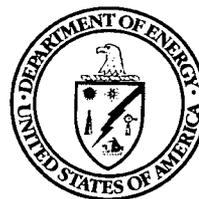


Draft Supplemental Environmental Impact Statement
for a Geologic Repository for the Disposal of
Spent Nuclear Fuel and High-Level Radioactive Waste
at Yucca Mountain, Nye County, Nevada –
Nevada Rail Transportation Corridor
DOE/EIS-0250F-S2D

and

Draft Environmental Impact Statement
for a Rail Alignment for the
Construction and Operation of a Railroad
in Nevada to a Geologic Repository at
Yucca Mountain, Nye County, Nevada
DOE/EIS-0369D

Summary



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

October 2007

COVER SHEET

RESPONSIBLE AGENCY: U.S. Department of Energy (DOE)

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

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Information about this document is available on the Internet at the Yucca Mountain Project web site at <http://www.ocrwm.doe.gov> and on the DOE National Environmental Policy Act (NEPA) web site at <http://eh.doe.gov/nepa/>.

ABSTRACT: The Nevada Rail Corridor SEIS (DOE/EIS-0250F-S2D) analyzes the potential impacts of constructing and operating a railroad to connect the Yucca Mountain repository site to an existing rail line near Wabuska, Nevada (in the Mina rail corridor). The Nevada Rail Corridor SEIS analyzes the Mina rail corridor at a level of detail commensurate with that of the rail corridors analyzed in the Final *Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (DOE/EIS-0250F). The Nevada Rail Corridor SEIS also updates relevant information regarding other rail corridors previously analyzed in the Yucca Mountain FEIS (Carlin, Jean, and Valley Modified) to identify any significant new circumstances or information relevant to environmental concerns.

The Rail Alignment EIS (DOE/EIS-0369D) analyzes the potential impacts of railroad construction and operation along common segments and alternative segments within the Caliente (selected in a previous Record of Decision, 69 *Federal Register* 18557) and Mina rail corridors for the purpose of determining an alignment for the construction and operation of a railroad for shipments of spent nuclear fuel, high-level radioactive waste, and other materials from an existing rail line in Nevada to a geologic repository at Yucca Mountain. The Rail Alignment EIS also analyzes the potential impacts of constructing and operating support facilities.

COOPERATING AGENCIES: The U.S. Bureau of Land Management, the Surface Transportation Board, and the U.S. Air Force are cooperating agencies in the preparation of the Nevada Rail Corridor SEIS and the Rail Alignment EIS.

PUBLIC COMMENTS: A 90-day comment period on this document begins with the publication of the Environmental Protection Agency Notice of Availability in the *Federal Register*. DOE will consider comments received after the 90-day period to the extent practicable. The Department will hold public hearings to receive comments on the document at the times and locations announced in local media and the DOE Notice of Availability. Written comments may also be submitted by U.S. mail to the U.S. Department of Energy at the above address in Las Vegas, via the Internet at <http://www.ymp.gov>, or by facsimile at 1-800-967-0739. This public comment period and the public hearings coincide with those of the *Supplemental Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (DOE/EIS-0250F-S1D).

FOREWORD

The U.S. Department of Energy (DOE or Department) has prepared two draft National Environmental Policy Act (NEPA) documents associated with the proposed disposal of spent nuclear fuel and high-level radioactive waste in a geologic repository at the Yucca Mountain Site in Nye County, Nevada:

Draft Supplemental Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada (DOE/EIS-0250F-S1; the Repository SEIS)

Draft Supplemental Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada – Nevada Rail Transportation Corridor (Part 1) (DOE/EIS-0250F-S2D; the Nevada Rail Corridor SEIS), and *Draft Environmental Impact Statement for a Rail Alignment for the Construction and Operation of a Railroad in Nevada to a Geologic Repository at Yucca Mountain, Nye County, Nevada* (Part 2) (DOE/EIS-0369D; the Rail Alignment EIS).

The Repository SEIS evaluates the potential environmental impacts of constructing and operating the Yucca Mountain repository under the current repository design and operational plans, the purpose of which is to assist the U.S. Nuclear Regulatory Commission (NRC) in adopting, to the extent practicable, any EIS prepared pursuant to Section 114(f)(4) of the Nuclear Waste Policy Act, as amended (NWPA; 42 United States Code 10101 *et seq.*).

The Nevada Rail Corridor SEIS and the Rail Alignment EIS evaluate the potential environmental impacts of constructing and operating a railroad for shipments of spent nuclear fuel and high-level radioactive waste from an existing rail line in Nevada to the repository at Yucca Mountain, the purpose of which is to help the Department decide whether to construct and operate a railroad, and if so, within which corridor and along which alignment.

Background and Context

The NWPA directs the Secretary of Energy, if the Secretary decides to recommend approval of the Yucca Mountain site for development of a repository, to submit a final EIS with any recommendation to the President. To fulfill that requirement, the Department prepared 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/EIS-0250F, February 2002) (Yucca Mountain FEIS).

On February 14, 2002, the Secretary transmitted to the President his recommendation (including the Yucca Mountain FEIS) for approval of the Yucca Mountain site for development of a geologic repository. The President considered the site qualified for application to the NRC for construction authorization and recommended the site to the U.S. Congress. Subsequently, Congress passed a joint resolution of the U.S. House of Representatives and the U.S. Senate designating the Yucca Mountain site for development as a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste. On July 23, 2002, the President signed the joint resolution into law (Public Law 107-200). The Department is now in the process of preparing an application for submittal to the NRC seeking authorization to construct the repository, as required by the NWPA (Section 114(b)).

Since completion of the Yucca Mountain FEIS in 2002, DOE has continued to develop the repository design and associated construction and operational plans. As now proposed, the newly designed surface and subsurface facilities would allow DOE to operate the repository following a primarily canistered approach in which most commercial spent nuclear fuel would be packaged at the reactor sites in transport, aging, and disposal (TAD) canisters. Any commercial spent nuclear fuel arriving at the repository in packages other than TAD canisters would be repackaged by DOE at the repository into TAD canisters. DOE would construct the surface and subsurface facilities over a period of several years (referred to as phased construction) to accommodate an increase in spent nuclear fuel and high-level radioactive waste receipt rates as repository operational capability reaches its design capacity. To address the current repository design and operational plans, the Department announced its intent to prepare a Supplement to the Yucca Mountain FEIS (DOE/EIS-0250F-S1), consistent with NEPA and the NWPA. (*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, NV*; 71 *Federal Register* [FR] 60490, October 13, 2006). The Repository SEIS supplements the Yucca Mountain FEIS by considering the potential environmental impacts of the construction, operation and closure of the repository under the current repository design and operational plans, and by updating the analysis and potential environmental impacts of transporting spent nuclear fuel and high-level radioactive waste to the repository, consistent with transportation-related decisions the Department made following completion of the Yucca Mountain FEIS.

On April 8, 2004, the Department issued a Record of Decision announcing its selection, both nationally and in the State of Nevada, of the mostly rail scenario analyzed in the Yucca Mountain FEIS as the primary means of transporting spent nuclear fuel and high-level radioactive waste to the repository (*Record of Decision on Mode of Transportation and Nevada Rail Corridor for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, NV*; 69 *FR* 18557, April 8, 2004). Implementation of the mostly rail scenario ultimately would require the construction of a rail line to connect the repository site at Yucca Mountain to an existing rail line in the State of Nevada. To that end, in the same Record of Decision, the Department also selected the Caliente rail corridor from several corridors considered in the Yucca Mountain FEIS as the corridor in which to study possible alignments for a rail line. On the same day DOE selected the Caliente corridor, it issued a Notice of Intent to prepare an EIS under NEPA to study alternative alignments within the Caliente corridor (the Rail Alignment EIS; DOE/EIS-0369) (*Notice of Intent to Prepare an Environmental Impact Statement for the Alignment, Construction, and Operation of a Rail Line to a Geologic Repository at Yucca Mountain, Nye County, NV*; 69 *FR* 18565, April 8, 2004).

During the subsequent public scoping process, DOE received comments suggesting that other rail corridors be considered, in particular, the Mina route. In the Yucca Mountain FEIS, DOE had considered but eliminated the Mina route from detailed study because a rail line within the Mina route could only connect to an existing rail line in Nevada by crossing the Walker River Paiute Reservation, and the Tribe had informed DOE that it would not allow nuclear waste to be transported across the Reservation.

Following review of the scoping comments, DOE held discussions with the Walker River Paiute Tribe and, in May 2006, the Tribal Council informed DOE that it would allow the Department to consider the potential impacts of constructing and operating a railroad to transport spent nuclear fuel and high-level radioactive waste across its reservation. On October 13, 2006, after a 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). Although the expanded NEPA analysis, referred to as the Nevada Rail Corridor SEIS and the Rail Alignment EIS, evaluate the potential environmental

impacts associated with the Mina rail corridor, DOE has identified the Mina alternative as nonpreferred because the Tribe has withdrawn its support for the EIS process.

Relationships Among the EISs

The Yucca Mountain FEIS, the Repository SEIS, and the Nevada Rail Corridor SEIS and the Rail Alignment EIS are related in several respects. The Nevada Rail Corridor SEIS supplements the rail corridor analysis of the Yucca Mountain FEIS by analyzing the potential environmental impacts associated with constructing and operating a railroad within the Mina corridor. The Nevada Rail Corridor SEIS analyzes the Mina corridor at a level of detail commensurate with that of the rail corridor analysis in the Yucca Mountain FEIS, and concludes that the Mina corridor warrants further study in the Rail Alignment EIS to identify an alignment for the construction and operation of a railroad.

The Nevada Rail Corridor SEIS also updates relevant information regarding three other rail corridors previously analyzed in the Yucca Mountain FEIS (Carlin, Jean, and Valley Modified). The update demonstrates that there are no significant new circumstances or information relevant to environmental concerns associated with these three rail corridors, and that they do not warrant further consideration in the Rail Alignment EIS. The Caliente-Chalk Mountain rail corridor, which also was included in the Yucca Mountain FEIS, would intersect the Nevada Test and Training Range, and was eliminated from further consideration because of U.S. Air Force concerns that a rail line within the Caliente-Chalk Mountain corridor would interfere with military readiness testing and training activities.

The Rail Alignment EIS tiers from the broader corridor analysis in both the Yucca Mountain FEIS and the Nevada Rail Corridor SEIS, consistent with the Council on Environmental Quality regulations (see 40 Code of Federal Regulations 1508.28). Under the Proposed Action considered in the Rail Alignment EIS, DOE analyzes specific potential impacts of constructing and operating a railroad along common segments and alternative segments within the Caliente and Mina corridors for the purpose of determining an alignment in which to construct and operate a railroad for shipments of spent nuclear fuel and high-level radioactive waste from an existing rail line in Nevada to a geologic repository at Yucca Mountain.

The Repository SEIS includes the potential environmental impacts of national transportation, and the potential impacts from the construction and operation of a rail line along specific alignments in either the Caliente or the Mina corridor, as described in the Rail Alignment EIS, to ensure that the Repository SEIS considers the full scope of potential environmental impacts associated with the proposed construction and operation of the repository. Conversely, the Rail Alignment EIS includes the potential impacts of constructing and operating the repository as a reasonably foreseeable future action in its cumulative impacts analysis. To ensure consistency, the Repository SEIS, the Nevada Rail Corridor SEIS, and the Rail Alignment EIS use the same inventory of spent nuclear fuel and high-level radioactive waste and the same number of rail shipments for analysis. Thus, the associated occupational and public health and safety impacts within the Nevada rail corridors under consideration are the same in both documents. Furthermore, to promote conformity, where appropriate, consistent analytical approaches were used in both documents to evaluate the various resource areas.

The figure that follows summarizes the relationship among the EISs.

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/EIS-0250F)

Proposed Action:

- DOE would construct, operate and monitor, and eventually close a geologic repository at Yucca Mountain.
- Repository operations would include transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain nationally and in Nevada by either mostly rail or mostly truck

Record of Decision

- Mostly rail nationally and in Nevada
- Caliente rail corridor to determine a rail alignment

**Repository SEIS
(DOE/EIS-0250F-S1)**

1. Supplements the Yucca Mountain FEIS in its entirety, as modified by:
 - Record of Decision (mostly rail, Caliente rail corridor) (69 FR 18557)
 - Outcome of the Nevada Rail Corridor SEIS (Mina rail corridor)
2. Otherwise the Proposed Action remains unchanged:
 - DOE would construct, operate and monitor, and eventually close a repository
 - During repository operations, shipments would occur by mostly rail
 - In Nevada, rail shipments would occur on a railroad to be constructed along an alignment within either the Caliente or the Mina rail corridor
 - Shipments also would arrive at repository by truck
3. To supplement Nevada transportation analysis, Repository SEIS incorporates by reference relevant information from the Rail Alignment EIS:
 - Affected environments for Caliente and Mina rail alignments
 - Environmental impacts from constructing and operating a railroad along Caliente or Mina rail alignment
 - Cumulative impacts associated with Caliente and Mina rail alignments

**Nevada Rail Corridor SEIS (Part 1)
(DOE/EIS-0250F-S2)**

1. Supplements the Nevada transportation analysis of the Yucca Mountain FEIS, as modified by:
 - Record of Decision (mostly rail) (69 FR 18557)
 - Proposed consideration of Mina rail corridor
2. Under the Proposed Action, DOE would construct and operate a railroad to connect the Yucca Mountain repository to an existing rail line near Wabuska, Nevada (the Mina rail corridor)
 - Mina corridor information and analyses at a level of detail commensurate with that of the other corridors in the Yucca Mountain FEIS
3. Considers other corridors in the Yucca Mountain FEIS for significant new circumstances or information relevant to environmental concerns
 - Review environmental information available since the Yucca Mountain FEIS
4. Conclusion:
 - Whether the Mina rail corridor warrants further detailed study to determine an alignment based on impact analysis
 - Whether there are significant changes or new information relevant to environmental concerns for the other corridors that would warrant further detailed study to determine an alignment

**Rail Alignment EIS (Part 2)
(DOE/EIS-0369)**

1. Tiers from the Yucca Mountain FEIS and the Nevada Rail Corridor SEIS
2. Proposed Action based on Record of Decision (69 FR 18557)
 - Under the Proposed Action, DOE would determine an alignment for the construction and operation of a railroad
 - ⇒ Caliente Implementing Alternative (preferred)
 - ⇒ Mina Implementing Alternative (nonpreferred)

Relationship between the Repository SEIS, the Nevada Rail Corridor SEIS, and the Rail Alignment EIS.

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SUMMARY OF NEVADA RAIL CORRIDOR SEIS AND RAIL ALIGNMENT EIS

This document summarizes the Nevada Rail Corridor SEIS and the Rail Alignment EIS. Volumes I, II, III, and IV provide detailed background information; descriptions of existing environments and environmental analyses; analytical methods and assumptions; a list of technical references; a glossary of terms; supporting appendixes, and an index.

S.1 INTRODUCTION

The U.S. Department of Energy (DOE or the Department) has prepared the *Draft Supplemental Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada – Nevada Rail Transportation Corridor* (for brevity, referred to as the Nevada Rail Corridor SEIS) and the *Draft Environmental Impact Statement for a Rail Alignment for the Construction and Operation of a Railroad in Nevada to a Geologic Repository at Yucca Mountain, Nye County, Nevada* (for brevity, referred to as the Rail Alignment EIS) to evaluate the potential environmental impacts of constructing and operating a railroad for shipments of spent nuclear fuel and high-level radioactive waste from an existing rail line in Nevada to a geologic repository at Yucca Mountain. The purpose of the evaluation is to assist the Department in deciding whether to construct and operate a railroad in Nevada, and if so, in which corridor and along which specific alignment within the selected corridor.

The Nevada Rail Corridor SEIS supplements the analysis in the *Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (Yucca Mountain FEIS; DOE/EIS-0250F, February 2002). The Rail Alignment EIS, analyzes the potential environmental impacts associated with constructing and operating a railroad along specific alignments within the Caliente and Mina rail corridors.

Section S.2 summarizes the Nevada Rail Corridor SEIS. Section S.3 summarizes the Rail Alignment EIS.

Rail corridor: A strip of land 400 meters (0.25 mile) wide within which DOE would determine an alignment for the construction of a rail line.

Rail alignment: An engineered refinement of a rail corridor in which DOE would identify the location of a rail line. A rail alignment is comprised of common segments and alternative segments.

Railroad: A transportation system incorporating the rail line, rail line operations support facilities, rail cars, locomotives, and other related property and infrastructure.

Rail line: An engineered feature incorporating the track, ties, ballast, and subballast at a specific location.

Spent nuclear fuel is fuel that has been withdrawn from a reactor following irradiation.

- **Commercial spent nuclear fuel** comes from civilian nuclear power plants that generate electricity.
- **DOE spent nuclear fuel** comes from DOE production reactors (such as defense nuclear material production reactors), naval reactors, and university- and government-owned test and experimental reactors.

High-level radioactive waste is the highly radioactive material that results from the reprocessing of spent nuclear fuel and other highly radioactive material, which the U.S. Nuclear Regulatory Commission determines by rule requires permanent isolation.

S.1.1 Background

The United States has focused a national effort on siting and developing a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste and on developing systems for transporting these materials from their present locations throughout the country to that repository.

The Nuclear Waste Policy Act of 1982 (Public Law 97-425) acknowledged the Federal Government's responsibility to provide for the disposal of the Nation's spent nuclear fuel and high-level radioactive waste, and initiated a process to select sites for technical study as potential geologic repository locations. In 1987, Congress amended the Nuclear Waste Policy Act. This Act, as amended (42 U.S.C. 10101 *et seq.*), which the Supplemental Nevada Rail Corridor EIS and Rail Alignment EIS refers to as the NWPA, identifies the Yucca Mountain Site in Nye County, Nevada, as the site to be studied as a potential location for a geologic repository.

After completion of site characterization studies at Yucca Mountain, the Secretary of Energy found the site to be scientifically and technically suitable for development of a repository. On February 14, 2002, the Secretary submitted his recommendation, along with a comprehensive statement of the basis for the recommendation, to the President of the United States, George W. Bush, for approval of the Yucca Mountain Site for the development of a nuclear waste repository. As required by the NWPA, the U.S. Department of Energy (DOE) had prepared an EIS, *Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (Yucca Mountain FEIS), to accompany the Secretary's recommendation to the President.

On February 15, 2002, the President, in accordance with the NWPA, approved the Secretary of Energy's recommendation of the Yucca Mountain Site for development as a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste. On July 23, 2002, the President signed into law a joint resolution of the U.S. House of Representatives and the U.S. Senate designating the Yucca Mountain Site for development as a geologic repository (Yucca Mountain Development Act of 2002, Public Law 107-200).

As part of its obligations under the NWPA, DOE is responsible for developing a system to transport spent nuclear fuel and high-level radioactive waste to the repository. In the Yucca Mountain FEIS, DOE analyzed a proposed action to construct, operate, monitor, and eventually close a geologic repository at Yucca Mountain in southern Nevada for the disposal of spent nuclear fuel and high-level radioactive waste. As part of that action, DOE evaluated various modes of transporting spent nuclear fuel and high-level radioactive waste from 72 commercial sites and five DOE sites nationwide to the Yucca Mountain Site. (Note: DOE now plans to move all spent nuclear fuel from Fort St. Vrain to Idaho National Laboratory prior to packaging for shipment to Yucca Mountain. Therefore, the number of DOE sites is four.)

After the Yucca Mountain Site was designated, DOE initiated preparation of a license application to be submitted to the U.S. Nuclear Regulatory Commission seeking authorization to construct the repository. In addition, to be in a position to transport spent nuclear fuel and high-level radioactive waste to the repository if the Commission granted the Department a construction authorization (and subsequently authorization to receive these materials), DOE proceeded with certain decisions related to transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain.

The Yucca Mountain FEIS examined various national transportation scenarios and Nevada transportation alternatives to evaluate potential transportation impacts to human health and the environment. DOE evaluated two national transportation scenarios, referred to as the "mostly legal-weight truck scenario" and the "mostly rail scenario," and three Nevada transportation scenarios, referred to as the "Nevada

mostly legal-weight truck scenario,” the “Nevada mostly rail scenario,” and the “Nevada mostly heavy-haul truck scenario.” Following completion of the Yucca Mountain FEIS, DOE identified the mostly rail scenario as its preferred mode of transportation, both nationally and in Nevada, due in part to lower potential impacts on the health and safety of workers and the public (*Notice of Preferred Nevada Rail Corridor* [68 *Federal Register* {FR} 74951, December 29, 2003]). In the same *Federal Register* notice, DOE announced its preference for the Caliente rail corridor.

In 2004, DOE announced the selection of the mostly rail scenario analyzed in the Yucca Mountain FEIS for transporting spent nuclear fuel and high-level radioactive waste nationally and within Nevada (*Record of Decision on Mode of Transportation and Nevada Rail Corridor for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, NV*, 69 FR 18557, April 8, 2004). As part of implementing that decision, DOE recognized that it would need to construct a rail line to connect the repository site to an existing rail line in Nevada. DOE also announced in that Record of Decision that it had selected the Caliente rail corridor for further evaluation for the construction and operation of a railroad in Nevada. (Note: The Record of Decision referred to construction and operation of a rail line. However, the Rail Alignment EIS refers to construction and operation of a railroad, which better describes the total transportation system, including the infrastructure required under the Proposed Action.) The Caliente rail alignment is an engineered refinement of the Caliente rail corridor analyzed in the Yucca Mountain FEIS.

At present, there is no rail line to the Yucca Mountain Site. In the Yucca Mountain FEIS, DOE evaluated in detail five potential rail corridors within the State of Nevada in which the Department could construct a rail line to link an existing rail line to Yucca Mountain: Caliente, Carlin, Caliente–Chalk Mountain, Jean, and Valley Modified rail corridors. DOE did not include the Mina rail corridor in the detailed evaluation because a rail line in the Mina rail corridor would need to cross the Walker River Paiute Reservation. In 1995, the Department eliminated the Mina rail corridor from further study because the Walker River Paiute Tribe had stated that it would not allow DOE to transport spent nuclear fuel and high-level radioactive waste across the Walker River Paiute Reservation.

However, the Mina rail corridor became feasible when, in a May 2006 letter, the Walker River Paiute Tribal Council informed DOE that it would allow the Department to consider the potential impacts of constructing and operating a railroad to transport spent nuclear fuel and high-level radioactive waste across its Reservation. DOE prepared a preliminary feasibility study of the Mina rail corridor and announced its intent to expand the scope of the Rail Alignment EIS to incorporate analysis of the potential environmental impacts associated with constructing and operating a railroad along an alignment in the Mina rail 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, October 13, 2006).

Because the Mina rail corridor was not included in the detailed Yucca Mountain FEIS analysis, the Department decided it was appropriate to supplement the Yucca Mountain FEIS with a corridor-level analysis of the Mina rail corridor commensurate with that performed for the other rail corridors analyzed in the FEIS. In addition, the Department decided it was appropriate to update the analyses of the Carlin, Jean, and Valley Modified rail corridors to identify any significant new information or circumstances that could change the range or magnitude of potential environmental impacts described in the Yucca Mountain FEIS. DOE eliminated the Caliente–Chalk Mountain rail corridor, which would cross part of the Nevada Test and Training Range, from further consideration because of U.S. Air Force concerns that a rail line would interfere with military mission activities.

On April 17, 2007, the Tribal Council for the Walker River Paiute Tribe announced a resolution withdrawing support for the Tribe's participation in the EIS process. The Tribal Council based its decision on review of information gathered to that time and input from members of the tribe. The Council's resolution also renewed the Tribe's past objection to the transportation of nuclear waste through the Walker River Paiute Reservation. Accordingly, DOE has identified the Mina rail corridor and the Mina Implementing Alternative as nonpreferred in the Rail Alignment EIS.

S.1.2 Cooperating Agencies

Council on Environmental Quality (CEQ) regulations at 40 Code of Federal Regulations (CFR) 1501.6, emphasize agency cooperation early in the NEPA process and allow a lead agency (in this case, DOE) to request the assistance of other agencies that either have jurisdiction by law or have special expertise regarding issues considered in an EIS. The Bureau of Land Management (BLM or the Bureau), the Surface Transportation Board (STB), and the U.S. Air Force are cooperating agencies in the development of the Supplemental Nevada Rail Corridor EIS and Rail Alignment EIS, pursuant to CEQ regulations, and have participated in its preparation.

Cooperating agencies that could issue decisions concerning the Proposed Action and alternatives to the Proposed Action could adopt the Supplemental Nevada Rail Corridor EIS and Rail Alignment EIS in whole or in part and use it as a basis for their decisions. These agencies have management and regulatory authority over lands and resources that would be crossed by or close to the proposed railroad, or they have special expertise related to the Proposed Action.

S.2 SUMMARY OF NEVADA RAIL CORRIDOR SEIS

S.2.1 Purpose and Need for Agency Action

The Nevada Rail Corridor SEIS has two purposes, as follows:

1. To analyze the Mina rail corridor, which was not previously analyzed in detail, at a level of detail commensurate with that of the rail corridors analyzed in the Yucca Mountain FEIS to determine if it warrants further detailed evaluation at the alignment level
2. To update relevant information regarding the Carlin, Jean, and Valley Modified rail corridors to identify any significant new circumstances or information relevant to environmental concerns associated with these three rail corridors that would warrant their further detailed evaluation at the alignment level

On April 8, 2004, the Department announced that it would ship most spent nuclear fuel and high-level radioactive waste to the repository by rail (train) and announced its selection of the Caliente rail corridor as the preferred corridor (69 *FR* 18557). On October 13, 2006, the Department issued an *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, Nevada* (71 *FR* 60484). In that notice, the Department announced its intent to incorporate analyses for the Mina rail corridor.

DOE did not analyze the Mina rail corridor in the Yucca Mountain FEIS; therefore, the Department has prepared a supplement (DOE/EIS-0250F-S2) to the Yucca Mountain FEIS, which considers the potential environmental impacts of a railroad in the Mina rail corridor at the same level of analysis as that for the Carlin, Jean, and Valley Modified rail corridors in the Yucca Mountain FEIS. Figure S-1 shows the rail corridors analyzed in the Yucca Mountain FEIS and the Mina rail corridor.

SUMMARY

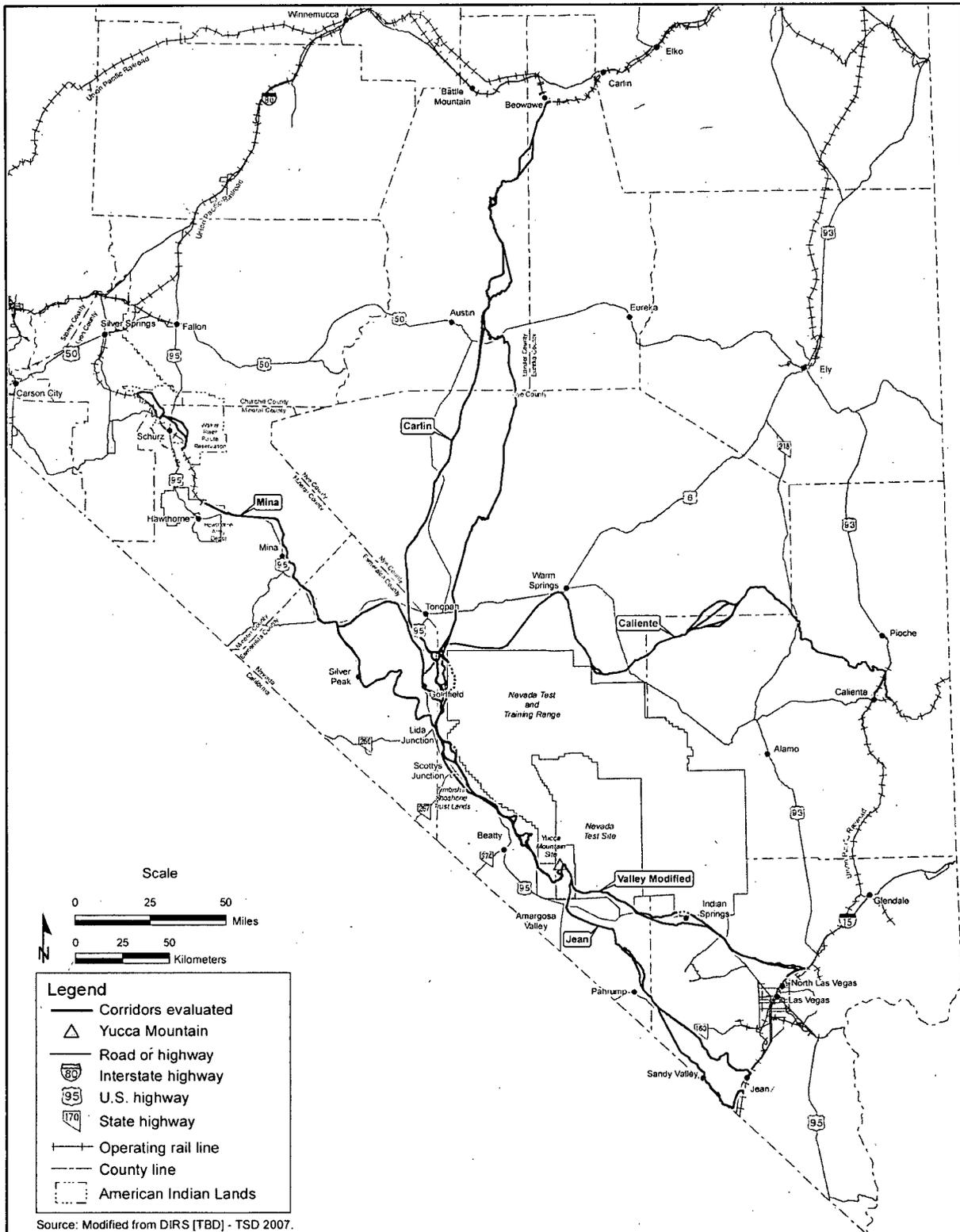


Figure S-1. Carlin, Jean, Valley Modified, Caliente, and Mina rail corridors (pre-scoping, October 2006).

The purpose of the DOE action is to construct and operate a railroad for the transportation of spent nuclear fuel and high-level radioactive waste that connects an existing rail line in the State of Nevada to the Yucca Mountain Site. In this regard, the Department is evaluating the Mina rail corridor so it can determine if the attributes, characteristics, and potential impacts of railroad construction and operation in the Mina rail corridor would be such that DOE should proceed with analyses of specific alignments within the corridor in the Rail Alignment EIS. At the same time, the Department has updated relevant environmental information for the Carlin, Jean, and Valley Modified rail corridors to determine whether there are significant new circumstances or information that would warrant consideration of these three rail corridors at the alignment level.

S.2.2 Proposed Action and Alternatives

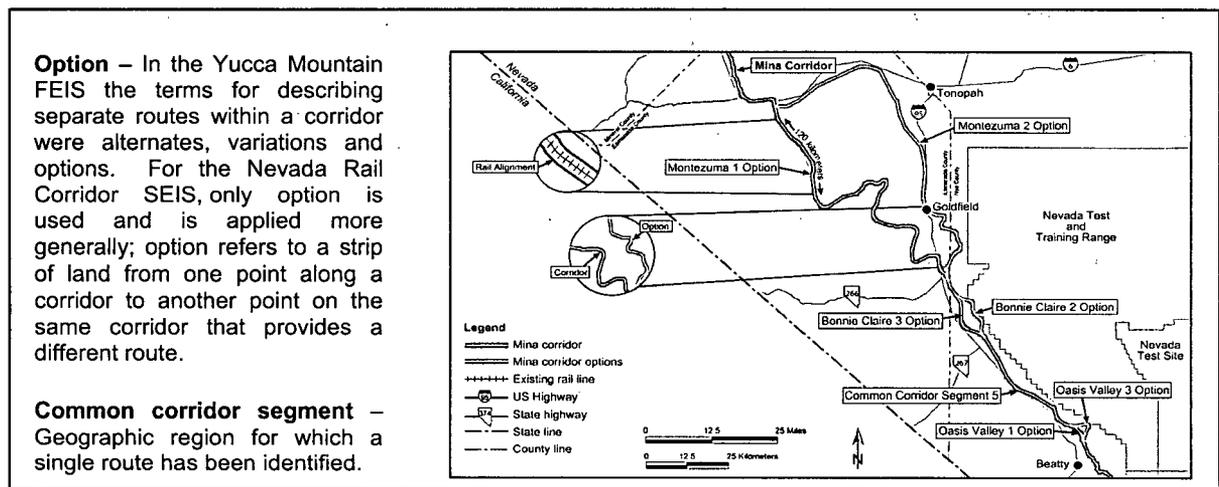
The Nevada Rail Corridor SEIS evaluates a Proposed Action and a No-Action Alternative. It supplements the Yucca Mountain FEIS to the extent that it analyzes the potential impacts of the Proposed Action to construct and operate a railroad to connect the Yucca Mountain Site to an existing rail line near Wabuska, Nevada, in the Mina rail corridor. Under the Proposed Action, DOE has analyzed the Mina rail corridor at a level of detail commensurate with that of the rail corridors (Caliente, Caliente-Chalk Mountain, Carlin, Jean, and Valley Modified) analyzed in the Yucca Mountain FEIS.

CEQ and DOE regulations that implement the procedural requirements of NEPA require consideration of the alternative of no action. Under the Nevada Rail Corridor SEIS No-Action Alternative, DOE would not select a rail alignment within the Mina rail corridor for the construction and operation of a railroad. Therefore, the No-Action Alternative provides a basis for comparison to the Proposed Action.

In response to the May 2006 letter from the Walker River Paiute Tribe, DOE initiated a study to consider the feasibility of the Mina rail corridor and to identify a specific corridor and associated preliminary options. The Department completed the feasibility study in October 2006. Based on the information in the feasibility study, DOE expanded the scope of the Rail Alignment EIS (DOE/EIS-0369) to incorporate analysis of the Mina rail corridor as a supplemental EIS.

The Nevada Rail Corridor SEIS also updates relevant information for the corridors already analyzed in the Yucca Mountain FEIS.

The Department identified rail corridor options on the Walker River Paiute Reservation to bypass the town of Schurz (Schurz bypass options), around the Montezuma Range (Montezuma options), north of Scottys Junction (Bonnie Claire options), and in Oasis Valley (Oasis Valley options). Figure S-2 shows the Mina rail corridor and its options.



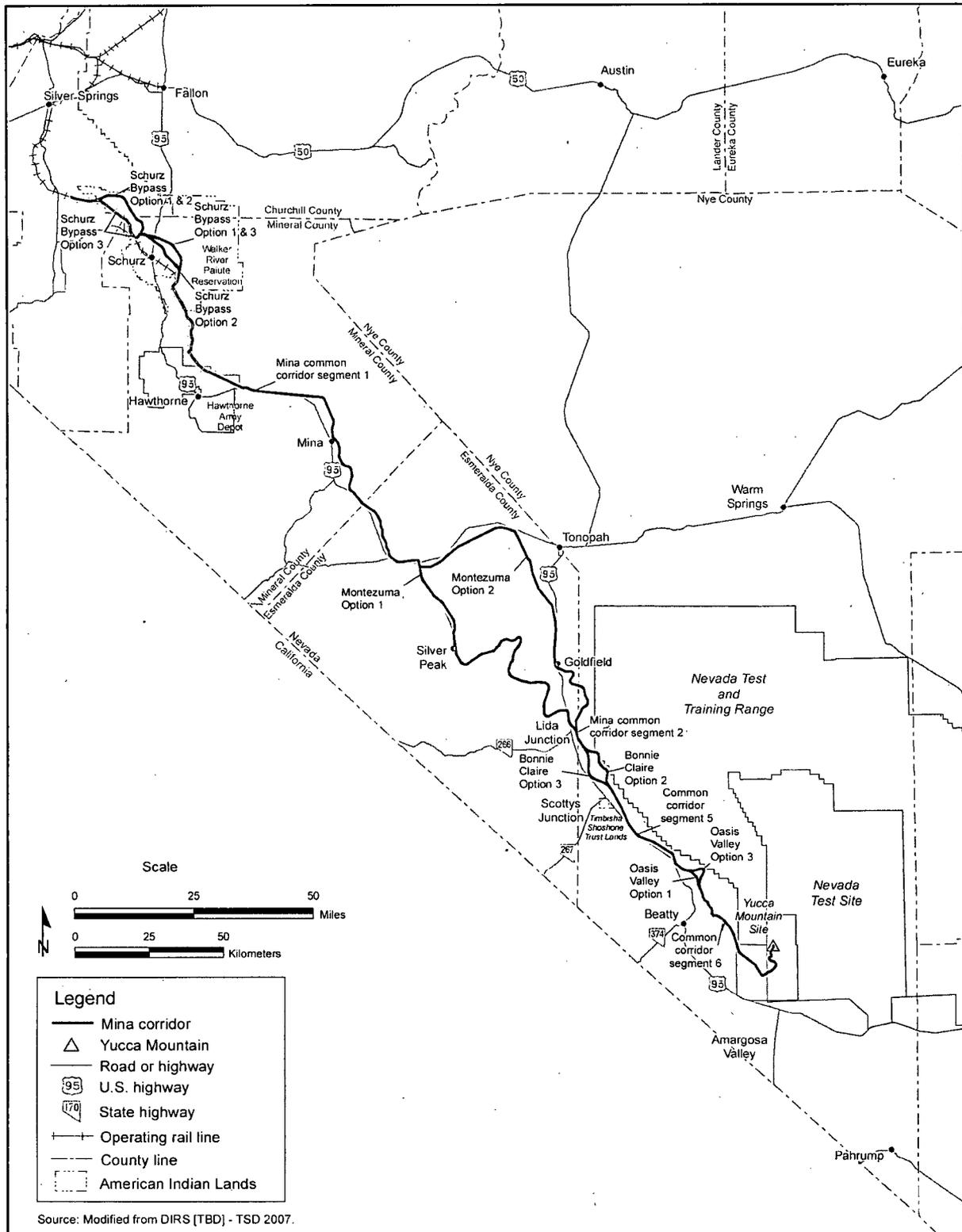


Figure S-2. Mina rail corridor and options (as defined prior to the October 2006 scoping meetings described Section S.2.3.1).

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. 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 the towns of 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 continue for about 1.5 kilometers (1 mile) before joining one of the Montezuma options. Mina common segment 1 would be approximately 120 kilometers (72 miles) long.

Near Blair Junction, the rail line would follow one of two options 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 Claire area. At that point the corridor would follow one of two options until forming a single route in the vicinity of Scottys Junction. The corridor would then trend southeast to Oasis Valley, and would follow one of two options through the Oasis Valley before turning north-northeast to Yucca Mountain as a single route. For purposes of analysis, 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.

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 386 and 400 kilometers (240 and 264 miles) because the corridor would include the existing U.S. Department of Defense Branchline from Wabuska to the Hawthorne Army Depot in Hawthorne, Nevada.

S.2.3 Issues Raised by the Public

S.2.3.1 PUBLIC SCOPING

On April 8, 2004 (69 *FR* 18565), DOE issued a Notice of Intent to prepare an EIS under NEPA for the alignment, construction, and operation of a railroad for shipments of spent nuclear fuel, high-level radioactive waste, and other materials related to the construction and operation of a repository from a site near Caliente, Nevada, to a geologic repository at Yucca Mountain, Nevada (the Rail Alignment EIS; DOE/EIS-0369). DOE received more than 4,100 comments during this first public scoping period for the Rail Alignment EIS, and some after the close of the scoping period. The Department considered the content of all substantive comments in determining the scope of the EIS. During this scoping period, DOE also received comments suggesting that other rail corridors be considered in the Rail Alignment EIS, in particular the Mina rail corridor. Public comments provided compelling arguments that the Mina rail corridor should be given a full evaluation.

On October 13, 2006, after a preliminary evaluation of the feasibility of the Mina rail corridor, DOE announced its intent to expand the scope of the Rail Alignment EIS to incorporate analysis of the potential environmental impacts associated with constructing and operating a railroad within the Mina rail corridor (71 *FR* 60484). DOE also announced that it would update, as appropriate, the information and analysis for other rail corridors analyzed in the Yucca Mountain FEIS. The scoping period for the expanded NEPA analysis began on October 13, 2006, and ended on December 12, 2006. The Department received approximately 790 comments during the public scoping period for the Supplemental Nevada Rail Corridor EIS and Rail Alignment EIS, and some comments after the close of the scoping period. The Department considered the content of all substantive comments in determining the scope of the expanded NEPA analysis.

S.2.3.2 TRIBAL INTERACTIONS

In 1987, DOE initiated the Native American Interaction Program to solicit input from and interact with tribes and organizations on the characterization of the Yucca Mountain Site and the possible construction and operation of a repository. These tribes and organizations—Southern Paiute; Western Shoshone; and Owens Valley Paiute and Shoshone people from Arizona, California, Nevada, and Utah—have cultural and historic ties to both the Yucca Mountain area and to the larger region that includes portions of the Mina rail corridor as well as the Carlin, Jean, and Valley Modified rail corridors. Ethnographic efforts eventually led to the involvement of 17 tribes and organizations in the Yucca Mountain Project American Indian and cultural resource studies. Those tribes formed the Consolidated Group of Tribes and Organizations, which consists of tribal representatives responsible for presenting issues concerning their respective tribal concerns and perspectives to DOE. DOE interactions with Tribes have produced several reports that record the regional history of American Indian people and the interpretation of American Indian cultural resources in the Yucca Mountain region. On June 2, 2004, DOE met with the Consolidated Group of Tribes and Organizations to introduce the proposed railroad project and learn of its members concerns and issues.

The American Indian Writers Subgroup, a subgroup of the Consolidated Group of Tribes and Organizations, prepared the *American Indian Perspectives on the Proposed Rail Alignment Environmental Impact Statement for the U.S. Department of Energy Yucca Mountain Project* providing insight into American Indian viewpoints and concerns regarding cultural resources along the Caliente rail alignment and long-term impacts of the DOE selection of a rail system to transport spent nuclear fuel and high-level radioactive waste to a geologic repository at Yucca Mountain. That document is a supplement to the American Indian Writers Subgroup document *American Indian Perspectives on the Yucca Mountain Site Characterization Project and the Repository Environmental Impact Statement*. The Department has held an ongoing series of meetings over the years with the Consolidated Group of Tribes and Organizations, and most recently on November 29, 2006, to present the proposed inclusion of the Mina rail corridor for analysis in this Supplemental Rail Corridor and Rail Alignment EIS and to provide an update on the ongoing analysis of the Caliente rail alignment. In addition DOE met with Walker River Paiute tribal representatives on several occasions in 2006 to discuss their interest in allowing DOE to evaluate a potential rail corridor, the Mina rail corridor, which would cross the Walker River Paiute Reservation. Tribal members toured the Yucca Mountain Site and attended scoping meetings.

S.2.4 Environmental Impacts

The first component of the Nevada Rail Corridor SEIS is the corridor-level analysis of the Mina rail corridor.

S.2.4.1 POTENTIAL IMPACTS OF THE MINA RAIL CORRIDOR

Where practical, DOE has quantified potential impacts and other characteristics of a Proposed Action to construct and operate a railroad in the Mina rail corridor. In other instances, it is not practical to quantify impacts and DOE provides a qualitative assessment of potential impacts. In the Nevada Rail Corridor SEIS, the Department has used the following descriptors to qualitatively characterize impacts where quantification of impacts was not practical:

- **Small** – For the issue, environmental effects would not be detectable or would be so minor that they would neither destabilize nor noticeably alter any important attribute of the resource.
- **Moderate** – For the issue, environmental effects would be sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

- **Large** – For the issue, environmental effects would be clearly noticeable and would be sufficient to destabilize important attributes of the resource.

Unless otherwise noted, potential impacts would be adverse.

S.2.4.1.1 Land Use and Ownership

Construction of a railroad in the Mina rail corridor would disturb approximately 37 to 41 square kilometers (9,000 to 10,000 acres) of land, depending on the combination of options. The corridor would cross up to 15 separate grazing allotments. The approximate disturbance area associated with the 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.

A railroad in the Mina rail corridor would impact approximately 1.6 to 2.7 square kilometers (400 to 670 acres) of private land in the corridor, depending on the combination of options. This private land is used primarily for agricultural and mineral development purposes, and none contains private residences. If in locating the final alignment DOE could not avoid private lands, the Department would need to acquire access to those lands. If the rail line would divide private property, access to the property could be disrupted.

The Mina rail corridor would not cross or affect any Wilderness Areas, Wilderness Study Areas, or Areas of Critical Environmental Concern. A railroad in 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 would pass.

The Mina rail corridor would cross land on the Walker River Paiute Reservation. Railroad construction and operations activities on this land would require land agreements between 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 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."

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 between the 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 common corridor segment 6 would be within the boundaries of the Nevada Test Site, which is managed by DOE. Railroad construction in this area would require land-use authorization from the DOE Nevada Site Office and the BLM.

The BLM would require DOE to obtain a right-of-way grant to construct and operate a railroad on public land. The Department would adjust the project footprint (the area of disturbance) where practicable to avoid or minimize land-use conflicts and restrictions. Railroad construction and operation in the Mina rail corridor through existing road or utility rights-of-way would require an evaluation of impacts to the road or utility or use of the right-of-way with both the right-of-way holder and the BLM. DOE would protect existing utility rights-of-way from damage so that disruption to utility service or damage to lines would be at most small and temporary.

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.

Rail line construction would result in loss of forage. Because the corridor would intersect 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 could be lost due to collisions with vehicles along roads used during the construction and operations phases and from collisions with trains during the operations phase.

Construction and operation of a railroad in the Mina rail corridor would impact access to land used by the public for recreation, requiring individuals to alter their access routes.

S.2.4.1.2 Air Quality

The Mina rail corridor would pass through rural parts of Nevada in areas that the U.S. Environmental Protection Agency considers to be in attainment or unclassifiable for criteria air pollutant National Ambient Air Quality Standards. Most rural areas of the United States are either in attainment or unclassifiable for all pollutants.

Impacts to air quality during railroad construction and operations in the Mina rail corridor would be small. During the relatively short construction phase, equipment emissions would result in a very small contribution of criteria air pollutants to the region. These pollutants would primarily come from the operation of construction equipment in rural areas or areas that are currently inhabited. Construction activities would also emit fugitive dust that would require DOE to implement dust suppression measures. Concentrations of criteria air pollutants and the generation of fugitive dust would decrease as the construction phase ended and the railroad became operational. During the operations phase, impacts to air quality would be smaller but would last longer.

S.2.4.1.3 Hydrology

Hydrologic hazards in the Mina rail corridor could include flash floods. Impacts to surface water associated with the alteration of drainage patterns or changes to erosion and sedimentation rates or locations would be small and localized. Any impacts on surface-water resources resulting from construction activities would generally be small and limited to the nominal width of the rail line construction right-of-way. DOE would use appropriate engineering standards and construction practices to avoid or minimize any potential impacts to surface water resources.

The groundwater analysis for the Nevada Rail Corridor SEIS based its calculations of water demand during the construction phase on earthwork needs and water that would be needed for soil compaction. Based on these considerations, total water demand for the Mina rail corridor would be approximately 7.32 million cubic meters (5,950 acre-feet). Groundwater use during the construction phase could result in a short-term decrease in the amount of available water in some hydrologic basins. To avoid adverse impacts to groundwater resources in the region, DOE would request the Nevada State Engineer to approve any potential plans to pump groundwater from new or existing wells or plans to otherwise obtain groundwater from other regional resources.

Groundwater demands during the operations phase would be small and limited to water needed to support maintenance activities and the smaller operations workforce. Operations water needs would be small and would have little effect on regional resources.

S.2.4.1.4 Biological Resources and Soils

The Mina rail corridor would primarily cross through remote areas that are characterized by a variety of vegetation communities, special status species (plants and animals including their habitats), game habitats, surface-water flows, and soil conditions along the route. The corridor would cross only one riparian area along the Walker River and one spring near Goldfield.

Some vegetation communities would be disturbed during construction activities in the Mina rail corridor. With the exception of the few riparian areas along the corridor, none of the vegetation communities are BLM-designated sensitive (unique or rare). The total land area disturbed within these vegetation communities in the corridor would be small compared to total land areas in Nevada that also support such vegetation communities.

The Mina rail corridor would cross through habitat that supports a low abundance of the desert tortoise (*Gopherus agasizii*), a federally listed threatened species under the Endangered Species Act. Disturbance of this habitat could disrupt normal tortoise movements or possibly result in mortality to some individual tortoises. DOE would work with the U.S. Fish and Wildlife Service to limit any impacts to the desert tortoise.

The Mina rail corridor would also cross riparian habitat for the Lahontan cutthroat trout (*Oncorhynchus clarkii henshawi*), a federally listed threatened species under the Endangered Species Act. Construction of a bridge over the Walker River, downstream of Walker Dam, would have to occur when the water flow was low and the species was rare or absent. Construction activities could degrade downstream water quality, but these impacts would be temporary and small. Any impacts to springs near the Mina rail corridor would be small.

The Mina rail corridor would cross habitat for some game species including big horn sheep, pronghorn sheep, mule deer, and mountain lions, and herd management areas for wild horses and burros. During the construction phase, these game animals would likely move away from the area due to noise and land disturbance. Noise from passing trains during the operations phase could disturb some animals. Any impacts would be small and would likely diminish over time because animals would become accustomed to the noise.

Land disturbance within the rail line construction right-of-way could increase the potential for soil erosion. DOE would use erosion control and dust suppression methods to reduce the potential for erosion, and would control the use of hazardous materials to limit the potential for soil contamination. Impacts to soil in the Mina rail corridor would be temporary and small.

S.2.4.1.5 Cultural Resources

Based on recent DOE searches of existing records, there are several cultural resources, which include archaeological and historic sites and structures, in the Mina rail corridor that are eligible or potentially eligible for listing on the *National Register of Historic Places*. Construction activities could degrade, cause the removal of, or alter the setting of cultural resources sites and cause the loss of cultural resources.

Before starting construction in the Mina rail corridor, DOE would perform additional field surveys and inventories to further locate and identify cultural resources. The Department would work closely with other federal agencies, tribal authorities, and state agencies to avoid and mitigate any potential adverse impacts to known cultural resources and those that might be discovered during construction activities.

DOE would not expect railroad operations and maintenance activities to result in any additional impacts to cultural resources in the Mina rail corridor.

S.2.4.1.6 Occupational and Public Health and Safety

The impact analysis for occupational health and safety focused on transportation impacts, worker industrial safety impacts, incident-free radiological impacts and nonradiological impacts, and radiological impacts in relation to accidents.

Nonradiological transportation impacts during the construction phase would be primarily from traffic accidents involving workers commuting to and from the construction sites, workers transporting construction materials to the construction sites, and from vehicle emissions produced by commuting workers and materials deliveries. DOE estimates that during the construction phase there could be 4 fatalities from traffic accidents and 0.54 latent cancer fatality from vehicle emissions. During railroad operations along the Mina rail corridor, there could be 3.6 vehicular-related fatalities.

DOE estimated nonradiological occupational health and safety impacts in relation to exposure of workers to physical hazards and nonradioactive hazardous chemicals over the region of influence for the Mina rail corridor. The Department based these estimates on the estimated number of hours worked and occupational incident rates for total recordable cases, lost workday cases, and fatalities. Industrial safety impacts resulting from railroad construction and operation are estimated to be about 0.92 fatality for the combined involved worker and noninvolved worker population.

The largest potential for radiological exposure during the railroad operations phase would be to workers involved in the transportation of spent nuclear fuel and high-level radioactive waste. That impact would be less 0.4 latent cancer fatality.

DOE estimated radiological impacts for members of the public along the Mina rail corridor. During 50 years of railroad operations, there would be less than one latent cancer fatality.

DOE estimated the radiological impacts from potential accident scenarios. For 50 years of railroad operations, the estimated number of worker and public latent cancer fatalities would be less than one.

S.2.4.1.7 Socioeconomics

The socioeconomic impacts analysis used a set of socioeconomic variables to provide a socioeconomic profile of conditions in the Mina rail corridor region of influence. Those variables considered changes to employment, population, economic measures, housing, and public services. The expected employment levels are a significant contributor to the analysis of socioeconomic impacts.

DOE estimated that during the railroad construction phase, workforce employment levels would range from about 340 to 2,100, depending on the length of the rail line, earthwork requirements, and phase of the project. Based on the identified levels of worker employment and the temporary and linear nature of the construction project, potential socioeconomics impacts to the local communities would be both short term and small.

DOE estimated that during the operations phase, workforce levels for operating and maintaining the railroad would be much less the levels estimated for the construction phase. There would be an estimated 42 workers involved in railroad operations. Given the relatively low number of employees necessary for railroad operations, the potential for socioeconomics impacts along the Mina rail corridor would be small.

These socioeconomic impacts for the construction and the operations phases are generally considered positive because of the jobs created, the increase disposable income, increases in gross regional product, and increases in services to local citizens as a result of increased tax revenue to local and state governments.

S.2.4.1.8 Noise and Vibration

Most of the Mina rail corridor would be in areas that are remote from human habitation. The distances from construction activities to the nearest receptors would be great; therefore, construction noise levels would be below the Federal Transit Administration noise guidelines.

DOE estimates that construction- and operations-train noise would be audible to receptors in Silver Peak and Goldfield. There would be no adverse noise impacts associated with these receptors because the noise levels would not exceed STB noise guidelines. Because transportation noise sources are audible throughout the United States, the audibility of train noise itself does not constitute an adverse noise impact.

Vibration levels during the railroad construction and operations phases would not exceed Federal Transit Administration damage or annoyance criteria.

S.2.4.1.9 Aesthetics

Railroad construction and operations in the Mina rail corridor would create small impacts to aesthetic resources, but would be consistent with BLM visual resource management objectives to retain the relative value of visual resources in the area.

S.2.4.1.10 Utilities, Energy, and Materials

Potential impacts to utilities, energy and materials would be small. Construction and operations needs would place limited demands on utilities such as public water and wastewater systems, telecommunications systems and providers of electric power. Regional service providers can be expected to adjust to any increasing needs. Needs for motor fuel during construction and operations activities would represent a very small fraction of Nevada's motor fuel consumption and not affect regional availability. Raw materials, such as concrete, steel, and rock, consumed during the construction phase would be available from regional or national sources.

S.2.4.1.11 Waste Management

DOE would store and use hazardous materials such as oil, gasoline, diesel fuel, and solvents during railroad construction and operations, primarily for the operation and maintenance of equipment and cleaning of equipment and facilities. The use of hazardous materials would generate hazardous wastes. There is ample disposal capacity for hazardous wastes in the western United States.

DOE would dispose of nonrecyclable or nonreusable waste in permitted landfills. During the construction phase, it is likely that while some of the larger landfills would not see an appreciable change in the amount of waste received if they were utilized, some of the smaller landfills, if utilized, might see a substantial, although manageable, change in daily receipt of solid and industrial and special wastes. The estimated average daily disposal mass would be about 1.5 metric tons (1.7 tons).

During the railroad operations phase, generation of wastes would be substantially less than during the construction phase.

S.2.4.1.12 Environmental Justice

The largest concentration of low-income and minority populations in the Mina rail corridor is on the Walker River Paiute Reservation. However, most of the Mina rail corridor would cross BLM-administered public land or land owned by the Department of Defense, where there is sparse population. As a consequence, there are no concentrations of low-income or minority populations in Lyon, Mineral, Esmeralda, and Nye Counties that construction or operation of a railroad in the Mina rail corridor would be likely to affect.

Impacts from the rail line construction and operations in the Mina rail corridor would be small overall and would be unlikely to cause a disproportionately high and adverse effect on the low-income or minority populations along the corridor.

S.2.4.2 CUMULATIVE IMPACTS – NEVADA RAIL CORRIDOR SEIS

DOE evaluated public- and private-sector past, present, and reasonably foreseeable activities that could, when combined with the Nevada Rail Corridor SEIS Proposed Action, result in cumulative impacts. The DOE analysis of potential cumulative effects was primarily qualitative, but the Department quantified information to the extent feasible. The cumulative impacts regions of influence for analysis encompassed the Mina rail corridor, and areas with potential direct and indirect effects for each resource area. To assess potential cumulative impacts from other projects, DOE identified major projects within the regions of influence that could have interactions with the proposed railroad in space or time. Those major projects included a wide variety of projects including the proposed Yucca Mountain Repository, the Nevada Test and Training Range, the Nevada Test Site, and BLM land management (including rights-of-way).

DOE determined that the cumulative impacts within most of the resource areas described in the Nevada Rail Corridor SEIS would be small in the Mina rail corridor region of influence unless noted otherwise.

Cumulative impacts, as defined by the CEQ, “result from the incremental impact of [an] action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions” (40 CFR 1508.7). Cumulative impacts can result from individually minor but potentially significant actions that occur within a common context of time and space.

In the Mina rail corridor region of influence, land use and management is changing because of increased construction and development, increased urbanization, and increased conversion of undeveloped land to other purposes or to multiple purposes. Federal agencies, primarily the BLM, will continue to be the major land manager throughout the regions of influence. The BLM has a major role in determining land use in the region through administration of federal lands, including development of resource management plans for the region. The incremental change to land use from constructing and operating the proposed railroad along the Mina rail corridor is projected to be small to moderate.

Overall, there is, and will continue to be, a broad contrast of how visual resource impacts are managed in the regions of influence, ranging from very little management for military mission-related activities to a formal visual resource management system on BLM-administered lands. DOE determined that operation of the proposed railroad would be visible in specific locations but would not dominate the viewsheds within the regions of influence. Changes to aesthetic resources in the regions of influence have already been affected by activities such as the Nevada Test and Testing Range, the Nevada Test Site, BLM management activities, and population growth. These changes will continue in future years, but the regions will generally maintain many of the remote and rural characteristics and conditions. The

incremental change to aesthetic resources from constructing and operating the proposed railroad in the Mina rail corridor is projected to be small.

Cumulative impacts concerns regarding surface-water resources in the Mina rail corridor region of influence include changes to drainage patterns, infiltration rates, flood control, and spill/contamination potential. Impacts would generally be localized. Insufficient inflow from the Walker River into Walker Lake would continue to jeopardize Walker Lake's future as a viable fishery, with or without the proposed railroad in the Mina region of influence.

The Department anticipates that cumulative impacts to groundwater resources in the Mina rail corridor region of influence would range from small to large. Overall, the groundwater needs of the Proposed Action would represent a small portion of current cumulative water usage in the Mina rail corridor region of influence. However, in some proposed groundwater well locations for railroad use, cumulative demand would exceed perennial yield values. Water availability will continue to be a major regional cumulative impact issue in the coming years.

A railroad in the Mina rail corridor is projected to result in small to moderate incremental impacts to cumulative biological resources in their regions of influence. A railroad and other reasonably foreseeable and continuing projects in the region of influence would require coordinated mitigation and impact avoidance among project proponents to avoid and reduce cumulative biological impacts in the region of influence. BLM land management activities also play a major role in regional impact avoidance and mitigation.

The Proposed Action would be only one of the many reasonably foreseeable sources of socioeconomic change to portions of the regions of influence, and would be relatively less important to socioeconomic change than external economic development and population growth. The road systems in the regions of influence could experience higher traffic levels, possibly associated congestion, and increased road maintenance, but incremental impacts due to the proposed railroad would be small.

DOE anticipates that impacts to air quality in the Mina rail corridor region of influence would be small. DOE found that impacts from railroad construction in the Mina rail corridor would generate emissions of some criteria pollutants that could be higher than applicable air quality standards. While these effects would be localized in specific areas, any potential violation of air quality standards would be of concern in relation of both project-specific and cumulative impacts.

The proposed railroad would result in nonradiological and radiological health and safety impacts for workers and residents along the corridor. For members of the public situated along the Mina rail corridor, the radiological impacts during the operations phase would be a minimal contribution to the overall radiological impacts of the Yucca Mountain Repository, and incremental impacts of the proposed railroad would be small.

The Yucca Mountain FEIS evaluated the cumulative impacts of two additional inventories of spent nuclear fuel, high-level radioactive waste, and other radioactive wastes (Modules 1 and 2). These additional wastes would be above and beyond the amounts of wastes that have been analyzed for shipment, and their possible shipment could represent a cumulative impact on the resources analyzed. Although emplacement of this additional waste at Yucca Mountain would require legislative action by Congress, such shipment is a reasonably foreseeable action for purposes of NEPA analysis. Because the planned annual shipment rate of spent nuclear fuel and high-level radioactive waste to the Yucca Mountain Repository would be about the same as the Nevada Rail Corridor SEIS Proposed Action, the only cumulative impacts to arise would be due to the annual increase in the number of casks. Impacts from these additional casks would be similar to the generally small impacts summarized above.

S.2.4.3 SHARED USE

Construction and operation of a railroad in the Mina rail corridor could provide an option for shared use and operation of commercial rail service to serve the communities of Tonopah, Goldfield, and Beatty, and other Tribal, public, and commercial interests in the Mina rail corridor. The presence of a rail line could influence further development and land use in the corridor. Shared use would not require any changes in railroad design, and DOE anticipates that the small additional construction and operations activities would result in very little additional impacts over those described for the Proposed Action without shared use.

S.2.5 Comparison of the Proposed Action and the No-Action Alternative

CEQ NEPA implementing regulations state that agencies should provide a comparison of the environmental impacts of the Proposed Action and alternatives to the Proposed Action to sharply define the issues and provide a clear basis for choice. To that end, in the context within the Nevada Rail Corridor SEIS of a Proposed Action to evaluate the Mina rail corridor at a level of detail commensurate with that of the other rail corridors analyzed in the Yucca Mountain FEIS, Table S-1 provides an overview of potential impacts along the Mina rail corridor. Under the No-Action Alternative, there would be no impacts to existing conditions because DOE would not select a rail alignment within the Mina rail corridor for the construction and operation of a railroad.

Table S-1. Potentially affected resources - Mina rail corridor (page 1 of 3).

Resource	Impact/indicator
<i>Land use</i>	
Disturbed land ^a	9,000 to 10,000 acres (37 to 41 square kilometers), depending on rail corridor option
<i>Land ownership/management authority</i>	
Private land	400 to 670 acres (1.6 to 2.7 square kilometers) (1 to 2 percent of total ownership/authority)
Tribal trust lands and reservations	3,100 to 5,100 acres (12.5 to 20.5 square kilometers) (5 to 12 percent of total ownership/authority)
BLM-administered land	32,600 to 33,100 acres (132.1 to 133.9 square kilometers) (80 to 85 percent of total ownership/authority)
Department of Defense land (Hawthorne Army Depot)	1,200 acres (4.7 square kilometers) (3 percent of total ownership/authority)
DOE land (Nevada Test Site)	1,300 acres (5.3 square kilometers) (3 percent of total ownership/authority)
<i>Air quality</i>	
National Ambient Air Quality Standards attainment status	Areas in attainment or unclassifiable for air quality standards; small impacts from construction and operations
<i>Hydrology</i>	
Surface water	Small impacts associated with the alteration of drainage patterns or changes to erosion and sedimentation rates
Groundwater use	5,950 acre-feet (7.32 million cubic meters)
<i>Biological resources and soils</i>	
Small impacts to habitat, wildlife, vegetation, and soils	
<i>Cultural resources (records search)</i>	
Five percent of area surveyed with 132 recorded sites; eligible affected sites would require mitigation during construction; indirect impacts would be small during operations phase.	

Table S-1. Potentially affected resources - Mina rail corridor (page 2 of 3).

Resource	Impact/indicator
<i>Occupational and Public Health and Safety</i>	
Construction and Operations	
Industrial hazards	
Total recordable incidents	379
Lost workday cases	215
Fatalities	0.92 (combined involved and noninvolved workers)
Transportation (construction phase only)	
Traffic fatalities	4.0
Cancer fatalities	0.54
Incident-free radiological impacts (latent cancer fatalities)	
Operations phase only	
Public	0.00082
Workers	0.33
Radiological transportation accident fatalities	
Radiological accident risk (latent cancer fatalities)	0.0000074
Cancer fatalities from vehicle emissions	0.40
Transportation accident fatalities	
Worker commuting and material delivery	3.3
Radiological waste transportation	0.31
<i>Socioeconomics</i>	
	Construction employment: 6,500 worker-years over a minimum 5-year construction phase, primarily from Clark County and the Carson City/Washoe County area.
	Construction economic measures: Less than a 2-percent increase in gross regional product, real disposable personal income, and spending by state and local governments
	Construction public services: Small increase in local populations
	Operations employment: 42 workers
	Operations economic measures: less than a 2-percent increase in gross regional product, real disposable personal income, and spending by state and local governments
	Operations public services: Small to moderate increase to local populations in Lyon, Mineral, Nye, and Esmeralda Counties
<i>Noise and Vibration</i>	
	Construction noise levels would be below the Federal Transit Administration noise guidelines. Construction- and operations-train noise would be audible to receptors in Silver Peak and Goldfield. No adverse impacts from vibration.
<i>Aesthetics</i>	
	Small; construction and operation of a railroad primarily in BLM visual resource management Class III and IV would be consistent with BLM management objectives for those areas.

Table S-1. Potentially affected resources - Mina rail corridor (page 3 of 3).

Resource	Impact/indicator
<i>Utilities, energy, and materials</i>	
Diesel	33 million gallons (125 million liters)
Gasoline	660,000 gallons (2.5 million liters)
Steel	74,000 tons (67,000 metric tons)
Concrete	287,000 tons (260,000 metric tons)
<i>Wastes</i>	
Construction-related municipal waste; limited quantities of other waste types	1.7 tons (1.5 metric tons) per day
<i>Environmental justice (disproportionately high and adverse impacts)</i>	None identified

a. Land disturbance is based on an average construction right-of-way of 100 meters (325 feet).

S.2.6 New Information Regarding Other Corridors

S.2.6.1 CARLIN, JEAN, AND VALLEY MODIFIED RAIL CORRIDORS

After DOE completed the preliminary evaluation of the feasibility of the Mina rail corridor, the Department announced its intent to expand the scope of the Rail Alignment EIS to include the Mina corridor (71 FR 60484, October 13, 2006). DOE also announced that it would update the Yucca Mountain FEIS analysis of the Carlin, Jean, and Valley Modified rail corridors to identify significant new information or circumstances relevant to environmental concerns in those rail corridors. The purpose of the update is to include new information that could change the range or magnitude of potential environmental impacts described in the Yucca Mountain FEIS. That update is the second component of the Nevada Rail Corridor SEIS. Figure S-1 shows the Carlin, Jean, and Valley Modified rail corridors and their options.

The Carlin rail corridor would originate at the Union Pacific Railroad Mainline near Beowawe, Nevada, 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 combination of options, the Carlin rail corridor would be approximately 530 kilometers (330 miles) long from its link with the Union Pacific Railroad Mainline to Yucca Mountain.

The Jean rail corridor would originate at the existing Union Pacific Railroad Mainline near Jean, Nevada. It would travel northwest near Pahrump, Town of Amargosa Valley, Jean, Goodsprings, Sand Spring, and Lathrop Wells before it reached Yucca Mountain. Depending on the combination of options, the Jean rail corridor would range from 180 to 200 kilometers (110 to 130 miles) long from its origin to Yucca Mountain.

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, the City of Las Vegas, and near Indian Springs and parallel to U.S. Highway 95 before it entered the southwest corner of the Nevada Test Site and reached Yucca Mountain. Depending on actual starting point and

combination of options, the corridor would range from 157 to 163 kilometers (98 to 101 miles) long from its origin to Yucca Mountain.

S.2.6.2 UPDATE OF ENVIRONMENTAL INFORMATION

DOE reviewed and updated the affected environment information reported in the Yucca Mountain FEIS, as appropriate, using the same data sources to the extent practicable. Updated information for the Carlin, Jean, and Valley Modified rail corridors is commensurate in content and detail with the presentation of corridor-level information in the Yucca Mountain FEIS. However, since DOE completed the Yucca Mountain FEIS, many data-management systems have advanced and now provide more data and specificity. The more advanced Caliente rail alignment design and plans provided a basis for updating estimates of potential environmental impacts for the Carlin, Jean, and Valley Modified corridors. To do this, DOE used primary impact indicators (parameters that describe alignment characteristics, such as length and earthwork quantities) from the Caliente rail alignment analyses, and calculated ratios to estimate the data at a corridor level.

Tables S-2, S-3, and S-4 summarize the results of the update to the primary impact indicators for the Carlin, Jean, and Valley Modified rail corridors, respectively, and compare them with the corridor information reported in the Yucca Mountain FEIS. The information reflects the total for railroad construction and operations unless otherwise noted. Sections S.2.6.2.1 through S.2.6.2.12 briefly describe the updated information.

S.2.6.2.1 Land Use and Ownership

Land use and ownership conflicts have increased since DOE issued the Yucca Mountain FEIS. The greatest changes to land uses associated with the Carlin and Jean rail corridors would be the significant increase in unpatented mining claims and the proposed construction of the Southern Nevada Supplemental Airport, respectively. Much has changed in relation to land use and ownership in the Valley Modified rail corridor, most notably potential land-use conflicts with Creech Air Force Base and Apex Industrial Park, and the release of the Quail Springs and Nellis A, B, and C Wilderness Study Areas to the public for sale or transfer (BLM land disposal). Impacts to private land would continue to be large for the Carlin and Jean rail corridors, as reported in the Yucca Mountain FEIS.

S.2.6.2.2 Air Quality

The Carlin rail corridor would be in areas that are in attainment or unclassifiable for criteria air pollutants. Construction activities along the Jean rail corridor could affect air quality in the Pahrump Valley near Pahrump, and nonattainment areas in the Las Vegas Valley for particulate matter with an aerodynamic diameter of 10 micrometers or less (PM_{10}) and carbon monoxide. The Pahrump area in Nye County is now subject to a Memorandum of Understanding with local regulatory agencies for air quality. Construction of a rail line in the Jean rail corridor would generate fugitive dust and could affect air quality. Construction activities in the Valley Modified rail corridor could affect air quality attainment and maintenance efforts for PM_{10} and carbon monoxide in the Las Vegas Valley. Railroad operations would be small contributors of criteria air pollutants in the Carlin, Jean, and Valley Modified rail corridors.

S.2.6.2.3 Hydrology

Impacts to surface-water resources from railroad construction and operations in the Carlin, Jean, and Valley Modified rail corridors would be the same as those reported in the Yucca Mountain FEIS. Impacts

SUMMARY

Table S-2. Updated environmental information for the Carlin rail corridor (page 1 of 2).

Resource	Changes from Yucca Mountain FEIS to this analysis
<i>Corridor length</i>	No change
<i>Land ownership</i>	
BLM-administered land	Yucca Mountain FEIS: 44,000 to 49,000 acres (180 to 200 square kilometers) (approximately 86 percent) Updated analysis: 44,000 to 52,000 acres (180 to 210 square kilometers) (88 to 94 percent)
Private land	Yucca Mountain FEIS: 1,000 to 3,700 acres (7.3 to 15 square kilometers) (approximately 6.7 percent) Updated analysis: 1,600 to 2,300 acres (6.4 to 9.4 square kilometers) (3.27 to 4.02 percent)
Nevada Test and Training Range land	Yucca Mountain FEIS: 0 to 2,700 acres (0 to 10.9 square kilometers) (approximately 5.2 percent) Updated analysis: 0 to 11.4 square kilometers (0 to 2,800 acres) (0 to 4.9 percent)
Nevada Test Site land	No change
American Indian trust lands and reservations	No change
<i>Air quality</i>	
National Ambient Air Quality Standards attainment status	No change
<i>Hydrology</i>	
Surface water	No change
Groundwater use (construction phase)	Yucca Mountain FEIS: 660 acre-feet (810,000 cubic meters) Updated analysis: 5,800 acre-feet (7.13 million cubic meters)
<i>Biological resources and soils</i>	
	Six additional sensitive species recorded
<i>Cultural resources (records search)</i>	
	Yucca Mountain FEIS: 110, recorded sites Updated analysis: 120 recorded sites
<i>Occupational and public health and safety</i>	
Industrial hazards (construction and operations)	
Total recordable cases	Yucca Mountain FEIS: 210 Updated analysis: 391
Lost workday cases	Yucca Mountain FEIS: 105 Updated analysis: 224
Fatalities	Yucca Mountain FEIS: 0.41 Updated analysis: 1
Transportation hazards (construction only)	
Traffic fatalities	Yucca Mountain FEIS: 1.1 Updated analysis: 4
Cancer fatalities	Yucca Mountain FEIS: 0.14 Updated analysis: 0.6

Table S-2. Updated environmental information for the Carlin rail corridor (page 2 of 2).

Resource	Changes from Yucca Mountain FEIS to this analysis
<i>Occupational and public health and safety (continued)</i>	
Incident-free radiological impacts (latent cancer fatalities) (operations only)	
Public	Yucca Mountain FEIS: 0.0012 Updated analysis: 0.000088
Workers	Yucca Mountain FEIS: 0.31 Updated analysis: 0.33
Radiological transportation accident fatalities	
Radiological accident risk (latent cancer fatalities)	Yucca Mountain FEIS: 0.000000037 Updated analysis: 0.000001
Cancer fatalities from vehicle emissions	Yucca Mountain FEIS: 0.09 Updated analysis: 0.4
Nonradiological transportation accident fatalities	
Spent nuclear fuel and high-level radioactive waste transportation	Yucca Mountain FEIS: 0.54 Updated analysis: 0.31
Construction and operations workforce	Yucca Mountain FEIS: 0.7 Updated analysis: 3.3
<i>Socioeconomics</i>	
Estimated construction workforce	Yucca Mountain FEIS: 1,230 worker-years Updated analysis: 6,600 worker-years
Estimated operations workforce	Yucca Mountain FEIS: 47 workers per year Updated analysis: 42 workers per year
<i>Noise and Vibration</i>	
	No change
<i>Aesthetics</i>	
	No change
<i>Utilities, energy, and materials (amount used)</i>	
Diesel	Yucca Mountain FEIS: 10.6 million gallons (40 million liters) Updated analysis: 29 million gallons (110 million liters)
Gasoline	Yucca Mountain FEIS: 0.22 million gallons (0.82 million liters) Updated analysis: 0.63 million gallons (2.4 million liters)
Steel	Yucca Mountain FEIS: 82,000 tons (76,000 metric tons) Updated analysis: 95,000 tons (86,000 metric tons)
Concrete	Yucca Mountain FEIS: 456,000 tons (414,000 metric tons) Updated analysis: 364,000 tons (330,000 metric tons)
<i>Waste Management</i>	
Sanitary Solid Waste	Updated analysis: 1.7 tons (1.6 metric tons) per day
<i>Environmental justice (disproportionately high and adverse impacts)</i>	
	No change, none identified

SUMMARY

Table S-3. Updated environmental information for the Jean rail corridor (page 1 of 2).

Resource	Changes from the Yucca Mountain FEIS to this analysis
<i>Corridor length</i>	No change
<i>Land ownership</i>	
BLM-administered land	Yucca Mountain FEIS: 15,000 to 17,000 acres (60 to 69 square kilometers) (about 83 percent) Updated analysis: 15,000 to 18,000 acres (61 to 73 square kilometers) (85.5 to 87.2)
Private land	No change
Nevada Test Site land	No change
<i>Air quality</i>	
National Ambient Air Quality Standards attainment Status	The Pahrump area in Nye County is now subject to a Memorandum of Understanding with regulatory agencies to better control fugitive emissions of PM ₁₀ and thereby avoid being designated a nonattainment area.
<i>Hydrology</i>	
Surface water	No change
Groundwater use (construction)	Yucca Mountain FEIS: 405 acre-feet (500,000 cubic meters) Updated analysis: 3,380 acre-feet (4.17 million cubic meters)
<i>Biological resources and soils</i>	Four additional sensitive species recorded
<i>Cultural resources (records search)</i>	Yucca Mountain FEIS: 6 recorded sites Updated analysis: 45 recorded sites
<i>Occupational and Public Health and Safety</i>	
Industrial hazards (construction and operations)	
Total recordable cases	Yucca Mountain FEIS: 148 Updated analysis: 246
Lost workday cases	Yucca Mountain FEIS: 76 Updated analysis: 143
Fatalities	Yucca Mountain FEIS: 0.3 Updated analysis: 0.9
Transportation Hazards (construction only)	
Traffic Fatalities	Yucca Mountain FEIS: 0.7 Updated analysis: 2.5
Cancer Fatalities	Yucca Mountain FEIS: 0.09 Updated analysis: 0.3
Incident-free radiological impacts (latent cancer fatalities) (operations only)	
Public	Yucca Mountain FEIS: 0.00085 Updated analysis: 0.00019
Workers	Yucca Mountain FEIS: 0.22 Updated analysis: 0.21

Table S-3. Updated environmental information for the Jean rail corridor (page 2 of 2).

Resource	Changes from the Yucca Mountain FEIS to this analysis.
<i>Radiological transportation accident fatalities</i>	
Radiological accident risk (latent cancer fatalities)	Yucca Mountain FEIS: 0.000000015 Updated analysis: 0.0000018
Cancer fatalities from vehicle emissions	Yucca Mountain FEIS: 0.07 Updated analysis: 0.3
<i>Nonradiological transportation accident fatalities</i>	
Spent nuclear fuel and high-level radioactive waste transportation	Yucca Mountain FEIS: 0.019 Updated analysis: 0.11
Construction and operations workforce	Yucca Mountain FEIS: 0.5 Updated analysis: 2
<i>Socioeconomics</i>	
Estimated construction workforce	Yucca Mountain FEIS: 855 worker-years Updated analysis: 4,100 worker-years
Estimated operations workforce	Yucca Mountain FEIS: 36 workers per year Updated analysis: 32 workers per year
<i>Noise and Vibration</i>	
No change	
<i>Aesthetics</i>	
No change	
<i>Utilities, energy, and materials (amount used)</i>	
Diesel	Yucca Mountain FEIS: 6.9 million gallons (26 million liters) Updated analysis: 22.7 million gallons (86 million liters)
Gasoline	Yucca Mountain FEIS: 1.3 million gallons (0.5 million liters) Updated analysis: 4.2 million gallons (1.6 million liters)
Steel	Yucca Mountain FEIS: 28,000 tons (26,000 metric tons) Updated analysis: 33,000 tons (30,000 metric tons)
Concrete	Yucca Mountain FEIS: 165,000 tons (150,000 metric tons) Updated analysis: 132,000 tons (120,000 metric tons)
<i>Waste Management</i>	
Sanitary Solid Waste	Updated analysis: 1 ton (0.91 metric ton) per day
<i>Environmental justice (disproportionately high and adverse impacts)</i>	
No change, none identified	

Table S-4. Updated environmental information for the Valley Modified rail corridor (page 1 of 2).

Resource	Changes from the Yucca Mountain FEIS to this analysis
<i>Corridor length</i>	No change
<i>Land ownership</i>	
BLM-administered land	Yucca Mountain FEIS: 7,400 to 9,100 acres (29.9 to 36.7 square kilometers (approximately 53 percent) Updated analysis: 7,700 to 8,900 acres (31 to 36 square kilometers) (51 to 53.7 percent)
Private land	Yucca Mountain FEIS: 49 acres (0.18 square kilometer) (about 3 percent) Updated analysis: 49 to 99 acres (0.2 to 0.4 square kilometer) (about 0.3 to 0.6 percent)
Nevada Test and Training Range land	Yucca Mountain FEIS: 900 to 1,900 acres (3.6 to 7.5 square kilometers) (about 11 percent) Updated analysis: 900 to 1,900 acres (4.3 to 9.4 square kilometers) (about 7.5 to 13.3 percent)
Nevada Test Site land	No change
U.S. Fish and Wildlife Service	No change
<i>Air quality</i>	
National Ambient Air Quality Standards attainment status	No change (potential for construction air quality impacts from PM ₁₀ and carbon monoxide)
<i>Hydrology</i>	
Surface water	No change
Groundwater use (construction)	Yucca Mountain FEIS: 395 acre-feet (395,000 cubic meters) Updated analysis: 320 acre-feet (3.44 million cubic meters)
<i>Biological resources and soils</i>	
<i>Cultural resources (records search)</i>	Yucca Mountain FEIS: 19 recorded sites Updated analysis: 45 recorded sites
<i>Occupational and Public Health and Safety</i>	
Industrial hazards (construction and operations)	
Total recordable cases	Yucca Mountain FEIS: 111 Updated analysis: 176
Lost workday cases	Yucca Mountain FEIS: 57 Updated analysis: 103
Fatalities	Yucca Mountain FEIS: 0.25 Updated analysis: 0.5
Transportation hazards (construction only)	
Traffic fatalities	Yucca Mountain FEIS: 0.4 Updated analysis: 1.5
Cancer fatalities	Yucca Mountain FEIS: 0.05 Updated analysis: 0.2

Table S-4. Updated environmental information for the Valley Modified rail corridor (page 2 of 2).

Resource	Changes from the Yucca Mountain FEIS to this analysis
Incident-free radiological impacts (latent cancer fatalities) (operations only)	
Public	Yucca Mountain FEIS: 0.00065 Updated analysis: 0.00014
Workers	Yucca Mountain FEIS: 0.22 Updated analysis: 0.21
Radiological transportation accident fatalities	
Radiological accident risk (latent cancer fatalities)	Yucca Mountain FEIS: 0.0000000029 Updated analysis: 0.0000013
Cancer fatalities from vehicle emissions	Yucca Mountain FEIS: 0.07 Updated analysis: 0.2
Nonradiological transportation accident fatalities	
Spent nuclear fuel and high-level radioactive waste transportation	Yucca Mountain FEIS: 0.016 Updated analysis: 0.095
Construction and operations workforce	Yucca Mountain FEIS: 0.5 Updated analysis: 1.3
<i>Socioeconomics</i>	
Estimated construction workforce	Yucca Mountain FEIS: 405 worker-years Updated analysis: 2,500 worker-years
Estimated operations workforce	Yucca Mountain FEIS: 36 workers per year Updated analysis: 32 workers per year
<i>Noise and Vibration</i>	
No change	
<i>Aesthetics</i>	
No change	
<i>Utilities, energy, and materials (amount used)</i>	
Diesel	Yucca Mountain FEIS: 3.4 million gallons (13 million liters) Updated analysis: 13 million gallons (49 million liters)
Gasoline	Yucca Mountain FEIS: 0.07 million gallons (0.27 million liters) Updated analysis: 0.26 million gallons (1 million liters)
Steel	Yucca Mountain FEIS: 24,000 tons (22,000 metric tons) Updated analysis: 29,000 tons (26,000 metric tons)
Concrete	Yucca Mountain FEIS: 143,000 tons (130,000 metric tons) Updated analysis: 110,000 tons (100,000 metric tons)
<i>Waste Management</i>	
Sanitary solid waste	Updated analysis: 0.7 tons (0.6 metric tons) per day
<i>Environmental justice (disproportionately high and adverse impacts)</i>	
No change, none identified	

associated with changes in drainage patterns or to erosion and sedimentation rates or locations would be small and localized.

Based on earthwork needs as opposed to terrain type, the estimated groundwater use for railroad construction in the Carlin, Jean, and Valley Modified rail corridors has increased substantially over that reported in the Yucca Mountain FEIS.

S.2.6.2.4 Biological Resources and Soils

There would be no differences in potential impacts to biological resources and soils from those reported in the Yucca Mountain FEIS for the Carlin, Jean, and Valley Modified rail corridors. DOE has identified additional records of sensitive species in all three corridors. Because all three corridors would cross some desert tortoise habitat, there would continue to be potential impacts to desert tortoise habitat and individuals of the species, as reported in the Yucca Mountain FEIS.

S.2.6.2.5 Cultural Resources

Since DOE completed the Yucca Mountain FEIS, there have been surveys that identified additional cultural resources in the Carlin, Jean, and Valley Modified rail corridors regions of influence. Grading and other construction activities could degrade, cause the removal of, or alter the setting of cultural resources sites and cause the loss of cultural resources.

S.2.6.2.6 Occupational and Public Health and Safety

The greatest potential impacts to health and safety would be from traffic accidents, mainly associated with commuting workers. In relation to industrial safety, the categories of worker impacts include total recordable incidents, lost workdays, and fatalities. Revised estimates of the number of workers needed to construct the railroad resulted in approximately a six-fold rise in the estimate of worker-years in comparison to the worker-years estimated in the Yucca Mountain FEIS (2,000 hours per worker-year). Since DOE completed the Yucca Mountain FEIS, there have been updates to the methods and data to estimate radiation doses for workers and members of the public. Because of the increase in the estimate of construction workers over that reported in the Yucca Mountain FEIS, there would be minimal increases in estimated traffic fatalities, and fatalities from exposure to vehicle emissions. DOE has estimated that radiological impacts to members of the public and workers from incident-free transportation and accident risks in the Carlin, Jean, and Valley Modified rail corridors would increase slightly over the estimate reported in the Yucca Mountain FEIS.

S.2.6.2.7 Socioeconomics

The Yucca Mountain FEIS discussion of socioeconomic impacts identified the number of employees that would be necessary to operate intermodal transfer stations. Based on the identified levels of employment, DOE concluded that the potential cumulative socioeconomic impacts to local communities would be small. Revised estimates of the number of workers needed to construct the rail line resulted in approximately a six-fold rise in the estimate of worker-years in comparison to the worker-years estimated in the Yucca Mountain FEIS (2,000 hours per worker-year).

In relation to employment levels for railroad construction in the Carlin, Jean, or Valley Modified rail corridor, the workforce requirements would vary based on the length of the corridor and earthwork requirements. Operations workforce levels for each corridor would change slightly from those reported in the Yucca Mountain FEIS. Given the short-term nature of construction and the relatively limited number of employees necessary for the railroad operations, the potential for socioeconomic impacts along a corridor would be both short-term and small. 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 DOE reported in the Yucca Mountain FEIS. Current population growth in Clark County would mask socioeconomic impacts due to the short-term growth in the workforce or the associated impact on population growth.

S.2.6.2.8 Noise and Vibration

Potential noise impacts would be small. The Carlin, Jean, and Valley Modified rail corridors mainly cross through unoccupied BLM-administered public lands. The number of trains per week on each line, approximately 17, would result in small impacts to potentially affected communities. DOE did not identify any significant new information or circumstances that would cause the affected environment or the estimated impacts from noise and vibration to change from that reported in the Yucca Mountain FEIS.

S.2.6.2.9 Aesthetics

Based on an evaluation of current BLM Resource Management Plans, there have been no changes to the visual setting classifications in the Carlin, Jean, and Valley Modified rail corridors since DOE completed the Yucca Mountain FEIS. Therefore, impacts to aesthetic resources would be the same as those reported in the Yucca Mountain FEIS. Most of the Carlin rail corridor would pass through BLM Visual Resource Management Class IV areas (the BLM designation that provides for management activities that require major modifications of the existing character of the landscape). Because the Jean rail corridor would cross Visual Resource Management Class II areas (the BLM designation that provides for the retention of the existing character of the landscape), impacts to the viewshed from railroad operations would cause a conflict with the visual resource classification. As reported in the Yucca Mountain FEIS, railroad operations in the Valley Modified rail corridor would have small impacts to visual resources in the area because the entire corridor would fall within the BLM-designated Class III areas (the BLM designation that provides for the partial retention of the existing character of the landscape).

S.2.6.2.10 Utilities, Energy, and Materials

Construction activities would use motor fuel, concrete, and steel. Quantities would be small in comparison to regional use and capacity, which would not be affected. Railroad operations would consume relatively small quantities of motor fuel and would not affect regional consumption. Estimates of steel and concrete consumption increased over those reported in the Yucca Mountain FEIS. The estimated impacts to utilities, energy, and materials from the railroad operations in the Carlin, Jean, or Valley Modified rail corridor would be small and similar to that reported in the Yucca Mountain FEIS. The estimated use of motor fuel by locomotives would have increased over that reported in the Yucca Mountain FEIS due to more weekly train trips, but overall motor fuel use impacts would remain small.

S.2.6.2.11 Waste Management

The Yucca Mountain FEIS evaluated waste management impacts that would be common to all rail corridors rather than for individual corridors. Information is now more readily available to differentiate between corridor-specific waste-management impacts. Therefore, DOE has included this information at a level of analysis similar to that of the Yucca Mountain FEIS. Construction activities would generate about 1.6 metric tons (1.7 tons) of municipal solid waste per day in the Carlin rail corridor, about one metric ton (1.1 tons) per day in the Jean rail corridor, and less than 1 metric ton (less than 1 ton) per day in the Valley Modified rail corridor. This volume could affect the capacity and closure dates of small rural landfills. Nevada has extensive waste disposal capacity and land for new capacity. DOE could transport waste to existing landfills with ample capacities, such as Apex. Volumes of other types of waste would be small, with no expected strain on disposal capacity.

Railroad operations would generate minimal amounts of waste. The Yucca Mountain FEIS estimated that the peak annual generation would be 910 metric tons (1,000 tons) of sanitary solid waste for each rail corridor; the updated estimates of post recycling waste for each corridor now average about half that amount.

S.2.6.2.12 Environmental Justice

The Yucca Mountain FEIS did not identify potential impacts to minority or low-income populations in the Carlin, Jean, and Valley Modified rail corridors. The environmental impacts updates for those rail corridors did not identify any new minority or low income populations or special pathways for impacts to such populations. Because no new impacts were identified, it is unlikely there would be any disproportionately high and adverse impacts to minority or low-income populations from railroad construction and operations along the Carlin, Jean, or Valley Modified rail corridors.

S.2.7 Issues to be Resolved

Within the context of the first purpose of the Rail Corridor SEIS, to analyze the Mina rail corridor at a level of detail commensurate with that of the rail corridors analyzed the Yucca Mountain FEIS, there are no issues that remain to be resolved. However, under the overarching Proposed Action to construct and operate a railroad in Nevada in the Mina rail corridor to transport spent nuclear fuel, high-level radioactive waste, and other materials to a repository at Yucca Mountain, it remains unresolved whether the BLM would choose to authorize DOE access to sufficient lands for railroad construction and operation under the right-of-way grant applied for by DOE. DOE would also need to apply to the Bureau of Indian Affairs to acquire a right-of-way in which to construct a rail line on the Walker River Paiute Reservation.

S.2.8 Areas of Controversy

The Yucca Mountain Project, including the transport of spent nuclear fuel and high-level radioactive waste along any chosen rail corridor through Nevada, has remained a controversial issue since its inception some 20 years ago, and has been strongly opposed in the State of Nevada by a variety of state, local, tribal, and citizen groups. A particular focus of controversy has been a state's right to determine federal projects within its borders. Over the last decade the State of Nevada has filed multiple lawsuits against the federal government regarding the Yucca Mountain Project. In 2004, the State of Nevada petitioned the United States Court of Appeals for the District of Columbia Circuit to review the Yucca Mountain FEIS and the portion of the DOE Record of Decision governing the transportation of nuclear waste. The State of Nevada alleged that the FEIS was procedurally flawed, violated NEPA, and ignored STB railroad regulations. The State of Nevada also challenged the Record of Decision under the Administrative Procedure Act in determining a "mostly rail" plan to be the preferred means of shipping waste to the site, and argued that DOE exceeded its authority in selecting the Caliente corridor. On August 8, 2006, the Court denied Nevada's petition.

In April 2007 the Tribal Council of the Walker River Paiute Tribe announced a resolution withdrawing their participation in the Rail Corridor SEIS and the Rail Alignment EIS, and renewing the Tribe's past objection to the transportation of nuclear waste through its Reservation. Thus, in the Rail Alignment EIS, DOE has identified the Mina rail corridor as a nonpreferred alternative.

The Consolidated Group of Tribes and Organizations has consistently opposed the siting of a repository at Yucca Mountain and transportation of spent nuclear fuel and high-level radioactive waste to such a repository. Construction and operation of the proposed repository the proposed railroad are viewed to constitute an intrusion on the holy lands of the Southern Paiute, Western Shoshone, and Owens Valley

Paiute and Shoshone people; a disturbance to cultural, biological, botanical, geological, and hydrological resources; and intrusion on American Indian viewscapes, songscapes, storyscapes, and traditional cultural properties. DOE accepts these viewpoints as responsible opposing viewpoints. These issues could continue to be viewed as unresolved within the forum of American Indian cultures and beliefs.

S.2.9 Major Conclusions

DOE concludes that the Mina rail corridor warrants further study at the alignment level under NEPA, although as a nonpreferred alternative. In reaching this conclusion, DOE considered the environmental conditions and associated potential impacts of constructing and operating a railroad for each of 12 environmental resource areas, and found overall that impacts would be small. The Mina rail corridor coincides in part with an abandoned rail line and follows relatively flat terrain over much of its length, which would minimize the amount of cuts and fills and tend to reduce environmental impacts. However, cumulative impacts to groundwater resources for railroad construction and operations in the Mina rail corridor would be small to moderate.

On April 17, 2007, the Walker River Paiute Tribal Council passed a resolution withdrawing support for the Tribe's participation in the Supplemental Yucca Mountain Nevada Rail Corridor EIS and Rail Alignment EIS preparation process. The Tribal Council's resolution also renewed the Tribe's past objection to the transportation of nuclear waste through its Reservation. Accordingly, DOE has identified the Mina Implementing Alternative as nonpreferred in the Supplemental Yucca Mountain Nevada Rail Corridor EIS and Rail Alignment EIS.

DOE also concludes that, based on the analysis in the Nevada Rail Corridor SEIS, there are no significant new circumstances or information relevant to environmental concerns that would warrant further consideration of the Carlin, Jean, and Valley Modified rail corridors at the alignment level. In reaching this conclusion, the Department has updated the information for 12 environmental resource areas for those three rail corridors, which were evaluated in detail in the Yucca Mountain FEIS. Overall, the environmental conditions and associated potential environmental impacts for each rail corridor remain unchanged from, or are substantially similar to, those reported in the Yucca Mountain FEIS. Notably, however, potential land use and ownership conflicts in the Jean and Valley Modified rail corridors have increased, and although the amount of private land within the Carlin rail corridor appears to have decreased (based on a more refined analysis using land ownership databases), the complex land-ownership pattern (mix of private and public lands that would be crossed) remains unchanged. Such land-use and ownership conflicts and complexity increase the potential to adversely affect construction of a railroad, and increase the potential for delays that could affect the availability of a railroad in these corridors. Moreover, air quality management goals within the Jean rail corridor have changed since DOE completed the Yucca Mountain FEIS, and construction of a railroad could increase the potential for conflicts with these goals.

S.3 SUMMARY OF THE RAIL ALIGNMENT EIS

S.3.1 Purpose and Need for Agency Action

Based on its obligations under the NWPA and its decision to select the mostly rail scenario for the transportation of spent nuclear fuel and high-level radioactive waste, DOE needs to ship these materials by rail in Nevada to a repository at Yucca Mountain.

At present, there is no railroad to the Yucca Mountain Site. In the Yucca Mountain FEIS, DOE evaluated in detail five potential rail corridors within Nevada in which the Department could construct a railroad to

link an existing rail line to Yucca Mountain: Caliente, Carlin, Caliente–Chalk Mountain, Jean, and Valley Modified rail corridors. Figure S-3 shows the five rail corridors analyzed in the Yucca Mountain FEIS.

DOE prepared the Rail Alignment EIS to provide the background, data, information, and analyses to help decisionmakers and the public understand the potential environmental impacts that could result from constructing and operating a railroad for shipment of spent nuclear fuel, high-level radioactive waste, and other materials from an existing rail line in Nevada to a repository at Yucca Mountain. This railroad would consist of a rail line, railroad operations support facilities, and other related infrastructure. DOE will use the Rail Alignment EIS to decide whether to construct and operate the proposed railroad, and if so, to:

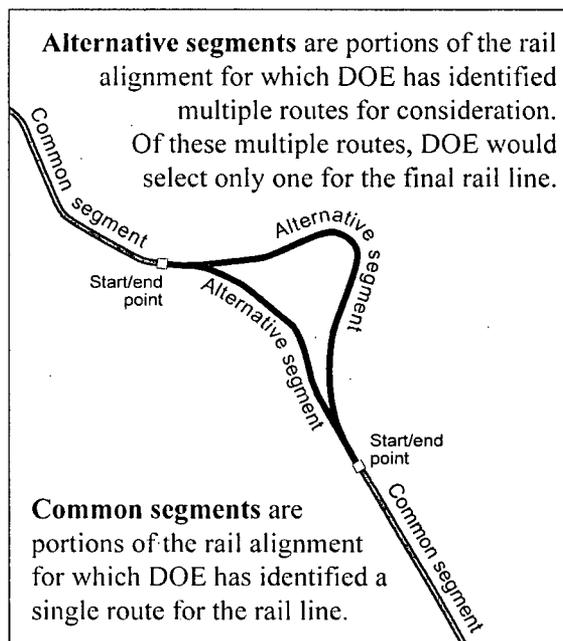
- Select a rail alignment (Caliente rail alignment or Mina rail alignment) in which to construct the railroad.
- Select the common segments and alternative segments within either a Caliente rail alignment or a Mina rail alignment. The Department would use the selected common segments and alternative segments to identify the public lands to be included in right-of-way applications.
- Decide where to construct proposed railroad operations support facilities.
- Decide whether to restrict use of the rail line to DOE trains, or whether to allow commercial shippers to operate over the rail line (Shared-Use Option).
- Determine what mitigation measures to implement.

S.3.2 Proposed Action and Alternatives

Under the Rail Alignment EIS Proposed Action, DOE would construct and operate a railroad in Nevada to transport spent nuclear fuel, high-level radioactive waste, and other materials to a repository at Yucca Mountain. DOE would also use the railroad to transport materials needed for construction, operation, and maintenance of the repository and rail line.

Under the Proposed Action Caliente Implementing Alternative (the **preferred alternative**), DOE would construct and operate a railroad along the Caliente rail alignment to run from a site in or near the City of Caliente, Nevada, to Yucca Mountain. The rail line would extend north from Caliente, Nevada, turn in a westerly direction and head to near the northwest corner of the Nevada Test and Training Range, and then continue south-southeast to Yucca Mountain. The rail line could range in length from approximately 528 to 541 kilometers (328 to 336 miles) depending on the combination of alternative segments (see Figure S-3).

Under the Proposed Action Mina Implementing Alternative (the **nonpreferred alternative**), DOE would construct and operate a railroad along the Mina rail alignment to run from a site near Wabuska, Nevada, to Yucca Mountain. The rail line would extend from near Wabuska, Nevada, in a southeasterly direction to Yucca Mountain. The total length of the Mina rail alignment could range from approximately



452 to 502 kilometers (281 to 312 miles), which includes portions of an existing rail line currently operated by the Department of Defense. Additionally, railroad operations along the Mina rail alignment would require DOE to operate trains on the Union Pacific Railroad Hazen Branchline, which extends from Hazen, Nevada, south to Wabuska (see Figure S-4).

Under the Shared-Use Option, the Department would allow commercial use of the rail line in under either implementing alternative.

The Rail Alignment EIS also considers the potential environmental impacts of a No-Action Alternative, under which DOE would not construct a railroad along the Caliente rail alignment or the Mina rail alignment.

Figure S-5 shows the two implementing alternatives and the rail line segments that would be the same under either implementing alternative.

For each rail alignment, DOE considered a series of common segments and a range of alternative segments (Figures S-3 and S-4, respectively). DOE applied various engineering, environmental, and design criteria to identify the common segments and alternative segments to be evaluated in the Rail Alignment EIS.

The Proposed Action includes acquiring a right-of-way grant from the BLM, which would authorize DOE access to sufficient lands for the rail alignment and railroad construction and operations support facilities. Under the Mina Implementing Alternative, DOE would need to obtain right-of-way access from the Walker River Paiute Tribe and the Bureau of Indian Affairs to access lands on the Walker River Paiute Reservation. Implementation of the Proposed Action would also require that DOE obtain access to some private land.

During construction of the proposed railroad, a right-of-way would be established that would occupy an approximately 300-meter (1,000-foot)-wide strip of land centered on the rail alignment within the rail corridor. During the railroad operations phase, the right-of-way would be reduced to an approximately 120-meter (400-foot)-wide strip.

Under the Proposed Action DOE would construct and operate the proposed railroad in accordance with applicable federal and State of Nevada laws and regulations, and in compliance with all stipulations and conditions in associated permits. To help ensure compliance with applicable requirements, DOE would implement an array of best management practices as part of the Proposed Action. Best management practices would include practices such as dust suppression and the use of silt fencing to control soil erosion during construction activities. DOE has identified potential mitigation measures to reduce environmental impacts where analyses indicate the potential for environmental impacts after DOE implemented engineering, site evaluation and planning practices, and best management practices. Under the Proposed Action without shared use, the rail line would be restricted to DOE shipments. DOE would use the rail line to ship approximately 9,500 casks containing spent nuclear fuel and high-level radioactive waste from the Caliente or Wabuska area to the repository for up to 50 years of operations. DOE would also ship approximately 29,000 railcars of other materials, which would include repository construction materials, materials necessary for day-to-day operations of the railroad and the repository, and waste materials for disposal, such as scrap metal and solid waste. DOE anticipates that an average of approximately 17 one-way trains per week would travel along either rail line. (A one-way train means a single trip in either direction.)

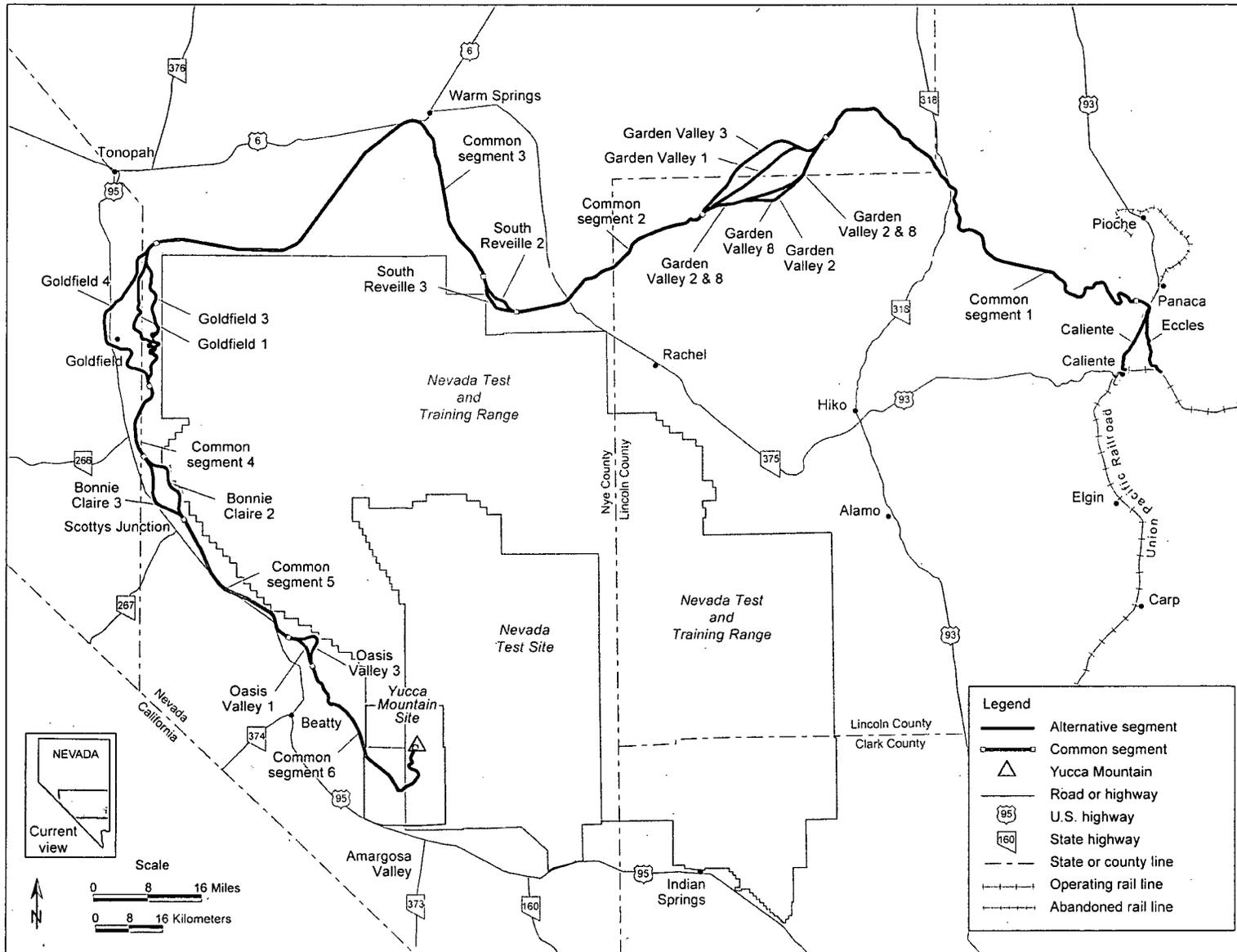


Figure S-3. Caliente rail alignment analyzed in the Rail Alignment EIS.

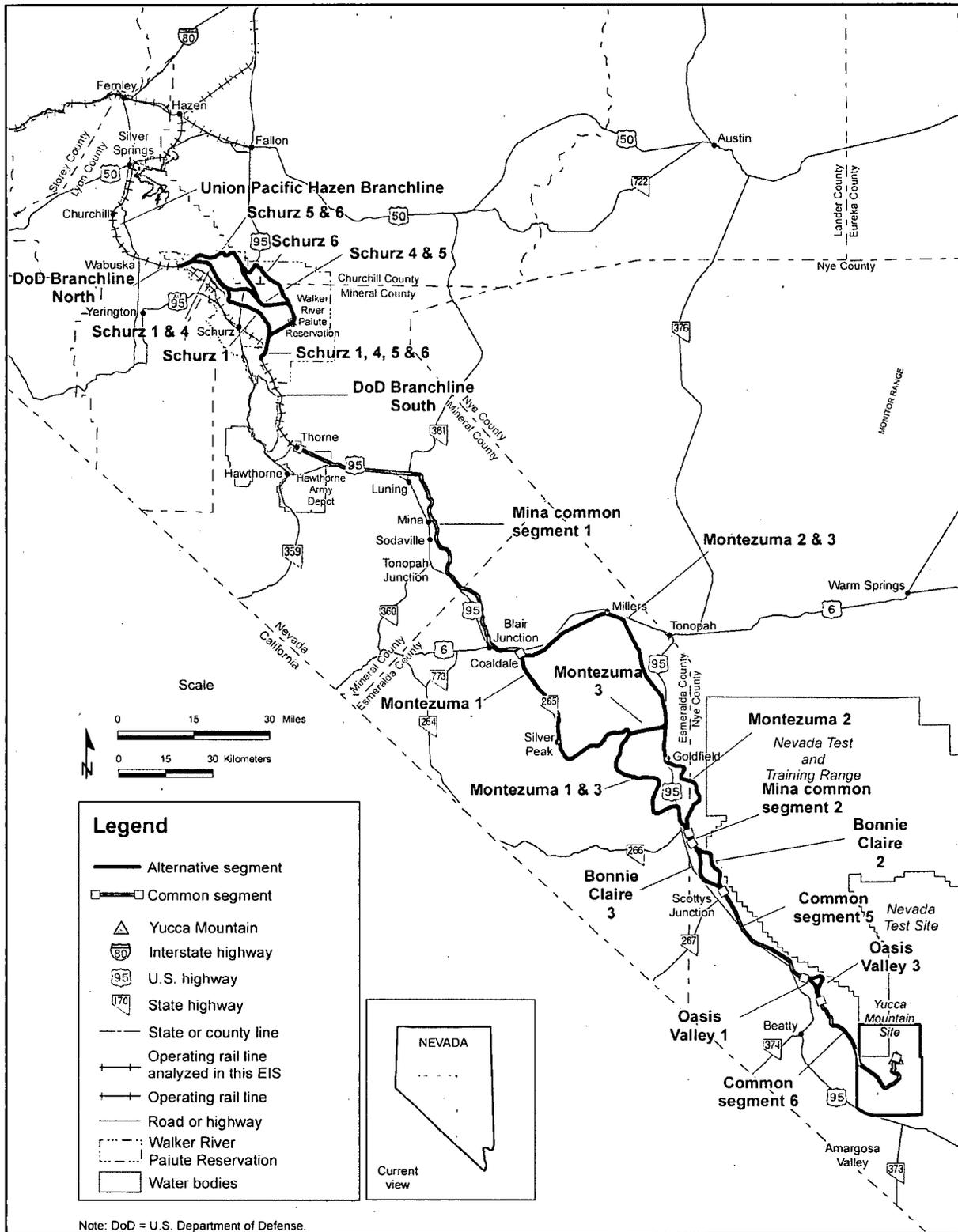


Figure S-4. Mina rail alignment analyzed in the Rail Alignment EIS.

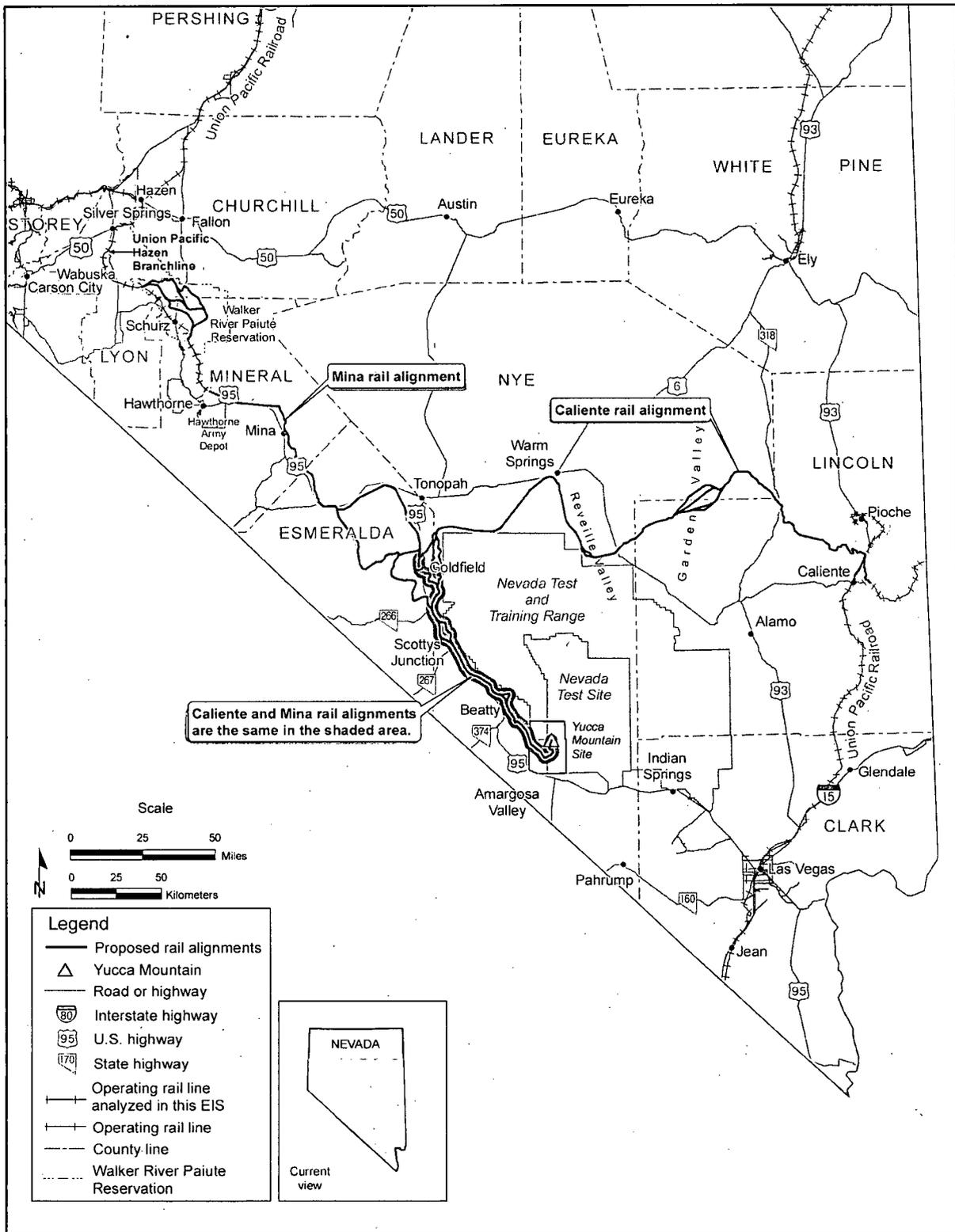


Figure S-5. The proposed Caliente and Mina rail alignments.

Both the Caliente and Mina Implementing Alternatives would require railroad operations support facilities. Under the Caliente Implementing Alternative, facilities would include:

- Interchange Yard
- Staging Yard
- Maintenance-of-Way Facilities
- Rail Equipment Maintenance Yard
- Cask Maintenance Facility
- Nevada Railroad Control Center and National Transportation Operations Center

Under the Mina Implementing Alternative, facilities would include:

- Staging Yard (which would encompass the Interchange Yard)
- Maintenance-of-Way Facility
- Rail Equipment Maintenance Yard
- Cask Maintenance Facility
- Nevada Railroad Control Center and National Transportation Operations Center.

The Department estimates the total cost to construct the railroad within the Caliente rail alignment would be approximately \$2.2 billion (in year 2005 dollars with no escalation), whereas the total cost to construct the railroad within the Mina rail alignment would be approximately \$1.7 billion (in year 2005 dollars with no escalation).

Ballast is the coarse rock that is placed under the railroad tracks to support the railroad ties and improve drainage along the rail line.

Subballast is a layer of crushed gravel that is used to separate the ballast and roadbed for the purpose of load distribution and drainage.

S.3.2.1 RAILROAD CONSTRUCTION

DOE anticipates that it would take 4 to 10 years to construct the proposed railroad along either rail alignment. Construction of the railroad would include construction of the rail line, the infrastructure necessary to support the construction and operation of the railroad (for example, construction camps, water wells, and ballast quarries), and operations support facilities. Construction activities would occur inside the 300-meter (1,000-foot)-wide construction right-of-way, except in some areas requiring deep cuts or high fills, which could extend beyond typical widths. The total construction footprint resulting from establishing this construction right-of-way under the Caliente Implementing Alternative would be approximately 170 square kilometers (41,000 acres) and under the Mina Implementing Alternative approximately 140 square kilometers (35,000 acres), but would vary depending on the final alternative segments selected. DOE would implement best management practices during this entire construction process.

Construction of the rail line would require obtaining water, ballast, subballast, steel for bridges, concrete ties, and rail. For purposes of analysis, DOE assumed that water would be obtained by pumping groundwater from new water-supply wells along the rail alignment. Under the Caliente Implementing Alternative, a maximum of 107 well sites would be required to supply the 6,100 acre-feet of water necessary for construction. Under the Mina Implementing Alternative, a maximum of 74 well sites would be required to supply the 5,950 acre-feet of water necessary for construction.

DOE would obtain ballast primarily by constructing new quarries along the rail alignment. New quarry sites would occupy a footprint of approximately 0.97 to 3.8 square kilometers (240 to 930 acres). Under the Caliente Implementing Alternative, the Department would construct up to four quarries from six potential locations along the rail alignment. Additionally, DOE is considering obtaining ballast from an existing quarry operation in Utah and shipping it to the proposed rail line. Under the Mina Implementing

Alternative, the Department would construct up to two quarries from five potential locations along the rail alignment.

Under either the Caliente or the Mina Implementing Alternative, DOE would obtain subballast from existing borrow sites along the rail alignment; waste rock generated at ballast quarry sites; from materials excavated during rail roadbed construction; or from the development of new subballast borrow sites established inside the construction right-of-way. Some of the borrow sites for the Mina Implementing Alternative would lie outside of the construction right-of-way. The Department would obtain steel, concrete ties, and rail from existing commercial sources.

DOE would construct the rail line in two major steps: (1) rail roadbed construction and (2) track construction. The rail roadbed would form the base upon which the subballast, ballast, concrete ties, and rail would be laid. Construction of the rail roadbed would require clearing, cuts and fills, and excavating earth. Track construction would involve the placement of subballast, ballast, concrete ties, and rail on top of the rail roadbed, building access roads, and establishing power and communication systems. Construction of the rail line would require DOE to establish construction camps along the rail alignment to provide housing for workers and a logistical base from which to conduct construction activities. Under the Caliente Implementing Alternative, the Department would establish up to 12 construction camps. Under the Mina Implementing Alternative, the Department would establish up to 10 construction camps. Each camp would occupy approximately 0.10 square kilometer (25 acres).

Under either the Mina or Caliente Implementing Alternative, DOE would construct bridges, *culverts*, and at-grade and *grade-separated* road crossings. Under the Caliente Implementing Alternative, the Department would construct up to 240 bridges ranging in length from 7.3 to 300 meters (24 to 1,000 feet); up to 138 large culverts; and up to five grade-separated crossings of highways along the rail alignment. Under the Mina Implementing Alternative, the Department would construct up to 69 bridges ranging in length from 16 to 300 meters (50 to 1,000 feet); up to 60 large culverts; and up to four grade-separated crossings of highways along the rail alignment.

Crossings at other paved public roadways would be at-grade and DOE would install active warning devices, such as flashing lights and gates. For crossings at unpaved roads and private crossings, DOE would install passive warning devices, such as crossbucks and stop signs.

Under either the Caliente or Mina Implementing Alternative, DOE would construct approximately 12 passing *sidings* approximately every 40 kilometers (25 miles) along the rail alignment. Under the Mina Implementing Alternative, DOE would also install sidings along the existing Department of Defense Branchline. Under either implementing alternative, DOE would construct temporary construction sidings at camps, quarries, and material laydown areas.

Table S-5 lists the attributes associated with rail line construction for each implementing alternative.

A **culvert** is a conduit for conveying surface water through an embankment. The typical culvert that would be utilized during construction is a box culvert, which is rectangular in cross section. Circular culverts, which are circular in cross section, would also be used when appropriate.

A **grade-separated crossing** occurs when a roadway and a rail line cross paths and one passes over or under the other via an overpass or underpass.

A **siding** is a track that runs parallel to the main line for a short distance and is used for passing and overtaking trains to prevent backups and keep traffic flowing.

SUMMARY

Table S-5. Project attributes associated with construction^a of the proposed rail line.

Attribute	Caliente Implementing Alternative	Mina Implementing Alternative
Estimated number of bridges	Approximately 215 to 240, ranging in length from 3 to 7.3 meters (24 to 1,000 feet)	Approximately 58 to 69, ranging in length from 3 to 16 meters (50 to 1,000 feet)
Estimated number of culverts	Approximately 96 to 138	Approximately 38 to 60
Communications towers	Approximately every 16 to 32 kilometers (10 to 20 miles) along the rail alignment, approximately 23 to 30 meters (75 to 100 feet) tall	
Estimated number of water wells needed to satisfy construction water demand	Minimum: 94 well sites containing 150 wells Maximum: 107 well sites containing 176 wells	Minimum: 58 well sites containing 77 wells Maximum: 74 well sites containing 110 wells
Sidings	12 sidings, ranging in length from 2,100 to 3,700 meters (7,000 to 12,000 feet)	12 sidings, ranging in length from 2,100 to 5,800 meters (7,000 to 19,000 feet)
Alignment access roads	The railroad alignment is planned to have an access road along most of its length. This road would be used primarily to support maintenance of the railroad infrastructure. In situations where rerouting existing roads to a common crossover point would be appropriate, DOE could use the access road to facilitate routing roads to a single crossing.	
Construction camps	Number: up to 12, with up to 6 operating at one time Function: To house the rail line construction workers and provide a logistical support area for construction. Location: One approximately every 50 kilometers (30 miles) along the rail alignment Employment: Up to 360 per camp (106 support staff and 254 contractors) Disturbed area: 0.10 square kilometer (25 acres) per camp	Number: up to 10, with up to 6 operating at one time
Ballast quarries	Number: If necessary, up to four would be developed from six potential sites. Locations: One near Caliente; two in South Reville Valley; one west of Goldfield; and two northeast of Goldfield Employees: Up to 30 at each quarry Disturbed Area: 0.32 to 0.49 square kilometer (80 to 120 acres) per site	Number: If necessary, up to two would be developed from five potential sites. Locations: Two east of Hawthorne; one east of Silver Peak; and two west of Goldfield.
Construction train traffic	Ballast trains: Approximately 8 one-way trains ^b per day Concrete tie trains: Approximately 2 one-way trains per day Rail section trains: Approximately 4 one-way trains per day Other materials trains: Approximately 2 one-way trains per day Total: Approximately 16 one-way trains per day	
Total construction employment (required over the entire construction phase)	8,100 employees (the maximum number of employees in one year is 2,160)	7,600 employees (the maximum number of employees in one year is 2,160)

a. Construction would take place over a 4- to 10-year period.

b. A one-way train means a single trip in either direction.

S.3.2.2 RAILROAD OPERATIONS AND MAINTENANCE

Under the Proposed Action, the railroad would be expected to operate for up to 50 years for the shipment of spent nuclear fuel, high-level radioactive waste, and other materials to the repository at Yucca Mountain. DOE would operate an average of 17 one-way trains per week to transport approximately 9,500 casks of spent nuclear fuel and high-level radioactive waste, and approximately 29,000 railcars of construction materials, diesel fuel, and supplies for the repository and facilities.

Under the Caliente Implementing Alternative, trains would arrive at the Interchange Yard on the Union Pacific Railroad Mainline near Caliente and proceed to the Staging Yard along either the Caliente or the Eccles alternative segment. Under the Mina Implementing Alternative, trains would arrive on the Union Pacific Railroad Mainline near Hazen and proceed to the Staging Yard at Hawthorne via the Union Pacific Railroad Hazen Branchline, the Department of Defense Branchline North, the selected Schurz alternative segment, and the Department of Defense Branchline South. Under the Caliente Implementing Alternative, two facilities (the Interchange Yard and the Staging Yard) would be required to fulfill the functional requirements of exchanging railcars between the Union Pacific Railroad Mainline and the proposed railroad. This is because there is not enough space where the Caliente rail alignment would intersect the Union Pacific Railroad Mainline to house all of the necessary functions of these facilities in one location. However, under the Mina Implementing Alternative, there is enough space to locate all the functions in a single facility (the Staging Yard) at Hawthorne. Once at a Staging Yard, Union Pacific Railroad locomotives would uncouple from cask cars and return to the mainline. The cask cars would go through all appropriate inspections in accordance with Federal Railroad Administration regulations (49 CFR Part 232 and 49 CFR Part 215). A DOE cask train would typically consist of two or three 4,000-horsepower diesel-electric locomotives followed by a buffer car; one to five cask cars followed by another buffer car; and one escort car carrying security personnel, as illustrated in Figure S-4. Naval spent nuclear fuel trains would typically include two or three locomotives, one to 12 cask cars, a buffer car in front of the first cask car and after the last cask car, and one to two escort cars.

Under either implementing alternative, following inspection and assembly of cask trains, trains would depart the Staging Yard and travel for less than 10 hours along the railroad to the Rail Equipment Maintenance Yard at the Yucca Mountain Site. Casks would then be transferred to control of the geologic repository operations area to be unloaded for repository storage. Empty casks would be transferred back to railroad control, and before they were returned to the Staging Yard for onward shipment, could be sent to a Cask Maintenance Facility for testing, inspection, maintenance, minor decontamination, and routine repair of the casks. The National Transportation Operations Center would oversee the shipment of casks from sites throughout the United States; train movements, rail operations, and emergency response operations along the proposed railroad would be coordinated from the Nevada Railroad Control Center. Both would be located either at the Rail Equipment Maintenance Yard or at the Staging Yard.

Under the Caliente Implementing Alternative, most rail line maintenance and inspection activities would be conducted in the Maintenance-of-Way Facilities, which consist of the Maintenance-of-Way Trackside Facility, Maintenance-of-Way Headquarters Facility, and two Satellite Maintenance-of-Way Facilities. Under the Mina Implementing Alternative, the Maintenance-of-Way Trackside Facility and the Maintenance-of-Way Headquarters Facility would be combined and housed in a single Maintenance-of-Way Facility. All maintenance and inspection activities would be performed out of this facility and two Satellite Maintenance-of-Way Facilities, one at the Staging Yard and one at the Rail Equipment Maintenance Yard. Maintenance activities along the Mina rail alignment would include maintaining the existing Department of Defense Branchline as needed.

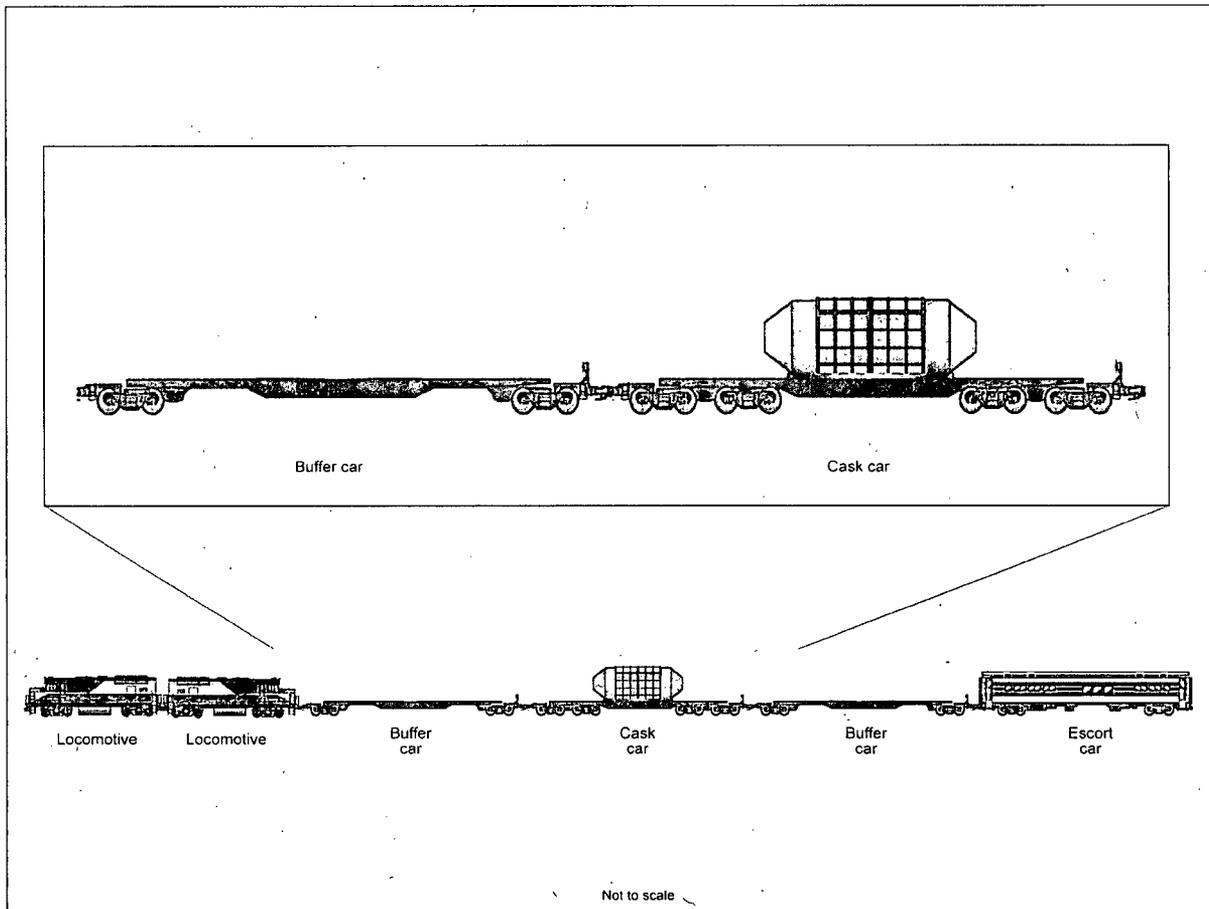


Figure S-4. Artist's conception of a repository train carrying one cask.

Table S-6 lists the rail facilities along the Caliente and Mina rail alignments and details their functions, their locations, and the number of personnel needed to operate each facility.

S.3.2.3 SHARED-USE OPTION

Under both implementing alternatives, DOE has analyzed a Shared-Use Option, under which (subject to STB approval) the Department would allow commercial shippers to use the rail line to ship general freight. The Shared-Use Option would require construction of commercial sidings to provide access for potential commercial shippers, and facilities for operation of commercial rail service. Funding for construction and commercial rail service could be provided by either the private sector or other government sources. The DOE design for the rail line (for example, grade and curvature) would accommodate shared use.

Commercial railcars would be hauled in trains that are separate from trains carrying spent nuclear fuel and high-level radioactive waste, but could be hauled with trains carrying other repository-related materials (for example, construction materials, water, and fuel). During the operations phase, trains carrying spent nuclear fuel and high-level radioactive waste would have priority over trains carrying commercial shipments.

Table S-6. Railroad operations support facilities – Caliente and Mina rail alignments (page 1 of 2).

Facility	Location	General function	Number of employees required for operations
<i>Facilities along the Caliente rail alignment (excluding facilities common to the Caliente and Mina rail alignments)</i>			
<i>Facilities at the Interface with the Union Pacific Railroad Mainline</i>			
Interchange Yard	Caliente or Eccles alternative segments Lincoln County	Handling point for the exchange of railcars containing construction and other materials between the Union Pacific Railroad Mainline and the proposed railroad	0 (employees would be based at the Staging Yard)
Staging Yard	Caliente alternative segment: Indian Cove or Upland option Eccles alternative segment: Eccles-North Lincoln County	Transfer point for casks and other materials delivered to the proposed railroad from around the country	50 (including employees for the potential Nevada Railroad Control Center and National Transportation Operations Center)
<i>Maintenance-of-Way Facilities</i>			
Maintenance-of-Way Headquarters Facility	South of Tonopah, near the intersection of U.S. Highway 95 and U.S. Highway 6 Esmeralda County	Coordination center for all maintenance activities along the proposed railroad	10
Maintenance-of-Way Trackside Facility	Common segment 3; 48 kilometers (30 miles) southeast of Tonopah Nye County	Base of operations for most maintenance activities along the rail alignment	40
Satellite Maintenance-of-Way Facility	Rail Equipment Maintenance Yard and Staging Yard Nye County and Lincoln County	Dispatch point for maintenance activities along the first third and final third of the rail line	0 (employees housed at the Maintenance-of-Way Trackside and Headquarters Facilities)
Staging Yard	Mina common segment 1 near Hawthorne Mineral County	Transfer point for casks and other materials delivered to the proposed railroad from around the country Handling point for the exchange of railcars containing construction and other materials between the Union Pacific Railroad and the proposed railroad	40

Table S-6. Rail line operations support facilities – Caliente and Mina rail alignments (page 2 of 2).

Facility	Location	General function	Number of employees required for operations
Facilities along the Mina rail alignment (excluding facilities common to the Caliente and Mina rail alignments)			
<i>Maintenance-of-Way Facilities</i>			
Maintenance-of-Way Facility	Montezuma alternative segment 1: Silver Peak option Montezuma alternative segments 2 and 3: Klondike option Esmeralda County	Coordination center and base of operations for all maintenance activities along the proposed railroad	40
Satellite Maintenance-of-Way Facility	Rail Equipment Maintenance Yard and Staging Yard Nye County and Lincoln County	Dispatch point for maintenance activities along the first third and final third of the rail line	0 (employees based at the Maintenance-of-Way Facility)
Facilities common to both the Caliente and Mina rail alignments			
Rail Equipment Maintenance Yard	Less than 1.6 kilometers (1 mile) south of the southern boundary of the geologic repository operations area Nye County	Receiving point for casks and other freight from the proposed railroad to the Yucca Mountain Repository; would also store, service, and maintain the rail cars and locomotives operating on the proposed railroad	40 (including employees for the potential Nevada Railroad Control Center and the National Transportation Operations Center)
Cask Maintenance Facility	Collocated with the Rail Equipment Maintenance Yard	Processing location for all transportation casks, including inspection, certification, maintenance and decontamination	30
Nevada Railroad Control Center and National Transportation Operations Center	Collocated with the Rail Equipment Maintenance Yard or the Staging Yard Nye County or Lincoln County	The Nevada Railroad Control Center would control operations along the proposed railroad; the National Transportation Operations Center would coordinate the national shipment of casks and other materials to the proposed railroad	15

Based on a study of potential commercial users, DOE estimated that approximately 8 one-way commercial trains could run per week along the Caliente rail alignment. For the Mina rail alignment, which would have the greater commercial potential, DOE estimated that approximately 18 one-way commercial trains could run on the rail line per week, 8 of which would travel only on the northern portion of the alignment.

S.3.2.4 RAILROAD ABANDONMENT

If DOE proposed to abandon the railroad after the operations phase, the Department could decide to remove ballast, track, ties, signaling, and other related materials. In addition, the Department could decide to decommission and dismantle facilities (for example, the Cask Maintenance Facility). The Department might not remove the rail roadbed, although the lands disturbed by the abandonment process would be reclaimed as required. If the Department decided to abandon the railroad, it would relinquish its regulatory right-of-way on BLM lands and the BLM would continue to manage the land. Abandonment of the railroad would be conducted in consultation with land-management entities, as appropriate, at the time of abandonment.

A decision about whether to abandon the railroad would be made near the completion of the shipping campaign, when more information would be available from the communities or the private business sector regarding the usefulness of maintaining portions of the rail line or individual facilities.

S.3.2.5 NO-ACTION ALTERNATIVE

CEQ regulations (40 CFR 1502.14) require that the alternatives analysis in an EIS include the alternative of no action. The No-Action Alternative provides a basis for comparison with a Proposed Action.

Under the Rail Alignment EIS No-Action Alternative, DOE would not select a rail alignment within the Caliente or the Mina rail corridor for the construction and operation of a railroad. DOE would relinquish public lands in the Caliente rail alignment that were withdrawn for study under Public Land Order 7653, and would also relinquish the public lands segregated from surface and mineral entry for 2 years in the Caliente and Mina rail alignments. The BLM would continue to manage public land for multiple uses. The location and extent of new mining claims and the associated development of mineral commodities, although not known with any certainty, would no longer be limited by the Public Land Orders.

Under the No-Action Alternative, there would be no impacts to land uses, natural, human health, social, economic, or cultural resources from construction and operation of a railroad in Nevada for shipments of spent nuclear fuel, high-level radioactive waste, and other materials from an existing rail line to a geologic repository at Yucca Mountain.

In the event that DOE were not to select a rail alignment in the Caliente corridor or in the Mina rail corridor, the future course that it would pursue to meet its obligations under the NWPA is uncertain.

S.3.3 Issues Raised by the Public

S.3.3.1 PUBLIC SCOPING

DOE provided two public scoping periods for the Rail Alignment EIS (the first between April 8 and June 1, 2004; the second between October 13 and December 12, 2006). DOE solicited written comments and held five public scoping meetings in Nevada in May 2004 (69 *FR* 18565).

In May 2006, the Walker River Paiute Tribal Council informed DOE that it would allow DOE to evaluate the environmental impacts of transporting nuclear waste across the Walker River Paiute Reservation in the Mina rail corridor. Following a preliminary evaluation, DOE solicited written comments on an expanded scope of the Rail Alignment EIS, and held one public scoping meeting in Washington, D.C., in October 2006, and eight in Nevada during November 2006 (71 *FR* 65785). In addition to publications in the *Federal Register*, DOE extensively advertised all meetings in a broad range of other media such as newspapers, letters, and press releases.

DOE received more than 4,100 comments from the first scoping period and nearly 800 from the second. Most of the comments DOE received during the second scoping period were similar to those from the first.

A number of commenters mentioned a variety of alternative segments that either should be considered or dismissed. DOE considered changes to alternative segments identified in the Notices of Intent, considered suggested new alternative segments, added some alternative segments, and adjusted or eliminated some alternative segments. Some commenters expressed concern about environmental resources to be considered that encompassed land-use issues, some specific land-use suggestions, air quality, socioeconomics, health and safety. DOE has conducted extensive analysis to encompass these issues. Other commenters expressed support for public or commercial use of the proposed rail line, and some commenters expressed the opposite viewpoint. DOE has therefore also analyzed a Shared-Use Option to allow a decision to be made on shared use. Various commenters noted best management practices and mitigation issues surrounding impacts associated with the construction and operation of the railroad (for example, to livestock, waterways and washes, and mining). In response DOE has developed a series of mitigation measures to avoid, minimize, rectify, reduce, and/or compensate for potential impacts, such as limiting fencing on public lands to those areas where grazing permittees might request it for livestock safety, positioning temporary pipelines so they would not obstruct natural drainage channels, and notifying all patented minerals lessees and claimants, and consulting with owners of active local mines and mining claims to ensure that impacts are minimized during construction. In addition, DOE and the BLM have solicited comments on potential mitigation measures from grazing permittees along the proposed rail line and considered these when developing mitigation measures.

Other commenters suggested that DOE identify and analyze the entire infrastructure necessary to construct and operate the proposed rail lines, including construction camps, ballast sources, borrow and fill areas, access roads, rail yards, maintenance facilities, and an operations center. DOE has done so. Commenters requested inclusion of detailed maps and plans, and to that end DOE has prepared a detailed map atlas as a reference to the Rail Alignment EIS. Comments specifically addressing the Mina rail alignment suggested that the scope of analysis should be from Hazen to Yucca Mountain. DOE has analyzed environmental impacts from Hazen to Yucca Mountain in the Rail Alignment EIS.

DOE considered the content all comments received during both public scoping periods in determining the scope of the Rail Alignment EIS.

S.3.3.2 TRIBAL UPDATE MEETINGS

DOE held a Tribal update meeting on June 2, 2004, to obtain comments from Tribal representatives from the Consolidated Group of Tribes and Organizations composed of 17 tribes and organizations with traditional ties to the Yucca Mountain area that have appointed representatives to represent their respective tribal concerns and perspectives. During the second scoping comment period for the Rail Alignment EIS, DOE held another meeting for the Consolidated Group of Tribes and Organizations on November 29, 2006, in Pahrump, Nevada. The Department considered all comments submitted during the meetings in the development of the scope of the EIS. Commenters called for continued consultation with tribes that would be culturally affected by the transportation of spent nuclear fuel and high-level radioactive waste. DOE is committed to continuing the consultation process throughout the development of the Rail Alignment EIS and plans to continue consultation with American Indians to ensure that tribal concerns and perspectives are considered.

S.3.3.3 BLM PUBLIC MEETINGS

On December 29, 2003, the BLM announced the receipt of an application from DOE requesting that approximately 1,249 square kilometers (308,600 acres) of public land in Nevada be withdrawn from surface and mineral entry for a period of 20 years to evaluate the land for the potential construction,

operation, and maintenance of a rail line for the transportation of spent nuclear fuel and high-level radioactive waste (*Notice of Proposed Withdrawal and Opportunity for Public Meeting; Nevada* (68 *FR* 74965, December 29, 2003). The *Federal Register* notice stated that the BLM had segregated the land from surface and mineral entry for up to 2 years while various studies and analyses are conducted to support a final decision on the withdrawal application. In a May 21, 2004, Notice of Public Meetings (69 *FR* 29323), the BLM invited the public to submit written comments on the proposed withdrawal and possible land-use plan amendments by June 30, 2004. The BLM held two public scoping meetings on the proposed withdrawal and possible land-use plan amendments. On January 10, 2007, the BLM issued a notice (72 *FR* 1235) of a DOE application for the withdrawal of 842 square kilometers (208,037 acres) of land (an additional 278 square kilometers [68,646 acres] of public lands for the Caliente rail corridor and 564 square kilometers [139,391 acres] of public lands for evaluation along the Mina rail corridor. Many of the public comments submitted to the BLM were similar to those at submitted DOE scoping meetings. DOE considered all the comments the BLM received in developing the scope for the Rail Alignment EIS; some of those comments led to the actions already described.

S.3.3.4 ADDITIONAL OUTREACH

In addition to the DOE and BLM scoping meetings, and comments from the Tribal Update Meetings, DOE used other information to define the scope of the Rail Alignment EIS. DOE worked with the Central Nevada Community Protection Working Group to gain the assistance of Nye, Lincoln, and Esmeralda Counties and the City of Caliente in obtaining information to support the EIS. Under a cooperative agreement with DOE, Lincoln County led an effort to interview landowners, business owners, county officials, elected officials, and other potentially interested parties. Comments received during these interviews closely mirrored the comments submitted to both DOE and the BLM. In addition, Nye County surveyed property owners along the Caliente rail corridor under a cooperative agreement with DOE. The surveys solicited comments on potential impacts of the proposed rail line and possible measures to mitigate those impacts. Also, the BLM interviewed grazing permittees along the Caliente rail corridor and asked for their comments on potential impacts associated with construction and operation of the proposed rail line and for their input on potential mitigation measures. DOE used the information obtained through these interviews and surveys to help define the scope of this Rail Alignment EIS.

S.3.4 Environmental Impacts

In the Rail Alignment EIS, potential impacts are identified as either direct or indirect, and either short term or long term. Where practicable, DOE has quantified potential impacts. In cases where it is not practical to quantify impacts, DOE provides a qualitative assessment of potential impacts. In the Rail Alignment EIS, DOE has used the following descriptors to qualitatively characterize impacts where quantification of impacts was not practical:

- **Small.** Environmental effects would not be detectable or would be so minor that they would neither destabilize nor noticeably alter any important attribute of the resource.
- **Moderate.** Environmental effects would be sufficient to alter noticeably, but not to destabilize, important attributes of the resource.
- **Large.** Environmental effects would be clearly noticeable and would be sufficient to destabilize important attributes of the resource.

DOE would meet all applicable regulatory requirements during construction and operation of the rail line, and would implement an array of best management practices to help ensure compliance with requirements. In addition, DOE could implement measures to mitigate impacts remaining after final design and compliance with regulatory requirements and implementation of best management practices. Sections S.7.1 through S.7.15 summarize environmental impacts for each resource area DOE analyzed.

S.3.4.1 PHYSICAL SETTING

DOE examined the region of influence for physical setting to determine the potential for impacts on physiography, geology, and soils. The region of influence for physical setting includes the areas that would be directly and indirectly affected by construction and operation of the proposed railroad, and incorporates the nominal width of the rail line construction right-of-way (300 meters [1,000 feet] centered on the rail alignment). It also includes the footprints of construction camps, quarry sites, facility sites, access roads, and water wells that would be outside of the nominal width of the construction right-of-way.

DOE determined that land disturbance would be 55 to 61 square kilometers (14,000 to 15,000 acres) for the Caliente rail alignment and 40 to 48 square kilometers (9,900 to 12,000 acres) for the Mina rail alignment. Lands that are currently relatively undisturbed would be extensively graded, which would result in topsoil loss and increased potential for erosion. However, DOE would implement best management practices to minimize erosion and sedimentation during construction activities. DOE assessed that impacts from soil erosion would be small.

Perlite, a locally important mineral, occurs in the area of the Caliente rail alignment Caliente and Eccles alternative segments, and other minerals, such as limestone, metallic commercial minerals, and geothermal resources have been identified in some nearby mountains. Although no mineral resources would be removed, placement of the rail line could reduce the availability of perlite or limestone for mining. The Goldfield alternative segments would cross mining areas and could limit the boundaries for mining if mineral resources extend under the rail line.

Neither railroad construction nor operations would reduce the availability for mining of metallic minerals that have been identified in surrounding mountains. The Montezuma alternative segments would cross mining areas in the Goldfield Hills area, and limit the boundaries for mining if mineral resources extended under the rail line.

Along the Caliente rail alignment, construction in the Caliente or Eccles alternative segment and Caliente common segment 1 would result in a small loss of up to 1.4 kilometers (340 acres) of prime farmland soil. These prime farmland soils are found in isolated pockets and are unfarmed. In the Mina rail alignment, construction of Schurz alternative segment 1, 4, 5, or 6 would impact soils characterized as prime farmland directly adjacent to the banks of the Walker River. These areas are not farmed and DOE expects no change in their current agricultural land use. DOE expects that impacts to prime farmland soils would be small (up to 0.014 square kilometer [3.5 acres] would be lost). There would be a potential for leaks and spills that could contaminate soils during railroad operations; however, DOE would implement best management practices and consider mitigation measures to reduce any impacts.

The Shared-Use Option would require the construction of additional rail sidings within the rail line construction right-of-way in areas of relatively flat terrain. DOE determined that implementation of the Shared-Use Option would increase the surface disturbance area by less than 0.1 percent for either the Caliente or Mina rail alignment, and would add no impacts to physical setting beyond the permanent alterations already described.

S.3.4.2 LAND USE AND OWNERSHIP

The region of influence for land use and ownership is the nominal width of the rail line construction right-of-way and includes all private land, American Indian land, and public land fully or partially within that area. It also includes lands outside the nominal width of the rail line construction right-of-way, where there would be facilities, quarries, and wells to support construction and long-term operation of the railroad.

DOE would need to gain access to private land—up to 0.72 square kilometer (178 acres) for the Caliente rail alignment and up to 0.59 square kilometer (146 acres) for the Mina rail alignment. For the Caliente rail alignment, another possible 1.15 square kilometers (284 acres) of private land would be required to accommodate support facilities. Neither rail alignment would displace existing or planned land uses over a substantial area, nor would they substantially conflict with applicable land-use plans or goals. The areas with the highest density of private land either rail alignment would cross are the City of Caliente (Caliente rail alignment) and Goldfield (both rail alignments). For the Caliente alternative segment, some structures at the existing Union Pacific train yard and three structures along the former Pioche and Prince Branchline would need to be demolished or relocated. The Caliente alternative segment would also occupy portions of the access road and parking lot of the Caliente Hot Springs Motel. The motel could be adversely affected because of the rail line's proximity. Alternative segments near Goldfield would cross vacant private land, including patented mining claims and state and county land.

In response to concerns from the Timbisha Shoshone Tribe, DOE avoided Timbisha Shoshone Trust Lands during the development of the Caliente and Mina rail alignments. The closest rail line segment along either rail alignment would be common segment 5, which would be approximately 3 kilometers (2 miles) east of Timbisha Shoshone Trust Lands near Scottys Junction. DOE initially studied the Mina rail alignment with the permission of the Walker River Paiute Tribe and the Department designed the Schurz alternative segments with the aim of removing the existing Department of Defense Branchline through the town of Schurz in accordance with the Tribe's request. The Schurz alternative segments would utilize up to 0.5 percent of the land area of the Reservation (up to 5.3 square kilometers [1,300 acres]).

The Caliente rail alignment would utilize up to 162 square kilometers (40,000 acres) of BLM-administered land out of a total construction footprint of approximately 170 square kilometers (41,000 acres), and the Mina rail alignment would utilize up to 113 square kilometers (28,000 acres) of BLM-administered land out of a total construction footprint of approximately 125 square kilometers (31,000 acres).

The Mina rail alignment would cross 4.6 square kilometers (1,150 acres) of land within the Hawthorne Army Depot near its northern border, where it would not pose a conflict with the Depot's mission or land uses. Railroad construction would result in surface disturbance across a number of grazing allotments on BLM-administered land. However, because the land would be restored after the construction phase and the operations right-of-way would be smaller than the construction right-of-way, long-term impacts would be small. Individual rail line segments would result in less than a 2-percent loss of animal unit months (a measure of the amount of forage needed to sustain one animal for 1 month) across all affected allotments for either rail alignment. The rail line could require livestock on some allotments to adjust to new routes to access water and forage. Generally, livestock could learn new routes and acclimate to and cross the rail line. The rail line could pose additional risk to ranching operations because livestock could be struck by passing trains. DOE or the railroad's commercial operator would reimburse ranchers for such losses, as appropriate.

Most of the local mining activity along both the Caliente and Mina rail alignments would be outside the rail line construction right-of-way. DOE would need to negotiate the surface rights to cross the few affected unpatented mining claims the rail line would intersect. Along the Caliente rail alignment, the rail line would intersect unpatented mining claims along South Reveille alternative segments 2 and 3; Caliente common segment 3; Goldfield alternative segments 1, 3, and 4; Oasis Valley alternative segments 1 and 3; and common segment 6. The Mina rail alignment would intersect unpatented mining claims along Montezuma alternative segments 1, 2 and 3; Oasis Valley alternative segments 1 and 3; and common segment 6. The rail line could be affected by or affect underground mining tunnels or shafts. During the final engineering design, DOE would perform a survey to verify the locations of mining tunnels and shafts and implement measures to avoid adverse impacts.

Rail alignments have been developed to avoid Wilderness Areas and other scenic and recreational areas. Under either implementing alternative, DOE would construct crossings to prevent the rail line from obstructing access to private and public land. While there could be temporary road closures or detours during the construction phase, there would be no impact to land access during the operations phase. In addition, organized off-highway vehicle events permitted in the past by the BLM might need to alter their routes to avoid the rail line.

The rail alignments would cross a number of utility rights-of-way. DOE would negotiate crossing agreements with right-of-way holders and the BLM. DOE would protect existing utilities from damage so that disruption to utility service or damage to lines would be at most small and temporary. The project would require a BLM right-of-way outside existing BLM planning corridors for utilities; this right-of-way would be outside of right-of-way avoidance areas. Under the longest potential routes, approximately 25 percent of the Caliente rail alignment and 44 percent of the Mina rail alignment (new construction on BLM-managed land) would fall within existing planning corridors. In addition, to avoid the proliferation of new rights-of-way, the BLM could elect to grant future rights-of-way for new utilities adjacent to the proposed rail line.

S.3.4.3 AESTHETIC RESOURCES

DOE considered the region of influence for the aesthetic resources as the viewshed around all common segments, alternative segments, and facilities along the Caliente and Mina rail alignments. To ensure that seldom-seen views were included in this analysis, DOE used a conservative region of influence extending 40 kilometers (25 miles) on either side of the centerline of all common segments and alternative segments, and around facilities. Most of the lands that would be affected by the Proposed Action are BLM-administered public lands, including those on which the proposed railroad would be constructed. For this reason, DOE used BLM visual resource management classifications and contrast rating methodologies to evaluate aesthetic impacts to the surrounding viewshed. The BLM assigns visual resource management classes to lands under its jurisdiction, based on scenic quality and other factors, that range from Class I to Class IV, with Class I representing the highest visual values. Each class comes with specific visual resource management objectives that indicate the levels of project-related contrast that are acceptable. In this analysis, the primary basis for identifying potential adverse impacts to aesthetic resources was inconsistency with these BLM visual resource management objectives. The Department assessed the potential visual contrast between existing conditions and conditions expected during the project from key locations and compared these levels of contrast with the visual resource management objectives associated with the BLM classifications of the surrounding viewshed.

Along both the Caliente and the Mina rail alignments, DOE found that the contrast that would be caused by the rail line and support facilities would remain consistent with BLM visual resource management objectives during the operations phase, but could be inconsistent in certain locations during the construction phase. Along the Caliente rail alignment, a conveyor crossing of U.S. Highway 93 near the Caliente-Indian Cove location of the Staging Yard and along some portions of Garden Valley alternative segments 1, 2, 3, and 8, construction would temporarily not meet BLM visual resource management objectives for Class II areas.

Along the Mina rail alignment, DOE determined that construction of Schurz alternative segment 6 crossing of U.S. Highway 95 on the Walker River Paiute Reservation would temporarily not meet BLM objectives for Class III areas.

Overall, DOE anticipates that short-term visual impacts during the construction phase would range from small to large, and long-term impacts during the operations phase would range from small to moderate and would be consistent with applicable BLM visual resource management objectives.

Impacts to aesthetic resources during the construction phase under the Shared-Use Option would generally be the same as those under the Proposed Action without shared use. Construction of additional sidings would create small impacts to the visual setting because of the short duration of construction. Impacts to aesthetic resources during the construction phase under the Shared-Use Option for both the Caliente and Mina rail alignments would be generally the same as those under the Proposed Action without shared use. Construction of additional sidings would create small impacts to the visual setting because of the short duration of construction.

S.3.4.4 AIR QUALITY AND CLIMATE

The air quality and climate region of influence for the Caliente rail alignment encompasses Lincoln, Nye, and Esmeralda Counties. The air quality and climate region of influence for the Mina rail alignment encompasses Lyon, Mineral, Esmeralda, and Nye Counties, a small portion of Churchill County near Hazen, and the Walker River Paiute Reservation, the bulk of which lies within Mineral County with smaller portions within Lyon and Churchill Counties. The Caliente and Mina rail alignments would cross desert and semi-desert areas that generally have abundant hours of cloud-free days, low annual precipitation, and large daily ranges in temperature. All portions of the Caliente and Mina rail alignments would be within areas classified by the U.S. Environmental Protection Agency as in attainment for all National Ambient Air Quality Standards (NAAQS).

DOE examined emissions inventories to determine county-level increases in air pollutant emissions, and performed air quality simulations to determine potential changes in air pollutant concentrations at specific (population-center) receptors. An adverse impact to air quality would occur if it were shown that a proposed action would conflict with or obstruct implementation of a state or regional air quality management plan, or would exceed an NAAQS primary standard or contribute to existing or projected exceedances. DOE determined air pollutant concentrations that could result from railroad construction and operation along the Caliente and Mina rail alignments using the Environmental Protection Agency-recommended model for regulatory applications (AERMOD dispersion modeling system version 07026). To assess potential air quality impacts from railroad construction and operations along the Caliente rail alignment, DOE modeled emissions and resultant concentrations of criteria air pollutants where there are two population centers that would be near the rail line: Caliente in Lincoln County and Goldfield in Esmeralda County, and then compared the modeling results to the National Ambient Air Quality Standards. DOE likewise modeled air quality for the Mina rail alignment near the population centers that would be relatively close to the rail line: Schurz, Hawthorne, and Mina in Mineral County; and Silver Peak and Goldfield in Esmeralda County. DOE also performed modeling for the Caliente rail alignment for construction-related activities at a potential quarry site northwest of Caliente and a potential quarry site in South Reveille Valley; and for the Mina rail alignment at the potential Garfield Hills and Malpais Mesa quarry sites.

The analysis showed that criteria air pollutant concentrations along the Caliente or Mina rail alignments would not exceed the NAAQS during the construction or operation phases, with the following possible exceptions. During the construction phase for the Caliente rail alignment, the 24-hour NAAQS for PM₁₀ (particulate matter with an aerodynamic diameter equal to or less than 10 micrometers) could be exceeded during quarry operations in South Reveille Valley. During the construction phase for the Mina rail alignment, the 24-hour NAAQS for both PM₁₀ and PM_{2.5} (particulate matter with an aerodynamic diameter equal to or less than 2.5 micrometers) could be exceeded near the construction right-of-way at Mina and Schurz during the relatively short (less than 6 months) construction period, at the Staging Yard at Hawthorne, and at the potential Garfield Hills quarry. However, DOE would be required to obtain a Surface Area Disturbance Permit Dust Control Plan issued by the State of Nevada Department of Environmental Protection prior to quarry and Staging Yard development. It is likely that requirements in the plan would reduce fugitive dust emissions, thus reducing the possibility of an NAAQS exceedance.

For the Caliente rail alignment, DOE determined that the highest increase in air pollutant emissions would occur during the construction phase. During the operations phase for the Caliente rail alignment, the highest increase would occur in the vicinity of the railroad operations support facilities. The highest increase in criteria air pollutant emissions would be for nitrogen oxides in Nye County, where construction emissions could be as much as 8,100 metric tons (8,900 tons) per year over the county's 2002 annual nitrogen oxides emissions. However, these emissions would be distributed over the entire length of the rail alignment in the county and no air quality standard would be exceeded.

For the Mina rail alignment, DOE determined that the highest increase in air pollutant emissions would occur during the construction phase. During the operations phase for the Mina rail alignment, the highest increase in air emissions from railroad operations would occur in the vicinity of the operations support facilities. The highest increase in criteria air pollutant emissions would be for nitrogen oxides in Esmeralda County, where construction emissions could be 3,570 metric tons (3,940 tons) per year higher than the 2002 county-wide nitrogen oxides emissions. However, these emissions would be distributed over the entire length of the rail alignment in the county and no air quality standard would be exceeded.

DOE determined that railroad construction and operations along either the Caliente or Mina rail alignment would not cause conflicts with state or regional air quality management plans.

Under the Shared-Use Options for both the Caliente and Mina rail alignments, total emissions would be increased marginally. DOE anticipates that impacts to air quality along the Caliente or Mina rail alignment under the Shared-Use Option would be similar to those under the Proposed Action without shared use.

S.3.4.5 SURFACE-WATER RESOURCES

The region of influence for surface-water resources would be limited in most cases to the nominal width of the construction right-of-way within the Caliente rail alignment or the Mina rail alignment. Railroad construction and operations along either rail alignment would potentially result in both direct and indirect impacts to surface-water resources. Many of these impacts are common impacts that would occur along the entire length of the rail alignments. Direct impacts would result from temporary or permanent grading, dredging, re-routing, or filling of surface-water resources. Indirect impacts would include potential increases in surface flow and non-point source pollution resulting from runoff from areas where surface grades and characteristics would be changed.

DOE anticipates that during the construction phase along the Caliente rail alignment, the Staging Yard and the Interchange Yard along either the Caliente or the Eccles alternative segment would require channelization of natural drainage surface waters to keep water out of railroad operations support facility sites. Changes in drainage patterns could result in changes in erosion and sedimentation rates or locations. However, in all instances where the rail alignment would come close to or cross a surface-water feature, impacts would be substantially minimized by the implementation of engineering design standards and best management practices.

The Caliente alternative segment is adjacent to wetlands and some wetland fill would be unavoidable. DOE proposes to construct the Caliente alternative segment over the abandoned Union Pacific Railroad roadbed, in part to minimize filling wetlands. Of the 0.28 square kilometer (68 acres) of wetlands delineated along the rail alignment, 0.05 square kilometer (12 acres) would be filled to construct the rail line. DOE could modify the final design of the rail line to avoid additional wetlands, such as those adjacent to the old rail roadbed along Meadow Valley Wash, by using a slightly narrower construction footprint; however, this would only slightly reduce the area of wetlands that would be filled.

Approximately 0.09 square kilometer (22 acres) of wetlands could be filled to construct a quarry siding at potential quarry CA-8B along the Caliente alternative segment. Approximately 0.19 square kilometer (47 acres) of wetlands would be filled for construction of the Staging Yard at Indian Cove near Caliente. The original wetland meadow area would be drained and built up above the level of the floodplain. Constructing an active drainage system and a channel around the site to keep the area dry and in a stable condition might be necessary. The proposed channel around the site would be approximately 1,680 meters (5,500 feet) long. These actions would require permits from the U.S. Army Corps of Engineers, and compliance with Section 404 of the Clean Water Act for stormwater runoff control measures.

The Eccles alternative segment Interchange Yard would require portions of Clover Creek to be filled to elevate the site out of the floodplain. For a length of approximately 1,400 meters (4,600 feet) along the bed of this ephemeral creek (for construction of the interchange tracks) the fill would extend approximately 7.6 to 15 meters (25 to 50 feet) into the creek bed. For a length of approximately 900 meters (2,900 feet) on the east end and 600 meters (2,000 feet) on the west end of the interchange tracks, (for construction of the interchange siding), the fill would extend approximately 8 meters (25 feet) into the creek. The total area that would be filled within the confines of Clover Creek would be approximately 0.033 square kilometer (8.2 acres).

Along the Mina rail alignment, there could be temporary impacts from disturbance of about 2,000 square meters (0.55 acre) of wetlands along Schurz alternative segments 1 and 4, and 3,000 square meters (0.73 acre) of wetlands along Schurz alternative segments 5 and 6 during construction of a bridge at the rail line crossing of the Walker River. Permanent fill or loss of wetlands would total about 20 square meters (0.005 acre) for Schurz alternative segments 1 and 4, or 28 square meters (0.007 acre) for emplacement of about 14 piers for Schurz alternative segments 5 and 6.

While some changes would be unavoidable, DOE would take steps to ensure that the alterations to natural drainage, sedimentation, and erosion processes would not increase future flood damage, increase the impact of floods on human health and safety, or cause identifiable harm to the function and values of floodplains. The Department would implement best management practices, including erosion control measures such as the use of silt fences and flow-control devices to reduce flow velocities and minimize erosion.

S.3.4.6 GROUNDWATER RESOURCES

The generally arid climate characterizing the southern Nevada region is consistent with a lack of shallow groundwater underlying much of the length of the Caliente and Mina rail alignments. The region of influence for groundwater resources includes portions of the aquifers that would be affected by groundwater withdrawals that DOE would make to obtain the water needed for railroad construction and operations. Groundwater resource features evaluated through impacts analysis include existing wells and nearby springs. Within the Caliente rail alignment region of influence, groundwater withdrawals for irrigation and agricultural purposes currently represent most of the groundwater usage. Within the Mina rail alignment region of influence, public supply-municipal, stock watering, and mining uses currently represent most of the groundwater usage.

To supply the approximately 7.5 billion cubic meters (6,100 acre feet) of water needed during the construction phase along the Caliente rail alignment, DOE estimates that it would need to install approximately 150 to 176 new wells. To supply the approximately 7.4 billion cubic meters (5,950 acre feet) of water needed during the construction phase along the Mina rail alignment, DOE estimates that it would need to install between approximately 77 and 110 new wells.

DOE analyses indicated that the effects of groundwater withdrawals from the proposed water-supply wells at the range of production rates that could be required to support a 4-year construction phase along

either rail alignment would be localized in nature and extent, and hydrogeologic effects would be temporary. DOE determined that the short-term impacts caused by water withdrawals would be a series of localized drawdown cones of depression within the host aquifer surrounding each pumped well. DOE does not anticipate that proposed groundwater withdrawals would conflict with known regional or local aquifer management plans or the goals of governmental water authorities, and impacts from groundwater withdrawals on downgradient groundwater basins (or hydrographic areas) would tend to be very small.

DOE anticipates that the impact to groundwater resources from contaminants that might be released by construction equipment during the construction phase or during railroad operations would be small because of generally deep groundwater beneath most of the Caliente and Mina rail alignments.

Railroad operations along the Mina and Caliente rail alignments would result in small potential impacts to groundwater resources. The Department would discontinue operating most of the wells needed during the construction phase because there would not be a continued need for large-scale water production to support railroad operations. Additionally, groundwater withdrawal rates for those wells left in place to support operations would be expected to be very low.

Overall, water demands for railroad construction and operations along the Caliente or the Mina rail alignment would represent a small portion of current water-use amounts in their respective regions of influence, which would likely continue to be dominated by irrigation and agricultural withdrawals, with possibly increasing urban use from water transfers to the Las Vegas area. DOE determined that impacts to ground subsidence or groundwater quality that could result from railroad construction and operations along either rail alignment would be small.

Under the Shared-Use Option for either rail alignment, commercial-only facilities would require water for daily operation. The additional impacts to groundwater resources would be small, and overall would be similar to those described for the Proposed Action without shared use.

S.3.4.7 BIOLOGICAL RESOURCES

DOE considered two areas of assessment in analyzing the affected environment for biological resources: a region of influence consisting of the nominal width of the construction right-of-way and a larger study area consisting of a 16-kilometer (10-mile)-wide area extending 8 kilometers (5 miles) on either side of the centerline of the rail alignment to ensure the identification of sensitive habitat areas and transient or migratory wildlife. The Caliente and Mina rail alignments are situated within the “cold” Great Basin Desert that covers most of central and northern Nevada and the “hot” Mojave Desert that covers most of southern Nevada and much of southeastern California. Although the two deserts are distinguished climatically, they are also distinguished by their predominant vegetation and vegetation communities.

For both the Caliente rail alignment and the Mina rail alignment, DOE determined that there would be some indirect adverse impacts due to the potential for the introduction and spread of noxious and invasive weed species during construction activities; however, the Department would minimize or avoid impacts through implementation of best management practices and BLM-prescribed methods. DOE concluded that there would be a small mostly short-term indirect impact to game species during railroad construction and operations along either rail alignment, due to temporary displacement causing pressure on other areas for habitat and forage. There could be small direct impacts due to a small loss of forage from the removal of vegetation to construct the proposed railroad. In addition, railroad operations could result in possible wildlife collisions with trains and disturbance from noise caused by passing trains. However, these impacts would not impact the viability of any game species’ population.

DOE determined that federally listed species potentially present along the Caliente and Mina rail alignments could include the Mojave Desert tortoise, southwestern willow flycatcher, yellow-billed

cuckoo, Lahontan cutthroat trout, and Ute ladies'-tresses orchid. There would likely be small short-term indirect impacts to some BLM and State of Nevada special status animal species because they might avoid the area of the rail alignment or be displaced during construction activities. Any potential direct impact would be due to habitat fragmentation and disturbance and possible injury or loss of individuals of a species from collision with trains. There could be indirect impacts on small mammals as a result of possible changes to predator/prey interactions due to the construction of towers and other structures that would provide new perch habitat for raptors and other predatory birds. DOE determined that potential impacts from noise disturbance to migratory birds would be small and short term during construction and small from permanent habitat loss during the operations phase. Potential direct impacts to desert tortoise would be due to fragmentation of habitat and the possible crushing of occupied burrows during construction of common segment 6 and the Rail Equipment Maintenance Yard. Although these losses would be a minor decrease in the number of individual tortoises in the vicinity of the railroad, long-term survival of this species would not be affected. For both the Caliente rail alignment and Mina rail alignment, DOE determined that impacts to herd management areas and potential impacts to individual wild horses or burros would be small and would not significantly affect the management strategies utilized within the herd management areas.

DOE anticipates that for the Caliente rail alignment there would be short-term and long-term impacts to wetlands and riparian habitats from construction of the Caliente alternative segment and either of the potential Staging Yard locations (Indian Cove and Upland), and the Eccles alternative segment. Impacts from constructing the Caliente alternative segment would be mostly short term and small, because the rail line would be constructed over an abandoned rail roadbed and limited to existing bridge crossings that would require modifications. The Eccles alternative segment would result in a small short-term impact to riparian habitat and limited to bridge construction over Meadow Valley Wash. Construction of the Indian Cove Staging Yard could result in a moderate impact compared to the Upland option due to topographic constraints that could require possible draining and filling of the wetland. The proposed Eccles Interchange Yard could result in mostly small direct short-term impacts due to a small loss of riparian vegetation, and small short-term indirect impacts with the potential for change in stream flow and increase in sedimentation. DOE determined there would be a moderate impact to wildlife habitat along Garden Valley alternative segments 1 and 3. Localized and minor loss of roosting and foraging habitat for the southwestern willow flycatcher and western yellow-billed cuckoo could occur from construction of the Caliente alternative segment; however, because these species do not nest along the alignment, impacts would be small and limited to transient individuals.

DOE determined that for the Mina rail alignment there would be direct short-term impacts to riparian vegetation from construction of Schurz alternative segment 1, 4, 5, or 6 due to bridge construction over the Walker River. There would be no long-term impacts on riparian vegetation along the Walker River as a result of constructing any of the Schurz alternative segments. There would be short-term moderate impacts to wildlife habitat at the potential Malpais Mesa quarry site. Construction of the Walker River Bridge for Schurz alternative segment 1, 4, 5, or 6 could result in a moderate short-term indirect impact on Lahontan cutthroat trout; however, DOE could mitigate any anticipated impact.

Under the Shared-Use Option, there would be more train traffic; therefore, DOE anticipates wildlife interactions with train traffic (collisions, change in movement patterns, altered behavior, and nest abandonment) to be slightly increased. Nevertheless, DOE anticipates that this slight increase in train traffic would result in small impacts to the wildlife communities. The existing rail alignment design can accommodate shared use with little additional construction (a few sidings) and the Department does not anticipate any other additional impacts above those discussed.

S.3.4.8 NOISE AND VIBRATION

DOE analyzed potential impacts from noise based on current ambient noise levels, noise modeling for future activities (proposed railroad construction and operations), and identification of changes in noise levels at receptors within the regions of influence. The region of influence for noise and vibration for construction and operations of the railroad along either the Caliente or the Mina rail alignment includes the construction right-of-way and extends out to variable distances along each rail alignment (depending on several factors, including the number of trains per day, ambient noise level, train speed, and number of rail cars).

For operation of trains during the construction and operations phases, DOE analyzed noise impacts under established STB impact criteria (a noise level of 65 DNL or greater, with a 3 dBA or greater increase from the baseline). For noise impacts from construction activities, DOE used U.S. Department of Transportation, Federal Transit Administration, methods and construction noise guidelines. To evaluate potential vibration impacts from construction and operation activities, DOE used Federal Transit Administration building vibration damage and human annoyance criteria.

DOE determined that railroad construction and operations along the Caliente rail alignment would lead to an unavoidable increase in ambient noise from construction activities and passing trains. Noise from trains might be noticeable as new noise in residential areas near the rail line in Caliente and Goldfield. Because there is already a substantial amount of train activity in Caliente, additional train noise would be less noticeable than in other areas where there is currently no train activity and no train noise. For construction activities, noise levels in Caliente would be higher than Federal Transit Administration construction noise guidelines and would result in a temporary unavoidable impact. Train noise during the construction and operations phases would not cause adverse noise impacts because noise levels at receptors would be lower than STB adverse impact criteria.

DOE determined that railroad construction and operations along the Mina rail alignment could lead to an unavoidable increase in ambient noise from passing trains in areas of Nevada that are mostly uninhabited. Noise from trains might be noticeable as new noise in residential areas near the rail line in Silver Springs, Silver Peak, Mina, and Goldfield. Because there is already some train activity in Silver Springs, additional train noise would be less noticeable there than in other areas where there is currently no train activity and no train noise. Construction of any of the Schurz alternative segments would eliminate future noise and vibration associated with operation of the existing Department of Defense Branchline through Schurz. However, there would be construction noise associated with removal of this existing rail line, although this noise would be temporary and no adverse impact would be expected.

For construction activities, noise levels along the Mina rail alignment would be lower than Federal Transit Administration construction noise guidelines. For train noise during the construction phase, there would be temporary adverse impacts at receptors in Silver Springs. For train noise during the operations phase, estimated noise levels at 8 receptors in Silver Springs and 1 in Wabuska would be higher than impact criteria; therefore, there would be adverse impacts from noise associated with railroad operations at those locations. However, DOE would investigate mitigation methods for these nine locations. Mitigation methods, where reasonable and feasible, could include building sound insulation or the development of a Quiet Zone, which would allow the rail operator to reduce horn noise at specific crossings.

During the construction and operations phases along either the Caliente or Mina rail alignment, vibration levels would not exceed the Federal Transit Administration damage criteria for extremely fragile historic buildings. Therefore, DOE would expect no building damage due to vibration. In addition, train-generated vibration levels would be lower than Federal Transit Administration human annoyance criterion.

Under the Shared-Use Option for either rail alignment, increased rail traffic could result in noise impacts similar to the impacts described for the Caliente and Mina rail alignments without shared-use. Increased operations would not affect vibration impacts because vibration is evaluated on a maximum-level basis only.

S.3.4.9 SOCIOECONOMICS

DOE assessed impacts to socioeconomic conditions of in relation to population, housing, employment and income, and public services over the region of influence for the Caliente rail alignment within Lincoln, Esmeralda, Nye, and Clark Counties, and over the region of influence for the Mina rail alignment within Churchill, Lyon, Mineral, Nye, Esmeralda, and Clark Counties, the combined area of Washoe County and Carson City, and the Walker River Paiute Reservation.

The social and economic activities and changes associated with railroad construction along either rail alignment would include a brief elevation in project-related employment; increases in real disposable income; increases in state and local spending; increases in gross regional product; population increases; slower rate of growth in the level of employment as railroad project activities moved from construction to operations; and possible small stresses on transportation, including small traffic-delay impacts on road traffic at grade crossings. The percentage values of such changes would be low and DOE has assessed such impacts to be generally small.

Changes associated with railroad operations along either rail alignment would include increases in project-related employment (particularly associated with railroad facilities); slight population increases; possible small stresses on transportation, including small traffic-delay impacts on road traffic at grade crossings; some pressure on housing; and possible strains on public services (schools, health care, fire-protection) in southern Nye County where the Cask Maintenance Facility, Rail Equipment Maintenance Yard, and possibly the Nevada Railroad Control Center and the National Transportation Operations Center would be located. The percentage values of such changes would be low and DOE has assessed such impacts to be generally small to moderate.

Under the Shared-Use Option for either rail alignment, there would be little increase in impacts beyond those described for the Proposed Action without shared use. Based on the lengths of track involved under the Shared-Use Option, the incremental impacts to traffic from constructing the additional sidings would be a small fraction of the overall impacts for rail line construction under the Proposed Action without shared use. Thus, impacts to the transportation infrastructure under the Shared-Use Option would be small. Traffic-delay impacts at highway-rail grade crossings from construction trains would be consistent with the delay impacts under the Proposed Action without shared use. These impacts would be small.

S.3.4.10 OCCUPATIONAL AND PUBLIC HEALTH AND SAFETY

S.3.4.10.1 Nonradiological Occupational Health and Safety Impacts

DOE estimated nonradiological occupational health and safety impacts in relation to worker exposures to physical hazards and nonradioactive hazardous chemicals during the construction phase. DOE based these estimates on the number of hours worked and occupational incident rates for total recordable cases, lost workday cases, and fatalities.

Construction and operations workers might be exposed to physical hazards and to nonradiological hazardous chemicals related to operation and maintenance of construction equipment, rail line equipment, and facilities equipment, including maintenance of casks and maintenance-of-way activities, including welding, metal degreasing, painting, and related activities. Occupational health and safety impacts might

also result from worker exposure to fuels, lubricants, and other materials used in railroad construction, operations, and maintenance.

The recorded incident rates of these exposure hazards during construction work at the Yucca Mountain Site have been small and are anticipated to be small for railroad construction and operations. Dust and soils hazards include potential occupational exposure to hazardous inhalable dust. However, occupational impacts associated with exposure to dust would be expected to be small. DOE would implement measures, such as processing and engineering controls, to reduce exposure to dust. Impacts to construction or operations workers from unexploded ordnance would be small due to implementation of inspection procedures and mitigation measures. Workers might also be exposed to biological hazards including infectious diseases (such as Hantavirus and West Nile Virus) and other biological hazards (such as venomous animals). The recorded incidence rates of these biological hazards are small, and DOE would expect small impacts to construction or operations workers from these biological hazards.

DOE used both qualitative and quantitative components to estimate transportation accident incidents and potential fatalities resulting from vehicular and train accidents.

DOE estimated the following:

- During the construction phase, along both the Caliente rail alignment and the Mina rail alignment, there would be six vehicular-related fatalities.
- During the operations phase along the Caliente rail alignment, there would be eight vehicular-related fatalities; along the Mina rail alignment, there would be seven vehicular-related fatalities.
- During railroad construction and operations along the Caliente rail alignment and the Mina rail alignment, modeling indicates that there would be 16 rail-related accidents and approximately one rail-related fatality.

For the Shared-Use Option, DOE estimated the following:

- During the operations phase along the Caliente rail alignment, there would be eight vehicular-related fatalities; along the Mina rail alignment, there would be seven vehicular-related fatalities.
- During the operations phase along the Caliente rail alignment, there would be 26 rail-related accidents and 4 rail-related fatalities; along the Mina rail alignment, there would be 36 rail-related accidents and 7 rail-related fatalities.
- Nonradiological fatality impacts to workers from industrial hazards from railroad and facility construction and operations along the Caliente rail alignment would be approximately three, and for the Mina rail alignment would be approximately two.

S.3.4.10.2 Radiological Occupational Health and Safety Impacts

Accidents - DOE estimated radiological impacts to workers and the public for incident-free transportation, the risk of transportation accidents, and the impacts of severe transportation accidents. The region of influence for radiological impacts to members of the public during incident-free transportation includes the area 0.8 kilometer (0.5 mile) on either side of the centerline of the rail alignments. The region of influence for occupational radiological impacts during incident-free operation includes the physical boundaries of railroad operations support facilities. For radiological accidents and sabotage, the populations within the region of influence are based on the population within 80 kilometers (50 miles) on either side of the centerlines of the rail alignments.

DOE estimated the following:

- For workers, the radiological impacts were estimated to be 0.34 latent cancer fatalities for the Caliente rail alignment and 0.35 latent cancer fatalities for the Mina rail alignment.
- For workers at the Cask Maintenance Facility, the radiological impacts were estimated to be 0.43 latent cancer fatalities. For workers at the Rail Equipment Maintenance Yard, the radiological impacts were estimated to be 0.0096 latent cancer fatalities.
- For members of the public, the radiological impacts were estimated to be 1.4×10^{-4} latent cancer fatalities for the Caliente rail corridor and 8.5×10^{-4} latent cancer fatalities for the Mina rail alignment.
- For members of the public, the radiological impacts from the Cask Maintenance Facility were estimated to be 7.0×10^{-6} latent cancer fatalities.
- The risk from transportation accidents was estimated to be 1.3×10^{-6} latent cancer fatalities for the Caliente rail alignment and 7.7×10^{-6} latent cancer fatalities for the Mina rail alignment.
- The impacts of the maximum reasonably foreseeable accident were estimated to be 0.0012 latent cancer fatalities in rural areas and 0.46 latent cancer fatalities in suburban areas along the Caliente rail alignment, and 0.0089 latent cancer fatalities in rural areas and 1.2 latent cancer fatalities in suburban areas along the Mina rail alignment. The frequency of this severe accident ranged from 6×10^{-7} to 7×10^{-7} per year.

Sabotage - In response to the terrorist attacks of September 11, 2001, and to intelligence information that has been obtained since then, the United States Government has initiated nationwide measures to reduce the threat of sabotage. These measures include security enhancements intended to prevent terrorists from gaining control of commercial aircraft and additional measures imposed on foreign passenger carriers and domestic and foreign cargo carriers, as well as charter aircraft.

The Federal Government has also greatly improved the sharing of intelligence information and the coordination of response actions among federal, state, and local agencies. DOE has been an active participant in these efforts. In addition to its domestic efforts, DOE is a member of the International Working Group on Sabotage for Transport and Storage Casks, which is investigating the impacts of sabotage events and exploring opportunities to enhance the physical protection of casks.

The Department, as required by the NWSA, would use Nuclear Regulatory Commission-certified shipping casks. Spent nuclear fuel is protected by the robust metal structure of the shipping cask, and by cladding that surrounds the fuel pellets in each fuel rod of an assembly. Further, the fuel is in a solid form, which would tend to reduce dispersion of radioactive particulates beyond the immediate vicinity of the cask, even if a sabotage event were to result in a breach of the multiple layers of protection.

In addition, the Nuclear Regulatory Commission has promulgated rules (10 CFR 73.37) and interim compensatory measures (67 FR 63167, October 10, 2002) specifically to protect the public from harm that could result from sabotage of spent nuclear fuel casks. The Department has committed to following these rules and measures (see 69 FR 18557, April 8, 2004).

For the reasons stated above, DOE believes that under general credible threat conditions the probability of a sabotage event that would result in a major radiological release would be low. Nevertheless, because of the uncertainty inherent in the assessment of the likelihood of a sabotage event, DOE has evaluated events in which a military jet or commercial airliner would crash into a spent nuclear fuel cask or a modern weapon (a high energy density device) would penetrate a spent nuclear fuel cask.

In the Yucca Mountain FEIS (Appendix J, Section J.3.3.1), DOE evaluated the ability of large aircraft parts to penetrate shipping casks and found that neither the engines nor shafts would penetrate a cask and cause a release of radiological materials if an aircraft were to crash into a spent nuclear fuel cask. In the Yucca Mountain FEIS, DOE estimated the potential impacts of a sabotage event in which a high energy density device penetrates a rail cask. For the Rail Alignment EIS, DOE obtained more recent estimates of the fraction of spent nuclear fuel materials that would be released (release fractions) (DIRS 104918-Luna et al. 1999, all). Based on the more recent information DOE estimated that there would be 0.0028 latent cancer fatalities in rural areas and 1.1 latent cancer fatalities in suburban areas along the Caliente rail alignment, and 0.021 latent cancer fatalities in rural areas and 2.8 latent cancer fatalities in suburban areas along the Mina rail alignment.

In addition to analyzing the impacts of sabotage events, the Department would continue to modify its approach to ensuring safe and secure shipments of spent nuclear fuel and high-level radioactive waste between now and the time of shipments.

DOE also used both qualitative and quantitative components to estimate transportation accident incidents and potential fatalities resulting from vehicular and train accidents.

S.3.4.11 UTILITIES, ENERGY, AND MATERIALS

The Caliente rail alignment region of influence for public water systems and wastewater transported offsite for treatment and disposal is Lincoln, Nye, and Esmeralda Counties. The Mina rail alignment region of influence for public water systems and wastewater transported offsite for treatment and disposal is Lyon, Mineral, Esmeralda, and Nye Counties, and the Walker River Paiute Reservation, the bulk of which lies in Mineral County, with smaller portions in Churchill and Lyon Counties. The region of influence for telecommunications and electricity is limited to the companies that service the aforementioned counties. The region of influence for fossil fuels is limited to regional suppliers within the State of Nevada. The region of influence for construction materials is defined by the distribution networks and suppliers of that material to the general project area.

DOE determined that the demands placed on utilities, energy, and materials from constructing and operating the proposed rail line along either rail alignment would be met by existing supply capacities; therefore, potential impacts would be small. Utility interfaces would have the potential for short-term interruption of service, but would experience no permanent or long-term loss of service or prevention of future service-area expansions. Most water for construction along either rail alignment is planned to be supplied by new wells, although public water systems could be slightly affected by population increases attributable to construction employees. Wastewater treatment systems would not be directly affected directly by construction activities, because dedicated treatment systems would be provided at construction camps; however, there could be small impacts to wastewater treatment systems due to population increases attributable to construction employees. There would be very small impacts to telecommunications systems because during the construction phase, DOE would utilize a dedicated telecommunications system and rely little on existing telecommunications systems.

Peak electricity demand would be within capacity of regional providers. The demand for fossil fuels during construction would be approximately 6.5 percent and 6 percent of statewide use for the Caliente and Mina rail alignments, respectively, and could be met by existing regional supply systems and suppliers. During the operations phase, the demand for fossil fuels for either rail alignment would be less than 0.25 percent of statewide use. The primary materials that would be consumed during the construction phase would be steel; concrete, principally for rail ties, bridges, and drainage structures; and rock for ballast and subballast. DOE determined that construction material requirements for the Caliente rail alignment and for the Mina rail alignment would be a small fraction of current production rates within the respective regions of influence.

Under the Shared-Use Option for either rail alignment, the incremental demands on utilities, energy, and materials for construction of commercial sidings and support facilities would be sufficiently small that the anticipated impacts on these resources would be effectively the same as for the Proposed Action without shared use. Therefore, potential impacts to local, regional, or national suppliers of such resources under the Shared-Use Option along either rail alignment would be small.

Fossil-fuel requirements for transporting general freight under the Shared-Use Option would depend on the volume and distance of shared-use traffic. DOE estimated that the incremental annual diesel consumption for commercial shared-use traffic would be 5.5 million liters (1.5 million gallons), a rate that is less than 0.3 percent of current annual diesel fuel usage in Nevada. Most, if not all, of this fuel consumption would be offset by diesel fuel that would otherwise be used if the goods or materials were shipped by truck. Therefore, the impact to the capacities of national and regional fuel producers and distributors under the Shared-Use Option would be small.

S.3.4.12 HAZARDOUS MATERIALS AND WASTES

For both the Caliente and Mina rail alignments, the region of influence for the use of hazardous materials and the generation of hazardous and nonhazardous wastes includes the nominal width of the rail line construction right-of-way, and the locations of railroad construction and operations support facilities; for the disposal of hazardous wastes, it includes the entire continental United States (commercial hazardous waste disposal vendors could utilize facilities throughout the country); and for the disposal of low-level radioactive wastes, it includes DOE low-level waste disposal sites, sites in Agreement States, and U.S. Nuclear Regulatory Commission-licensed sites. The region of influence for the disposal of nonhazardous waste for the Caliente rail alignment includes the disposal facilities in Lincoln, Nye, Esmeralda, and Clark Counties; and for the Mina rail alignment includes the disposal facilities in Mineral, Nye, Esmeralda, and Clark Counties.

During railroad construction and operations, DOE would store and use hazardous materials such as oil, gasoline, diesel fuel, and solvents, primarily for the operation, maintenance, and cleaning of equipment and cleaning of equipment and facilities, which would result in the generation of associated hazardous wastes. During the railroad construction and operations phases, the Department would implement an Environmental Management System and a Pollution Prevention/Waste Minimization Program, which would include an evaluation of methods to eliminate, reduce, or minimize the amounts of hazardous materials used and hazardous wastes generated. Ample disposal capacity is available for the disposal of hazardous waste during the construction and operations phase. DOE would implement appropriate planning measures for the storage and handling of hazardous materials and comply with applicable regulations.

The Department would dispose of nonrecyclable or nonreusable waste in permitted landfills. During construction, it is likely that, if utilized, some of the larger landfills would not see an appreciable change in the amount of waste received if they were utilized; however, some of the smaller landfills, if utilized, might see a substantial, although manageable, change in daily receipt of solid, and industrial, and special wastes.

DOE estimates that railroad construction along the Caliente rail alignment would increase the overall rate of disposal of solid waste by less than 0.01 percent and industrial and special waste in the region of influence by about 0.261 percent. DOE anticipates that impacts to local landfills from the disposal of solid and industrial and special these wastes would be small (for the relatively large Apex Landfill) to moderate (for the smaller landfills such as Goldfield Class I).

DOE estimates that railroad construction along the Mina rail alignment could generate three times the amount of industrial and special waste as would railroad construction along the Caliente rail alignment.

This is because of wastes from dismantling the Department of Defense Branchline through the town of Schurz. However, to the extent practicable, these wastes would be recycled to minimize waste volumes. DOE estimates that railroad construction along the Mina rail alignment would increase the overall rate of disposal of solid waste by 0.077 percent and, industrial and special waste in the region of influence by about 0.41 percent and 9 percent. DOE anticipates that impacts to local landfills from the disposal of these solid, industrial, and special wastes would be small (for the relatively large Apex Landfill) to moderate (for the smaller landfills such as Goldfield Class I).

During railroad operations along either the Caliente or Mina rail alignment, the generation of wastes would be substantially less than during the construction phase. DOE anticipates that railroad operations along either alignment would produce similar amounts of wastes. Therefore, impacts to landfills during operations would be small, because ample disposal capacity would be available for either rail alignment.

Activities at the Cask Maintenance Facility would generate from 3,200 to 7,900 cubic meters (113,000 to 280,000 cubic feet) of Class A low-level radioactive waste throughout the railroad operations phase. DOE would control and dispose of site-generated low-level radioactive waste in a DOE low-level waste disposal site, a site in an Agreement State, or in a U.S. Nuclear Regulatory Commission-licensed site, all of which currently have ample capacity to accept these wastes. Therefore, impacts to low-level radioactive waste disposal facilities would be small. No low-level radioactive waste is anticipated to be generated during construction activities; therefore, no impacts to disposal facilities would occur.

Under the Shared-Use Option for either rail alignment, waste characteristics, generation rates, and disposal requirements would increase only slightly; therefore, any additional adverse impacts associated with the Shared-Use Option would be small.

S.3.4.13 CULTURAL RESOURCES

The region of influence for cultural resources (historic and prehistoric sites) includes the construction right-of-way (the area of potential direct and indirect impacts) and a 3.2-kilometer (2-mile)-wide area centered on the rail alignment (the area of potential indirect impacts).

Because of the length of the proposed rail line along the Caliente and Mina rail alignments, DOE is using a phased cultural resource identification and evaluation approach, described in 36 CFR 800.4(b)2, to identify specific cultural resources. Under this approach, DOE would defer final intensive field surveys (known as a Class III inventory) of the actual construction right-of-way, as provided in the Programmatic Agreement between DOE, the BLM, the STB, and the Nevada State Historic Preservation Office. The Programmatic Agreement states that an appropriate level of field investigation—including on-the-ground intensive surveys; evaluations of all recorded resources listed on the *National Register of Historic Places*; assessments of adverse effects; and applicable mitigation of identified impacts—be completed before any ground-disturbing construction activities that could impact a specific resource could begin.

Railroad construction and operations could lead to unavoidable changes in cultural landscapes, such as changes to ethnographic, rural historic, and historic viewsapes. Cultural landscapes along the Caliente rail alignment include historic-period Western Shoshone villages and surrounding use areas in the Oasis Valley, the Goldfield area, and Stone Cabin and Reveille Valleys; early ranching operations in the Stone Cabin and Reveille Valleys; the historic Mormon settlement of Meadow Valley Wash, and the Goldfield, Clifford, and Reveille Mining Districts. Cultural landscapes along the Mina rail alignment include historic-period Northern Paiute use of the Walker River and Walker Lake areas, historic-period Western Shoshone villages and surrounding use areas in the Oasis Valley and Goldfield areas, and historic mining in the Luning, Mina, and Goldfield districts.

DOE completed literature reviews and a Class II inventory (sample field surveys within the construction right-of-way) for 20 percent of each alternative segment and common segment along the Caliente and Mina rail alignments, and has thereby identified some potential areas of specific impacts. Additionally, DOE conducted an intensive Class III inventory along a 12-kilometer (7.4-mile) corridor within the Yucca Mountain Site boundary, which resulted in the identification of seven sites and five isolates (isolated artifacts).

Based on preliminary information and the sample surveys conducted to date, the magnitude of impacts along both the Caliente and Mina rail alignments would range from small to moderate due to the extensive effort DOE would undertake to avoid or mitigate impacts to cultural resources in accordance with the regulatory framework and with the terms of the Programmatic Agreement.

Impacts to cultural resources under the Shared-Use Option for either the Caliente or Mina rail alignment would be approximately the same as those under the Proposed Action without shared use. However, construction of any additional commercial-use sidings would have the potential to impact cultural resources.

S.3.4.14 PALEONTOLOGICAL RESOURCES

Paleontology is a science that uses fossil remains to study life in past geological periods. Paleontological resources are recognized as a fragile and nonrenewable record of the history of life on earth and a critical component of America's natural heritage, and once damaged, destroyed, or improperly collected, their scientific and educational value may be greatly reduced or lost forever. The region of influence for paleontological resources along both rail alignments is the rail line construction right-of-way, and the footprints of railroad construction and operations support facilities.

DOE used the BLM system to classify paleontological resource areas according to their potential for containing vertebrate fossils, or noteworthy occurrences of invertebrate or plant fossils. This classification system became the basis to analyze the magnitude of potential impacts from construction in the region of influence of the Caliente and Mina rail alignments.

DOE determined that there are no known paleontological resources along any of the Caliente or Mina rail alignments or at the proposed locations of railroad construction and operations support facilities. Therefore, the Department would not anticipate any impacts to paleontological resources during the construction or operations phase along either rail alignment. However, if DOE uncovered previously unknown paleontological resources during construction activities, the Department would consult with the BLM to develop appropriate conservation measures.

Under the Shared-Use Option for either rail alignment impacts to paleontological resources would be similar to the Proposed Action without shared-use.

S.3.4.15 ENVIRONMENTAL JUSTICE

The region of influence for environmental justice encompasses the regions of influence for all other resource areas because impacts in other resource areas could result in environmental justice impacts.

DOE performed the analysis of potential environmental justice impacts in accordance with Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, and Council on Environmental Quality guidance. According to the Council on Environmental Quality, a minority population exists where either (a) the minority population of the affected area exceeds 50 percent; this calculation includes federally recognized American Indian lands, because American Indians are included in the definition of minority populations; 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. In addition to the 50-percent threshold, DOE used both the United States and the State of Nevada minority populations as bases for comparison.

The Council on Environmental Quality defines low-income by using 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 used both the United States and the State of Nevada low-income populations as the bases for comparison. DOE assumed a 20-percent threshold above state low-income percentages in accordance with U.S. Nuclear Regulatory Commission guidance.

DOE determined whether there would be minority or low-income populations in the Caliente or Mina rail alignment regions of influence for environmental justice, and assessed whether any high and adverse impacts could fall disproportionately on minority or low-income populations. DOE also considered whether minority or low-income populations would be affected by an alternative in different ways than the general population, such as through unique exposure pathways or rates of exposure, special sensitivities, or different uses of natural resources.

For the Caliente rail alignment, the Department determined that railroad construction and operations would not result in disproportionately high and adverse impacts to minority or low-income populations. For the Mina rail alignment, DOE determined that the Schurz population center and the Walker River Census County Division are the only locations where the minority populations exceed the threshold of 50 percent, and the Walker River Census County Division to be the only location where the low-income population exceeds the threshold of 20 percent over the state average of 10.5 percent established by the Nuclear Regulatory Commission and the Council on Environmental Quality. Because there are no large and adverse impacts in these areas, it cannot be concluded that low-income and minority populations in these areas would be disproportionately affected. Constructing and operating the proposed railroad along the Mina rail alignment would not result in high and adverse impacts to minority or low-income populations.

Similarly, the Department determined that under the Shared-Use Option for either rail alignment, there would be not high and adverse impacts to minority or low-income populations.

S.3.5 American Indian Interests

Based on information provided by the Consolidated Group of Tribes and Organizations, American Indians are concerned that substantial and high adverse effects to a number of American Indian interests could be caused within and adjacent to the Caliente rail alignment region of influence, which also encompasses the southern segments of the Mina rail alignment. The Consolidated Group of Tribes and Organizations is a forum consisting of officially appointed tribal representatives, from 17 tribes and organizations, who are responsible for presenting their respective tribal concerns and perspectives to DOE. At the time of discussions with the Consolidated Group of Tribes and Organizations, the Mina rail alignment was not under consideration as an implementing alternative and the views of the Northern Paiute peoples who traditionally occupied lands north of Goldfield and Tonopah are not represented by this group. As part of any Proposed Action, the Department would continue to consult with American Indian tribes with regard to their interests and believes.

The proposed Mina rail alignment would pass through and directly affect the Walker River Paiute Reservation. In a letter dated April 29, 2007, the Walker River Paiute Tribal Council officially informed the Department of their withdrawal from the environmental impact statement process. The Tribal Council

made the decision to withdraw based on information obtained during the Tribe's involvement with the Rail Alignment EIS process and input from Tribal members. The Tribe determined that the impacts and risks associated with nuclear shipments through the Reservation were too great and they reaffirmed a past objection to the transportation by any means of nuclear or radioactive waste through the Reservation.

American Indian views on construction and operation of a railroad along the Caliente rail alignment, as primarily expressed by the Consolidated Group of Tribes and Organizations, state that construction and operation of the proposed railroad would constitute an intrusion on the traditional lands of Southern Paiute, Western Shoshone, and Owens Valley Paiute and Shoshone people; would disturb cultural, biological, botanical, geological, and hydrological resources, including American Indian views, songscapes, storiscapes, and traditional cultural properties; would restrict the free access of American Indian people to their resources; and could cause substantial and high adverse effects to a number of American Indian interests within and adjacent to the region of influence. Within that forum of beliefs there would be an unavoidable impact to American Indian interests.

S.3.6 Cumulative Impacts

DOE evaluated public- and private-sector past, present, and reasonably foreseeable activities that could, when combined with the Proposed Action or Shared-Use Option, result in cumulative impacts. The DOE analysis of potential cumulative effects was primarily qualitative, but the Department quantified information to the extent feasible. The cumulative impacts regions of influence for analysis encompassed the Caliente and Mina rail alignments, and areas with potential direct and indirect effects for each resource area. To assess potential cumulative impacts from other projects, DOE identified major projects within the regions of influence that could have interactions with the proposed railroad in space or time. Those major projects included a wide variety of projects including the proposed Yucca Mountain Repository, the Nevada Test and Training Range, the Nevada Test Site, groundwater development, BLM land management (including rights-of-way), and power-plant construction.

DOE determined that the cumulative impacts within most of the resource areas described in the Rail Alignment EIS would be small in the Caliente and Mina rail alignment regions of influence unless noted otherwise.

In the Caliente and Mina rail alignment regions of influence, land use and management is changing because of increased construction and development, increased urbanization, and increased conversion of undeveloped land to other purposes or to multiple purposes. Federal agencies, primarily the BLM, will continue to be the major land manager throughout the regions of influence. The BLM has a major role in determining land use in the region through administration of federal lands, including development of resource management plans for the region. The incremental change to land use from constructing and operating the proposed railroad along the Caliente or the Mina rail alignment is projected to be small to moderate.

Overall, there is, and will continue to be, a broad contrast of how visual resource impacts are managed in the regions of influence, ranging from very little management for military mission-related activities to a formal visual resource management system on BLM-administered lands. DOE determined that operation of the proposed railroad would be visible in specific locations but would not dominate the viewsheds within the regions of influence. Changes to aesthetic resources in the regions of influence have already been affected by activities such as the Nevada Test and Testing Range, the Nevada Test Site, BLM management activities, and population growth. These changes will continue in future years, but the regions will generally maintain many of the remote and rural characteristics and conditions. The incremental change to aesthetic resources from constructing and operating the proposed railroad along the Caliente or the Mina rail alignment is projected to be small.

Cumulative impacts concerns regarding surface-water resources in the Caliente and Mina rail alignment regions of influence include changes to drainage patterns, infiltration rates, flood control, and spill/contamination potential. Regional impacts would generally be localized to each specific project. Insufficient inflow from the Walker River into Walker Lake would continue to jeopardize Walker Lake's future as a viable fishery, with or without the proposed railroad in the Mina rail alignment region of influence.

The Department anticipates that cumulative impacts to groundwater resources in the Caliente and Mina rail alignments regions of influence would range from small to large, depending on location along each alignment. Overall, the groundwater needs of the Proposed Action would represent a small portion of current cumulative water usage within the Caliente or Mina rail alignment regions of influence. However, in some proposed groundwater well locations for railroad use, cumulative demand would exceed perennial yield values. Water availability will continue to be a major regional cumulative impact issue in the coming years.

The Caliente or Mina rail alignment is projected to result in small to moderate incremental impacts to cumulative biological resources in their regions of influence. A railroad and other reasonably foreseeable and continuing projects in the region of influence would require coordinated mitigation and impact avoidance among project proponents to avoid and reduce cumulative impacts to biological resources. BLM land management activities also play a major role in regional impact avoidance and mitigation.

The Proposed Action would be only one of the many reasonably foreseeable sources of socioeconomic change to portions of the regions of influence, and would be relatively less important to socioeconomic change than external economic development and population growth. The road systems in the regions of influence could experience higher traffic levels, possibly associated congestion, and increased road maintenance, but incremental impacts due to the proposed railroad would be small.

DOE anticipates that impacts to air quality in the Caliente and Mina regions of influence would be small to moderate. DOE found that impacts from construction for either the Caliente or Mina rail alignment would generate emissions of some criteria pollutants that could be higher than applicable air quality standards. While these effects would be localized in specific areas, any potential violation of air quality standards would be of concern in relation to both project-specific and cumulative impacts.

The proposed railroad would result in nonradiological and radiological health and safety impacts for workers and residents along the alignments. For members of the public situated along the Caliente and Mina rail alignments, the radiological impacts during the operations phase would be a very small contribution to the overall radiological impacts of the Yucca Mountain Repository, and incremental impacts of the proposed railroad would be small.

The Yucca Mountain FEIS evaluated the cumulative impacts of two additional inventories of spent nuclear fuel, high-level radioactive waste, and other radioactive wastes (Modules 1 and 2). These additional wastes would be above and beyond the amounts of wastes that have been analyzed for shipment in the Rail Alignment EIS, and their possible shipment could represent a cumulative impact on the resources analyzed in the Rail Alignment EIS. Although emplacement of this additional waste at Yucca Mountain would require legislative action by Congress, such shipment is a reasonably foreseeable action for purposes of NEPA analysis. Because the planned annual shipment rate of spent nuclear fuel and high-level radioactive waste to the Yucca Mountain Repository would be about the same as the Proposed Action in the Rail Alignment EIS, the only cumulative impacts to arise would be due to the annual increase in the number of casks. Impacts from these additional casks would be similar to the generally small impacts summarized above.

It is possible that new economic activity associated with the Shared-Use Option might lead to induced effects, but the locations, scope, and types of these effects are not known at this time.

S.3.7 DOE Preferred Alternative

The Council on Environmental Quality NEPA implementing regulations require an agency to identify its preferred alternative to fulfill its statutory mission, if one or more exists, in a Draft EIS (40 CFR 1502.14[e]). For the Rail Alignment EIS, the DOE preferred alternative would be to construct and operate a railroad along the Caliente rail alignment and to implement the Shared-Used Option. The DOE preferred alignment along the Caliente rail alignment consists of the following: the Caliente alternative segment, common segment 1, Garden Valley alternative segment 1, common segment 2, South Reveille alternative segment 3, common segment 3, Goldfield alternative segment 3, Caliente common segment 4, Bonnie Claire alternative segment 3, common segment 5, Oasis Valley alternative segment 1, and common segment 6. Table S-7 lists the preferred alternative segments and identifies the bases for the Department's preferences. The table does not list common segments 1, 2, 3, 4, 5, and 6, because those are all included in the preferred alignment.

S.3.8 Issues to be Resolved

An issue that remains unresolved is the determination of land access. The BLM would need to authorize DOE access to sufficient lands for railroad construction and operation under a right-of-way grant applied for by DOE. Under the Mina Implementing Alternative, DOE would also need to apply to the Bureau of Indian Affairs to acquire a right-of-way in which to construct segments of the rail line on the Walker River Paiute Reservation. The DOE preferred alternative is to construct and operate a railroad along the Caliente rail alignment and within that alignment DOE has identified preferred alternative segments. However, it remains unresolved whether the BLM would choose to authorize DOE land access to those preferred alternative segments or to other alternative segments, or whether under the nonpreferred alternative the Bureau of Indian Affairs would grant DOE access to land on the Walker River Paiute Reservation.

Under each implementing alternative, DOE has analyzed a Shared-Use Option, under which the Department would allow commercial shippers to use the proposed rail line for shipments of general freight. A Shared-Use Option would be subject to STB approval, and it remains unresolved whether STB would grant such approval.

S.3.9 Areas of Controversy

The Yucca Mountain Project, including the transport of spent nuclear fuel and high-level radioactive waste, has remained a controversial issue since its inception some 20 years ago, and has been strongly opposed by the State of Nevada and a variety of state, local, tribal, and citizen groups. Over the last decade the State of Nevada has filed multiple lawsuits against the Federal Government regarding the Yucca Mountain Project. In 2004, the State of Nevada petitioned the United States Court of Appeals for the District of Columbia Circuit to review the Yucca Mountain FEIS and the portion of the DOE *Record of Decision* governing the transportation of nuclear waste. The State of Nevada alleged that the FEIS was procedurally flawed, violated NEPA, and ignored STB railroad regulations. The State of Nevada also challenged the Record of Decision under the Administrative Procedure Act in determining a "mostly rail" plan to be the preferred means of shipping waste to the site, and argued that DOE exceeded its authority in selecting the Caliente corridor. On August 8, 2006, the Court denied Nevada's petition.

Table S-7. Caliente rail alignment preferred alternative segments.^a

DOE preferred alternative	Analysis factors
Caliente alternative segment	<ul style="list-style-type: none"> • The Eccles alternative segment would include an Interchange Yard that requires a large amount of fill in Clover Creek to enable construction of the Staging Yard. The Caliente alternative segment Interchange Yard location would avoid this impact to Clover Creek. • The Caliente alternative segment would have greater impacts to wetlands than the Eccles alternative segment. This would create greater regulatory complexity associated with obtaining a U.S. Army Corps of Engineers permit to fill jurisdictional waters. • The Caliente alternative segment would cross more private land than the Eccles alternative segment. • The Eccles alternative segment would be more complex to construct and would cost approximately twice as much as the Caliente alternative segment. • Based on scoping comments, more stakeholders prefer the Caliente alternative segment. • The Caliente alternative segment Indian Cove Staging Yard location would require filling 47 acres (0.19 square kilometer) of wetlands. The Upland Staging Yard location would avoid the impacts to wetlands associated with the Indian Cove location.^b
Garden Valley alternative segment 1	<ul style="list-style-type: none"> • Engineering factors and regulatory complexity do not offer a means to discriminate among the Garden Valley alternative segments. • Garden Valley 1 would disturb less area than Garden Valley 2, 3, or 8.
South Reveille alternative segment 3	<ul style="list-style-type: none"> • No major environmental discriminator. • South Reveille 3 would avoid complex road and wash crossing that would be required for South Reveille 2.
Goldfield alternative segment 3	<ul style="list-style-type: none"> • Engineering uncertainty of crossing mining district associated with Goldfield 1. • Goldfield 4 would include two grade-separated crossings of U.S. Highway 95. • Goldfield 4 would have greater cultural resources impacts than Goldfield 1 or Goldfield 3. Goldfield 4 would enter the Goldfield Historic District. • Goldfield 3 would have fewer land-use conflicts than Goldfield 1 or Goldfield 4.
Bonnie Claire alternative segment 3	<ul style="list-style-type: none"> • No major environmental discriminator. • Bonnie Claire 2 would be close to the boundary of the Nevada Test and Training Range and would be more complex to construct than Bonnie Claire 3.
Oasis Valley alternative segment 1	<ul style="list-style-type: none"> • No major environmental discriminator. • Oasis Valley 1 would cross one parcel of private property. Oasis Valley 3 would not cross private property. • Oasis Valley 1 would require fewer earthworks for construction than Oasis Valley 3.

a. The DOE preferred rail alignment, Caliente, includes all six common segments.

b. DOE has not identified a preference for the Staging Yard location.

The Consolidated Group of Tribes and Organizations has consistently opposed the siting of the Yucca Mountain repository and transportation of spent nuclear fuel and high-level radioactive waste to such a repository. Construction and operation of the Yucca Mountain repository and proposed railroad are viewed to constitute an intrusion on the holy lands of the Southern Paiute, Western Shoshone, and Owens Valley Paiute and Shoshone people, as well as a disturbance to cultural, biological, botanical, geological, and hydrological resources, and to American Indian viewscapes, songscapes, storyscapes, and traditional cultural properties. DOE accepts these viewpoints as responsible opposing viewpoints. These issues may continue to be viewed as unresolved within the forum of American Indian cultures and beliefs.

Water needs for the Caliente or Mina rail alignments would represent a small portion of current cumulative water usage within the region of influence; however, water usage in some locations would continue to exceed perennial yield values. Water usage and water development projects will continue to be a major concern in the region of influence irrespective of the water demands associated with either rail alignment. Growth in water demand in Nevada has been very rapid: water usage against the backdrop of regional water transfer plans remains an overarching controversial issue.

Possible rail line alternative segments through Garden Valley have been considered controversial in that its use has been viewed as detrimental to the remote desert setting of *City*, a large complex of abstract sculptural and architectural forms made from earth, rock, and concrete extending over 2.5 kilometers (1.5 miles) in Garden Valley.

Some issues related to land use could be viewed as potentially controversial. Although the total amount of private land along either alignment would be small (about 1 percent for Caliente and 0.5 percent for Mina) compared to the total amount of land required for the alignment, there are individual landowners who could be directly affected. No residences would be directly affected. One local business along the Caliente rail alignment, the Caliente Hot Springs Hotel, could be adversely affected because of the rail line's proximity to the hotel.

S.3.10 Major Conclusions

DOE analysis shows that construction and operation of a railroad along the Caliente rail alignment or the Mina rail alignment for shipment of spent nuclear fuel, high-level radioactive waste, and other materials from an existing rail line in Nevada to a repository at Yucca Mountain would result in broadly similar but generally small impacts to natural, human-health, social, economic, and cultural resources. The environmental justice analyses indicate that there would be no disproportionately high and adverse human health or environmental impacts to minority or low-income populations from railroad construction and operations along either the Caliente rail alignment or the Mina rail alignment.

DOE recognizes that the Mina Implementing Alternative would, on balance, be environmentally preferable to the Caliente Implementing Alternative because, in general, the Mina Implementing Alternative would have fewer private-land conflicts, less surface disturbance, smaller impacts to wetlands, and smaller impacts to air quality than the Caliente Implementing Alternative. In addition, DOE has estimated that the total cost to construct the railroad along the Mina rail alignment would be approximately 20 percent less than to construct the railroad along the Caliente rail alignment (\$1.7 billion compared to \$2.2 billion [2005 dollars]). However, stemming from the Walker River Paiute Tribal Council decision to withdraw from participating in the Nevada Rail Corridor SEIS and the Rail Alignment EIS process, and to renew past objections to the transportation of nuclear waste through Walker River Paiute Reservation, the DOE preferred alternative is to construct and operate a railroad along the Caliente rail alignment.

Under the No-Action Alternative, there would be no impacts to natural, human-health, social, economic, or cultural resources. In the event that DOE were not to select a rail alignment, the future course that it would pursue to meet its obligations under the NWPA would become uncertain.

S.3.11 Comparison of Environmental Impacts

Council on Environmental Quality regulations that implement the procedural requirements of NEPA state that agencies should provide a comparison of the environmental impacts of the Proposed Action and its alternatives to sharply define the issues and provide a clear basis for choice. The comparison in this section is based on the information and analyses presented in subsequent chapters of this Rail Alignment EIS.

Tables S-8 through S-10 highlight the differences in potential impacts under the Proposed Action for the Caliente and Mina Implementing Alternatives and the No-Action Alternative. Table S-8 lists the range of potential impacts under the Proposed Action for the Caliente Implementing Alternative and the Mina Implementing Alternative considering the largest and smallest potential impacts of the different alternative segments. Table S-8 allows a comparison of the Proposed Action to the No-Action Alternative.

Potential impacts under the Shared-Use Option would be generally the same as impacts under the Proposed Action without shared use, unless noted otherwise in the tables. Potential commercial sidings and facilities that could be constructed under the Shared-Use Option would likely be constructed within the operations right-of-way to the extent practicable; therefore, the impacts of their construction are included within those impacts presented for the Proposed Action.

Tables S-9 and S-10 highlight potential impacts under the Proposed Action for the Caliente rail alignment and the Mina rail alignment, respectively. The tables include the alternative segments and common segments that could form each rail alignment. To make the tables more useful to the reader in discriminating between alternative segments, they focus on the major differences in impacts. Therefore, the tables do not include entries for all resource areas. Chapter 4 includes full summaries of potential impacts for each resource area.

These tables illustrate that the Mina Implementing Alternative would be environmentally preferable when compared to the Caliente Implementing Alternative. In general, the Mina Implementing Alternative would have fewer private-land conflicts, less surface disturbance, smaller wetlands impacts, and smaller air quality impacts than the Caliente Implementing Alternative. However, the Mina Implementing Alternative remains the nonpreferred alternative due to the objection of the Walker River Paiute Tribe to the transportation of spent nuclear fuel and high-level radioactive waste through its Reservation.

Table S-8. Comparison of potential impacts under the Proposed Action (Caliente Implementing Alternative and Mina Implementing Alternative) and the No-Action Alternative^a (page 1 of 17).

Resource Area	Proposed Action		
	Caliente Implementing Alternative	Mina Implementing Alternative	No-Action Alternative
Physical setting	<p>Total surface disturbance: 55 to 61 square kilometers (14,000 to 15,000 acres). Would result in topsoil loss and increased potential for erosion.</p> <p>Loss of prime farmland soils: 1.3 to 1.8 square kilometers (320 to 440 acres). Less than 0.1 percent of prime farmland soils in Lincoln and Nye Counties.</p>	<p>Total surface disturbance: 40 to 48 square kilometers (9,900 to 12,000 acres). Would result in topsoil loss and increased potential for erosion.</p> <p>Loss of prime farmland soils: 0.011 to 0.014 square kilometer (2.7 to 3.5 acres). Less than 3 percent of the prime farmland soils of the Walker River Paiute Reservation.</p>	<p>No surface disturbance or prime farmland soils impacts because the rail line and associated facilities would not be constructed.</p>
Land use and ownership	<p>Land-use change on public lands for operations right-of-way.</p> <p>Private parcels the rail line would cross: 14 to 71. Area of private land affected: 0.33 to 0.72 square kilometer (82 to 178 acres).</p> <p>Private land needed for facilities: 1.15 square kilometers (284 acres)</p> <p>Active grazing allotments the rail line would cross: 24 to 27.</p> <p>Animal unit months lost: 1,019 to 1,050. (An animal unit month represents enough dry forage for one mature cow for one month.)</p> <p>Sections with unpatented mining claims that would be crossed: 32 to 37.</p>	<p>Land-use change on public lands and the Walker River Paiute Reservation for operations right-of-way.</p> <p>Private parcels the rail line would cross: 1 to 40. Area of private land affected: 0.21 to 0.59 square kilometer (52 to 146 acres).</p> <p>Active grazing allotments the rail line would cross: 5 to 8.</p> <p>Animal unit months lost: 159 to 246.</p> <p>Sections with unpatented mining claims that would be crossed: 23 to 30.</p>	<p>DOE would relinquish public lands along the Caliente rail alignment that were withdrawn for study under Public Land Order 7653. DOE would also relinquish the public lands segregated from surface and mineral entry for 2 years along the Caliente and Mina rail alignments.</p>

Table S-8. Comparison of potential impacts under the Proposed Action (Caliente Implementing Alternative and Mina Implementing Alternative) and the No-Action Alternative^a (page 2 of 17).

Resource Area	Proposed Action		
	Caliente Implementing Alternative	Mina Implementing Alternative	No-Action Alternative
Aesthetic resources	<p>Small to moderate impact across Caliente rail alignment from operations. No contrast to moderate contrast in the long term from the installation of linear track, signals, communications towers, power poles connecting to the grid, and access roads.</p> <p>Small impact from train operations. No contrast to strong contrast in the short term from passing trains.</p> <p>Moderate impact from Staging Yard at Indian Cove. Moderate contrast from the operation of the facility in the Class III non-BLM lands, weak contrast from the track on BLM Class II lands at the north end; in each area, consistent with applicable BLM management objectives.</p> <p>Potential quarry CA-8B - Moderate impact. Moderate contrast in the short term from installation and use of the conveyor from the quarry across U.S. Highway 93. No long-term impact under the Proposed Action; conveyor would be removed at end of construction phase. Moderate impact under the Shared-Use Option from the use of a conveyor across U.S. Highway 93 for 6 to 8 years.</p>	<p>Same as the Caliente Implementing Alternative.</p> <p>Same as the Caliente Implementing Alternative.</p> <p>Small to moderate impact from Schurz alternative segments. Weak to moderate contrast as rail line and crossing structures would, in places, attract the attention of viewers, but would meet BLM Class III management objectives. (Moderate to strong contrast in the short term from construction of the rail-over-road grade-separated crossing of U.S. Highway 95 for Schurz 6, which would not meet BLM Class III management objectives.)</p> <p>Small to moderate impact from Montezuma alternative segment 1. Weak contrast from new linear feature adjacent to State Route 265 and weak to moderate contrast in Clayton Valley; would meet BLM Class III and IV management objectives.</p> <p>Potential Garfield Hills quarry - Moderate impact. Moderate contrast in the short term from quarrying, ballast production facilities, and conveyor close to viewers that would be compatible with BLM Class III management objectives. Small impact in long term; production facilities and conveyor would be removed and quarried areas restored after closure of quarry at end of construction phase.</p>	<p>No impacts because the rail line and associated facilities would not be constructed. Public land would remain subject to BLM administration under applicable resource management plans. BLM would continue to manage public land for multiple use.</p>

Table S-8. Comparison of potential impacts under the Proposed Action (Caliente Implementing Alternative and Mina Implementing Alternative) and the No-Action Alternative^a (page 3 of 17).

Resource Area	Proposed Action		
	Caliente Implementing Alternative	Mina Implementing Alternative	No-Action Alternative
Aesthetic resources (continued)		<p>Potential Gabbs Range quarry - Small to moderate impact. Weak to moderate contrast in the short term from ballast production facilities close to viewers that would be compatible with BLM Class III management objectives. Small impact in long term; production facilities would be removed after closure of quarry at end of construction phase.</p> <p>Potential North Clayton quarry - Weak to moderate impact. Moderate contrast in the short term from production facilities close to viewers that would be compatible with BLM Class IV management objectives. Small impact in long term; production facilities would be removed and waste dumps restored after closure of quarry at end of construction phase.</p>	
Air quality and climate – Lincoln County	<p>Using conservative modeling assumptions, no exceedances of the NAAQS would be expected from the construction or operation of the railroad, the Caliente Interchange Yard, or potential quarry CA-8B.</p> <p>The closest approach to a NAAQS standard would be for 24-hour PM₁₀ (38 percent of standard for rail line and potential quarry CA-8B) during the construction phase.</p>	Not applicable. No portion of a rail line along the Mina rail corridor would be constructed in Lincoln County.	No impacts because the rail line and associated facilities would not be constructed.

Table S-8. Comparison of potential impacts under the Proposed Action (Caliente Implementing Alternative and Mina Implementing Alternative) and the No-Action Alternative^a (page 4 of 17).

Resource Area	Proposed Action		
	Caliente Implementing Alternative	Mina Implementing Alternative	No-Action Alternative
Air quality and climate – Esmeralda County	<p>Using conservative modeling assumptions, no exceedances of the NAAQS would be expected from railroad construction and operations.</p> <p>The closest approaches to a NAAQS standard would be for 24-hour PM₁₀ (87 percent of standard) and 24-hour PM_{2.5} (74 percent of standard), for rail line construction near Goldfield.</p>	<p>Using conservative modeling assumptions, no exceedances of the NAAQS would be expected from the railroad construction and operations or the potential Malpais Mesa quarry, with most values expected to be well below the NAAQS.</p> <p>The closest approach to a NAAQS standard would for 24-hour PM₁₀ (63 percent of standard) and 24-hour PM_{2.5} (54 percent of standard) for the rail line construction near Silver Peak.</p>	No impacts because the rail line and associated facilities would not be constructed.
Air quality and climate – Nye County	<p>Using conservative modeling assumptions, no exceedances of the NAAQS would be expected from the railroad construction operations, with the possible exception of 24-hour PM₁₀.</p> <p>Modeling at the potential quarry NN-9B site in the South Reveille Valley indicates a potential exceedance (160 percent of standard, temporary and localized) of the 24-hour PM₁₀ NAAQS. However, operating restrictions in the required Surface Disturbance Permit would likely reduce PM₁₀ emissions, making such an exceedance unlikely.</p>	No exceedances of the NAAQS would be expected from the railroad construction and operations, with most values expected to be far below the NAAQS.	No impacts because the rail line and associated facilities would not be constructed.

Table S-8. Comparison of potential impacts under the Proposed Action (Caliente Implementing Alternative and Mina Implementing Alternative) and the No-Action Alternative^a (page 5 of 17).

Resource Area	Proposed Action		
	Caliente Implementing Alternative	Mina Implementing Alternative	No-Action Alternative
Air quality and climate – Churchill County	Not applicable. No portion of the rail line along the Caliente rail alignment would be constructed in Churchill County.	No exceedances of the NAAQS would be expected from the railroad operations, with most values expected to be far below the NAAQS. There is no new rail line construction planned within Churchill County; the only construction activity would be the operation of trains carrying construction material on the existing rail line.	No impacts because the rail line and associated facilities would not be constructed.
Air quality and climate – Lyon County	Not applicable. No portion of the rail line along the Caliente rail alignment would be constructed in Lyon County.	No exceedances of the NAAQS would be expected from the railroad construction and operations, with most values expected to be far below the NAAQS.	No impacts because the rail line and associated facilities would not be constructed.
Air quality and climate – Mineral County	Not applicable. No portion of the rail line along the Caliente rail alignment would be constructed in Mineral County.	<p>Conservative modeling indicated potential exceedances of the NAAQS for PM₁₀ and PM_{2.5} in the following scenarios:</p> <ul style="list-style-type: none"> • Rail line construction near Mina; 111 percent of the 24-hour PM₁₀ NAAQS. • Rail line construction near Schurz, 186 percent of the 24-hour PM₁₀ NAAQS. • Rail line construction near Schurz, 124 percent of the 24-hour PM_{2.5} NAAQS. • Rail line construction near Schurz, 103 percent of the annual PM₁₀ NAAQS. • Staging Yard construction near Hawthorne, 165 percent of the 24-hour PM₁₀ NAAQS. • Staging Yard construction near Hawthorne, 118 percent of the 24-hour PM_{2.5} NAAQS. • Staging Yard construction near Hawthorne, 102 percent of the annual PM₁₀ NAAQS. • Operation of the potential Garfield Hills quarry near Hawthorne, 200 percent of the 24-hour PM₁₀ NAAQS. <p>However, operating restrictions in the required Surface Disturbance Permit would likely reduce PM₁₀ and PM_{2.5} emissions, making such exceedances unlikely. No exceedances for other criteria pollutants would be expected, with most values expected to be well below the NAAQS.</p>	No impacts because the rail line and associated facilities would not be constructed.

Table S-8. Comparison of potential impacts under the Proposed Action (Caliente Implementing Alternative and Mina Implementing Alternative) and the No-Action Alternative^a (page 6 of 17).

Resource Area	Proposed Action		
	Caliente Implementing Alternative	Mina Implementing Alternative	No-Action Alternative
Air quality and climate – Mineral County (continued)		<p>Modeling of emissions from construction of the Staging Yard at Hawthorne found that the 24-hour PM₁₀ and PM_{2.5} NAAQS could be exceeded in the immediate vicinity of the Staging Yard under some conditions.</p> <p>Modeling of emissions from the operation of the potential quarry at Garfield Hills indicates that the 24-hour PM₁₀ and PM_{2.5} NAAQS could be potentially exceeded. However, the required Surface Disturbance Permit is anticipated to greatly reduce PM₁₀ and PM_{2.5} emissions, making an exceedance of the NAAQS unlikely.</p>	
Surface-water resources	<p>Caliente alternative segment: Approximately 0.05 square kilometer (12 acres) of wetlands would be filled. Long-term reduced and potentially eliminated access to Caliente Hot Springs.</p> <p>Eccles alternative segment: Negligible amount of wetlands would be filled.</p> <p>Caliente alternative segment: Indian Cove Staging Yard, approximately 0.19 square kilometer (47 acres) of wetlands would be filled; Upland Staging Yard, no wetlands would be filled.</p> <p>Potential quarry CA-8B: Approximately 0.09 square kilometer (22 acres) of wetlands would be filled to construct the quarry siding.</p> <p>Eccles alternative segment, Interchange Yard: Approximately 0.033 square kilometer (8.2 acres) of Clover Creek would be filled.</p> <p>Goldfield alternative segment 3: Long-term reduced and potentially eliminated access to Willow Springs.</p>	<p>Schurz alternative segments: Of the 0.065 square kilometer (16 acres) of wetlands crossed in this area, only 20 to 28 square meters (220 to 300 square feet) would be permanently filled to construct the bridge over the Walker River.</p>	<p>No impacts because the rail line and associated facilities would not be constructed. Erosion and sedimentation would continue under natural processes.</p>

Table S-8. Comparison of potential impacts under the Proposed Action (Caliente Implementing Alternative and Mina Implementing Alternative) and the No-Action Alternative^a (page 7 of 17).

Resource Area	Proposed Action		No-Action Alternative
	Caliente Implementing Alternative	Mina Implementing Alternative	
Groundwater resources	<p>Physical impacts to existing groundwater resource features such as existing wells or springs resulting from railroad construction and operation would be small.</p> <p>Groundwater withdrawals during construction from hydrographic areas in Panaca Valley, Sarcobatus Flat, and Oasis Valley could impact existing groundwater resources and users through localized and temporary drawdown of the water table. However, mitigation measures such as reducing the pumping rate or relocating proposed wells Pan V25/26, Pan V4, Pan V5, Pan V7/8, Pan V2, Pan V24, SaF1, OV3, OV4, and OV5/13 would minimize these impacts.</p> <p>The potential for groundwater withdrawals during the construction and operations phases to cause subsidence of the ground surface would be small.</p> <p>The impact of proposed groundwater withdrawals on groundwater quality would be small, and the impact of withdrawals on downgradient hydrographic areas would be very small. The proposed withdrawals would not conflict with water quality standards protecting groundwater resources.</p>	<p>Physical impacts to existing groundwater resource features such as existing wells or springs resulting from railroad construction and operations would be small.</p> <p>Groundwater withdrawals during construction from hydrographic areas in Clayton Valley, Sarcobatus Flat, Oasis Valley, and Columbus Salt Marsh could impact existing groundwater resources and users. However, mitigation measures such as reducing the pumping rate or relocating proposed wells CL-1a, SaF1, OV3, OV4, OV5/13, and CSM-2a would minimize these impacts.</p> <p>Same as the Caliente Implementing Alternative.</p> <p>Same as the Caliente Implementing Alternative.</p>	<p>No impacts because the rail line and associated facilities would not be constructed.</p>

Table S-8. Comparison of potential impacts under the Proposed Action (Caliente Implementing Alternative and Mina Implementing Alternative) and the No-Action Alternative^a (page 8 of 17).

Resource Area	Proposed Action		
	Caliente Implementing Alternative	Mina Implementing Alternative	No-Action Alternative
Biological resources	<p>Short-term impact to 0.12 to 0.24 square kilometer (30 to 59 acres) wetland/riparian habitat. Long-term impact to 0.11 to 0.23 square kilometer (27 to 57 acres) wetland/riparian habitat.</p> <p>Short-term moderate impact on riparian and wetland vegetation along Oasis Valley alternative segment 3.</p> <p>Small to moderate impact on raptor nesting sites from the construction of potential quarry NN-9A. Short-term moderate impacts to desert bighorn sheep southwest of common segment 6.</p>	<p>Short-term impact to 0.01 to 0.05 square kilometer (2.5 to 12 acres) wetland/riparian habitat. Long-term impact to 0 to 0.01 square kilometer (0 to 2.5 acres) wetland/riparian habitat.</p> <p>Same as the Caliente Implementing Alternative.</p> <p>Small to moderate long-term impacts to Inter-Mountains Mixed Salt Desert Scrub and Inter-Mountain Basins Greasewood Flat along Schurz alternative segment 6.</p> <p>Moderate long-term impact to Inter-Mountains Mixed Salt Desert Scrub along Mina common segment 1.</p> <p>Short-term and long-term moderate impacts to western snowy plover along Mina common segment 1.</p> <p>Moderate impact to winterfat communities – Montezuma alternative segments and potential Gabbs Range quarry site.</p> <p>Long-term moderate impacts to Inter-Mountain Basins Mixed Salt Desert Scrub and Inter-Mountain Basins Big Sagebrush at potential North Clayton and Malpais Mesa quarry sites.</p> <p>Short-term moderate impacts to desert bighorn sheep southwest of common segment 6.</p>	<p>No impacts because the rail line and associated facilities would not be constructed.</p>

Table S-8. Comparison of potential impacts under the Proposed Action (Caliente Implementing Alternative and Mina Implementing Alternative) and the No-Action Alternative^a (page 9 of 17).

Resource Area	Proposed Action		
	Caliente Implementing Alternative	Mina Implementing Alternative	No-Action Alternative
Noise and vibration	<p>Noise from construction activities in Caliente would exceed Federal Transit Administration guidelines. Daytime limits would be exceeded by 11 dBA from construction equipment noise and by 7 dBA from pile driving; 30-day DNL limit would be exceeded by 2 dBA from construction equipment noise and by 12 dBA from pile driving.</p> <p>Noise from construction equipment along the Eccles alternative segment would exceed limits by 5 dBA.</p> <p>No adverse noise or vibration impacts from construction trains or from operational train activity.</p>	<p>DOE estimates that 34 receptors would be included within the construction-train 65 DNL contours in Silver Springs, and 7 receptors would be included within the 65 DNL contours in Wabuska. These noise impacts would be considered temporary adverse impacts.</p> <p>Noise from operations would create adverse noise impacts at eight receptors in Silver Springs and one receptor in Wabuska.</p> <p>No vibration impacts from construction trains or from operational train activity.</p>	No change to existing noise and vibration. No impacts because the rail line and associated facilities would not be constructed.
Socioeconomic: - Throughout the region of influence	<p><i>Construction</i></p> <p>Up to 1,083 animal unit months lost, valued at \$57,000 (An animal unit month represents enough dry forage for one mature cow for one month.)</p> <p><i>Operations</i></p> <p>Continued lack of access to up to 1,083 animal unit months, valued at \$57,000</p>	<p><i>Construction</i></p> <p>Up to 326 animal unit months lost, valued at \$17,400</p> <p><i>Operations</i></p> <p>Continued lack of access to up to 326 animal unit months, valued at \$17,400</p>	No impacts to existing socioeconomic conditions because the rail line and associated facilities would not be constructed.
Socioeconomic: - Lincoln County	<p><i>Construction</i></p> <p>Population: 1.7 percent increase</p> <p>Employment: 5.6 percent increase</p> <p>Real disposable income: 4.1 percent increase</p> <p>Gross regional product: 28 percent increase</p> <p>State and local government spending: 1.9 percent increase</p> <p>Traffic impacts to local highways: level of service on U.S. Highway 93 at Caliente would degrade from A to B</p>	Not applicable	No impacts to existing socioeconomic conditions because the rail line and associated facilities would not be constructed.

Table S-8. Comparison of potential impacts under the Proposed Action (Caliente Implementing Alternative and Mina Implementing Alternative) and the No-Action Alternative^a (page 10 of 17).

Resource Area	Proposed Action		No-Action Alternative
	Caliente Implementing Alternative	Mina Implementing Alternative	
Socioeconomics – Lincoln County (continued)	<p><i>Operations</i></p> <p>Population: 2.9 percent increase</p> <p>Employment: 3.9 percent increase</p> <p>Real disposable income: 4.7 percent increase</p> <p>Gross regional product: 5.2 percent increase</p> <p>State and local government spending: 3.2 percent increase</p>		
Socioeconomics – Esmeralda County	<p><i>Construction</i></p> <p>Population: 1.1 percent increase</p> <p>Employment: 2.7 percent increase</p> <p>Real disposable income: 7.6 percent increase</p> <p>Gross regional product: 9.5 percent increase</p> <p>State and local government spending: 2.2 percent increase</p> <p><i>Operations</i></p> <p>Population: 2.0 percent increase</p> <p>Employment: 3.0 percent increase</p> <p>Real disposable income: 2.9 percent increase</p> <p>Gross regional product: 3.8 percent increase</p> <p>State and local government spending: 3.1 percent increase</p>	<p><i>Construction</i></p> <p>Population: 3.1 percent increase</p> <p>Employment: 14 percent increase</p> <p>Real disposable income: 27 percent increase</p> <p>Gross regional product: 57 percent increase</p> <p>State and local government spending: 4.6 percent increase</p> <p><i>Operations</i></p> <p>Population: 7.0 percent increase</p> <p>Employment: 14 percent increase</p> <p>Real disposable income: 10 percent increase</p> <p>Gross regional product: 24 percent increase</p> <p>State and local government spending: 9.9 percent increase</p>	No impacts to existing socioeconomic conditions because the rail line and associated facilities would not be constructed.

Table S-8. Comparison of potential impacts under the Proposed Action (Caliente Implementing Alternative and Mina Implementing Alternative) and the No-Action Alternative^a (page 11 of 17).

Resource Area	Proposed Action		No-Action Alternative
	Caliente Implementing Alternative	Mina Implementing Alternative	
Socioeconomic: <i>Construction</i> – Nye County	<p>Population: 0.2 percent increase Employment: 1.2 percent increase Real disposable income: 0.9 percent increase Gross regional product: 3.5 percent increase State and local government spending: 0.4 percent increase Traffic impacts to local highways: level of service on U.S. Highway 95 near access to Yucca Mountain Site would degrade from B to C</p> <p><i>Operations</i> Population: 0.3 percent increase Employment: 0.3 percent increase Real disposable income: 0.3 percent increase Gross regional product: 0.5 percent increase State and local government spending: 0.3 percent increase Housing: county-wide population increase could place a strain on housing units in Pahrump Health-care services: moderate impacts due to population increases in medically underserved area Fire-protection services: moderate impacts in Pahrump due to population increases in underserved area Educational services: addition of 30 school-aged children to overcrowded schools Traffic impacts to local highways: level of service on U.S. Highway 95 near access to Yucca Mountain Site would degrade from B to C</p>	<p><i>Construction</i> Population: 0.16 percent increase Employment: 0.6 percent increase Real disposable income: 0.4 percent increase Gross regional product: 1 percent increase State and local government spending: 0.2 percent increase Traffic impacts to local highways: level of service on U.S. Highway 95 near access to Yucca Mountain Site would degrade from B to C</p> <p><i>Operations</i> Population: 0.3 percent increase Employment: 0.1 percent increase Real disposable income: 0.1 percent increase Gross regional product: 0.2 percent increase State and local government spending: 0.1 percent increase Housing: county-wide population increase could place a strain on housing units in Pahrump Health-care services: moderate impacts due to population increases in medically underserved area Fire-protection services: moderate impacts in Pahrump due to population increases in underserved area Educational services: addition of 23 school-aged children to overcrowded schools Traffic impacts to local highways: level of service on U.S. Highway 95 near access to Yucca Mountain Site would degrade from B to C</p>	<p>No impacts to existing socioeconomic conditions because the rail line and associated facilities would not be constructed.</p>

Table S-8. Comparison of potential impacts under the Proposed Action (Caliente Implementing Alternative and Mina Implementing Alternative) and the No-Action Alternative^a (page 12 of 17).

Resource Area	Proposed Action		
	Caliente Implementing Alternative	Mina Implementing Alternative	No-Action Alternative
Socioeconomics - Not applicable Churchill County		<p><i>Construction and Operations</i></p> <p>Delay impacts on road traffic at grade crossings; less than 1 percent of vehicles traveling on U.S. Highway 50A in Hazen would incur a delay of less than 1 minute</p> <p>Rail impacts on existing rail traffic: moderate</p>	No impacts to existing socioeconomic conditions because the rail line and associated facilities would not be constructed.
Socioeconomics - Not applicable Lyon County		<p><i>Construction</i></p> <p>Population: 0.01 percent increase</p> <p>Employment: 0.02 percent increase</p> <p>Real disposable income: 0.03 percent increase</p> <p>Gross regional product: 0.04 percent increase</p> <p>State and local government spending: 0.01 percent increase</p> <p>Rail impacts on existing rail traffic: moderate</p> <p><i>Operations</i></p> <p>Population: less than 0.01 percent increase</p> <p>Employment: 0.01 percent increase</p> <p>Real disposable income: 0.01 percent increase</p> <p>Gross regional product: 0.01 percent increase</p> <p>State and local government spending: 0.01 percent increase</p> <p>Rail impacts on existing rail traffic: moderate</p>	No impacts to existing socioeconomic conditions because the rail line and associated facilities would not be constructed.

Table S-8. Comparison of potential impacts under the Proposed Action (Caliente Implementing Alternative and Mina Implementing Alternative) and the No-Action Alternative^a (page 13 of 17).

Resource Area	Proposed Action		No-Action Alternative
	Caliente Implementing Alternative	Mina Implementing Alternative	
Socioeconomic: Not applicable – Walker River Paiute Reservation		<p><i>Construction</i></p> <p>Assuming one of the construction camps is placed on the Walker River Paiute Reservation:</p> <p>Employment: up to 20 additional jobs</p> <p>Real disposable income: up to \$386,000</p> <p>Gross regional product: up to \$1.4 million</p> <p><i>Operations</i></p> <p>Included in the Mineral County estimates because the forecasting model cannot discriminate impacts to the Reservation.</p>	No impacts to existing socioeconomic conditions because the rail line and associated facilities would not be constructed.
Socioeconomic: Not applicable – Mineral County		<p><i>Construction</i></p> <p>Population: 1.4 percent increase</p> <p>Employment: 6.1 percent increase</p> <p>Real disposable income: 4.5 percent increase</p> <p>Gross regional product: 14 percent increase</p> <p>State and local government spending: 1.8 percent increase</p> <p>Rail impacts on existing rail traffic: moderate</p> <p><i>Operations</i></p> <p>Population: 1.6 percent increase</p> <p>Employment: 2.6 percent increase</p> <p>Real disposable income: 2.8 percent increase</p> <p>Gross regional product: 1.9 percent increase</p> <p>State and local government spending: 1.5 percent increase</p> <p>Rail impacts on existing rail traffic: moderate</p>	No impacts to existing socioeconomic conditions because the rail line and associated facilities would not be constructed.

Table S-8. Comparison of potential impacts under the Proposed Action (Caliente Implementing Alternative and Mina Implementing Alternative) and the No-Action Alternative^a (page 14 of 17).

Resource Area	Proposed Action		No-Action Alternative
	Caliente Implementing Alternative	Mina Implementing Alternative	
Socioeconomics - Clark County	<p><i>Construction</i></p> <p>Population: less than 0.1 percent increase Employment: 0.1 percent increase Real disposable income: 0.2 percent increase Gross regional product: 0.2 percent increase State and local government spending: small increase</p> <p><i>Operations</i></p> <p>Population: less than 0.1 percent increase Employment: less than 0.1 percent increase Real disposable income: less than 0.1 percent increase Gross regional product: less than 0.1 percent increase State and local government spending: less than 0.1 percent increase</p>	<p><i>Construction</i></p> <p>Population: 0.04 percent increase Employment: 0.1 percent increase Real disposable income: 0.1 percent increase Gross regional product: 0.1 percent increase State and local government spending: 0.04 percent increase</p> <p><i>Operations</i></p> <p>Population: less than 0.01 percent increase Employment: less than 0.1 percent increase Real disposable income: less than 0.1 percent increase Gross regional product: less than 0.1 percent increase State and local government spending: less than 0.1 percent increase</p>	No impacts to existing socioeconomic conditions because the rail line and associated facilities would not be constructed.
Socioeconomics - Washoe County/Carson City	Not applicable	<p><i>Construction</i></p> <p>Population: less than 1 percent increase Employment: less than 0.3 percent increase Real disposable income: less than 0.3 percent increase Gross regional product: less than 0.3 percent increase State and local government spending: less than 0.1 percent increase</p> <p><i>Operations</i></p> <p>Population: less than 0.1 percent increase Employment: less than 0.1 percent increase Real disposable income: less than 0.1 percent increase Gross regional product: less than 0.1 percent increase State and local government spending: less than 0.1 percent increase</p>	No impacts to existing socioeconomic conditions because the rail line and associated facilities would not be constructed.

Table S-8. Comparison of potential impacts under the Proposed Action (Caliente Implementing Alternative and Mina Implementing Alternative) and the No-Action Alternative^a (page 15 of 17).

Resource Area	Proposed Action		
	Caliente Implementing Alternative	Mina Implementing Alternative	No-Action Alternative
Occupational and public health and safety	Occupational radiological impacts: less than one latent cancer fatality	Occupational radiological impacts: less than one latent cancer fatality	No impacts because the rail line and associated facilities would not be constructed or operated.
	Public radiological impacts: less than one latent cancer fatality	Public radiological impacts: less than one latent cancer fatality	
	Nonradiological industrial hazards during proposed railroad construction and operations: 2.22 worker fatalities	Nonradiological industrial hazards during proposed railroad construction and operations: 2 worker fatalities	
	Vehicular-related accidents during construction: 6 fatalities	Vehicular-related accidents during construction: 6 fatalities	
	Vehicular-related accidents during operations: 8 fatalities	Vehicular-related accidents during operations: 7 fatalities	
	Rail-related fatalities during construction and operations: 1.3 fatalities	Rail-related accidents during construction and operations: 1.1 fatalities	
	<i>Shared-Use Option</i>	<i>Shared-Use Option</i>	
	Vehicular-related accidents during construction: 6 fatalities	Vehicular-related accidents during construction: 6 fatalities	
	Vehicular-related accidents during operations: 8 fatalities	Vehicular-related accidents during operations: 7 fatalities	
	Rail-related fatalities during construction and operations: 4.6 fatalities	Rail-related fatalities during construction and operations: 7.4 fatalities	
Utilities, energy and materials	Utility interfaces: Potential for short-term interruption of service during construction. No permanent or long-term loss of service or prevention of future service area expansions.	Utility interfaces: Potential for short-term interruption of service during construction. No permanent or long-term loss of service or prevention of future service area expansions.	No impacts because the rail line and associated facilities would not be constructed.
	Public water systems: Most water would be supplied by new wells; small effect on public water systems from population increase attributable to construction and operations employees.	Public water systems: Most water would be supplied by new wells; small effect on public water systems from population increase attributable to construction and operations employees.	

Table S-8. Comparison of potential impacts under the Proposed Action (Caliente Implementing Alternative and Mina Implementing Alternative) and the No-Action Alternative^a (page 16 of 17).

Resource Area	Proposed Action		
	Caliente Implementing Alternative	Mina Implementing Alternative	No-Action Alternative
Utilities, energy, and materials (continued)	<p>Wastewater treatment systems: Dedicated treatment systems would be provided at construction camps and operations facilities; small impact on public systems from population increase attributable to construction and operations employees.</p> <p>Fossil fuels: Demand would be approximately 6.5 percent of statewide use during construction and less than 0.25 percent of statewide use during operations. Demand could be met by existing regional supply systems and suppliers.</p> <p>Materials: Requirements generally would be very small in relation to supply capacity. <i>Shared-Use Option</i> Fossil fuels: Demand would be less than 0.3 percent of statewide use during operations. Demand could be met by existing regional supply systems and suppliers.</p>	<p>Wastewater treatment systems: Same as Caliente Implementing Alternative.</p> <p>Fossil fuels: Demand would be approximately 6 percent of statewide use during construction and less than 0.25 percent of statewide use during operations. Demand could be met by existing regional supply systems and suppliers.</p> <p>Materials: Same as Caliente Implementing Alternative.</p> <p><i>Shared-Use Option</i> Fossil fuels: Same as Caliente Implementing Alternative.</p>	
Hazardous materials and waste	<p>Small (Apex Landfill) to moderate (smaller landfills) impacts during the construction phase and no impact to small impact during the operations phase from nonhazardous waste (solid and industrial and special waste) disposal.</p> <p>Small impacts from use of hazardous materials during the construction and operations phases.</p> <p>Small impacts from hazardous-waste disposal during the construction and operations phases.</p> <p>Small impacts during the operations phase from low-level radioactive waste disposal for wastes that would be generated at the Cask Maintenance Facility.</p>	<p>Same as Caliente Implementing Alternative.</p>	<p>No impacts because the rail line and associated facilities would not be constructed.</p>

Table S-8. Comparison of potential impacts under the Proposed Action (Caliente Implementing Alternative and Mina Implementing Alternative) and the No-Action Alternative^a (page 17 of 17).

Resource Area	Proposed Action		
	Caliente Implementing Alternative	Mina Implementing Alternative	No-Action Alternative
Cultural resources	Numerous archaeological sites have been identified along segments of alignments subjected to sample inventory. Potential direct and indirect impacts to National Register-eligible sites and to other sites that might be identified during the complete survey. Construction could result in impacts to the early Mormon colonization cultural landscape, Pioche-Hiko silver mining community route, 1849 Emigrant Trail campsites, and American Indian trail systems. Indirect effects to a National Register-eligible rock-art site are likely from two quarry sites. More than 50 National Register-eligible sites have been identified along segments of alignments subjected to sample inventory.	Numerous archaeological sites have been identified along segments of alignments subjected to sample inventory. Potential direct and indirect impacts to National Register-eligible sites and to other sites that might be identified during the complete survey. More than 60 National Register-eligible sites have been identified along segments of alignments subjected to sample inventory.	No impacts because the rail line and associated facilities would not be constructed.
Paleontological resources	No direct impacts to known paleontological resources.	Same as Caliente Implementing Alternative.	No impacts because the rail line and associated facilities would not be constructed.
Environmental justice	Constructing and operating the proposed rail line along the Caliente rail alignment would not result in disproportionately high and adverse impacts to minority or low-income populations.	Same as Caliente Implementing Alternative.	No impacts because the rail line and associated facilities would not be constructed.

a. BLM = Bureau of Land Management; CO = carbon monoxide; dBA = A-weighted decibels; DNL = day-night average noise level; DOE = U.S. Department of Energy; NAAQS = National Ambient Air Quality Standards; NO_x = oxides of nitrogen; PM₁₀ = particulate matter with an aerodynamic diameter equal to or less than 10 micrometers; PM_{2.5} = particulate matter with an aerodynamic diameter equal to or less than 2.5 micrometers; SO₂ = sulfur dioxide; VOCs = volatile organic compounds.

Table S-9. Comparison of potential impacts under the Proposed Action – Caliente rail alignment alternative segments and common segments^a (page 1 of 7).

Resource Area	Alternative segments and common segments	
	Interface with the Union Pacific Railroad – Caliente	Interface with the Union Pacific Railroad – Eccles
Physical setting	Total surface disturbance: 3.1 square kilometers (770 acres). Loss of prime farmland soils: 0.16 square kilometer (40 acres). Less than 0.1 percent of prime farmland soils in Lincoln County.	Total surface disturbance: 2.1 square kilometers (520 acres). Loss of prime farmland soils: 0.10 square kilometer (24 acres). Less than 0.1 percent of prime farmland soils in Lincoln County.
Land use and ownership	Private parcels crossed: 32. Area of private land affected: 0.31 square kilometer (77 acres). Active grazing allotments crossed: 2. Animal unit months lost: 6 (0.6 percent). Indian Cove Staging Yard area of private land affected: 0.73 square kilometer (180 acres) Upland Staging Yard, area of private land affected: 0.45 square kilometer (110 acres)	Private parcels crossed: 11. Area of private land affected: 0.32 square kilometer (80 acres). Active grazing allotments crossed: 4. Animal unit months lost: 18 (1.5 percent).
Aesthetic resources	Small to moderate impact. No contrast to moderate contrast in the long term from the installation of linear track, signals, communications towers, power poles connecting to the grid, and access roads. Moderate impact from Staging Yard at Indian Cove. Moderate contrast from the operation of the facility in the Class III non-BLM lands, weak contrast from the track on BLM Class II lands at the north end; in each area, consistent with applicable BLM objectives. Potential quarry CA-8B - Moderate impact. Moderate contrast in the short term from installation and use of the conveyor from the quarry across U.S. Highway 93, consistent with surrounding non-BLM lands treated as Class III. No long-term impact under the Proposed Action; conveyor would be removed at end of construction phase.	Small to moderate impact. No contrast to moderate contrast in the long term from the installation of linear track, signals, communications towers, power poles connecting to the grid, and access roads. Quarry CA-8B would not be developed for the Eccles alternative segment.
Surface-water resources	Caliente alternative segment: Approximately 0.05 square kilometer (12 acres) of wetlands would be filled. Long-term reduced and potentially eliminated access to Caliente Hot Springs. Indian Cove Staging Yard: Approximately 0.19 square kilometer (47 acres) of wetlands would be filled. Potential quarry CA-8B: Approximately 0.09 square kilometer (22 acres) of wetlands would be filled to construct the quarry siding.	Eccles alternative segment: Negligible amount of wetlands would be filled. Eccles Interchange Yard: Approximately 0.033 square kilometer (8.2 acres) of Clover Creek would be filled.

Table S-9. Comparison of potential impacts under the Proposed Action – Caliente rail alignment alternative segments and common segments^a (page 2 of 7).

Resource Area	Alternative segments and common segments	
	Interface with the Union Pacific Railroad – Caliente	Interface with the Union Pacific Railroad – Eccles
Groundwater resources	Groundwater withdrawals from the hydrographic area in Panaca Valley could impact existing groundwater users. However, mitigation measures such as reducing the pumping rate at or relocating proposed wells Pan V25/26, Pan V4, Pan V5, and Pan V3/6 would minimize these impacts.	Groundwater withdrawals from the hydrographic area in Panaca Valley could impact existing groundwater users. However, mitigation measures such as reducing the pumping rate at or relocating proposed wells Pan V3/6 and Pan V25/26 would minimize these impacts.
Biological resources	<p>Caliente alternative segment and Interchange Yard: Short-term impact to 0.09 square kilometer (22 acres) wetland/riparian habitat. Long-term impact to 0.11 square kilometer (27 acres) wetland/riparian habitat.</p> <p>Upland Staging Yard: Short-term impact to 0.01 square kilometer (2.5 acres) wetland/riparian habitat. Long-term impact to less than 0.01 square kilometer (2 acres) wetland/riparian habitat.</p> <p>Indian Cove Staging Yard: Short-term impact to 0.09 square kilometer (22 acres) wetland/riparian habitat. Long-term impact to 0.04 square kilometer (9.9 acres) wetland/riparian habitat.</p> <p>Long-term moderate impact on riparian and wetland vegetation from the construction of a siding for potential quarry CA-8B.</p>	<p>Eccles alternative segment and Interchange Yard: Short-term impact to 0.10 square kilometer (24 acres) wetland/riparian habitat. Long-term impact to 0.10 square kilometer (24 acres) wetland/riparian habitat.</p> <p>Eccles-North Staging Yard: Short-term impact to 0.01 square kilometer (2.6 acres) wetland/riparian habitat. Long-term impact to 0.01 square kilometer (2.6 acres) wetland/riparian habitat.</p>
Noise and vibration	<p>Noise from construction activities would exceed Federal Transportation Administration guidelines. Daytime limits would be exceeded by 11 dBA from construction equipment noise and by 7 dBA from pile driving; 30-day DNL limit would be exceeded by 2 dBA from construction equipment noise and by 12 dBA from pile driving.</p> <p>There would be no adverse impacts from the operation of construction trains. There would be no receptors within the 65 DNL contour.</p> <p>There would be no adverse impacts from noise for the operation of trains along the rail alignment. No receptors would fall within the 3 dBA increase contour or the 65 DNL contour.</p> <p>There would be no adverse impacts from vibrations, which would fall below Federal Transportation Administration criteria.</p>	<p>Noise from construction activities would exceed Federal Transportation Administration guidelines. Construction equipment noise would cause daytime limits to be exceeded by 5 dBA.</p> <p>There would be no adverse impacts from the operation of construction trains. No receptors would fall within the 65 DNL contour.</p> <p>There would be no adverse impacts from noise for the operation of trains along the rail alignment. No receptors would be within the 65 DNL contour.</p> <p>There would be no adverse impacts from vibrations, which would fall below Federal Transportation Administration criteria.</p>
Cultural resources	Potential direct and indirect impacts at three known National Register-eligible sites and at other sites that might be identified during the complete survey.	Potential direct and indirect impacts at two known potentially eligible sites and at other sites that might be identified during the complete survey.

Table S-9. Comparison of potential impacts under the Proposed Action – Caliente rail alignment alternative segments and common segments^a (page 3 of 7).

Resource Area	Alternative segments and common segments			
	Caliente common segment 1			
Physical setting	Total surface disturbance: 12 square kilometers (3,000 acres). Loss of prime farmland soils: 1.2 square kilometers (300 acres). Less than 0.1 percent of prime farmland soils in Lincoln and Nye Counties.			
Land use and ownership	Private parcels crossed: 1. Area of private land affected: 0.0007 square kilometer (0.2 acre). Active grazing allotments crossed: 10. Animal unit months lost: 453 (0.7 percent).			
Cultural resources	Construction activities could result in impacts to the early Mormon colonization cultural landscape, the Pioche-Hiko silver mining community route, 1849 emigrant campsites, a National Register-eligible prehistoric site in the vicinity of Black Rock Springs, and to other sites that might be identified during the complete survey.			
	Garden Valley 1	Garden Valley 2	Garden Valley 3	Garden Valley 8
Physical setting	Total surface disturbance: 3.4 square kilometers (840 acres). Would result in topsoil loss and increased potential for erosion. Loss of prime farmland soils: 0.29 square kilometer (72 acres). Less than 0.1 percent of prime farmland soils in Lincoln and Nye Counties.	Total surface disturbance: 3.6 square kilometers (890 acres). Would result in topsoil loss and increased potential for erosion. Loss of prime farmland soils: 0.4 square kilometer (99 acres). Less than 0.1 percent of prime farmland soils in Lincoln and Nye Counties.	Total surface disturbance: 3.7 square kilometers (910 acres). Would result in topsoil loss and increased potential for erosion. Loss of prime farmland soils: 0 square kilometer (0 acre).	Total surface disturbance: 3.7 square kilometers (910 acres). Would result in topsoil loss and increased potential for erosion. Loss of prime farmland soils: 0.36 square kilometer (89 acres). Less than 0.1 percent of prime farmland soils in Lincoln and Nye Counties.
Land use and ownership	Active grazing allotments crossed: 5. Animal unit months lost: 120 (1.34 percent).	Active grazing allotments crossed: 4. Animal unit months lost: 131 (1.1 percent).	Active grazing allotments crossed: 5. Animal unit months lost: 126 (1.4 percent).	Active grazing allotments crossed: 4. Animal unit months lost: 131 (1.1 percent).

Table S-9. Comparison of potential impacts under the Proposed Action – Caliente rail alignment alternative segments and common segments^a (page 4 of 7).

Resource Area	Alternative segments and common segments			
	Garden Valley 1	Garden Valley 2	Garden Valley 3	Garden Valley 8
Aesthetic resources	Small impact. Track on some parts of the alternative segment would create a new linear feature that would not meet BLM Class II management objectives. Vegetated earthwork berms would reduce the contrast to levels consistent with Class II.	Small impact. Track on some parts of the alternative segment would create a new linear feature that would not meet BLM Class II management objectives. Vegetated earthwork berms would reduce the contrast to levels consistent with Class II.	Small impact. Track on some parts of the alternative segment would create a new linear feature that would not meet BLM Class II management objectives. Vegetated earthwork berms would reduce the contrast to levels consistent with Class II.	Small impact. Track on some parts of the alternative segment would create a new linear feature that would not meet BLM Class II management objectives. Vegetated earthwork berms would reduce the contrast to levels consistent with Class II.
Cultural Resources	Construction could result in direct and indirect impacts to American Indian trail systems and to other sites that might be identified during the complete survey.	Construction could result in direct and indirect impacts to American Indian trail systems, two National Register-eligible sites, and to other sites that might be identified during the complete survey.	Construction could result in direct and indirect impacts to American Indian trail systems and to other sites that might be identified during the complete survey.	Construction could result in direct and indirect impacts to American Indian trail systems and to other sites that might be identified during the complete survey.
Caliente common segment 2				
Physical setting	Total surface disturbance: 4.1 square kilometers (1,000 acres). Would result in topsoil loss and increased potential for erosion.			
Land use and ownership	Active grazing allotments crossed: 3. Animal unit months lost: 128 (0.4 percent).			
Cultural resources	Potential indirect impacts include visual impacts to the Black Top archaeological locality; potential direct and indirect impacts to American Indian trail systems and a potential historic ranching cultural landscape, and to other sites that might be identified during the complete survey.			
South Reveille 2		South Reveille 3		
Physical setting	Total surface disturbance: 4.8 square kilometers (1,200 acres). Would result in topsoil loss and increased potential for erosion.	Total surface disturbance: 5 square kilometers (1,240 acres). Would result in topsoil loss and increased potential for erosion.		
Land use and ownership	Active grazing allotments crossed: 1. Animal unit months lost: 54 (0.2 percent). Sections with unpatented mining claims the alignment would cross: 2 sections with 72 claims.	Active grazing allotments crossed: 1. Animal unit months lost: 58 (0.2 percent). Sections with unpatented mining claims the alignment would cross: 2 sections with 72 claims.		

Table S-9. Comparison of potential impacts under the Proposed Action – Caliente rail alignment alternative segments and common segments^a (page 5 of 7).

Resource Area	Alternative segments and common segments		
	South Reveille 2		South Reveille 3
Biological resources	Small to moderate impact on raptor nesting sites from the construction of potential quarry NN-9A.		Small to moderate impact on raptor nesting sites from the construction of potential quarry NN-9A.
Cultural resources	Rail line construction could represent a long-term indirect impact on a National Register-eligible rock-art site, and potential direct and indirect impacts at other sites that might be identified during the complete survey.		Rail line construction could represent a long-term indirect impact on a National Register-eligible rock-art site, and potential direct and indirect impacts at other sites that might be identified during the complete survey.
	Caliente common segment 3		
Physical setting	Total surface disturbance: 10 square kilometers (2,500 acres). Would result in topsoil loss and increased potential for erosion.		
Land use and ownership	Active grazing allotments crossed: 3. Animal unit months lost: 250 (0.6 percent). Sections with unpatented mining claims the alignment would cross: 10 sections with 166 claims.		
Cultural resources	Potential direct and indirect impacts at one known National Register-eligible archaeological site, and at other sites that might be identified during the complete survey.		
	Goldfield 1	Goldfield 3	Goldfield 4
Physical setting	Total surface disturbance: 9.8 square kilometers (2,400 acres). Would result in topsoil loss and increased potential for erosion.	Total surface disturbance: 10.2 square kilometers (2,500 acres). Would result in topsoil loss and increased potential for erosion.	Total surface disturbance: 6.5 square kilometers (1,600 acres). Would result in topsoil loss and increased potential for erosion.
Land use and ownership	Private parcels crossed: 6. Area of private land affected: 0.37 square kilometer (91 acres). Unpatented mining claims the alignment would cross: 14 sections with 474 claims.	Private parcels crossed: 2. Area of private land affected: 0.01 square kilometer (2 acres). Unpatented mining claims the alignment would cross: 14 sections with 359 claims.	Private parcels crossed: 37. Area of private land affected: 0.23 square kilometer (56 acres). Unpatented mining claims the alignment would cross: 19 sections with 538 claims.
Cultural resources	Potential direct and indirect impacts at possible Western Shoshone camps, archaeological sites identified along segments subjected to sample inventory, and at other sites that might be identified during the complete survey.	Potential direct and indirect impacts at one possible Western Shoshone camp, archaeological sites identified along segments subjected to sample inventory, and at other sites that might be identified during the complete survey.	Potential direct and indirect impacts at multiple National Register-eligible sites and in and around the town of Goldfield, at archaeological sites identified along segments subjected to sample inventory, and at other sites that might be identified during the complete survey.
Surface-water resources	No impact to Willow Springs.	Long-term reduced and potentially eliminated access to Willow Springs.	No impact to Willow Springs.

Table S-9. Comparison of potential impacts under the Proposed Action – Caliente rail alignment alternative segments and common segments^a (page 6 of 7).

Resource Area	Alternative segments and common segments	
	Caliente common segment 4	
Physical setting	Total surface disturbance: 1.1 square kilometers (270 acres). Would result in topsoil loss and increased potential for erosion.	
Cultural resources	Potential direct and indirect impacts at archaeological sites identified along segments subjected to sample inventory, and at other sites that might be identified during the complete survey.	
	Bonnie Claire 2	Bonnie Claire 3
Physical setting	Total surface disturbance: 1.9 square kilometers (470 acres). Would result in topsoil loss and increased potential for erosion.	Total surface disturbance: 1.9 square kilometers (470 acres). Would result in topsoil loss and increased potential for erosion.
Cultural resources	Potential direct and indirect impacts at one National Register-eligible archaeological site, and at other sites that might be identified during the complete survey.	Potential direct and indirect impacts at one National Register-eligible archaeological site, and at other sites that might be identified during the complete survey.
	Common segment 5	
Physical setting	Total surface disturbance: 3.1 square kilometers (770 acres). Would result in topsoil loss and increased potential for erosion.	
Cultural resources	Potential direct and indirect impacts at two National Register-eligible archaeological sites, 20 additional resources that have been recorded within the region of influence, and at other sites that might be identified during the complete survey.	
	Oasis Valley 1	Oasis Valley 3
Physical setting	Total surface disturbance: 1 square kilometer (250 acres). Would result in topsoil loss and increased potential for erosion.	Total surface disturbance: 1.3 square kilometers (320 acres). Would result in topsoil loss and increased potential for erosion.
Land use and ownership	Private parcels crossed: 1. Area of private land affected: 0.04 square kilometer (9.9 acres). Active grazing allotments crossed: 1. Animal unit months lost: 8 (0.8 percent). Unpatented mining claims the alignment would cross: 2 sections with 14 claims.	Private parcels crossed: 0. Area of private land affected: 0. Active grazing allotments crossed: 1. Animal unit months lost: 13 (1.4 percent). Unpatented mining claims the alignment would cross: 2 sections with 14 claims.
Groundwater resources	Groundwater withdrawals from hydrographic area 228 (Oasis Valley) would impact existing groundwater users or groundwater resources. However, mitigation measures such as reducing the pumping rate at proposed wells OV3, OV4, and OV5 or drawing water from alternative wells nearby would minimize these impacts.	Groundwater withdrawals from hydrographic area 228 (Oasis Valley) would impact existing groundwater users or groundwater resources. However, mitigation measures such as reducing the pumping rate at proposed well OV13 or drawing water from alternative wells nearby would minimize these impacts.

Table S-9. Comparison of potential impacts under the Proposed Action – Caliente rail alignment alternative segments and common segments^a (page 7 of 7).

Resource Area	Alternative segments and common segments	
	Oasis Valley 1	Oasis Valley 3
Biological resources	No impact on riparian and wetland vegetation.	Short-term moderate impact on riparian and wetland vegetation.
Cultural resources	Potential direct and indirect impacts at a historic cattle ranch, campsite, archaeological sites identified along segments subjected to sample inventory, and at other sites that might be identified during the complete survey.	Potential direct and indirect impacts at a historic cattle ranch, campsite, archaeological sites identified along segments subjected to sample inventory, and at other sites that might be identified during the complete survey.
Common segment 6		
Physical setting	Total surface disturbance: 5.5 square kilometers (1,400 acres). Would result in topsoil loss and increased potential for erosion.	
Cultural resources	Potential direct and indirect impacts at archaeological sites recorded in region of influence, including three National Register-eligible resources, and at other sites that might be identified during the complete survey.	
Land use and ownership	Sections with unpatented mining claims the alignment would cross: 4 sections with 34 claims.	
Biological resources	Short-term moderate impacts to desert bighorn sheep southwest of common segment 6.	

a. BLM = Bureau of Land Management; dBA = A-weighted decibels; DOE = U.S. Department of Energy.

Table S-10. Comparison of potential impacts under the Proposed Action – Mina rail alignment existing rail line, alternative segments, and common segments^a (page 1 of 7).

Resource area	Existing rail line/alternative segments/common segments	
	Union Pacific Railroad Hazen Branchline	
Noise and vibration	DOE estimates that 34 receptors would be included within the construction train 65 DNL contours in Silver Springs, and 7 receptors would be included within the 65 DNL contours in Wabuska. These noise impacts would be considered temporary adverse impacts. Noise from operations would create adverse noise impacts at eight receptors in Silver Springs and one receptor in Wabuska. There would be no adverse impact from vibrations, which would fall below Federal Transportation Administration criteria.	
Department of Defense Branchline North		
Physical setting	Total surface disturbance: 0.16 square kilometer (40 acres). Would result in topsoil loss and increased potential for erosion.	

Table S-10. Comparison of potential impacts under the Proposed Action – Mina rail alignment existing rail line, alternative segments, and common segments^a (page 2 of 7).

Resource area	Existing rail lines/alternative segments/common segments			
	Schurz alternative segment 1	Schurz alternative segment 4	Schurz alternative segment 5	Schurz alternative segment 6
Physical setting	Total surface disturbance: 4.6 square kilometers (1,100 acres). Would result in topsoil loss and increased potential for erosion. Loss of prime farmland soils: 0.011 square kilometer (2.7 acres). Less than 3 percent of the prime farmland soils of the Walker River Paiute Reservation.	Total surface disturbance: 6.1 square kilometers (1,500 acres). Would result in topsoil loss and increased potential for erosion. Loss of prime farmland soils: 0.012 square kilometer (3 acres). Less than 3 percent of the prime farmland soils of the Walker River Paiute Reservation.	Total surface disturbance: 6.9 square kilometers (1,700 acres). Would result in topsoil loss and increased potential for erosion. Loss of prime farmland soils: 0.014 square kilometer (3.5 acres). Less than 3 percent of the prime farmland soils of the Walker River Paiute Reservation.	Total surface disturbance: 6.5 square kilometers (1,600 acres). Would result in topsoil loss and increased potential for erosion. Loss of prime farmland soils: 0.014 square kilometer (3.5 acres). Less than 3 percent of the prime farmland soils of the Walker River Paiute Reservation.
Aesthetic resources	Small to moderate impact. Weak to moderate contrast as rail line and crossing structures would, in places, attract the attention of viewers, but would meet BLM Class III management objectives.	Small to moderate impact. Weak to moderate contrast as rail line and crossing structures would, in places, attract the attention of viewers, but would meet BLM Class III management objectives.	Small to moderate impact. Weak to moderate contrast as rail line and crossing structures would, in places, attract the attention of viewers, but would meet BLM Class III management objectives.	Small to moderate impact. Weak to moderate contrast as rail line and crossing structures would, in places, attract the attention of viewers, but would meet BLM Class III management objectives. Moderate to strong contrast in the short term from construction of the rail-over-road crossing of U.S. Highway 95 for Schurz 6, which would not meet BLM Class III management objectives.

Table S-10. Comparison of potential impacts under the Proposed Action – Mina rail alignment existing rail line, alternative segments, and common segments^a (page 3 of 7).

Resource area	Existing rail line/alternative segments/common segments			
	Schurz alternative segment 1	Schurz alternative segment 4	Schurz alternative segment 5	Schurz alternative segment 6
Biological resources	No impacts to Inter-Mountains Mixed Salt Desert Scrub and Inter-Mountain Basins Greasewood Flat. Short-term impact to 0.03 square kilometer (6.4 acres) wetland/riparian habitat. Long-term impact to 0.01 square kilometer (3.1 acres) wetland/riparian habitat.	No impacts to Inter-Mountains Mixed Salt Desert Scrub and Inter-Mountain Basins Greasewood Flat. Short-term impact to 0.03 square kilometer (6.4 acres) wetland/riparian habitat. Long-term impact to 0.01 square kilometer (3.1 acres) wetland/riparian habitat.	No impacts to Inter-Mountains Mixed Salt Desert Scrub and Inter-Mountain Basins Greasewood Flat. Short-term impact to 0.02 square kilometer (4.9 acres) wetland/riparian habitat. No long-term impact to wetland/riparian habitat.	Small to moderate long-term impacts to Inter-Mountains Mixed Salt Desert Scrub and Inter-Mountain Basins Greasewood Flat. Short-term impact to 0.01 square kilometer (3.1 acres) wetland/riparian habitat. No long-term impact to wetland/riparian habitat.
Surface-water resources	Of the 0.065 square kilometer (16 acres) of wetlands crossed in this area, only 20 square meters (220 square feet) would be permanently filled to construct the bridge over the Walker River.	Of the 0.065 square kilometer (16 acres) of wetlands crossed in this area, only 20 square meters (220 square feet) would be permanently filled to construct the bridge over the Walker River.	Of the 0.065 square kilometer (16 acres) of wetlands crossed in this area, only 28 square meters (300 square feet) would be permanently filled to construct the bridge over the Walker River.	Of the 0.065 square kilometer (16 acres) of wetlands crossed in this area, only 28 square meters (300 square feet) would be permanently filled to construct the bridge over the Walker River.
Cultural resources	Potential direct and indirect impacts at two potential National Register-eligible sites, at archaeological sites identified along segments subjected to sample inventory, and at other sites that might be identified during the complete survey.	Potential direct and indirect impacts at three potential National Register-eligible sites, at archaeological sites identified along segments subjected to sample inventory, and at other sites that might be identified during the complete survey.	Potential direct and indirect impacts at archaeological sites identified along segments subjected to sample inventory, and at other sites that might be identified during the complete survey.	Potential direct and indirect impacts at two potential National Register-eligible sites, at archaeological sites identified along segments subjected to sample inventory, and at other sites that might be identified during the complete survey.
Department of Defense Branchline South				
Physical setting	Total surface disturbance: 0.26 square kilometer (64 acres). Would result in topsoil loss and increased potential for erosion.			
Mina common segment 1				
Physical setting	Total surface disturbance: 12 square kilometers (3,000 acres). Would result in topsoil loss and increased potential for erosion.			

Table S-10. Comparison of potential impacts under the Proposed Action – Mina rail alignment existing rail line, alternative segments, and common segments^a (page 4 of 7).

Resource area	Existing rail line/alternative segments/common segments			
	Mina common segment 1	Montezuma alternative segment 1	Montezuma alternative segment 2	Montezuma alternative segment 3
Land use and ownership	Private parcels the rail line would cross: 1. Area of private land affected: 0.21 square kilometer (53 acres). Active grazing allotments the rail line would cross: 3. Animal unit months lost: 104 (0.6 percent).			
Aesthetic resources	Potential Garfield Hills quarry - Moderate impact. Moderate contrast in the short term from quarrying, ballast production facilities, and conveyor close to viewers that would be compatible with BLM Class III management objectives. Small impact to no impact in long term; production facilities and conveyor would be removed and quarried areas restored after closure of quarry at end of construction phase. Potential Gabbs Range quarry - Small to moderate impact. Weak to moderate contrast in the short term from ballast production facilities close to viewers that would be compatible with BLM Class III management objectives. Small impact to no impact in long term; production facilities would be removed after closure of quarry at end of construction phase.			
Biological resources	Moderate long-term impact to Inter-Mountains Mixed Salt Desert Scrub. Moderate impact to winterfat communities – Potential Gabbs Range quarry.			
Cultural resources	Potential direct and indirect impacts at multiple National Register-eligible sites, at archaeological sites identified along segments subjected to sample inventory, and at other sites that might be identified during the complete survey.			
Physical setting	Total surface disturbance: 16 square kilometers (4,000 acres). Would result in topsoil loss and increased potential for erosion.	Total surface disturbance: 11 square kilometers (2,700 acres). Would result in topsoil loss and increased potential for erosion.	Total surface disturbance: 17 square kilometers (4,200 acres). Would result in topsoil loss and increased potential for erosion.	
Land use and ownership	Private parcels crossed: 0. Area of private land affected: 0 square kilometer (0 acre). Active grazing allotments crossed: 4. Animal unit months lost: 117 (1.2 percent). Unpatented mining claims the alignment would cross: 17 sections containing 202 claims.	Private parcels crossed: 38. Area of private land affected: 0.34 square kilometer (84 acres). Active grazing allotments crossed: 1. Animal unit months lost: 47 (0.5 percent). Unpatented mining claims the alignment would cross: 24 sections containing 655 claims.	Private parcels crossed: 1. Area of private land affected: 0.1 square kilometer (24 acres). Active grazing allotments crossed: 2. Animal unit months lost: 129 (0.8 percent). Unpatented mining claims the alignment would cross: 19 sections containing 249 claims.	

Table S-10. Comparison of potential impacts under the Proposed Action – Mina rail alignment existing rail line, alternative segments, and common segments^a (page 5 of 7).

Resource area	Existing rail line/alternative segments/common segments		
	Montezuma alternative segment 1	Montezuma alternative segment 2	Montezuma alternative segment 3
Aesthetic resources	<p>Small to moderate impact. No to moderate contrast in the long term from the installation of linear track, signals, communications towers, power poles connecting to the grid, access roads.</p> <p>Weak contrast from new linear feature adjacent to State Route 265 and weak to moderate contrast in Clayton Valley; would meet BLM Class III and IV management objectives.</p> <p>Potential North Clayton quarry - Small to moderate impact. Moderate contrast in the short term from production facilities close to viewers that would be compatible with BLM Class IV management objectives. Small impact to no impact in long term; production facilities would be removed and waste dumps restored after closure of quarry at end of construction phase.</p>	<p>Small to moderate impact. No contrast to moderate contrast in the long term from the installation of linear track, signals, communications towers, power poles connecting to the grid, access roads.</p>	<p>Small to moderate impact. No contrast to moderate contrast in the long term from the installation of linear track, signals, communications towers, power poles connecting to the grid, access roads.</p> <p>Potential North Clayton quarry - Weak to moderate impact. Moderate contrast in the short term from production facilities close to viewers that would be compatible with BLM Class IV management objectives. Small impact to no impact in long term; production facilities would be removed and waste dumps restored after closure of quarry at end of construction phase.</p>
Groundwater resources	<p>Groundwater withdrawals from hydrographic area 143 (Clayton Valley) would impact existing users of groundwater in the vicinity of Silver Peak. However, mitigation measures such as reducing the pumping rate at proposed well CL-1a would minimize these impacts.</p>	<p>Groundwater withdrawals would not result in impacts on existing groundwater users or groundwater resources.</p>	<p>Groundwater withdrawals would not result in impacts on existing groundwater users or groundwater resources.</p>

Table S-10. Comparison of potential impacts under the Proposed Action – Mina rail alignment existing rail line, alternative segments, and common segments^a (page 6 of 7).

Resource area	Existing rail line/alternative segments/common segments		
	Montezuma alternative segment 1	Montezuma alternative segment 2	Montezuma alternative segment 3
Biological resources	Moderate impact to winterfat communities. Long-term moderate impacts to Inter-Mountain Basins Mixed Salt Desert Scrub and Inter-Mountain Basins Big Sagebrush at potential North Clayton and Malpais Mesa quarry sites.	Moderate impact to winterfat communities.	Moderate impact to winterfat communities. Long-term moderate impacts to Inter-Mountain Basins Mixed Salt Desert Scrub and Inter-Mountain Basins Big Sagebrush at potential Malpais Mesa quarry site.
Cultural resources	Potential direct and indirect impacts at archaeological sites identified along segments subjected to sample inventory, and at other sites that might be identified during the complete survey.	Potential direct and indirect impacts at archaeological sites identified along segments subjected to sample inventory, and at other sites that might be identified during the complete survey.	Potential direct and indirect impacts at archaeological sites identified along segments subjected to sample inventory, and at other sites that might be identified during the complete survey.
Mina common segment 2			
Physical setting	Total surface disturbance: 0.28 square kilometer (69 acres). Would result in topsoil loss and increased potential for erosion.		
Cultural resources	Potential direct and indirect impacts at archaeological sites identified along segments subjected to sample inventory, and at other sites that may be identified during the complete survey.		
Bonnie Claire alternative segment 2		Bonnie Claire alternative segment 3	
Physical setting	Total surface disturbance: 1.9 square kilometers (470 acres). Would result in topsoil loss and increased potential for erosion.	Total surface disturbance: 1.9 square kilometers (470 acres). Would result in topsoil loss and increased potential for erosion.	
Cultural resources	Potential direct and indirect impacts at one National Register-eligible archaeological site, and at other sites that might be identified during the complete survey.	Potential direct and indirect impacts at one National Register-eligible archaeological site, and at other sites that might be identified during the complete survey.	
Common segment 5			
Physical setting	Total surface disturbance: 3.1 square kilometers (770 acres). Would result in topsoil loss and increased potential for erosion.		
Cultural resources	Potential direct and indirect impacts at two National Register-eligible archaeological sites, 20 additional resources that have been recorded within the region of influence, and at other sites that might be identified during the complete survey.		

Table S-10. Comparison of potential impacts under the Proposed Action – Mina rail alignment existing rail line, alternative segments, and common segments^a (page 7 of 7).

Resource area	Existing rail line/alternative segments/common segments	
	Oasis Valley alternative segment 1	Oasis Valley alternative segment 3
Physical setting	Total surface disturbance: 1 square kilometer (250 acres). Would result in topsoil loss and increased potential for erosion.	Total surface disturbance: 1.3 square kilometers (320 acres). Would result in topsoil loss and increased potential for erosion.
Land use and ownership	Private parcels crossed: 1 Area of private land affected: 0.04 square kilometer (9.9 acres). Active grazing allotments crossed: 1 Animal unit months lost: 8 (0.8 percent). Unpatented mining claims the alignment would cross: 2 sections with 14 claims.	Private parcels crossed: 0 Area of private land affected: 0 Active grazing allotments crossed: 1 Animal unit months lost: 13 (1.4 percent). Unpatented mining claims the alignment would cross: 2 sections with 14 claims.
Groundwater resources	Groundwater withdrawals from hydrographic area 228 (Oasis Valley) would impact existing groundwater users or groundwater resources. However, mitigation measures such as reducing the pumping rate at proposed wells OV3, OV4, and OV5 or drawing water from nearby alternative wells would minimize these impacts.	Groundwater withdrawals from hydrographic area 228 (Oasis Valley) would impact existing groundwater users or groundwater resources. However, mitigation measures such as reducing the pumping rate at proposed well OV13 or drawing water from nearby alternative wells would minimize these impacts.
Biological resources	No impact on riparian and wetland vegetation.	Short-term moderate impact on riparian and wetland vegetation.
Cultural resources	Potential direct and indirect impacts at a historic cattle ranch, campsite, archaeological sites identified along segments subjected to sample inventory, and at other sites that might be identified during the complete survey.	Potential direct and indirect impacts at a historic cattle ranch, campsite, archaeological sites identified along segments subjected to sample inventory, and at other sites that might be identified during the complete survey.
Common segment 6		
Physical setting	Total surface disturbance: 5.5 square kilometers (1,400 acres). Would result in topsoil loss and increased potential for erosion.	
Biological resources	Short-term moderate impacts to desert bighorn sheep southwest of common segment 6.	
Land use and ownership	Sections with unpatented mining claims the alignment would cross: 4 sections with 34 claims.	
Cultural resources	Potential direct and indirect impacts at archaeological sites recorded in region of influence, including three National Register-eligible resources, and at other sites that might be identified during the complete survey.	

a. BLM = Bureau of Land Management; dBA = A-weighted decibels; DNL = day-night average noise level; DOE = U.S. Department of Energy.

CONVERSIONS

METRIC TO ENGLISH			ENGLISH TO METRIC		
Multiply	by	To get	Multiply	by	To get
Area					
Square meters	10.764	Square feet	Square feet	0.092903	Square meters
Square kilometers	247.1	Acres	Acres	0.0040469	Square kilometers
Square kilometers	0.3861	Square miles	Square miles	2.59	Square kilometers
Concentration					
Kilograms/sq. meter	0.16667	Tons/acre	Tons/acre	0.5999	Kilograms/sq. meter
Milligrams/liter	1 ^a	Parts/million	Parts/million	1 ^a	Milligrams/liter
Micrograms/liter	1 ^a	Parts/billion	Parts/billion	1 ^a	Micrograms/liter
Micrograms/cu. Meter	1 ^a	Parts/trillion	Parts/trillion	1 ^a	Micrograms/cu. meter
Density					
Grams/cu. cm	62.428	Pounds/cu. ft.	Pounds/cu. ft.	0.016018	Grams/cu. cm
Grams/cu. meter	0.0000624	Pounds/cu. ft.	Pounds/cu. ft.	16,025.6	Grams/cu. meter
Length					
Centimeters	0.3937	Inches	Inches	2.54	Centimeters
Meters	3.2808	Feet	Feet	0.3048	Meters
Kilometers	0.62137	Miles	Miles	1.6093	Kilometers
Temperature					
<i>Absolute</i>					
Degrees C + 17.78	1.8	Degrees F	Degrees F - 32	0.55556	Degrees C
<i>Relative</i>					
Degrees C	1.8	Degrees F	Degrees F	0.55556	Degrees C
Velocity/Rate					
Cu. meters/second	2118.9	Cu. feet/minute	Cu. feet/minute	0.00047195	Cu. meters/second
Grams/second	7.9366	Pounds/hour	Pounds/hour	0.126	Grams/second
Meters/second	2.237	Miles/hour	Miles/hour	0.44704	Meters/second
Volume					
Liters	0.26418	Gallons	Gallons	3.78533	Liters
Liters	0.035316	Cubic feet	Cubic feet	28.316	Liters
Liters	0.001308	Cubic yards	Cubic yards	764.54	Liters
Cubic meters	264.17	Gallons	Gallons	0.0037854	Cubic meters
Cubic meters	35.314	Cubic feet	Cubic feet	0.028317	Cubic meters
Cubic meters	1.3079	Cubic yards	Cubic yards	0.76456	Cubic meters
Cubic meters	0.0008107	Acre-feet	Acre-feet	1233.49	Cubic meters
Weight/Mass					
Grams	0.035274	Ounces	Ounces	28.35	Grams
Kilograms	2.2046	Pounds	Pounds	0.45359	Kilograms
Kilograms	0.0011023	Tons (short)	Tons (short)	907.18	Kilograms
Metric tons	1.1023	Tons (short)	Tons (short)	0.90718	Metric tons
ENGLISH TO ENGLISH					
Acre-feet	325,850.7	Gallons	Gallons	0.000003046	Acre-feet
Acres	43,560	Square feet	Square feet	0.000022957	Acres
Square miles	640	Acres	Acres	0.0015625	Square miles

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

METRIC PREFIXES

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