Final Supplemental Environmental Impact Statement
for a Geologic Repository for the Disposal of
Spent Nuclear Fuel and High-Level Radioactive Waste
at Yucca Mountain, Nye County, Nevada –
Nevada Rail Transportation Corridor
DOE/EIS-0250F-S2

and

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

Summary

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

June 2008

ACRONYMS AND ABBREVIATIONS

To ensure a more reader-friendly document, the U.S. Department of Energy limited the use of acronyms and abbreviations in this environmental impact statement. Acronyms and abbreviations are defined the first time they are used in each chapter or appendix. The acronyms and abbreviations used in the text of this document are listed below. Acronyms and abbreviations used in tables and figures because of space limitations are listed in footnotes to the tables and figures.

BLM	Bureau of Land Management
CFR	Code of Federal Regulations
CEQ	Council on Environmental Quality
CO	carbon monoxide
dB	decibels
dBA	A-weighted decibels
DIRS	Document Input Reference System
DOE	U.S. Department of Energy
DNL	day-night average noise level
EIS	environmental impact statement
FR	*Federal Register*
FEIS	final environmental impact statement
GNEP	Global Nuclear Energy Partnership
GTCC	Greater-than-Class C (low-level radioactive waste)
NAAQS	National Ambient Air Quality Standards
NAC	Nevada Administrative Code
NDWR	Nevada Division of Water Resources
NEPA	National Environmental Policy Act
NO_x	oxides of nitrogen
NWPA	Nuclear Waste Policy Act, as amended
NRC	U.S. Nuclear Regulatory Commission
PM	particulate matter
SEIS	supplemental environmental impact statement
SO_2	sulfur dioxide
STB	Surface Transportation Board
TAD	transportation, aging, and disposal
U.S.C.	United States Code
USGS NWIS	U.S. Geological Survey National Water Information System
VdB	vibration velocity in decibels
VHF	very high frequency
VOC	volatile organic compound
VRM	visual resource management

UNDERSTANDING SCIENTIFIC NOTATION

DOE has used scientific notation in this EIS to express numbers that are so large or so small that they can be difficult to read or write. Scientific notation is based on the use of positive and negative powers of 10. The number written in scientific notation is expressed as the product of a number between 1 and 10 and a positive or negative power of 10. Examples include the following:

Positive Powers of 10
$10^1 = 10 \times 1 = 10$
$10^2 = 10 \times 10 = 100$
and so on; therefore,
$10^6 = 1{,}000{,}000$ (or 1 million)

Negative Powers of 10
$10^{-1} = 1/10 = 0.1$
$10^{-2} = 1/100 = 0.01$
and so on; therefore,
$10^{-6} = 0.000001$ (or 1 in 1 million)

Probability is expressed as a number between 0 and 1 (0 to 100 percent likelihood of the occurrence of an event). The notation 3×10^{-6} can be read 0.000003, which means that there are three chances in 1,000,000 that the associated result (for example, a fatal cancer) will occur in the period covered by the analysis.

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COVER SHEET

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

TITLE: *Final Supplemental Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada – Nevada Rail Transportation Corridor* (DOE/EIS-0250F-S2; the Nevada Rail Corridor SEIS), and *Final Environmental Impact Statement for a Rail Alignment for the Construction and Operation of a Railroad in Nevada to a Geologic Repository at Yucca Mountain, Nye County, Nevada* (DOE/EIS-0369; the Rail Alignment EIS)

CONTACTS:

For more information about this document, write or call:
U.S. Department of Energy
Office of Civilian Radioactive Waste Management
U.S. Department of Energy
1551 Hillshire Drive M/S 011
Las Vegas, NV 89134
ATTN: Jane R. Summerson
Telephone: (800) 967-3477
Fax: 1-800-967-0739

For general information on the DOE NEPA process, write or call:
Carol M. Borgstrom, Director
Office of NEPA Policy and Compliance (GC-20)
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, DC 20585
Telephone: (202) 586-4600
Or leave a message: (800) 472-2756

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://www.eh.doe.gov/nepa/*.

ABSTRACT: The Nevada Rail Corridor SEIS (DOE/EIS-0250F-S2) 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-0369) 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 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, the U.S. Air Force, Esmeralda, Lincoln, and Nye Counties, Nevada, and the City of Caliente, Nevada, are cooperating agencies in the preparation of the Nevada Rail Corridor SEIS and the Rail Alignment EIS.

PUBLIC COMMENTS: In preparing these NEPA analyses, DOE considered written comments received by letter, electronic mail, and facsimile transmission, and oral and written comments given at public hearings at six locations in Nevada, one location in California, and in Washington, DC.

FOREWORD

The U.S. Department of Energy (DOE or Department) has prepared three analyses under the National Environmental Policy Act (NEPA) 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. The first analysis, the *Final Supplemental Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (DOE/EIS-0250F-S1) (Repository SEIS), evaluates the potential environmental impacts of constructing and operating the Yucca Mountain Repository under the proposed repository design and operational plans. It supplements 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) (Yucca Mountain FEIS) prepared by the Department in 2002.

The second and third analyses are set forth in the *Final Supplemental Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada – Nevada Rail Transportation Corridor* (DOE/EIS-0250F-S2) (Nevada Rail Corridor SEIS) , and the *Final Environmental Impact Statement for a Rail Alignment for the Construction and Operation of a Railroad in Nevada to a Geologic Repository at Yucca Mountain, Nye County, Nevada* (DOE/EIS-0369) (Rail Alignment EIS). These analyses 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, in order to help the Department decide whether to construct and operate a railroad, and if so, within which corridor and along which alignment. Because both the Nevada Rail Corridor SEIS and the Rail Alignment EIS address potential environmental impacts associated with the proposed construction and operation of a railroad, they are bound together in one document for the convenience of the reader.

Background and Context

The Nuclear Waste Policy Act, as amended (NWPA, 42 U.S.C. 10101 *et seq.*) 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 Yucca Mountain FEIS.

On February 14, 2002, the Secretary transmitted to the President the Secretary's 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). As required by the NWPA (Section 114(b)), the Department has submitted an application to the NRC seeking authorization to construct the repository.

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 designed, the 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 transportation, 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 modifications to repository design and operational plans, the Department announced its intent to prepare a Supplement to the Yucca Mountain FEIS, consistent with NEPA and the NWPA (Notice of Intent to prepare a *Supplement to the Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, NV*; 71 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 modified 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 transporting 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 analyses, referred to as the Nevada Rail Corridor SEIS

and Rail Alignment EIS, evaluate the potential environmental impacts associated with the Mina corridor, DOE has identified the Mina alternative as non-preferred because the Tribe renewed its prior objection to the transportation of nuclear waste across the Reservation.

Relationships Among the EISs

Although the Yucca Mountain FEIS, the Repository SEIS, the Nevada Rail Corridor SEIS, and Rail Alignment EIS are all related to the proposal to construct and operate the Yucca Mountain Repository, they consider actions involving the jurisdiction of more than one federal agency. The Repository SEIS supplements the Yucca Mountain FEIS and considers the potential environmental impacts associated with the construction and operation of the Yucca Mountain Repository. The responsibility for issuing construction authorization and a license to receive and possess radioactive materials at the repository rests with the Nuclear Regulatory Commission (NRC). Should the NRC authorize development of the repository, DOE would be the federal agency responsible for constructing and operating the repository.

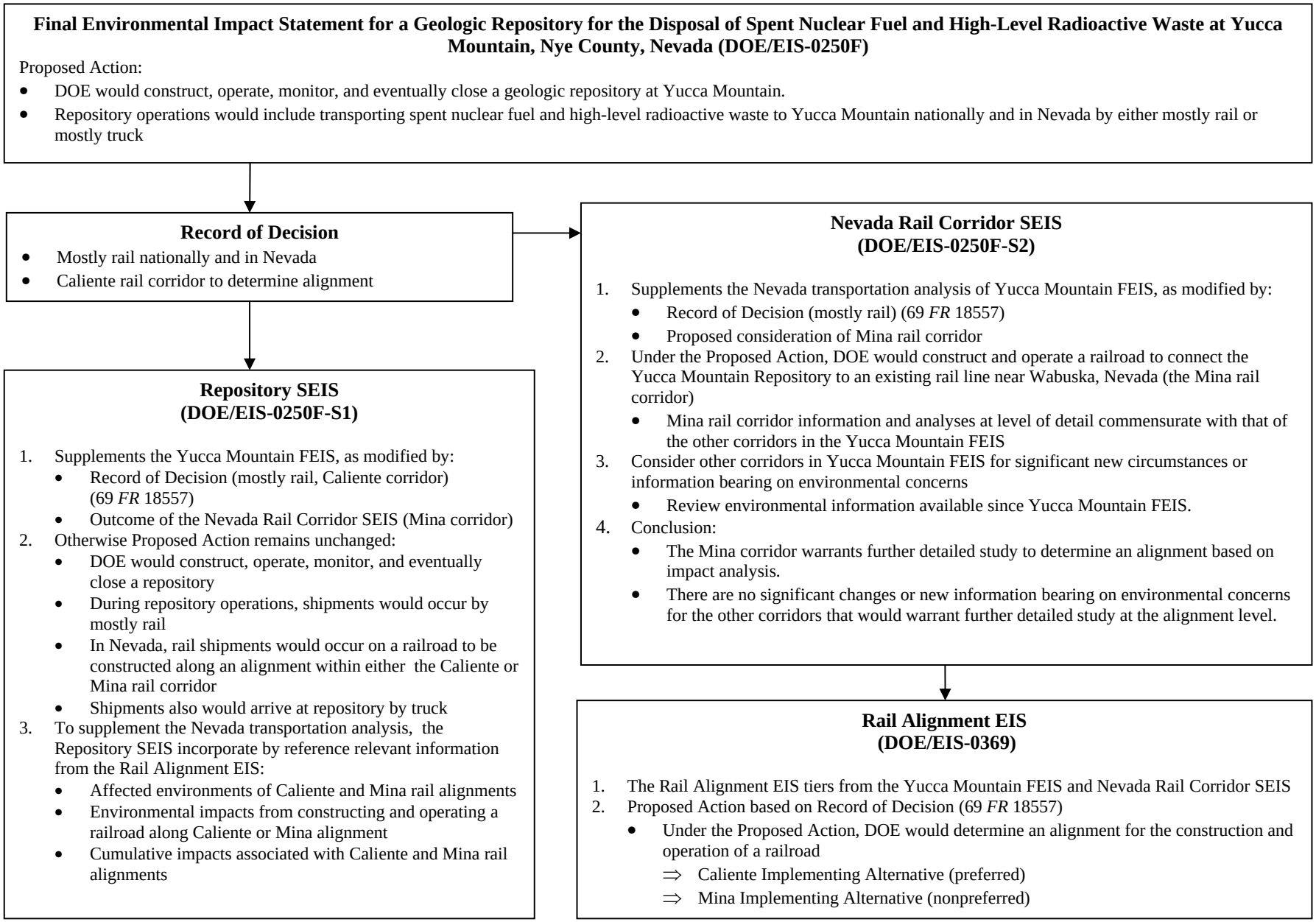
The Nevada Rail Corridor SEIS, which supplements the rail corridor analysis in the Yucca Mountain FEIS, analyzes the potential environmental impacts associated with constructing and operating a railroad within the Mina corridor. The Nevada Rail Corridor SEIS analyzes the Mina corridor at a level of detail 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 CFR 1508.28). Under the Proposed Action considered in the Rail Alignment EIS, DOE analyzes specific potential impacts of constructing and operating a rail line 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. If DOE were to decide that a railroad should be constructed, it would be the federal agency charged with responsibility for carrying out the actions necessary to construct and operate the railroad.

The Repository SEIS includes the potential environmental impacts of national transportation, as well as the potential impacts in Nevada from the construction and operation of a rail line along specific alignments in either the Caliente or the Mina corridor, to ensure that the Repository SEIS considers the full scope of potential environmental impacts associated with the proposed construction and operation of the repository. Accordingly, the Repository SEIS incorporates by reference appropriate portions of the Nevada Rail Corridor SEIS and the Rail Alignment EIS. To ensure consistency, the Repository SEIS,

and the Nevada Rail Corridor SEIS and Rail Alignment EIS use the same updated 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 the Repository SEIS and in the Nevada Rail Corridor SEIS and Rail Alignment EIS. Furthermore, to promote conformity, consistent analytical approaches were used where appropriate to evaluate common resource areas.



Foreword Figure 1. Relationship among the Repository SEIS, the Nevada Rail Corridor SEIS, and Rail Alignment EIS.

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SUMMARY OF THE NEVADA RAIL CORRIDOR SEIS AND THE RAIL ALIGNMENT EIS

This document summarizes the Nevada Rail Corridor SEIS and the Rail Alignment EIS. Volumes I, II, III, IV, and V provide detailed background information; descriptions of existing environments and environmental impact analyses; analytical methods and assumptions; a list of technical references; a glossary of terms; an index; and supporting appendices. Volume VI contains the Comment-Response Documents where DOE provides responses to public comments on the Draft Nevada Rail Corridor SEIS and Rail Alignment EIS.

S.1 Introduction

The U.S. Department of Energy (DOE or the Department) has prepared 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 – Nevada Rail Transportation Corridor* (for brevity, referred to as the Nevada Rail Corridor SEIS) and the *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.

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.

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.

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, operations support facilities, railcars, locomotives, and other related property and infrastructure.

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

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

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 United States Code [U.S.C.] 10101 *et seq.*), which the Nevada Rail Corridor SEIS 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, DOE had prepared the 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 April 8, 2002, the Governor of Nevada submitted to Congress a notice of disapproval of the Yucca Mountain Site designation. On May 8 and July 9, 2002, the U.S. House of Representatives and the U.S. Senate, respectively, passed a joint resolution that overrode the notice of disapproval and approved the development of a repository for the disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain. On July 23, 2002, the President signed into law the 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 considered in the Nevada Rail Corridor SEIS and Rail Alignment EIS 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 (NRC) 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 Nevada Rail Corridor SEIS and Rail Alignment EIS, pursuant to CEQ regulations, and have participated in its preparation. Since the Draft Rail Corridor SEIS and Draft Rail Alignment EIS were published, DOE invited Nye County, Esmeralda County, Lincoln County, and the City of Caliente to become cooperating agencies. Nye County, Esmeralda County, Lincoln County, and the City of Caliente have accepted cooperating agency status for the development of the Nevada Rail Corridor SEIS and Rail Alignment EIS, pursuant to Council on Environmental Quality regulations, and have participated in the preparation of the Final Nevada Rail Corridor SEIS and Final Rail Alignment EIS.

The BLM and the STB could adopt the Nevada Rail Corridor SEIS and Rail Alignment EIS in whole or in part and use them as a basis for any decisions concerning the Proposed Action and alternatives. The BLM, STB, and U.S. Air Force have management responsibilities, regulatory authority, or special expertise related to the Proposed Action.

S.2 Summary of the Nevada Rail Corridor SEIS

S.2.1 PURPOSE AND NEED FOR AGENCY ACTION

The Nevada Rail Corridor SEIS has two purposes:

- 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

- 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, NV* (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-0250-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 Caliente, 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.

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.

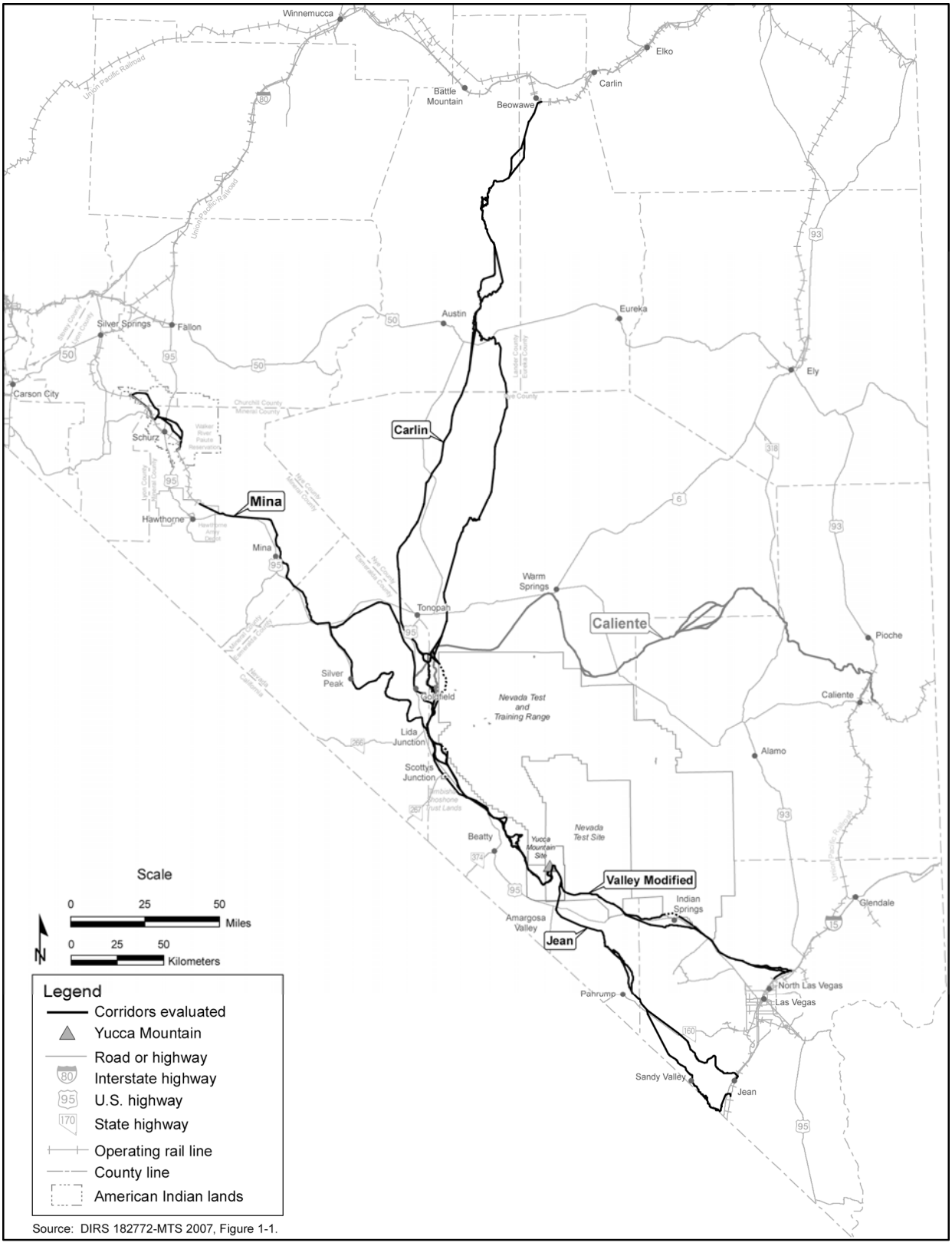


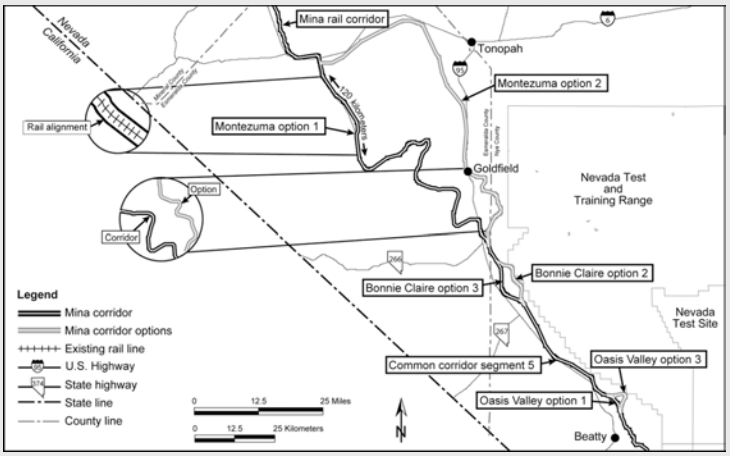
Figure S-1. Carlin, Jean, Valley Modified, Caliente, and Mina rail corridors (pre-scoping, October 2006).

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; DOE/EIS-0250F-S2).

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

Option – In the Yucca Mountain FEIS the terms for describing separate routes within a corridor were alternates, variations, and options. For the Nevada Rail Corridor SEIS, only option is used and is applied more generally; option refers to a strip of land from one point along a corridor to another point on the same corridor that provides a different route.

Common corridor segment – Geographic region for which a single route has been identified.



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.

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 corridor 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.

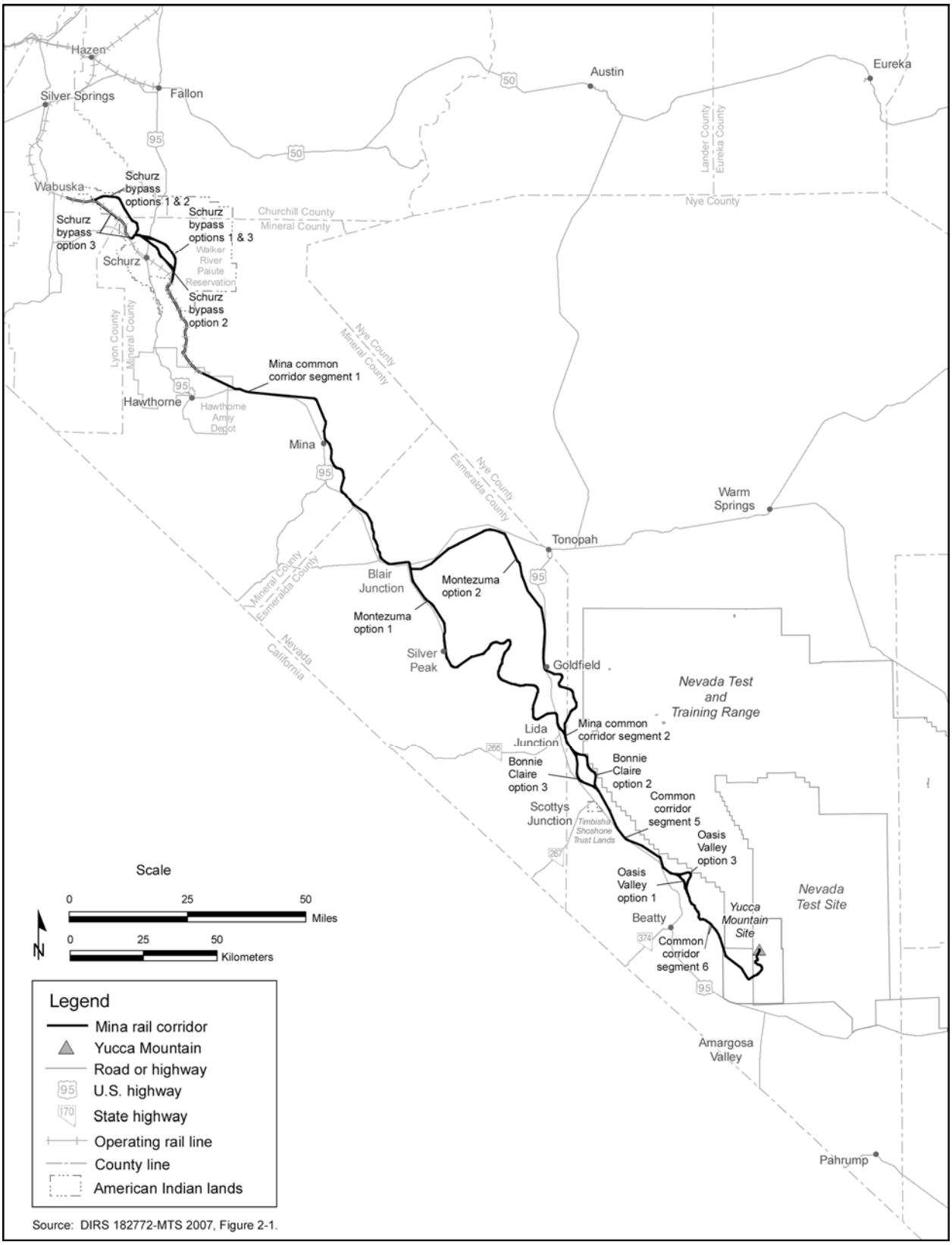


Figure S-2. Mina rail corridor and options (as defined prior to the October 2006 scoping meetings described Section S.2.3.1).

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, DOE issued a Notice of Intent (69 *FR* 18565) 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 Nevada Rail Corridor SEIS and the 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, including on November 29, 2006, to present the proposed inclusion of the Mina rail corridor for analysis in the Nevada Rail Corridor SEIS and the 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.2.3.3 Draft SEIS Public Comment Process and Public Hearings

On October 12, 2007, EPA announced in the *Federal Register* (72 *FR* 58081) the availability of the Draft Repository SEIS, and the Draft Nevada Rail Corridor SEIS and Draft Rail Alignment EIS. Also on October 12, 2007, DOE announced in the Federal Register (72 *FR* 58071) the availability of these draft NEPA documents related to its Yucca Mountain Project. DOE's Notice of Availability invited interested parties to comment on the NEPA documents during a 90-day public comment period that ended on January 10, 2008. During the public comment period, DOE held eight public hearings on the Draft Repository SEIS, and the Draft Nevada Rail Corridor SEIS and Draft Rail Alignment EIS at locations in Nevada, California, and Washington, D.C. Approximately 518 people attended the hearings (the count is approximate because not all attendees signed in) and 110 people provided oral comments.

In total DOE received approximately 4,000 comments on the NEPA documents from nearly 1,100 commenters. Approximately 255 of these comments were on the Nevada Rail Corridor SEIS. DOE has prepared a Comment-Response Document for the Nevada Rail Corridor SEIS that addresses the issues raised during the public comment period. The Comment-Response Document contains each comment (as an individual comment or summarized with similar comments) and the DOE response to each comment. DOE has incorporated changes to the Final Nevada Rail Corridor SEIS analysis resulting from the comments on the Draft Nevada Rail Corridor SEIS.

S.2.3.4 Issues Raised by the Public on the Draft Nevada Rail Corridor SEIS

The Nevada Rail Corridor Comment-Response Document contains all the comments DOE received on the Draft Nevada Rail Corridor SEIS, and the DOE responses to those comments. The comments received from the public during the comment period identified a number of key issues for the Draft Nevada Rail Corridor SEIS, which are described below along with DOE's response. DOE identified the issues as "key" based on the following factors:

- The extent to which an issue concerned fundamental aspects of the Proposed Action;
- The nature of the comments as characterized by the commenters; and
- The extent to which DOE changed the SEIS in response to the issue.

S.2.3.4.1 Mina Rail Corridor

Study of the Mina rail corridor is unwarranted.

In the Yucca Mountain FEIS, DOE evaluated in detail five potential rail corridors in the State of Nevada in which DOE could construct a rail line to link an existing rail line to Yucca Mountain. In the Yucca Mountain FEIS, DOE considered, but eliminated from further study, several other potential rail corridors.

The Department eliminated one of those, the Mina rail corridor, because it crosses the Walker River Paiute Reservation and the Tribe had previously stated that it would not allow DOE to transport nuclear waste across the Reservation.

During initial scoping for the Rail Alignment EIS in 2004, DOE received comments that identified the Mina rail corridor for consideration as an alternative to the Caliente rail corridor. DOE subsequently held discussions with the Tribe on the availability of the Mina rail corridor, and in May 2006 the Tribe informed DOE that it would not object to the Department studying the potential impacts of constructing and operating a railroad across its Reservation. In response, DOE prepared a preliminary feasibility study of the Mina rail corridor. On October 13, 2006, based on the results of the study, DOE issued an Amended Notice of Intent to expand the scope of the Rail Alignment EIS to include the Mina rail corridor (71 *FR* 60484).

In April 2007, the Walker River Paiute Tribal Council passed a resolution and announced that it was withdrawing from participation in the EIS process. The Tribe renewed its prior objection to the transportation of nuclear waste across the Reservation. At the time the Tribe announced its withdrawal from the EIS process, DOE had completed the fieldwork and engineering studies necessary to conclude that it should include the Mina rail corridor in both the Nevada Rail Corridor SEIS and the Rail Alignment EIS. The studies indicated that construction and operation of a railroad along the Caliente or Mina rail alignment would have similar but generally small environmental impacts. On balance, however, the Mina rail corridor would be environmentally preferable because, in general, it would present fewer private-land conflicts, less surface disturbance, and smaller impacts to wetlands and air quality than the Caliente rail corridor would. In addition, based on preliminary estimates, the total cost to construct the railroad along the Mina rail corridor would be approximately 20 percent less than to construct along the Caliente rail corridor.

For the reasons stated above, DOE has included the Mina rail corridor in the Nevada Rail Corridor SEIS and Rail Alignment EIS but, in light of the Walker River Paiute Tribe's current position on the shipment of nuclear waste across its Reservation, DOE has identified the Mina rail corridor as a nonpreferred alternative.

S.2.3.4.2 Lead Agency

The Surface Transportation Board should be the lead agency for the Rail Alignment EIS (and by extension the Nevada Rail Corridor SEIS), not DOE.

CEQ regulations (40 CFR 1501.5, 1501.6) address the issue of lead and cooperating agencies. DOE has adopted the CEQ NEPA regulations and implemented its own regulation on interagency cooperation (10 CFR 1021.342). The role of a federal agency in the NEPA process is a function of the agency's expertise and relationship to the proposed action. If more than one federal agency is involved in an undertaking that requires an EIS, CEQ regulations provide for the designation of a lead agency to supervise preparation of the environmental analysis (40 CFR 1501.5). The lead agency, which is generally the agency with major responsibility for the proposed action [40 CFR 1501.5(c)], is responsible for the preparation of the EIS and for compliance with other NEPA procedural requirements (40 CFR 1508.16).

A federal, state, tribal, or local agency with special expertise on an environmental issue or jurisdiction by law can be a cooperating agency in the NEPA process. A cooperating agency has the responsibility to assist the lead agency by participating in the NEPA process at the earliest possible time; by participating in the scoping process; in developing information and preparing environmental analyses including portions of the environmental impact statement for which the cooperating agency has special expertise; and in making available staff support at the lead agency's request to enhance the lead agency's

interdisciplinary capabilities (40 CFR 1501.6). A cooperating agency can adopt the EIS prepared by the lead agency and use it in its own decisionmaking (40 CFR 1506.3).

DOE is the lead agency for the Rail Alignment EIS. Under the Nuclear Waste Policy Act, the Department is responsible for the disposal of spent nuclear fuel and high-level radioactive waste to protect public health, safety, and the environment, and for the development and implementation of a plan to transport spent nuclear fuel and high-level radioactive waste to a repository at Yucca Mountain. The Rail Alignment EIS appropriately tiers from the broader corridor analysis in the Yucca Mountain FEIS, consistent with CEQ regulations (40 CFR 1508.28) and the court's decision in State of Nevada vs. DOE, 457 F.3d 78 (D.C. Cir. 2006).

Consistent with CEQ and DOE regulations, DOE has requested the assistance of other agencies that have management or regulatory authority over lands and resources that the proposed railroad could affect or that have special expertise related to the proposed action in the Rail Alignment EIS. One of those agencies is the Surface Transportation Board (STB), which has exclusive jurisdiction over common-carrier rail lines that are part of the interstate rail network. The STB accepted cooperating agency status in the preparation of the Rail Alignment EIS. During the preparation of the NEPA analyses, DOE met with the STB to discuss project direction and coordination, as Appendix B, Section B.1, of the Rail Alignment EIS describes.

If the proposed railroad were to be operated as a common-carrier railroad (referred to as shared use in the Rail Alignment EIS), the Department would have to obtain a certificate of public convenience and necessity to construct and operate the railroad from the STB. As part of its review process, the STB would need to consider the environmental effects of railroad construction and operations. Although DOE has not made a decision whether to construct and operate a railroad, DOE filed an application for a certificate of public convenience and necessity with the STB on March 17, 2008. As part of the consideration of that application, the STB Section of Environmental Analysis is responsible for preparing the appropriate NEPA documentation for railroad construction and operation cases under the jurisdiction of the STB. Consistent with CEQ regulations, the STB could adopt the Rail Alignment EIS in whole or in part and use it as a basis for its decision. If the STB needed additional NEPA documentation in addition to the Rail Alignment EIS to support its decision whether to issue a certificate of public convenience and necessity, that additional NEPA documentation would be prepared by the STB.

The STB has not requested lead agency status, nor has it expressed any disagreement with DOE's status as lead agency. Under these circumstances, where no federal agency has expressed disagreement with the decision on lead agency status, as the CEQ concluded in a letter dated February 8, 2005, the process outlined in its regulations [40 CFR 1501.5(c)] for resolution of disagreements among agencies regarding lead agency status has not been triggered.

For these reasons, DOE is the appropriate lead agency for the Rail Alignment EIS and the Nevada Rail Corridor SEIS.

S.2.3.5 Changes Made to the Draft Nevada Rail Corridor SEIS

The Final Nevada Rail Corridor SEIS reflects changes made to the Draft Nevada Rail Corridor SEIS because of public and agency comments and the availability of new and updated information. Examples of these changes include:

- The addition of four cooperating agencies: Nye County, Esmeralda County, Lincoln County, and the City of Caliente, whose views have been incorporated.
- Revisions to Chapter 4, Cumulative Impacts, to evaluate newly identified projects in the regions of influence and the addition of newly available reference documents for proposed projects.

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 practicable, 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 practicable 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. Rail line 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 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 Yucca Mountain Site.

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 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 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 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 riparian area 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 bighorn sheep, pronghorn antelope, 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 would be four fatalities from traffic accidents and 0.54 latent cancer fatality from vehicle emissions. During railroad operations along the Mina rail corridor, there would be an estimated 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 operations 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. The estimated impact would be less than one 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 socioeconomic 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 than 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 socioeconomic 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, increases in 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 noise-sensitive receptors (such as residences, schools, libraries, retirement communities, nursing homes) 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 occurs in Mineral County and 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. 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.

An examination of impacts of construction and operation in the Mina rail corridor determined that the only moderate or large impacts relate to noise impacts from construction. These impacts would not occur on the Walker River Paiute Reservation; therefore, there would be no high and adverse effects that would disproportionately affect a low-income or minority community. DOE has not identified any special pathways that would result in disproportionately high and adverse effects to low-income or minority communities.

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.

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. For the Mina rail corridor, the region of influence for cumulative impacts consists of the Walker River Paiute Reservation, and Lyon, Mineral, Esmeralda, and Nye Counties (referred to as the Mina region of influence). Clark, Churchill, and Washoe Counties are generally excluded from the cumulative impacts regions of influence except as needed to maintain consistency with individual resource analyses in the Nevada Rail Corridor SEIS, such as socioeconomics or air quality. To assess potential cumulative impacts from other projects, DOE identified major projects within the region 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 region of influence unless noted otherwise.

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 region of influence. The BLM has a major role in determining land use in the region though administration of federal lands, including development of resource management plans for the region. The proposed railroad and existing and reasonably foreseeable projects could have a moderate to large cumulative impact to land use and ownership.

Overall, there is, and will continue to be, a broad contrast of how visual resource impacts are managed in the region 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 proposed railroad and other existing and reasonably foreseeable projects could have a small to moderate cumulative impact to aesthetic resources in the Mina region of influence.

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 rail corridor region of influence. The proposed railroad and other existing or reasonably foreseeable projects could result in small cumulative impacts to surface-water resources.

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. The proposed railroad and other existing and reasonably foreseeable projects could have a moderate to large cumulative impact to groundwater resources, but DOE would minimize impacts to the extent practicable.

A railroad in the Mina rail corridor is projected to result in small to moderate incremental impacts to cumulative biological resources in their region 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 region of influence. The road systems in the region of influence could experience higher traffic levels, possibly associated congestion, and increased road maintenance. While there is some limited potential for induced growth impacts, the specific locations and scope of these actions is unknown at this time, and any such actions are projected to be small. The proposed railroad and other existing and reasonably foreseeable projects could result in moderate cumulative impacts to socioeconomics because of the numerous planned development projects in the Mina region of influence.

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 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 corridor. The Yucca Mountain FEIS and the Repository SEIS 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.

DOE estimated that, under assumed conditions, 8.1 and 12 latent cancer fatalities for repository workers would result from Yucca Mountain Repository construction, operations, monitoring, and closure for Modules 1 and 2, respectively. For workers along the rail line, DOE estimated that there could be 1.2 latent cancer fatalities for Module 1, and 1.7 latent cancer fatalities for Module 2. For members of the public, DOE estimated that, under assumed conditions, 18 and 27 latent cancer fatalities could result from construction, operations, monitoring, and closure for Modules 1 and 2, respectively. For members of the public along the Mina rail corridor, DOE estimated that 0.0020 latent cancer fatality for Module 1, and 0.0030 latent cancer fatality for Module 2 could occur from transportation of spent nuclear fuel and high-level radioactive waste.

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. If DOE were to proceed with shared use of the rail line, there would be some limited potential for induced growth impacts. However, the specific locations and scope of these actions are unknown at this time. Such development – if it occurs – would likely have small to moderate socioeconomic impacts. 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.

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 rail

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

Resource	Impact/indicator
Land use	
Disturbed land[a]	9,000 to 10,000 acres (37 to 41 square kilometers), depending on rail corridor option
Land ownership/management authority	
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)
Air quality	
National Ambient Air Quality Standards attainment status	Areas in attainment or unclassifiable for air quality standards; small impacts from construction and operations
Hydrology	
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)
Biological resources and soils	Small impacts to habitat, wildlife, vegetation, and soils
Cultural resources (records search)	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
Occupational and public health and safety	
Construction and operations	
Industrial hazards	
Total recordable incidents	410
Lost workday cases	230
Fatalities	1 (combined involved and noninvolved workers)
Transportation (construction phase only)	
Traffic fatalities	4.0
Cancer fatalities	0.54
Operations phase only	
Incident-free radiological impacts (latent cancer fatalities)	
Public	0.00082
Workers	0.33

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

Resource	Impact/indicator
Occupational and public health and safety cont.	
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
Socioeconomics	Construction employment: 6,500 full-time equivalents (FTE)[b] 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 FTEs 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
Noise and vibration	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.
Aesthetics	Small; construction and operation of a railroad primarily in BLM visual resource management Class III and IV areas would be consistent with BLM management objectives for those areas.
Utilities, energy, and materials	
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)
Wastes	
Construction-related municipal waste; limited quantities of other waste types	1.7 tons (1.5 metric tons) per day
Environmental justice (disproportionately high and adverse impacts	None identified

a. Land disturbance is based on an average construction right-of-way of 100 meters (325 feet).
b. Full-time equivalents (FTEs) also known as worker-years

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.

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

Resource	Changes from the Yucca Mountain FEIS to this analysis
Corridor length	No change
Land ownership	
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: 1,800 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
Air quality	
National Ambient Air Quality Standards attainment status	No change
Hydrology	
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)
Biological resources and soils	Six additional sensitive species recorded
Cultural resources (records search)	Yucca Mountain FEIS: 110 recorded sites Updated analysis: 120 recorded sites
Occupational and public health and safety	
Industrial hazards (construction and operations)	
Total recordable cases	Yucca Mountain FEIS: 210 Updated analysis: 410
Lost workday cases	Yucca Mountain FEIS: 105 Updated analysis: 230
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 the Yucca Mountain FEIS to this analysis
Occupational and public health and safety (continued)	
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: 0.00000099
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
Socioeconomics	
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
Noise and vibration	No change
Aesthetics	No change
Utilities, energy, and materials (amount used)	
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)
Waste management	
Sanitary solid waste	Updated analysis: 1.7 tons (1.6 metric tons) per day
Environmental justice (disproportionately high and adverse impacts)	No change, none identified

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
Corridor length	No change
Land ownership	
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 percent)
Private land	No change
Nevada Test Site land	No change
Air quality	
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.
Hydrology	
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)
Biological resources and soils	Four additional sensitive species recorded
Cultural resources (records search)	Yucca Mountain FEIS: 6 recorded sites Updated analysis: 45 recorded sites
Occupational and public health and safety	
Industrial hazards (construction and operations)	
Total recordable cases	Yucca Mountain FEIS: 148 Updated analysis: 260
Lost workday cases	Yucca Mountain FEIS: 76 Updated analysis: 150
Fatalities	Yucca Mountain FEIS: 0.3 Updated analysis: 0.7
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
Occupational and public health and safety (continued)	
Radiological transportation accident fatalities	
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
Nonradiological transportation accident fatalities	
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
Socioeconomics	
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
Noise and vibration	No change
Aesthetics	No change
Utilities, energy, and materials (amount used)	
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)
Waste management	
Sanitary solid waste	Updated analysis: 1 ton (0.91 metric ton) per day
Environmental justice (disproportionately high and adverse impacts)	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
Corridor length	No change
Land ownership	
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
Air quality	
National Ambient Air Quality Standards attainment status	No change (potential for construction air quality impacts from PM_{10} and carbon monoxide)
Hydrology	
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)
Biological resources and soils	Six additional records of sensitive species
Cultural resources (records search)	Yucca Mountain FEIS: 19 recorded sites
	Updated analysis: 45 recorded sites
Occupational and public health and safety	
Industrial hazards (construction and operations)	
Total recordable cases	Yucca Mountain FEIS: 111
	Updated analysis: 190
Lost workday cases	Yucca Mountain FEIS: 57
	Updated analysis: 110
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
Occupational and public health and safety (continued)	
Incident-free radiological impacts (latent cancer fatalities) (operations only)	
Public	Yucca Mountain FEIS: 0.00065
	Updated analysis: 0.00014
Workers	Yucca Mountain FEIS: 0.27
	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
Socioeconomics	
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
Noise and vibration	No change
Aesthetics	No change
Utilities, energy, and materials (amount used)	
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)
Waste management	
Sanitary solid waste	Updated analysis: 0.7 tons (0.6 metric tons) per day
Environmental justice (disproportionately high and adverse impacts)	No change, none identified

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 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 Carlin, Jean or Valley Modified rail corridors 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 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 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 construct and operate the rail line. 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 has 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 Nevada 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 25 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 U.S. 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 Nevada 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 and 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 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.

On April 17, 2007, the Walker River Paiute Tribal Council passed a resolution withdrawing support for the Tribe's participation in the Nevada Rail Corridor SEIS and the 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 Nevada Rail Corridor SEIS and the 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.

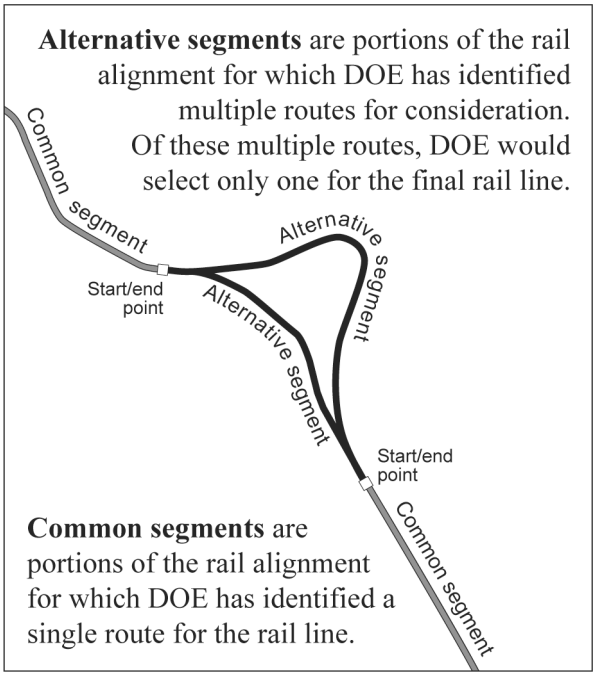
DOE prepared the Rail Alignment EIS to provide the background, data, information, and analyses to help decisionmakers and the public understand the potential environmental impacts that could result from constructing and operating a railroad for shipment of spent nuclear fuel, high-level radioactive waste, 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.
- 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 which 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 (with the Shared-Use Option, DOE's **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 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,

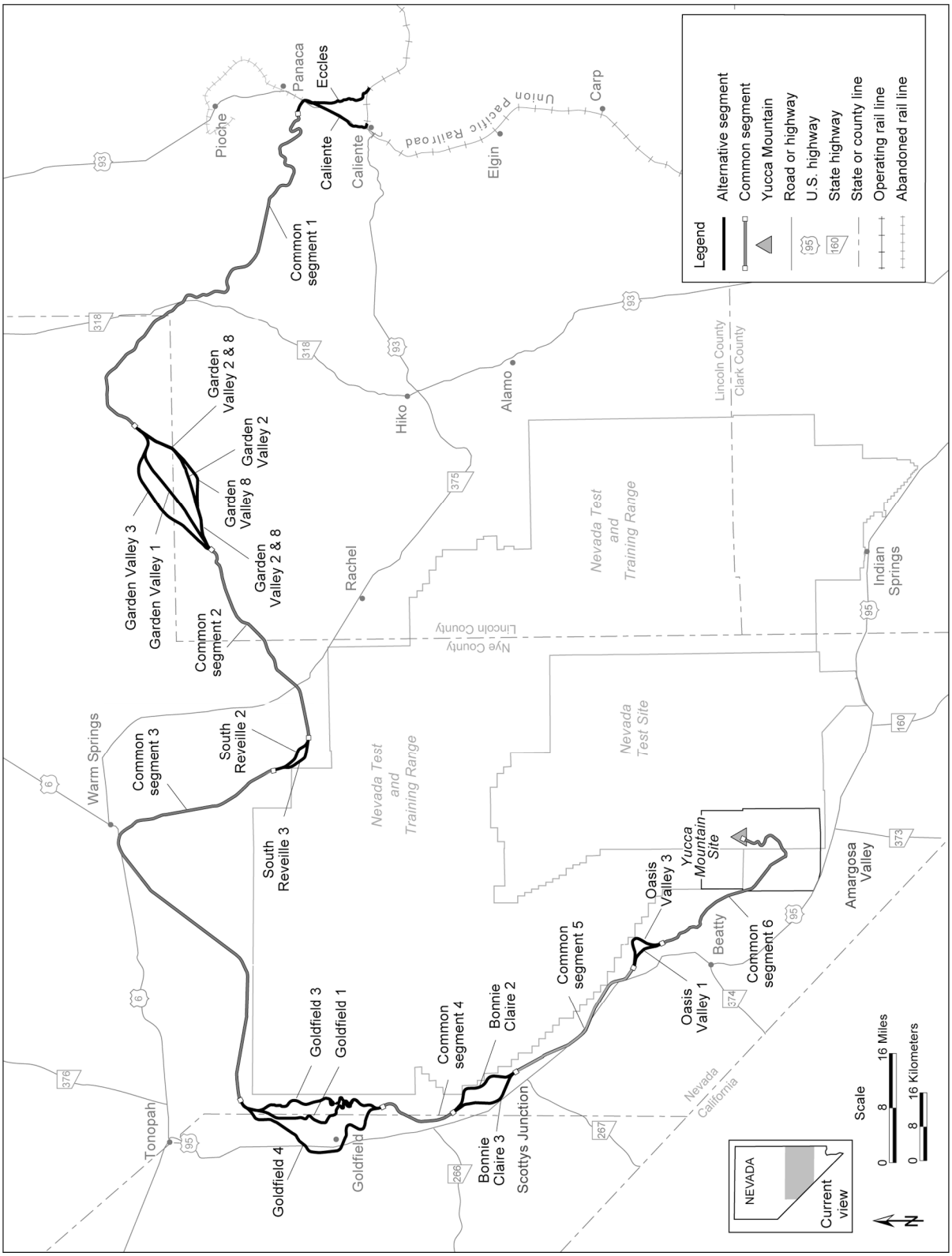


Figure S-3. Caliente rail alignment analyzed in the Rail Alignment EIS.

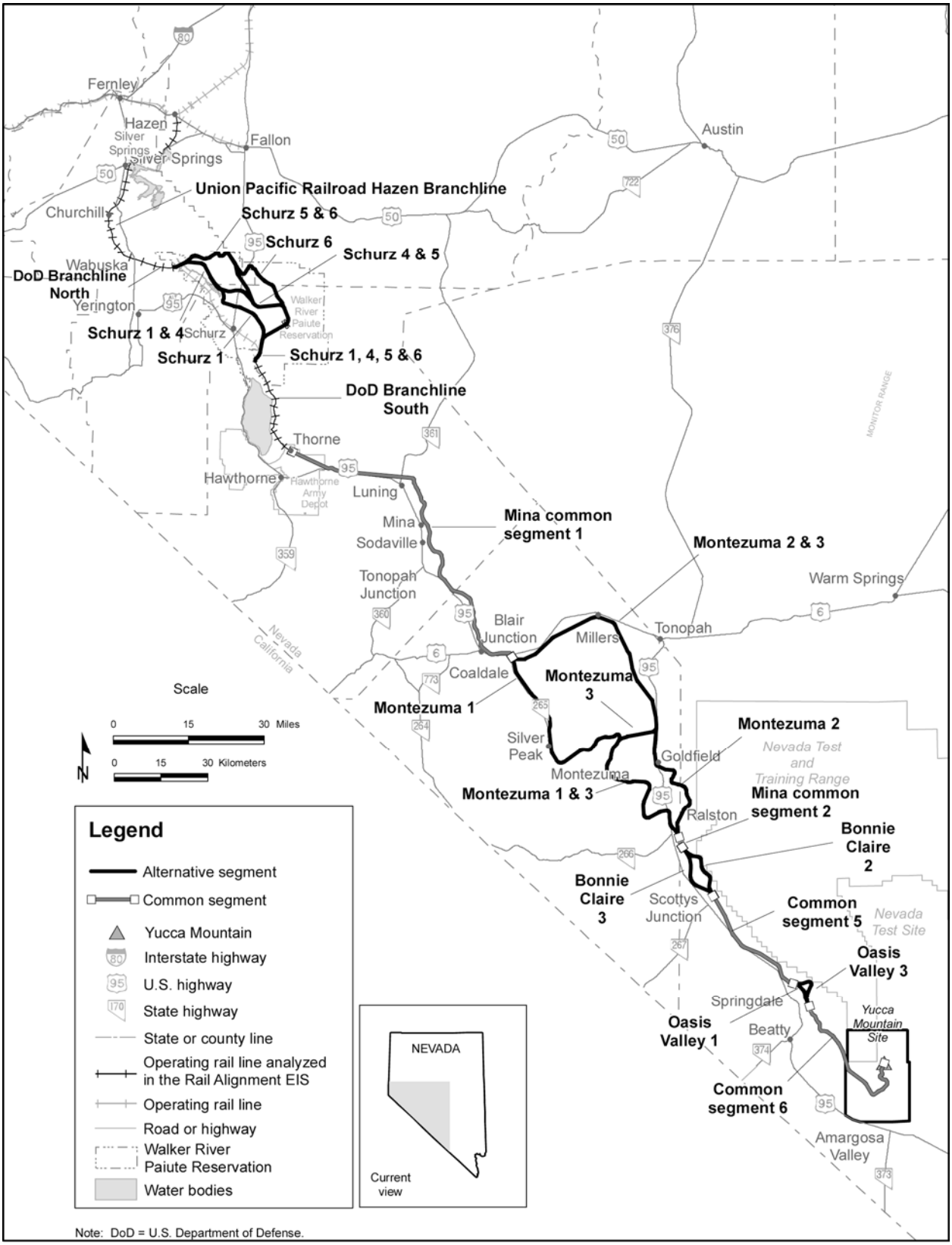


Figure S-4. Mina rail alignment analyzed in the Rail Alignment EIS.

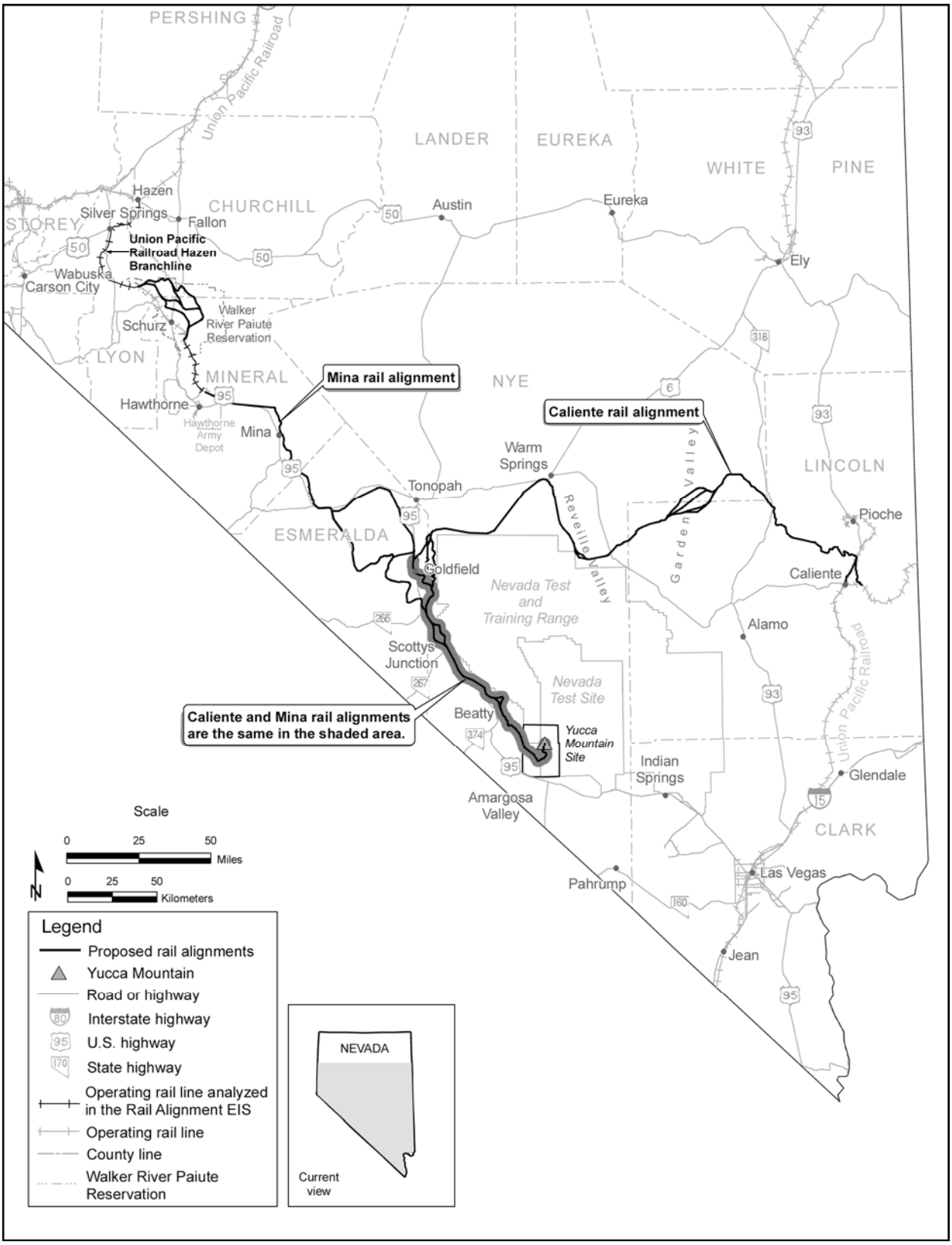


Figure S-5. The proposed Caliente and Mina rail alignments.

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.)

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 Facility (if Goldfield alternative segment 4 is selected)
- Maintenance-of-Way Headquarters Facility (if Goldfield alternative segment 1 or 3 is selected)
- Maintenance-of-Way Trackside Facility (if Goldfield alternative segment 1 or 3 is selected)
- Satellite 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
- Satellite Maintenance-of-Way Facilities
- 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 $2.57 billion (in year 2008 dollars), whereas the total cost to construct the railroad within the Mina rail alignment would be approximately $2.03 billion (in year 2008 dollars).

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 164 square kilometers (40,600 acres) and under the Mina Implementing Alternative approximately 125 square kilometers (30,900 acres), but would vary depending on the final alternative segments selected. DOE would implement best management practices during this entire construction process.

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.

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 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. 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.

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.

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.

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 7.3 to 300 meters (24 to 1,000 feet)	Approximately 58 to 69, ranging in length from 16 to 300 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 service road	The railroad alignment is planned to have a service 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 service 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 Reveille 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 full-time equivalents (FTEs) (the maximum number of FTEs in one year is 2,160)	7,600 FTEs (the maximum number of FTEs 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-6. 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 out of the Maintenance-of-Way Facilities, which, if Goldfield alternative segment 4 were constructed, would consist of the Maintenance-of-Way Facility and two Satellite Maintenance-of-Way Facilities. If Goldfield alternative segment 1 or 3 were constructed, the functions of the Maintenance-of-Way Facility would be divided between a Maintenance-of-Way Headquarters Facility and a Maintenance-of-Way Trackside Facility. Under the Mina Implementing Alternative, most rail line maintenance and inspection activities would be conducted out of the Maintenance-of-Way Facilities, which would consist of the Maintenance-of-Way Facility and two Satellite Maintenance Maintenance-of-Way Facilities. Maintenance activities along the Mina rail alignment would include maintaining the existing Department of Defense Branchline as needed.

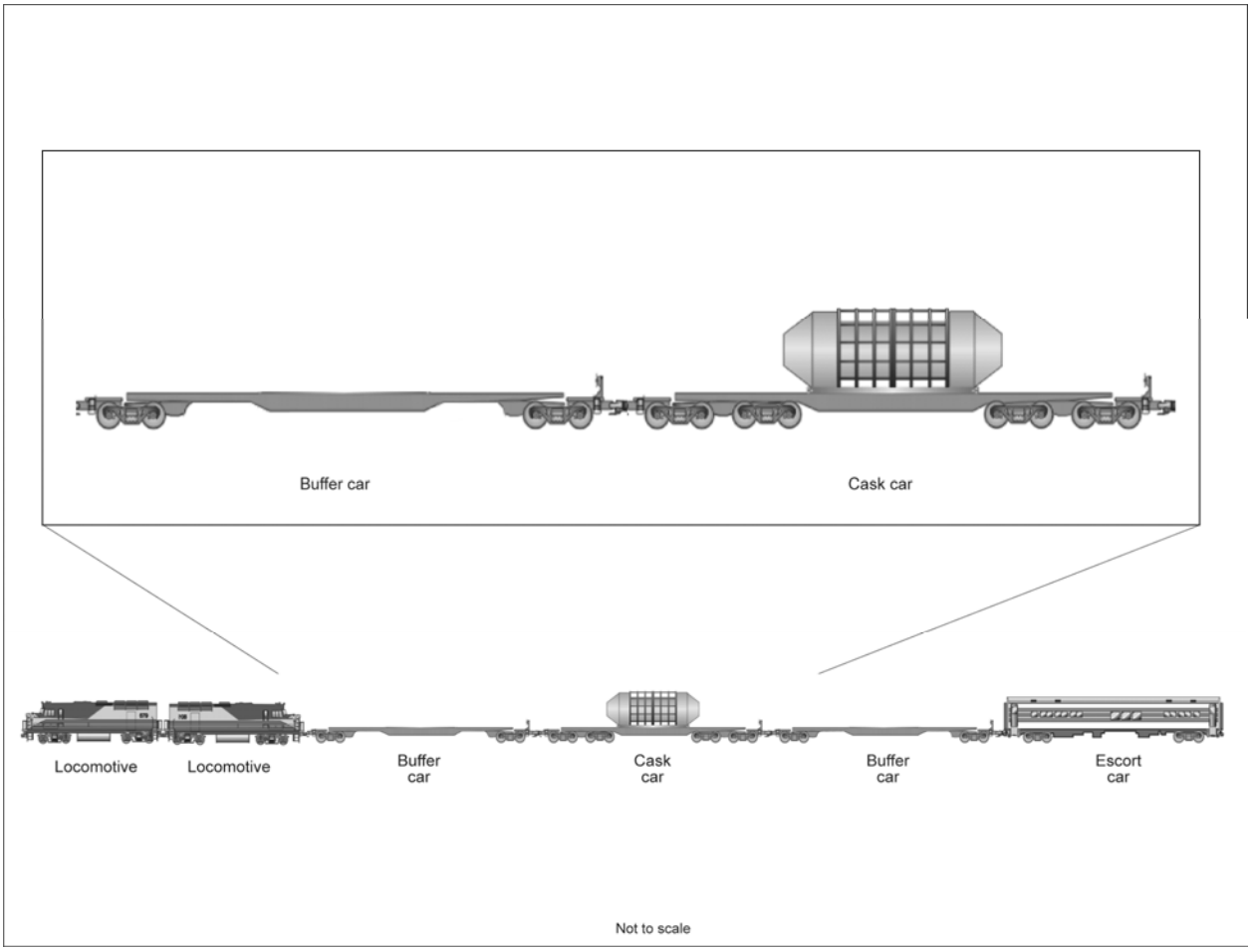


Figure S-6. Artist's conception of a repository train carrying one cask.

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
Facilities along the Caliente rail alignment (excluding facilities common to the Caliente and Mina rail alignments)			
Facilities at the Interface with the Union Pacific Railroad Mainline			
Interchange Yard	Caliente or Eccles alternative segment 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)
Maintenance-of-Way Facilities			
Maintenance-of-Way Headquarters Facility (if Goldfield 1 or Goldfield 3 is constructed)	Approximately 5 miles[a] south of Tonopah Esmeralda County	Coordination center for all maintenance activities along the proposed railroad	10
Maintenance-of-Way Trackside Facility (if Goldfield 1 or Goldfield 3 is constructed)	Approximately 30 miles southeast of Tonopah along Caliente common segment 3 Nye County	Base of operations for most maintenance activities along the rail alignment	40
Maintenance-of-Way Facility (if Goldfield 4 is constructed)	Goldfield alternative segment 4 Esmeralda County	Coordination center and base of operations for all maintenance activities along the proposed railroad	50
Satellite Maintenance-of-Way Facilities	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 along the Mina rail alignment (excluding facilities common to the Caliente and Mina rail alignments)			
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. Railroad 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)			
Maintenance-of-Way Facilities			
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 Facilities	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 railcars 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 Nye County	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

a. To convert miles to kilometers, multiply by 1.6093.

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 built and operated, the proposed railroad could be abandoned after shipments to the repository were complete. DOE could decide to remove ballast, track, ties, signaling, and other related infrastructure. In addition, DOE could decide to decommission and dismantle facilities such as the Cask Maintenance Facility. DOE might not remove the rail roadbed, although the Department would reclaim the lands disturbed by the abandonment process. If DOE decided to abandon the railroad, it would relinquish its regulatory right-of-way and the BLM would continue to manage the land. Any abandonment of the railroad would be conducted in accordance with all applicable laws and in consultation with local governments, the BLM, and other land-management entities, as appropriate, at the time of abandonment.

Analysis of railroad abandonment would be performed near the completion of the shipping campaign, when an accurate assessment could be made regarding the usefulness of maintaining portions of the rail line or individual facilities.

S.3.2.5 No-Action Alternative

Council on Environmental Quality regulations (40 CFR 1502.14) require that the alternatives analysis in an EIS include the alternative of no action. Under the No-Action Alternative in this Rail Alignment EIS, DOE would not select a rail alignment within the Caliente or Mina rail corridor for the construction and operation of a railroad. As such, the No-Action Alternative provides a basis for comparison with the Proposed Action.

Under the No-Action Alternative, DOE would relinquish the ***public lands*** withdrawn from surface and mineral entry for purposes of evaluating the lands for the potential construction, operation, and maintenance of a railroad (70 *FR* 76854, December 28, 2005). These lands would then become available for surface and mineral entry.

If DOE does not select a rail alignment in the Caliente or Mina rail corridor, the future course that it would pursue to meet its obligation under the NWPA is highly uncertain. DOE recognizes that other possibilities could be pursued, including evaluating the Carlin, Jean, or Valley-Modified rail corridors to determine an alignment for the construction and operation of a rail line to transport spent nuclear fuel and high-level radioactive waste to the repository at Yucca Mountain; these possibilities were analyzed in the Yucca Mountain FEIS and in the Nevada Rail Corridor SEIS. Further consideration of these possibilities may require additional NEPA reviews, as appropriate.

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 of 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, which is 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 Rail Alignment 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 continued 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 submitted at 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 the Rail Alignment EIS.

S.3.3.5 Draft EIS Public Comment Process and Public Hearings

On October 12, 2007, the EPA announced in the *Federal Register* (72 *FR* 58081) the availability of the Draft Repository SEIS, and the Draft Nevada Rail Corridor SEIS and Draft Rail Alignment EIS. Also on October 12, 2007, DOE announced in the *Federal Register* (72 *FR* 58071) the availability of these NEPA documents. DOE's Notice of Availability invited interested parties to comment on the NEPA documents during a 90-day public comment period that ended January 10, 2008. DOE held eight public hearings on the Draft Repository SEIS, and the Draft Nevada Rail Corridor SEIS and Draft Rail Alignment EIS at locations in Nevada, California, and Washington, D.C. Approximately 518 people attended the hearings (the count is approximate because not all attendees signed in) and 110 people provided oral comments. DOE also met with the Consolidated Group of Tribes and Organizations on November 27, 2007 in Pahrump, Nevada, during the public comment period for the Draft Rail Alignment EIS.

In total, DOE received approximately 4,000 comments on the NEPA documents from nearly 1,100 commenters. Approximately 1,200 of these comments were on the Rail Alignment EIS. DOE has prepared a Comment-Response Document for the Rail Alignment EIS (Volume VI of the Final Rail Alignment EIS) that addresses the issues raised during the public comment period. The Comment-Response Document contains each comment (as an individual comment or summarized with similar comments) and the DOE response to each comment. The Comment-Response Document includes responses to all comments received by DOE, including comments submitted after January 10, 2008. DOE has incorporated changes to the Rail Alignment EIS resulting from the comments on the Draft Rail

Alignment EIS. For example, a number of commenters provided input on DOE's proposed mitigation and best management practices presented in Chapter 7 of the Draft Rail Alignment EIS. As a result of these public comments, DOE has revised Chapter 7 to expand the list of mitigation and best management practices that DOE would consider during construction and operation of the proposed railroad and to provide discussion of the process by which DOE would work with affected stakeholders to determine final mitigation decisions. DOE also received comments on the wetland impacts associated with the Caliente and Eccles alternative segments, Interchange Yard locations, and Staging Yard locations. To reduce potential wetland impacts, DOE has selected the Caliente alternative segment with the Upland Staging Yard option as its preferred alternative for connecting with the Union Pacific Railroad Mainline near the City of Caliente. DOE also moved the proposed location of a quarry siding associated with the Upland Staging Yard to further reduce potential wetland impacts.

S.3.3.6 Issues Raised by the Public on the Draft Rail Alignment EIS

The Rail Alignment Comment-Response Document contains all the comments DOE received on the Draft Rail Alignment EIS, and the DOE responses to those comments. The comments received from the public during the comment period identified a variety of key issues for the Draft Rail Alignment EIS, which are described below along with DOE's response. DOE identified the issues as "key" based on the following factors:

- The extent to which an issue concerned fundamental aspects of the Proposed Action;
- The nature of the comments as characterized by the commenters; and
- The extent to which DOE changed the EIS in response to the issue.

S.3.3.6.1 Mina Rail Corridor

Study of the Mina rail corridor is unwarranted.

In the Yucca Mountain FEIS, DOE evaluated in detail five potential rail corridors in the State of Nevada in which DOE could construct a rail line to link an existing rail line to Yucca Mountain. In the Yucca Mountain FEIS, DOE considered, but eliminated from further study, several other potential rail corridors. The Department eliminated one of those, the Mina rail corridor, because it crosses the Walker River Paiute Reservation and the Tribe had previously stated that it would not allow DOE to transport nuclear waste across the Reservation.

During initial scoping for the Rail Alignment EIS in 2004, DOE received comments that identified the Mina rail corridor for consideration as an alternative to the Caliente rail corridor. DOE subsequently held discussions with the Tribe on the availability of the Mina rail corridor, and in May 2006 the Tribe informed DOE that it would not object to the Department studying the potential impacts of constructing and operating a railroad across its Reservation. In response, DOE prepared a preliminary feasibility study of the Mina rail corridor. On October 13, 2006, based on the results of the study, DOE issued an Amended Notice of Intent to expand the scope of the Rail Alignment EIS to include the Mina rail corridor (71 *FR* 60484).

In April 2007, the Walker River Paiute Tribal Council passed a resolution and announced that it was withdrawing from participation in the EIS process. The Tribe renewed its prior objection to the transportation of nuclear waste across the Reservation. At the time the Tribe announced its withdrawal from the EIS process, DOE had completed the fieldwork and engineering studies necessary to conclude that it should include the Mina rail corridor in both the Nevada Rail Corridor SEIS and the Rail Alignment EIS. The studies indicated that construction and operation of a railroad along the Caliente or Mina rail alignment would have similar but generally small environmental impacts. On balance,

however, the Mina rail corridor would be environmentally preferable because, in general, it would present fewer private-land conflicts, less surface disturbance, and smaller impacts to wetlands and air quality than the Caliente rail corridor would. In addition, based on preliminary estimates, the total cost to construct the railroad along the Mina rail corridor would be approximately 20 percent less than to construct along the Caliente rail corridor.

For the reasons stated above, DOE has included the Mina rail corridor in the Nevada Rail Corridor SEIS and Rail Alignment EIS but, in light of the Walker River Paiute Tribe's current position on the shipment of nuclear waste across its Reservation, DOE has identified the Mina rail corridor as a nonpreferred alternative.

S.3.3.6.2 Lead Agency

The Surface Transportation Board should be the lead agency for the Rail Alignment EIS, not DOE.

CEQ regulations (40 CFR 1501.5, 1501.6) address the issue of lead and cooperating agencies. DOE has adopted the CEQ NEPA regulations and implemented its own regulation on interagency cooperation (10 CFR 1021.342). The role of a federal agency in the NEPA process is a function of the agency's expertise and relationship to the proposed action. If more than one federal agency is involved in an undertaking that requires an EIS, CEQ regulations provide for the designation of a lead agency to supervise preparation of the environmental analysis (40 CFR 1501.5). The lead agency, which is generally the agency with major responsibility for the proposed action [40 CFR 1501.5(c)], is responsible for the preparation of the EIS and for compliance with other NEPA procedural requirements (40 CFR 1508.16).

A federal, state, tribal, or local agency with special expertise on an environmental issue or jurisdiction by law can be a cooperating agency in the NEPA process. A cooperating agency has the responsibility to assist the lead agency by participating in the NEPA process at the earliest possible time; by participating in the scoping process; in developing information and preparing environmental analyses including portions of the environmental impact statement for which the cooperating agency has special expertise; and in making available staff support at the lead agency's request to enhance the lead agency's interdisciplinary capabilities (40 CFR 1501.6). A cooperating agency can adopt the EIS prepared by the lead agency and use it in its own decisionmaking (40 CFR 1506.3).

DOE is the lead agency for the Rail Alignment EIS. Under the Nuclear Waste Policy Act, the Department is responsible for the disposal of spent nuclear fuel and high-level radioactive waste to protect public health, safety, and the environment, and for the development and implementation of a plan to transport spent nuclear fuel and high-level radioactive waste to a repository at Yucca Mountain. The Rail Alignment EIS appropriately tiers from the broader corridor analysis in the Yucca Mountain FEIS, consistent with CEQ regulations (40 CFR 1508.28) and the court's decision in State of Nevada v. DOE, 457 F.3d 78 (D.C. Cir. 2006).

Consistent with CEQ and DOE regulations, DOE has requested the assistance of other agencies that have management or regulatory authority over lands and resources that the proposed railroad could affect or that have special expertise related to the proposed action in the Rail Alignment EIS. One of those agencies is the Surface Transportation Board (STB), which has exclusive jurisdiction over common-carrier rail lines that are part of the interstate rail network. The STB accepted cooperating agency status in the preparation of the Rail Alignment EIS. During the preparation of the NEPA analyses, DOE met with the STB to discuss project direction and coordination, as Appendix B, Section B.1, of the Rail Alignment EIS describes.

If the proposed railroad were to be operated as a common-carrier railroad (referred to as shared use in this Rail Alignment EIS), the Department would have to obtain a certificate of public convenience and

necessity to construct and operate the railroad from the STB. As part of its review process, the STB would need to consider the environmental effects of railroad construction and operations. Although DOE has not made a decision whether to construct and operate a railroad, DOE filed an application for a certificate of public convenience and necessity with the STB on March 17, 2008. As part of the consideration of that application, the STB Section of Environmental Analysis is responsible for preparing the appropriate NEPA documentation for railroad construction and operation cases under the jurisdiction of the STB. Consistent with CEQ regulations, the STB could adopt the Rail Alignment EIS in whole or in part and use it as a basis for its decision. If the STB determined that it needed NEPA documentation in addition to the Rail Alignment EIS to support its decision whether to issue a certificate of public convenience and necessity, that additional NEPA documentation would be prepared by the STB.

The STB has not requested lead agency status, nor has it expressed any disagreement with DOE's status as lead agency. Under these circumstances, where no federal agency has expressed disagreement with the decision on lead agency status, as the CEQ concluded in a letter dated February 8, 2005, the process outlined in its regulations [40 CFR 1501.5(c)] for resolution of disagreements among agencies regarding lead agency status has not been triggered.

For these reasons, DOE is the appropriate lead agency for the Rail Alignment EIS and the Nevada Rail Corridor SEIS.

S.3.3.6.3 Alternatives Analyzed

Cost seems to have driven the selection of alignment alternatives analyzed in the Rail Alignment EIS, resulting in an inadequate consideration and evaluation of all reasonable alternatives.

The CEQ has stated that "reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense" (*Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations*, 46 *FR* 18026, 18027 [March 23, 1981]). DOE analyzed the range of reasonable alternatives, which it developed through a rigorous process that is consistent with CEQ guidance. Appendix C of the Rail Alignment EIS describes this process in detail.

As described in Section C.1, to develop the range of alternative segments for evaluation in the Rail Alignment EIS, DOE evaluated a suite of potential alternative segments for the Caliente and Mina Implementing Alternatives to determine if they would be practical or feasible from a technical, environmental, and economic standpoint. As Sections C.1 and C.2 explain, the Department first identified preliminary alternative segments and common segments in the Notice of Intent and Amended Notice of Intent (69 *FR* 18565, April 8, 2004; 71 *FR* 60484, October 13, 2006) and invited public comment on the identified alternatives as part of the scoping process. DOE considered all comments on alternative segments, including those that suggested specific alternative segments or criteria for modifying the preliminary alternative segments and identifying new alternative segments.

As described in Section C.3, after the scoping process DOE used a computer-based modeling system to evaluate multiple alternative and common segments within the geographic areas of the Caliente and Mina rail corridors. DOE also used the modeling software to develop preliminary construction cost estimates. As Section C.2 explicitly states, the modeling software derived alternative segments and common segments that met the applicable design criteria while it addressed the need to minimize or avoid potentially adverse impacts. Table C-1 lists the specific primary engineering factors or standards related to the design and construction of a rail line that DOE considered in this analysis. Section C.3 identifies the environmental and land-use features that DOE considered; they include, for example, springs, Wilderness Study Areas, cultural resources, and mineral resources, as well as private, American Indian, and federally managed lands. Based on public scoping comments and the DOE analyses described above,

DOE produced full suites of alternative and common segments for the Caliente and Mina rail corridors (as shown in Figures C-4 and C-5 , respectively, of the Rail Alignment EIS).

Although Tables C-4 through C-10 contain preliminary construction cost estimates (which increase with the avoidance of environmental and land use features), the estimates did not serve as the sole basis for elimination of any alternative from detailed consideration. As Section C.4 states, the primary reasons for eliminating or adjusting an alternative segment included (1) environmental constraints, such as impacts to Wilderness Areas or wildlife preserves; (2) avoidance of private lands, mineral resources, or oil resources; (3) engineering considerations, such as steep grades, tight curvature, tunneling, or excessive excavation or placement of fill materials; and (4) public safety and national security issues associated with the Nevada Test and Training Range. Tables C-2 (Caliente rail alignment) and C-11 (Mina rail alignment) identify the alternative segments DOE analyzed in detail and those it eliminated from detailed analysis. For the latter, Tables C-2 and C-11 indicate the reason(s) for the elimination of such segments (for example, engineering criteria or land-use constraints).

The process described in Appendix C of the Rail Alignment EIS is fully consistent with all applicable NEPA requirements and CEQ guidance.

S.3.3.6.4 No-Action Alternative

The No-Action Alternative for the Rail Alignment EIS should be the shipment of spent nuclear fuel and high-level radioactive waste by the mostly legal-weight truck scenario analyzed in the Yucca Mountain FEIS, and not that DOE would not construct and operate a rail line in Nevada.

DOE disagrees that the No-Action Alternative in the Rail Alignment EIS should be the mostly legal-weight truck scenario. DOE specifically considered the human-health and environmental impacts associated with the mostly legal-weight truck scenario in the Yucca Mountain FEIS. In the Yucca Mountain FEIS, DOE analyzed two national transportation scenarios: mostly rail and mostly legal-weight truck. Based on the analyses in the FEIS, DOE made several decisions in a Record of Decision, one of which was selection of the mostly rail scenario as the transportation mode both on a national basis and in the State of Nevada (69 *FR* 18557, April 8, 2004). In the Record of Decision, DOE acknowledged that selection of the mostly rail scenario would ultimately require construction of a rail line in Nevada.

The Rail Alignment EIS "tiers" from the Yucca Mountain FEIS and the decisions DOE reached on the basis of the FEIS analysis. The CEQ NEPA regulations define tiering as:

> ... the coverage of general matters in broader environmental impact statements (such as national program or policy statements) with subsequent narrower statements or environmental analyses (such as regional or basinwide program statements or ultimately site-specific statements) incorporating by reference the general discussions and concentrating solely on the issues specific to the statement subsequently prepared (40 CFR 1508.28).

The CEQ regulations explicitly recognize the appropriateness of tiering by federal agencies "when it helps the lead agency to focus on the issues which are ripe for decision and exclude from consideration issues already decided or not yet ripe" [40 CFR 1508.28(b)]. Because DOE, as lead agency, analyzed the mostly legal-weight truck scenario in the Yucca Mountain FEIS and did not select it as the primary mode of transportation in its Record of Decision, it is an issue the Department has already decided and, therefore, excluded from further consideration in the Rail Alignment EIS.

In addition, the CEQ has stated that "no action" in cases that involve federal decisions on proposals for projects can mean that the proposed activity would not take place, and the agency should compare the environmental impacts of taking no action with the impacts of permitting the proposed activity. (See

Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations, 46 *FR* 18026, 18027 [March 23, 1981]). Therefore, it is appropriate that the No-Action Alternative for the Rail Alignment EIS assumes maintenance of the "status quo."

S.3.3.6.5 Mitigation

DOE states that it will consider the implementation of mitigation measures, but the Rail Alignment EIS lacks specific mitigation commitments and sufficient details on actual goals or methods.

DOE has revised Chapter 7 of the Draft Rail Alignment EIS to reflect more clearly the Department's commitment to implement best management practices and mitigation measures and present its intent to develop and institute an ongoing mitigation process. The Department recognizes the impacts the rail line could have on a number of individuals and parties and would mitigate such impacts to the extent practicable. DOE appreciates the comments it received on best management practices and mitigation measures and has used these comments to develop a stronger mitigation policy. Chapter 7 expresses the policy and explains the steps DOE would follow in the longer-term mitigation process to develop, in consultation with its stakeholders, the measures it would implement, and the methods it would use to monitor the effectiveness of those measures.

DOE has expanded its range of best management practices and mitigation measures (see the revised tables in Chapter 7 of the EIS) to include measures that commenters suggested. Some commenters recommended alternatives to the measures DOE included in the Draft Rail Alignment EIS. In addition, DOE has added measures the STB sometimes requires, and measures the BLM uses in its resource management plans. DOE anticipates that the design would continue to evolve, which would create additional opportunities for mitigation and potentially eliminate the need for some of the best management practices and mitigation measures currently under consideration.

With these changes, DOE has identified both a range of best management practices and mitigation measures and an ongoing process committed to applying mitigation in compliance with CEQ regulations (40 CFR 1508.20) by avoiding, minimizing, rectifying, or compensating for impacts.

S.3.3.6.6 Sabotage and Terrorism

The consideration of terrorist attacks is incomplete and requires additional analysis.

Whether acts of sabotage or terrorism would occur, and the exact nature and location of the events or the magnitude of the consequences of such acts if they were to occur, is inherently uncertain—the possibilities are infinite. Nevertheless, DOE took a hard look at the consequences of potential acts of sabotage or terrorism at the repository and during the transport of spent nuclear fuel and high-level radioactive waste by evaluating two fundamentally different scenarios: one involving aircraft and one involving a weapon or device that struck a transportation cask loaded with commercial spent nuclear fuel. DOE estimated the consequences of these scenarios without regard to their probability of occurrence; that is, DOE assumed the scenarios would occur and under conditions that would reasonably maximize the consequences.

As with any aspect of environmental impact analysis, it is always possible to postulate scenarios that could produce higher consequences than previous estimates. In eliminating the requirement that agencies conduct a worst-case analysis, the Council on Environmental Quality has pointed out that "one can always conjure up a worse 'worst case'" by adding more variables to a hypothetical event, and that "'worst case analysis' is an unproductive and ineffective method … one which can breed endless hypothesis and speculation." As indicated in the Council on Environmental Quality regulations that implement NEPA, an agency has a responsibility to address reasonably foreseeable significant adverse

effects. The evaluation of impacts is subject to a "rule of reason," ensuring analysis based on credible scientific evidence is useful to the decisionmaking process. In applying the rule of reason, an agency does not need to address remote and highly speculative consequences in its EIS.

Since the terrorist attacks of September 11, 2001, the NRC has issued safeguards advisories and orders to enhance the security of spent nuclear fuel transportation and shipments of large quantities of radioactive material. Enhancements include more preplanning and coordination with affected states, additional advance notification of shipments, additional control and monitoring, trustworthiness checks for individuals who have access to a shipment or information about a shipment, and more stringent security measures for shipment routes and schedules. In addition, the NRC issued orders that require enhanced security measures for spent nuclear fuel shipments from reactors.

Failure to address the potential for a nuclear criticality during a terrorist attack.

The presence of water could increase the likelihood of criticality. Therefore, spent nuclear fuel shipping casks are specifically designed to remain subcritical, even when filled with water. It is highly unlikely that a terrorist event would cause the contents of a shipping cask to achieve a nuclear criticality, even if the event disrupted the contents of the cask.

S.3.3.7 Changes Made to the Draft Rail Alignment EIS

The Final Rail Alignment EIS reflects changes made to the Draft Rail Alignment EIS because of public and agency comments and the availability of new and updated information. Examples of these changes include:

- The addition of four cooperating agencies: Nye County, Esmeralda County, Lincoln County, and the City of Caliente, whose views have been included.
- Revisions to Chapter 7 to expand the list of mitigation and best management practices that DOE would consider during construction and operation of the proposed railroad and provide discussion of the process by which DOE would work with directly affected parties to determine mitigation measures.
- An assessment of the potential greenhouse gas emissions during construction and operation of the proposed railroad.
- Identification of the Caliente alternative segment with the Upland Staging Yard option as DOE's preferred alternative for connecting with the Union Pacific Railroad Mainline near the City of Caliente.
- Movement of the proposed location of a quarry siding associated with the Upland Staging Yard to reduce potential wetland impacts.
- Identification of Garden Valley alternative segment 3 rather than Garden Valley alternative segment 1 as DOE's preferred alternative through Garden Valley.
- Identification of Goldfield alternative segment 4 rather than Goldfield alternative segment 3 as DOE's preferred alternative in the Goldfield area.
- Movement of the proposed location of construction camp 12 to outside of the analyzed land withdrawal area.
- Addition of a potential location for a Maintenance-of-Way Facility along Goldfield alternative segment 4 of the Caliente rail alignment.

- An updated analysis of locomotive horn sounding in Caliente to consider the potential impacts to noise-sensitive receptors.
- Explanation of DOE's plans to seek authorization pursuant to section 404(r) of the Clean Water Act for the discharge of dredged or fill material in connection with the construction of the railroad.
- Revisions to Chapter 5, Cumulative Impacts to evaluate newly identified projects in the regions of influence and the addition of newly available reference documents for proposed projects.
- Revised analyses to reflect publication of BLM's Final EIS for the proposed Ely Resource Management Plan.

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.

Analyses used throughout the Rail Alignment EIS are designed to provide conservative estimates of the impacts that may occur. Where appropriate, cautious, but reasonable assumptions are employed; thus, the analyses have a tendency to overestimate impacts. Unless otherwise noted, potential impacts described in this and other chapters would be adverse.

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.3.4.1 through S.3.4.15 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 extended 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 1.3 square kilometers (320 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 0.015 square kilometer [3.6 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 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, borrow sites, and wells to support construction and long-term operation of the railroad.

DOE would need to gain access to private land—up to 1.25 square kilometers (310 acres) for the Caliente rail alignment and up to 0.81 square kilometer (200 acres) for the Mina rail alignment. For the Caliente rail alignment, another possible 0.93 square kilometer (230 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 proximity of the rail line could adversely affect the motel and the Department would work with the land owner to mitigate the impacts to the motel through the process described in Chapter 7 (Best Management Practices and Mitigation). Through this process, DOE would develop specific measures to avoid, reduce, or

mitigate impacts to this property, including measures to maintain access to the motel during construction. Finally, DOE could also negotiate compensation with the land owner if design, construction, or operational accommodations are not sufficient to mitigate the impacts. Alternative segments near Goldfield would also 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 between 153 and 162 square kilometers (37,900 to 40,000 acres) of land, not including support facilities, during construction and operations. The Mina rail alignment would use between 111 and 124 square kilometers (27,500 to 30,700 acres) of land. Most of the land would be public land. DOE would need to gain access to the entire area of the construction right-of-way, but the actual area of land disturbance would be smaller. A portion of the Eccles alternative alignment and common segment 1 would cross through Areas of Critical Environmental Concern under the Ely Proposed Resource Management Plan. These areas were designated after the issuance of the Draft Rail Alignment EIS and would be finalized after further study by the BLM. In consultation with the BLM, DOE would conduct pre-construction surveys and implement avoidance, minimization, and mitigation strategies to protect the resource values of these areas. If the BLM finds that through these strategies there would be minimal conflict with the areas' resource values, then the right-of-way could be authorized.

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. Assuming all the vegetation in the construction right-of-way and support facility footprints across all affected allotments was unavailable for forage, the route with the greatest impact on grazing for either alignment would directly result in a less than 2-percent loss of animal unit months (1 animal unit month equates to approximately 360 kilograms [800 pounds] of forage and is a measure of the forage needed to support one cow, one cow/calf pair, one horse, or five sheep for 1 month). Additional animal unit months could be lost due to the inaccessibility of forage in locations where the rail line acted as a barrier to livestock, though allotment management plans would be revised to minimize grazing impacts associated with the rail line and DOE would coordinate with permittees and the BLM to institute mitigation measures. The rail line could require livestock on some allotments to adjust to new routes to access water and forage. In most areas, livestock could learn new routes and acclimate to and cross the rail line. DOE would provide temporary feed, water, and assistance in livestock movement during rail line construction to assist with the adjustment of cattle to the presence of the rail line. The rail line could pose an 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 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; Caliente common segment 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; Mina common segment 1; Oasis Valley alternative segments 1 and 3; and common segment 6. Mining activities at the Gemfield deposit by Metallic Ventures Gold, Inc., should they occur, could create direct conflicts with the proposed routes of Goldfield alternative segment 4 and Montezuma alternative segment 2, and the Caliente Maintenance-of-Way Facility. DOE would employ mitigation and avoidance strategies as discussed in Chapter 7 to address this potential conflict. Should it be required, there appears to be sufficient space to relocate both the alternative segment and the Maintenance-of-Way Facility to an area of unoccupied BLM land west of the currently proposed location. This BLM land has topography favorable to the construction of a rail line and Maintenance-of-Way Facility. 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, as described in Chapter 7, Best Management Practices and Mitigation, to avoid adverse impacts.

The 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 40 percent of the Mina rail alignment (new construction on BLM-administered 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 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 that would be located near either the Caliente-Indian Cove or Caliente-Upland location of the Staging Yard, the northern portion of the Caliente-Indian Cove 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 the surrounding Class II or III lands.

Along the Mina rail alignment, DOE determined that construction of the 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, without mitigation, 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 considered 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 operations 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 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 PM_{10} (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 PM_{10} 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. 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. The peak year increase in CO_2 emissions during construction would increase the national CO_2 emission rate by less than 1,105,852 metric tons (1,219,000 tons) (0.02 percent) over 2005 levels. During the operations phase, the highest increase in criteria air emissions would occur in the vicinity of the railroad operations support facilities. CO_2 emissions during operations would increase the national CO_2 emission rate by about 85,275 metric tons (94,000 tons) (0.001 percent) over 2005 levels.

For the Mina rail alignment, DOE determined that the highest increase in air pollutant emissions would occur during the construction phase. 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. The peak year increase in CO_2 emissions during construction would increase the national CO_2 emission rate by less than 995,177 metric tons (1,097,000 tons) (0.02 percent) over 2005 levels. During the operations phase, the highest increase in criteria air emissions from railroad operations would occur in the vicinity of the railroad operations support facilities. CO_2 emissions would increase the national CO_2 emission rate by about 66,224 metric tons (73,000 tons) (0.001 percent) over 2005 levels.

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, rerouting, or filling of surface-water resources. Indirect impacts would include potential increases in surface flow and nonpoint source pollution resulting from runoff from areas where surface grades and characteristics would be changed.

DOE anticipates that during the construction phase of the Caliente or Mina rail alignment, channelization of natural drainage features would be required. 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 long-term (permanent) direct impacts to wetlands would be mitigated through onsite or off-site mitigation. DOE would develop a compensatory mitigation and monitoring plan for unavoidable impacts as part of its compliance with Section 404 of the Clean Water Act.

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

There are two options for siting the Staging Yard along the Caliente alternative segment. One option, the Indian Cove Staging Yard, would be constructed in a pasture located north of the City of Caliente. Construction of the Staging Yard in this area would require the wetlands to be filled above the level of the floodplain. It might also require an active drainage system and a channel around the eastern edge of the site to keep the area dry and in a stable condition. Approximately 0.19 square kilometer (47 acres) of wetlands would be filled for construction of the Staging Yard at Indian Cove near Caliente. These actions would require compliance with Section 404 of the Clean Water Act.

The second option (DOE's preferred option), the Upland site of the Staging Yard, is within and adjacent to an agricultural field in Meadow Valley. There is an isolated wetland immediately to the west of the Upland site, in a swale adjacent to the abandoned rail roadbed. DOE would avoid filling this wetland by constructing the staging yard to the west of the abandoned rail roadbed; therefore, no fill of wetlands or other waters of the United States would be required and there would be no impacts to wetlands to construct the Staging Yard at the Upland site.

DOE identified two possible locations where ballast from quarry CA-8B may be loaded onto ballast trains, which are dependent upon the location of the staging yard. If DOE were to select the Indian Cove Staging Yard, ballast would be loaded at that yard. If DOE were to select the Upland Staging Yard, it would construct a quarry siding immediately south of Beaver Dam Road and to the east of the mainline track. The total area of wetlands within the site is estimated to be 0.006 square kilometers (1.59 acres).

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 7.6 meters (25 feet) into

the creek. The total area that would be filled within the confines of Clover Creek would be approximately 0.033 to 0.043 square kilometer (8.2 to 11 acres), depending on the width of the fill. Channelizing the creek bank and filling the creek bed could affect the velocity, sedimentation rates, and other hydraulic properties of the wash and could indirectly impact downstream riparian areas and associated wetlands, including the proposed Lower Meadow Valley Wash Area of Critical Environmental Concern. It could also impact riparian restoration efforts in Clover Creek required by the U.S. Environmental Protection Agency.

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 over 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 beneath 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 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, seeps, and other surface-water-right locations (if present within the region of influence and potentially in hydraulic connection with proposed groundwater withdrawal well water-bearing zones). Within 1.6-kilomter (1-mile) of the Caliente rail alignment groundwater withdrawals for domestic and irrigation purposes currently represent most of the groundwater usage.

Within 1.6-kilometer (1-mile) of the Mina rail alignment, public supply-municipal, agricultural (stock watering), and mining and milling-related groundwater withdrawals 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 expects that the likelihood of impacts from groundwater withdrawals occurring to downgradient groundwater basins (hydrographic

areas) would be very low. DOE expects that impacts to ground subsidence or groundwater quality that could result from railroad construction and operations along either rail alignment would be 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 following the railroad construction phase because there would not be a continued need for large-scale water withdrawals to support railroad operations. Additionally, groundwater withdrawal rates for those wells left in place to support railroad 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. Existing groundwater uses with a 1.6-kilometer (1-mile) region of influence would likely continue to be dominated by domestic and irrigation withdrawals for the Caliente rail alignment, and by public-supply/municipal agricultural, and mining and milling withdrawals for the Mina rail alignment, with possibly increasing urban use from water transfers to the Las Vegas area (Caliente alignment).

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 collisions 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 Caliente Staging Yard locations (Indian Cove and Upland), or to the Eccles alternative segment and interchange yard. 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 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. 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 limited 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 noise-sensitive receptors (such as residences, schools, libraries, retirement communities, nursing homes) 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 railcars).

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 phase would cause 34 noise-sensitive receptors to be adversely impacted. These would be temporary adverse impacts because of the temporary nature of the construction phase. During the operation phase, three receptors would be adversely impacted by train noise. For these receptors, DOE would consider mitigation, such as the development of a Quiet Zone, stationary warning horns, or building sound insulation treatments. A Quiet Zone refers to specific grade crossings which have sufficiently upgraded safety measures such that locomotive warning horns do not have to be sounded.

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 34 receptors in Silver Springs. For train noise during the operations phase, estimated noise levels at eight receptors in Silver Springs and one 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 could include building sound insulation, stationary warning horns, 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 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 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 four rail-related fatalities; along the Mina rail alignment, there would be 36 rail-related accidents and seven 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 Impacts

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 fatality for the Caliente rail alignment and 0.35 latent cancer fatality 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 fatality.

- For members of the public, the radiological impacts were estimated to be 1.4×10^{-4} latent cancer fatality for the Caliente rail alignment and 8.5×10^{-4} latent cancer fatality 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 fatality.
- The risk from transportation accidents was estimated to be 1.3×10^{-6} latent cancer fatality for the Caliente rail alignment and 7.7×10^{-6} latent cancer fatality for the Mina rail alignment.
- The impacts of the maximum reasonably foreseeable accident were estimated to be 0.0012 latent cancer fatality in rural areas and 0.46 latent cancer fatality in suburban areas along the Caliente rail alignment, and 0.0089 latent cancer fatality in rural areas and 1.2 latent cancer fatality 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 NWPA, would use NRC-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 NRC 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 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 also 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). Based on the more recent information, DOE estimated that there would be 0.0028 latent cancer fatality in rural areas and 1.1 latent cancer fatalities in suburban areas along the Caliente rail alignment, and 0.021 latent

cancer fatality in rural areas and 2.8 latent cancer fatalities in suburban areas along the Mina rail alignment.

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 railroad 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 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 ballast requirements for construction could be met with output from planned quarries along the rail lines and that subballast would be obtained from materials excavated during rail roadbed construction or from crushing rock in quarries. DOE determined that other 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 up to 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. NRC-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 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. Each year, during the course of construction, approximately 18 metric tons (20 tons) of hazardous wastes would be generated, and a total of 74 metric tons (82 tons) over the entire construction phase. Ample disposal capacity is available for the disposal of hazardous waste during both the construction and operations phases. 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; 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.

Construction of the proposed railroad along the Caliente rail alignment would raise the disposal rate of nonhazardous waste to landfills in the region of influence by about 0.15 percent. DOE anticipates that impacts to local landfills from the disposal of solid and industrial and special 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. Construction of the proposed railroad along the Mina rail alignment would raise the disposal rate of nonhazardous waste to landfills in the region of influence by about 0.34 percent. DOE anticipates that impacts to local landfills from the disposal of these solid and 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. Site-generated, low-level radioactive waste would be controlled and disposed of in a DOE low-level waste disposal site, an ***Agreement State*** site, or in a U.S. Nuclear Regulatory Commission-licensed site subject to the completion of the appropriate review pursuant to the National Environmental Policy Act. Disposal in an Agreement State site or in a U.S. Nuclear Regulatory Commission-licensed site would be in accordance with applicable provisions of 10 CFR Part 20. DOE low-level radioactive waste disposal sites, such as the Nevada Test Site, and commercial low-level radioactive waste disposal sites such as Energy Solutions Barnwell Operations in Barnwell, South Carolina; U.S. Ecology in Richland, Washington; and Energy Solutions Clive Operations in Clive, Utah, all currently have capacity to accept these wastes. Therefore, impacts to low-level radioactive waste disposal facilities would be small. For comparison, the total amount of waste estimated to be generated throughout the operations phase accounts for only about six percent of the low-level waste disposed of in 2005 at commercial low-level waste facilities nationwide. 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 viewscapes. 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*, CEQ guidance, and NRC policy.

DOE followed the CEQ guidance to use the annual statistical poverty thresholds from the U.S. Census Bureau to identify low-income populations, and followed NRC's 2004 policy to identify low-income and minority populations. That policy states, in part:

> Under current NRC staff guidance, a minority or low-income community is identified by comparing the percentage of the minority or low-income population in the impacted area to the percentage of the minority or low-income population in the County (or Parish) and the State. If the percentage in the impacted area significantly exceeds that of the State or the County percentage for either the minority or low-income population then EJ [environmental justice] will be considered in greater detail. 'Significantly' is defined by

staff guidance to be 20 percentage points. Alternatively, if either the minority or low-income population percentage in the impacted area exceeds 50 percent, EJ matters are considered in greater detail.

Following this policy, DOE identified low-income communities as those affected areas (by census block groups) where the percentage of people characterized as below the poverty threshold exceeded 31 percent, which is 20 percent above the state average of 11 percent of people below the poverty threshold.

Because the percentage of minorities in Nevada is approximately 34 percent, adding 20 percentage points would provide a threshold of 54 percent to identify minority communities. In its analysis, DOE identified minority communities as those affected areas (by census blocks) where the minority population exceeded 50 percent. 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, which includes the Walker River Paiute Reservation, are the only locations where the minority populations exceed the threshold of 50 percent, and the Walker River Census County Division is the only location where the low-income population exceeds the threshold of 31 percent . Because there would be no high and adverse impacts in these areas, constructing and operating the proposed railroad along the Mina rail alignment would not result in disproportionately high and adverse impacts to minority or low-income populations. DOE has not identified any special pathways that would result in disproportionately high and adverse impacts to low-income or minority communities.

Similarly, the Department determined that under the Shared-Use Option for either rail alignment, there would not be disproportionately 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 beliefs.

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 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 viewscapes, songscapes, storyscapes, 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 Lincoln, Nye, and Esmeralda Counties for the Caliente rail alignment; and the Walker River Paiute Reservation and Lyon, Mineral, Esmeralda, and Nye Counties for the Mina rail alignment. 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 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.

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

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.

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

Cumulative impacts concerns regarding surface-water resources in the Caliente and Mina 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 region of influence.

The Department anticipates that cumulative impacts to groundwater resources in the Caliente and Mina regions of influence from the proposed railroad and other existing and reasonably foreseeable projects would range from moderate to large. Overall, the groundwater needs of the Proposed Action would represent a small portion of current cumulative water usage within the Caliente or Mina 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 cumulative impacts to biological resources from the proposed railroad and other existing and reasonably foreseeable projects could be small to moderate. Mitigation measures would be implemented during the construction and operations phases to address impacts related to habitat loss and fragmentation, the introduction and spread of invasive species and noxious weeds, and the increased likelihood of wildfires. All existing and proposed projects, federal, state, or private, are subject to regulations that protect special status species, and protective habitat conservation plans are already underway for many of the proposed projects in the Caliente and Mina regions of influence. The BLM manages most of the lands in the Caliente and Mina regions of influence and has programs in place to minimize impacts to biological resources.

For both Mina and Caliente regions of influence, a number of receptors would experience an adverse noise impact because they would be exposed to 65 DNL and a 3 dBA increase. The cumulative impacts to noise from the proposed railroad and other existing and reasonably foreseeable projects could be moderate to large because of the receptors that would experience adverse impacts and the existing and proposed noise sources.

The Proposed Action would be only one of the many reasonably foreseeable sources of socioeconomic change to portions of the regions of influence. The road systems in the regions of influence could experience higher traffic levels, possibly associated congestion, and increased road maintenance. While there is some limited potential for induced growth impacts, the specific locations and scope of these actions is unknown at this time, and any such actions are projected to be small. The cumulative impacts to socioeconomics from the proposed railroad and other existing and reasonably foreseeable projects could be moderate because of the numerous planned development projects in the Caliente and Mina regions of influence.

DOE determined that the cumulative impacts to air quality and climate from the proposed railroad and other existing and reasonably foreseeable projects would be small, but could approach moderate if potential violations of the National Ambient Air Quality Standards occurred from development of a quarry in the Reveille Valley for the Caliente rail alignment or development of a quarry at Garfield Hills and railroad construction near Mina, Schurz and Hawthorne for the Mina rail alignment. 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. It is likely that the permit requirements DOE would be subject to would greatly reduce fugitive dust particulate matter emissions, thus reducing the possibility of exceeding National Ambient Air Quality Standards.

Construction and operation of the proposed railroad would result in nonradiological and radiological health and safety impacts for workers and members of the public along the rail alignments. The Yucca Mountain FEIS and the Yucca Mountain SEIS 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.

Under the assumed conditions, 8.1 and 12 latent cancer fatalities for repository workers could result from Yucca Mountain Repository construction, operations, monitoring, and closure for Inventory Modules 1 and 2, respectively. For workers along the rail line, DOE estimated that there could be 1.2 latent cancer fatalities for Module 1, and 1.7 latent cancer fatalities for Module 2. For members of the public, DOE estimated that, under assumed conditions, 18 and 27 latent cancer fatalities could result from Yucca Mountain Repository construction, operations, monitoring, and closure for Modules 1 and 2, respectively. For members of the public along the Caliente rail alignment, DOE estimated that 0.00034 latent cancer fatality for Module 1, and 0.00052 latent cancer fatality for Module 2 could occur from transportation of spent nuclear fuel and high-level radioactive waste. For members of the public along the Mina rail alignment, DOE estimated that 0.0020 latent cancer fatality for Module 1, and 0.0030 latent cancer fatality for Module 2 could occur from transportation of the spent nuclear fuel and high-level radioactive waste.

S.3.7 DOE PREFERRED ALTERNATIVE

CEQ NEPA implementing regulations require an agency to identify its preferred alternative to fulfill its statutory mission (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-Use Option. The DOE preferred alignment along the Caliente rail alignment consists of the following: the Caliente alternative segment with the Upland Staging Yard option, Caliente common segment 1, Garden Valley alternative segment 3, Caliente common segment 2, South Reveille alternative segment 3, Caliente common segment 3, Goldfield alternative segment 4, 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.

Although DOE has not made a decision whether to construct and operate a railroad, DOE submitted a right-of-way application for the Caliente rail alignment to BLM on March 4, 2008. 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.

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

DOE preferred alternative	Analysis factors
Caliente alternative segment with Upland Staging Yard option	• The Caliente Indian Cove Staging Yard location would require filling 47 acres (0.19 square kilometer) of wetlands. • The Caliente Upland Staging Yard location would result in fewer wetlands impacts than the Indian Cove location. The Indian Cove location would require filling approximately 47 acres (0.19 square kilometer) of wetlands; the Upland location would require filling approximately 1.59 acres (0.006 square kilometer) of wetlands for the quarry siding. • The Eccles alternative segment would include an Interchange Yard that requires 8 to 11 acres (0.033 to 0.043 square kilometer) of fill in Clover Creek. Additional fill could be needed for dikes in Clover Creek to direct the flow of water and maintain the track embankment. Channelizing the creek bank and filling the creek bed would result in direct impacts to the hydrology of Clover Creek and indirect impacts to riparian areas downstream of the Interchange Yard. The affected riparian areas have been proposed as an Area of Critical Environmental Concern by the BLM for the protection of habitat for federally endangered, threatened, and candidate species such as the southwestern willow flycatcher. • Operating a railroad on the Eccles alternative segment would present greater engineering challenges than the Caliente alternative segment due to the slope of the Interchange Yard tracks, slope of the main track leaving the Interchange Yard, lack of space for a wye track, and no access to a local source of ballast. • The Eccles alternative segment would be more complex to construct due to the larger drainages and steeper terrain present at the Interchange Yard location and would cost approximately twice as much as the Caliente alternative segment.
Garden Valley alternative segment 3	• Engineering factors and regulatory complexity do not offer a means to discriminate among the Garden Valley alternative segments. • Garden Valley 3 is the farthest alternative segment from the *City* sculpture, which would minimize any potential noise or aesthetic impacts on the sculpture.
South Reveille alternative segment 3	• South Reveille 3 would avoid the complex road and wash crossing that would be required for South Reveille 2. • South Reveille 3 is farther from the boundary of the South Reveille Wilderness Study Area than South Reveille 2.
Goldfield alternative segment 4	• Goldfield 4 would be easier to construct and operate than Goldfield 1 or Goldfield 3. • Engineering uncertainty of crossing ***mining district*** associated with Goldfield 1. Goldfield 3 would require very complex engineering to construct. • Goldfield 3 would impact Willow Springs. • Goldfield 4 would have greater cultural resources impacts than Goldfield 1 or Goldfield 3.
Bonnie Claire alternative segment 3	• 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	• Oasis Valley 1 would be easier to construct and require fewer earthworks for construction than Oasis Valley 3.

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

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. Although DOE has not made a decision whether to construct and operate a railroad, DOE filed an application for a certificate of public convenience and necessity with the STB on March 17, 2008 based on DOE's preferred alternative of constructing and operating a railroad in the Caliente rail corridor.

DOE views the preliminary best management practices and mitigation measures discussed in Chapter 7 as representing the initial step in a longer-term, iterative process to further develop, detail, and eventually implement these practices and measures. DOE considers the process to be "longer-term" in that the preliminary best management practices and mitigation measures identified in this Rail Alignment EIS would be further developed and detailed through (1) the regulatory compliance process, such as that required in DOE's right-of-way application with the BLM or DOE's application for a certificate of public convenience and necessity with the STB; (2) development of the final design and associated specifications; and (3) consultation with directly affected parties, such as grazing permittees and local communities through which the rail line would pass.

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 U.S. 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.

Although DOE has not made a decision whether to construct and operate a railroad, DOE filed an application for a certificate of public convenience and necessity with the STB on March 17, 2008. In its April 11, 2008 notice of filing of DOE's application, the STB stated that it will take into consideration both the transportation merits and the environmental impacts of constructing and operating the proposed railroad when ruling on DOE's application. The State of Nevada opposes the application and has filed a motion with the STB asking that the application be rejected.

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 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 alignment would represent a small portion of current cumulative water usage within the regions 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 regions 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 Motel, could be adversely affected because of the rail line's proximity to the motel.

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 ($2.03 billion compared to $2.57 billion [2008 dollars]). However, in light of 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 the Walker River Paiute Reservation, the DOE preferred alternative is to construct and operate a railroad along the Caliente rail alignment.

During the preparation of this Rail Alignment EIS, DOE and BLM reviewed Resource Management Plans for lands that would be affected by the Caliente and Mina rail alignments to identify potential inconsistencies with the plans. An inconsistency is defined as a component of the proposed action or alternatives that would not be allowed by the BLM without preparation and approval of an amendment to the resource management plan. The resource management plans address the types of land uses BLM considers to be allowable so that various resources (such as soils, wildlife and recreation) are protected and multiple use land management objectives would be achieved. The following plans were reviewed: Proposed Ely Resource Management Plan, Tonopah Resource Management Plan, Las Vegas Resource Management Plan and Carson City Consolidated Resource Management Plan. DOE and BLM did not identify any inconsistencies with the Resource Management Plans as a result of the review.

Under the No-Action Alternative, DOE would not implement the Proposed Action within the Caliente rail corridor or the Mina rail corridor and would relinquish public lands withdrawn from surface and mineral entry. These lands would then become available for surface and mineral entry. Under the No-Action Alternative, there would be no impacts to natural, human-health, social, economic, or cultural resources.

DOE would not cause changes in current public land uses such as grazing and recreation; uses of public land would remain subject to BLM administration under applicable resource management plans. 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

CEQ 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 the 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 18).

Resource area	Proposed Action		No-Action Alternative
	Caliente Implementing Alternative	Mina Implementing Alternative	
Physical setting	Total surface disturbance: 55 to 61 square kilometers (14,000 to 15,000 acres). Would result in topsoil loss and increased potential for erosion. Loss of prime farmland soils: 1.2 to 1.8 square kilometers (300 to 440 acres). Less than 0.1 percent of prime farmland soils in Lincoln and Nye Counties.	Total surface disturbance: 40 to 48 square kilometers (9,900 to 12,000 acres). Would result in topsoil loss and increased potential for erosion. Loss of prime farmland soils: 0.011 to 0.015 square kilometer (2.6 to 3.6 acres). Less than 3 percent of the prime farmland soils of the Walker River Paiute Reservation.	No surface disturbance impacts or loss of prime farmland soils because the rail line and associated facilities would not be constructed.
Land use and ownership	Land-use change on public lands for operations right-of-way. Private parcels the rail line would cross: 7 to 66. Area of private land affected: 0.49 to 1.25 square kilometers (120 to 310 acres). Private land needed for facilities: 0.65 to 0.89 square kilometer (159 to 219 acres). Active grazing allotments the rail line would cross: 23 to 25. Animal unit months lost: 999 to 1,034. (An animal unit month equates to approximately 360 kilograms [800 pounds] of forage and is a measure of the forage needed to support one cow, one cow/calf pair, one horse, or five sheep for 1 month.) Sections with unpatented mining claims that would be crossed: 37 to 42.	Land-use change on public lands and the Walker River Paiute Reservation for operations right-of-way. At present, the Walker River Paiute Tribe does not support routes over their Reservation and their concurrence would be necessary to secure a right-of-way for the rail line. Private parcels the rail line would cross: 1 to 39. Area of private land affected: 0.21 to 0.81 square kilometer (53 to 199 acres). Active grazing allotments the rail line would cross: 6 to 9. Animal unit months lost: 179 to 199. Sections with unpatented mining claims that would be crossed: 43 to 50.	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.

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 18).

Resource area	Proposed Action		No-Action Alternative
	Caliente Implementing Alternative	Mina Implementing Alternative	
Aesthetic resources	Small to large impact across Caliente rail alignment from construction and 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. Weak to strong contrast from scars on soil and vegetated landscape from cuts, fills, and well pads.	Same as the Caliente Implementing Alternative.	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. The BLM would continue to manage public land for multiple use.
	Small impact from train operations. No contrast to strong contrast in the short term from passing trains.	Same as the Caliente Implementing Alternative.	
	Moderate impact from Caliente common segment 1. Moderate contrast from construction and operations activities at road crossings of State Route 318 and Timber Mountain Pass Road due to proximity; would meet BLM Class III management objectives.	Small to large, but temporary impact from Schurz alternative segments. Weak to moderate contrast in the short term 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; would not meet BLM Class III management objectives. Small to moderate impact in the long-term. Weak to moderate contrast in the long-term consistent with Class III objectives.	
	Small to large, but temporary, impact for some locations along Garden Valley alternative segments. Weak to strong contrast in the short term, which would not meet BLM management objectives for Class II visual resources. Small impact in the long term, consistent with BLM management objectives.		
	Small to moderate impact from Caliente common segment 2. Weak to moderate contrast from construction and operations activities in the Cedar Pipeline Ranch area; would meet BLM Class IV management objectives.	Moderate, but temporary, impact from Mina common segment 1. Moderate contrast in the short term at the intersection of State Route 265 and U.S. Highway 93 due to proximity of rail to road; would meet BLM Class III and IV management objectives. Small impact in the long-term; weak to no contrast in the long term.	
		Small to moderate impact from Montezuma alternative segment 1. Weak to moderate contrast from new linear feature adjacent to State Route 265 and in Clayton Valley; would meet BLM Class III and IV management objectives.	

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 18).

Resource area	Proposed Action		No-Action Alternative
	Caliente Implementing Alternative	Mina Implementing Alternative	
Aesthetic resources (continued)	Moderate impact from Staging Yard at Indian Cove. Moderate contrast from the construction of the facility in Class III non-BLM lands, but inconsistent with BLM management objectives for Class II visual resources on the BLM lands at the north end of the yard. Moderate contrast for Class III lands and weak contrast for Class II lands during operation, would meet BLM management objectives. Potential quarry CA-8B: Large impact in the short term. Strong contrast in the short term from installation and use of the conveyor from the quarry across U.S. Highway 93; inconsistent near Upland Yard with surrounding non-BLM-administered lands treated as Class III and in consistent near Indian Cove with surrounding BLM Class II lands. Moderate impact in the long-term. Moderate contrast consistent with Class III lands; conveyor would be removed but quarry would be visible from a secondary road., Potential quarries NN-9B and NN-9A, moderate impact; in the short term, potential quarry ES-7, moderate to small impact in the short term. Moderate to strong contrast in the short term for all three quarries from quarrying and/or facilities close to viewers on secondary roads. Contrast levels would meet BLM Class IV management objectives. Small to no impact in the long term. Production facilities and conveyor would be removed and quarried areas restored after closure of quarry at end of construction phase.	Potential Garfield Hills and Malpais Mesa quarries: Moderate , but temporary, impact. Moderate (Garfield Hills) and moderate to strong contrast (Malpais Mesa) 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 to no impact in long term for both quarries; production facilities and conveyor would be removed and quarried areas restored after closure of quarries at end of construction phase.	

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 18).

Resource area	Proposed Action		No-Action Alternative
	Caliente Implementing Alternative	Mina Implementing Alternative	
Aesthetic resources (continued)		Potential Gabbs Range and North Clayton quarries: Small to moderate impact, but temporary. Weak to moderate (Gabbs Range) and moderate (North Clayton) contrast in the short term from ballast production facilities close to viewers that would be compatible with BLM Class III management objectives. Small to no impact in the long term for both quarries; production facilities would be removed after closure of quarries at end of construction phase.	
Air quality and climate – Lincoln County	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. The closest approach to a NAAQS standard would be for 24-hour PM_{10} (44 percent of standard for rail line and potential quarry CA-8B) during the construction phase.	Not applicable. Not within the region of influence considered.	No impacts because the rail line and associated facilities would not be constructed.
Air quality and climate – Esmeralda County	Using conservative modeling assumptions, no exceedances of the NAAQS would be expected from railroad construction and operations. The closest approaches to a NAAQS standard would be for 24-hour PM_{10} (87 percent of standard) and 24-hour $PM_{2.5}$ (74 percent of standard), for rail line construction near Goldfield.	Using conservative modeling assumptions, no exceedances of the NAAQS would be expected from railroad construction and operations or the potential Malpais Mesa quarry, with most values expected to be well below the NAAQS. The closest approach to a NAAQS standard would be for 24-hour PM_{10} (63 percent of standard) and 24-hour $PM_{2.5}$ (54 percent of standard) for the rail line construction near Silver Peak.	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 18).

Resource area	Proposed Action		No-Action Alternative
	Caliente Implementing Alternative	Mina Implementing Alternative	
Air quality and climate – Nye County	Using conservative modeling assumptions, no exceedances of the NAAQS would be expected from railroad construction and operations, with the possible exception of 24-hour PM_{10}. 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 PM_{10} NAAQS. However, operating restrictions in the required Surface Disturbance Permit would likely reduce PM_{10} emissions, making such an exceedance unlikely.	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 – Churchill County	Not applicable. Not within the region of influence considered.	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. Not within the region of influence considered.	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. Not within the region of influence considered.	Conservative air quality modeling indicated that during construction, the potential exists for exceedances of the NAAQS for PM_{10} and $PM_{2.5}$ in the following scenarios: Rail line construction near Mina, 111 percent of the 24-hour PM_{10} NAAQS. Rail line construction near Schurz, 186 percent of the 24-hour PM_{10} NAAQS. Rail line construction near Schurz, 124 percent of the 24-hour $PM_{2.5}$ 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 6 of 18).

Resource area	Proposed Action		No-Action Alternative
	Caliente Implementing Alternative	Mina Implementing Alternative	
Air quality and climate – Mineral County (continued)		Rail line construction near Schurz, 103 percent of the annual PM_{10} NAAQS. Staging Yard construction near Hawthorne, 165 percent of the 24-hour PM_{10} 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 PM_{10} NAAQS. Operation of the potential Garfield Hills quarry near Hawthorne, 200 percent of the 24-hour PM_{10} NAAQS. However, operating restrictions in the required Surface Disturbance Permit would likely reduce PM_{10} and $PM_{2.5}$ emissions, making such exceedances unlikely. No exeedances for other criteria pollutants would be expected, with most values expected to be well below the NAAQS. No exceedances of the NAAQS would be expected from the rail operations, with most values expected to be far below the NAAQS.	
Surface-water resources	Caliente alternative segment: Approximately 0.029 square kilometer (7.1 acres) of wetlands would be filled. Eccles alternative segment: Negligible amount of wetlands would be filled. 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.	Schurz alternative segments: Of the 0.065 square kilometer (16 acres) of wetlands crossed in this area, only 20 to 28 square meters (0.005 to 0.007 acre) would be permanently filled to construct the bridge over the Walker River.	No impacts because the rail line and associated facilities would not be constructed. Erosion and sedimentation would continue under natural processes.

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 18).

Resource area	Proposed Action		No-Action Alternative
	Caliente Implementing Alternative	Mina Implementing Alternative	
Surface-water resources (continued)	North quarry siding, Upland Staging Yard option: Approximately 0.006 square kilometer (1.59 acres) of wetlands would be filled to construct the quarry siding. Eccles alternative segment, Interchange Yard: Approximately 0.033 to 0.043 square kilometer (8.2 to 11 acres) of Clover Creek would be filled. Changes to hydraulic properties of the creek and possible indirect impacts to downstream riparian areas and wetlands. Goldfield alternative segment 3: Short-term direct impacts to water quality for Willow Springs.		
Groundwater resources	Physical impacts to existing groundwater resource features such as existing wells, springs, seeps, and other surface-water-right locations (if present within the region of influence and potentially in hydraulic connection with proposed groundwater withdrawal well water-bearing zones) resulting from railroad construction and operations would be small. Groundwater withdrawals during construction would not be expected to impact groundwater resources except at one or more specific locations in hydrographic areas in Panaca Valley, Hot Creek Valley, and Oasis Valley where localized and temporary drawdown of the water table(s) could occur. In such instances, depending on the average pumping rate applied at the new well locations, one or more best management practices could be required in order to minimize these impacts to the aquifer and preclude impacts to existing groundwater users. The best management practices could include reducing the pumping rate at some or all of the following proposed well locations, depending on the average pumping rate applied: Pan V1, Pan V3/6, Pan V26, possibly Pan V4 (depending on the location of a nearby existing well), Pan V5, Pan V7/8, HC5, OV3, OV4, OV17, and OV5/13, obtaining water from existing water- rights holders (by purchasing water), or obtaining water from other nearby	Physical impacts to existing groundwater resource features such as existing wells, springs, seeps, and other surface-water-right locations (if present within the region of influence and potentially in hydraulic connection with proposed groundwater withdrawal well water-bearing zones) resulting from railroad construction and operations would be small. Groundwater withdrawals during construction would not be expected to impact groundwater resources except potentially at one location in the Columbus Salt Marsh hydrographic area and some specific locations in the Oasis Valley hydrographic area where localized and temporary drawdown of the water table could occur. In this instance, depending on the average pumping rate applied at the new well locations, one or more best management practices could be required in order to minimize these impacts and preclude impacts to existing groundwater users. The best management practices could include reducing the pumping rate at proposed well locations OV3, OV4, OV5/13, OV17, and possibly CSM-2a (depending on the presence or absence of a low flow rate spring), obtaining water from existing water-rights holders (by purchasing water), or obtaining water	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 8 of 18).

Resource area	Proposed Action		No-Action Alternative
	Caliente Implementing Alternative	Mina Implementing Alternative	
Groundwater resources (continued)	proposed wells located sufficiently far away from existing groundwater users and groundwater resource features to preclude the impacts from occurring. from other nearby proposed wells located sufficiently far away from existing groundwater users and groundwater resource features to preclude the impacts from occurring. The potential for groundwater withdrawals during the construction and operations phases to cause subsidence of the ground surface would be small. The impact of proposed groundwater withdrawals on groundwater quality would be small, and the likelihood of an impact of withdrawals on downgradient hydrographic areas would be very small. The proposed withdrawals would not conflict with water-quality standards protecting groundwater resources.	from other nearby proposed wells located sufficiently far away from existing groundwater users and groundwater resource features to preclude the impacts from occurring. Same as the Caliente Implementing Alternative. Same as the Caliente Implementing Alternative.	

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 18).

Resource Area	Proposed Action		No-Action Alternative
	Caliente Implementing Alternative	Mina Implementing Alternative	
Biological resources	Short-term impact to 0.014 to 0.28 square kilometer (3.4 to 69 acres) of wetland/riparian habitat. Long-term impact to 0.011 to 0.18 square kilometer (2.7 to 45 acres) of wetland/riparian habitat.	Short-term impact to 0.013 to 0.035 square kilometer (3.19 to 8.7 acres) of wetland/riparian habitat. Long-term impact to 0 to 0.0015 square kilometer (0 to 0.37 acres) of wetland/riparian habitat.	No impacts because the rail line and associated facilities would not be constructed.
	Short-term moderate impact on riparian and wetland vegetation along Oasis Valley alternative segment 3.	Same as the Caliente Implementing Alternative.	
	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.	Small to moderate long-term impacts to Inter-Mountains Mixed Salt Desert Scrub and Inter-Mountain Basins Greasewood Flat along Schurz alternative segment 6.	
		Small long-term impact to Inter-Mountains Mixed Salt Desert Scrub along Mina common segment 1.	
		Short-term and long-term small impacts to western snowy plover along Mina common segment 1.	
		Moderate impact to winterfat communities – Montezuma alternative segments and potential Gabbs Range quarry site.	
		Long-term moderate impacts to Inter-Mountain Basins Mixed Salt Desert Scrub and Inter-Mountain Basins Big Sagebrush Shrubland at potential North Clayton and Malpais Mesa quarry sites.	
		Short-term moderate impacts to desert bighorn sheep southwest of common segment 6.	

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 18).

Resource area	Proposed Action		No-Action Alternative
	Caliente Implementing Alternative	Mina Implementing Alternative	
Noise and vibration	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. Noise from construction trains in Caliente would adversely impact 34 receptors. These noise impacts would be considered temporary adverse impacts. Noise from construction equipment along the Eccles alternative segment would exceed limits by 5 dBA. Noise from operations would create adverse noise impacts at three receptors in Caliente. No vibration impacts from construction trains or from operations train activity.	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. No vibration impacts from construction trains or from operations train activity.	No change to existing noise and vibration. No impacts because the rail line and associated facilities would not be constructed.
Socioeconomics – Throughout the region of influence	*Construction* Up to 1,036 animal unit months lost, valued at $55,000. *Operations* Continued lack of access to up to 1,036 animal unit months, valued at $55,000.	*Construction* Up to 199 animal unit months lost, valued at $10,600. *Operations* Continued lack of access to up to 199 animal unit months, valued at $10,600.	No impacts to existing socioeconomic conditions because the rail line and associated facilities would not be constructed.
Socioeconomics – Lincoln County	*Construction* Population: 1.7 percent increase. Employment: 5.6 percent increase. Real disposable income: 4.1 percent increase. Gross regional product: 28 percent increase. State and local government spending: 1.9 percent increase. Traffic impacts to local highways: Level of service on U.S. Highway 93 at Caliente would degrade from A to B.	Not applicable. Not within the region of influence considered.	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 18).

Resource area	Proposed Action		No-Action Alternative
	Caliente Implementing Alternative	Mina Implementing Alternative	
Socioeconomics – Lincoln County (continued)	*Operations* Population: 2.9 percent increase. Employment: 3.9 percent increase. Real disposable income: 4.7 percent increase. Gross regional product: 5.2 percent increase. State and local government spending: 3.2 percent increase.		
Socioeconomics – Esmeralda County	*Construction* Population: 1.1 percent increase. Employment: 2.7 percent increase. Real disposable income: 7.6 percent increase. Gross regional product: 9.5 percent increase. State and local government spending: 2.2 percent increase. *Operations* Population: 2.0 percent increase. Employment: 3.0 percent increase. Real disposable income: 2.9 percent increase. Gross regional product: 3.8 percent increase. State and local government spending: 3.1 percent increase.	*Construction* Population: 3.1 percent increase. Employment: 14 percent increase. Real disposable income: 27 percent increase. Gross regional product: 57 percent increase. State and local government spending: 4.6 percent increase. *Operations* Population: 7.0 percent increase. Employment: 14 percent increase. Real disposable income: 10 percent increase. Gross regional product: 24 percent increase. State and local government spending: 9.9 percent increase.	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 12 of 18).

Resource area	Proposed Action		No-Action Alternative
	Caliente Implementing Alternative	Mina Implementing Alternative	
Socioeconomics – Nye County	*Construction* 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. *Operations* 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 42 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.	*Construction* 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. *Operations* 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 17 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.	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 18).

Resource area	Proposed Action		No-Action Alternative
	Caliente Implementing Alternative	Mina Implementing Alternative	
Socioeconomics – Churchill County	Not applicable. Not within the region of influence considered.	*Construction and operation*s Delay impacts on road traffic at grade crossings. Rail impacts on existing rail traffic: Moderate.	No impacts to existing socioeconomic conditions because the rail line and associated facilities would not be constructed.
Socioeconomics – Lyon County	Not applicable. Not within the region of influence considered.	*Construction* Population: 0.01 percent increase. Employment: 0.02 percent increase. Real disposable income: 0.03 percent increase. Gross regional product: 0.04 percent increase. State and local government spending: 0.01 percent increase. Rail impacts on existing rail traffic: Moderate. *Operations* Population: Less than 0.01 percent increase. Employment: 0.01 percent increase. Real disposable income: 0.01 percent increase. Gross regional product: 0.01 percent increase. State and local government spending: 0.01 percent increase. Rail impacts on existing rail traffic: Moderate.	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 18).

Resource area	Proposed Action		No-Action Alternative
	Caliente Implementing Alternative	Mina Implementing Alternative	
Socioeconomics – Walker River Paiute Reservation	Not applicable. Not within the region of influence considered.	*Construction* Assuming one of the construction camps is placed on the Walker River Paiute Reservation: Employment: Up to 20 additional jobs. Real disposable income: Up to $386,000. Gross regional product: Up to $1.4 million. *Operations* Included in the Mineral County estimates because the forecasting model cannot discriminate impacts to the Reservation.	No impacts to existing socioeconomic conditions because the rail line and associated facilities would not be constructed.
Socioeconomics – Mineral County	Not applicable. Not within the region of influence considered.	*Construction* Population: 1.4 percent increase. Employment: 6.1 percent increase. Real disposable income: 4.5 percent increase. Gross regional product: 14 percent increase. State and local government spending: 1.8 percent increase. Rail impacts on existing rail traffic: Moderate. *Operations* Population: 1.6 percent increase. Employment: 2.6 percent increase. Real disposable income: 2.8 percent increase. Gross regional product: 1.9 percent increase. State and local government spending: 1.5 percent increase. Rail impacts on existing rail traffic: Moderate.	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 18).

Resource area	Proposed Action		No-Action Alternative
	Caliente Implementing Alternative	Mina Implementing Alternative	
Socioeconomics – Clark County	*Construction* 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. *Operations* 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.	*Construction* 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. *Operations* 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.	No impacts to existing socioeconomic conditions because the rail line and associated facilities would not be constructed.
Socioeconomics – Washoe County/ Carson City	Not applicable. Not within the region of influence considered.	*Construction* 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. *Operations* 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.	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 16 of 18).

Resource area	Proposed Action		No-Action Alternative
	Caliente Implementing Alternative	Mina Implementing Alternative	
Occupational and public health and safety	Occupational 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. Vehicular-related accidents during construction: 6 fatalities. Vehicular-related accidents during operations: 8 fatalities. Rail-related fatalities during construction and operations: 1.3 fatalities. *Shared-Use Option* Vehicular-related accidents during construction: 6 fatalities. Vehicular-related accidents during operations: 8 fatalities. Rail-related fatalities during construction and operations: 4.6 fatalities.	Occupational 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 worker fatalities. Vehicular-related accidents during construction: 6 fatalities. Vehicular-related accidents during operations: 7 fatalities. Rail-related accidents during construction and operations: 1.1 fatalities. *Shared-Use Option* Vehicular-related accidents during construction: 6 fatalities. Vehicular-related accidents during operations: 7 fatalities. Rail-related fatalities during construction and operations: 7.4 fatalities.	No impacts because the rail line and associated facilities would not be constructed or operated.
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. 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.	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. 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.	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 17 of 18).

Resource area	Proposed Action		No-Action Alternative
	Caliente Implementing Alternative	Mina Implementing Alternative	
Utilities, energy, and materials (continued)	Wastewater treatment systems:	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.	Same as Caliente Implementing Alternative.	
	Fossil fuels:	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.	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.	
	Materials:	Materials:	
	Requirements generally would be very small in relation to supply capacity.	Same as Caliente Implementing Alternative.	
	Shared-Use Option	*Shared-Use Option*	
	Fossil fuels:	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.	Same as Caliente Implementing Alternative.	
Hazardous materials and waste	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.	Same as Caliente Implementing Alternative.	No impacts because the rail line and associated facilities would not be constructed.
	Small impacts from use of hazardous materials during the construction and operations phases.	Same as Caliente Implementing Alternative.	
	Small impacts from hazardous-waste disposal during the construction and operations phases.	Same as Caliente Implementing Alternative.	
	Small impacts during the operations phase from low-level radioactive waste disposal for wastes that would be generated at the Cask Maintenance Facility.	Same as Caliente Implementing Alternative.	

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 18 of 18).

Resource area	Proposed Action		No-Action Alternative
	Caliente Implementing Alternative	Mina Implementing Alternative	
Cultural resources	Numerous archaeological sites have been identified along segments of alignments DOE investigated as part of the Class I (literature review) and II (sample field survey) inventories of cultural resources. 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 DOE investigated as part of the Class I (literature review) and II (sample field survey) inventories of cultural resources. 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; dBA = A-weighted decibels; DNL = day-night average noise level; DOE = U.S. Department of Energy; NAAQS = National Ambient Air Quality Standards; PM_{10} = 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.

Table S-9. Comparison of potential impacts under the Proposed Action – Caliente rail alignment alternative segments and common segments[a] (page 1 of 8).

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).	Total surface disturbance: 1.9 square kilometers (480 acres).
	Loss of prime farmland soils: 0.16 square kilometer (40 acres). Less than 0.1 percent of prime farmland soils in Lincoln County.	Loss of prime farmland soils: 0.091 square kilometer (23 acres). Less than 0.1 percent of prime farmland soils in Lincoln County.
Land use and ownership	Private parcels crossed: at least 30.	Private parcels crossed: at least 5.
	Area of private land affected: 0.65 square kilometer (160 acres).	Area of private land affected: 0.30 square kilometer (74 acres).
	Active grazing allotments crossed: 1.	Active grazing allotments crossed: 3.
	Animal unit months lost in active allotments crossed: 1 (0.5 percent).	Animal unit months lost: 17 (1.4 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).	
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.	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 construction and operation of the facility, consistent with Class III non-BLM lands, but inconsistent with BLM Class II lands at the north end of the yard.	Quarry CA-8B would not be developed for the Eccles alternative segment.
	Potential quarry CA-8B: Large impact. Strong contrast in the short term from installation and use of the conveyor from the quarry across U.S. Highway 93, inconsistent near Upland Yard with surrounding non-BLM lands treated as Class III, inconsistent near Indian Cove with surrounding BLM Class II lands. No long-term impact under the Proposed Action; conveyor would be removed at end of construction phase.	

Table S-9. Comparison of potential impacts under the Proposed Action – Caliente rail alignment alternative segments and common segments[a] (page 2 of 8).

Resource area	Alternative segments and common segments	
	Interface with the Union Pacific Railroad – Caliente	Interface with the Union Pacific Railroad – Eccles
Surface-water resources	Caliente alternative segment: Approximately 0.029 square kilometer (7.1 acres) of wetlands would be filled. Indian Cove Staging Yard: Approximately 0.19 square kilometer (47 acres) of wetlands would be filled. Upland Staging Yard: No wetlands would be filled. North quarry siding, Upland Staging Yard option: Approximately 0.006 square kilometer (1.59 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 to 0.043 square kilometer (8.2 to 11 acres) of Clover Creek would be filled. Changes to hydraulic properties of the creek and possible indirect impacts to downstream riparian areas and wetlands, including a proposed Area of Critical Environmental Concern.
Groundwater resources	Proposed groundwater withdrawals from the hydrographic area in Panaca Valley could impact existing groundwater users. However, one or more best management practices such as reducing the pumping rate at or relocating proposed well locations Pan V25/26, Pan V4, Pan V5, and Pan V3/6, purchasing water from an existing water-rights holder, or drawing water from nearby proposed alternative well locations would be expected to preclude these impacts.	Proposed Groundwater withdrawals from the hydrographic area in Panaca Valley could impact existing groundwater users. However, one or more best management practices such as reducing the pumping rate at or relocating proposed well locations Pan V1, Pan V3/6, and Pan V26, purchasing water from an existing water-rights holder, or drawing water from nearby proposed alternative well locations would be expected to preclude these impacts.
Biological resources	Caliente alternative segment and Interchange Yard: Short-term impact to 0.10 square kilometer (24.3 acres) wetland/riparian habitat. Long-term impact to 0.11 square kilometer (26.9 acres) wetland/riparian habitat. Upland Staging Yard: Short-term impact to 0.01 square kilometer (3.6 acres) wetland/riparian habitat. Long-term impact to less than 0.01 square kilometer (0.78 acre) wetland/riparian habitat. 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 (10.9 acres) wetland/riparian habitat. Long-term moderate impact on riparian and wetland vegetation from the construction of a siding for potential quarry CA-8B.	Eccles alternative segment and Interchange Yard: Short-term impact to 0.01 square kilometer (3.14 acres) wetland/riparian habitat. Long-term impact to 0.01 square kilometer (2.65 acres) wetland/riparian habitat. Eccles-North Staging Yard: Short-term impact to less than 0.01 square kilometer (0.35 acre) wetland/riparian habitat. No long-term impact.
Noise and vibration	Noise from construction activities 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.	Noise from construction activities would exceed Federal Transit Administration guidelines. Construction equipment noise would cause daytime limits to be exceeded by 5 dBA.

Table S-9. Comparison of potential impacts under the Proposed Action – Caliente rail alignment alternative segments and common segments[a] (page 3 of 8).

Resource area	Alternative segments and common segments	
	Interface with the Union Pacific Railroad – Caliente	Interface with the Union Pacific Railroad – Eccles
Noise and vibration (continued)	Noise from construction trains in Caliente would adversely impact 34 receptors. These noise impacts would be considered temporary adverse impacts. Noise from operations phase trains would create adverse noise impacts at three receptors in Caliente. There would be no adverse impacts from vibrations, which would fall below Federal Transit Administration criteria.	There would be no adverse impacts from the operation of trains along the rail alignment. No receptors would be within the 65 DNL contour. There would be no adverse impacts from vibrations, which would fall below Federal Transit Administration criteria.
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 and potentially National Register-eligible sites and at other sites that might be identified during the complete survey.

	Caliente common segment 1
Physical setting	Total surface disturbance: 11 square kilometers (2,800 acres). Loss of prime farmland soils: 1.1 square kilometers (280 acres). Less than 0.1 percent of prime farmland soils in Lincoln and Nye Counties.
Land use and ownership	Active grazing allotments crossed: 9. Animal unit months lost in active allotments crossed: 452 (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.
Aesthetic resources	Moderate impact. Moderate contrast in the short and long term due to proximity to viewers during construction and road crossings of State Route 318 and Timber Mountain Pass Road; would meet BLM Class III management objectives.

	Garden Valley 1	Garden Valley 2	Garden Valley 3	Garden Valley 8
Physical setting	Total surface disturbance: 3.4 square kilometers (830 acres). Would result in topsoil loss and increased potential for erosion. Loss of prime farmland soils: 0.29 square kilometer (70 acres). Less than 0.1 percent of prime farmland soils in Lincoln and Nye Counties.	Total surface disturbance: 3.6 square kilometers (880 acres). Would result in topsoil loss and increased potential for erosion. Loss of prime farmland soils: 0.39 square kilometer (97 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 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.

Table S-9. Comparison of potential impacts under the Proposed Action – Caliente rail alignment alternative segments and common segments[a] (page 4 of 8).

Resource area	Alternative segments and common segments			
	Garden Valley 1	Garden Valley 2	Garden Valley 3	Garden Valley 8
Land use and ownership	Active grazing allotments crossed: 5. Animal unit months lost in active allotments crossed: 121 (1.34 percent).	Active grazing allotments crossed: 5. Animal unit months lost in active allotments crossed: 132 (1.1 percent).	Active grazing allotments crossed: 5. Animal unit months lost in active allotments crossed: 125 (1.4 percent).	Active grazing allotments crossed: 5. Animal unit months lost in active allotments crossed: 126 (1.1 percent).
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 in active allotments crossed: 117 (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.			
Aesthetic resources	Small to moderate impact. Weak to moderate contrast in the short and long term due to proximity to viewers in the Cedar Pipeline Ranch area; would meet BLM Class IV management objectives.			

Table S-9. Comparison of potential impacts under the Proposed Action – Caliente rail alignment alternative segments and common segments[a] (page 5 of 8).

Resource area	Alternative segments and common segments	
	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 (1,200 acres). Would result in topsoil loss and increased potential for erosion.
Land use and ownership	Active grazing allotments crossed: 1. Animal unit months lost in active allotments crossed: 54 (0.2 percent). Sections with unpatented mining claims the alignment would cross: 2 sections with 63 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 63 claims.
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.
Aesthetic resources	Potential quarry NN-9A and NN-9B: Moderate, but temporary, impact. Moderate to strong contrast in the short term from quarrying, ballast production facilities, and conveyor close to viewers on a lightly traveled road. Contrast levels would meet BLM Class IV management objectives. Small to no impact in the long term. Production facilities and conveyor would be removed and quarried areas restored after closure of quarry at end of construction phase.	Potential quarry NN-9A and NN-9B: Moderate, but temporary, impact. Moderate to strong contrast in the short term from quarrying, ballast production facilities, and conveyor close to viewers on a lightly traveled road. Contrast levels would meet BLM Class IV management objectives. Small to no impact in the long term. Production facilities and conveyor would be removed and quarried areas restored after closure of quarry at end of construction phase.
	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: 2. Animal unit months lost in active allotments crossed: 229 (0.6 percent). Sections with unpatented mining claims the alignment would cross: 10 sections with 133 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.	
Groundwater resources	Proposed groundwater withdrawals from the hydrographic area near Black Spring could impact discharge rates at the spring. However, one or more best management practices such as reducing the pumping rate at proposed well HC5, purchasing water from an existing water-rights holder, or drawing water from an alternative nearby proposed well location would be expected to preclude this impact.	

Table S-9. Comparison of potential impacts under the Proposed Action – Caliente rail alignment alternative segments and common segments[a] (page 6 of 8).

Resource area	Alternative segments and common segments		
	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: at least 2 patented mining claims. Area of private land affected: 0.61 square kilometer (150 acres). Unpatented mining claims the alignment would cross: 14 sections with 375 claims.	Private parcels crossed: 2 patented mining claims. Area of private land affected: 0.19 square kilometer (46 acres). Unpatented mining claims the alignment would cross: 14 sections with 205 claims.	Private parcels crossed: 33 plus at least 2 patented mining claims (at least 35). Area of private land affected: 0.49 square kilometer (120 acres). Unpatented mining claims the alignment would cross: 19 sections with 374 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.	Short-term direct impacts to water quality for Willow Springs.	No impact to Willow Springs.
Aesthetic resources	Potential quarries NS-3A and NS-3B would not be visible or attract attention.	Potential quarries NS-3A and NS-3B would not be visible or attract attention.	Potential quarry ES-7: Moderate to small, but temporary, impact. Moderate to strong contrast in the short term to viewers on a secondary road from conveyor and siding; weak contrast for these facilities from U.S. Highway 95. Contrast levels would be compatible with BLM Class IV management objectives. Small to no impact in the long term. Conveyor would be removed at the end of construction.

Table S-9. Comparison of potential impacts under the Proposed Action – Caliente rail alignment alternative segments and common segments[a] (page 7 of 8).

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 (460 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 (780 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 (330 acres). Would result in topsoil loss and increased potential for erosion.
Land use and ownership	Private parcels crossed: 1. Area of private land affected: 0.004 square kilometer (0.9 acres). Active grazing allotments crossed: 1. Animal unit months lost in active allotments crossed: 8 (0.8 percent). Unpatented mining claims the alignment would cross: 2 sections with 7 claims.	Private parcels crossed: 0. Area of private land affected: 0 square kilometer (0 acre). Active grazing allotments crossed: 1. Animal unit months lost in active allotments crossed: 12 (1.3 percent). Unpatented mining claims the alignment would cross: 2 sections with 7 claims.

Table S-9. Comparison of potential impacts under the Proposed Action – Caliente rail alignment alternative segments and common segments[a] (page 8 of 8).

Resource area	Alternative segments and common segments	
	Oasis Valley 1	Oasis Valley 3
Groundwater resources	Proposed groundwater withdrawals from hydrographic area 228 (Oasis Valley), if unabated, would impact existing groundwater users or groundwater resources. However, one or more best management practices such as reducing the pumping rate at proposed well locations OV3, OV4, and OV5, purchasing water from an existing water-rights holder, or drawing water from nearby proposed alternative wells locations would be expected to preclude these impacts.	Proposed groundwater withdrawals from hydrographic area 228 (Oasis Valley), if unabated, would impact existing groundwater users or groundwater resources. However, one or more best management practices such as reducing the pumping rate at proposed well location OV13 and OV17, purchasing water from an existing water-rights holder, or drawing water from nearby proposed alternative well locations would be expected to preclude these impacts.
Biological resources	No impact on riparian and wetland vegetation.	Short-term impact to 0.019 square kilometer (4.67 acres) of wetland/riparian habitat. No long-term impacts.
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 the 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 19 claims. Active grazing allotments crossed: 2. Animal unit months lost in active allotments crossed: 17 (1.8 percent).	
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 8).

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 Transit 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.			
	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 (2.6 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 (2.9 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: 0.015 square kilometer (3.6 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 (3.4 acres). Less than 3 percent of the prime farmland soils of the Walker River Paiute Reservation.

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 8).

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
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 large, but temporary, impact. 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. Small to moderate impact in the long-term. Weak to moderate contrast in the long-term as rail line and crossing structures would, in places, attract the attention of viewers, but would meet BLM Class III management objectives.
Biological resources	Small long-term impacts to Inter-Mountains Mixed Salt Desert Scrub and Inter-Mountain Basins Greasewood Flat. Short-term impact to 0.01 square kilometer (3.45 acres) wetland/riparian habitat. No long-term impacts.	Small long-term impacts to Inter-Mountains Mixed Salt Desert Scrub and Inter-Mountain Basins Greasewood Flat. Short-term impact to 0.01 square kilometer (3.19 acres) wetland/riparian habitat. Long-term impact to less than 0.01 square kilometer (0.31 acre) wetland/riparian habitat.	Small long-term impacts to Inter-Mountains Mixed Salt Desert Scrub and Inter-Mountain Basins Greasewood Flat. Short-term impact to 0.02 square kilometer (3.94 acres) wetland/riparian habitat. Long-term impact to less than 0.01 square kilometer (0.37 acre+) 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 0.02 square kilometer (4.03 acres) wetland/riparian habitat. No long-term impact to wetland/riparian habitat.

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 8).

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
Land use	At present, the Walker River Paiute Tribe does not support routes over their Reservation and their concurrence would be necessary to secure a right-of-way for the rail line.	At present, the Walker River Paiute Tribe does not support routes over their Reservation and their concurrence would be necessary to secure a right-of-way for the rail line.	At present, the Walker River Paiute Tribe does not support routes over their Reservation and their concurrence would be necessary to secure a right-of-way for the rail line.	At present, the Walker River Paiute Tribe does not support routes over their Reservation and their concurrence would be necessary to secure a right-of-way for the rail line.
Surface-water resources	Of the 0.065 square kilometer (16 acres) of wetlands crossed in this area, only 20 square meters (0.005 acre) 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 (0.005 acre) 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 (0.007 acre) 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 (0.007 acre) 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: 0.16 square kilometer (40 acres). Would result in topsoil loss and increased potential for erosion.			
Mina common segment 1				
Physical setting	Total surface disturbance: 12 square kilometers (3,100 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 8).

Resource area	Existing rail line/alternative segments/common segments Mina common segment 1
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 in active allotments crossed: 102 (0.6 percent).
Aesthetic resources	Moderate, but temporary, impact. Moderate contrast at the intersection of State Route 265 and U.S. Highway 95 due to proximity of rail to road; would be compatible with BLM Class III and IV management objectives. Small impact in the long-term. Weak to no contrast from track adjacent to U.S. Highway 95 that would be obscured at points by topography; would meet BLM Class III and IV management objectives. Potential Garfield Hills quarry: Moderate, but temporary, 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, but temporary, 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	Small long-term impact to Inter-Mountains Mixed Salt Desert Scrub. Potential Gabbs Range quarry: Moderate impact to winterfat communities. Short-term and long-term small impacts to western snowy plover.
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.
Groundwater resources	Proposed groundwater withdrawals from the Columbus Salt Marsh Valley (hydrographic area 118), if unabated, could impact existing groundwater resources. However, one or more best management practices such as reducing the pumping rate at proposed well location CSM-2a, purchasing water from an existing water-rights holder, or drawing water from a nearby proposed alternative well location would be expected to preclude these impacts.

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 8).

Resource area	Existing rail line/alternative segments/common segments		
	Montezuma alternative segment 1	Montezuma alternative segment 2	Montezuma alternative segment 3
Physical setting	Total surface disturbance: 15 square kilometers (3,800 acres). Would result in topsoil loss and increased potential for erosion.	Total surface disturbance: 11 square kilometers (2,800 acres). Would result in topsoil loss and increased potential for erosion.	Total surface disturbance: 17 square kilometers (4,100 acres). Would result in topsoil loss and increased potential for erosion.
Land use and ownership	Private parcels crossed: 0.	Private parcels crossed: 36.	Private parcels crossed: 1.
	Area of private land affected: 0 square kilometer (0 acre).	Area of private land affected: 0.59 square kilometer (145 acres).	Area of private land affected: 0.1 square kilometer (24 acres).
	Active grazing allotments crossed: 4.	Active grazing allotments crossed: 1.	Active grazing allotments crossed: 2.
	Animal unit months lost in active allotments crossed: 43 (0.4 percent).	Animal unit months lost in active allotments crossed: 51 (0.5 percent).	Animal unit months lost in active allotments crossed: 59 (0.4 percent).
	Unpatented mining claims the alignment would cross: 17 sections containing 94 claims.	Unpatented mining claims the alignment would cross: 24 sections containing 362 claims.	Unpatented mining claims the alignment would cross: 19 sections containing 164 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 6 of 8).

Resource area	Existing rail line/alternative segments/common segments		
	Montezuma alternative segment 1	Montezuma alternative segment 2	Montezuma alternative segment 3
Aesthetic resources	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, and access roads. Moderate 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. Potential North Clayton quarry: Small to moderate, but temporary, 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. Potential Malpais Mesa quarry: Moderate, but temporary, impact. Moderate to strong contrast in the short term to viewers on a secondary road from quarrying, ballast production facilities, and conveyor close to viewers that would be compatible with BLM Class IV management objectives. Small to no impact in the long term. Production facilities would be removed and waste dumps restored after closure of quarry 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. Potential ES-7 quarry: Moderate to small, but temporary, impact. Moderate to strong contrast in the short term to viewers on a secondary road from conveyor and siding; weak contrast for these facilities from U.S. Highway 95. Contrast levels would be compatible with BLM Class IV management objectives. Small to no impact in the long term. 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. Potential North Clayton quarry: Small to moderate, but temporary 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.

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 8).

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 (70 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 (460 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 (780 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 8 of 8).

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 (330 acres). Would result in topsoil loss and increased potential for erosion.
Land use and ownership	Private parcels crossed: 1	Private parcels crossed: 0
	Area of private land affected: 0.004 square kilometer (0.9 acre).	Area of private land affected: 0
	Active grazing allotments crossed: 1	Active grazing allotments crossed: 1
	Animal unit months lost in active allotments crossed: 8 (0.8 percent).	Animal unit months lost in active allotments crossed: 12 (1.3 percent).
	Unpatented mining claims the alignment would cross: 2 sections with 7 claims.	Unpatented mining claims the alignment would cross: 2 sections with 7 claims.
Groundwater resources	Proposed groundwater withdrawals from hydrographic area 228 (Oasis Valley), if unabated, would impact existing groundwater users or groundwater resources. However, one or more best management practices such as reducing the pumping rate at proposed wells OV3, OV4, and OV5 purchasing water from an existing water-rights holder, or drawing water from nearby proposed alternative well locations would be expected to preclude these impacts.	Proposed groundwater withdrawals from hydrographic area 228 (Oasis Valley), if unabated, would impact existing groundwater users or groundwater resources. However, one or more best management practices such as reducing the pumping rate at proposed wells OV13 and OV17, purchasing water from an existing water-rights holder, or drawing water from nearby proposed alternative well locations would be expected to preclude these impacts.
Biological resources	No impact on riparian and wetland vegetation.	Short-term impact to 0.019 square kilometer (4.67 acres) of wetland/riparian habitat. No long-term impacts.
Cultural resources	Potential direct and indirect impacts at a historic cattle ranch, a 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, a 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 19 claims.	
	Active grazing allotments crossed: 2.	
	Animal unit months lost in active allotments crossed: 17 (1.8 percent).	
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					
Absolute					
Degrees C + 17.78	1.8	Degrees F	Degrees F – 32	0.55556	Degrees C
Relative					
Degrees C	1.8	Degrees F	Degrees F	0.55556	Degrees C
Velocity/Rate					
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	$= 10^{-12}$

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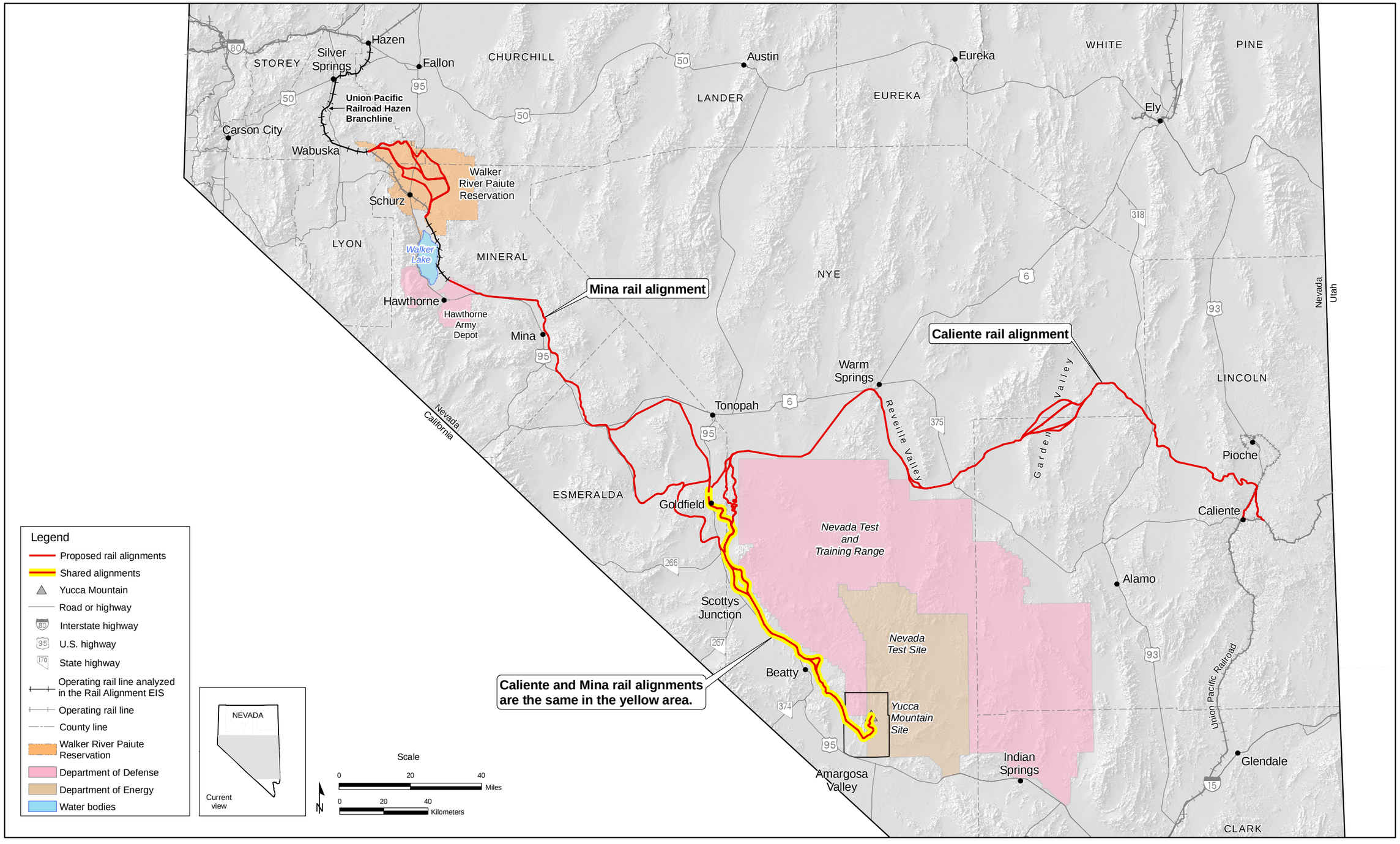
Hazen
Silver Springs
Fallon
CHURCHILL
Austin
Eureka
WHITE
PINE
STOREY
LANDER
EUREKA
Ely
Union Pacific Railroad Hazen Branchline
Carson City
Wabuska
Walker River Paiute Reservation
Schurz
LYON
Walker Lake
MINERAL
NYE
Mina rail alignment
Hawthorne
Hawthorne Army Depot
Mina
Caliente rail alignment
Warm Springs
Tonopah
Reveille Valley
Garden Valley
LINCOLN
Nevada
California
Utah
Pioche
ESMERALDA
Goldfield
Caliente
Nevada Test and Training Range
Alamo
Scottys Junction
Nevada Test Site
Beatty
Yucca Mountain Site
Union Pacific Railroad
Indian Springs
Glendale
Amargosa Valley
CLARK
Caliente and Mina rail alignments are the same in the yellow area.
Legend
Proposed rail alignments
Shared alignments
Yucca Mountain
Road or highway
Interstate highway
U.S. highway
State highway
Operating rail line analyzed in the Rail Alignment EIS
Operating rail line
County line
Walker River Paiute Reservation
Department of Defense
Department of Energy
Water bodies
NEVADA
Current view
Scale
0 20 40 Miles
0 20 40 Kilometers