about 1 to 2 percent annually, and is not expected to impact the capacity of service providers. In cooperation with the affected utilities, DOE would perform electrical capacity analyses to ensure adequate capacity exists, including the evaluation of the conditions of existing electric facilities and determination of appropriate interface equipment to meet the needs of both parties, prior to any connection into a transmission or distribution line.

Construction equipment would consume motor fuel (diesel and gasoline), which would represents the largest energy resource usage during construction. The total motor fuel use in Nevada in 2005 was about 5.8 billion liters (1.5 billion gallons) (FHA 2006, Table MF-21). Highway motor fuel use in 2005 increased 6.2 percent over that in 2004, the largest percentage increase for any state, which is attributable to Nevada's growing population. Table 2-14 includes the estimated amounts of diesel fuel and gasoline expected to be consumed during the construction phase.

Table 2-14. Construction materials and fuel estimates for the Mina rail corridor.[a]

Length (kilometers)[b,c]	Diesel fuel use (million liters)[d]	Gasoline use (million liters)	Steel (thousand metric tons)[e]	Concrete (thousand metric tons)
410	120	2.5	67	260

a. Source: Nevada Rail Partners 2007a.
b. Corridor length listed for comparative evaluation.
c. To convert kilometers to miles, multiply by 0.623.
d. To convert liters to gallons, multiply by 0.264.
e. To convert metric tons to tons, multiply by 1.102.

The peak construction year would account for about 27 percent of the total construction period fuel consumption but would represent only about 0.6 percent of the motor fuel consumed annually in Nevada. Unlike overall state use, construction activities would use primarily diesel fuel, and during the peak year would consume about 2.2 percent of all special fuel (mainly diesel) used annually in Nevada. Nevada motor use fuel will continue to increase in the future, so the actual project percent use would be lower than these values.

Steel for rails, concrete (principally for rail ties, bridges, and drainage structures), and rock for ballast would be the primary materials that the construction of a rail line would consume. Table 3-15 lists estimates of steel and concrete consumption. Steel rail production often exceeds the need and there would be sufficient production flexibility and capacity to meet rail-line construction demands. DOE would purchase pre-cast concrete components from national suppliers in staggered preordered phases, and because construction would involve a small amount of cast-in-place concrete via the use of onsite batch plants.

During railroad operations, the amount of motor fuel used by locomotives would be small compared to regional availability. The amount of materials needed for rail maintenance would be limited compared to the supply.

2.2.11 WASTE MANAGEMENT

2.2.11.1 Waste Management Methodology

The region of influence for waste management includes counties in Nevada that a potential rail line would traverse and that have existing municipal sanitary waste landfills and disposal facilities for other types of wastes. The Department obtained this information from the Nevada Division of Environmental Protection (NDEP 2007b).

2.2.11.2 Waste Management Affected Environment

The Mina rail corridor would run through the Walker River Paiute Reservation, and Lyon, Mineral, Esmeralda, and Nye Counties. Of these, Lyon County and the Walker River Paiute Reservation have no landfill. The Goldfield landfill, in Esmeralda County, which serves a population of fewer than 1,500 people, received about 3.6 metric tons (4 tons) of solid waste per day in 2003. Nye County disposed of

about 250 metric tons (280 tons) of waste during 2003 at three different landfills, but the county plans to close two of these landfills by 2011, which would represent 96 percent of the county's current waste disposal capacity. The Hawthorne Landfill in Mineral County disposed of about 25 metric tons (28 tons) per day in 2003; it has an estimated closure date of 2041. In comparison, the Apex Landfill in Clark County, which serves the Las Vegas Valley and has an estimated closure data of 2047, received 8,000 metric tons (8,800 tons) daily during 2003 (NDEP 2007a, Appendix 2).

The construction of a rail line would generate hazardous and nonhazardous solid wastes, and recyclable material. DOE would dispose of nonhazardous wastes in permitted landfills. Hazardous waste such as corrosives and solvents, if any, would be shipped to a permitted hazardous waste treatment and disposal facility. All waste would be handled in accordance with applicable environmental, occupational safety, and public health and safety requirements.

Potential waste impacts would result from the construction and operation of a railroad in the Mina rail corridor. Waste impacts are based on the estimated generation of solid municipal waste from construction activities. The estimated waste generation would be approximately 750 metric tons (830 tons) annually during the peak year of construction (NRP 2007b).

Approximately 25 percent of the generated waste would be recyclable, which would result in 550 metric tons (620 tons) of waste for disposal at municipal landfills (NRP 2007b). The estimated total mass of waste from the construction of the rail line would be about 2,000 metric tons (2,200 tons). This mass of waste would occupy about 5,000 cubic meters (6,600 cubic yards) of landfill volume at a waste density of 420 kilograms per cubic meter (700 pounds per cubic yard), which is typical of smaller landfills (Brady et al. 1998). The estimated average daily disposal mass would be about 1.5 metric tons (1.7 tons).

For the landfills in rural counties, this would represent an increase in waste disposal volume. As an example, disposal of solid waste from rail line construction could represent a nearly 50-percent increase in daily waste volume for the Goldfield landfill and could potentially hasten its estimated closure date of 2023. Waste generated during construction could be trucked to larger landfills with small impact on waste disposal capacity.

Railroad operations would periodically generate waste during maintenance activities. Some locomotive and railcar maintenance could generate used oil and solvents that DOE would recycle or dispose of as hazardous waste.

2.2.12 ENVIRONMENTAL JUSTICE

2.2.12.1 Environmental Justice Methodology

Environmental justice analyses determine the potential for actions to have disproportionately high and adverse impacts to minority or low-income populations. The potential for environmental justice impacts along the Mina Corridor varies with each environmental discipline and its region of influence.

The analysis of environmental justice for the Mina Corridor is based on Executive Order 12898, *Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations*, and associated guidance.

2.2.12.2 Environmental Justice Affected Environment

The largest concentration of low-income or minority populations along the Mina rail corridor occurs in Mineral County and on the Walker River Paiute Reservation. The corridor would cross American Indian

tribal lands, with the three Schurz bypass options almost entirely on the Walker River Paiute Reservation (BSC 2006a).

There are approximately 1.4 square kilometers (350 acres) of the Reservation lands in the corridor (BSC 2006a). 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. Nevada's per capita income is approximately the same as the national average of about $22,000 but the per capita income on the Reservation is less than half that of residents in the state. Walker River Paiute Reservation, Mineral County, and State of Nevada economic characteristics are presented in Table 2-15.

The Mineral County unemployment rate is approximately twice the rate of the state; with Nevada unemployment statistics mirroring the Nation's unemployment rate. The unemployment rate on the Walker River Paiute Reservation however, is more than three times that of the state. Table 2-16 lists labor and employment characteristics on the Walker River Paiute Reservation, in Mineral County, and in Nevada.

Socioeconomics

Because there would be small changes in long-term population attributable to activities in the corridor, impacts or stresses to the housing stock, infrastructure systems, or social services would be unlikely. A portion of the Mina rail corridor would cross lands in Esmeralda County where most of the land is managed by the BLM or owned by the U.S. Department of Defense, resulting in a sparse population. As a consequence, there are no concentrations of low-income or minority populations in Esmeralda County that the construction or operation of a railroad in the Mina rail corridor would be likely to affect. DOE further concluded that there were no special pathways (unique practices and activities creating opportunities for increased impacts) that could not be mitigated.

Table 2-15. Economic characteristics of the Walker River Paiute Reservation, Mineral County, and the State of Nevada, 2000[a].

Characteristic	Walker River Paiute Reservation	Mineral County	Nevada
Total population	853	5,100	2,000,000
Median Household income (dollars)	$24,000	$33,000	$45,000
Per capita income (dollars)	$10,000	$17,000	$22,000
Individuals below poverty level	270	760	210,000
Percent individuals below poverty level	32	15	11

a. Source: Bureau of the Census (2000b).

Likewise, a rail line in the corridor would be unlikely to affect low-income or majority populations in Lyon County.

Nye County has a minority population of approximately 13 percent with approximately 11 percent of the total population considered low income.

Socioeconomic impacts from the rail line construction and operation in the Mina rail corridor would be small overall and would be unlikely to adversely or disproportionately affect the low-income or minority populations along the corridor. Impacts to socioeconomic variables would be neither high nor adverse.

Table 2-16. Labor and employment characteristics of the Walker River Paiute Reservation, Mineral County, and the State of Nevada, 2000.

Characteristic	Walker River Paiute Reservation	Mineral County	Nevada
Total population	853	5,070	2,000,000
Population 16 years and older	570	4,000	1,540,000
In labor force, civilian	340	2,400	990,000
Employed	260	2,100	930,000
Unemployed	77	310	62,000
Percent unemployed	23	13	6.2
Labor participation rate	60	60	65
Individuals employed in construction industry	28	130	86,000

3. CARLIN, JEAN, AND VALLEY MODIFIED CORRIDORS

The section summarizes the environmental information from the *Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (the FEIS; DOE 2002), provides updated information where possible and appropriate, and discusses the differences in how changes in information could alter the original range or magnitude of potential environmental impacts for the Carlin, Jean, and Valley Modified Corridors.

3.1 General Methodology

DOE reviewed and updated the affected environment information in the FEIS, as appropriate, using the same data sources to the extent possible. However, since DOE completed the FEIS, many data management systems, such as geographic information systems (GIS); and data sources, such as the BLM's LR2000; have advanced and currently provide more data and specificity than was previously available.

Since DOE completed the FEIS, the design and plans for an alignment for the construction of a rail line within the Caliente corridor have advanced. The advanced Caliente rail design and plans provide a basis for updating the FEIS corridors to estimate environmental impacts. The approach DOE used to estimate changes in environmental impacts for the Carlin, Jean, and Valley Modified corridors is based on primary impact indicators. A primary impact indicator is the most important contributor or parameter used to determine the impacts of a particular environmental resource area. To update the information on the Carlin, Jean, and Valley Modified rail corridors, parameters that describe alignment characteristics (such as length of corridor and earthwork quantities) derived from Caliente rail corridor analyses provided ratios to estimate the data at a corridor level.

In addition, DOE updated the baseline environmental conditions for each resource area through the collection of federal, state, and local data commensurate with the information in the FEIS for the Carlin, Jean, and Valley Modified rail corridors. Using updated affected environments as the new baselines, while considering the evolution of engineering and design changes, DOE evaluated how the magnitude and range of potential impacts might have changed from what the FEIS presented. Present and reasonably foreseeable actions that would affect direct, indirect, and cumulative impacts within the region of influence for these rail corridors are discussed within the text. The general approach used to update the environmental conditions for each resource area for the Carlin, Jean, and Valley Modified rail corridors is presented below.

3.1.1 LAND USE

In the FEIS, DOE determined that an evaluation of impacts to land use and ownership should identify the current ownership of the land that its activities could disturb, and the present and anticipated future uses of the land. The region of influence for land-use and ownership impacts was defined as land areas that would be disturbed or whose ownership or use would change as a result of the construction and operation of a railroad. In the FEIS, DOE evaluated land use and ownership within the 400-meter (0.25-mile)-wide corridor. This update used the same region of influence. Based on these criteria, DOE evaluated the potential impacts to land use and ownership from the construction and operation of the railroad. The BLM manages the majority of the public lands through which the Carlin, Jean, and Valley Modified rail corridors pass. Traditional land uses in most of the areas would be directly and indirectly affected include grazing, mining, energy development, general recreation, utility rights-of-way, and wildlife management.

Much of this land is not extensively disturbed, although it has been modified through activity such as grazing and mining.

Some BLM-managed lands have special designations which denote their use or what they have been set aside for. These include Wildlife Habitat Management Areas, Areas of Critical Environmental Concern, Wilderness Areas, and Wilderness Study Areas. Public lands in the Carlin, Jean, and Valley Modified rail corridors provide a number of diverse recreation opportunities, and the BLM has designated certain lands as Special Recreation Management Areas.

The vast majority of the land used for the Carlin, Jean, and Valley Modified rail corridors would be on BLM-administered land. Each BLM Field Office manages lands within its administrative boundaries according to one or more Management Framework Plans and/or Resource Management Plans. In addition to BLM land, the range of potentially affected land ownership includes private land holdings (including land designated for commercial development), other federal lands (DOE lands, U.S. Department of Defense lands), and Tribal Trust lands and reservations.

To evaluate this resource area, DOE obtained data from the latest edition of BLM Master Title Plats and online land record databases, such as the BLM LR2000 (BLM 2007b). The Department also evaluated county and state land records and information on land managed by other federal agencies, universities, or commercial developments.

3.1.2 AIR QUALITY

This update included changes in attainment status for the counties through which the three corridors would pass. The region of influence was defined as those air basins through which the Carlin, Jean, and Valley Modified rail corridors would pass which was the same as the FEIS. To update this resource area, DOE obtained data from the Nevada Bureau of Air Quality to determine attainment status for counties that could be affected.

The air quality update for the other corridors used the same qualitative methods presented in the FEIS. Areas in violation of one or more of the criteria pollutant standards are classified as nonattainment areas. If there is not enough air quality data to determine the status of a remote or sparsely populated area, then the EPA lists the area as unclassifiable. Unclassifiable areas are considered to be in attainment. The region of influence includes the air basins in the vicinity of sources of criteria pollutant emissions that could be affected during rail line construction and operations. In particular, the air basins of the Las Vegas Valley (for particulate matter with aerodynamic diameters of 10 micrometers or less [PM_{10}] and carbon monoxide) and the Pahrump Valley (PM_{10}) where criteria pollutant concentrations are already an issue. If nonattainment or maintenance areas are not identified, detailed estimates of emission rates or comparisons to threshold levels for conformity were not made.

3.1.3 HYDROLOGY

The FEIS analyzed surface water resources within the 400-meter (0.25-mile)-wide corridor and within 1 kilometer (0.6 mile) of each side of the corridor. For this update, the region of influence for surface water, including springs, was the same as the FEIS. Information for this update was obtained from (1) the National Hydrography Dataset Waterbody geospatial data that the U.S. Geological Survey developed in cooperation with EPA (USGS 1999); (2) the Geographic Names Information System Nevada geospatial database developed by the U.S. Geological Survey and BLM (USGS and BLM 2003); and (3) the National Wetlands Inventory database managed by the U.S. Fish and Wildlife Service, dated 2007 (FWS2007a).

In the FEIS, the Department used terrain types to estimate total water demand. Since publication of the FEIS, DOE has canvassed similar projects throughout Nevada and determined that the excavation type, not the terrain, would more accurately estimate total water demand associated with the construction of a rail line. Ratios based on earthwork were applied to the corridors to estimate water demand in relation to the values for the Caliente rail alignment. DOE updated the water demand based on earthwork needs and reevaluated the water required for compaction. Earthwork needs would include excavation of common (alluvial) ripable rock, and drilling and blasting of solid bedrock.

3.1.4 BIOLOGICAL RESOURCES AND SOILS

This update assessed changes in baseline biological resources and soils conditions for the Carlin, Jean, and Valley Modified corridors within the same region of influence as the FEIS. These changes in baseline conditions include vegetation cover, soil types, new or delisted special status species, critical habitat, and wildlife management areas. Consistent with the FEIS, this update considered the potential for impacts to vegetation communities; special status species (plants and animals), including their habitat; springs, wetlands, and riparian areas; big game habitat; and wild horse and burro herd management areas that may occur within the 400-meter (0.25-mile)-wide corridor. This update also considered special status species and big game habitat within 5 kilometers (3 miles) of each side of the corridor that may be affected by construction of the rail line, and springs and riparian areas within this area that could be affected by permanent changes in surface-water flows.

DOE obtained location records for special status species from a statewide database managed by the Natural Heritage Program (NNHP 2005) that contains records of observations of rare or protected plants, fish, and wildlife species. Other information sources included (1) the *Carson City Field Office Consolidated Resource Management Plan*; (2) the *Tonopah Resource Management Plan and Record of Decision*; (3) the *Biological Field Findings Report for Potential Rail Alignments along the Mina Route*; (4) the *Mina Rail Route Feasibility Study*; (5) The National Hydrography Dataset Waterbody geospatial data that the U.S. Geological Survey developed in cooperation with the U.S. EPA; (6) the Geographic Names Information System Nevada geospatial database; (7) the BLM Wild Horse and Burro Management Area Maps (BLM 2006).

3.1.5 CULTURAL RESOURCES

This update assess changes in the baseline cultural resources conditions since DOE completed the FEIS. These changes include a review of surveys completed since completion of the FEIS and the number of sites and their potential for listing on the *National Register of Historic Places*. The region of influence was a corridor width of 400 meters (0.25 miles) which was the same as the FEIS. This update used records from the Desert Research Institute, the Nevada Cultural Resources Information System, and archaeological information repositories at the Harry Reid Center at the University of Nevada-Las Vegas, and the Nevada State Museum in Carson City.

As part of this update the Department completed Class I records searches for the Carlin, Jean and Valley Modified rail corridors. The records search identified the presence of cultural resources, including historic and archaeological sites.

3.1.6 OCCUPATIONAL AND PUBLIC HEALTH AND SAFETY

This update for occupational and public health and safety focuses on traffic, worker industrial safety, incident-free radiological and nonradiological impacts, and radiological impacts with respect to accidents.

Since DOE completed the FEIS, there have been updates to the methods and data to estimate the radiation doses for workers and members of the public (MTS 2007).

Based on the conceptual design and plans for the construction of a rail line within the Caliente corridor, DOE has determined that the estimated workforce has increased since the publication of the FEIS. To update occupational and public health and safety impacts, employment levels scaled from the Caliente corridor were used.

The region of influence for each includes:

Traffic impacts: The 400-meter (0.25-mile) width of the corridor and public highways used by workers and for shipments during construction and operations.

Worker industrial safety impacts: The 400-meter (0.25-mile)-wide rail corridor.

Incident-free radiological and nonradiological impacts: The 800-meter (0.5-mile) area on either side of the centerline of the rail corridor.

Radiological impacts with respect to accidents: An area within an 80-kilometer (50-mile) radius from a potential occurrence location in the rail corridor.

Information was obtained from the Bureau of Labor Statistics for 2005, the analysis also used the RADTRAN 5 computer program (Neuhauser and Kanipe 2000; Neuhauser, Kanipe, and Weiner 2000) and the RISKIND computer program (Yuan et al. 1995) where applicable.

3.1.7 SOCIOECONOMICS

This update included changes to the employment and population baselines for the three corridors. The region of influence was defined as those Nevada counties, which the proposed corridors would cross, and the two areas where most workers would be expected to reside (the Carson City/Washoe County area and Clark County).

To update this resource area, DOE obtained data from the U.S. Census Bureau, the Nevada State Demographer, and other local and state sources. In addition, the Department utilized estimates and projections from the socio-demographic forecasting software program REMI, version 9, to develop baselines.

3.1.8 NOISE AND VIBRATION

To assess and update the baseline conditions for noise and vibration, DOE reviewed the input parameters used for the noise and vibration analysis in the FEIS. This included the population within the region of influence for noise and vibration, relevant noise standards, and the frequency and number of trains. This update assessed the distance of the rail line from communities along the rail line and estimated the noise impacts from the construction and operation of a railroad to these communities and updated as appropriate. For vibration, DOE considered typical background level of ground vibration, the number of trains, and the distance of the rail line from to historic structures or sites of cultural significance, and updated the impacts as appropriate from the operation of a railroad.

3.1.9 AESTHETICS

The region of influence for aesthetics was based on a 400-meter (0.25 mile)-wide corridor and its viewshed which is consistent with the FEIS. This update considered changes to the visual sensitivity ratings of viewsheds in Nevada and the BLM Visual Resource Management System objectives as

described under BLM Handbook H-8431-1, Visual Resource Contrast Rating (BLM 1986). BLM plans reviewed included the Elko Resource Management Plan, Las Vegas Resource Management Plan, and the Tonopah/Battle Mountain Resource Management Plan. The analysis of potential impacts on aesthetic resources considered BLM ratings for both federal and non-federal land areas. Non-federal lands were granted the rating of surrounding BLM lands or else assigned the BLM rating of Class III. The regions of influence included the landscapes along the rail corridor with aesthetic quality that construction and operations of a railroad could affect.

3.1.10 UTILITIES, ENERGY, AND MATERIALS

The FEIS evaluated utilities, energy, and materials impacts common to all corridors and noted that these impacts would include the use of motor fuel, steel, and concrete. For this update, th e baseline supply of utilities, energy, and construction materials was updated since the completion of the FEIS. For example, annual motor fuel use in Nevada was updated from the Federal Highway Administration database. The engineering methods gained from the Caliente alignment were applied to the other three corridors to estimate the amount of earthwork for the Carlin, Jean, and Valley Modified corridors. The estimated amount of earthwork was used to determine fuel use as fuel use is proportional to the quantity of earthwork needed. In addition, applying the engineering methods from the Caliente alignment, material requirement estimates were developed based on the length of line for steel (main track rail) and concrete (main track ties).

3.1.11 WASTE MANAGEMENT

Waste impacts are based on the estimated generation of solid municipal waste from construction of a rail line in each of the three corridors. The FEIS evaluated common waste management impacts for all corridors rather than for individual corridors. Information to allow differentiation between corridor waste management impacts is now much more readily available. Consistent with the FEIS, this update estimated the peak annual generation of sanitary solid waste. However, based on advanced databases, this update was then able to estimate the impact that the waste generated would have on the individual landfills serving the respective corridor rather than on landfills on a state-wide basis as the FEIS did. Information on landfills was obtained from the Nevada Division of Environmental Protection database (NDEP 2007a).

3.1.12 ENVIRONMENTAL JUSTICE

Consistent with the FEIS, DOE evaluated the potential impacts to two specific populations, those populations defined as low income and populations defined as minority. For the FEIS, the region of influence for the environmental justice analysis was defined as those Nevada counties the rail line corridors would cross. DOE identified low income and minority populations by examining 1990 and 2000 U. S. Census Bureau block group data in the region of influence. Census data for the year 2000 concerning minority communities in Nevada was available at the Census block group level for the FEIS analysis; however, 2000 Census data on low-income communities were not. Therefore, the information on low-income communities was from the 1990 Census. As a consistent criterion for identifying minority and low-income blocks and block groups, DOE employed a 10-percent threshold, meaning that the environmental analysis focused on blocks and block groups in Nevada having a 10-percent or greater minority population or low-income population than the State averages. DOE adopted the 10-percent threshold for the Draft EIS from a 1995 Nuclear Regulatory Commission document, *Interim NRR Procedure for Environmental Justice Reviews* (NRC 1995). This threshold is consistent with the recent revision of the Nuclear Regulatory Commission's guidance on environmental justice (NRC 1999).

For determining minority populations for this update, DOE followed the Council on Environmental Quality guidance (CEQ 1997, all) and the approach used in the FEIS (DOE 2002, Section 3.1.13), DOE considered that a minority population exists where either: (a) the minority population of the affected area exceeds 50 percent; or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis (DOE used both the United States and the State of Nevada minority populations).

DOE used the Council on Environmental Quality definition of low-income and the annual statistical poverty thresholds from the U.S. Census Bureau. A low-income community exists when the low-income population percentage in the area of interest is meaningfully greater than the low-income population in the general population. For purposes of the analysis of low-income communities, DOE applied the U.S. Nuclear Regulatory Commission guidance of a 20-percent threshold above the state average of 11 percent (that is, 31 percent) for low-income populations.

DOE used 2000 Census Bureau information block group data to determine both low-income and minority populations for this update.

3.2 Update of Environmental Information

3.2.1 CARLIN CORRIDOR

Table 3-1 summarizes the results of the update to the primary impact indicators for the Carlin corridor and compares them with the corridor information completed in the FEIS. The information reflects the total for the construction and operation of the rail corridor unless otherwise noted.

Table 3-1. Updated environmental information for the Carlin rail corridor

Resource	Changes from FEIS to this analysis
Corridor length	No change
Land ownership (square kilometers)[a]	
BLM-administered land	Changed from 177 – 201 (~ 86%) to 183.3 - 205.8 (88.3 - 94.3%)
Private land	Changed from 7.3 - 15.2 (~6.7%) to 6.35 - 9.4 (3.27 - 4.02%)
Department of Defense-managed land	Changed from 0 – 10.9 (~5.2%) to 0 - 11.4 (0 - 4.9%)
Department of Energy-managed land	No change
Tribal trust lands and reservations	No change
Air quality	
Attainment status	No change
Hydrology	
Surface water	No change
Groundwater use (construction) (cubic meters)[b]	Changed from 810,000 to 7.1 million
Biological resources and soils	Additional records of sensitive species
Cultural resources (records search)	Changed in the number of recorded sites from 110 to 120
Occupational and public health and safety	
Industrial hazards (*Construction and Operations)*	
Total recordable cases	Changed from 210 to 391
Lost workday cases	Changed from 105 to 224
Fatalities	Changed from 0.41 to 1.0
Transportation hazards *(Construction Only)*	

Resource	Changes from FEIS to this analysis
Traffic Fatalities	Changed from 1.1 to 4.0
Cancer Fatalities	Changed from 0.14 to 6.0
Incident-free radiological impacts (latent cancer fatalities) (Operations Only)	
Public	Changed from 0.0012 to 0.000088
Workers	Changed from 0.31 to 0.33
Radiological transportation accident fatalities	
Radiological accident risk (latent cancer fatalities)	Changed from 0.000000037 to 0.000001
Cancer fatalities from vehicle emissions	Changed from 0.09 to 0.4
Nonradiological transportation accident fatalities	
Spent nuclear fuel and high-level radioactive waste transportation	Changed from 0.54 to 0.31
Construction and operations workforce	Changed from 0.7 to 3.3
Socioeconomics	
Estimated construction workforce	Changed from 1,230 worker-years to 6,600 worker-years
Estimated operations workforce	Changed from 47 workers per year to 42 workers per year
Noise and Vibration	No changes
Aesthetics	No changes
Utilities, energy, and materials (Amount used)	
Diesel (million liters)[c]	Changed from 40 to 110
Gasoline (million liters)	Changed from 0.82 to 2.4
Steel (thousand metric tons)[d]	Changed from 74 to 86
Concrete (thousand metric tons)	Changed from 414 to 330
Waste Management	
Sanitary Solid Waste	Changed to 1.6 metric tons (1.7 tons) per day
Environmental justice (disproportionately high and adverse impacts)	No changes

a. To convert square kilometers to acres, multiply by 247.10.
b. To convert cubic meters to acre-feet, multiply by 0.0008107.
c. To convert liters to gallons, multiply by 0.26418.
d. To convert metric tons to tons, multiply by 1.1023.

The Carlin rail corridor would originate at the Union Pacific Railroad Mainline near Beowawe in north-central Nevada. The corridor would travel south through Crescent, Grass, and Big Smoky Valleys, passing west of Tonopah and east of Goldfield. It would then travel south following and periodically crossing the western boundary of the Nevada Test and Training Range, passing through Oasis Valley and across Beatty Wash. It would travel across Crater Flats and along Fortymile Wash to Yucca Mountain. Depending on the option, the Carlin rail corridor would be approximately 530 kilometers (330 miles) long from its link with the Union Pacific Railroad Mainline to Yucca Mountain.

Options to the Carlin Corridor range from 510 kilometers to 540 kilometers (320 to 340 miles). The two main corridor options are the Big Smoky Valley option and the Monitor Valley option. The FEIS contains detailed descriptions of the Carlin rail corridor and its options, which are shown in Figure 3-1.

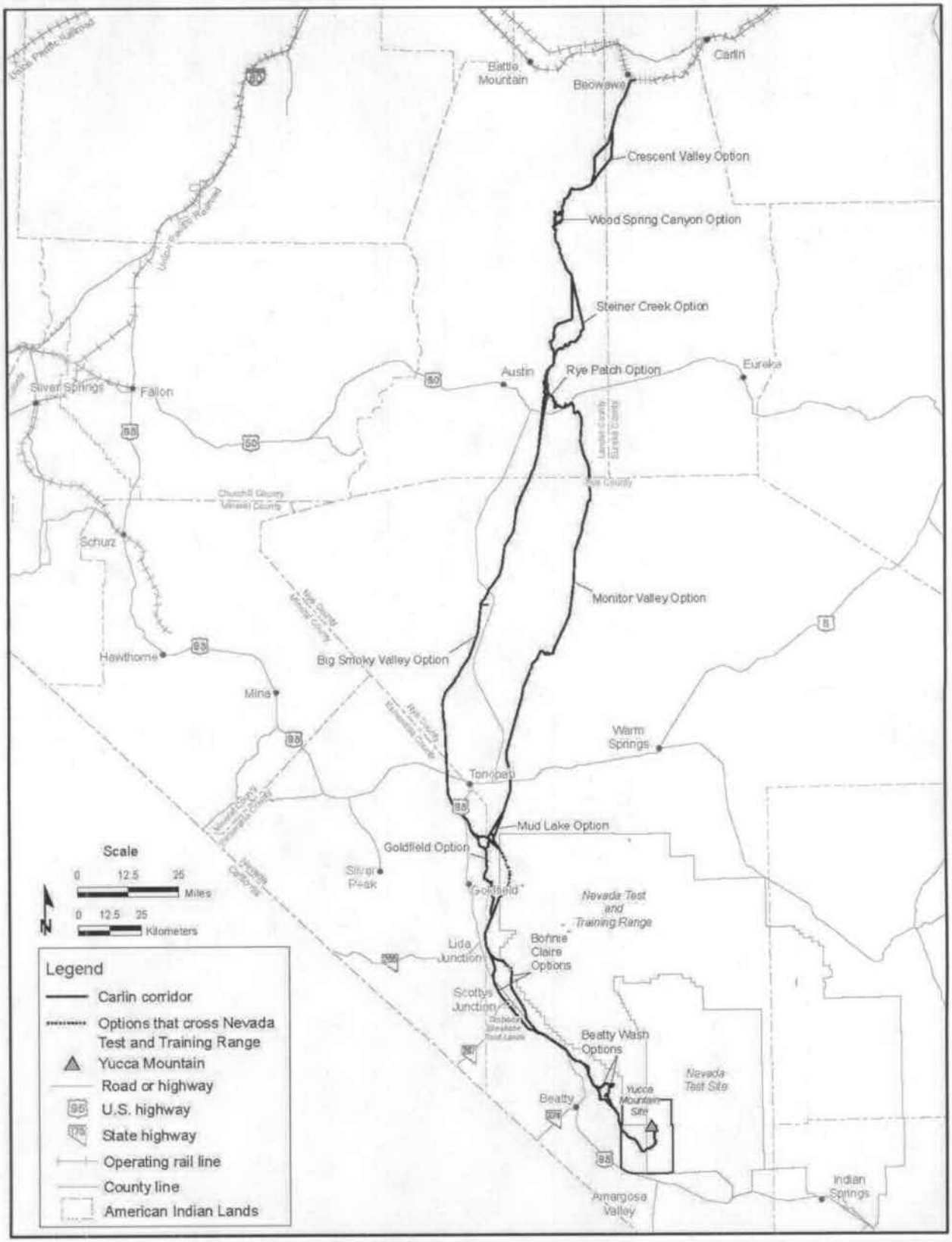

Figure 3-1. Carlin Corridor and options.

3.2.1.1 Land Use and Ownership

The following paragraphs discuss information gathered in relation to land use in the Carlin rail corridor since the publication of the FEIS. Potential impacts from construction and operation of a railroad in the Carlin rail corridor would be consistent with those that DOE reported in the FEIS (DOE 2002, Section 6.3.2.1.1).

The FEIS reported that the BLM administered approximately 86 percent of the land in the corridor (177 to 201 square kilometers), the Department of Defense managed 5.2 percent (0 to 10.9 square kilometers), DOE managed 2.2 percent (4.6 square kilometers), and less than 1 percent (0 to 1.6 square kilometers) was held in trust by the Timbisha Shoshone Tribe. The Department of Defense lands were on the Nevada Test and Training Range.

Current land holdings for the Carlin rail corridor are as follows: BLM-administered land, 88.3 - 94.3 percent (183.3 - 205.8 square kilometers); Department of Defense land, about 0 to 4.9 percent (0 - 11.4 square kilometers); DOE land, approximately 2 percent (unchanged); and Timbisha Shoshone trust lands less than 1 percent (unchanged). The change in estimates of amount of BLM-administered land and private property within this corridor are, in part, the result of using databases whose land ownership data have been refined and enhanced since completion of the FEIS.

The FEIS reported that about 6.7 percent (7.3 to 15.2 square kilometers) of the land within the Carlin corridor was private property. Currently, DOE estimates that private property occupies about 3.27 - 4.02 percent (6.35 - 9.4 square kilometers) of the land in the corridor. Similar to changes in BLM administered land, the change in the amount of private land reflects, in part, the use of more recent databases whose land ownership data have been enhanced since the FEIS. The highest density of private land occurs within the first 30 kilometers (19 miles) of the corridor (near Beowawe), although other concentrations of private property occur near Crescent Valley. In the Crescent Valley area, for instance, much of the private property lies in single sections (2.6-square-kilometer [1 square mile]) of land that are separated by BLM administered sections (as shown in Figure 3-2 for the area south of Crescent Valley) which creates a correspondingly complex ownership pattern.

The Bonnie Claire option in the Carlin rail corridor would cross and divide an 11-square-kilometer (2,800-acre) portion of the Timbisha Shoshone trust lands near Scottys Junction, Nevada.

Since DOE completed the FEIS, the BLM has found that a 0.43-square-kilometer (100-acre) parcel of public land near Hadley, Nevada, is suitable for direct (noncompetitive) sale to Round Mountain Gold Corporation for expansion of the existing Hadley Airport (*Notice of Realty Action: Direct (Non-Competitive) Sale of Public Lands, Nye County, NV*; 72 *FR* 4290, January 30, 2007); Figure 3-3 shows the location of the airport in relation to the Carlin rail corridor. This land, which is approximately 2.6 kilometers (1.6 miles) from the center of the Mina rail corridor, was purchased by the Round Mountain Gold Corporation on May 11, 2007.

The Carlin rail corridor would pass near historic and currently established mining districts. At the time DOE completed the FEIS, the number of unpatented claims staked in Nevada had been steadily dropping since the BLM instituted a requirement in 1991 for an annual fee for each claim. Since the publication of the FEIS, the prices of gold and other metallic resources have been steadily rising, which has caused a resurgence in the number of mining claims. Unpatented mining claims have been, and continue to be, staked along the corridor, with sections containing the greatest number of claims located near the Crescent Valley and the Goldfield area (BLM 2007b) (see Figure 3-4). According to a mineral assessment prepared for Lander County, exploration and development activity is increasing in and around the Crescent Valley area for gold, silver, barite and geothermal resources (Carpenter 2003).

The Cortez Gold Mines are near the northern end of the Carlin rail corridor, in the vicinity of Crescent Valley, and have been expanding their mining operations since the publication of the FEIS. The Cortez Gold Mines, also called the Cortez Joint Venture, is the oldest continuously operating gold mining operation in Nevada; Figure 3-5 shows the location of the mine in relation to the Carlin rail corridor. The Cortez Gold Mines are among the largest annual producers of gold in the state of Nevada, and considered one of Nevada's major mines (UNR 2005). Since the publication of the FEIS, the Cortez Gold Mine has proposed an expansion of its Pipeline/South Pipeline Project, which is an open-pit gold mining and processing operation (*Notice of Intent To Prepare an Environmental Impact Statement To Analyze the Proposed Amendment to the Pipeline/South Pipeline Plan of Operations (NVN–067575) for the Cortez Hills Expansion Project*; 70 *FR* 72308, December 2, 2005). The BLM has granted authorization to Cortez Gold Mine to disturb approximately 37 square kilometers (9,100 acres) associated with the Pipeline/South Pipeline Project, which was under BLM consideration when DOE completed the FEIS. The proposed expansion would include an additional 25 square kilometers (6,100 acres). The proposed expansion is less than 1.6 kilometers (1 mile) from the outer boundary of the Carlin rail corridor. The EIS for the proposed expansion project is in preparation, so it is unknown what impacts it could have; in addition, the project could undergo modifications and boundary adjustments.

DOE reviewed information in the Mineral Resources Data System (USGS 2005) and the Abandoned Mine database (NBMG 2001) to determine if additional mines, active or abandoned, have been located and documented since publication of the FEIS. Updates to these data systems revealed that the Carlin rail corridor would cross Mammoth, Diamondfield Property, Aloha, Tognoni Spring, Goldfield Bullion, Future Group, and Wright Prospect mines. The Monitor Valley option would cross Nevada State Pit, and there is an abandoned mine on the Steiner Creek option. Of these, Nevada State Pit, Tognoni Spring, and Diamondfield Property are "past producers," meaning that mining activities occurred in the past but no mining operations are currently underway. The classification for Wright Prospect and Future Group is "occurrence," meaning that discovery of an outcrop has occurred and there could be some land disturbance, but there is currently no mining operation underway. Aloha, Goldfield Bullion, and Mammoth are "prospect sites," meaning there has been discovery of a mineral resource but no mining.

During the Goldfield mining history, several patented mining claims were issued along the Carlin rail corridor, which were reported in the FEIS. With a patented mining claim, the claimholder owns the land and the minerals. Effective October 1, 1994, Congress imposed a moratorium on spending appropriated funds for the acceptance or processing of mineral patent applications that had not yet received First Half Final Certificates (FHFC) (required first step for patent issuance) or were not in Washington, D.C. for Secretary of Interior review of FHFC on or before September 30, 1994. Until the moratorium is lifted, the BLM will not accept applications for mining claim patents (BLM 2007c). Therefore, the numbers and locations of patented mining claims remain unchanged from those reported in the FEIS.

During an evaluation of Wilderness Areas and Wilderness Study Areas potentially affected by the Carlin rail corridor, the FEIS determined that only the Steiner Creek option would encroach on the Simpson Park Wilderness Study Area. The status of this Wilderness Study Area has not changed; therefore, this remains a land-use conflict (Figure 3-6).

The FEIS reported that the Carlin rail corridor and its options would cross 12 BLM grazing allotments. The BLM has since updated their grazing allotment information, which indicates Carlin and its options would now cross the Geyser, South Buckhorn, Carico Lake, Grass Valley, Simpson Park, Potts, Monitor, Hunts Canyon, Kingston, Wildcat Canyon, Smoky, Francisco, San Antone, Montezuma and Razorback grazing allotments, along with an allotment the BLM has designated as being unused (BLM 2005). According to this data source, the Carlin corridor also crosses the Ralston and Silver King grazing allotments; however, the BLM Battle Mountain District Office reports this same area as just the Ralston grazing allotment (Figure 3-7).

As reported in the FEIS, the corridor would cross six wild horse and burro herd management areas, the Bates Mountain pronghorn antelope release area, three riparian habitats, and the Simpson Park habitat management area. According to the FEIS, the Carlin rail corridor would cross a Desert Land Entry Withdrawal. Since DOE completed the FEIS, the BLM has authorized or received proposals for additional Desert Land Entry Withdrawals within or adjacent to the Carlin rail corridor (BLM 2007d). For example, the Monitor Valley Option crosses or is adjacent to six Desert Land Entries. Of these, three have been issued patents, one has been authorized by BLM and is awaiting patent, and two others have applications in process with the BLM. The Desert Land Act was passed by Congress in 1877 to encourage and promote economic development of the arid and semiarid public lands of the western United States. Through the Act, individuals may apply for a desert-land entry to reclaim, irrigate, and cultivate arid and semiarid public land. The BLM grants Desert Land Entry Withdrawals to individuals who after four years have successfully cultivated and irrigated at least one-eight of the land under the application . Desert Land Entry Withdrawals are considered private land holdings.

The FEIS reported that the Carlin rail corridor would cross linear land features such as rights-of-way for utilities and roads. A review of BLM land records, including Master Title Plats, indicated the authorization of additional rights-of-way since DOE completed the FEIS (BLM 2007a,b).

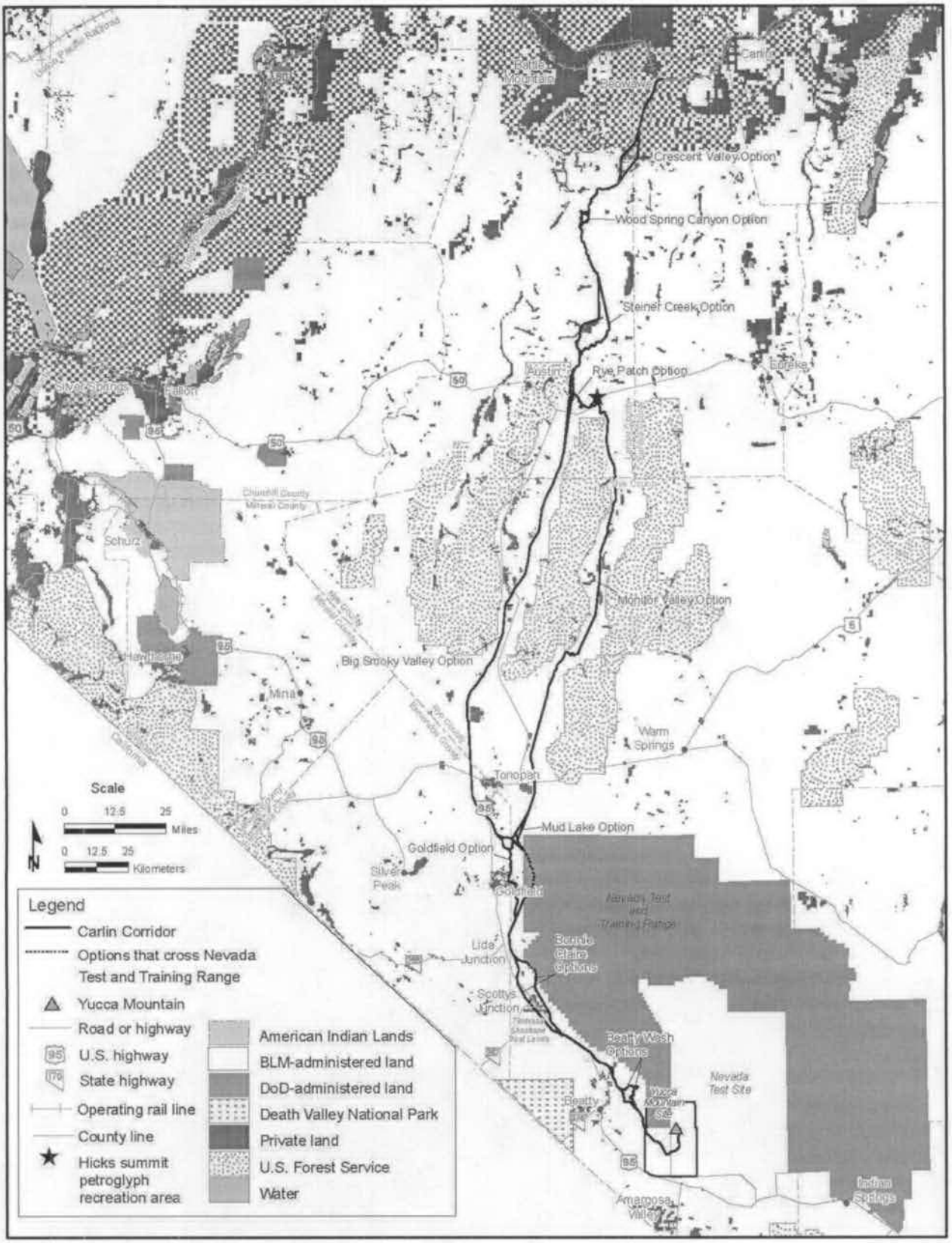

Figure 3-2. Carlin Corridor land use.

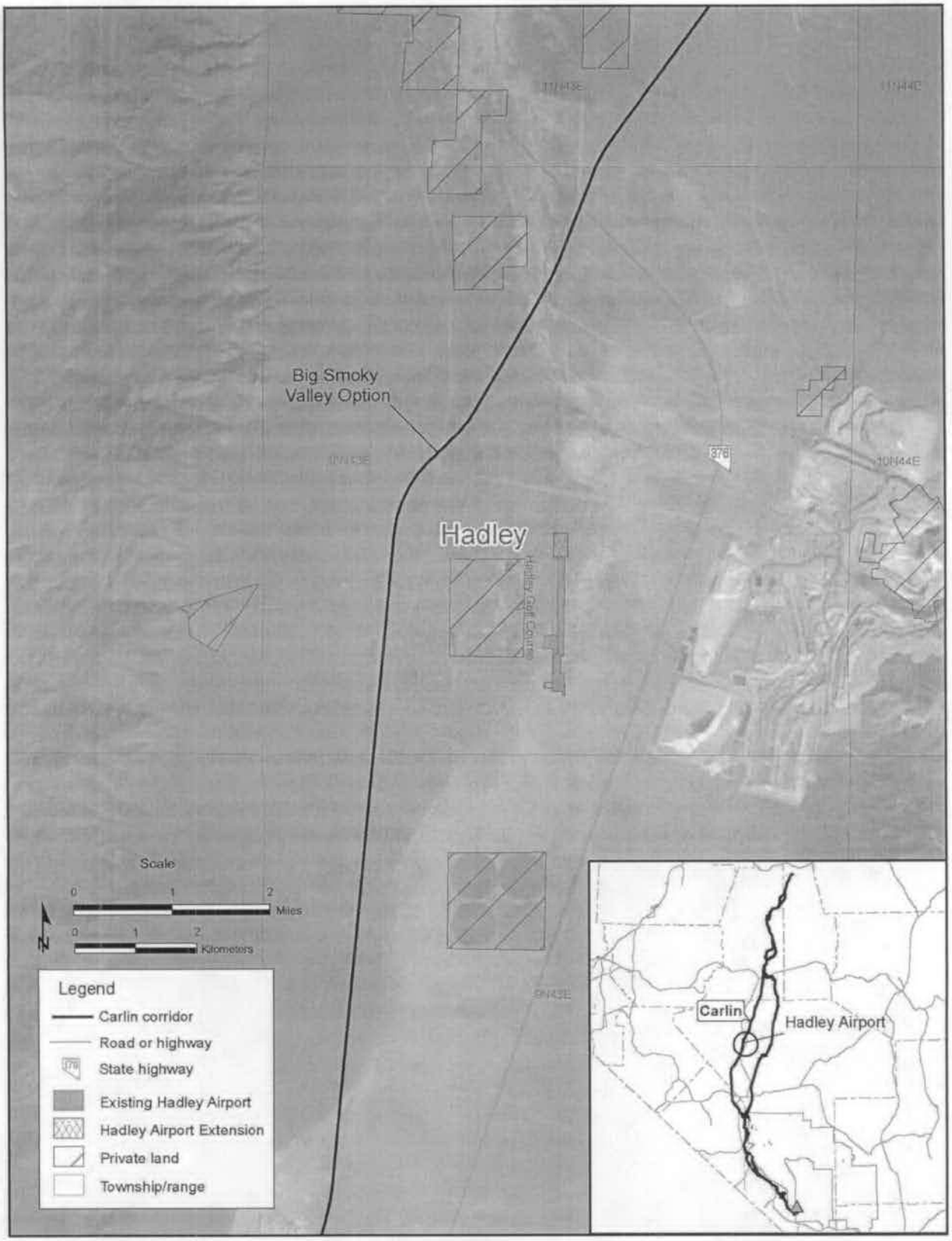

Figure 3-3. Hadley airport location.

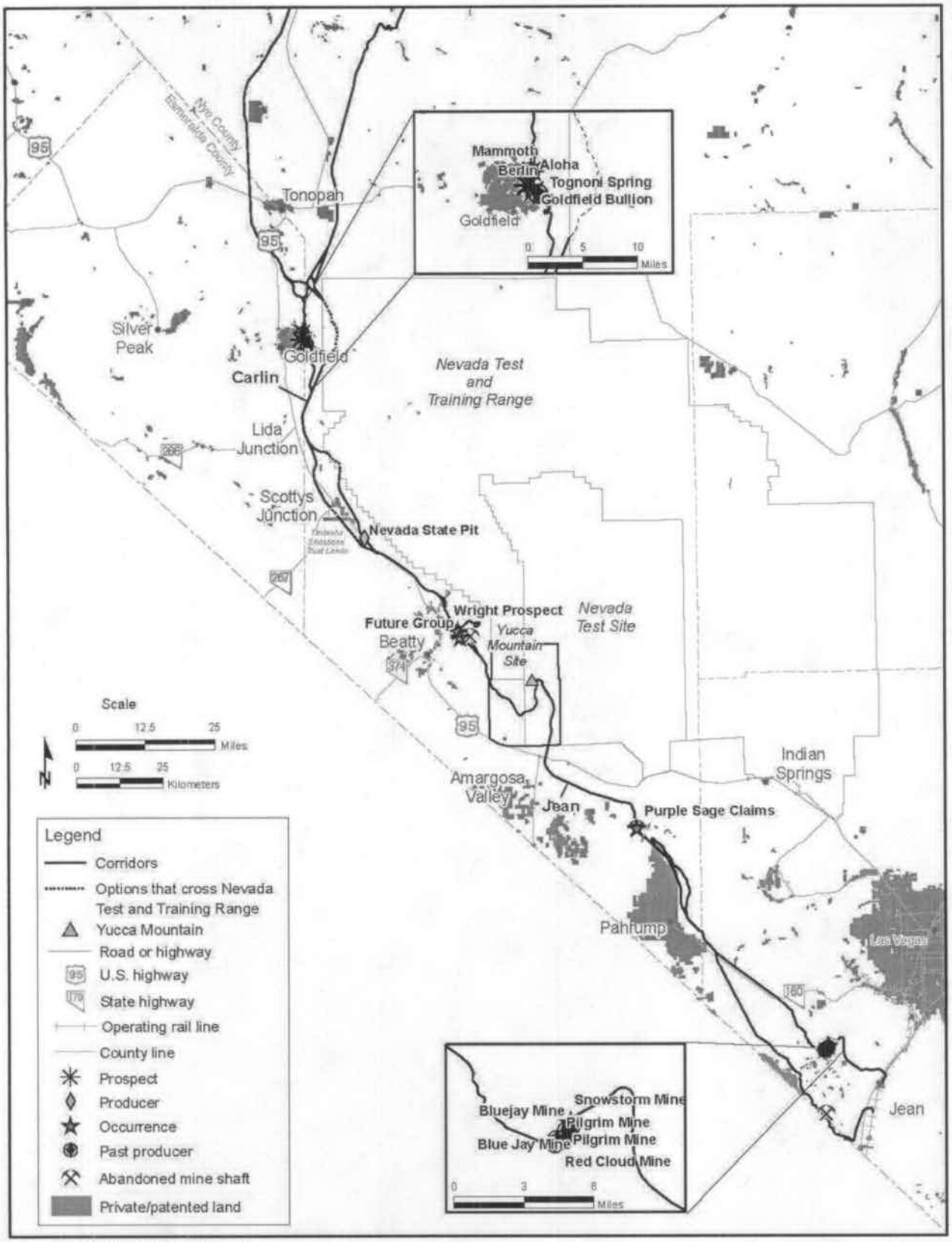

Figure 3-4. Mining locations.

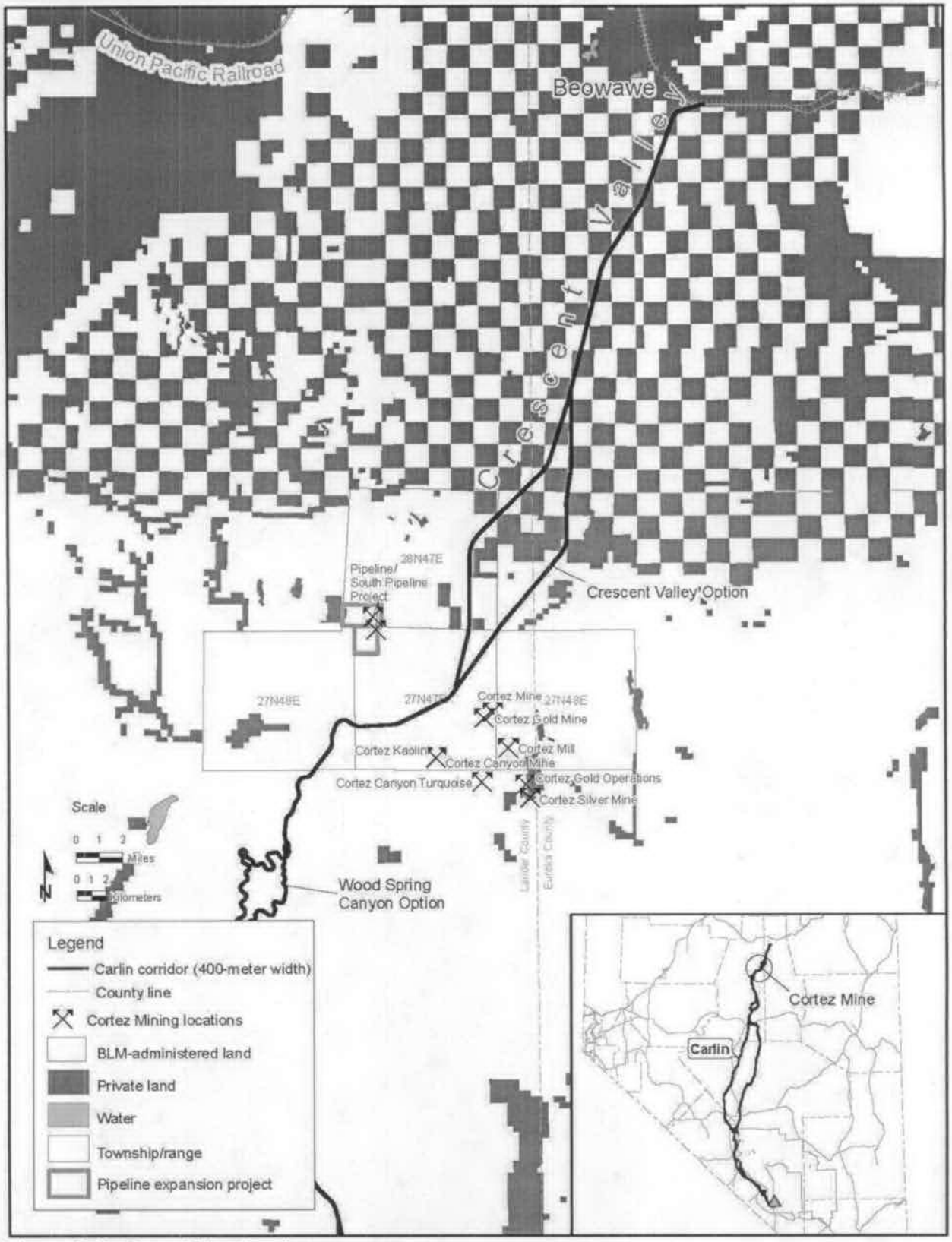

Figure 3-5. Cortez Mine location.

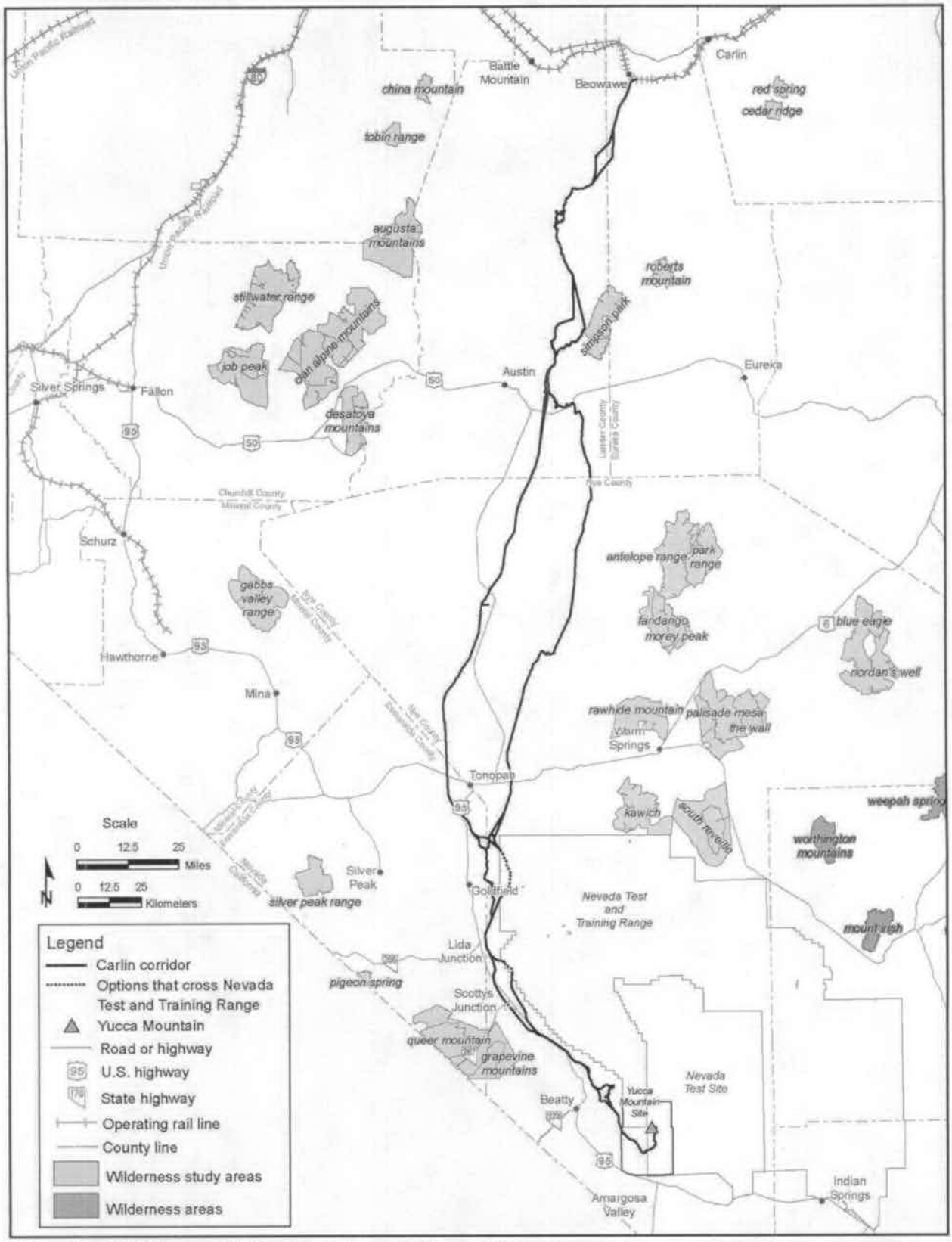

Figure 3-6. Wilderness Study Areas along Carlin corridor.

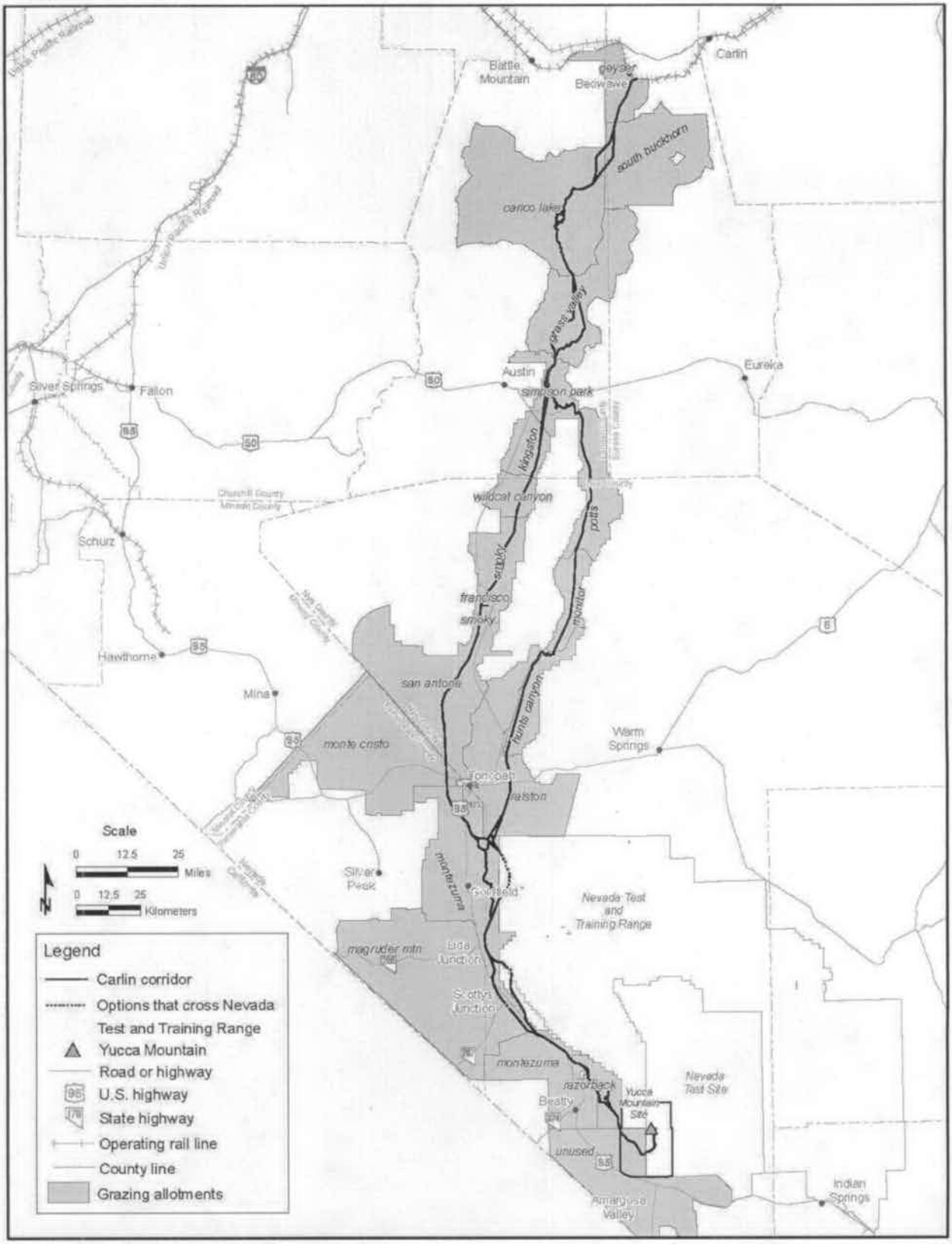

Figure 3-7. Carlin grazing allotments.

3.2.1.2 Air Quality

The FEIS evaluated air quality impacts common to all of the proposed corridors and noted that these impacts would include temporary increases in criteria air pollutant concentrations from construction of a rail line. The FEIS did not identify any air quality impacts unique to the Carlin rail corridor. The update did not find any indication that the air quality status of the counties and areas along the Carlin rail corridor has changed since publication of the FEIS (EPA 2007a,b; NDEP 2007b).

Areas in violation of one or more of the criteria pollutant standards are classified as nonattainment areas. If there is not enough air quality data to determine the status of a remote or sparsely populated area, then the EPA lists the area as unclassifiable and the area is considered to be in attainment. The Carlin rail corridor would pass through rural parts of Nye, Esmeralda, Lander, and Eureka Counties in Nevada that are either in attainment or unclassifiable for criteria air pollutants under the EPA (EPA 2007a). Since no nonattainment or maintenance areas were identified, no detailed estimates of emission rates or comparisons to threshold levels for conformity were made.

Fuel use by construction equipment would emit carbon monoxide, nitrogen dioxide, sulfur dioxide, and particulate matter with diameters of 10 micrometers or less (PM_{10}) and 2.5 micrometers or less ($PM_{2.5}$) Construction activities would also emit PM_{10} in the form of fugitive dust from excavation, truck traffic, and operation of concrete batch plants (NRP 2007a). The emissions would be temporary and would cover a sizeable area as construction progressed along the length of the corridor.

Air quality impacts common to all corridors during railroad operations would result from diesel locomotives, which would emit carbon monoxide, nitrogen dioxide, sulfur dioxide, PM_{10} and $PM_{2.5}$. The number of locomotive engines in use and the associated operational characteristics would not differ appreciably from those in the FEIS.

3.2.1.3 Hydrology

This section describes surface-water and groundwater resources and impacts to those resources. The FEIS analyzed surface water and groundwater resources within the 400-meter (0.25-mile)-wide corridor and within 1 kilometer (0.6 mile) of each side of the corridor. For this update, the region of influence for hydrology, was the same as for the FEIS.

Surface Water

The FEIS identified potential surface-water resources, which include springs, streams, riparian areas, and reservoirs within the region of influence along the corridor (DOE 2002, Table 6-37). As noted in the FEIS, the spread of construction-related materials by precipitation or intermittent runoff events, releases to surface waters, and the alteration of natural drainage patterns or runoff rates that could affect downgradient resources would be unlikely. Based on the information collected for this update, impacts to surface-water resources from construction of a rail line in the Carlin rail corridor would be the same as those reported in the FEIS.

The Carlin rail corridor, including all of its options, would cross 11 different mapped 100-year flood zones or flood zone groups. These remain unchanged since the publication of the FEIS. Although unlikely, the spread of construction-related materials by precipitation or intermittent runoff events could occur during the construction of a rail line.

Groundwater

In the FEIS, the Department used terrain types to estimate total water demand (NRP 2007a). Since publication of the FEIS, DOE has canvassed similar projects throughout Nevada and determined that the amount and type of earthwork, not the terrain, would more accurately estimate total water demand associated with the construction of a rail line. Therefore, DOE updated the water demand based on earthwork needs. This resulted in an estimated water demand for the Carlin rail corridor of approximately 7.1 million cubic meters (5,800 acre feet) (NRP 2007a) compared to the estimate based on terrain types reported in the FEIS of 810,000 cubic meters (660 acre-feet) (DOE 2002). To accommodate this increase in estimated water demand, DOE would need to draw more water than originally estimated in the FEIS from the underlying hydrographic basins and pump from additional wells. Groundwater withdrawal could temporarily affect discharge from nearby wells or springs. DOE would conduct detailed analyses if new wells required for construction of the rail line were to be located near other water sources.

Construction of a rail line would require water for soil compaction, dust control, and workforce use. Water use during construction would come primarily from groundwater resources, specifically hydrographic basins. If the hydrographic basin is designated, permitted groundwater rights approach or exceed the estimated perennial yield, water resources are being depleted or require additional administration, and the Nevada State Engineer has declared preferred uses of water. Table 3-2 updates the designation status of the hydrographic basins and the percentage of the Carlin rail corridor that would be in the respective basin. The total percentage of the Carlin rail corridor that would be in designated basins is about 68 percent (NRP 2007a). The FEIS estimated that about 70 percent of the Carlin corridor would be in designated basins (DOE 2002).

Table 3-2. Hydrographic basins associated with the Carlin rail corridor.[a]

Hydrographic basin (and subbasin where applicable)	Length (km)[b]	Percentage of total[c]	Designated
Alkali Spring Valley	21	4	No
Big Smoky Valley/Northern Part	110	21	Yes
Big Smoky Valley/Tonopah Flat	76	14	Yes
Carico Lake Valley	4.4	0.82	No
Crater Flat	29	5.5	No
Crescent Valley	80	15	Yes
Fortymile Canyon/Jackass Flats	13	2.4	No
Grass Valley	55	10	No
Lida Valley	24	4.4	No
Oasis Valley	23	4.4	Yes
Ralston Valley	27	5.1	Yes
Sarcobatus Flat	48	9	Yes
Stonewall Flat	21	3.9	No

a. To calculate water demand for each basin, multiply the total water demand for a given corridor by the percentage of total.
b. km = kilometer; to convert kilometers to miles, multiply by 0.62137.
c. Based on primary option in FEIS.

Operations along the completed rail line would have little effect on groundwater resources. Possible changes in recharge, if any, would be the same as those at the completion of construction.

3.2.1.4 Biological Resources and Soils

Potential impacts to biological resources and soils from the construction and operation of a railroad in the Carlin corridor would be consistent with those reported in the FEIS. Maximum land disturbance for the

construction of a rail line in the Carlin rail corridor would not differ from the estimates in the FEIS and therefore the potential impacts would not change.

Consistent with the FEIS, this update considered the potential for impacts to vegetation communities; special status species (plants and animals), including their habitat; springs, wetlands, and riparian areas; big game habitat; and wild horse and burro herd management areas that may occur within the 400-meter (0.25-mile)-wide corridor. The analysis considered special status species and big game habitat within a 5-kilometer (3 mile)-wide area along each side of the corridor that may be affected by construction of the rail line. DOE also analyzed springs and riparian areas that could be affected by permanent changes in surface-water flows.

Biological Resources

The Carlin rail corridor would start in the Great Basin; the predominant land-cover types in this area are salt desert scrub and sagebrush. There are areas of pinon-juniper forests near the corridor. The corridor would pass through the Mojave Desert, which has predominant land-cover types of creosote-bursage, Mojave mixed scrub, and salt desert scrub.

Table 3-3 presents the special status species, big game habitat, and herd management areas identified in the FEIS and identifies additional information resulting from this update. The updated version of the Nevada Natural Heritage Program (NNHP) database examined for this document included observations of six additional sensitive species not included in the FEIS. They are:

- Lahontan cutthroat trout[1] (*Oncorhynchus clarkii henshawi*),
- Southwestern Willow Flycatcher (*Empidonax traillii extimus*),
- Crescent Dunes serican scarab (*Serica ammomenisco*),
- Eastwood milkweed (*Asclepias eastwoodiana*),
- Ripley's springparsley/Sanicle Biscuitroot (*Cymopterus ripleyi var. saniculoides*), and
- Toquima Milkvetch (*Astragalus toquimanus*)

Table 3-3. Special status species, big game habitat, and herd management areas associated with the Carlin rail corridor

Resource	TYPE	FEIS		UPDATE	
		In Corridor	Within 5 km	In Corridor	Within 5 km
Threatened or Endangered Species (Categorized by Type)					
Southwestern Willow Flycatcher (*Empidonax traillii extimus*)	B				•
Desert Tortoise (*Gopherus agasizii*)	A/R	•		•	
Lahontan cutthroat trout[1] (*Oncorhynchus clarkii henshawi*)	F			•	
Sensitive Species					
Pygmy rabbit (*Brachylagus idahoensis*)	M		•		•

Resource	TYPE	FEIS		UPDATE	
		In Corridor	Within 5 km	In Corridor	Within 5 km
Fringed myotis (*Myotis thysanodes*)	M		•		•
San Antonio pocket gopher (*Thomomys bottae curtatus*)	M	•		•	
Ferruginous hawk (nesting area) (*Buteo regalis*)	B	•	•	•	•
Amargosa Toad (*Bufo nelsoni*)	A/R		•		•
Oasis Valley speckled dace (*Rhinichthys osculus*)	F		•		•
Big Smoky Valley speckled dace (*Rhinichthys osculus lariversi*)	F		•		•
Oasis Valley springsnail (*Pyrgulopsis micrococcus*)	MO		•		•
Crescent Dune aegialian scarab (*Aegialia crescenta*)	I		•		
Crescent Dunes serican scarab (*Serica ammomenisco*)	I				•
Eastwood milkweed (*Asclepias eastwoodiana*)	P				•
Funeral Mountain milkvetch (*Astragalus funereus*)	P		•		•
Nevada Sanddune beardtongue (*Penstemon arenarius*)	P	•	•	•	•
Ripley's springparsley/Sanicle Biscuitroot (*Cymopterus ripleyi var. saniculoides*)	P				•
Toquima Milkvetch (*Astragalus toquimanus*)	P				•
Game Habitat					
Elk *(Cervus canadensis)*	M	•		•	
Mule deer (*Odocoileus*	M	•		•	
Pronghorn Antelope (*Antilocapra*) americana	M	•		•	
Sage grouse (*Centrocercus*)	B	•		•[2]	
Wild Horse and Burro Herd Management Areas					
Bald Mountain		•		•	
Callaghan		•		•	
Hickison		•		•	
Saulsbury		•		•	
Goldfield		•		•	
Gold Mountain					•
Nevada Wild Horse Range				•	

Resource	TYPE	FEIS		UPDATE	
		In Corridor	Within 5 km	In Corridor	Within 5 km
Stonewall		•		•	
Bullfrog		•		•	

Species Type Key — *M = Mammal*; *B = Bird*; *A/R = Amphibian or Reptile*; *F = Fish*; *MO = Mollusk*; *I = Insect*; *P = Plant*

Data collected from NNHP (2005), BLM (2006a,b), and URS (2006).

[1] Habitat for the Lahontan cutthroat trout, a threatened species under the Endangered Species Act, crosses the Big Smoky Valley and Monitor Valley Options of the corridor north and northeast of Round Mountain in Nye County. Sightings of the species were not observed but occurrences might exist in the habitat range.

[2] Portions of the Carlin Corridor pass through winter habitat, brood rearing habitat, and nesting habitat of the sage grouse (*Centrocercus urophasianus*; NDOW and CDFG 2004). Conservation of the Greater sage grouse has become an important concern due to a decline in population and habitat. Since the release of the FEIS, the State of Nevada has developed a Greater Sage-Grouse Conservation Plan. This plan involves a number of state and federal agencies, including the Nevada Department of Wildlife, the California Department of Fish and Game, the Nevada and California BLM State Offices, and the U.S. Fish and Wildlife Service among others. The Plan's highest priorities focus on maintaining sage grouse habitats that are currently intact and highly productive. In addition, it emphasizes the enhancement of degraded seasonal habitats that have the greatest potential for recovery (NDOW and CDFG 2004).

There are no other known changes to game habitat, sensitive species, or springs and riparian areas within the corridor or within 5 kilometers (3 miles) of the corridor than reported in the FEIS.

Soils

The FEIS classified soils in the rail corridor with four attributes: shrink swell, erodes easily, unstable fill, and blowing soil. As noted in the FEIS, the shrink swell and erodes easily attributes are common in the Carlin rail corridor. The FEIS also reported that there were no soils classified as prime farmlands within the Carlin corridor. For the update, no new information was identified on the attributes of the soils surveyed in the corridor.

The FEIS reported construction activities would temporarily disturb soils in and adjacent to about 19 square kilometers (4,700 acres) of land. Disturbance of erodible soils could lead to increased silt loads in water courses or increased soil transport by wind. Erosion control during construction, and revegetation or other means of soil stabilization after construction, would minimize these concerns. The soils within the Carlin corridor and the potential impacts to these soils remain unchanged since FEIS issuance.

3.2.1.5 Cultural Resources

The effects of rail line construction and operations in the Carlin rail corridor on cultural resources would be essentially the same as those DOE reported in the FEIS.

Cultural resources include any prehistoric or historic archaeological sites, buildings, structures, landscapes, or objects resulting from or modified by human activity and can include mining, ranching, and linear features such as roads and trails. Cultural resources designated as historic properties warrant consideration with regard to potential adverse impacts resulting from proposed Federal actions.

For this update, DOE conducted an archaeological site file search using records from the Desert Research Institute, the Nevada Cultural Resources Information System, and archaeological information repositories at the Harry Reid Center at the University of Nevada-Las Vegas, and the Nevada State Museum in Carson City.

The records search revealed the presence of 120 known archaeological sites within the 400 meters (0.25 mile) width of the Carlin rail corridor. The difference between the 110 sites reported in the FEIS and the 120 identified in the new survey reflects the addition of sites recorded in the past decade, particularly in the vicinity of Yucca Mountain, where cultural resources inventories have been ongoing. Of the 120 known sites, 11 are eligible or potentially eligible for inclusion on the *National Register of Historic Places*.

The types of sites found in the new survey records are the same as those reported in the FEIS. The total amount of archaeological inventories conducted is approximately 3 percent of the total area for the Carlin rail corridor. Prior to construction of a rail line, field surveys and potentially mitigation of cultural resources would be required.

3.2.1.6 Occupational and Public Health and Safety

Industrial Safety

The categories of worker impacts include total recordable incidents, lost workdays, and fatalities. Recordable incidents or cases are 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) incidents that result in the transfer of a worker to another job, termination of employment, medical treatment, loss of consciousness, or restriction of motion during work activities.

Revised estimates of the number of workers needed to construct the rail line resulted in 6,600 worker-years in comparison to the 1,230 worker-years estimated in the FEIS (2,000 hours per worker-year). Estimates of industrial safety impacts incorporate Bureau of Labor Statistics data for 2005 (BLS 2007a,b). The FEIS used 1998 data from the same source. Industrial safety impacts from operations in the Carlin rail corridor would be lower than those reported in the FEIS because of differences in the labor statistics used. Operation of the railroad would require about 60 workers each year an increase from 47 workers estimated in the FEIS. Table 3-4 lists estimated industrial safety impacts reported in the FEIS as well as the updated information.

Table 3-4. Impacts to workers from industrial hazards during rail line construction and operations for the Carlin rail corridor.[a]

Group and industrial hazard category	Construction		Operations		Total FEIS	Total Update
	FEIS[b]	Update[c]	FEIS[d]	Update[e]		
Involved worker						
Total recordable cases[f]	99	300	95	50	194	350
Lost workday cases	49	170	52	38	101	208
Fatalities	0.14	0.59	0.26	0.35	0.4	0.94
Noninvolved worker						
Total recordable cases	5.9	30	5.4	12	11.3	42
Lost workday cases	2.2	16	2.0	6.4	4.2	22.4
Fatalities	0.006	0.04	0.006	0.02	.012	.06
Totals[g]						

Total recordable cases	110	330	100	61	210	391
Lost workday cases	51	180	54	44	105	224
Fatalities	0.14	0.6	0.27	0.4	0.41	1.0

a. Estimates of worker-years multiplied by accident rate (BLS 2007a,b).
b. Estimated workforce to construct the rail line would be 1,230 worker-years.
c. Estimated workforce to construct the rail line would be 6,600 worker-years.
d. Totals for 24 years for operations.
e. Totals for operations up to a 50-year period.
f. Total recordable cases include injuries, illnesses, and fatalities.
g. Totals might differ from sums of values due to rounding.

Transportation

Since DOE completed the FEIS, there have been updates to the methods and data used to estimate the radiation doses for workers and members of the public. The impacts for the Carlin corridor reflect new information resulting from these changes (MTS 2007).

Updates for transportation estimated impacts during construction from the transportation of construction materials to the construction sites and impacts from commuting workers. Operation of the railroad would result in incident-free radiological impacts, risks from radiological accidents, impacts from vehicle emissions from waste transportation and commuting workers, and traffic fatalities associated with waste transport and commuting workers.

The FEIS evaluated traffic fatality and vehicle emission impacts from the movement of equipment and delivery of materials for construction, worker commutes to and from construction sites, and transport of water to construction sites. Table 3-5 lists the impacts of transportation during the construction period. Due to the increased number of construction workers from the estimate in the FEIS, estimated traffic fatalities would increase from 1.1 to 4, and fatalities from exposure to vehicle emissions would increase from 0.14 to 0.6. Total transportation impacts from construction would be about 5 fatalities.

Table 3-5. Transportation impacts during rail line construction for the Carlin rail corridor.

	Traffic fatalities		Number of cancers			
Transportation impact category	FEIS	Update	FEIS	Update	Total FEIS	Total Update
Vehicle emission impacts (cancer fatalities)						
Material delivery vehicles	–	–	0.04	0.04	0.04	0.04
Worker commuting	–	–	0.10	0.5	0.10	0.5
Transportation accidents (fatalities)						
Material delivery vehicles	0.3	0.3	–	–	0.3	0.3
Worker commuting	0.8	3.7	–	–	0.8	3.7
Total construction impacts of transportation[a]	1.1	4.0	0.14	0.6	1.54	4.6
[a]Totals might differ from sums of values due to rounding.						

The transportation of spent nuclear fuel and high-level radioactive waste in the Carlin rail corridor would result in radiological and nonradiological impacts to workers and the public. Radiological impacts would result from radiation that the rail casks emitted during incident-free transportation, from radionuclides released from the rail cask during transportation accidents, or from radiation that the rail cask emitted because of a loss of shielding during a transportation accident. Nonradiological impacts (vehicle emission-related fatalities) would result from diesel locomotives and fugitive dust. Nonradiological impacts would also result from traffic accidents that involved workers and members of the public.

Table 3-6 lists the impacts of using the Carlin rail corridor to ship spent nuclear fuel and high-level radioactive waste calculated using updated methods and data. The impacts presented reflect those from the mainline to the repository. This is in contrast to the FEIS, where the Nevada impacts started where the mainline intersects the Nevada border.

For members of the public, estimated radiological impacts from incident-free (routine) transportation decreased from those in the FEIS, from 0.0012 to 0.000088 latent cancer fatality. This would be due primarily to the change in analysis for the Nevada rail line to model dedicated trains for shipments to the repository (Golan 2005), which would be partially offset by the increase in the latent cancer fatality conversion factor.

For workers, radiological impacts from incident-free transportation would increase from 0.31 to 0.33 latent cancer fatality. The increase would be due primarily to the increase in the latent cancer fatality conversion factor, the use of additional escorts in all areas, and the estimation of impacts for uninvolved workers at the staging yard, which would be partially offset by the decrease in the exposure time at the staging yard.

Radiological accident risks would increase from 0.000000037 to 0.000001 latent cancer fatality. This would be due primarily to the use of the combined Track Class 3 transportation accident rate (Bendixen and Facanha 2007) based on train kilometers and railcar kilometers and the increase in the latent cancer fatality conversion factor. Although this is an increase, radiological accident risk would still be a negligible contributor to the overall transportation risk.

Estimated impacts from waste transportation vehicle emissions would decrease from 0.0008 to 0.00038 fatality. This would be due primarily to decreases in populations along the Carlin rail corridor. Vehicle emission impacts from commuting workers would increase from those reported in the FEIS because of the longer operations phase.

Estimated impacts from nonradiological transportation accidents would increase from 0.054 to 0.31 fatality. This is the most notable change to accident risk and would be due primarily to the use of the updated rail fatality rate (DOT 2005) and from accounting for the presence of locomotives and buffer cars in the estimation of the number of nonradiological transportation accident fatalities. Due to the increase in the number of workers, traffic fatalities associated with commuting workers would also increase.

Overall, the estimated total number of transportation-related fatalities from operation of a railroad in the Carlin rail corridor has increased from 1.0 fatality reported in the FEIS to 4.3 fatalities in the current assessment. This change is due primarily to the increase in the number of fatalities from traffic accidents.

Table 3-6. Operations impacts of transportation for the Carlin rail corridor.

Transportation impact category	Traffic fatalities		Number of cancers		Total	
	FEIS	Update	FEIS	Update	FEIS	Update

Transportation impact category	Traffic fatalities		Number of cancers		Total	
	FEIS	Update	FEIS	Update	FEIS	Update
Incident-free radiological impacts (LCFs)[a]						
Public (LCFs)	–	–	0.0012	0.000088		
Workers (LCFs)	–	–	0.31	0.33		
Radiological accident risks (LCFs)			0.000000037	0.000001		
Vehicle emission impacts (cancer fatalities)						
Waste transportation	–	–	0.0008	0.00038		
Worker commuting	–	–	0.09	0.4		
Transportation accidents (fatalities)						
Waste transportation	0.054	0.31	–	–		
Worker commuting	0.7	3.3	–	–		
Total operations impacts[b]	0.7	3.6	0.4	0.7	1.1	4.3

a. LCF = latent cancer fatality.
b. Totals might differ from sums of values due to rounding.

3.2.1.7 Socioeconomics

In the FEIS, DOE used construction costs, workforce estimates, and state and regional economic data to identify potential direct and indirect changes in state and regional economic activity. The Department noted that construction activities would cause short-term, temporary increases in employment and population.

Revised estimates of the number of workers needed to construct the rail line in the Carlin corridor resulted in 6,600 worker-years in comparison to the 1,230 worker-years estimated in the FEIS. Operation of the railroad would require about 42 workers each year in comparison to the 47 workers estimated in the FEIS.

The FEIS estimated population baselines for Clark, Nye, and Lincoln Counties and the Rest of Nevada on projections by state and local agencies including the Nevada State Demographer, Nye County, and Clark County, which was prepared by the University of Nevada Las Vegas. The rest of Nevada included Eureka, Lander, and Esmeralda Counties. The original baseline estimate was that the 2006 population in the region of influence would be approximately 1.73 million persons. The updated baseline, which incorporates the Nevada State Demographer's more current data, indicates that the estimated 2006 population in the region was approximately 1.94 million persons (NSDO 2006b).

Clark County, which includes Las Vegas, dominates the region of influence with a 2006 estimated population of 1.89 million, which is approximately 7 percent more than the population that DOE reported in the FEIS. Population growth in the unincorporated town of Pahrump dominates Nye County's growing popularity as a residential destination. Since DOE completed the FEIS, Pahrump, the largest population center in Nye County, has experienced double-digit growth. The estimated population of Pahrump increased from 23,000 persons in July 1999 to 33,000 persons by July 2005, an increase of about 45 percent. In the same period, the State Demographer estimates that Nye County as a whole grew from about 31,000 persons to about 41,000 persons. The Carlin rail corridor would pass near the towns of

Beatty and Tonopah. The State Demographer estimated the 2005 population of Beatty to be slightly over 1,000 persons and the 2005 population of Tonopah to be about 2,600 people (NSDO 2006b).

Because the construction workforce is expected to come largely from Clark County and the Carson City/Washoe County area, any changes to the regional employment and population baselines would be small. Changes in employment and population in Nye and Lincoln Counties, including the communities within those counties, is unlikely because workers would live near the rail line and would be unlikely to return to Nye or Lincoln Counties as permanent residents once construction ends. Current population growth in these counties would mask socioeconomic impacts due to the short-term growth in the workforce or the associated impact on population growth.

3.2.1.8 Noise and Vibration

The FEIS analysis for noise considered typical day-night sound levels, the distance of the rail line from communities along the rail line, and estimated the impacts from the construction and operation of a railroad to these communities. The FEIS analysis for vibration considered typical background level of ground vibration, the number of trains, and the distance of the rail line from to historic structures or sites of cultural significance, and estimated the impacts from the operation of a railroad. There are no significant new circumstances or information that would cause the affected environment or the estimated impacts from noise or vibration to change from what was reported in the FEIS.

3.2.1.9 Aesthetics

Based on a corridor-level analysis and an evaluation of current BLM Resource Management Plans, there have been no changes to Visual Resource Management classifications for the Carlin rail corridor since the publication of the FEIS. Under the current BLM plans, the Carlin rail corridor would pass through Visual Resource Management Class IV lands.

3.2.1.10 Utilities, Energy, and Materials

The FEIS evaluated utilities, energy, and materials impacts common to all corridors and noted that these impacts would include the use of motor fuel, steel, and concrete. The estimated impacts from these resources associated with the construction and operation of a railroad in Nevada would be similar to those in the FEIS.

The Carlin rail corridor would pass through rural parts of Nye, Esmeralda, Lander, and Eureka Counties in Nevada that have little access to support services. Electric power for construction would be initially supplied by portable generators. New power lines would be installed to provide power for construction services and would be extended, via underground distribution along the rail roadbed to meet all other construction and operational needs. Construction equipment would consume motor fuel (diesel and gasoline). The total motor fuel use in Nevada in 2005 was about 5.8 billion liters (1.5 billion gallons) (FHA 2006, Table MF-21). Highway motor fuel use in the state in 2005 increased 6.2 percent over that in 2004, the largest percentage increase for any state and attributable to Nevada's growing population. Table 5-7 lists the estimated amounts of diesel fuel and gasoline for construction for the Carlin rail corridor, which are higher than the estimates in the FEIS. The annual average use of motor fuel would be about 0.52 percent of that consumed annually in Nevada. Unlike overall state use, construction activities would use primarily diesel fuel, which would be about 2.1 percent of all special fuel (mainly diesel) used annually in Nevada.

Steel for rails, concrete (principally for rail ties, bridges, and drainage structures), and rock for ballast would be the primary materials that the construction of a rail line would consume. Table 3-7 lists estimates of steel and concrete consumption, which have changed from those in the FEIS.

Table 3-7. Construction fuel and materials impacts for the Carlin rail corridor.[a]

Length (kilometers)[b,c]	Diesel fuel use (million liters)[d]		Gasoline use (million liters)		Steel (thousand metric tons)[e]		Concrete (thousand metric tons)	
	FEIS	Update	FEIS	Update	FEIS	Update	FEIS	Update
530	40	110	0.82	2.4	74	86	414	330

a. Source of Update: Nevada Rail Partners 2007, p. 2-7, Table 2-1).
b. Corridor length used for comparative evaluation.
c. To convert kilometers to miles, multiply by 0.623.
d. To convert liters to gallons, multiply by 0.264.
e. To convert metric tons to tons, multiply by 1.102.

The estimated impacts to utilities, energy, and materials from the operation of a railroad in Nevada would be similar to those in the FEIS. The use of motor fuel by locomotives would increase over that in the FEIS due to more weekly train trips.

3.2.1.11 Waste Management

The FEIS evaluated common waste management impacts for all corridors rather than for individual corridors. Information to allow differentiation between corridor waste management impacts is now much more readily available. Therefore, DOE has included this information at a level of analysis that was similar to the FEIS.

Waste generation and management impacts common to all corridors would result from construction and operation a railroad in the Carlin rail corridor. There would be relatively minor quantities of industrial, hazardous, and sanitary waste.

The FEIS estimated the peak annual generation of sanitary solid waste would be 910 metric tons (1,000 tons). DOE now estimates that solid municipal waste from construction facilities would be 750 metric tons (830 tons) during the peak year of construction. An assumed 25 percent of the waste would be recyclable, which would result in 570 metric tons (620 tons) for disposal at municipal landfills. The estimated total mass of waste that would be generated during rail line construction is about 2,000 metric tons (2,200 tons). This mass of sanitary solid waste would occupy about 5,100 cubic meters (6,600 cubic yards) of landfill volume at a waste density of 410 kilograms per cubic meter (700 pounds per cubic yard). The estimated average daily disposal mass would be about 1.6 metric tons (1.7 tons) per day.

For the landfills in rural counties, this would represent a potential increase in volume of waste requiring processing. The Goldfield landfill, which serves a population of fewer than 1,500 people in Esmeralda County, received about 3.6 metric tons (4 tons) of solid waste per day in 2003 (NDEP 2007a, Appendix 2). Disposal of solid waste generated during the construction phase would represent nearly a 50-percent increase in daily waste volume for the Goldfield landfill and could hasten its estimated closure date of 2023. Nye County disposed of about 250 metric tons (280 tons) of waste during 2003 at three different landfills (NDEP 2007a), but the county plans to close two of these landfills by 2011, which would represent 96 percent of the county's current waste disposal capacity. The Austin and Battle Mountain landfills in Lander County disposed of about 2.7 and 12 metric tons (3 and 13 tons) per day, respectively, in 2003; their estimated closure dates are 2041 and 2069. For comparison, the Apex Landfill in Clark County, which serves the Las Vegas Valley, receives 8,000 metric tons (8,800 tons) each day (State of

Nevada 2004, pp. 6 and 7). Waste generated during construction could be trucked to larger landfills with small impact on waste disposal capacity.

Railroad operations would periodically generate waste during maintenance activities. Locomotive and railcar maintenance could generate used oil and solvents that DOE would recycle or dispose of as regulated waste.

3.2.1.12 Environmental Justice

The FEIS environmental justice analysis considered the potential for disproportionately high and adverse impacts on two segments of the overall population—minority communities and low-income communities. In the FEIS, DOE employed a criterion for identifying minority and low-income communities by applying a 10-percent threshold, meaning that the environmental analyses for environmental justice purposes focused on Census blocks and Census block groups having minority or low-income populations at least 10-percent higher than state averages.

For this update, DOE adopted new criteria based upon revised NRC guidance. The new criteria are Census blocks having a 50 percent or higher minority population (e.g., 10 percent higher than the State average), and Census block groups having a 30.5 percent low income population (e.g., 20 percent higher than the State average).

Updates for the 2000 U.S. Census Bureau block group data used in the FEIS to examine the location and concentration of low income populations were not available at the time of publication of the FEIS. Instead, the FEIS used 1990 U S Census Bureau block group data to identify low income populations. For this update, DOE used the more current 2000 U S Census Bureau block group data to identify both low income and minority populations. The next set of comprehensive Census Bureau data will not be released until the 2010 Census, thus, the 2000 data is still considered the most current data set. The region of influence identified in the FEIS for the Carlin rail corridor has remained the same. Furthermore, county level U.S. Census Bureau data estimates for 2006 suggest that while the population in southern Nevada is growing rapidly, the location of concentrations of minority and low income populations have remained relatively constant and static since 2000.

DOE concluded in the FEIS that there would not be any high and adverse impacts from transportation of spent nuclear fuel and high-level radioactive waste in Nevada on any populations, and that disproportionately high and adverse effects would be unlikely for any specific segment of the population, including minorities and low-income communities. DOE further concluded that there were no special pathways (unique practices and activities creating opportunities for increased impacts) that could not be mitigated. Therefore, the FEIS concluded that there were no environmental justice impacts associated with any proposed rail corridor.

Since the publication of the FEIS, DOE has not identified any new large and adverse impacts to any population. DOE has also not identified any new minority or low income populations in the Carlin rail corridor region of influence, and has not identified any special pathways that could increase impacts to these populations. Therefore, DOE maintains that there would be no environmental justice impacts associated with the Carlin rail corridor.

3.2.2 JEAN CORRIDOR

Table 3-8 summarizes the results of the update to the primary impact indicators for the Jean corridor and compares them with the corridor information published in the FEIS. The information reflects the total for the construction and operation of the rail corridor unless otherwise noted.

Table 3-8. Updated environmental information for the Jean rail corridor.

Resource	Changes from the FEIS to this analysis
Corridor length	No change
Land ownership (in square kilometers)[a]	
BLM-administered land	Changed from 60 - 69 (~83%) to 60.7 - 72.9 (85.5 - 87.2%)
Private land	Changed from 0.1 – 3.5 (~5%) to 0.13 - 3.5 (0.19 - 4.16%)
Department of Energy-managed land	No Change
Air quality	
Attainment Status	The Pahrump area in Nye County is now subject to a Memorandum of Understanding with regulatory agencies to better control fugitive
Hydrology	
Surface water	No change
Groundwater use (construction) (cubic meters)[b]	Changed from 506,000 to 4.2 million
Biological resources and soils	Additional records of sensitive species
Cultural resources (records search)	Changed in the number of recorded sites from 6 to 45
Occupational and Public Health and Safety	
Industrial hazards (Construction and Operations)	
Total recordable cases	Changed from 148 to 246
Lost workday cases	Changed from 76 to 143
Fatalities	Changed from 0.3 to 0.9
Transportation Hazards (Construction Only)	
Traffic Fatalities	Changed from 0.7 to 2.5
Cancer Fatalities	Changed from 0.09 to 0.3
Incident-free radiological impacts (latent cancer fatalities) (Operations Only)	
Public	Changed from 0.00085 to 0.00019
Workers	Changed from 0.22 to 0.21
Radiological transportation accident fatalities	
Radiological accident risk (latent cancer fatalities)	Changed from 0.000000015 to 0.0000018
Cancer fatalities from vehicle emissions	Changed from 0.07 to 0.3
Nonradiological transportation accident fatalities	
Spent nuclear fuel and high-level radioactive waste transportation	Changed from 0.019 to 0.11
Construction and operations workforce	Changed from 0.5 to 2.0
Socioeconomics	
Estimated construction workforce	Changed from 855 workers per year to 4,100 workers per year
Estimated operations workforce	Changed from 36 workers per year to 32 workers per year
Noise and Vibration	No changes
Aesthetics	No changes
Utilities, energy, and materials (Amount Used)	
Diesel (million liters)[c]	Increase from 26 to 86
Gasoline (million liters)	Increase from 0.5 to 1.6
Steel (thousand metric tons)[d]	Increase from 26 to 30
Concrete (thousand metric tons)	Decrease from 150 to 120

Resource	Changes from the FEIS to this analysis
Waste Management	
Sanitary Solid Waste	Changed to 1.1 metric tons to 1 metric ton per day
Environmental justice (disproportionately high and adverse impacts)	No changes

a. To convert square kilometers to acres, multiply by 247.10.
b. To convert cubic meters to acre-feet, multiply by 0.0008107.
c. To convert liters to gallons, multiply by 0.26418.
d. To convert metric tons to tons, multiply by 1.1023.

The Jean rail corridor would originate at the existing Union Pacific Railroad Mainline near Jean, Nevada. It would travel northwest near Pahrump, the Town of Amargosa Valley, and the communities of Jean, Goodsprings, Sand Spring, and Lathrop Wells before it reached Yucca Mountain. The State Line option would pass near Primm, Nevada.

Jean rail corridor options would range from 180 to 200 kilometers (110 to 130 miles) long. Figure 3-8 shows the corridor and its two options, the Wilson Pass option and the Stateline Pass option. The FEIS contains detailed corridor and option descriptions.

3.2.2.1 Land Use and Ownership

The following paragraphs discuss information gathered in relation to land use in the Jean rail corridor since the publication of the FEIS. The change in the estimates of the amount of BLM-administered land and private property within this corridor are in part the result of using more accurate databases of land ownership for this update. Land use and ownership conflicts with commercial growth have increased since those reported in the FEIS.

The FEIS reported that the BLM administered approximately 83 percent of the land in the corridor (60 to 69 square kilometers), DOE managed 12 percent (8.5 square kilometers), 5 percent was private land (0.1 to 3.5 square kilometers),

Current land holdings for the Jean rail corridor are as follows: BLM-administered land, 85.5 - 87.2 percent (60.7 – 72.9 square kilometers); DOE land, approximately 10.2 - 12.6 percent (8.8 square kilometers); and private land, about 0.19 - 4.2 percent (0.13 - 3.5 square kilometers). The Jean rail corridor has two options, Wilson Pass and Stateline Pass, off the Union Pacific Main line. The Wilson Pass option would cross private property at the Bluejay, Snowstorm, and Pilgrim mines and run south of the Toiyabe National Forest in the Spring Mountains (Figure 3-9). The western option of the Jean rail corridor in Pahrump Valley also intersects private property. The eastern option in that area avoids those private parcels.

The FEIS reported that the Wilson Pass option would cross the Old Spanish Trail/Mormon Road special recreation management area, and four areas that the BLM has designated as available for sale or transfer. The option would be within approximately 1.6 kilometer (1 mile) of the Toiyabe National Forest. There have been no changes to the status of these areas since DOE completed the FEIS. The FEIS also reported that the Jean rail corridor would cross two wild horse and burro herd management areas and a BLM Class II Visual Resource Area.

The Stateline Pass option would begin in Ivanpah Valley and cross through the proposed Ivanpah Valley Airport in the area between Interstate Highway 15 and the Union Pacific Railroad rail line. Clark County was considering the construction of the airport when DOE completed the FEIS. On October 27, 2000, President Clinton signed the Ivanpah Valley Airport Public Land Transfer Act, which permitted the

Secretary of the Interior to convey public lands for sale to the Clark County Department of Aviation (Public Law 106-362, 114 Stat. 1404). Since publication of the FEIS, the Clark County Department of Aviation has purchased the property and is preparing an EIS (*Notice of Intent To Prepare an Environmental Impact Statement for the Southern Nevada Supplemental Airport, Clark County, NV, and To Conduct Public Scoping Meetings*, 71 *FR*52367, September 5, 2006). If constructed, the Ivanpah Valley Airport, which is now called the Southern Nevada Supplemental Airport, would be a major public air carrier serving the greater Las Vegas metropolitan area, second to McCarran International Airport; Figure 3-10 shows the location of the proposed airport in relation to the Jean rail corridor.

The Stateline Pass option would cross the California-Nevada boundary and would cross into the Stateline Wilderness Area established by the California Desert Conservation Act (Figure 3-11). This wilderness area designation remains unchanged since DOE completed the FEIS.

DOE evaluated information in the Mineral Resources Data System (USGS 2005) and the Abandoned Mine database (NBMG 2001) to determine if there are any newly located mines, active or abandoned, since DOE completed the FEIS. In addition to the mines reported in the FEIS, the primary option for Jean would cross an abandoned mine and Purple Sage Claims. The Wilson Pass option would cross the Red Cloud Mine. Of these, Purple Sage Claims is an occurrence mine site, which means there has been discovery of an outcrop and there might be some land disturbance, but there is no mining operation underway at present. Red Cloud Mine is a past producer, which means mining occurred in the past but no mining operation is underway at present.

According to the FEIS, the Jean Corridor would cross as many as eight BLM grazing allotments, depending on the option. The BLM has since updated their grazing allotment information. Updated information indicates that the Jean corridor and its options would cross up to 10 allotments - Mount Sterling, Wheeler Wash, Younts Spring, Stump Spring, Black Butte, Table Mountain, Spring Mountain, Roach Lake, two allotments BLM has designated as unused, and one designated as private (Figure 3-12) (BLM 2005).

The FEIS reported the Jean rail corridor would cross linear land features such as rights-of-way for utilities and roads. A review of BLM land records, including Master Title Plats, indicated the authorization of additional rights-of-way since DOE completed the FEIS (BLM 2007a,b).

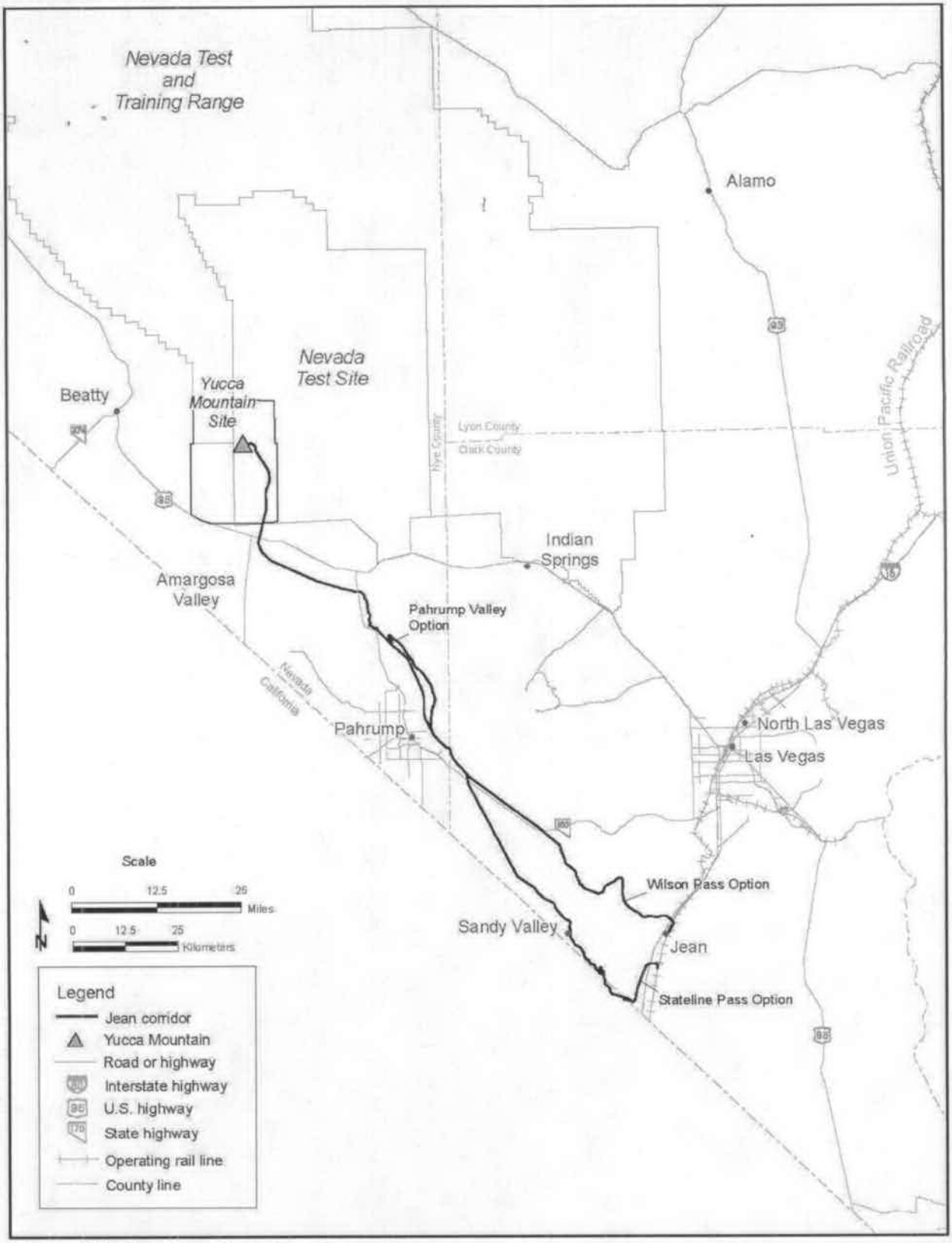

Figure 3-8. Jean Corridor and options.

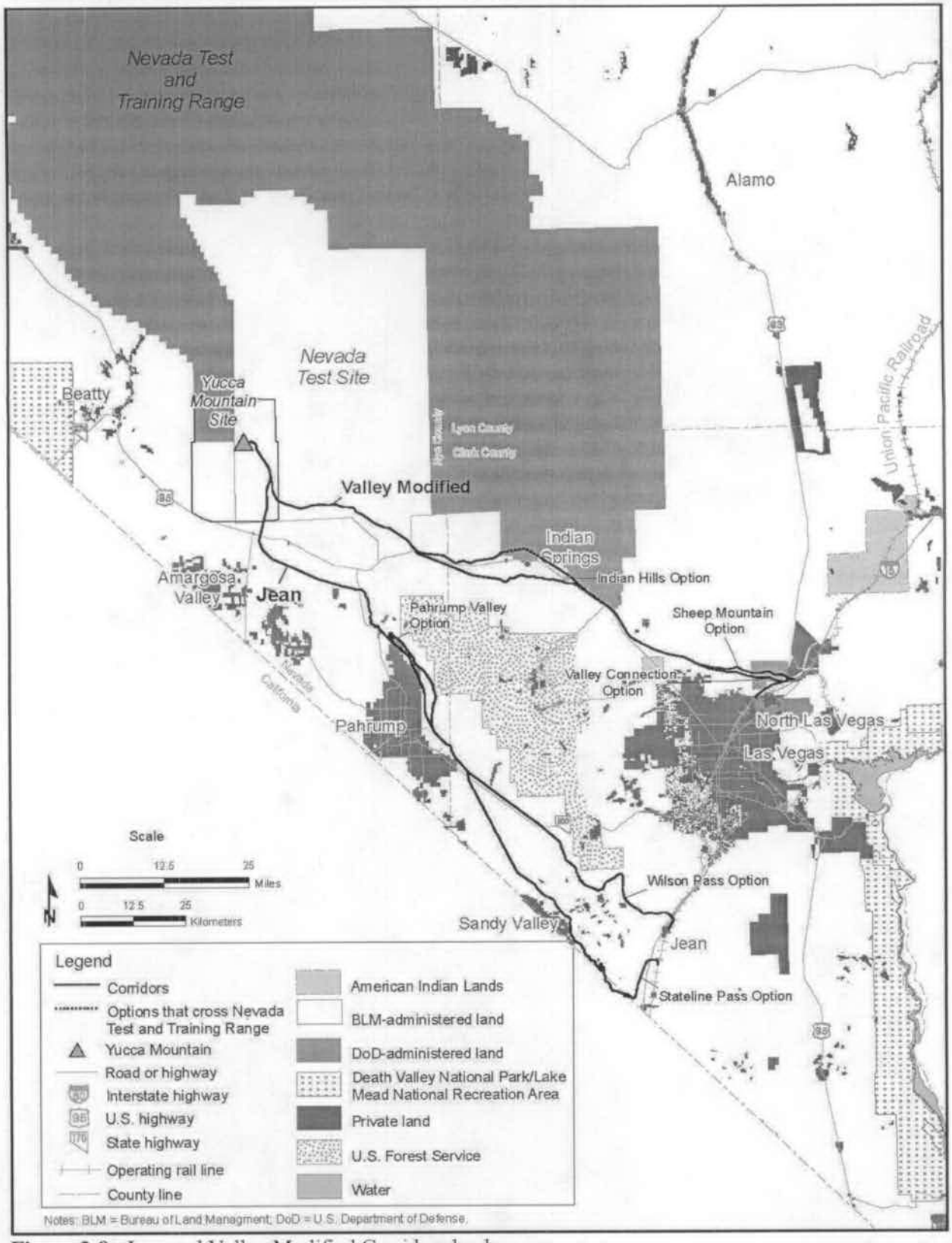

Figure 3-9. Jean and Valley Modified Corridors land use.

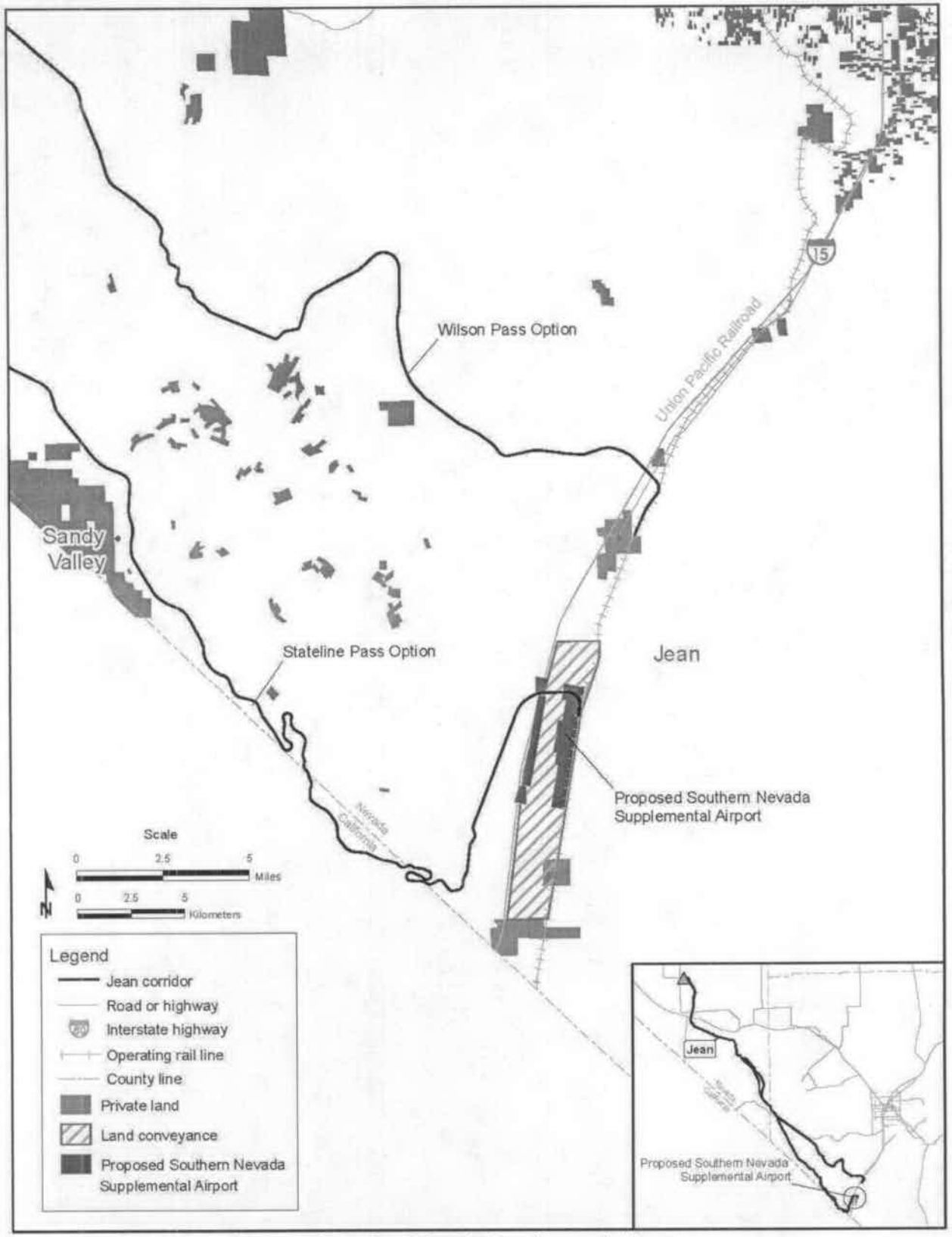

Figure 3-10. Location of proposed Southern Nevada Supplemental Airport.

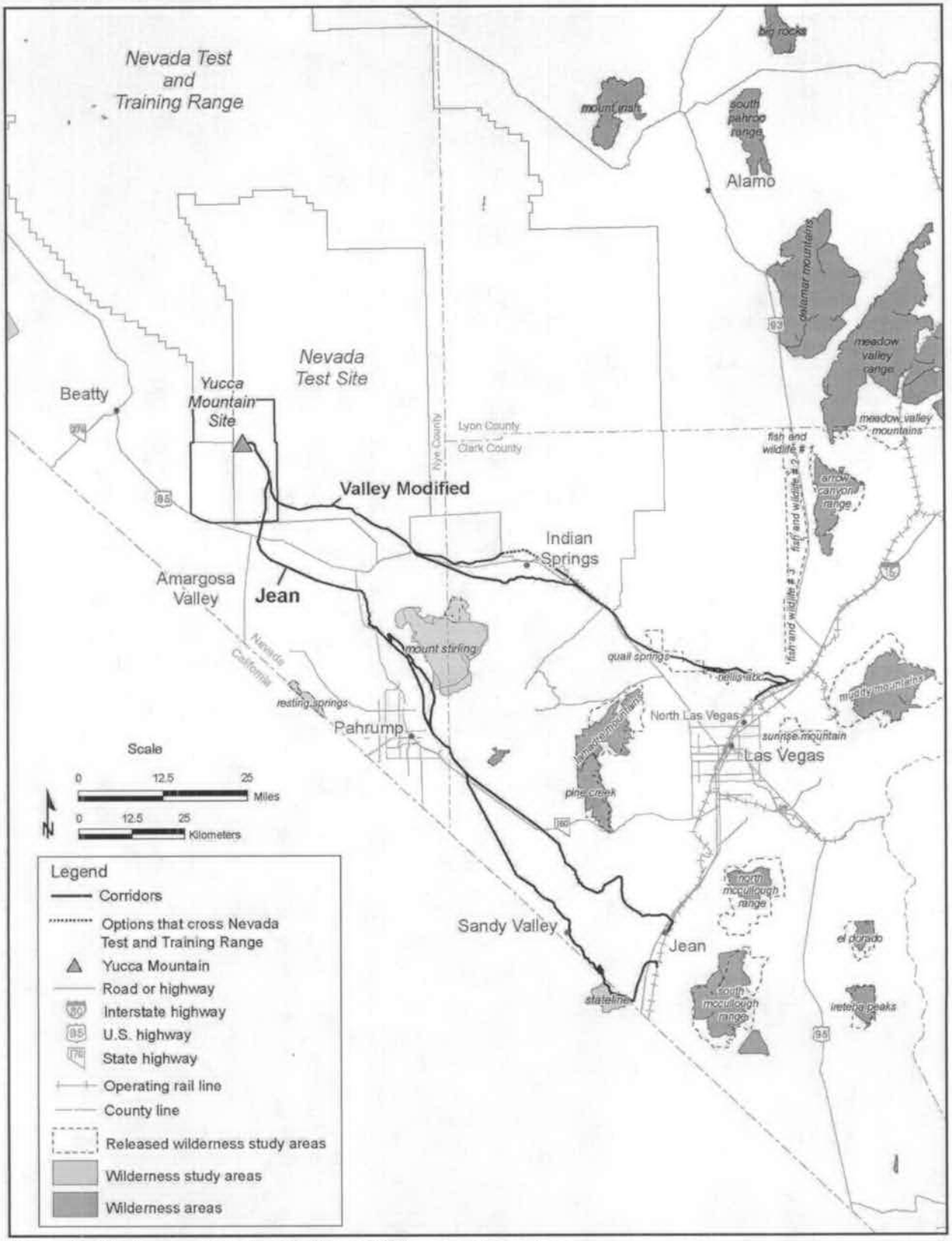

Figure 3-11. Jean and Valley Modified Wilderness Study Areas.

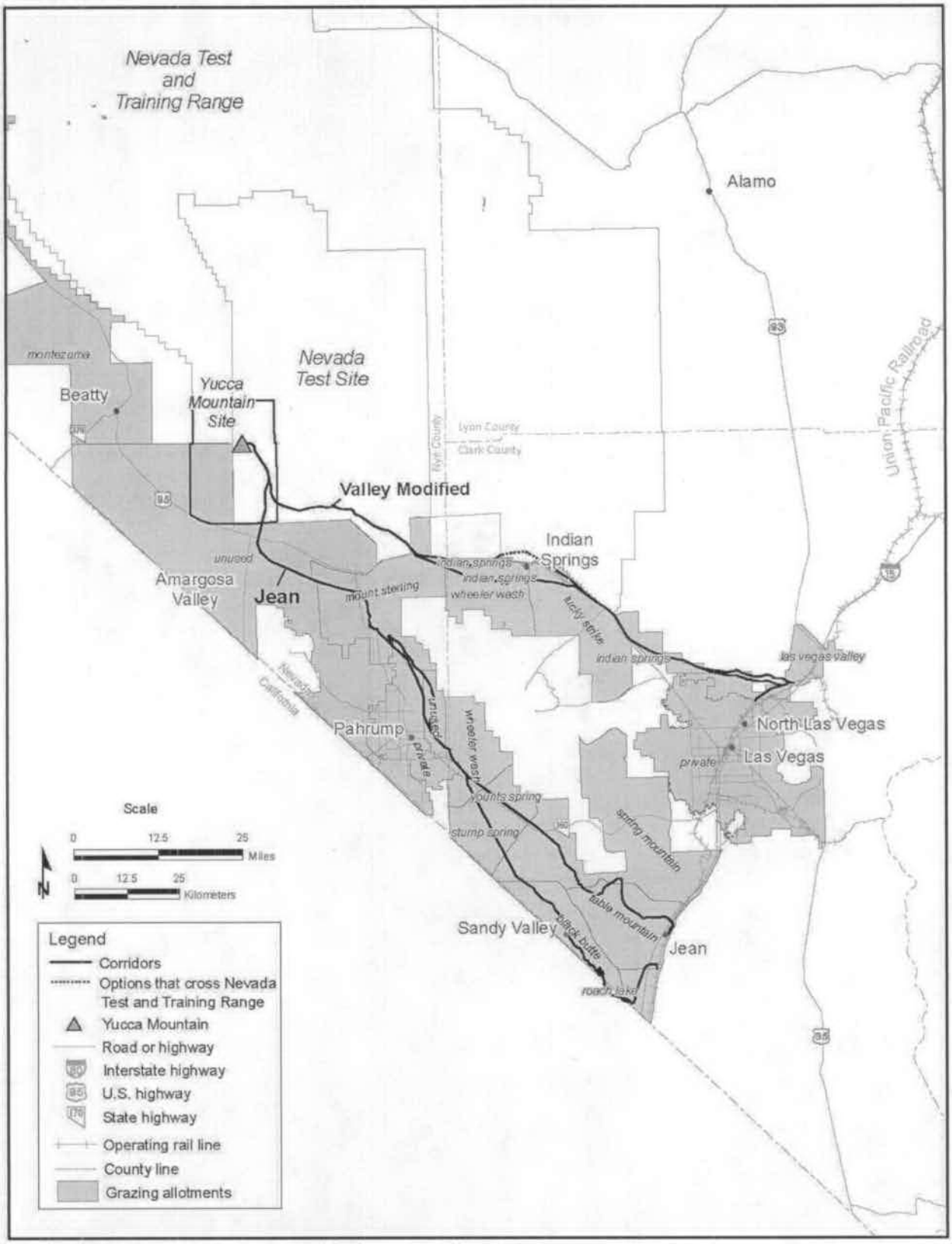

Figure 3-12. Jean and Valley Modified grazing allotments.

3.2.2.2 Air Quality

The FEIS evaluated air quality impacts common to all proposed rail corridors and noted that the impacts would include temporary increases in criteria pollutant concentrations from construction of the rail line. Fuel use by construction equipment would emit carbon monoxide, nitrogen dioxide, sulfur dioxide, and particulate matter with diameters of 10 micrometers or less (PM_{10}) and 2.5 micrometers or less ($PM_{2.5}$) Construction activities would also emit PM_{10} in the form of fugitive dust from excavation, truck traffic, and operation of concrete batch plants (NRP 2007a). The emissions would be temporary and would cover a sizeable area as construction progressed along the length of the corridor.

Areas in violation of one or more of the criteria pollutant standards are classified as nonattainment areas. If there is not enough air quality data to determine the status of a remote or sparsely populated area, then the EPA lists the area as unclassifiable and are considered to be in attainment. The Jean rail corridor would pass through rural parts of Clark and Nye Counties in Nevada and one option would pass through a portion of rural San Bernardino County in California. A portion of the corridor would be in the Pahrump Valley in Nye County. At the time DOE completed the FEIS, these rural areas were all either unclassifiable or in attainment for criteria pollutants.

Since that time, however, the town of Pahrump and the nearby surrounding area have experienced double-digit growth and resultant development (NDEP 2007c). The development has led to areas of cleared land, which has increased fugitive dust emissions. The Nevada Bureau of Air Quality Planning began monitoring the ambient air quality in Pahrump in January 2001. During 2001, 2002, and 2003 the 24-hour ambient air standard for PM_{10} was exceeded 27 times. Under the Clean Air Act, this means that Pahrump is no longer attaining the 24-hour standard of 150 micrograms per cubic meter (NDEP 2007c). However, the U.S. EPA has revoked, effective December 17, 2006 (71 *FR* 61144), the annual standard for PM_{10} from the National Ambient Air Quality Standards, citing a lack of evidence that links health problems to long-term exposure to coarse particle pollution.

In September 2003, the EPA Region IX Administrator, the Nevada Division of Environmental Protection Administrator, the Nye County Board of Commissioners, and the Pahrump Town Board signed the Memorandum of Understanding and implement a Clean Air Action Plan for the Pahrump Valley and defines the limits of the plan as Nevada Hydrographic Area 162. It sets measurable and enforceable milestones for the development and implementation of a Clean Air Action Plan, which will serve as the area's official air quality improvement plan, with quantified emission reduction measures. If a Plan milestone is not achieved, the area will receive a traditional nonattainment area designation and be subject to federal requirements to meet air quality standards.

Under the conditions of the Memorandum of Understanding, Nye County will have until 2009 to bring the area into attainment. Control strategies were to have been in place by 2006 and are to remain in place to ensure that the Pahrump Valley continues to attain the air quality standards in the future.

During preparation of the FEIS, DOE conducted an air quality conformity review for the Jean rail corridor and determined that a conformity determination was not necessary because the entire corridor area was either in attainment or unclassifiable for criteria pollutants (Jason Technologies 2001). Since the original air quality conformity review, the State of Nevada has monitored the town of Pahrump for ambient concentrations of PM_{10} and has signed the Memorandum of Understanding to improve air quality in the vicinity of Pahrump.

Because of the effective change in PM_{10} attainment status for the Pahrump Valley portion of the Jean rail corridor, this update used the air quality conformity review conducted for the Jean rail corridor in support of the FEIS (Jason Technologies 2001) to estimate potential PM_{10} emissions for comparison to the air quality General Conformity threshold level. A portion of the Jean rail corridor would cross the Las Vegas Valley, which was and remains a nonattainment area for PM_{10} and carbon monoxide (EPA 2007a).

The PM_{10} emissions for Jean rail route construction activities could exceed the General Conformity threshold level of 63 metric tons (70 tons) per year. Reviews of updated and more detailed information and methods (NRP 2006, 2007a) considered rail line construction and additional contributions from access roads, unpaved roads, storage piles, a batch plant, coarse stockpiles, and a quarry. The reviews indicated potential construction fugitive dust and PM_{10} emissions would increase above those originally estimated for the FEIS. Before any construction activities in the Jean rail corridor and Pahrump Valley, DOE would need to perform more detailed air quality calculations to evaluate the impacts of construction activities.

The State of Nevada has prepared a 2001 base-year emissions inventory for the Pahrump Valley area of 110,000 metric tons (120,000 tons) per year (NDEP 2007c). The estimated emissions for rail line construction in the Jean rail corridor would be about 0.78 percent of this base-year inventory. A comparison for future years is not possible until finalization of the Clean Air Action Plan or State Implementation Plan.

Air quality impacts common to all corridors during railroad operations would result from diesel locomotives, which would emit carbon monoxide, nitrogen dioxide, sulfur dioxide, PM_{10} and $PM_{2.5}$. The number of locomotive engines in use and the associated operational characteristics would not differ appreciably from those in the FEIS.

3.2.2.3 Hydrology

This section describes surface-water and groundwater resources and impacts to those resources. The FEIS analyzed surface water resources within the 400-meter (0.25-mile)-wide corridor and within 1 kilometer (0.6 mile) of each side of the corridor. For this update, the region of influence for hydrology was the same as for the FEIS.

Surface Water

There are no lakes, streams, or other perennial surface-water features along the Jean rail corridor or its options. The corridor and its options would cross seven mapped 100-year flood zones or flood zone groups (DOE 2002, Table 6-61). These remain unchanged since DOE completed the FEIS.

Impacts to surface-water resources from construction and operation of a railroad in the Jean rail corridor would be the same as those in the FEIS for all three options. Although unlikely, the spread of construction-related materials by precipitation or intermittent runoff events could occur during rail line construction.

Groundwater

In the FEIS, the Department used terrain types to estimate total water demand. Since publication of the FEIS, DOE has canvassed similar projects throughout Nevada and determined that the amount and type of earthwork, not the terrain, would more accurately estimate total water demand associated with the construction of a rail line. Therefore, DOE updated the water demand based on earthwork needs. This resulted in an estimated water demand for the Jean rail corridor of approximately 4.2 million cubic meters (3,400 acre-feet) (NRP 2007a) compared to the estimate based on terrain types reported in the FEIS of 510,000 cubic meters (410 acre-feet) (DOE 2002). To accommodate this increase in estimated water

demand, DOE would need to draw more water than originally estimated in the FEIS from the underlying hydrographic basins and pump from additional wells. Groundwater withdrawal could temporarily affect discharge from nearby wells or springs. DOE would conduct detailed analyses if new wells required for construction of the rail line were to be located near other water sources.

Construction of a rail line would require water for soil compaction, dust control, and workforce use. Water use during construction would come primarily from groundwater resources, specifically from hydrographic basins. If the hydrographic basin is designated, permitted groundwater rights approach or exceed the estimated perennial yield, water resources are being depleted or require additional administration, and the Nevada State Engineer has declared preferred uses of the water. Table 3-9 updates the designation status of the hydrographic basins and the percentage of the Jean rail corridor that is in the respective basin. The total percentage of the Jean rail corridor in designated basins is about 87 percent (NRP 2007a). The FEIS estimated that about 90 percent of the length of the Jean corridor would be in designated basins (DOE 2002).

Table 3-9. Hydrographic basins associated with the Jean rail corridor.[a]

Hydrographic basin (and subbasin where applicable)	Length (kilometers)[b]	Percentage of total[c]	Designated
Amargosa Desert	42	23	Yes
Fortymile Canyon/Jackass Flats	21	12	No
Ivanpah Valley/Southern Part	31	17	Yes
Mesquite Valley	20	11	Yes
Pahrump Valley	64	35	Yes
Rock Valley	3.3	1.8	No

a. To calculate water demand for each basin, multiply the total water demand for a given corridor by the percentage of total.
b. km = kilometer; to convert kilometers to miles, multiply by 0.62137.
c. Based on primary option in FEIS.

Operations along the completed rail line would have little effect on groundwater resources. Possible changes in recharge, if any, would be the same as those at the completion of construction.

3.2.2.4 Biological Resources and Soils

Potential impacts to biological resources and soils from the construction and operation of a railroad in the Carlin corridor would be consistent with those reported in the FEIS. Maximum land disturbance for the construction of a rail line in the Valley Modified rail corridor would not differ from the estimates in the FEIS.

Consistent with the FEIS, this update considered the potential for impacts to vegetation communities; special status species (plants and animals), including their habitat; springs, wetlands, and riparian areas; big game habitat; and wild horse and burro herd management areas that may occur within the 400-meter (0.25-mile)-wide corridor. The analysis considered special status species and big game habitat within a 5-kilometer (3 mile)-wide area along each side of the corridor that may be affected by construction of the rail line. DOE also analyzed springs and riparian areas that could be affected by permanent changes in surface-water flows.

Biological Resources

The area encompassing the Jean rail corridor is in the Mojave Desert; the predominant land-cover types are creosote-bursage, Mojave mixed scrub, and blackbrush.

Table 3-10 presents the special status species, big game habitat, and herd management areas identified in the FEIS and identifies additional information resulting from this update. The updated version of the NNHP database examined for this update included observations of two additional sensitive species not included in the FEIS. They are the Half-ring milkvetch/ Mojave milkvetch (*Astragalus mohavensis* var. *hemygurus)* and the Spring Mountains pyrg (*Pyrgulopsis deaconi*).

Table 3-10. Special status species, big game habitat, and herd management areas associated with the Jean rail corridor.

Resource	TYPE	FEIS		UPDATE	
		In Corridor	Within 5 km	In Corridor	Within 5 km
Threatened or Endangered Species (Separated by Type)					
Desert Tortoise (*Gopherus agasizii*)	A/R	•		•	
Pahrump poolfish (*Empertrichthys latos)*	F				•
Sensitive Species					
Allen's big-eared bat (*Idionycteris phyllotis*)	M		•		•
Fringed myotis (*Myotis thysanodes*)	M		•		•
Long-legged myotis (*Myotis volans)*	M		•		•
Townsend's big-eared bat (*Corynorhinus townsendii*)	M	•		•	
Yuma Myotis *(Myotis yumanensis*)	M	•		•	
Gila Monster (*Heloderma suspectum cinctum)*	A/R		•		•
Oasis Valley springsnail (*Pyrgulopsis micrococcus*)	MO		•		•
Spring Mountains pyrg (*Pyrgulopsis deaconi*)	MO				•
Redheaded sphecid wasp (*Eucerceris ruficeps*)	I		•		•
Death Valley beardtongue (*Penstemon fruticiformis ssp. amargosae*)	P		•		•
Desert bearpoppy (*Arctomecon merriamii*)	P		•		•
Half-ring milkvetch/ Mojave milkvetch (*Astragalus mohavensis* var. *hemygurus)*	P				•
Pinto beardtongue (*Penstemon bicolor spp.*)	P	•	•	•	•

Resource	TYPE	FEIS		UPDATE	
		In Corridor	Within 5 km	In Corridor	Within 5 km
Pahrump Valley buckwheat (*Eriogonum bifurcatum*)	P		•		•
Rusby's globemallow (*Sphaeralcea rusbyi* Gray)	P		•		•
Sheep Fleabane (*Erigeron ovinus*)	P		•		•
Spring Mountain milketch (*Astragalus remotus*)	P		•		•
White-Margined beardtongue (*Penstemon albomarginatus*)	P	•		•	
Wolly sage (*Salvia funerea*)	P	•		•	
Game Habitat					
Bighorn Sheep *(Ovis canadensis)*	M	•		•	
Mule deer *(Odocoileus hemionus)*	M	•		•	
Chukar *(Alectoris chukar)*	B	•		•	
Quail *(Callipepla gambelii)*	B	•		•	
Wild Horse and Burro Herd Management Areas					
Ash Meadows					•
Johnnie		•		•	
Wheeler Pass		•		•	
Red Rock		•		•	

Species Type Key *M = Mammal* *MO = Mollusk* *B = Bird* *I = Insect* *A/R = Amphibian or Reptile* *P = Plant* *F = Fish*

Data collected from NNHP (2005), BLM (2006a,b), and URS (2006).

DOE evaluated surface-water resources, which include springs, streams, riparian areas, and reservoirs for all options. No springs, perennial streams, or riparian areas occur within the Jean Corridor. These remain unchanged since the publication of the FEIS. Eleven springs or groups of springs are outside the corridor, but are within 5 kilometers (3 miles) of the corridor.

There are no other known changes to the existence of game habitat, sensitive species, or springs in or within 5 kilometers (3 miles) of the Jean rail corridor in comparison to information in the FEIS. The Ash Meadows National Wildlife Refuge is 9 kilometers (about 6 miles) outside the Jean rail corridor.

Soils

The FEIS classified soils in the rail corridor locations with four attributes—shrink swell, erodes easily, unstable fill, and blowing soil. As noted in the FEIS, the shrink swell and blowing soils attributes are common in the Jean rail corridor, although a portion of the corridor would pass through areas that consist of soils with erodes easily and unstable fill attributes. The FEIS also reported that there were no soils classified as prime farmlands within the Jean corridor. No significant new information was identified on the attributes of the soils surveyed in the Jean rail corridor.

The FEIS reported the construction of the Jean corridor would temporarily disturb soils in and adjacent to 9.3 square kilometers (2,300 acres) of land. Disturbance of erodible soils could lead to increased silt loads in water courses or increased soil transport by wind. Erosion control during construction, and revegetation or other means of soil stabilization after construction, would minimize these concerns. The soils within the Jean corridor and the potential impacts to these soils remain unchanged since FEIS issuance.

3.2.2.5 Cultural Resources

The effects of rail line construction and operations in the Jean rail corridor on cultural resources would be essentially the same as those DOE reported in the FEIS.

Cultural resources include any prehistoric or historic archaeological sites, buildings, structures, landscapes, or objects resulting from or modified by human activity and include mining, ranching, and linear features such as roads and trails. Cultural resources designated as historic properties warrant consideration with regard to potential adverse impacts resulting from proposed Federal actions.

For this update, DOE conducted an archaeological site file search using records from the Desert Research Institute, the Nevada Cultural Resources Information System, and archaeological information repositories at the Harry Reid Center at the University of Nevada-Las Vegas, and the Nevada State Museum in Carson City.

The records search revealed the presence of 45 known archaeological sites within the 400 meters (0.25 mile) width of the Jean rail corridor. The difference between the 6 sites reported in the FEIS and the 45 identified in the new survey reflects the addition of sites recorded in the past decade, particularly in the vicinity of Yucca Mountain, where cultural resources inventories have been ongoing. Of the 45 known sites, 11 are eligible or potentially eligible for inclusion on the *National Register of Historic Places*.

The types of sites found in the new survey records are the same as those reported in the FEIS. The total amount of archaeological inventories conducted is approximately less than 1 percent of the total area for the Jean rail corridor. Prior to construction of a rail line, field surveys and potentially mitigation of cultural resources would be required.

3.2.2.6 Occupational and Public Health and Safety

Industrial Safety

The categories of worker impacts include total recordable incidents, lost workdays, and fatalities. Recordable incidents or cases are 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) incidents that result in the transfer of a worker to another job, termination of employment, medical treatment, loss of consciousness, or restriction of motion during work activities.

Revised estimates of the number of workers needed to construct the rail line resulted in 4,100 worker-years in comparison to the 855 worker-years estimated in the FEIS (2,000 hours per worker-year). Estimates of industrial safety impacts incorporate updated Bureau of Labor Statistics data for 2005 (BLS 2007a,b). The FEIS used 1998 data from the same source. Industrial safety impacts from operations in the Jean rail corridor would be lower than those in the FEIS because of differences in the labor statistics used. Operation of the railroad would require about 32 workers each year. Table 3-11 lists estimated industrial safety impacts reported in the FEIS as well as the updated information.

Table 3-11. Impacts to workers from industrial hazards during rail line construction and operations for the Jean rail corridor.[a]

Group and industrial hazard category	Construction		Operations		Total FEIS	Total Update
	FEIS[b]	Update[c]	FEIS[d]	Update[e]		
Involved worker						
Total recordable cases[f]	67	180	73	37	140	217
Lost workday cases	33	100	40	28	73	128
Fatalities	0.09	0.36	0.20	0.26	0.29	0.62
Noninvolved worker						
Total recordable cases	4.0	19	4.1	8.9	8.1	27.9
Lost workday cases	1.5	10	1.5	4.8	3.0	14.8
Fatalities	0.004	0.03	0.004	0.01	.008	.04
Totals[e]						
Total recordable cases	71	200	77	46	148	246
Lost workday cases	35	110	41	33	76	143
Fatalities	0.10	0.6	0.20	0.3	0.3	0.9

a. Estimates of worker-years multiplied by accident rate ((BLS 2007a,b)
b. Estimated workforce to construct the rail line would be 855 worker-years.
c. Estimated workforce to construct the rail line would be 4,100 worker-years.
d. Totals for 24 years for operations.
e. Totals for 33 years of operations within a 50-year period.
f. Total recordable cases include injuries, illnesses, and fatalities.

Transportation

Since DOE completed the FEIS, there have been updates to the methods and data to estimate the radiation doses for workers and members of the public. The impacts for the Jean rail corridor reflects new information resulting from these changes (MTS 2007).

Updates for transportation estimated impacts during construction from the transportation of construction materials to the construction sites and impacts from commuting workers. Operation of the railroad would result in incident-free radiological impacts, risks from radiological accidents, impacts from vehicle emissions from waste transportation and commuting workers, and traffic fatalities associated with waste transport and commuting workers.

The FEIS evaluated traffic fatality and vehicle emission impacts from the movement of equipment and delivery of materials for construction, worker commutes to and from construction sites, and transport of water to construction sites. Table 3-12 lists the impacts of transportation during the construction period. Due to the increased number of construction workers from the estimate in the FEIS, estimated traffic fatalities would increase from 0.7 to 2.5, and fatalities from exposure to vehicle emissions would increase from 0.09 to 0.3. Total transportation impacts from construction would be about 2.8 fatalities.

Table 3-12. Transportation impacts during rail line construction for the Jean rail corridor.

Transportation impact category	Traffic fatalities		Number of cancers		Total FEIS	Total Update
	FEIS	Update	FEIS	Update		
Vehicle emission impacts (cancer fatalities)						
Material delivery vehicles	–	–	0.02	0.02	0.02	0.02
Worker commuting	–	–	0.07	0.3	0.07	0.3
Transportation accidents (fatalities)						
Material delivery vehicles	0.2	0.2	–	–	0.2	0.2
Worker commuting	0.5	2.3	–	–	0.5	2.3
Total construction impacts of transportation[a]	0.7	2.5	0.09	0.3	0.79	2.8
a. Totals might differ from sums of values due to rounding.						

The transportation of spent nuclear fuel and high-level radioactive waste in the Jean rail corridor would result in radiological and nonradiological impacts to workers and the public. Radiological impacts would result from radiation that the rail casks emitted during incident-free transportation, from radionuclides released from the rail cask during transportation accidents, or from radiation that the rail cask emitted because of a loss of shielding during a transportation accident. Nonradiological impacts (vehicle emission-related fatalities) would result from diesel locomotives and fugitive dust. Nonradiological impacts would also result from traffic accidents that involved workers and members of the public.

Table 3-13 lists the impacts of using the Jean rail corridor to ship spent nuclear fuel and high-level radioactive waste calculated using updated methods and data. The impacts presented reflect those from the mainline to the repository. This is in contrast to the FEIS, where the Nevada impacts started where the mainline intersects the Nevada border.

Table 3-13. Operations impacts of transportation for the Jean rail corridor.

Transportation impact category	Traffic fatalities		Number of cancers	
	FEIS	Update	FEIS	Update
Incident-free radiological impacts (LCFs)[a]				
Public (LCFs)	–	–	0.00085	0.00019
Workers (LCFs)	–	–	0.22	0.21
Radiological accident risks (LCFs)	-	-	0.000000015	0.0000018
Vehicle emission impacts (cancer fatalities)				
Waste transportation	–	–	0.00032	0.00083
Worker commuting	–	–	0.07	0.3

Transportation accidents (fatalities)				
Waste transportation	0.019	0.11	–	–
Worker commuting	0.5	2.0	–	–
Total operations impacts[b]	0.52	2.1	0.3	0.5

a. LCF = latent cancer fatality.
b. Totals might differ from sums of values due to rounding.

For members of the public, estimated radiological impacts from incident-free (routine) transportation decreased from those in the FEIS, from 0.00085 to 0.00019 latent cancer fatality. This would be due primarily to the change in analysis for the Nevada rail line to model dedicated trains for shipments to the repository, (Golan 2005) which would be partially offset by the increase in the latent cancer fatality conversion factor.

For workers, estimated radiological impacts from incident-free transportation would decrease from 0.22 to 0.21 latent cancer fatality. The decrease would be due primarily to the decrease in the exposure time at the staging yard, which would partially offset by the increase in the latent cancer fatality conversion factor, the use of escorts in all areas, and the estimation of impacts for non involved workers at the staging yard.

Estimated radiological accident risks increased from 0.000000015 to 0.0000018 latent cancer fatality. This would be due primarily to the use of the combined Track Class 3 transportation accident rate (Bendixen and Facanha 2007) based on train kilometers and railcar kilometers and the increase in the latent cancer fatality conversion factor, and the increase in the population along the Jean rail corridor. Although this is an increase, radiological accident risk would still be a negligible contributor to the overall transportation risk.

Estimated impacts from waste transportation vehicle emissions would increase from 0.00032 to 0.00083 fatality. This would be due primarily to the increase in populations along the Jean rail corridor. Vehicle emission impacts from commuting workers would increase from those reported in the FEIS because of the longer operations phase.

Estimated impacts from nonradiological transportation accidents would increase from 0.019 to 0.11 fatality. This is the most notable change to accident risk and would be due primarily to the use of the updated rail fatality rate (DOT 2005) and from accounting for the presence of locomotives and buffer cars in the estimation of the number of nonradiological transportation accident fatalities. Traffic fatalities associated with commuting workers would also increase due to the increase in the numbers or workers.

Overall, the estimated total number of transportation-related fatalities from operation of a rail line in the Jean rail corridor has increased from 0.82 fatality reported in the FEIS to 2.6 fatalities in the current assessment. This change is due primarily to the increase in the number of fatalities from traffic accidents.

3.2.2.7 Socioeconomics

In the FEIS, DOE used construction costs, workforce estimates, and state and regional economic data to identify potential direct and indirect changes in state and regional economic activity. The Department noted that construction activities would cause short-term, temporary increases in employment and population.

Revised estimates of the number of workers needed to construct the rail line in the Jean corridor resulted in 4,100 worker-years in comparison to the 855 worker-years estimated in the FEIS. Operation of the railroad would require about 32 workers each year in comparison to the 36 workers estimated in the FEIS.

Clark County, which includes Las Vegas, dominates the region of influence with a 2006 estimated population of 1.89 million, which is approximately 7 percent more than the population that DOE reported in the FEIS. Population growth in the unincorporated town of Pahrump dominates Nye County's growing popularity as a residential destination. Since DOE completed the FEIS, Pahrump, the largest population center in Nye County, has experienced double-digit growth. The estimated population of Pahrump increased from 23,000 persons in July 1999 to 33,000 persons by July 2005, an increase of about 45 percent. In the same period, the State Demographer estimates that Nye County as a whole grew from about 31,000 persons to about 41,000 persons.

Because the construction workforce is expected to come largely from Clark County and the Carson City area, any changes to the regional employment and population baselines would be small. Changes in employment and population in Nye County, including the communities within that county, is unlikely because workers would live near the rail line and would be unlikely to return to Nye County as permanent residents once construction ends. Current population growth in these counties would mask socioeconomic impacts due to the short-term growth in the workforce or the associated impact on population growth.

3.2.2.8 Noise and Vibration

The FEIS analysis for noise considered typical day-night sound levels, the distance of the rail line from communities along the rail line, and estimated the impacts from the construction and operation of a railroad to these communities. The FEIS analysis for vibration considered typical background level of ground vibration, the number of trains, and the distance of the rail line from to historic structures or sites of cultural significance, and estimated the impacts from the operation of a railroad. There are no significant new circumstances or information that would cause the affected environment or the estimated impacts from noise or vibration to change from what was reported in the FEIS.

3.2.2.9 Aesthetics

Based on a corridor-level analysis and an evaluation of current BLM Resource Management Plans, there have been no changes to Visual Resource Management classifications for the Jean Corridor since the publication of the FEIS. As discussed in the FEIS, the Wilson Pass Option of the Jean rail corridor would pass through Visual Resource Management Class II areas. The BLM's established objective for Class II areas, in order to retain the existing character of the landscape, is that the level of change to the characteristic landscape should be low.

3.2.2.10 Utilities, Energy, and Materials

The FEIS evaluated utilities, energy, and materials impacts common to all corridors and noted that these impacts would include use of motor fuel, steel, and concrete. The estimated impacts from these resources associated with the construction and operation of a railroad in Nevada would be similar to those in the FEIS.

The Jean rail corridor would pass through rural parts of Clark and Nye Counties in Nevada, and one of the options would cross a portion of rural San Bernardino County in California, that have little access to support services for much of the corridor. Electric power for construction would be initially supplied by portable generators. New power lines would be installed to provide power for construction services and would be extended, via underground distribution along the rail roadbed to meet all other construction and operational needs. Construction equipment would consume motor fuel (diesel and gasoline). The total motor fuel use in Nevada in 2005 was about 5.8 billion liters (1.5 billion gallons) ((FHA 2006, Table MF-21). Highway motor fuel use in the state in 2005 increased 6.2 percent over that in 2004, the largest

percentage increase for any state and attributable to Nevada's growing population. Table 5-11 lists the estimated amounts of diesel fuel and gasoline for rail line construction in the Jean rail corridor, which are higher than the estimates in the FEIS. Based on a construction period of 43 months, the annual average use of motor fuel would be about 0.42 percent of that consumed annually in Nevada. Unlike overall state use, construction activities would use primarily diesel fuel, which would be about 1.6 percent of all special fuel (mainly diesel) used annually in Nevada.

Steel for rails, concrete (principally for rail ties, bridges, and drainage structures), and rock for ballast would be the primary materials that the construction of a rail line would consume. Table 3-14 lists estimates of steel and concrete consumption, which have increased over those reported in the FEIS.

Table 3-14. Construction energy and materials impacts for the Jean rail corridor.[a]

Length (kilometers)[b,c]	Diesel fuel use (million liters)[d]		Gasoline use (million liters)		Steel (thousand metric tons)[e]		Concrete (thousand metric tons)	
	FEIS	Update	FEIS	Update	FEIS	Update	FEIS	Update
180	26	86	0.5	1.6	26	30	150	120

a. Update Source: Nevada Rail Partners 2007a.
b. Corridor length used for comparative evaluation.
c. To convert kilometers to miles, multiply by 0.623.
d. To convert liters to gallons, multiply by 0.264.
e. To convert metric tons to tons, multiply by 1.102.

The estimated impacts to utilities, energy, and materials from the operation of a railroad in Nevada would be similar to those in the FEIS. The use of motor fuel by locomotives would increase over that in the FEIS due to more weekly train trips, but the overall use would still be small.

3.2.2.11 Waste Management

The FEIS evaluated common waste management impacts for all corridors rather than for individual corridors. Information to allow differentiation between corridor waste management impacts is now much more readily available. Therefore, this information has been included at a level of analysis that was similar to the FEIS.

Waste generation and management impacts common to all corridors would result from construction and operation a railroad in the Jean rail corridor. There would be relatively minor quantities of construction debris and sanitary waste.

The FEIS estimated the peak annual generation of sanitary solid waste would be 910 metric tons (1,000 tons). DOE now estimates that solid municipal waste from construction facilities would be 500 metric tons (550 tons) during the peak year of construction. An assumed 25 percent of the waste would be recyclable, which would result in about 380 metric tons (410 tons) of waste to be disposed of at municipal landfills. The estimated total mass of waste that would be generated during construction of the rail line is about 1,200 metric tons (1,300 tons). This mass of sanitary solid waste would occupy about 2,900 cubic meters (3,800 cubic yards) of landfill volume at a waste density of 410 kilograms per cubic meter (700 pounds per cubic yard) (Brady et al. 1998). Heavier equipment used at large facilities such as the Apex Landfill in Clark County would result in greater waste compaction and less waste volume. The estimated average daily disposal mass would be about 1 metric ton (1.1 tons) per day.

A rail line in the Jean rail corridor would represent an increase in waste volume requiring processing for rural counties. Nye County disposed of about 250 metric tons (280 tons) of waste during 2003 at three different landfills (NDEP 2007a), but the county plans to close two of these landfills by 2011, which

represent 96 percent of the county's current waste disposal capacity. The Apex Landfill in Clark County serves the Las Vegas Valley and receives 8,000 metric tons (8,800 tons) each day (State of Nevada 2004, pp. 6 and 7). The estimated closure for this landfill is in 2047. Waste generated during construction could be trucked to the larger landfill with negligible impact on waste disposal capacity.

Operations would generate waste during periodic maintenance activities. Locomotive and railcar maintenance could generate used oil and solvents that DOE would recycle or dispose of as regulated waste.

3.2.2.12 Environmental Justice

The FEIS environmental justice analysis considered the potential for disproportionately high and adverse impacts on two segments of the overall population—minority communities and low-income communities. In the FEIS, DOE employed a criterion for identifying minority and low-income communities by applying a 10-percent threshold, meaning that the environmental analyses for environmental justice purposes focused on Census blocks and Census block groups having minority or low-income populations at least 10-percent higher than state averages.

For this update, DOE adopted new criteria based upon revised NRC guidance. The new criteria are Census blocks having a 50 percent or higher minority population (e.g., 10 percent higher than the State average), and Census block groups having a 30.5 percent low income population (e.g., 20 percent higher than the State average).

Updates for the 2000 U.S. Census Bureau block group data used in the FEIS to examine the location and concentration of low income populations were not available at the time of publication of the FEIS. Instead, the FEIS used 1990 U S Census Bureau block group data to identify low income populations. For this update, DOE used the more current 2000 U S Census Bureau block group data to identify both low income and minority populations. The next set of comprehensive Census Bureau data will not be released until the 2010 Census, thus, the 2000 data is still considered the most current data set. The region of influence identified in the FEIS for the Jean rail corridor has remained the same. Furthermore, county level U.S. Census Bureau data estimates for 2006 suggest that while the population in southern Nevada is growing rapidly, the location of concentrations of minority and low income populations have remained relatively constant and static since 2000.

DOE concluded in the FEIS that there would not be any high and adverse impacts from transportation of spent nuclear fuel and high-level radioactive waste in Nevada on any populations, and that disproportionately high and adverse effects would be unlikely for any specific segment of the population, including minorities and low-income communities. DOE further concluded that there were no special pathways (unique practices and activities creating opportunities for increased impacts) that could not be mitigated. Therefore, the FEIS concluded that there were no environmental justice impacts associated with any proposed rail corridor.

Since the publication of the FEIS, DOE has not identified any new large and adverse impacts to any population. DOE has also not identified any new minority or low income populations in the Jean rail corridor region of influence, and has not identified any special pathways that could increase impacts to these populations. Therefore, DOE maintains that there would be no environmental justice impacts associated with the Jean rail corridor.

3.2.3 VALLEY MODIFIED CORRIDOR

Table 3-15 summarizes the results of the update to the primary impact indicators for the Valley Modified corridor and compares them with the corridor information published in the FEIS. The information reflects the total for the construction and operation of the rail corridor unless otherwise noted.

Table 3-15. Updated environmental information for the Valley Modified rail corridor.

Resource	Changes from the FEIS to this analysis
Corridor length	No change
Land ownership (in square kilometers)[a]	
BLM-administered land	Changed from 29.9 – 36.7 (~53%) to 31 to 36 (51 - 53.7%)
Private land	Changed from 0 - 0.18 (~0.3%) to 0.2 - 0.44 (0.3 to 0.6%)
Department of Defense-managed land	Changed from 3.6 – 7.5 (~11%) to 4.3 - 9.4 (7.5 to 13.3%)
Department of Energy-managed land	No change
US FWS-administered land	Changed from 1.7 – 4.1 (~3%) to 1.7 to 4.1 (3 to 5.8%)
Air quality	
Attainment Status	No change
Hydrology	
Surface water	No change
Groundwater use (construction) (cubic meters)[b]	Changed from 395,000 to 3.5 million
Biological resources and soils	Additional records of sensitive species
Cultural resources (records search)	Change in the number of recorded sites from 19 to 45
Occupational and Public Health and Safety	
Industrial hazards (Construction and Operations)	
Total recordable cases	Changed from 111 to 176
Lost workday cases	Changed from 57 to 103
Fatalities	Changed from 0.25 to 0.5
Transportation hazards (Construction Only)	
Traffic Fatalities	Changed from 0.4 to 1.5
Cancer Fatalaties	Changed from 0.05 to 0.2
Incident-free radiological impacts (latent cancer fatalities) (Operations Only)	
Public	Changed from 0.00065 to 0.00014
Workers	Changed from 0.22 to 0.21
Radiological transportation accident fatalities	
Radiological accident risk (latent cancer fatalities)	Changed from 0.0000000029 to 0.0000013
Cancer fatalities from vehicle emissions	Changed from 0.07 to 0.2
Nonradiological transportation accident fatalities	
Spent nuclear fuel and high-level radioactive waste transportation	Increase from 0.016 to 0.095
Construction and operations workforce	Increase from 0.5 to 1.3
Socioeconomics	
Estimated construction workforce	Changed from 405 workers per year to 2,500 workers per year
Estimated operations workforce	Change from 36 workers per year to 32 workers per year
Noise and Vibration	No changes
Aesthetics	No changes

Resource	Changes from the FEIS to this analysis
Utilities, energy, and materials	
Diesel (million liters)[c]	Changed from 13 to 49
Gasoline (million liters)	Changed from 0.27 to 1.0
Steel (thousand metric tons)[d]	Changed from 22 to 26
Concrete (thousand metric tons)	Changed from 130 to 100
Waste Management	
Sanitary Solid Waste	Changed to 0.6 metric tons (0.7 tons) per day.
Environmental justice (disproportionately high and adverse impacts)	No changes

a. To convert square kilometers to acres, multiply by 247.10.
b. To convert cubic meters to acre-feet, multiply by 0.0008107.
c. To convert liters to gallons, multiply by 0.26418.
d. To convert metric tons to tons, multiply by 1.1023.

The Valley Modified rail corridor would originate near the existing Apex rail siding off the Union Pacific Railroad Mainline. It would travel northwest and pass north of the City of North Las Vegas, and Las Vegas and near the Town of Indian Springs and parallel to U.S. Highway 95 before it entered the southwest corner of the Nevada Test Site and reached Yucca Mountain (see Figure 3-9).

Valley Modified rail corridor options would range from 157 to 163 kilometers (98 to 101 miles) long. Figure 3-13 shows the corridor and its options. The corridor has two possible starting locations and two possible options until they merge north of the City of Las Vegas in the Apex area. The Valley Modified rail corridor has three options – Valley Connection, Sheep Mountain, and Indian Hills. The FEIS contains detailed descriptions of the corridor and its options.

3.2.3.1 Land Use and Ownership

Much has changed in relation to the land-use and ownership in the Valley Modified rail corridor since DOE issued the FEIS. The change in the estimates of the amount of BLM-administered land and private property within this corridor are in part the result of using more accurate databases of land ownership for this update. Notable changes include land use conflicts with Creech Air Force Base and Apex Industrial Park. In addition, Congress has since released the Quail Springs and Nellis A, B, and C Wilderness Study Areas from Wilderness Study Area status, which expanded the land disposal boundary for the Las Vegas area. Current land use and ownership for the Valley Modified Corridor is depicted in Figure 3-9.

The FEIS reported that the BLM administered approximately 53 percent (29.9 to 36.7 square kilometers) of the land in the corridor, the Department of Defense managed 11 percent (3.6 to 7.5 square kilometers), DOE managed 32 percent (20.6 square kilometers), the Fish and Wildlife Service controlled 3 percent (1.7 to 4.1 square kilometers), and less than 1 percent was private land.

Current land holdings for the Valley Modified Corridor are as follows, the BLM administers about 51 to 53.7 percent (31 to 36 square kilometers), the Department of Defense manages 7.5 to 13.3 percent (4.3 to 9.4 square kilometers), DOE manages 32 percent (unchanged), the Fish and Wildlife Service controls about 3 percent (unchanged), and less than 1 percent is private land (unchanged).

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 (GlobalSecurity.org 2005). The base is home to two key military operations: the MQ-1 Predator unmanned aerial vehicle and the Unmanned Aerial Vehicle Battle laboratory. The FEIS reported the Valley Modified rail corridor would pass through this

area, which at the time was predominantly vacant land under Air Force management. At present, the corridor would cross infrastructure the Air Force constructed to support the mission of Creech Air Force Base. The Indian Hills option would bypass this land-use conflict.

The Apex Industrial Park is an 85-square-kilometer (21,000-acre) area privately held by the VesCor real estate development company. It is approximately 21 kilometers (13 miles) northeast of downtown Las Vegas and about 6 kilometers (4 miles) from the Las Vegas metropolitan area. It is one of the few large contiguous industrial properties in Southern Nevada. Since DOE issued the FEIS, this industrial park has gone beyond a proposed activity to one in which 24 square kilometers (6,000 acres) is available for immediate sale and development, with nearly half already sold (VesCor 2005). The Valley Modified rail corridor would cross approximately 0.5 square kilometers (110 acres) of the Apex Industrial Park.

The BLM is currently preparing an EIS and initiating public scoping for UNEV, LLC's proposal to construct and operate a liquid petroleum products pipeline from Woods Cross, UT to the Apex Industrial Park. The terminus of the pipeline would include a tank farm for product and a load out facility. This proposed activity is outside of the Valley Modified Corridor, approximately 13 kilometers (8 miles) north (72 FR 44851, August 9, 2007).

The FEIS reported the corridor would cross the Quail Springs and Nellis A, B, and C Wilderness Study Areas, and one area designated as available for sale or transfer. In particular, the Indian Hills option would cross Fish and Wildlife Service lands, would pass almost entirely within a BLM utility corridor, and would cross a BLM Withdrawal Area for a power project. The Sheep Mountain option would pass through Quail Springs and Nellis A, B, and C Wilderness Study Areas, and the Nellis Small Arms Range. Of these land uses, the only changes have been to Quail Springs and Nellis A, B, and C. The Clark County Conservation of Public Land and Natural Resources Act (Public Law 107-282, 116 Stat. 1994) released these areas from the designation of Wilderness Study Areas in 2002 thus expanding the land disposal boundary for the Las Vegas area. The land formerly containing the Quail Springs WSA was sold to Clark County in 2002. The land formerly containing Nellis A, B, and C WSA's have not yet been sold. These areas are under consideration for conservation areas to protect rare plant species, and will undergo NEPA analysis before the BLM offers these for sale or transfer.

The FEIS reported the Sheep Mountain option would pass through the Desert National Wildlife Refuge. Upon further evaluation, the Sheep Mountain and Valley Connection options, and a portion of the common corridor segment just north of these options would pass through the Desert National Wildlife Refuge. The Desert National Wildlife Refuge established in 1936 includes a 610-square-kilometer (1.5-million-acre) area to protect the desert bighorn sheep and its habitat. In 1979, approximately 580 square kilometers (1.4 million acres) of this land were found to be suitable for further consideration as wilderness and were proposed for designation as a unit of the National Wilderness Preservation System. This means the area remains in proposed wilderness status and is managed as wilderness in accordance with National Wildlife Refuge System policy; public use is limited to wildlife observation, primitive camping, and picnicing. This current land status would present a land conflict. According to the Fish and Wildlife Service, the Comprehensive Conservation Plan Environmental Impact Statement process, currently underway, is evaluating the wilderness status of this area (FWS 2007b).

The FEIS reported the corridor would cross three BLM grazing allotments (Wheeler Slope, Indian Springs, and Las Vegas Valley). The BLM has since updated their grazing allotment information. The Valley Modified corridor now crosses the Mount Sterling, Indian Springs, Wheeler Wash (formerly Wheeler Slope), Lucky Stripe, and the Las Vegas Valley grazing allotments, depending on the option (BLM 2005) (Figure 3-12).

DOE evaluated information in the Mineral Resources Data System (USGS 2005) and the Abandoned Mine database (NBMG 2001) to determine if the addition of active or abandoned mines has occurred since DOE issued the FEIS. There are no known active or abandoned mines in the Valley Modified rail corridor or its options and, therefore, no change since the FEIS.

The FEIS reported that the Valley Modified rail corridor would cross linear land features such as rights-of-way for utilities, and roads. A review of BLM records, including Master Title Plats, indicated the authorization of additional rights-of-way since DOE completed the FEIS (BLM 2007c).

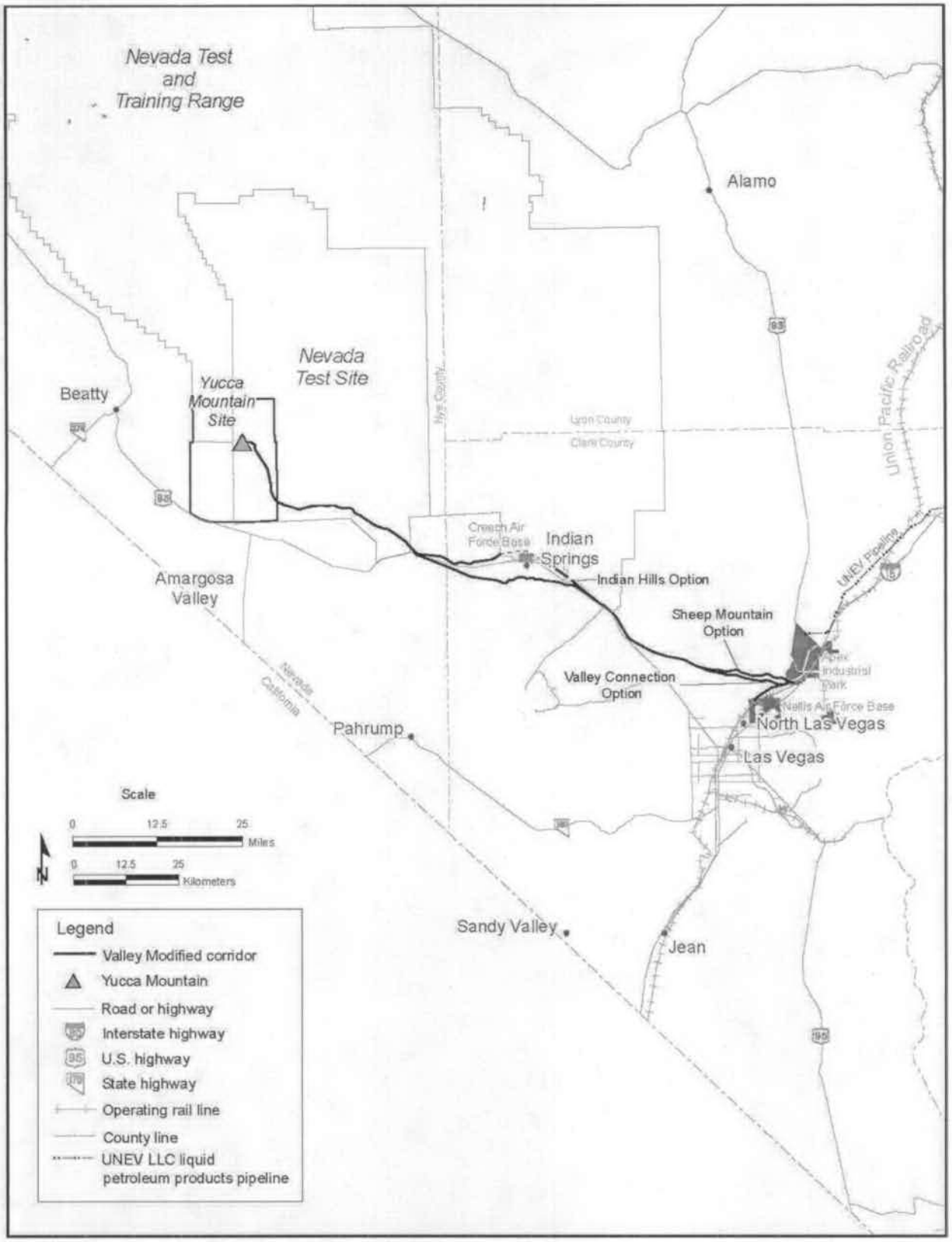

Figure 3-13. Valley Modified Corridor and options.

3.2.3.2 Air Quality

The FEIS evaluated air quality impacts common to all proposed corridors and noted these would include temporary increases in criteria pollutant concentrations from construction of the rail line. Fuel use by construction equipment would emit carbon monoxide, nitrogen dioxide, sulfur dioxide, and particulate matter with diameters of 10 micrometers or less (PM_{10}) and 2.5 micrometers or less ($PM_{2.5}$) Construction activities would also emit PM_{10} in the form of fugitive dust from excavation, truck traffic, and operation of concrete batch plants (NRP 2007a). The emissions would be temporary and would cover a sizeable area as construction progressed along the length of the corridor.

The Valley Modified rail corridor would pass north of the metropolitan Las Vegas area and on through rural parts of Clark and Nye Counties. A portion of the corridor would be in the Las Vegas Valley in Clark County. When DOE prepared the FEIS, the Las Vegas Valley was in nonattainment for the criteria pollutants, carbon monoxide and PM_{10}. Areas in violation of one or more of the criteria pollutant standards are classified as nonattainment areas. The Las Vegas Valley remains officially in nonattainment for these two criteria pollutants (EPA 2007a), although progress has been made since 2000; the Valley is attaining the carbon monoxide National Ambient Air Quality Standard (70 *FR* 31353), and the U.S. EPA approved implementation plans for PM_{10} in 2004 (69 *FR* 32277).

During preparation of the FEIS, DOE conducted an air quality conformity review for areas of the Valley Modified rail corridor in the Las Vegas Valley (Jason Technologies 2001). This review determined that construction activities in the Las Vegas Valley would be likely to exceed the General Conformity threshold level for PM_{10}. Reviews of updated and more detailed information and methods (NRP 2006, 2007a) considered rail line construction and additional contributions from construction of access roads, unpaved roads, storage piles, batch plant, coarse stockpiles, and a quarry. The reviews indicated potential construction fugitive dust and PM_{10} emissions would increase above those originally estimated for the FEIS. Before any construction activities in the Valley Modified rail corridor, DOE would need to perform more detailed air quality calculations to evaluate the impacts of construction activities.

Air quality impacts common to all corridors during railroad operations would result from diesel locomotives, which would emit carbon monoxide, nitrogen dioxide, sulfur dioxide, PM_{10} and $PM_{2.5}$. The number of locomotive engines in use and the associated operational characteristics would not differ appreciably from those in the FEIS.

3.2.3.3 Hydrology

This section describes surface-water and groundwater resources and impacts to those resources. The FEIS analyzed surface water resources within the 400-meter (0.25-mile)-wide corridor and within 1 kilometer (0.6 mile) along each side of the corridor. For this update, the region of influence for hydrology is the same as for the FEIS.

Surface Water

The corridor and its options would cross only two mapped, 100-year flood zones or flood zone groups (DOE 2002, Table 6-74). These remain unchanged since DOE published the FEIS. Impacts to surface-water resources from the rail line construction in the Valley Modified rail corridor would be the same as those reported in the FEIS for all three options. Although unlikely, the spread of construction-related materials by precipitation or intermittent runoff events could occur during the construction of the rail line.

Groundwater

In the FEIS, the Department used terrain types to estimate total water demand. Since publication of the FEIS, DOE has canvassed similar projects throughout Nevada and determined that the amount and type of

earthwork, not the terrain, would more accurately estimate total water demand associated with the construction of a rail line. Therefore, DOE updated the water demand based on earthwork needs. This resulted in an estimated water demand for the Valley Modified rail corridor of approximately 3.4 million cubic meters (2,800 acre-feet) (NRP 2007a) compared to the estimate based on terrain types reported in the FEIS of 400,000 cubic meters (320 acre-feet) (DOE 2002). To accommodate this increase in estimated water demand, DOE would need to draw more water than originally estimated in the FEIS from the underlying hydrographic basins and pump from additional wells. Groundwater withdrawal could temporarily affect discharge from nearby wells or springs. DOE would conduct detailed analyses if new wells required for construction of the rail line were to be located near other water sources.

Water use during construction would come primarily from groundwater resources, specifically, hydrographic basins. If the hydrographic basin is designated, permitted groundwater rights approach or exceed the estimated perennial yield, water resources are being depleted or require additional administration, and the Nevada State Engineer has declared preferred uses of the water. Table 3-16 updates the designation status of the hydrographic basins and the percentage of the Valley Modified rail corridor that is in the respective basin. The total percentage of the Valley Modified rail corridor in designated basins is about 54 percent (NRP 2007a). The FEIS estimated that about 70 percent of the length of the Valley Modified corridor would be in designated basins (DOE 2002).

Table 3-16. Hydrographic basins associated with the Valley Modified rail corridor.[a]

Hydrographic basin (and subbasin where applicable)	Length (km)[b]	Percentage of total[c]	Designated
Fortymile Canyon/Jackass Flats	17	11	No
Indian Springs Valley	29	18	Yes
Las Vegas Valley	56	36	Yes
Mercury Valley	19	12	No
Rock Valley	18	12	No
Three Lakes Valley	19	12	No

a. To calculate water demand for each basin, multiply the total water demand for a given corridor by the percentage of total.
b. km = kilometer; to convert kilometers to miles, multiply by 0.62137.
c. Based on primary option in FEIS.

Operations along the completed rail line would have little impact on groundwater resources. Possible changes in recharge, if any, would be the same as those at the completion of construction.

3.2.3.4 Biological Resources and Soils

Potential impacts to biological resources and soils from the construction and operation of a railroad in the Carlin corridor would be consistent with those reported in the FEIS. Maximum land disturbance for the construction of a rail line in the Valley Modified rail corridor would not differ from the estimates in the FEIS.

Consistent with the FEIS, this update considered the potential for impacts to vegetation communities; special status species (plants and animals), including their habitat; springs, wetlands, and riparian areas; big game habitat; and wild horse and burro herd management areas that may occur within the 400-meter (0.25-mile)-wide corridor. The analysis considered special status species and big game habitat within a 5-kilometer (3 mile)-wide area along each side of the corridor that may be affected by construction of the rail line. DOE also analyzed springs and riparian areas that could be affected by permanent changes in surface-water flows.

Biological Resources

The Valley Modified rail corridor is in the Mojave Desert; the predominant land-cover types are creosote-bursage and Mojave mixed scrub.

Table 3-17 presents the special status species, big game habitat, and herd management areas identified in the FEIS and identifies additional information resulting from this update. The updated version of the NNHP database examined for this update included observations of six additional sensitive species not included in the FEIS. They include the:

- Southwestern Willow Flycatcher (*Empidonax traillii extimus*),
- Clarke phacelia *(Phacelia filiae),*
- Clokey buckwheat[1] (*Eriogonum heermannii var. clokeyi*),
- Fringed myotis (*Myotis thysanodes*),
- Las Vegas buckwheat (*Eriogonum corymbosum var. nilesii*), and
- Planoconvex Cordmoss (*Entosthodon planoconvexus*)

Table 3-17. Special status species, big game habitat, and herd management areas associated with the Valley Modified rail corridor.

Resource	TYPE	FEIS		UPDATE	
		In Corridor	Within 5 km	In Corridor	Within 5 km
Threatened or Endangered Species (Separated by Type)					
Southwestern Willow Flycatcher (*Empidonax traillii extimus*)	B				•
Desert Tortoise (*Gopherus agasizii*)	A/R	•		•	
Pahrump poolfish (*Empetrichthys latos*[1])	F		•		•
Razorback sucker (*Xyrauchen texanus)*	F		•		•
Sensitive Species					
Fringed myotis (*Myotis thysanodes*)	M				•
Townsend's big-eared bat (*Corynorhinus townsendii*)	M	•		•	
Clarke phacelia *(Phacelia filiae)*	P			•	
Beatley's scorpionweed (*Phacelia beatleyae*)	P		•		•
California bearpoppy (*Arctomecon californica*)	P		•		•
Clokey buckwheat[1] (*Eriogonum heermannii var. clokeyi*)	P				•[1]
Death Valley beardtongue (*Penstemon fruticiformis ssp.*	P		•		•

Resource	TYPE	FEIS		UPDATE	
		In Corridor	Within 5 km	In Corridor	Within 5 km
Desert/White/Merrium bearpoppy (*Arctomecon merriamii*)	P		•	•[1]	•
Half-ring milkvetch/Mojave milkvetch[2] (*Astragalus mohavensis*	P	•		•	•
Largeflower suncup (*Camissonia megalantha*)	P		•		•
Las Vegas buckwheat (*Eriogonum corymbosum var. nilesii*)	P				•
Parish scorpionweed (*Phacelia parishii*)	P	•	•	•	•
Pinto beardtongue (*Penstemon bicolor ssp.*)	P		•	•	•
Planoconvex Cordmoss (*Entosthodon planoconvexus*)	P				•
Ripley's springparsley/Sanicle biscuitroot *(Cymopterus ripleyi var. saniculoides)*	P	•		•	
White-Margined beardtongue (*Penstemon albomarginatus*)	P	•		•	
Game Habitat					
Bighorn Sheep (*Ovis Canadensis*)	M	•		•	
Mule deer (*Odocoileus hemionus*)	M	•		•	
Quail (*Callipepla gambelii)*	B	•		•	
Wild Horse and Burro Herd Manaagement Areas					
Johnnie				•	
Wheeler Pass			•		•

Species Type Key — *M = Mammal*; *B = Bird*; *A/R = Amphibian or Reptile*; *F = Fish*; *MO = Mollusk*; *I = Insect*; *P = Plant*

Data collected from NNHP (2005), BLM (2006a,b), and URS (2006).

[1] Pahrump pool fish have been introduced into ponds in Floyd Lamb State Park and into the outflow of Corn Creek Springs both of which are located outside the region of influence for surface waters.

DOE evaluated surface-water resources, which include springs, streams, riparian areas, and reservoirs for all options. No springs, perennial streams, or riparian areas occur in the Valley Modified Corridor. These remain unchanged since the publication of the FEIS.

There are no other known changes to the information in the FEIS on existence of game habitat, sensitive species, or springs within 5 kilometers (3 miles) of the corridor.

Soils

The FEIS classified soils in the Valley Modified rail corridor with four attributes: shrink swell, erodes easily, unstable fill, and blowing soil. As noted in the FEIS, the shrink swell and blowing soils attributes

are common in the Valley Modified corridor. The FEIS also reported that there were no soils classified as prime farmlands within the Valley Modified corridor. No significant new information was readily available about the attributes of the soils surveyed in the corridor.

According to the FEIS, soils in and adjacent to the Valley Modified corridor would be disturbed on approximately 5 square kilometers (1,200 acres) of land during construction of the rail line. Shrink-swell soils occur along much of the corridor, as does the potential for blowing soils. Disturbance during construction would increase the amount of soil that could be transported by wind because the existing vegetation would be disturbed, at least temporarily. Vegetation or other means of soil stabilization after construction could minimize this. The soils within the Valley Modified corridor and the potential impacts to these soils remain unchanged since FEIS issuance.

3.2.3.5 Cultural Resources

The effects of rail line construction and operations in Valley Modified rail corridor on cultural resources would be essentially the same as those DOE reported in the FEIS.

Cultural resources include any prehistoric or historic archaeological sites, buildings, structures, landscapes, or object resulting from or modified by human activity and include mining, ranching, and linear features such as roads and trails. Cultural resources designated as historic properties warrant consideration with regard to potential adverse impacts resulting from proposed Federal actions. For this update, DOE conducted an archaeological site file search using records from the Desert Research Institute, the Nevada Cultural Resources Information System, and archaeological information repositories at the Harry Reid Center at the University of Nevada-Las Vegas, and the Nevada State Museum in Carson City.

The records search revealed the presence of 45 known archaeological sites within the 400 meters (0.25 mile) width of the Valley Modified rail corridor. The difference between the 19 sites reported in the FEIS and the 45 identified in the new survey reflects the addition of sites recorded in the past decade, particularly in the vicinity of Yucca Mountain, where cultural resources inventories and improvements in cultural resources records have been ongoing. Of the 45 known sites, 12 are eligible or potentially eligible for inclusion on the *National Register of Historic Places*.

The types of sites found in the new survey records are the same as those reported in the FEIS. The total amount of archaeological inventories conducted is approximately less than 1 percent of the total area for the Valley Modified rail corridor. Prior to construction of a rail line, field surveys and potentially mitigation of cultural resources would be required.

3.2.3.6 Occupational and Public Health and Safety

Industrial Safety

The categories of worker impacts include total recordable incidents, lost workdays, and fatalities. Recordable incidents or cases are 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) incidents that result in the transfer of a worker to another job, termination of employment, medical treatment, loss of consciousness, or restriction of motion during work activities.

Revised estimates of the number of workers needed to construct the rail line resulted in 2,500 worker-years in comparison to the 405 worker-years estimated in the FEIS (2,000 hours per worker-year). Estimates of industrial safety impacts incorporate updated Bureau of Labor Statistics data for 2005 (BLS 2007a,b). The FEIS used 1998 data from the same source. Industrial safety impacts from operations in

the Valley Modified rail corridor would be lower than those in the FEIS because of differences in the labor statistics used. Operation of the railroad would require about 45 workers each year. Table 3-18 lists estimated industrial safety impacts reported in the FEIS as well as the updated information.

Table 3-18 Impacts to workers from industrial hazards during rail line construction and operations for the Valley Modified rail corridor.[a]

Group and industrial hazard category	Construction		Operations		Total FEIS	Total Update
	FEIS[b]	Update[c]	FEIS[d]	Update[e]		
Involved worker						
Total recordable cases[f]	32	110	73	37		
Lost workday cases	16	64	40	28		
Fatalities	0.04	0.23	0.20	0.26		
Noninvolved worker						
Total recordable cases	1.9	12	4.1	8.9		
Lost workday cases	0.7	6.3	1.5	4.8		
Fatalities	0.002	0.02	0.004	0.01		
Totals[f]						
Total recordable cases	34	130	77	46	111	176
Lost workday cases	16	70	41	33	57	103
Fatalities	0.05	0.2	0.20	0.3	0.25	0.5

a. Estimates of worker-years multiplied by accident rate (BLS 2007a,b).
b. Estimated workforce to construct the rail line would be 405 worker-years.
c. Estimated workforce to construct the rail line would be 2,500 worker-years.
d. Totals for 24 years for operations.
e. Totals for 33 years of operations within a 50-year period.
f. Total recordable cases include injuries, illnesses, and fatalities.

Transportation

Since DOE completed the FEIS, there have been updates to the methods and data to estimate the radiation doses for workers and members of the public. The impacts for the Valley Modified rail corridor reflects new information resulting from these changes (MTS 2007).

Updates for transportation estimated impacts during construction from the transportation of construction materials to the construction sites and impacts from commuting workers. Operation of the railroad would result in incident-free radiological impacts, risks from radiological accidents, impacts from vehicle emissions from waste transportation and commuting workers, and traffic fatalities associated with waste transport and commuting workers.

The FEIS evaluated traffic fatality and vehicle emission impacts from the movement of equipment and delivery of materials for construction, worker commutes to and from construction sites, and transport of water to construction sites. Table 3-19 lists the impacts of transportation during the construction phase. Due to the increased number of construction workers from the estimate in the FEIS, estimated traffic fatalities would increase from 0.4 to 1.5, and fatalities from exposure to vehicle emissions would increase from 0.05 to 0.2. Total transportation impacts from construction would be about 1.7 fatalities.

Table 3-19. Transportation impacts during rail line construction for the Valley Modified rail corridor.

Transportation impact category	Traffic fatalities		Number of cancers			
	FEIS	Update	FEIS	Update	Total FEIS	Total Update
Vehicle emission impacts (cancer fatalities)						
Material delivery vehicles	–	–	0.02	0.02		
Worker commuting	–	–	0.03	0.2		
Transportation accidents (fatalities)						
Material delivery vehicles	0.1	0.1	–	–		
Worker commuting	0.2	1.4	–	–		
Total construction impacts of transportation[a]	0.4	1.5	0.05	0.2	0.45	1.7
a. Totals might differ from sums of values due to rounding.						

Transportation of spent nuclear fuel and high-level radioactive waste in the Valley Modified rail corridor would result in radiological and nonradiological impacts to workers and the public. Radiological impacts would result from radiation that the rail casks emitted during incident-free transportation, from radionuclides released from the rail cask during transportation accidents, or from radiation the rail cask emitted because of a loss of shielding during a transportation accident. Nonradiological impacts (vehicle emission-related fatalities) would result from diesel locomotives and fugitive dust. Nonradiological impacts would also result from traffic accidents that involved workers and members of the public.

Table 3-20 lists the impacts of using the Valley Modified rail corridor to ship spent nuclear fuel and high-level radioactive waste calculated using updated methods and data. The impacts presented reflect those from the mainline to the repository. This is in contrast to the FEIS, where the Nevada impacts started where the mainline intersects the Nevada border.

For members of the public, estimated radiological impacts from incident-free (routine) transportation decreased from those in the FEIS, from 0.00065 to 0.00014 latent cancer fatality. This would be due primarily to the change in analysis for the Nevada rail line to model dedicated trains for shipments to the repository, (Golan 2005) which would be partially offset by the increase in the latent cancer fatality conversion factor.

For workers, estimated radiological impacts from incident-free transportation would decrease from 0.27 to 0.21 latent cancer fatality. The decrease would be due primarily to the decrease in the exposure time at the staging yard, which would partially offset by the increase in the latent cancer fatality conversion factor, the use of escorts in all areas, and the estimation of impacts for non involved workers at the staging yard.

Estimated radiological accident risks increased from 0.0000000029 to 0.0000013 latent cancer fatality. This would be due primarily to the use of the combined Track Class 3 transportation accident rate (Bendixen and Facanha 2007) based on train kilometers and railcar kilometers and the increase in the latent cancer fatality conversion factor, and the increase in the population along the Valley Modified rail corridor. Although this is an increase, radiological accident risk would still be a negligible contributor to the overall transportation risk.

Table 3-20. Operations impacts of transportation for the Valley-Modified rail corridor.

Transportation impact category	Traffic fatalities		Number of cancers	
	FEIS	Update	FEIS	Update
Incident-free radiological impacts (LCFs)[a]				
Public (LCFs)	Not applicable	–	0.00065	0.00014
Workers (LCFs)	–	–	0.27	0.21
Radiological accident risks (LCFs)	-	-	0.0000000029	0.0000013
Vehicle emission impacts (cancer fatalities)				
Waste transportation	–	–	0.000047	0.0006
Worker commuting	–	–	0.07	0.2
Transportation accidents (fatalities)				
Waste transportation	0.016	0.1	–	–
Worker commuting	0.5	1.3	–	–
Total operations impacts[b]	0.5	1.4	0.3	0.4

a. LCF = latent cancer fatality.
b. Totals might differ from sums of totals due to rounding.

Estimated impacts from waste transportation vehicle emissions would increase from 0.000047 to 0.0006 fatality. This would be due primarily to the increase in populations along the Valley Modified rail corridor. Vehicle emission impacts from commuting workers would increase from those reported in the FEIS because of the longer operations phase.

Estimated impacts from nonradiological transportation accidents would increase from 0.016 to 0.095 fatality. This is the most notable change to accident risk and would be due primarily to the use of the updated rail fatality rate (DOT 2005) and from accounting for the presence of locomotives and buffer cars in the estimation of the number of nonradiological transportation accident fatalities. Traffic fatalities associated with commuting workers would also increase.

Overall, the estimated total number of transportation-related fatalities from operation of a railroad in the Valley Modified rail corridor has increased from 0.8 fatality reported in the FEIS to 1.8 fatalities in the current assessment. This change is due primarily to the increase in the number of fatalities from traffic accidents.

3.2.3.7 Socioeconomics

In the FEIS, DOE used construction costs, workforce estimates, and state and regional economic data to identify potential direct and indirect changes in state and regional economic activity. The Department noted that construction activities would cause short-term, temporary increases in employment and population.

Revised estimates of the number of workers needed to construct the rail line in the Valley Modified corridor resulted in 2,500 worker-years in comparison to the 405 worker-years estimated in the FEIS.

Operation of the railroad would require about 32 workers each year in comparison to the 36 workers estimated in the FEIS. Increased workforce estimates would not notably affect the regional economy.

Clark County, which includes Las Vegas, dominates the region of influence with a 2006 estimated population of 1.89 million, which is approximately 7 percent more than the population that DOE reported in the FEIS. Population growth in the unincorporated town of Pahrump dominates Nye County's growing popularity as a residential destination. Since DOE completed the FEIS, Pahrump, the largest population center in Nye County, has experienced double-digit growth. The estimated population of Pahrump increased from 23,000 persons in July 1999 to 33,000 persons by July 2005, an increase of about 45 percent. In the same period, the State Demographer estimates that Nye County, as a whole, grew from about 31,000 persons to about 41,000 persons.

Because the construction workforce is expected to come largely from Clark County, any changes to the regional employment and population baselines would be nearly imperceptible. Meaningful changes in employment and population due to the construction and operation of the railroad is unlikely. Current population growth in these Clark and Nye counties would mask socioeconomic impacts due to the short-term growth in the workforce or the associated impact on population growth.

3.2.3.8 Noise and Vibration

The FEIS analysis for noise considered typical day-night sound levels, the distance of the rail line from communities along the rail line, and estimated the impacts from the construction and operation of a railroad to these communities. The FEIS analysis for vibration considered typical background level of ground vibration, the number of trains, and the distance of the rail line from to historic structures or sites of cultural significance, and estimated the impacts from the operation of a railroad. There are no significant new circumstances or information that would cause the affected environment or the estimated impacts from noise and vibration to change from what was reported in the FEIS.

3.2.3.9 Aesthetics

Based on a corridor-level analysis and an evaluation of current BLM Resource Management Plans, there have been no changes to Visual Resource Management classifications for the Valley Modified Corridor since the publication of the FEIS and, therefore, impacts would be the same as those discussed in the FEIS. As stated in the FEIS, the entire Valley Modified rail corridor falls within the BLM Class III designation.

3.2.3.10 Utilities, Energy, and Materials

The FEIS evaluated utilities, energy, and materials impacts common to all corridors and noted that these impacts would include the use of motor fuel, steel, and concrete. The estimated impacts from these resources associated with the construction and operation of a railroad in Nevada would be similar to those in the FEIS.

The Valley Modified rail corridor would pass north of the Las Vegas metropolitan area. Electric power for construction would be initially supplied by portable generators. New power lines would be installed to provide power for construction services and would be extended, via underground distribution along the rail roadbed to meet all other construction and operational needs. Construction equipment would also consume motor fuel (diesel and gasoline). The total motor fuel use in Nevada in 2005 was about 5.8 billion liters (1.5 billion gallons) in 2005 (FHA 2006, Table MF-21). Highway motor fuel use in the state in 2005 increased 6.2 percent over that in 2004, the largest percentage increase for any state and attributable to Nevada's growing population. Table 3-21 lists the estimated amounts of diesel fuel and gasoline for construction for the Valley Modified rail corridor, which are higher than the estimates in the FEIS. Based on a construction period of 40 months, the annual average use of motor fuel would be about 0.27 percent of that consumed annually in Nevada. Unlike overall state use, construction activities would

use primarily diesel fuel, which would be about 1 percent of all special fuel (mainly diesel) used annually in Nevada.

Table 3-21. Construction energy and materials impacts for the Valley Modified rail corridor.[a]

Length (kilometers)[b,c]	Diesel fuel use (million liters)[d]		Gasoline use (million liters)		Steel (thousand metric tons)[e]		Concrete (thousand metric tons)	
	FEIS	Update	FEIS	Update	FEIS	Update	FEIS	Update
160	13	49	0.27	1.0	22	26	130	100

a. Source: Nevada Rail Partners 2007a
b. Rail corridor length used for comparative evaluation.
c. To convert kilometers to miles, multiply by 0.623.
d. To convert liters to gallons, multiply by 0.264.
e. To convert metric tons to tons, multiply by 1.102.

Steel for rails, concrete (principally for rail ties, bridges, and drainage structures), and rock for ballast would be the primary materials that the construction of a rail line would consume. Table 3-16 lists estimates of steel and concrete consumption.

The estimated impacts to utilities, energy, and materials from the operation of a railroad in Nevada would be similar to those in the FEIS. The estimated use of motor fuel by locomotives would increase over that in the FEIS due to more weekly train trips, but the overall use would still be small.

3.2.3.11 Waste Management

The FEIS evaluated common waste management impacts for all corridors rather than for individual corridors. Information to allow differentiation between corridor waste management impacts is now much more readily available. Therefore, this readily available information has been included at a level of analysis that was similar to the FEIS.

Waste generation and management impacts common to all corridors would result from construction and operation a railroad in the Valley Modified rail corridor. There would be relatively low amounts of construction debris and sanitary waste generated.

The FEIS estimated that the peak annual generation would be 910 metric tons (1,000 tons) of sanitary solid waste. DOE now estimates solid municipal waste from construction facilities would be 380 metric tons (410 tons) during the peak year of construction. An assumed 25 percent of the waste generated would be recyclable, which would result in about 280 metric tons (310 tons) of waste for disposal at municipal landfills. The estimated total mass of waste generated during construction of the rail line would be about 760 metric tons (840 tons). This mass of sanitary solid waste would occupy about 1,800 cubic meters (2,400 cubic yards) of landfill volume at a waste density of 410 kilograms per cubic meter (700 pounds per cubic yard) (Brady et al. 1998). Heavier equipment used at large facilities such as the Apex Landfill in Clark County would result in greater waste compaction and less waste volume. The estimated average daily disposal mass would be about 0.6 metric ton (0.7 ton) per day.

Nye County disposed of about 250 metric tons (280 tons) of waste during 2003 at three different landfills (NDEP 2007a), but the county plans to close two of these landfills by 2011, which would represent 96 percent of the county's current waste disposal capacity. The Apex Landfill in Clark County serves the Las Vegas Valley and receives 8,000 metric tons (8,800 tons) each day (State of Nevada 2004, pp. 6 and 7). The estimated closure is in 2047. Waste generated during construction could be trucked to larger landfills with small impact on waste disposal capacity.

Operations would generate waste during periodic maintenance activities. Locomotive and railcar maintenance could generate used oil and solvents that DOE would recycle or dispose of as hazardous chemicals.

3.2.3.12 Environmental Justice

The FEIS environmental justice analysis considered the potential for disproportionately high and adverse impacts on two segments of the overall population—minority communities and low-income communities. In the FEIS, DOE employed a criterion for identifying minority and low-income communities by applying a 10-percent threshold, meaning that the environmental analyses for environmental justice purposes focused on Census blocks and Census block groups having minority or low-income populations at least 10-percent higher than state averages.

For this update, DOE adopted new criteria based upon revised NRC guidance. The new criteria are Census blocks having a 50 percent or higher minority population (e.g., 10 percent higher than the State average), and Census block groups having a 30.5 percent low income population (e.g., 20 percent higher than the State average).

Updates for the 2000 U.S. Census Bureau block group data used in the FEIS to examine the location and concentration of low income populations were not available at the time of publication of the FEIS. Instead, the FEIS used 1990 U S Census Bureau block group data to identify low income populations. For this update, DOE used the more current 2000 U.S. Census Bureau block group data to identify both low income and minority populations. The next set of comprehensive Census Bureau data will not be released until the 2010 Census, thus, the 2000 data is still considered the most current data set. The region of influence identified in the FEIS for the Valley Modified rail corridor has remained the same.

Furthermore, county level U S Census Bureau data estimates for 2006 suggest that while the population in southern Nevada is growing rapidly, the location of concentrations of minority and low income populations have remained relatively constant and static since 2000.

DOE concluded in the FEIS that there would not be any high and adverse impacts from transportation of spent nuclear fuel and high-level radioactive waste in Nevada on any populations, and that disproportionately high and adverse effects would be unlikely for any specific segment of the population, including minorities and low-income communities. DOE further concluded that there were no special pathways (unique practices and activities creating opportunities for increased impacts) that could not be mitigated. Therefore, the FEIS concluded that there were no environmental justice impacts associated with any proposed rail corridor.

Since the publication of the FEIS, DOE has not identified any new large and adverse impacts to any population. DOE has also not identified any new minority or low income populations in the Valley Modified rail corridor region of influence, and has not identified any special pathways that could increase impacts to these populations. Therefore, DOE maintains that there would be no environmental justice impacts associated with the Valley Modified rail corridor.

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