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

DOE/EIS-0250F-S2

and

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

DOE/EIS-0369

Volume I

Nevada Rail Corridor SEIS

Rail Alignment EIS - Chapters 1 and 2

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

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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)

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

READERS GUIDE

READERS GUIDE TO

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

This document contains two separate NEPA analyses—

- The Nevada Rail Corridor SEIS supplements and updates the information on Nevada rail corridors reported in the Yucca Mountain EIS (DOE/EIS-0250F), which DOE completed in 2002.
- The Rail Alignment EIS provides detailed analyses of two rail corridors (Caliente and Mina) at the alignment level.

The Repository SEIS (DOE/EIS-0250F-S1), published simultaneously with the Nevada Rail Corridor SEIS and the Rail Alignment EIS, is a separate, but related, analysis.

The Foreword, which immediately follows this Readers Guide, explains and graphically shows the relationship among the Nevada Rail Corridor SEIS, the Rail Alignment EIS, and the Repository SEIS.

Readers might want to know…

Why did DOE change the Nevada Rail Corridor SEIS and the Rail Alignment EIS?

The Proposed Actions in the Nevada Rail Corridor SEIS and in the Rail Alignment EIS have not changed. With that in mind, and in accordance with Council on Environmental Quality regulations under the National Environmental Policy Act of 1969, as amended, DOE relied on three criteria for introducing changes to information presented in the Draft Rail Corridor SEIS and the Draft Rail Alignment EIS. The Department changed the documents (1) in response to public comments, as appropriate, (2) to correct errors in the draft documents, and (3) to provide new information or improved analyses relevant to the documents. For example, DOE added an assessment of the potential greenhouse gas emissions during proposed railroad construction and operations.

DOE issued the Draft Nevada Rail Corridor SEIS and Draft Rail Alignment EIS in October 2007 and requested comments on the documents. The Department received approximately 4,000 comments in letters, emails, faxes, and transcripts of public hearings at six locations in Nevada, one location in

California, and in Washington. D.C. Volume VI of the Final Nevada Rail Corridor SEIS and the Final Rail Alignment EIS contains all of those comments individually or in summary form, and the DOE responses to them. Some of those comments led DOE to change or update the Nevada Rail Corridor SEIS and the Rail Alignment EIS, primarily to enhance understanding, but also to correct errors that readers found.

In addition to errors pointed out by the public during the comment period, DOE internal reviewers found typographical and editorial errors. DOE corrected those errors in the final documents.

Finally, DOE included new information and related analyses in the final document. For example, the Department moved the proposed location of a quarry siding associated with the Upland Staging Yard to reduce potential wetland impacts, and updated the analysis of locomotive-horn sounding in Caliente to consider potential impacts to noise-sensitive receptors.

How will I know specifically where the document has changed?

DOE has chosen to indicate substantive changes to the Draft Nevada Rail Corridor SEIS and the Draft Rail Alignment EIS with "change bars" in the margins of the affected pages. These change bars indicate new or revised information acquired since DOE completed the draft document, information based on revised analyses, and information included as the result of public comments.

A number of commenters requested that DOE make changes, and the Department did so where appropriate. However, some suggested changes were not appropriate because they would have introduced errors or because they were not germane to the Proposed Actions. Other than the three types of changes described above, the Department did not alter the documents.

To identify changes in tables and figures, DOE used the following approach:

- The addition of a table or figure is marked with a change bar at the caption, along the length of the table or figure, and in the List of Tables or List of Figures.
- To preserve table and figure numbering, tables or figures added in front of the first table or figure of a chapter are numbered 1-0 or 1-0a, 1-0b for more than one addition. Tables or figures added elsewhere in the document are identified with the preceding table or figure number and the addition of a letter. For example, a new table immediately following Table 3-3 would be identified as Table 3-3a.
- Modified tables have change bars at the rows that changed.
- Modified figures have change bars along their entire length.
- The deletion of a table or figure is noted in the List of Tables or List of Figures, but does not have a placeholder in the document.

DOE did not use change bars for editorial changes, rephrased (but technically unchanged) information from the draft document, or revisions to style and formatting. Examples of changes not shown by change bars are:

- Rearrangement of text resulting in reissue of acronym definition, italicizing glossary term, addition/deletion of unit conversion, rephrasing of short titles.
- Formatting tables to avoid spillover.

- Moving text around to better position tables and figures to callouts.
- Standardizing terms.
- Correction of reference spelling, author, or supportive information for an existing, unchanged reference (that is, the reference maintains the same DIRS number).

How is the final document structured?

The final document is structured the same as the draft document, with the addition of a volume for public comments and DOE responses. It has a Summary and six volumes, as follows:

The Summary provides an overview of the information and analyses provided in Volumes I, II, III, IV, V, and VI. From the Summary, readers will gain a general understanding of the proposed project, the environmental analyses, and potential environmental impacts. By its very nature, the Summary does not provide the engineering and scientific detail of the full document. The Summary stresses the major conclusions, areas of controversy, and issues to be resolved.

Volume I contains the Nevada Rail Corridor SEIS in its entirety, and Chapters 1 and 2 of the Rail Alignment EIS.

Volume II contains Chapter 3 of the Rail Alignment EIS, which describes the existing environmental setting and conditions for 15 environmental resource areas along the Caliente rail alignment and the Mina rail alignment, and provides a discussion of American Indian interests in the Proposed Action.

Volume III contains Chapter 4 of the Rail Alignment EIS, which describes potential impacts to the existing environmental setting and conditions for 15 environmental resource areas along the Caliente rail alignment and the Mina rail alignment.

Volume IV contains Chapters 5, Cumulative Impacts; 6, Statutory, Regulatory, and Other Applicable Requirements; 7, Best Management Practices and Mitigation; and 8, Unavoidable Adverse Impacts of the Rail Alignment EIS. Volume IV also contains a list of preparers, contributors, and reviewers; a glossary of terms, a reference list, and an index to the Rail Alignment EIS.

Volume V contains Appendices A through N, which provide additional information and detail to support analyses in the Nevada Rail Corridor SEIS and the Rail Alignment EIS.

Volume VI contains two Comment-Response Documents, one that addresses public comments on the Draft Nevada Rail Corridor SEIS and one that addresses public comments on the Draft Rail Alignment EIS. The introduction to each Comment-Response Document in Volume VI describes how DOE solicited comments on the draft documents; the methodology the Department used to identify, categorize, and respond to public comments; a summary of the key issues raised in the comments; instructions on how to use the Comment-Response Document; and index tables that list organizations and individuals who submitted comments.

In addition, DOE has developed Map Atlases, which contain aerial photographs with digital overlays of the proposed railroad along the Caliente rail alignment and the Mina rail alignment. The Map Atlases are available on the Office of Radioactive Waste Management website at *www.ocrwm.doe.gov*.

The graphic on the next page shows the document structure and lists the contents of each volume.

Is this document difficult to understand?

This NEPA document is large and the subject of the proposed railroad project is complex. The analyses cover many environmental resource areas over long linear distances. DOE has endeavored to present this information in a logical format, and has included much of the information in tables and figures.

The Caliente and Mina rail alignments are treated fully and individually in the Rail Alignment EIS, Chapters 3 and 4. Although this approach results in repetition of some information, it allows readers interested in only one of the rail alignments easy access to information about that alignment.

The Department has provided tools and applied conventions to make the document as understandable and reader friendly as possible. For example:

- **Acronyms and Abbreviations** This document uses relatively few acronyms and abbreviations. Those used in text are spelled out at first use in each chapter; those used in tables and figures because of space limitations are defined in table and figure footnotes. The inside front cover of each volume of the document lists acronyms and abbreviations used in text. Each appendix has its own list of acronyms and abbreviations, as appropriate.

- **Definitions** Volume IV contains a glossary of terms. The glossary defines terms unique to this document and focuses on terms used in the environmental analyses and terms related to railroads. Glossary terms are shown in ***bold italics*** at first use in each chapter. Some glossary terms are also given in text boxes at appropriate places in the document.

- **Document Navigation** The Summary and each volume of this document contain detailed tables of contents, including lists of tables and figures. There is also a detailed index at the end of the Nevada Rail Corridor SEIS and in the back of Volume IV.

- **Units of Measure** DOE has used standard units of measure, both metric and English. The Metric Conversion Act of 1975 (Public Law 94-168) and Executive Order 12770, *Metric Usage in Federal Government Programs*, require federal agencies to "seek out ways to increase understanding of the metric system of measurement through educational information and guidance and in Government publications."

  Generally, measurements given in text and figures are provided in the metric unit followed by the English conversion in parentheses. Tables in the draft document provided measurements in metric and included footnotes with metric-to-English conversion factors. To improve understanding for the average reader, tables in the final document provide measurements in English and include footnotes with English-to-metric conversion factors. The inside back cover of each volume of this document provides a conversion table (metric to English and English to metric).

Summary

High-level overview of the Nevada Rail Corridor SEIS and the Rail Alignment EIS.

Volume I

Nevada Rail Corridor SEIS

Rail Alignment EIS

Volume II

Rail Alignment EIS

Volume III

Rail Alignment EIS

Volume IV

Rail Alignment EIS

Volume V

Volume VI

- **Rounding** DOE has endeavored to provide numerical data at a level to permit a meaningful comparison of quantities. Some numbers in this document are rounded, others are not. Generally, DOE has not rounded numbers taken from source documents and used as inputs to analyses. Numbers resulting from analyses are rounded if the inclusion of more digits would not be meaningful for comparative purposes. Extremely large numbers or extremely small numbers might be given using what is known as scientific notation. The inside front cover of each volume of this document provides a brief explanation of scientific notation.

What is DIRS?

The acronym DIRS precedes technical references cited in this document. DIRS stands for *Document Input Reference System*, a Yucca Mountain Project database used to catalog and track the use of references in project documents. Documents in this system have been checked and verified suitable for use, including those requiring copyright permissions. Every reference cited in the Nevada Rail Corridor SEIS and Rail Alignment EIS is traceable via its unique DIRS number. To the extent possible, each reference citation provides a pointer to the location of the cited information within the reference. If the citation is general and applies to the entire document, or if it is not possible to provide a specific pointer (for example, in large data sets), the citation is indicated as “all.”

What does DTN mean?

Data sets referenced in this document are preceded by the abbreviation DTN, which stands for *Data Tracking Number*. The Yucca Mountain Project uses a controlled system for cataloging and tracking all data used in project technical documents. Data in this system have been checked and verified suitable for use. All project data cited in the Nevada Rail Corridor SEIS and the Rail Alignment EIS are traceable to the unique DTN.

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.

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

Proposed Action:

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

Record of Decision

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

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

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

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

1. Supplements the Nevada transportation analysis of Yucca Mountain FEIS, as modified by:
   - Record of Decision (mostly rail) (69 *FR* 18557)
   - Proposed consideration of Mina rail corridor
2. Under the Proposed Action, DOE would construct and operate a railroad to connect the Yucca Mountain Repository to an existing rail line near Wabuska, Nevada (the Mina rail corridor)
   - Mina rail corridor information and analyses at level of detail commensurate with that of the other corridors in the Yucca Mountain FEIS
3. Consider other corridors in Yucca Mountain FEIS for significant new circumstances or information bearing on environmental concerns
   - Review environmental information available since Yucca Mountain FEIS.
4. Conclusion:
   - The Mina corridor warrants further detailed study to determine an alignment based on impact analysis.
   - There are no significant changes or new information bearing on environmental concerns for the other corridors that would warrant further detailed study at the alignment level.

Rail Alignment EIS (DOE/EIS-0369)

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

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

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

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

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1. PURPOSE AND NEED FOR AGENCY ACTION

This chapter explains why DOE needs to construct and operate a railroad in Nevada, summarizes the process leading to the addition of a rail corridor for further study, and describes the interests and roles of cooperating agencies. It describes the Rail Alignment EIS and Nevada Rail Corridor SEIS scoping process, and summarizes public scoping comments and how DOE acted on those comments. It describes interactions with American Indian tribes and tribal organizations; and the relationship of this Nevada Rail Corridor SEIS to other environmental documents. It also describes the Draft EIS public hearings and public comment process.

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

1.1 Purpose and Need

The United States has focused a national effort on siting and developing a ***geologic repository*** for ***disposal*** of ***spent nuclear fuel*** and ***high-level radioactive waste***, and on developing systems in preparation for transporting these materials from their locations throughout the country to a repository. On July 23, 2002, the President signed into law (Public Law 107-200) a joint resolution of the U.S. House of Representatives and the U.S. Senate designating the Yucca Mountain Site in Nye County, Nevada, for development as a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste.

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, 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.

After the Yucca Mountain Site was designated, the U.S. Department of Energy (DOE or the Department) initiated preparation of a license application to be submitted to the U.S. Nuclear Regulatory Commission seeking authorization to construct the repository. In addition, to be in a position to transport spent nuclear fuel and high-level radioactive waste to the repository should the Commission approve construction of the repository and receipt of these materials, DOE proceeded with certain decisions related to the transportation of these materials. 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) (*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 *Federal Register* [*FR*] 18557). Because rail access to Yucca Mountain is not currently available, DOE would have to build a rail line to connect to an existing rail line in Nevada.

1.2 Yucca Mountain Site-Selection and Recommendation Process

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. This Act, as amended (42 United States Code [U.S.C.] 10101 *et seq.*), which the Nevada Rail

Corridor SEIS and the Rail Alignment EIS refer 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, finding the site to be scientifically and technically suitable for development of a repository, submitted his recommendation, along with a comprehensive statement of the basis for the recommendation, to the President of the United States, George W. Bush, for approval of the Yucca Mountain Site for the development of a nuclear waste repository. As required by the NWPA, the Department prepared the *Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (DOE/EIS-0250F, February 2002; DIRS 155970-DOE 2002, all) (Yucca Mountain FEIS), to accompany the Secretary's recommendation. The President considered the site qualified for application to the Nuclear Regulatory Commission for a construction authorization and recommended the site to the U.S. Congress. On July 23, 2002, the President signed into law (Public Law 107-200) 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.

1.3 Rail Corridors Considered in the Yucca Mountain FEIS and this Nevada Rail Corridor SEIS

In the Yucca Mountain FEIS, DOE analyzed a proposed action to construct, operate and monitor, and eventually close a geologic repository at Yucca Mountain. As part of that action, DOE evaluated various modes of transporting spent nuclear fuel and high-level radioactive waste to the Yucca Mountain Site from 72 commercial and 5 DOE sites (now 4 DOE sites because the Department is moving spent nuclear fuel from the Fort St. Vrain site in Colorado to the Idaho National Laboratory in Idaho). Figure 1-1 shows these sites.

DOE evaluated two national transportation scenarios, 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."

Under the Nevada mostly rail scenario, DOE considered in detail five potential ***rail corridors*** (Caliente, Carlin, Caliente-Chalk Mountain, Jean, and Valley Modified) within the State of Nevada in which the Department could construct a ***railroad*** to link an existing rail line to a repository at Yucca Mountain. Figure 1-2 shows these five corridors.

Rail corridor: A strip of land 400 meters (0.25 mile) wide through which DOE would identify an alignment (***rail alignment***) for the construction of a ***rail line*** in Nevada to a ***geologic repository*** at Yucca Mountain.

Rail route: A path that a rail line would follow within a rail corridor.

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

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

Option: A strip of land from one point along a corridor to another point on the same corridor that provides a different route.

On April 8, 2004 (69 *FR* 18557), 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

Legend

▲ Yucca Mountain

★ Commercial Sites

Note: The Yucca Mountain FEIS analysis considered three commercial site pairs—Salem and Hope Creek, Nine Mile Point and FitzPatrick, and Dresden and Morris—to be single sites because of their proximity to each other.

◉ DOE Sites

Notes:

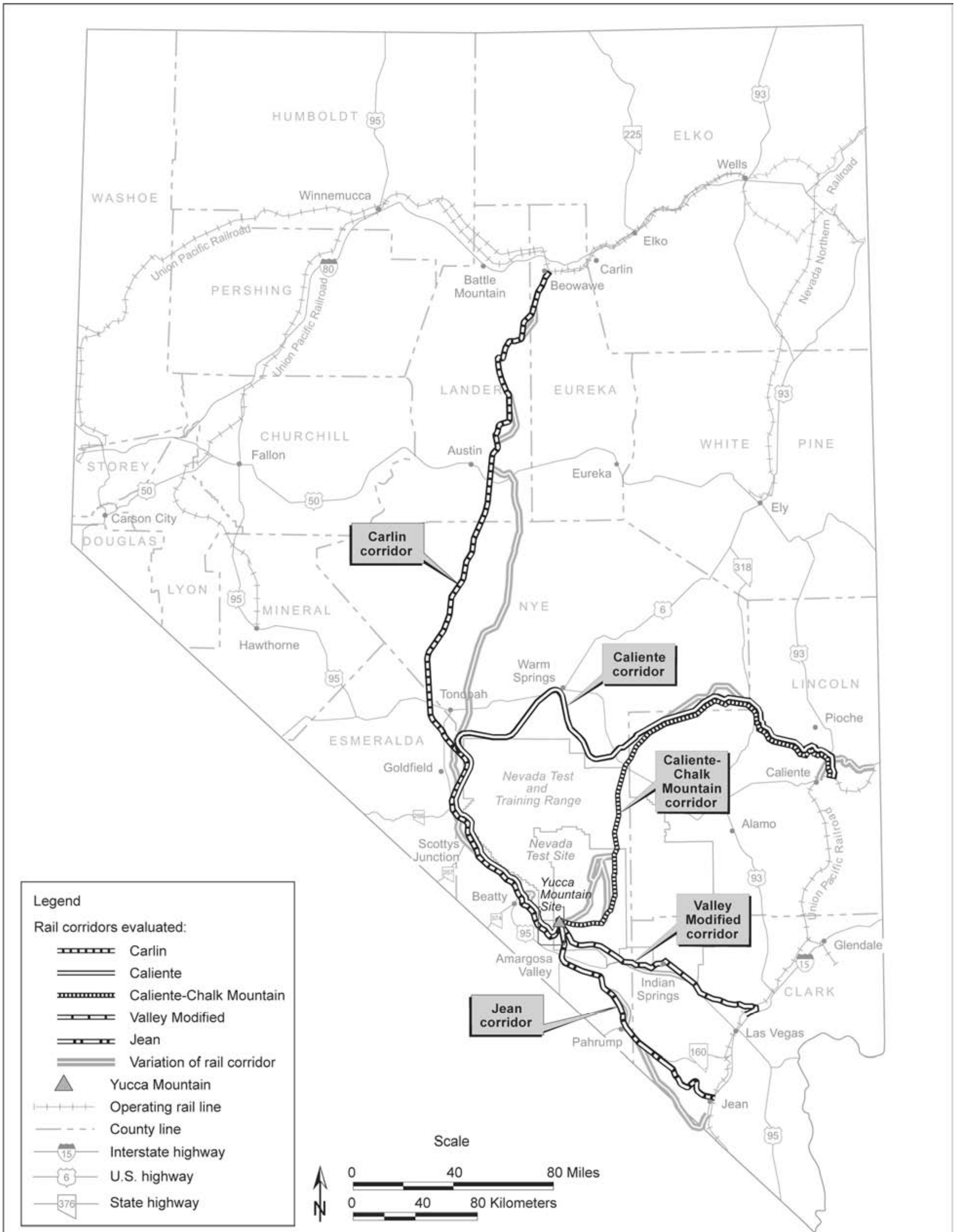
The Yucca Mountain FEIS analysis included the high-level radioactive waste at West Valley. The State of New York owns the high-level radioactive waste and the site. Under the West Valley Demonstration Project Act, DOE is responsible for solidifying and transporting the high-level radioactive waste to a repository.

The Yucca Mountain FEIS analysis included DOE spent nuclear fuel at a fifth DOE location, Fort St. Vrain in Colorado. DOE will move that waste to the Idaho National Laboratory for processing and it will be included in the laboratory inventory. Therefore, this map does not show Fort St. Vrain as a DOE source of spent nuclear fuel.

Notes: DOE = U.S. Department of Energy; FEIS = Final Environmental Impact Statement. Symbols do not reflect precise locations.

Source: Modified from DIRS 155970-DOE 2002, Figure 1-1.

Figure 1-1. Locations of commercial and DOE sites that would ship spent nuclear fuel and high-level radioactive waste to Yucca Mountain.



Source: Modified from DIRS 155970-DOE 2002, Figure 2-26.

Figure 1-2. Five rail corridors evaluated in detail in the Yucca Mountain FEIS.

repository. 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 the National Environmental Policy Act (NEPA) to study alternative alignments (now referred to as alternative segments) 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).

During subsequent public scoping, DOE received comments suggesting that DOE consider other rail corridors that DOE had not previously considered in detail, 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 (DIRS 182776-Collins 1991, all).

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 (DIRS 182775-Williams 2006, all). DOE then prepared a preliminary feasibility study of the Mina rail corridor (DIRS 180222-BSC 2006, all).

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). DOE also announced that it would update, as appropriate, the information and analysis for other rail corridors analyzed in the Yucca Mountain FEIS.

This expanded NEPA analysis includes the Nevada Rail Corridor SEIS (DOE/EIS-0250F-S2), which updates the Nevada rail corridor analysis in the Yucca Mountain FEIS by analyzing the potential environmental impacts associated with constructing and operating a railroad within the Mina rail corridor (corridor-level analysis) and the Rail Alignment EIS (DOE/EIS-0369), which analyzes the potential environmental impacts associated with constructing and operating a railroad along specific alignments within the Caliente rail corridor and the Mina rail corridor (alignment-level analysis). Figure 1-3 shows the location of the Mina rail corridor evaluated in this Nevada Rail Corridor SEIS, and the Caliente rail corridor evaluated in the Rail Alignment EIS.

This Nevada Rail Corridor SEIS supplements the Nevada transportation-related element of the Yucca Mountain FEIS, but only the element that remains a part of the Yucca Mountain FEIS Proposed Action–the Nevada mostly rail scenario. Under the Proposed Action considered in this Nevada Rail Corridor SEIS (described in more detail in Chapter 2), DOE would construct and operate a railroad to connect the Yucca Mountain Repository to an existing rail line near Wabuska, Nevada (the Mina rail corridor). Accordingly, this Nevada Rail Corridor SEIS analyzes the Mina rail corridor at a level of detail commensurate with that of the rail corridors analyzed in the Yucca Mountain FEIS (see Chapters 3 and 4 of this Nevada Rail Corridor SEIS).

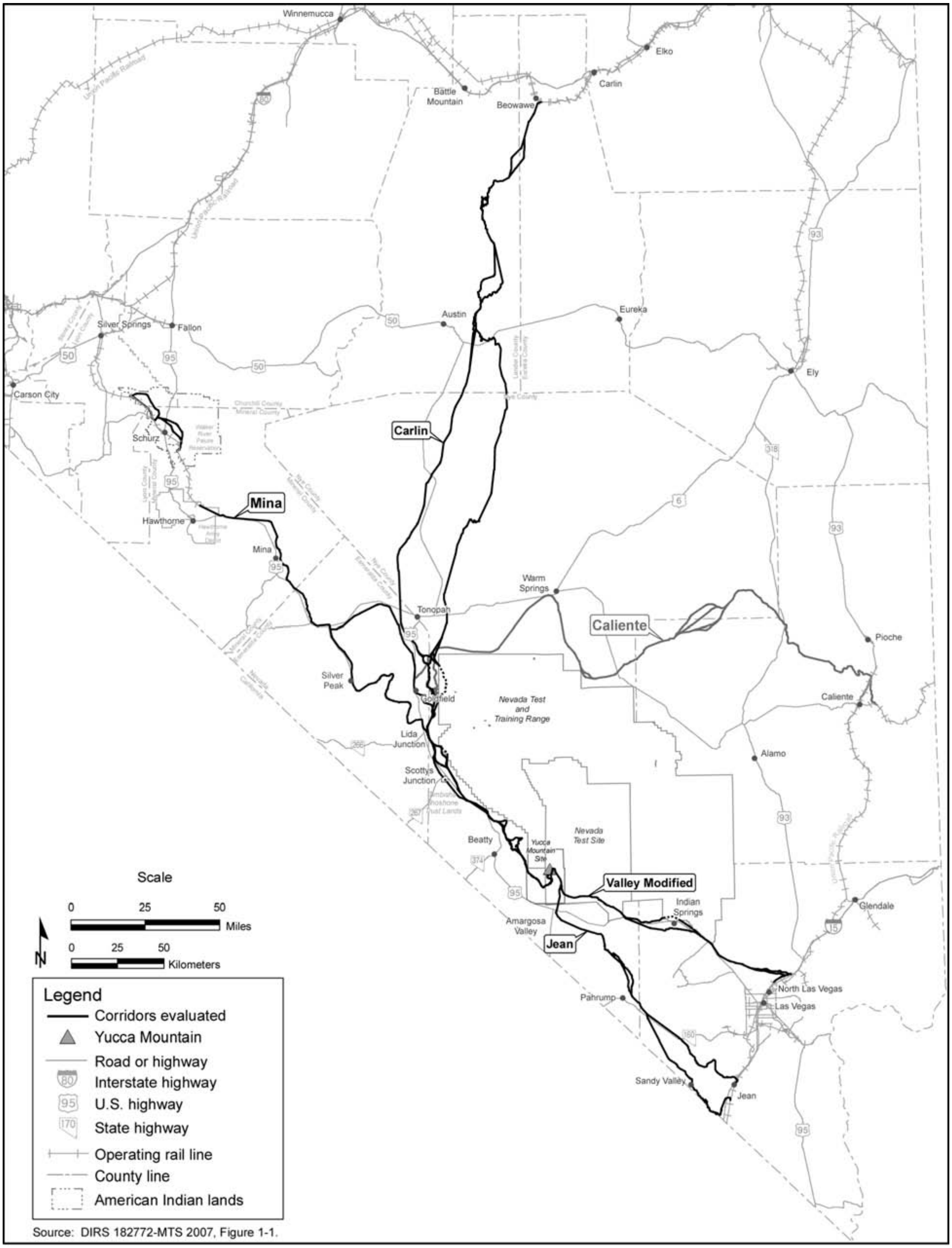


Figure 1-3. Four rail corridors and the Caliente corridor (pre-scoping, October 2006).

The analysis of the Mina rail corridor is intended to support Departmental conclusions about whether the potential attributes, characteristics, and environmental impacts of constructing and operating a railroad within the Mina rail corridor are such that DOE should proceed with analyzing specific alignments within the Mina rail corridor in the Rail Alignment EIS. In Chapter 6 of this Nevada Rail Corridor SEIS, DOE concludes that the Mina rail corridor warrants further study to determine an alignment for the construction and operation of a railroad.

On April 17, 2007, the Tribal Council for the Walker River Paiute Tribe passed a resolution withdrawing support for the Tribe's participation in the preparation of the Nevada Rail Corridor SEIS and the Rail Alignment EIS. The Tribal Council based its decision on a review of information gathered to that time and input from Tribal members. The Tribal Council's resolution also renewed the Tribe's past objection to the transportation of nuclear waste through their Reservation (DIRS 181604-Williams 2007, all). Thus, although Mina is analyzed in detail in the Rail Alignment EIS, DOE has identified the Mina Implementing Alternative as nonpreferred.

This 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 that would cause DOE to further consider these corridors. The Caliente-Chalk Mountain rail corridor, also previously analyzed in the Yucca Mountain FEIS, would conflict with the mission of the U.S. Air Force. Therefore, DOE has eliminated this corridor from further consideration and has not updated information concerning the Caliente-Chalk Mountain rail corridor in this Nevada Rail Corridor SEIS.

Chapter 5 of this Nevada Rail Corridor SEIS provides updated information and analyses for the Carlin, Jean, and Valley Modified rail corridors; Figure 1-3 shows the locations of these three rail corridors.

The updated information and analysis are intended to support Departmental conclusions about whether there are significant new circumstances or information relevant to environmental concerns for the Carlin, Jean, and Valley Modified corridors. Factors important to reaching a conclusion include the nature of the updated environmental information and associated changes to potential environmental impacts, including irreversible and irretrievable commitments of resources and cumulative impacts, since DOE completed the Yucca Mountain FEIS. Other factors include, as appropriate, changes to potential land-use conflicts and their potential to adversely affect construction of a rail line, and the potential delays that could affect the availability of a rail line in these corridors. In Chapter 6 of this Nevada Rail Corridor SEIS, DOE concludes that there are no significant new circumstances or information relevant to environmental concerns regarding these corridors. Therefore, the Rail Alignment EIS considers implementing alignment alternatives only in the Caliente and Mina corridors.

As Chapter 6 discusses, although the amount of private land within the Carlin rail corridor appears to have decreased since DOE completed the Yucca Mountain FEIS, the complex land-ownership pattern resulting from the mix of private and public lands the corridor would cross remains unchanged. Such land-use complexity increases the potential to adversely affect construction of a railroad, and increases the potential for delays that could affect the availability of a rail line in the Carlin rail corridor. In contrast, the Mina rail corridor would cross less private land, and the corresponding land-ownership pattern would be less complex. Therefore, although DOE announced its secondary preference for the Carlin rail corridor in the *Federal Register* (68 *FR* 74951, December 29, 2003), the Department has concluded that the Carlin rail corridor does not warrant further consideration at the alignment level in the Rail Alignment EIS.

1.3.1 CALIENTE RAIL CORRIDOR

In its Record of Decision (69 *FR* 18557, April 8, 2004), DOE selected the Caliente rail corridor in which to evaluate possible ***rail alignments*** for construction and operation of a railroad within Nevada. The Department decided to evaluate alignments within the Caliente corridor based, in part, on the analyses of the Yucca Mountain FEIS. The Department, however, also considered other factors such as potential for construction delays, direct and indirect costs of each alignment, and comments received from the public.

DOE also considered potential land-use conflicts and their potential to adversely affect construction of a rail line. Compared to the other four corridors, the Caliente rail corridor appeared to have the fewest land-use or other conflicts that could lead to substantial delays in acquiring the necessary land and rights-of-way, or beginning construction. The Department concluded that the Valley Modified rail corridor could conflict with the Desert National Wildlife Range and local community plans for development in the greater Las Vegas metropolitan area. The Caliente-Chalk Mountain rail corridor would conflict with the U.S. Air Force mission on the Nevada Test and Training Range. The Jean rail corridor would require crossing relatively greater amounts of private land, and would pose greater potential land-use conflicts because of its proximity to the Las Vegas metropolitan area. The Carlin rail corridor also would require crossing relatively greater amounts of private land, and little infrastructure, such as roads and electric power, is available over long segments of the corridor, which would tend to make logistics and emergency response during construction more challenging.

The Department also considered concerns expressed by members of the public in Nevada. In these comments, the public stated that DOE should avoid rail corridors in the Las Vegas Valley.

DOE also considered the direct costs of constructing and operating a railroad, and the indirect costs resulting from potential delays in the availability of the railroad. The Jean and Valley Modified rail corridors would be the shortest among the five corridors and would have the lowest estimated construction costs. The Carlin and Caliente rail corridors would be the longest and, on the basis of construction costs alone, would be more expensive to develop. However, delays in rail line construction because of land-use or other conflicts and the resulting inability to accept spent nuclear fuel and high-level radioactive waste transported by rail to the repository in a timely manner would add to both the liability costs for delayed acceptance of commercial spent nuclear fuel and the costs of continued storage of high-level radioactive waste.

The Department considered irreversible and irretrievable commitments of resources in making its decision, recognizing that resources such as electric power, fossil fuels, construction materials, and water would be consumed during rail line construction within any of the five rail corridors considered in the Yucca Mountain FEIS. On balance, DOE concluded that these commitments would not significantly diminish the resources in question.

DOE concluded that the Caliente rail corridor would be preferable to the other corridors, and therefore decided to evaluate possible alignments for the rail line connecting the repository to an existing rail line in Nevada. This evaluation is included in the Rail Alignment EIS.

1.3.2 MINA RAIL CORRIDOR

DOE had previously considered, but eliminated the Mina rail corridor from detailed study because a rail line in that corridor could only connect to an existing rail line by crossing the Walker River Paiute Reservation, and the Tribe had informed DOE that it would not allow nuclear waste to be transported across its Reservation (DIRS 182776-Collins 1991, all).

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 DOE to consider the potential impacts of constructing and operating a rail line to transport spent nuclear fuel and high-level radioactive waste across its Reservation (DIRS 182775-Williams 2006, all). 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 rail corridor (71 *FR* 60484).

The analysis of the Mina rail corridor is intended to support DOE conclusions about whether the potential attributes, characteristics, and environmental impacts of constructing and operating a railroad in that corridor are such that DOE should proceed with analyzing specific alignments within the corridor in the Rail Alignment EIS.

However, in May 2007, the Walker River Paiute Tribal Council informed DOE that it was withdrawing its support for the Tribe's participation in the preparation of the Nevada Rail Corridor SEIS and Rail Alignment EIS. The Tribal Council based its decision on a review of information gathered to that time and input from Tribal members. The Tribal Council's resolution also renewed the Tribe's past objection to the transportation of nuclear waste through its Reservation (DIRS 181604-Williams 2007, all). Accordingly, in the Rail Alignment EIS DOE has identified the Mina Implementing Alternative as nonpreferred.

1.3.3 CARLIN, JEAN, AND VALLEY MODIFIED RAIL CORRIDORS

In the Amended Notice of Intent (71 *FR* 60484, October 13, 2006), DOE also announced that it would update, as appropriate, the information and analyses for other rail corridors analyzed in the Yucca Mountain FEIS (Carlin, Jean, and Valley Modified) to identify any significant new circumstances or information relevant to environmental concerns. DOE eliminated the Caliente-Chalk Mountain rail corridor, which would intersect the Nevada Test and Training Range, from detailed study because of U.S. Air Force concerns that a rail line within the Range would interfere with the military's mission; therefore, DOE did not include the Caliente-Chalk Mountain rail corridor in this Nevada Rail Corridor SEIS.

Chapter 5 of this Nevada Rail Corridor SEIS provides updated information and analyses for the Carlin, Jean, and Valley Modified rail corridors.

The updated information and analyses for the Carlin, Jean, and Valley Modified rail corridors are intended to support Departmental conclusions about the status of those corridors and whether, based on environmental considerations, any of those corridors should be further analyzed at the alignment level. In Chapter 6 of this Nevada Rail Corridor SEIS, DOE concludes that there are no significant new circumstances or information relevant to environmental concerns that would warrant further consideration of the Carlin, Jean, or Valley Modified rail corridors at the alignment level. DOE also concludes that the Mina rail corridor warrants further study to determine an alignment for the construction and operation of a railroad.

1.4 Cooperating Agencies

Pursuant to the NWPA, DOE is responsible for the disposal of spent nuclear fuel and high-level radioactive waste to protect public health, safety, and the environment, and for developing and implementing a plan for transporting spent nuclear fuel and high-level radioactive waste to a repository at Yucca Mountain. Council on Environmental Quality 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), the Surface

Transportation Board (STB), and the U.S. Air Force are federal cooperating agencies in the development of this Nevada Rail Corridor SEIS, pursuant to Council on Environmental Quality regulations, and have participated in the preparation of this Nevada Rail Corridor SEIS. Since the Draft Nevada Rail Corridor SEIS and the 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 the role of cooperating agencies in the development of this Nevada Rail Corridor SEIS, pursuant to Council on Environmental Quality regulations, and have participated in the preparation of this Final Nevada Rail Corridor SEIS. The BLM and the STB and could adopt the Nevada Rail Corridor SEIS and the 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, the STB, and the U.S. Air Force have management and regulatory authority over lands and resources that would be crossed by or be close to the proposed railroad or they have special expertise related to the Proposed Action.

During preparation of the Nevada Rail Corridor SEIS, DOE interacted with the Walker River Paiute Tribe, other federal agencies, and Nevada state and local government agencies. For a description of intergovernmental and stakeholder interactions, see Appendix B.

1.4.1 BUREAU OF LAND MANAGEMENT

The BLM is an agency within the U.S. Department of the Interior and is responsible for administering more than 1 million square kilometers (250 million acres) of public lands, mostly in 12 western states, including Alaska. Congress enacted the Federal Land Policy and Management Act (43 U.S.C. 1701 *et seq*.) "to establish public land policy; to establish guidelines for its administration; to provide for the management, protection, development, and enhancement of the public lands; and for other purposes." It is the primary legislation guiding the BLM in its responsibility to manage the public lands and resources in a combination of ways that best serve the present and future needs of the American people.

Resource management plan: A land-use plan for public lands as described by the Federal Land Management and Policy Act. Among other things, it establishes land areas for limited, restricted, or exclusive use; allowable resource uses; resource condition goals and objectives; general management practices to achieve the goals; the need for more specific management plans for certain areas; general implementation sequences; and monitoring intervals and standards (43 CFR Part 1610).

To construct that portion of the proposed rail line that would cross public land, DOE must obtain a right-of-way from the BLM. BLM regulations at 43 CFR Part 2800 establish the procedures for processing right-of-way applications from federal agencies. Although DOE has not made a decision to construct the railroad, DOE has submitted a right-of-way application to the BLM on March 4, 2008 (DIRS 185486-Larson 2008, all). The right-of-way application includes public land required for the rail line, access roads, ***construction camps***, water wells, and other facilities that would be part of the proposed railroad. The BLM may adopt this Nevada Rail Corridor SEIS and the Rail Alignment EIS, as authorized by Council on Environmental Quality regulations (40 CFR 1506.3) to satisfy its NEPA requirements for the right-of-way application. ***Right-of-way grants*** on public lands must be consistent with the applicable BLM ***resource management plan***(s). The BLM is a cooperating agency in the preparation of this Nevada Rail Corridor SEIS and the Rail Alignment EIS and could adopt and use the document to process a DOE right-of-way application for access to the public lands that would be required for construction and operation of the proposed railroad. The procedures for BLM adoption of another agency's EIS (*National Environmental Policy Act Handbook*, BLM Handbook H-1790-1; DIRS 182299-BLM 1988, all) specify that the BLM conduct an independent review of the EIS and issue its own Record of Decision. Cooperating agency status provides the BLM the opportunity to work closely with

DOE during development of this Nevada Rail Corridor SEIS and the Rail Alignment EIS to encourage a product that meets the NEPA requirements for processing a right-of-way application.

1.4.2 SURFACE TRANSPORTATION BOARD

The STB is a regulatory agency that Congress charged with the fundamental missions of resolving railroad rate and service disputes and reviewing proposed railroad construction, acquisitions, mergers, and abandonments. The STB is decisionally independent, although it is administratively affiliated with the U.S. Department of Transportation. The ICC [Interstate Commerce Commission] Termination Act of 1995 (Public Law No. 104-88) created the STB, which is the successor agency to the Interstate Commerce Commission.

The STB has jurisdiction over railroad rate and service issues, and rail structuring transactions such as new line construction, line sales, line abandonments, and railroad mergers. The STB also has jurisdiction over common-carrier rail lines that are part of the interstate rail network. A common-carrier rail line is one that holds itself out to the public for service and has an obligation to provide rail service to any and all shippers that request service along that line.

If the proposed railroad is to be operated as a common-carrier rail line (referred to as shared use in this Nevada Rail Corridor SEIS), the Department would have to obtain a certificate of public convenience and necessity to construct and operate the railroad from the STB. Although DOE has not made a decision whether to construct and operate the railroad, DOE has submitted, on March 17, 2008, an application to the STB for a certificate of public convenience and necessity to construct and operate the proposed railroad as a common-carrier railroad (DIRS 185339-Vandeberg 2008, all). As part of its review process, the STB must consider the environmental effects of railroad construction and operations. The STB's Section of Environmental Analysis is responsible for preparing the appropriate NEPA documentation for railroad construction and operations under the jurisdiction of the STB. If any NEPA documentation were required in addition to this Nevada Rail Corridor SEIS to support an STB decision on whether to issue a certificate of public convenience and necessity, the STB would prepare that additional NEPA documentation.

1.4.3 U.S. AIR FORCE

The mission of the U.S. Air Force, in conjunction with the other armed services, is to preserve the peace and security and provide for the defense of the United States, its Territories, Commonwealths, and possessions, and any U.S.-occupied areas. The U.S. Air Force agreed to become a cooperating agency as a consequence of its jurisdiction over airspace and land associated with the Nevada Test and Training Range that would have been affected by one or more of the potential rail line options (segments) analyzed in this Nevada Rail Corridor SEIS and the Rail Alignment EIS. DOE coordinates with and, at times, obtains approval from the responsible armed service when DOE actions might encroach on U.S. Department of Defense land and potentially affect military operations. Although DOE has decided not to pursue potential rail line options that would have entered the Nevada Test and Training Range, DOE is coordinating with the U.S. Air Force (for example, on the nature, extent, and location of U.S. Air Force overflights) to minimize impacts of the proposed rail line to the U.S. Air Force mission. In addition, the U.S. Air Force offers special expertise associated with portions of the rail corridors near the Nevada Test and Training Range.

1.4.4 NYE COUNTY

Nye County, Nevada, is the situs jurisdiction of the Yucca Mountain Repository and would contain portions of the proposed railroad. Nye County has special expertise on the relationship of DOE's

Proposed Action to the objectives of regional and local land-use plans, policies and controls, and to the current and planned infrastructure in the county, including public services and traffic conditions. Subsequent to the release of the Draft Nevada Rail Corridor SEIS, DOE invited and Nye County accepted cooperating agency status on this Nevada Rail Corridor SEIS and the Rail Alignment EIS. Consistent with Council on Environmental Quality regulations and guidance on cooperating agencies, Nye County accepts and acknowledges DOE's authority as the lead agency for the Yucca Mountain Project. Participation as a cooperating agency is consistent with the stated county policy of constructive engagement with DOE (Nye County Board of Commissioners Resolution No. 2002-22) and with the objectives of the county's Community Protection Plan (approved August 2006). Representatives from Nye County attended public, project, and technical working group meetings; participated on interdisciplinary teams; compiled and provided socioeconomic data such as population, housing, and other forecasting information; provided relevant reports and studies prepared or conducted by the county; assisted with the identification of environmental issues and with environmental analyses; reviewed working draft and preliminary draft documents; and assisted with the resolution of comments.

1.4.5 ESMERALDA COUNTY

Esmeralda County, Nevada, would contain portions of the proposed railroad and has special expertise on the relationship of DOE's Proposed Action to the objectives of regional and local land-use plans, policies and controls, and to the current and planned infrastructure in the county, including public services and traffic conditions. Subsequent to the release of the Draft Nevada Rail Corridor SEIS, DOE invited and Esmeralda County accepted cooperating agency status on this Nevada Rail Corridor SEIS and the Rail Alignment EIS. Consistent with Council on Environmental Quality regulations and guidance on cooperating agencies, Esmeralda County accepts and acknowledges DOE's authority as the lead agency for the Yucca Mountain Project. Representatives from Esmeralda County attended public, project, and technical working group meetings; participated on interdisciplinary teams; compiled and provided socioeconomic data such as population, housing, and other forecasting information; provided relevant reports and studies prepared or conducted by the county; assisted with the identification of environmental issues and with environmental analyses; reviewed working draft and preliminary draft documents; and assisted with the resolution of comments.

1.4.6 LINCOLN COUNTY

Lincoln County, Nevada, would contain portions of the proposed railroad and has special expertise on the relationship of DOE's Proposed Action to the objectives of regional and local land-use plans, policies and controls, and to the current and planned infrastructure in the county, including public services and traffic conditions. Subsequent to the release of the Draft Nevada Rail Corridor SEIS, DOE invited and Lincoln County accepted cooperating agency status on this Nevada Rail Corridor SEIS and the Rail Alignment EIS. Consistent with Council on Environmental Quality regulations and guidance on cooperating agencies, Lincoln County accepts and acknowledges DOE's authority as the lead agency for the Yucca Mountain Project. Representatives from Lincoln County attended public, project, and technical working group meetings; participated on interdisciplinary teams; compiled and provided socioeconomic data such as population, housing, and other forecasting information; provided relevant reports and studies prepared or conducted by the county; assisted with the identification of environmental issues and with environmental analyses; reviewed working draft and preliminary draft documents; and assisted with the resolution of comments.

1.4.7 CITY OF CALIENTE

The City of Caliente, Nevada, would contain portions of the proposed railroad and has special expertise on the relationship of DOE's Proposed Action to the objectives of local land-use plans, policies and controls, and to the current and planned infrastructure in the city, including public services and traffic conditions. Subsequent to the release of the Draft Nevada Rail Corridor SEIS, DOE invited and the City of Caliente accepted cooperating agency status on this Nevada Rail Corridor SEIS and the Rail Alignment EIS. Consistent with Council on Environmental Quality regulations and guidance on cooperating agencies, the City of Caliente accepts and acknowledges DOE's authority as the lead agency for the Yucca Mountain Project. Representatives from the City of Caliente attended public, project, and technical working group meetings; participated on interdisciplinary teams; compiled and provided socioeconomic data such as population, housing, and other forecasting information; provided relevant reports and studies prepared or conducted by the city; assisted with the identification of environmental issues and with environmental analyses; reviewed working draft and preliminary draft documents; and assisted with the resolution of comments.

1.5 National Environmental Policy Act Process

The Council on Environmental Quality regulations (40 CFR Parts 1500 through 1508) that implement the procedural requirements of NEPA and DOE NEPA regulations (10 CFR Part 1021) provide procedures to use when preparing an EIS. A major emphasis of the NEPA process is to promote public awareness of the environmental impacts of the proposed action and its alternatives and to provide opportunities for public involvement. This is accomplished in a series of steps: (1) by publishing a Notice of Intent to prepare an EIS and implementing a process known as "public scoping," as further discussed in Section 1.5.1, whereby comments are solicited from federal, state, and local agencies, American Indian tribes and organizations, other organizations, and the general public to assist in defining the proposed action, alternatives, and impacts and issues requiring analysis; (2) by preparing a Draft EIS for public review and comment; (3) by preparing a Final EIS that incorporates and responds to all substantive comments received on the Draft EIS; and (4) by preparing a Record of Decision to announce the agency's decision on a project and explain the reasons for the decision.

1.5.1 DEPARTMENT OF ENERGY NOTICES OF INTENT AND SCOPING MEETINGS

On April 8, 2004, DOE published a Notice of Intent (69 *FR* 18565) announcing that it would prepare an EIS for the alignment, construction, and operation of a railroad (called the rail line in the Notice of Intent) for the shipment of spent nuclear fuel, high-level radioactive waste, and other materials from a site near Caliente, Lincoln County, Nevada, to a geologic repository at Yucca Mountain, Nye County, Nevada. The Notice also announced the schedule for public scoping meetings, and invited and encouraged comments on the scope of the Rail Alignment EIS to ensure that all relevant environmental issues and reasonable alternatives would be addressed. To facilitate the scoping process, in the Notice of Intent DOE identified a preliminary list of issues and environmental resources that might be considered in the Rail Alignment EIS, and specifically invited comments on the following six questions to help define the scope of the EIS:

1. Should additional alternatives be considered that might minimize, avoid, or mitigate adverse environmental impacts (for example, looking beyond the corridor, avoiding ***Wilderness Study Areas***, American Indian trust lands, or encroachment on the Nevada Test and Training Range)?
2. Should any of the preliminary alternatives be eliminated from detailed consideration?
3. Should additional environmental resources be considered?
4. Should DOE allow private entities to ship commercial commodities on its rail line?
5. What mitigation measures should be considered?
6. Are there national security issues that should be addressed?

The scoping comment period began with publication of the Notice of Intent in the *Federal Register* and was originally scheduled to close on May 24, 2004. In response to a request from the State of Nevada, DOE extended the comment period by 7 days, to June 1, 2004 (69 *FR* 22496, April 26, 2004), bringing the total length of the scoping comment period to 55 days. DOE held five public scoping meetings on the Rail Alignment EIS at the following locations on the following dates in Nevada:

- Amargosa Valley, NV – Longstreet Hotel Casino, Nevada State Highway 373, May 3, 2004
- Goldfield, NV – Goldfield Community Center, 301 Crook Street, May 4, 2004
- Caliente, NV – Caliente Youth Center, U.S. Highway 93, May 5, 2004
- Reno, NV – University of Nevada, Reno, Fifteenth and North Virginia, May 12, 2004
- Las Vegas, NV – Cashman Center, 850 North Las Vegas Boulevard, May 17, 2004

In addition to the *Federal Register* notices announcing the meetings, DOE advertised the meetings in five local newspapers that have a total circulation of approximately 250,000; sent four separate press releases to media outlets, industry, and stakeholders; mailed several thousand letters to stakeholders, members of the public, and other interested parties; and distributed over 1,000 handbills in Esmeralda, Lincoln, and Nye Counties.

DOE conducted the public scoping meetings in an open-house format. Members of the public were invited to attend the meetings at their convenience, any time during meeting hours, and submit their comments in writing at the meeting, or in person to a court reporter who was available throughout the meeting. The open-house format provided for one-on-one discussions with DOE representatives responsible for the preparation of the Rail Alignment EIS. Approximately 440 people (number is approximate because some attendees did not sign in) attended the meetings and 86 submitted oral comments (that the court reporters transcribed) on the scope of the EIS.

DOE considered all comments received during the scoping comment period on the scope of the Rail Alignment EIS, along with information BLM received, including results of interviews with grazing allotment permittees and other interested parties documented in *Proposed Yucca Mountain Corridor Affected Grazing Permittees* (DIRS 173845-Resource Concepts 2005, all). DOE sponsored an American Indian perspectives document in *American Indian Perspectives on the Proposed Rail Alignment Environmental Impact Statement for the U.S. Department of Energy's Yucca Mountain Project* (the American Indian Resource Document; DIRS 174205-Kane et al. 2005, all) (see section 1.5.3). DOE also considered information obtained through sources such as interviews with officials from Lincoln and Nye Counties.

On October 13, 2006, after a preliminary evaluation of the feasibility of the Mina rail corridor (DIRS 180222-BSC 2006, all), DOE announced its intent to expand the scope of the Rail Alignment EIS to include the Mina rail corridor as an alternative (*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). DOE specifically invited comments on the following four questions relative to the Mina rail corridor to help define the scope of the analysis:

1. Should additional alternative alignments (now called alternative segments) be considered that might minimize, avoid, or mitigate adverse environmental impacts (for example, looking beyond the Mina rail corridor, avoiding environmentally sensitive areas)?
2. Should any of the preliminary alternatives be eliminated from detailed consideration?
3. Should additional environmental resources be considered?
4. What mitigation measures should be considered?

In addition, DOE indicated interest in identifying any significant changes to, or significant new information relevant to, the rail corridors analyzed in the Yucca Mountain FEIS.

The second scoping comment period began with publication of the Amended Notice of Intent in the *Federal Register* and was originally scheduled to close on November 27, 2006. In response to requests from the public, DOE extended the comment period by 15 days, to December 12, 2006 (71 *FR* 65785, November 9, 2006), bringing the total length of the scoping comment period to 61 days. DOE held eight public scoping meetings during the second public scoping period at the following locations on the following dates in Nevada and Washington, D.C.:

- Washington, D.C. – L'Enfant Plaza Hotel, 480 L'Enfant Plaza, SW, October 30, 2006
- Amargosa Valley, NV – Longstreet Hotel Casino, Nevada State Highway 373, November 1, 2006
- Las Vegas, NV – Cashman Center, 850 North Las Vegas Boulevard, November 2, 2006
- Caliente, NV – Caliente Youth Center, U.S. Highway 93, November 8, 2006
- Goldfield, NV – Goldfield School Gymnasium, Hall and Euclid, November 13, 2006
- Hawthorne, NV – Hawthorne Convention Center, 932 E. Street, November 14, 2006
- Fallon, NV – Fallon Convention Center, 100 Campus Way, November 15, 2006
- Reno, NV – University of Nevada, Reno, Lawlor Event Center, 1500 N. Virginia Street, November 27, 2006

In addition to the *Federal Register* notices announcing the meetings, DOE advertised the meetings in eight local newspapers, including the *Washington Post*. Total circulation of the newspapers is approximately 280,000 plus an additional 750,000 for the *Washington Post*. DOE sent four separate press releases to media outlets, industry, and stakeholders; mailed several thousand letters to stakeholders, members of the public, and other interested parties; and distributed over 1,300 handbills in Washoe, Churchill, Lyon, Mineral, Esmeralda, Lincoln, and Nye Counties.

DOE conducted the public scoping meetings in an open-house format. Members of the public were invited to attend the meetings at their convenience, any time during meeting hours, and submit their comments in writing at the meeting, or in person to a court reporter who was available throughout the meeting. The open-house format provided for one-on-one discussions with DOE representatives responsible for the preparation of this Nevada Rail Corridor SEIS and the Rail Alignment EIS. Approximately 330 people (number is approximate because some attendees did not sign in) attended the meetings, and 63 submitted oral comments (that the court reporters transcribed) on the scope of the expanded NEPA analysis.

1.5.2 PUBLIC SCOPING COMMENTS

DOE received more than 4,100 comments during the first public scoping period for the Rail Alignment EIS, and some after the close of the scoping period. DOE summarized all comments received in *Summary of Public Scoping Comments, Related to the Environmental Impact Statement for the Alignment, Construction, and Operation of a Rail Line to a Geologic Repository at Yucca Mountain, Nye County, NV* (DIRS 176463-Craig, Lechel, and Morton 2004, all) and considered the content of all substantive comments in determining the scope of the Rail Alignment 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 corridor. Compelling arguments were presented in comments that the Mina rail corridor should be given a full evaluation.

The scoping period for this expanded NEPA document (this Nevada Rail Corridor SEIS and the Rail Alignment EIS) began on October 13, 2006, and ended on December 12, 2006. DOE received approximately 790 comments during this second public scoping period, and some comments after the close of the scoping period. DOE summarized all comments received (including those submitted after the close of the scoping period) in *Summary of Public Scoping Comments on the Expanded 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* (DIRS 181379-DOE 2007, all) and considered the content of all comments in determining the scope of this expanded NEPA analysis.

Many of the comments received were applicable to this expanded EIS, including the Mina rail corridor, and the review of the Carlin, Jean, and Valley Modified rail corridors (Nevada Rail Corridor SEIS). Other comments related to the Repository SEIS (DOE/EIS-0250F-S1).

Table 1-1 summarizes the public scoping comments DOE received during both scoping periods held in 2004 and 2006, as they relate to corridor identification and evaluation.

1.5.3 TRIBAL INTERACTIONS MEETINGS

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.

The Native American Interaction Program concentrates on the protection of cultural resources at Yucca Mountain and contributes to a government-to-government relationship with the tribes and organizations. Its purpose is to help DOE comply with various federal laws and regulations, including the American Indian Religious Freedom Act (42 U.S.C. 1996); the Archaeological Resources Protection Act (16 U.S.C. 470aa *et seq*.); the National Historic Preservation Act (16 U.S.C. 470 *et seq*.); the Native American Graves Protection and Repatriation Act (25 U.S.C. 3001); the American Indian and Alaska Native Tribal Government Policy; DOE Order 1230.2, *American Indian and Tribal Government Policy*; Executive Order 13007, *Indian Sacred Sites*, and Executive Order 13084, *Consultation and Coordination with Indian Tribal Governments*. These regulations and Executive Orders mandate the protection of archaeological sites and cultural items and require agencies to include American Indians and federally recognized tribes in discussions and interactions on major federal actions.

Initial ethnographic studies identified three tribal groups – the Southern Paiute, the Western Shoshone, and the Owens Valley Paiute and Shoshone – whose cultural heritage includes the Yucca Mountain region. Additional ethnographic efforts eventually led to the involvement of 17 tribes and organizations in the Yucca Mountain Project American Indian and cultural resource studies.

The 17 tribes and organizations have formed the Consolidated Group of Tribes and Organizations, which consists of tribal representatives who are responsible for presenting their respective tribal concerns and perspectives to DOE. A major priority of the Group has been the protection of cultural resources and environmental restoration at Yucca Mountain. Members of the Consolidated Group of Tribes and Organizations have participated in many ethnographic interviews and have provided DOE valuable insights into American Indian cultural and religious values and beliefs. These interactions 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 rail alignment project and learn of its members' concerns.

Table 1-1. Public comments specific to this Nevada Rail Corridor SEIS resulting from the 2004 and 2006 scoping periods (page 1 of 3).

Comment issue	Scoping comment summary	DOE comment summary response
Basis of corridor selection	Commenters sought clarification for, or questioned the basis of, the DOE decision to select the Caliente corridor. Commenters also questioned the basis for not selecting the other corridors such as Valley Modified or Caliente Chalk-Mountain.	On December 29, 2003, DOE announced it preference for the Caliente corridor (68 *FR* 74951). In that announcement, the Department also announced the Carlin corridor as its secondary preference. On April 8, 2004, the Department issued a *Federal Register* Notice that documented the detailed bases for the rail corridor decision. In large part the decision was based on the preference to avoid and minimize crossing of private lands.
Scope of Rail Alignment EIS	Two commenters suggested that before completing the comparative analysis of impacts of the Caliente, Mina, and No-Action Alternatives, DOE should update and distribute in draft form its comparative analysis of all previously considered rail routes (Carlin, Jean, and Valley Modified). This report should be the basis for development of the EIS and be a justification for inclusion or elimination of a particular route.	In its October 13, 2006, *Federal Register* Notice (71 *FR* 60484), DOE announced its intent to expand the scope of the *Environmental Impact Statement for the Alignment, Construction, and Operation of a Rail Line to a Geologic Repository at Yucca Mountain, Nye County, Nevada*. Part of the intended expanded scope of the EIS was to proceed with the review of the environmental analyses presented in the Yucca Mountain FEIS for the Carlin, Jean, and Valley Modified corridors along with changes in the affected environment. As appropriate the environmental information and analyses were updated. This information is presented in Chapter 5 of this Nevada Rail Corridor SEIS.
Carlin corridor	A few commenters preferred the Carlin rail corridor to either the Mina or Caliente rail corridor because Carlin would be more protected and have less chance of sabotage. The EIS should address the concerns raised by Eureka County in its 2001 report on the Carlin rail corridor (see www.yuccamountain.org/impact01.htm). Activities at Barrick Gold Mines' property in Crescent Valley have increased substantially since the Yucca Mountain FEIS was released. Other mining activities are occurring near Beowawe and it is possible that this part of Eureka County could one day rival the famous Carlin trend farther east near Elko.	The environmental information and analyses for the Carlin corridor have been reviewed and updated as appropriate. Based on these reviews and updates, the Department had found that for the most part, the environmental conditions and associated environmental impacts for each of the original corridors, including Carlin, remain unchanged from, or are substantially similar to, those reported in the Yucca Mountain FEIS. A DOE alignment-level evaluation of potential impacts from possible sabotage indicated that such impacts would not be a discriminator in the selection of a rail alignment, and, therefore, would not be a discriminator in the selection of a rail corridor. Potential impacts from possible sabotage would be the same for any corridor. DOE acquired the cited Eureka County report and factored the information provided into its review of the Carlin corridor. Changes as appropriate can be found in Section 5.2 of this Nevada Rail Corridor SEIS. DOE noted that potential land-use conflicts in the Carlin corridor have increased since publication of the Yucca Mountain FEIS.
Jean corridor	One commenter preferred the Jean rail corridor because it would be the least expensive to construct.	DOE reviewed and updated the environmental information and impact analyses reported in the Yucca Mountain FEIS, as appropriate. DOE found that potential land-use conflicts and air quality concerns have increased since the Department completed the Yucca Mountain FEIS conflicts.

Table 1-1. Public comments specific to this Nevada Rail Corridor SEIS resulting from the 2004 and 2006 scoping periods (page 2 of 3).

Comment issue	Scoping comment summary	DOE comment summary response
Valley Modified corridor	The EIS should consider substantial changes that have occurred elsewhere in Clark County relative to the Department's continued consideration of routes other than Mina and Caliente. Annexation of land by both the City of North Las Vegas and the City of Henderson, as well as privatization of BLM lands in the valley, have resulted in substantial real and planned changes since issuance of the Yucca Mountain FEIS. The development of the Ivanpah Airport in the southwestern part of Clark County should also be taken into consideration when evaluating both rail and truck routes.	DOE reviewed land-use changes for the Carlin, Jean, and Valley Modified rail corridors and updated that information. Section 5.4.1 of this Nevada Rail Corridor SEIS reports updated land-use information for the Valley Modified rail corridor; the Ivanpah Airport is addressed under several resource categories.
Changes in land use in Las Vegas and Clark county since 2002	The EIS should consider the many land-use changes that have occurred in the Las Vegas metropolitan area since the Yucca Mountain FEIS was released. For example, as of June 2006, there were 105 projects planned or being built within 1 mile of the existing Union Pacific Railroad, I-15, State Route 160, and the beltway. Within this area are 132,951 housing units and 33,368,223 square feet of commercial property.	DOE reviewed land-use changes for the Carlin, Jean, and Valley Modified rail corridors and updated that information. Section 5.4.1 of this Nevada Rail Corridor SEIS reports updated land-use information for the Valley Modified rail corridor; the Ivanpah Airport is addressed under several resource categories.
Chalk Mountain corridor	Several commenters suggested that national security concerns by themselves should not have eliminated the Caliente Chalk-Mountain corridor.	In a letter to the U.S. Air Force (dated December 1, 2004), DOE eliminated from detailed study alignments within the Caliente rail corridor that would intersect the Nevada Test and Training Range because of concerns regarding military readiness testing and training activities. This letter was in response to a May 28, 2004, letter from the U.S. Air Force. DOE based its decision not to provide updates for the Caliente-Chalk Mountain rail corridor on the same rationale.

Table 1-1. Public comments specific to this Nevada Rail Corridor SEIS resulting from the 2004 and 2006 scoping periods (page 3 of 3).

Comment issue	Scoping comment summary	DOE comment summary response
Suggested new routes and routes eliminated in 2002	Several commenters suggested new rail line routes to Yucca Mountain and alternatives to rail transport. One person suggested a new rail corridor originating from Baker, California, and extending through Death Valley Junction to Yucca Mountain. According to the commenter, this corridor would be shorter than the Mina rail corridor and easier to construct. Another commenter said that a rail route through the Tonopah Test Range would be reasonable considering that the Range will be closing in 2010. Another person suggested a rail route from Fallon southward through Gabbs Valley. Another person said that a route through the Nevada Test Site should be used, along with part of the Caliente corridor. One person questioned why the shortest distance to Yucca Mountain, via a 100-mile-long rail line through the Las Vegas Valley, was not being considered. One person suggested that all possible corridors to Yucca Mountain be considered in the EIS (such as one from Barstow, California, and Apex, Nevada), including those previously examined in the Yucca Mountain FEIS. One commenter requested that DOE study the Feather River rail line as an alternative to the Donner Pass rail line that passes through Reno. One commenter said that DOE should eliminate those routes that had already been eliminated in the Yucca Mountain FEIS, and focus only on the Mina and Caliente rail corridors. According to this commenter, there is no reason for DOE to reconsider in this EIS its decision that the Caliente corridor is preferred to the other four corridors previously evaluated; to do so would add unnecessary cost and complexity to preparation of the ongoing EIS and delay its issuance.	Most of the routes suggested in these scoping comments were eliminated from consideration for reasons similar to those for eliminating routes considered in the 1990 *Preliminary Rail Access Study* (DIRS 104792-YMP 1990, all). Over the years, DOE has evaluated numerous rail corridor modes for transporting spent nuclear fuel and high-level radioactive was to Yucca Mountain. Before DOE prepared the Yucca Mountain FEIS, the Department identified 10 potential rail line routes to Yucca Mountain (Valley, Arden, Crucero, Ludlow, Mina, Caliente, Carlin, Cherry Creek and Dike) in the 1990 *Preliminary Rail Access Study* (DIRS 104792-YMP 1990, all). Options within each route were developed wherever possible. The routes were chosen to maximize the use of federal lands, provide access to regional rail carriers, avoid obvious land-use conflicts, and meet current rail line engineering practices. After the development of these rail routes, Lincoln County and the City of Caliente identified three additional routes (identified as Lincoln County Routes A, B, and C). DOE evaluated the 10 rail line routes plus Lincoln County A, B, and C, for a total of 13 routes. In 1995 DOE reevaluated the routes in the *Nevada Potential Repository Preliminary Transportation Strategy, Study* 1 (DIRS 104795-CRWMS M&O 1995, all) and in the second part of the study in 1996 (DIRS 101214-CRWMS M&O 1996, all). One new route, Valley Modified, was added in the 1995 study based on updated information from the Bureau of Land Management. Three additional alignments – Caliente-Chalk Mountain, Elgin/Rox, and Hancock Summit-were evaluated in the *Nevada Potential Repository Preliminary Assessment of the Caliente-Chalk Mountain Rail Corridor* (DIRS 132219-CRWMS M&O 1997, all). The evaluation reviewed each potential rail corridor to identify land-use issues and access to regional carriers. The evaluations compared other factors for the routes, including favorable topography and avoidance of lands withdrawn from public use by federal action. DOE eliminated the Valley, Arden, Crucero, Ludlow, Mina, Cherry Creek, Dike, Elgin/Rox, Hancock Summit, and Lincoln County A, B, and C rail routes from further study. In 1995 (DIRS 104795-CRWMS M&O 1995, all) and 1996 (DIRS 101214-CRWMS M&O 1996, all) studies DOE determined that the Mina and Cherry Creek rail corridors should be assigned a status of "Eliminated from Detailed Evaluation – Monitor." For the most part, the environmental conditions and associated potential environmental impacts for each rail corridor remain unchanged from, or are substantially similar to, those considered in the Yucca Mountain FEIS. For these reasons, DOE concludes there are no significant new circumstances or information relevant to environmental concerns that would warrant further consideration of these three rail corridors at the alignment level. DOE did not update the information and analysis for the Caliente-Chalk Mountain rail corridor.

In October 2004, a group of designated tribal representatives participated with DOE representatives in a field reconnaissance trip along the proposed rail alignment, followed by a meeting with the consolidated group in late November 2004. Based on these efforts, these tribal representatives known as the American Indian Writers Subgroup, a subgroup of the Consolidated Group of Tribes and Organizations, prepared the American Indian Resource Document (DIRS 174205-Kane et al. 2005, all). This document provides 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, Nevada. This document is a supplement to the American Indian Writers Subgroup document produced in 1998 titled *American Indian Perspectives on the Yucca Mountain Site Characterization Project and the Repository Environmental Impact Statement* (DIRS 102043-AIWS 1998, all).

In July 2005, DOE held a tribal update meeting with the Consolidated Group of Tribes and Organizations. The rail alignment project and the document prepared by the American Indian Writers Subgroup were topics of discussion. In September 2005, DOE held a special meeting with the Group for discussions on the Environmental Assessment associated with a DOE request for the Public Land Order and associated regulatory actions. In April 2006, DOE again met with the American Indian Writers Subgroup for continued discussions and updates on the Caliente rail alignment. After each meeting the tribal representatives prepared a series of recommendations for DOE consideration. DOE received recommendations, categorized them, and assigned personnel to respond to the recommendations. On November 29, 2006, DOE met with the Group to present the proposed inclusion of the Mina rail corridor for analysis in this Nevada Rail Corridor SEIS and in the Rail Alignment EIS and to provide an update on the ongoing analysis of the Caliente rail alignment.

DOE met with Walker River Paiute tribal representatives on several occasions in 2006 and 2007 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.

1.5.4 DRAFT EIS PUBLIC COMMENT PROCESS AND PUBLIC HEARINGS

On October 12, 2007, the Environmental Protection Agency 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, and announced the schedule for public hearings. DOE made the NEPA documents available on the Internet, sent copies of the Summary or the full Draft EIS to everyone on the project mailing list, and made the documents available in five reading rooms in Nevada and one in Washington, D.C. DOE distributed approximately 3,700 copies of the Summary and approximately 400 full copies of the Draft EIS.

DOE held eight public hearings on the Draft Repository SEIS, and Draft Nevada Rail Corridor SEIS and Draft Rail Alignment EIS at the following locations in Nevada, California, and Washington, D.C.:

- Hawthorne, NV – Hawthorne Convention Center, 932 E. Street, November 13, 2007
- Caliente, NV – Caliente Youth Center, U.S. Highway 93, November 15, 2007
- Reno/Sparks, NV – Reno/Sparks Convention Center, 4590 South Virginia Street, November 19, 2007
- Amargosa Valley, NV – Longstreet Inn and Casino, Nevada State Highway 373, November 26, 2007
- Goldfield, NV – Goldfield School Gymnasium, Hall and Euclid, November 27, 2007
- Lone Pine, CA – Statham Hall, 138 North Jackson Street, November 29, 2007

- Las Vegas, NV – Cashman Center, 850 North Las Vegas Boulevard, December 3, 2007
- Washington, D.C. – Marriott at Metro Center, 775 12th Street, NW, December 5, 2007

DOE conducted the public hearings in a format in which the first hour was reserved for open-house interactions, where members of the public could engage DOE representatives in discussions followed by a formal oral statement process. DOE also provided public hearing attendees the opportunity to submit comments in writing at the hearing or in person with a court reporter who was available throughout the hearing. 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 in Pahrump on November 27, 2007 to take comments on the NEPA documents.

In total, DOE received approximately 4,000 comments on the NEPA documents from nearly 1,100 commenters. DOE reviewed all the comments for applicability to each of the NEPA documents. Approximately 255 of these comments were on the Nevada Rail Corridor SEIS. DOE has prepared a Comment-Response Document for the Draft Nevada Rail Corridor SEIS (Volume V of this Final Nevada Rail Corridor SEIS) that addresses the issues raised during the public comment period. DOE considered all comments that were received, including those that came after the close of 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 Draft Nevada Rail Corridor SEIS analysis resulting from the comments in this Final Nevada Rail Corridor SEIS. Changes to sections of the Final Nevada Rail Corridor SEIS resulting from comments on the Draft Nevada Rail Corridor SEIS are noted in the responses in the Comment-Response Document. The comments received from the public during the comment period identified a variety of key issues for the Draft Nevada Rail Corridor SEIS. The key issues cover the inclusion of the Mina rail corridor in the EIS and suggestions that the STB should be the lead agency for preparation of the EIS. DOE also received comments on a number of other key issues – Environmental Justice, Mitigation Measures and Compensation, No-Action Alternative, and others – that apply to the Nevada Rail Corridor SEIS or the Rail Alignment EIS. These key issues are described in the Introduction to the Comment-Response Document.

1.5.5 CHANGES MADE TO THE DRAFT NEVADA RAIL CORRIDOR SEIS

The Final Nevada Rail Corridor SEIS reflects changes DOE 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 new 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.

1.6 Relationship to Other Environmental Documents

On October 13, 2006, the Department announced its intent to prepare a Supplement to the Yucca Mountain FEIS (DOE/EIS-0250F-S1), consistent with NEPA and NWPA, to evaluate the potential environmental impacts of the current repository design and operational plans (71 *FR* 60490). As stated in the Foreword to this Nevada Rail Corridor SEIS and the Rail Alignment EIS, the Repository SEIS supplements the Yucca Mountain FEIS and considers the full scope of potential environmental impacts associated with the construction and operation of the repository, except for those transportation-related elements that were eliminated from the Department's Proposed Action (such as the mostly legal-weight truck scenario) by the 2004 Record of Decision. Therefore, under the Repository SEIS Proposed Action, DOE would construct, operate and monitor, and eventually close a repository at Yucca Mountain.

During repository operations, most shipments of spent nuclear fuel and high-level radioactive waste would arrive at the repository by rail, and in Nevada such shipments would be via a rail line constructed within either the Caliente or the Mina rail corridors. Accordingly, the Repository SEIS analyzes the potential environmental impacts from the construction, operation, and closure of the repository, and updates the analysis of the impacts of shipping most spent nuclear fuel and high-level radioactive waste by rail.

This Nevada Rail Corridor SEIS supplements the Yucca Mountain FEIS, to the extent that it analyzes the potential impacts of constructing and operating a rail line to connect the Yucca Mountain repository site to an existing rail line near Wabuska, Nevada (in the Mina rail corridor). This Nevada Rail Corridor SEIS analyzes the Mina rail corridor at a level of detail commensurate with that of the rail corridors analyzed in the Yucca Mountain FEIS. It also updates relevant information regarding the other rail corridors analyzed in the Yucca Mountain FEIS (Carlin, Jean, and Valley Modified) to identify any significant new circumstances or information relevant to environmental concerns. Mitigation of impacts in rail corridors is discussed in the Repository SEIS, Chapter 9, and is incorporated by reference. More detailed information on mitigation of impacts along the Mina route is found in Chapter 7 of the Rail Alignment EIS.

The Rail Alignment EIS tiers from the broader corridor analysis in the Yucca Mountain FEIS and in this Nevada Rail Corridor SEIS. Under the Rail Alignment EIS Proposed Action, DOE analyzes the potential impacts of specific common segments and alternative segments within the Caliente and Mina rail corridors for the purpose of determining an alignment in which to construct and operate a railroad for shipments of spent nuclear fuel, high-level radioactive waste, and other materials from an existing rail line in Nevada to a geologic repository at Yucca Mountain.

The Repository SEIS, this Nevada Rail Corridor SEIS, and the Rail Alignment EIS are related to the extent that the potential transportation impacts associated with shipments to the repository are part of the total impacts associated with the Repository SEIS Proposed Action. Thus, the Repository SEIS incorporates by reference the rail alignment impact evaluations of the Rail Alignment EIS to ensure that the Repository SEIS considers the full scope of potential environmental impacts associated with its Proposed Action. Moreover, because the potential transportation impacts associated with shipments to the repository are part of the total impacts associated with the Repository SEIS Proposed Action, the Rail Alignment EIS considers potential impacts from constructing the repository as a reasonably foreseeable future action in its cumulative impacts analysis. To ensure consistency, the Repository SEIS, this Nevada Rail Corridor SEIS, and the Rail Alignment EIS use the same inventory of spent nuclear fuel and high-level radioactive waste and the same number of rail shipments for analysis. Thus, the associated occupational and public health and safety impacts within the Nevada rail corridors under consideration are the same in all three NEPA analyses. Furthermore, to promote conformity, in all three NEPA analyses DOE used consistent analytical approaches to evaluate the various resource areas where appropriate.

A number of completed, in-preparation, or proposed DOE NEPA-related documents relate to this Nevada Rail Corridor SEIS. In addition, other federal agencies have prepared related documents. Consistent with Council on Environmental Quality regulations that implement the procedural requirements of NEPA (40 CFR Parts 1500 through 1508), DOE has used information from these documents in its analysis and has incorporated this material by reference as appropriate throughout this Nevada Rail Corridor SEIS. Table 1-2 lists these documents.

Table 1-2. NEPA documentation related to the proposed rail corridor[a] (page 1 of 3).

Document	Relationship to this Nevada Rail Corridor SEIS
DOE documents	
Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada. Las Vegas, Nevada: U.S. Department of Energy, Nevada Operations Office. 1996 (DOE/EIS-0243).	Examines the impacts from the continued operations of the Nevada Test Site.
Supplement Analysis for the Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada: DOE/EIS-0243-SA-01. U.S. Department of Energy, Nevada Operations Office (DIRS 162638-DOE 2002, all).	Documents the affected environment in 2002 and discusses any changes from the 1996 site-wide EIS (DOE/EIS-0243). Provides the status of new programs as of 2002.
Draft Supplement Analysis for the Final Environmental Impact Statement for the Nevada Test Site and Off-Site Location in the State of Nevada: DOE/EIS-0243-SA-03. U.S. Department of Energy, National Nuclear Security Administration, Nevada Field Office (DIRS 185437-DOE 2008, all).	Presents a systematic environmental impacts review to determine if there were substantial changes in the actions proposed in the 1996 site-wide EIS (DOE/EIS-0243) or significant new circumstances or information relevant to environmental concerns.
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, U.S. Department of Energy (DOE/EIS-0250F).	Examines the impacts of construction, operation, monitoring, and eventual closure of a geologic repository at Yucca Mountain. Examines the potential impacts of transporting spent nuclear fuel and high-level radioactive waste nationally and in the State of Nevada.
Notice of Preferred Nevada Rail Corridor (68 *FR* 74951, December 29, 2003).	Announces the Caliente rail corridor, from the five rail corridors studied in the Yucca Mountain FEIS, as the DOE preferred rail corridor in which to construct a rail line.
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).	Selects the mostly rail scenario analyzed in the Yucca Mountain FEIS as the mode of transportation on a national basis and within the State of Nevada. Selects the Caliente rail corridor for alignment, construction, and operation of a proposed railroad to Yucca Mountain.
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 (68 *FR* 18565, April 8, 2004).	Announces DOE intent to prepare an EIS for the alignment, construction, and operation of a railroad for the shipment of spent nuclear fuel, high-level radioactive waste, and other materials from a site near Caliente, Lincoln County, Nevada to a geologic repository at Yucca Mountain, Nye County, Nevada.
Environmental Assessment for the Proposed Withdrawal of Public Lands Within and Surrounding the Caliente Corridor, U.S. Department of Energy, DOE/EA-1545 (DIRS 176452-DOE 2002, all).	Examines the environmental impacts of withdrawing public lands from surface and mineral entry for up to 20 years to allow evaluation of the land for the proposed 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).	Announced DOE intent to expand the scope of the Rail Alignment EIS to include the Mina rail alignment.

Table 1-2. NEPA documentation related to the proposed rail corridor[a] (page 2 of 3).

Document	Relationship to this Nevada Rail Corridor SEIS
DOE documents (continued)	
Draft Supplemental Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada (DOE/EIS-0250F-S1).	Updates the Yucca Mountain FEIS and examines the impacts of construction, operation, monitoring, and eventual closure of a geologic repository at Yucca Mountain. Examines the potential impacts of transporting spent nuclear fuel and high-level radioactive waste nationally.
Notice of Availability of the Draft Environmental Assessment for the Proposed Infrastructure Improvements for the Yucca Mountain Project, Nevada, U.S. Department of Energy (71 *FR* 38391, July 6, 2006).	DOE released a Draft Environmental Assessment (EA) in 2006 that evaluated several proposed improvements to infrastructure at the Yucca Mountain Repository Site and adjacent portions of the Nevada Test Site. Proposed infrastructure improvements that were analyzed in the Draft EA are analyzed in the Repository SEIS. Therefore, DOE will not publish a Final Infrastructure EA.
Draft Complex Transformation Supplemental Programmatic Environmental Impact Statement. DOE/EIS-0236-S4 (DIRS 185273-DOE 2007, all).	Analyzes the potential environmental impacts of reasonable alternatives to continue transformation of the nuclear weapons complex to be smaller, and more responsive, efficient, and secure in order to meet national security requirements.
Notice of Availability of Draft Supplemental Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, NV (DOE/EIS-0250F-S1D) *and the Draft Supplemental Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada-Nevada Rail Transportation Corridor* (DOE/EIS-0250F-S2D) *and Draft Environmental Impact Statement for a Rail Alignment for the Construction and Operation of a Railroad in Nevada to a Geologic Repository at Yucca Mountain, Nye County, NV* (DOE/EIS-0369) (72 *FR* 58071).	Announced the availability of two draft NEPA documents related to the Yucca Mountain Project.
Notice of Intent to Prepare an Environmental Impact Statement for the Disposal of Greater-Than-Class-C Low-Level Radioactive Waste (72 *FR* 40135, July 23, 2007).	Announced DOE intent to prepare an EIS to evaluate disposal options for Greater-Than-Class-C low-level radioactive waste.
Draft Programmatic Environmental Impact Statement of the Designation of Energy Corridors in the 11 Western States (DIRS 185274-DOE 2007, all).	Addresses the environmental impacts from designation of corridors on federal land in the 11 western states for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities (energy corridors), as required by Section 368 of the Energy Policy Act of 2005 (Public Law 109-58). DOE and the BLM co-led this effort, with the U.S. Department of Agriculture's Forest Service, the Department of Defense, and the Department of the Interior's Fish and Wildlife Service participating as federal cooperating agencies. Potential corridors cross Nevada.

Table 1-2. NEPA documentation related to the proposed rail corridor[a] (page 3 of 3).

Document	Relationship to this Nevada Rail Corridor SEIS
DOE documents (continued)	
Notice of Intent to Prepare a Programmatic Environmental Impact Statement for the Global Nuclear Energy Partnership (72 *FR* 331, January 4, 2007).	Announced DOE intent to prepare a programmatic EIS to analyze the potential environmental impacts of alternatives to support an expansion of nuclear energy production, while reducing the risks of nuclear proliferation, and reducing the impacts associated with the disposal of future spent nuclear fuel (for example, by reducing the volume, thermal output, or radiotoxicity of waste requiring geologic disposal).
Other agency documents	
Tonopah Resource Management Plan and Final Environmental Impact Statement (DIRS 173224-BLM 1997, all).	Examines implementation of BLM management goals and actions in the Tonopah area.
Record of Decision for the Approved Las Vegas Resource Management Plan and Final Environmental Impact Statement (DIRS 176043-BLM 1998, all).	Examines implementation of BLM management goals and actions in the Las Vegas area.
Notice of Proposed Withdrawal and Opportunity for Public Meeting; Nevada (68 *FR* 74965, December 29, 2003).	Announced BLM receipt of a request from DOE to withdraw public land in the Caliente corridor 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 corridor for the transportation of spent nuclear fuel and high-level radioactive waste in Nevada. Segregates the land from surface and mineral entry for up to 2 years while various studies and analyses are made to support a final decision on the withdrawal application.
Ely Proposed Resource Management Plan/Final Environmental Impact Statement (DIRS 184767-BLM 2007, all).	Examines implementation of BLM resource management plans, actions, and goals in the Ely area.
Final Environmental Impact Statement: Weber Dam Repair and Modification Project (DIRS 182302-Miller Ecological Consultants 2005, all).	Examines potential environmental impacts to the Walker River from repair and modification of the Weber Dam.
Public Land Order No. 7653; Withdrawal of Public Lands for the Department of Energy to Protect the Caliente Rail Corridor, Nevada (70 *FR* 76854, December 28, 2005).	Withdraws public lands within the Caliente rail corridor from surface and mineral entry, subject to valid existing rights, for 10 years to allow DOE to evaluate the lands for the potential construction, operation, and maintenance of a rail corridor.
Notice of Proposed Withdrawal and Opportunity for Public Meeting; Nevada (72 *FR* 1235, January 10, 2007).	Announced BLM receipt of an application from DOE to withdraw public lands from surface and mineral entry through December 27, 2015, to evaluate the lands for the potential construction, operation, and maintenance of a rail line. This covers the Mina rail alignment and segments of the Caliente rail alignment not covered in Public Land Order No. 7653. Segregates the land from surface and mineral entry for up to 2 years while various studies and analyses are made to support a final decision on the withdrawal application.

a. BLM = Bureau of Land Management; DOE = U.S. Department of Energy; EA = environmental assessment; EIS = environmental impact statement; FEIS = final environmental impact statement; *FR* = *Federal Register*.

2. PROPOSED ACTION AND ALTERNATIVES

This chapter describes the Proposed Action and the No-Action Alternative analyzed in this Nevada Rail Corridor SEIS. Section 2.2 describes the Proposed Action. Section 2.3 describes the No-Action Alternative. Section 2.4 summarizes the potential environmental impacts under the Proposed Action for the Mina rail corridor.

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

2.1 Introduction

This Nevada Rail Corridor SEIS analyzes a ***Proposed Action*** and a ***No-Action Alternative***. 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* (Yucca Mountain FEIS; DOE/EIS-0250F; DIRS 155970-DOE 2002, all), to the extent that it analyzes the potential impacts of constructing and operating a railroad to connect the Yucca Mountain Site to an existing rail line near Wabuska, Nevada, within the Mina rail corridor. Under the Proposed Action, the U.S. Department of Energy (DOE or the Department) has analyzed in this Nevada Rail Corridor SEIS 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. This Nevada Rail Corridor SEIS further provides updated information on the Carlin, Jean, and Valley Modified rail corridors (see Chapter 5 of this Nevada Rail Corridor SEIS). 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 (see Section 1.3 of this Nevada Rail Corridor SEIS).

Council on Environmental Quality and DOE regulations that implement the provisions of the National Environmental Policy Act (NEPA) require consideration of the alternative of no action. Under the No-Action Alternative in this Nevada Rail Corridor SEIS, DOE would not select a rail alignment within the Mina rail corridor for the construction and operation of a railroad. As such, the No-Action Alternative provides a basis for comparison to the Proposed Action.

This Nevada Rail Corridor SEIS also analyzes a Shared-Use Option for the Mina rail corridor under which DOE would allow commercial shippers to use the railroad for shipments of general freight.

2.2 Proposed Action

The Proposed Action in this Nevada Rail Corridor SEIS is to construct and operate a railroad within the Mina rail corridor to connect the Yucca Mountain Repository to an existing rail line near Wabuska, Nevada. The purpose of this railroad would be to transport, in Nevada, spent nuclear fuel and high-level radioactive waste and other materials for repository construction and operations to the Yucca Mountain Site.

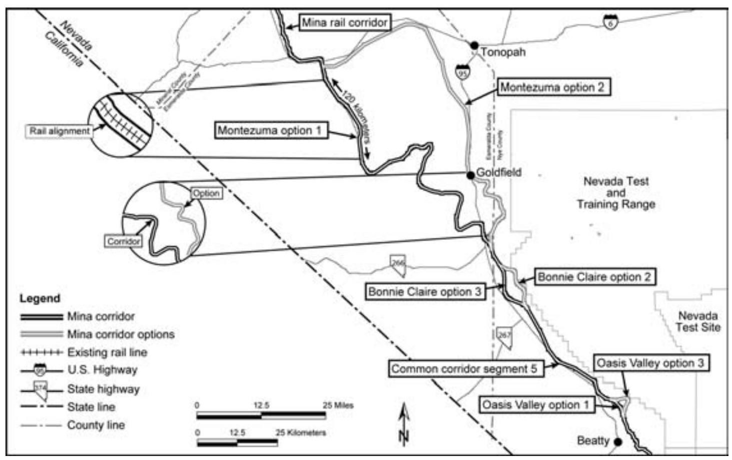
The Proposed Action includes construction and operation of a railroad and the infrastructure necessary to support the construction and operation of a railroad within the Mina rail corridor. Construction would occur primarily within the rail corridor right-of-way and would require obtaining water, ballast, subballast, steel for bridges, concrete ties, and rail. DOE would first construct a rail roadbed and then track construction would occur. The rail roadbed would form the base upon which the ballast, concrete ties, and rail would be laid. Track construction would include the placement of concrete ties, rail, and ballast on top of the rail roadbed and establishing power and communication systems. DOE would also need to construct bridges, place ***culverts***, and create ***at-grade*** and ***grade-separated crossings*** along the rail line.

In this Nevada Rail Corridor SEIS, DOE analyzes construction of a rail line in the Mina rail corridor. During the construction and operations phases, certain support facilities and access features (for example, a staging yard and access roads) would be needed, and those are addressed insofar as information is available for this corridor-level analysis. However, DOE does not consider impacts from construction and operations support facilities a discriminator at the corridor level. A detailed analysis of construction and operations support facilities, including their locations, is provided in the Rail Alignment EIS.

On April 8, 2004 (69 *Federal Register* [*FR*] 18557), 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. 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. The Proposed Action in this Nevada Rail Corridor SEIS does not change the Department's decision to select the mostly rail scenario nor the selection of the Caliente rail corridor in which to study possible alignments for a rail line.

TERMS RELATED TO THE PROPOSED ACTION IN THIS NEVADA RAIL CORRIDOR SEIS

Rail corridor – A strip of land 400 meters (0.25 mile) wide through which DOE would identify an alignment for the construction of a railroad in Nevada to a geologic repository at Yucca Mountain.



Rail alignment – A strip of land less than 400 meters (0.25 mile) wide through which the location of a rail line would be identified. In the Rail Alignment EIS, the location of a rail line within a rail corridor.

Option – In the Yucca Mountain FEIS, the terms for describing separate routes within a corridor were alternates, variations, and options. For this 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.

2.2.1 MINA RAIL CORRIDOR

The Mina rail corridor is about 450 kilometers (280 miles) in length; however, construction of new rail line would range between about 386 kilometers (240 miles) and 409 kilometers (254 miles) because the corridor includes existing Department of Defense rail line between Wabuska and the Hawthorne Army Depot in Hawthorne, Nevada (DIRS 180222-BSC 2006, p. 5). Figure 2-1 shows the Mina rail corridor and its options.

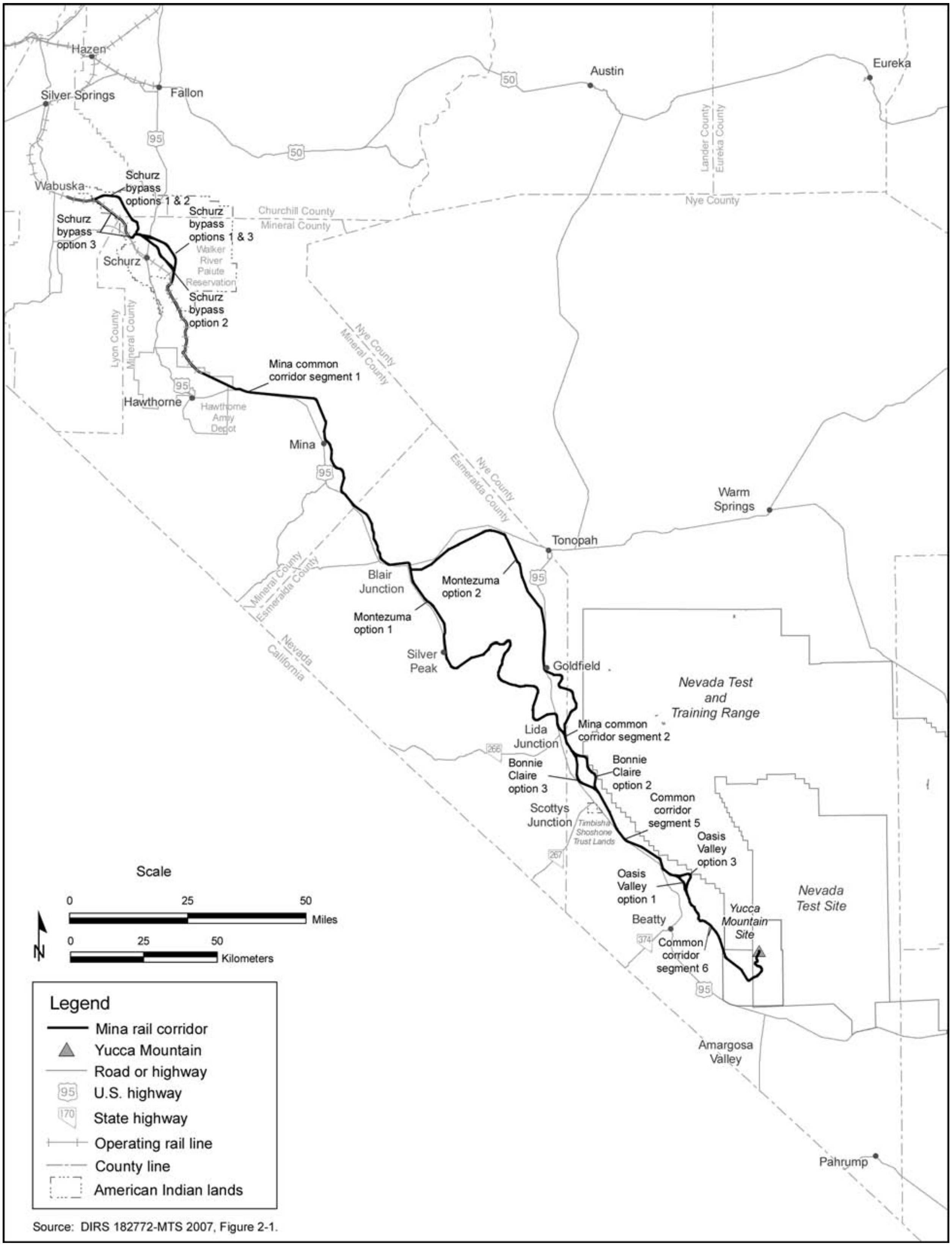


Figure 2-1. Mina rail corridor and options (pre-scoping, October 2006).

In the summer of 2006, DOE initiated a study to consider the feasibility of the Mina rail corridor and to identify specific common corridor segments and associated preliminary options (DIRS 180222-BSC 2006, all). In this feasibility study the Department identified rail line options on the Walker River Paiute Reservation to bypass Schurz, around the Montezuma Range, north of Scottys Junction (referred to as Bonnie Claire), and in Oasis Valley.

The Mina rail corridor originates at an existing rail line near Wabuska, Nevada, where it proceeds southeasterly through Hawthorne, to Blair Junction, and then on to Lida Junction. The construction of the new rail line from Hawthorne south would follow an abandoned rail line nearly to Yucca Mountain. At Lida Junction, the rail corridor trends southeasterly through Oasis Valley before turning north-northeast to Yucca Mountain. Sections 2.2.1.1 through 2.2.1.9 describe the Mina rail corridor common corridor segments and options.

2.2.1.1 Department of Defense Branchline

The Mina rail corridor would begin near Wabuska, Nevada, east of the Fort Churchill Siding on the Department of Defense rail line. The rail corridor proceeds southeast to a point about 29 kilometers (18 miles) northwest of the Town of Schurz. The Department of Defense Branchline is about 8 kilometers (5 miles) long (DIRS 180222-BSC 2006, p. 9). The rail corridor then crosses the Walker River Paiute Reservation, along one of three options that would bypass the town of Schurz.

2.2.1.2 Schurz Bypass Options

A May 2006 letter from the Tribal Council for the Walker River Paiute Tribe (DIRS 182775-Williams 2006, all) indicated that if DOE were to build a new rail line through the Reservation, the Tribe would prefer that the rail line avoid the town of Schurz. At present, an existing rail line travels through the middle of town. In response to the Tribe’s letter, DOE identified three options to bypass Schurz, as shown in Figure 2-2. All the Schurz bypass options would cross the Walker River and the Walker River Paiute Reservation.

Schurz bypass option 1 would begin at the existing Department of Defense Branchline about 29 kilometers (18 miles) northwest of Schurz and pass along the eastern side of Sunshine Flat. From there, it would pass east of Weber Reservoir and cross U.S. Highway 95 about 8 kilometers (5 miles) north of the intersection of U.S. Highway 95 and Alternate U.S. Highway 95. Schurz bypass 1 would be about 51 kilometers (32 miles) long and would reconnect with the Department of Defense Branchline about 13 kilometers (8 miles) south of Schurz (DIRS 180222-BSC 2006, pp. 9 and 27).

Schurz bypass option 2 would begin at the existing Department of Defense Branchline at the same point as Schurz bypass option 1. From there, it would pass east of Weber Reservoir and cross U.S. Highway 95 about 6.4 kilometers (4 miles) north of the intersection of Highway 95 and Alternate U.S. Highway 95. From there, it would trend to the southeast but stay to the east of Schurz and west of the location of Schurz bypass option 1 until it rejoined the existing Department of Defense Branchline about 13 kilometers (8 miles) south of Schurz. Schurz bypass option 2 would be about 50 kilometers (31 miles) long (DIRS 180222-BSC 2006, pp. 9 and 27).

Schurz bypass option 3 would begin at the Department of Defense Branchline about 9.7 kilometers (6 miles) northwest of Schurz. It would cross U.S. Highway 95 about 8 kilometers (5 miles) north of the intersection of U.S. Highway 95 and Alternate U.S. Highway 95, at which point it would continue southeast to a point where it would rejoin the existing Department of Defense Branchline about 13 kilometers (8 miles) south of Schurz. Schurz bypass option 3 would be about 50 kilometers (31 miles) long (DIRS 180222-BSC 2006, pp. 9 and 27).

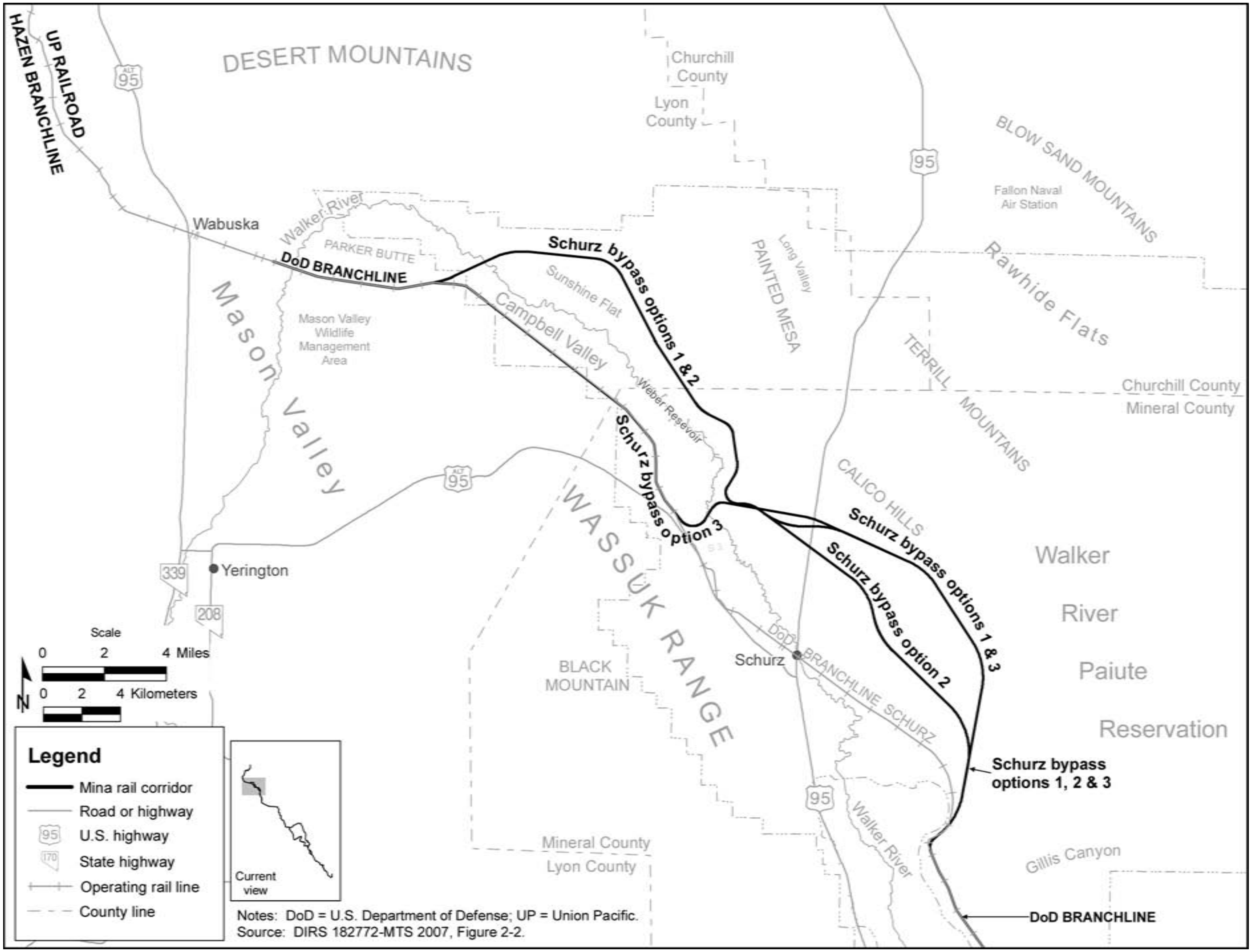


Figure 2-2. Schurz bypass options (pre-scoping, October 2006).

2.2.1.3 Common Corridor Segment 1

Common corridor segment 1 would begin north of Hawthorne and would trend southeast before turning east at U.S. Highway 95. It would trend east along U.S. Highway 95 through Soda Springs Valley for approximately 40 kilometers (25 miles). Continuing to parallel U.S. Highway 95, the rail line would cross State Route 361 and turn south for approximately 64 kilometers (40 miles). It would pass Luning and Mina along U.S. Highway 95. The rail line would then turn east before crossing U.S. Highway 95 in the area of Blair Junction and continuing for about 1.6 kilometers (1 mile) before joining the selected Montezuma options. Common corridor segment 1 would be approximately 160 kilometers (92 miles) long, which includes 21 miles of existing Department of Defense rail line (DIRS 180222-BSC 2006, pp. 9 and 27).

2.2.1.4 Montezuma Options

Montezuma option 1 would depart common corridor segment 1 just southeast of Blair Junction. It would trend roughly southeast along State Route 265 passing to the east of Silver Peak in Clayton Valley. It would then turn to the northwest through Clayton Valley. It would then trend south between Clayton Ridge on the west and Montezuma Peak on the east before turning east, passing to the south of Montezuma Peak. The rail corridor would again turn roughly south, traveling to the west of the Goldfield Hills. It would then travel northwest, cross U.S. Highway 95, and turn south before joining common corridor segment 2 near Lida Junction. Montezuma option 1 would be approximately 120 kilometers (73 miles) long (DIRS 180222-BSC 2006, pp. 10 and 27).

Montezuma option 2 would depart common corridor segment 1 just southeast of Blair Junction. It would trend northeast just south of U.S. Highway where it would follow an abandoned rail roadbed of the former Tonopah and Goldfield Railroad to north of Lone Mountain. Northeast of Lone Mountain, it would turn south into Montezuma Valley and run south before turning east and crossing U.S. Highway 95 south of Goldfield. It would then trend south before joining common corridor segment 2 near Lida Junction. Montezuma option 2 would be approximately 120 kilometers (74 miles) long (DIRS 180222-BSC 2006, pp. 10 and 27).

2.2.1.5 Common Corridor Segment 2

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 kilometers (2 miles) before reaching the Bonnie Claire area. Common corridor segment 2 would be approximately 3 kilometers long (DIRS 180222-BSC 2006, pp. 10 and 27).

2.2.1.6 Bonnie Claire Options

DOE is considering two options in the Bonnie Claire area, Bonnie Claire 2 and 3. The Department did not evaluate Bonnie Claire option 1 because it would cross Timbisha Shoshone Trust Lands (see Appendix C). Bonnie Claire option 2 would begin about 8 kilometers (5 miles) north of Stonewall Pass and trend east toward the Nevada Test and Training Range for about 5 kilometers (3 miles) before turning south for an additional 18 kilometers (11 miles). Bonnie Claire option 2 would generally follow the Nevada Test and Training Range boundary and end in Sarcobatus Flats north of Scottys Junction near the intersection of State Route 267 and U.S. Highway 95. Bonnie Claire option 2 would be approximately 19 kilometers (12 miles) long (DIRS 180222-BSC 2006, pp. 10 and 27).

Bonnie Claire option 3 would begin about 8 kilometers (5 miles) north of Stonewall Pass. It would trend generally south, parallel to U.S. Highway 95 to the east. Bonnie Claire option 3 would end in Sarcobatus Flats north of Scottys Junction near the intersection of State Route 267 and U.S. Highway 95. Bonnie

Claire option 3 would be approximately 19 kilometers (12 miles) long (DIRS 180222-BSC 2006, pp. 11 and 27).

2.2.1.7 Common Corridor Segment 5

Common corridor segment 5 would begin approximately 4 kilometers (2 miles) north of Scottys Junction and trend generally southeast through the Sarcobatus Flat area. Common corridor segment 5 would end approximately 6 kilometers (4 miles) north of Springdale, where it would connect to one of the selected Oasis Valley options. Common corridor segment 5 would be approximately 40 kilometers (25 miles) long (DIRS 180222-BSC 2006, p. 11).

2.2.1.8 Oasis Valley Options

DOE is considering two options in the Oasis Valley area, Oasis Valley 1 and 3. The Department did not evaluate Oasis Valley option 2 because the option's engineering factors and environmental and land-use features are similar to those for Oasis Valley option 1 (see Appendix C). Oasis Valley option 1 would begin about 3.2 kilometers (2 miles) north of Oasis Mountain, and run southeast. It would be approximately 9.7 kilometers (6 miles) long (DIRS 180222-BSC 2006, p. 11).

Oasis Valley option 3 would begin about 3.2 kilometers (2 miles) north of Oasis Mountain, and run generally east and then south before it crossed Oasis Valley farther to the east than Oasis Valley option 1. Oasis Valley option 3 would be about 14 kilometers (9 miles) long (DIRS 180222-BSC 2006, p. 11).

2.2.1.9 Common Corridor Segment 6

Common corridor segment 6 would begin about 3 kilometers (2 miles) east of U.S. Highway 95. Common corridor segment 6 would trend generally southeast for 40 kilometers (25 miles) from Oasis Valley to Beatty Wash. It would then turn north near the southern end of Busted Butte, running west of Fran Ridge, and then trend generally north for another 11 kilometers (7 miles), terminating inside the Yucca Mountain Site boundary. Common corridor segment 6 would be approximately 51 kilometers (32 miles) long (DIRS 180222-BSC 2006, p. 11).

2.2.2 SHARED-USE OPTION

In the Yucca Mountain FEIS, the Department considered a Shared-Use Option as reasonably foreseeable and evaluated that option under cumulative impacts. For this Nevada Rail Corridor SEIS, the Department considers the Shared-Use option under the Proposed Action.

Construction and operation of a rail line in the Mina rail corridor could provide an option for shared use and operation of commercial rail service to serve communities along the corridor. The presence of a rail line could influence further development and land use in the corridor. The Shared-Use Option would not require any changes in design to that described for the Proposed Action in this Nevada Rail Corridor SEIS. However, shared use would require design and construction of additional commercial ***sidings*** and facilities to provide access and operational capabilities for commercial shippers. Trains carrying commercial shipments would be separate from trains carrying spent nuclear fuel and high-level radioactive waste.

2.2.3 OVERVIEW OF DESIGN EVOLUTION

In the Yucca Mountain FEIS and in this Nevada Rail Corridor SEIS and Rail Alignment EIS, DOE based its rail corridor design and associated construction and operations plans on standard railroad industry practices and in consideration of applicable regulations. Since issuing the Yucca Mountain FEIS, DOE has advanced its proposed design and associated plans to determine an alignment for the construction and operation of a railroad within the Caliente rail corridor (DIRS 180877-Nevada Rail Partners 2007, all). These current design and construction and operations plans, which meet standard industry practices and objectives, have advanced from those of the Yucca Mountain FEIS. The following engineering design details and associated operations plans for the Caliente rail alignment have been used in developing the Mina rail corridor for purposes of evaluating the potential environmental impacts from constructing and operating a railroad from Wabuska, Nevada, to Yucca Mountain.

- More detailed aerial mapping and contour analysis of the Caliente rail corridor and its options
- Corridor options to further avoid areas of environmental concern
- Use of material excavated from one area within the corridor to provide subballast for other areas; the use of any excess material for widening the rail roadbed or development of a service road, thereby reducing the need for spoils areas
- Final grading requirements of slopes, installation of rock-fall protection devices, replacement of topsoil, revegetation and installation of other permanent erosion control systems, and an adjacent maintenance road within the corridor
- Changes to design criteria to now include a maximum horizontal curvature of 6 degrees with 2-percent compensated curves, use of 62-kilogram (136-pound) rail and 30 centimeters (12 inches) of ballast, and a 9.4-meter (31-foot) top of cross section
- Use of a centralized train control signal system (monitoring equipment, signals, communications equipment) for train operations
- An increase in the total number of trains of up to 17 trains per week during the operations phase
- An operations period of up to 50 years
- More detailed design of certain facilities that would interface with the Union Pacific Railroad near Caliente, Nevada
- The average width of land disturbed is 100 meters (325 feet) within the corridor based on conceptual rail alignment engineering and construction design (DIRS 180877-Nevada Rail Partners 2007, all)

DOE analyzed the construction and operation of a rail line within the Mina rail corridor. Where details regarding supporting facilities within the Mina rail corridor are known (staging yards, maintenance roads), they were analyzed in the appropriate resource area. Regardless of where in the document they are analyzed or considered, supporting facilities are not considered a discriminator at the corridor level. A detailed analysis of supporting facilities, including locations, is done at the alignment level in the Rail Alignment EIS.

2.2.4 RAIL LINE CONSTRUCTION IN THE MINA RAIL CORRIDOR

Unless otherwise indicated, all construction activities would occur inside the rail line ***construction right-of-way*** (nominally 150 meters [500 feet] on either side of the centerline of the rail corridor, for a ***nominal*** width of 300 meters [1,000 feet]). The total construction ***footprint*** would be approximately 140 square kilometers (35,000 acres), but would vary depending on the corridor options selected. However, based on land disturbance computations from the Air Quality Emission Factors and Socio-Economic Input Caliente Rail Corridor (DIRS 182825-Nevada Rail Partners 2007, all), DOE used an average width of the Caliente rail alignment of 100 meters (325 feet) to estimate land disturbance for the Mina rail corridor at 41 square kilometers (10,000 acres) (DIRS 180877-Nevada Rail Partners 2007, p. 2-10).

DOE would implement ***best management practices*** during the entire construction process, such as dust suppression and the use of silt fencing to control soil erosion during construction activities.
DOE anticipates that it would take a minimum of 4 years, and possibly up to 10 years, to construct the railroad in the Mina rail corridor. Construction would begin with the procurement of concrete ties and rail for track construction and steel for bridge construction. DOE would start constructing major bridges, culverts, and grade-separated crossings before other infrastructure because they would take longer to construct (DIRS 180922-Nevada Rail Partners 2007, Section 7.0).

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.

Water, subballast, ballast, steel for bridges, concrete ties, and rail would be required for rail line construction.

Approximately 90 percent of the water that would be used during construction would be used for earthwork compaction and control of excavation dust (DIRS 180922-Nevada Rail Partners 2007, pp. 9 and 10).

Approximately 4.5 metric tons of subballast per meter (1.5 tons of subballast per foot) of track construction would be required. The Department would obtain subballast from materials excavated during rail roadbed construction, or from existing ***borrow sites*** in the rail corridor (DIRS 180877-Nevada Rail Partners 2007, p. 2-3).

Approximately 5.1 metric tons of ballast per meter (1.7 tons of ballast per foot) of track construction would be needed along the rail line. DOE would obtain ballast from new quarries developed along the proposed rail corridor. Approximately one concrete tie for every 0.61 meter (2 feet) of track construction would be needed along the entire length of the rail line. DOE would obtain rail from commercial sources and weld it into 440-meter (1,440-foot) strings at a portable welding plant located within the construction right-of-way (DIRS 180922-Nevada Rail Partners 2007, pp. 3-1 to 3-10).

DOE would install grade crossings where the rail line would cross a roadway. In places where the rail line would cross a highway (for example, U.S. Highway 95), the routes would be grade-separated. Where the rail line would cross paved public roadways, the routes would cross at-grade and active warning devices, such as flashing lights and gates, would be installed. Where the rail line would cross unpaved roads, DOE would install passive warning devices such as crossbucks and stop signs (DIRS 182826-Nevada Rail Partners 2007, p. 6-9).

The rail roadbed would be constructed along the centerline of the rail line. Construction of the rail roadbed would require clearing, excavating earth and rock on previously undisturbed land, and removing and stockpiling topsoil where needed. Construction would require both cuts and fills (DIRS 180922-Nevada Rail Partners 2007, Section 2.0).

During rail line construction, DOE would install an unpaved road parallel to the rail line inside the construction right-of-way. The Department could leave this access road in place to provide additional access to the rail line for maintenance. Because maintenance would be performed using on-rail vehicles or trains, no bridges would need to be constructed for access roads (DIRS 180922-Nevada Rail Partners 2007, Section 4.5).

DOE would construct sidings approximately every 40 kilometers (25 miles) so that trains running in opposite directions could pass one another. This spacing would result in approximately 10 to 12 sidings for the rail line. Sidings would be placed inside the ***operations right-of-way*** (nominally 61 meters [200 feet] on either side of the rail line centerline) (DIRS 180922-Nevada Rail Partners 2007, p. 2-3).

The Department would build a distribution line for electric power along the entire length of the corridor. Power to the distribution system would be fed from locations where existing high-voltage transmission lines intersected the corridor (DIRS 180922-Nevada Rail Partners 2007, p. 4-6).

DOE would install a communications system utilizing a fiber-optic communications cable, very-high-frequency (commonly called VHF) radio, satellite radios, and possibly satellite or cellular telephones. The Department would position communications towers at the beginning, end, and approximately every 16 to 32 kilometers (10 to 20 miles) along the rail line. These towers would be approximately 23 to 30 meters (75 to 100 feet) tall and would enable very-high-frequency radio communication between rail line personnel working in remote locations along the rail line. DOE would install 4.6-meter (15-foot)-tall ***wayside signals*** along the rail line to control train movements (DIRS 180922-Nevada Rail Partners 2007, pp. 2-2 and 2-3).

The final step in the construction of the railroad would be the commissioning of train operations. Each time a section of the track was completed and the signals and communications systems installed and tested, integrated testing would commence, utilizing train equipment to validate that all components were operating as designed. Successful testing would result in final jurisdictional inspection and commissioning, by the appropriate regulatory authority, of the rail line for normal operations (DIRS 180922-Nevada Rail Partners 2007, p. 7-4).

2.2.5 RAILROAD OPERATIONS AND MAINTENANCE

The rail line 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 and maintain the rail line in accordance with applicable regulations, guidelines, and standards of the Federal Railroad Administration, the Union Pacific Railroad, and the Association of American Railroads.

2.2.5.1 Railroad Operations

Railroad operations would begin immediately after construction was completed. The railroad would operate dedicated trains carrying spent nuclear fuel and high-level radioactive waste and trains carrying other materials, which could include construction materials, diesel fuel, and repository equipment. During the operations phase, DOE would use the rail line to transport approximately 9,500 railcars, each with a cask of spent nuclear fuel or high-level radioactive waste, and approximately 29,000 railcars of construction materials, diesel fuel, and supplies for the repository and facilities. The frequency of trains going to the repository would vary slightly, but would average 17 one-way trains or 8.5 round trips per week (derived from DIRS 175036-BSC 2005, Table 4.2).

Union Pacific Railroad trains carrying casks of spent nuclear fuel and high-level radioactive waste would arrive in Nevada via the Union Pacific Railroad Mainline, travel to Wabuska via the Union Pacific branchline, and then proceed to a staging yard.

The dedicated cask trains on the rail line would be assembled at the staging yard and would 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. ***Naval spent nuclear fuel*** trains would typically include two or three locomotives, 1 to 12 cask cars, a buffer car in front of the first cask car and after the last

> A **buffer car** is a railcar that would be placed at the front of a cask train between the locomotive and the first cask car and at the back of the train between the last cask car and the escort car.
>
> A **cask car** is a railcar that would be used to transport a cask of spent nuclear fuel or high-level radioactive waste.
>
> An **escort car** is a passenger car that would carry security personnel.

cask car, and one to two escort cars. Trains would depart a staging yard and proceed along the rail line to the Yucca Mountain Site. Trains would require fewer than 10 hours for the trip between a staging yard and the Yucca Mountain Repository (DIRS 182826-Nevada Rail Partners 2007, p. 5-1). After casks were unloaded at the site, the empty casks would be returned to service.

Freight trains carrying construction and other materials would arrive in Nevada via the Union Pacific Railroad mainline, travel to Wabuska via the Union Pacific branchline, and then proceed to a nearby staging yard. From a staging yard, locomotives would transport the materials along the rail line to the repository.

A railroad control center, in coordination with a national transportation operations center, would control the operations along the rail line. DOE would use a satellite-based transportation tracking and communication system to track rail shipments of spent nuclear fuel and high-level radioactive waste to the repository (DIRS 182826-Nevada Rail Partners 2007, p. 6-6).

2.2.5.2 Railroad Maintenance

Maintenance of the rail line would be an ongoing process that would be concurrent with the operations phase of the railroad. The primary maintenance and inspection functions would include track inspection; signal testing and inspection; minor rail, tie, and turnout replacement; and routine ballasting and surfacing tasks. Maintenance activities would be scheduled to minimize the impact on planned train movements (DIRS 182826-Nevada Rail Partners 2007, Section 10.0).

Maintenance crews would access the work area using ***hi-rail trucks*** (vehicles capable of traveling on roads or on railroad tracks**)**, rail mounted machinery (tamper, track liner, etc), or maintenance trains. During rail line construction, DOE would construct unpaved roads parallel to the rail line inside the construction right-of-way. The Department could leave these access roads in place to provide additional access to the rail line for maintenance.

Following the final shipment of spent nuclear fuel, high-level radioactive waste, and other materials to the repository, DOE could abandon the rail line or could make it available to local communities or the private sector for other uses (DIRS 182826-Nevada Rail Partners 2007, Section 10.0).

2.3 No-Action Alternative

Council on Environmental Quality and DOE regulations that implement the procedural requirements of NEPA require consideration of the alternative of no action. Under the No-Action Alternative in this Nevada Rail Corridor SEIS, DOE would not construct and operate a railroad within the Mina rail corridor from Wabuska to Yucca Mountain. Therefore, the No-Action Alternative provides a basis for comparison to the Proposed Action.

2.4 Summary of Potential Environmental Impacts for the Mina Rail Corridor

Sections 2.4.1 through 2.4.12 summarize the potential environmental impacts associated with construction and operation of a railroad in the Mina rail corridor. Table 2-1 provides an overview of these potential impacts for the Mina rail corridor.

Table 2-1. 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.
Occupational and public health and safety	
Construction and operations	
Industrial hazards	
Total recordable cases	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 only	
Incident-free radiological impacts (latent cancer fatalities)	
Public	0.00082
Workers	0.33
Radiological transportation accident fatalities	
Radiological accident risk (latent cancer fatalities)	0.0000074
Cancer fatalities from vehicle emissions	0.40

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

Resource	Impact/indicator
Occupational and public health and safety (continued)	
Operations phase only	
Transportation accident fatalities	
Worker commuting and material delivery	3.3
Radiological waste transportation	0.31
Socioeconomics	Construction employment: 6,500 full-time equivalents 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 full-time equivalents 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 would be consistent with BLM management objectives for those areas
Utilities, energy, and materials	
Diesel fuel	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) (DIRS 180877-Nevada Rail Partners 2007, p. 2-10).

Where practical, DOE has ***quantified*** potential impacts and other characteristics of the Proposed Action. In other instances, it is not practical to quantify impacts and DOE provides a ***qualitative*** assessment of potential impacts. In this Nevada Rail Corridor SEIS, the Department has used the following descriptors to qualitatively characterize impacts only 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 described in Table 2-1 would be adverse and are for both the construction and operations phases.

2.4.1 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 option selected (DIRS 180877-Nevada Rail Partners 2007, p. 2-10). The Mina rail 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 Mina rail corridor would constitute a minor proportion of overall land commitment. Impacts to private land could be approximately 1.6 to 2.7 square kilometers (400 to 670 acres), depending on the option selected, which consists of primarily agricultural and mineral uses and contain no private residences.

The Mina rail corridor would not cross or affect any Wilderness Areas, Wilderness Study Areas, or Areas of Critical Environmental Concern. The Mina rail corridor would be consistent with the goals and policies of the resource management plans in the BLM-administered areas through which it passes. A rail line in the Mina rail corridor could cross private lands. If, in locating the final alignment, DOE could not avoid private lands, the Department would need to acquire access to them to construct and operate the railroad. If private property was divided by the rail line, access to the property could be disrupted.

The rail corridor would cross land on the Walker River Paiute Reservation. Construction and operation of a railroad on this land will require land agreements between DOE, the U.S. Department of the Interior, 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 of the Mina rail corridor would be within the boundaries of the Nevada Test Site, which is managed by the DOE. Construction of a rail line within this area would require land-use authorization from the DOE Nevada Site Office and the BLM.

BLM would require the DOE to obtain a right-of-way grant to construct and operate a railroad on public land. The Department would adjust the width of the construction right-of-way where practicable to avoid or minimize land-use conflicts and restrictions. Construction and operation of the railroad in the Mina rail corridor through existing rights-of-way would require an evaluation of the impact to the road or utility or use of the right-of-way with both the right-of-way holder and the BLM. 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. Construction of the rail line would result in loss of forage. Because the corridor intersects grazing allotments, a rail line could create a barrier to livestock movement. Livestock could have difficulty accessing water if there was a deep cut or a high fill associated with the rail line. Ranch operations and livestock rotations could be disrupted. Livestock mortality could occur along roads used during rail line construction and operations and possibly by trains during the operations phase. Construction and operation of a rail line through the Mina corridor could impact access to land used by the public for recreation, requiring individuals to alter their access routes.

2.4.2 AIR QUALITY

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

The impacts to air quality during rail line construction and subsequent operation would be small. During the relatively short-term period for construction of a rail line in the Mina Corridor, equipment emissions would result in a minimal contribution of criteria pollutants to the region. The criteria pollutants emitted would primarily come from the operation of construction equipment in rural areas or areas that are currently uninhabited. Construction activities would also emit ***fugitive dust*** that would require DOE to implement dust suppression measures. Impacts to these air quality criteria pollutant concentrations and fugitive dust generation should decrease as the rail line and rail facility construction is completed and the railroad becomes operational. During operations these impacts would be smaller but would last longer during the period of operation.

Impacts associated with railroad operations and maintenance activities would be small.

2.4.3 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. Impacts on surface-water resources resulting from construction activities would generally be small and limited to within the nominal width of the construction right-of-way. Impacts to springs near the corridor would be small. DOE would use appropriate engineering standards and construction practices to help avoid or minimize potential impacts on surface-water resources.

Impacts associated with railroad operations and maintenance activities on surface water would be small.

The groundwater analysis for this Nevada Rail Corridor SEIS based its calculations of water demand for the construction of a rail line in the Mina rail corridor on earthwork needs and subsequent water required 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.

DOE would request the Nevada State Engineer to approve any potential plans to pump groundwater from new or existing wells and otherwise obtain groundwater from other regional resources, so as to not adversely affect groundwater resources in the region. Groundwater demands during operation of the railroad would be small and limited to water needed to support maintenance activities and a reduced workforce. These needs would be small and have little effect on regional resources.

2.4.4 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. The corridor only crosses one riparian area along the Walker River and one spring near Goldfield.

Some vegetation communities would be disturbed during construction activities within the 400-meter (0.25-mile)-wide corridor. With the exception of the riparian area in the corridor along the Walker River, none of the plant communities encountered are considered by BLM to be sensitive (unique or rare). The total land area disturbed within these vegetation communities in the corridor would be small when compared to the other land areas in Nevada that also support them.

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 movements or possibly result in some individual tortoise deaths. DOE would work with U.S. Fish and Wildlife Services to help limit impacts to the desert tortoise.

The 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 is low and the species would be rare or absent. Construction activities could temporarily degrade downstream water quality. As such, impacts would be temporary and small.

The 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 burro herds. During construction activities, the movement of these animals could temporarily be disrupted due to noise and land disturbance and they would likely move away from the area. Noise from passing trains during railroad operations could minimally disturb some animals. Impacts would be small and would likely diminish over time as animals acclimated to the presence of passing trains.

Soil erosion could increase from land disturbance during construction activities within the construction right-of way. Prime farmland occupies less than 1 percent of the soils in the corridor. DOE would use erosion control methods to help reduce the potential of direct impacts during construction. Use of hazardous materials would be controlled to limit the potential for soil contamination. Impacts to soil would be temporary and small.

Impacts associated with railroad operations and maintenance activities would be small.

2.4.5 CULTURAL RESOURCES

There could be impacts to cultural resources at different locations in the Mina rail corridor. There are several cultural resources, which include archaeological and historic sites and structures, in the corridor that are eligible or potentially eligible for inclusion on the *National Register of Historical 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, DOE would perform additional field surveys and inventories to further locate and identify cultural resources along the corridor. The Department would work closely with other federal agencies, tribal authorities, and state agencies to help avoid and mitigate potential adverse impacts to identified cultural resources in the corridor. DOE would use procedures and work with other agencies to help protect cultural resources encountered during the construction phase as a result of surface disturbances. Steps would be taken to avoid and protect them and to mitigate potential adverse impacts from both project-related activities and the actions of others.

Railroad operations and maintenance activities are not expected to result in any additional impacts to cultural resources at archeological or historic sites.

2.4.6 OCCUPATIONAL AND PUBLIC HEALTH AND SAFETY

The impacts 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 of the project are expected to primarily result from traffic accidents involving workers commuting to and from the construction sites and transporting rail line construction materials to the construction sites, and from vehicle emissions produced by commuting workers and material deliveries. Those impacts during the construction phase of the project are estimated to be four fatalities from traffic accidents and 0.54 latent cancer fatality from vehicle emissions.

The largest potential for radiological exposure during the railroad operations phase would be to workers involved in the transportation of spent nuclear fuel and high-level radioactive waste. That impact would be about 0.40 latent cancer fatality.

Industrial safety impacts resulting from railroad construction and operations are estimated to be about 0.92 fatalities for the combined involved worker and noninvolved worker population.

DOE estimated nonradiological occupational health and safety impacts in terms of exposure of workers to physical hazards and nonradioactive hazardous chemicals over the region of influence for the Mina corridor. These estimates were based on the estimated number of hours worked and occupational incident rates for total recordable cases, lost workday cases, and fatalities. DOE estimated radiological impacts to workers and the public for incident-free transportation, transportation accidents and severe transportation accidents.

DOE estimated the following fatalities:

- Less than one latent cancer fatality to workers and the public from radiological impacts for up to 50 years of railroad operations in the Mina rail corridor.
- Nonradiological fatality impacts to workers from industrial hazards from railroad construction and operation in the Mina rail corridor would be 0.92.
- During railroad construction in the Mina rail corridor, there would be four vehicular-related fatalities.

- During railroad operations in the Mina rail corridor, there would be 3.6 vehicular-related fatalities.
- During railroad construction and operations in the Mina corridor, there would be 1.3 rail-related fatalities.

2.4.7 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.

During the construction phase of the project, DOE estimated that the workforce employment levels for construction 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 nature of a linear construction project, the socioeconomic impacts to the local communities would be both short term and small.

During the operations phase of the project, DOE estimated that the workforce levels for operating and maintaining the railway would be much less than that 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 in the corridor are estimated to be small.

These socioeconomic impacts for both the construction and the operations phase are generally considered positive because of jobs created, increased 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.

2.4.8 NOISE AND VIBRATION

2.4.8.1 Noise

For the most part, the Mina rail corridor would pass through areas that are remote from human habitation. Thus, the potential impacts for noise from the construction of a rail line would be temporary. 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 noise and 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 they would not experience a 3 dBA increase and 65 DNL or greater noise levels. The purpose of the 3 dBA increase component of STB noise guidelines is to identify potential impact areas and areas where train noise would be particularly audible. However, because transportation noise sources are audible throughout the United States, the audibility of train noise itself does not constitute an adverse noise impact.

2.4.8.2 Vibration

Based on the proposed construction equipment and Federal Transit Administration vibration data, DOE estimated potential ground-borne vibration levels due to construction activity. The vibration levels are below Federal Transit Administration building vibration damage criteria (0.20 inch per second for fragile buildings, and 0.12 inch per second for extremely fragile historic buildings). Therefore, DOE would expect no damage to buildings due to vibration during construction. In addition, because of relatively low vibration levels and the temporary nature of construction, human annoyance due to construction vibration would be low.

DOE evaluated the potential impacts from vibration for construction and operations trains by using train-induced vibration levels as a function of distance from a rail line, along with vibration levels likely to result in building damage or annoyance, in combination with information on the location of residences or other buildings in relation to the rail line. Because vibration is a function of train speed, construction-train vibration would be lower than operations-train vibration. Freight trains operating at 80 kilometers (50 miles) per hour would produce an annoyance-based vibration contour extending approximately 24 meters (80 feet) from the tracks (DIRS 177297-Hanson, Towers, and Meister 2006, p. 10-3). There are no buildings within approximately 24 meters of the Mina rail corridor, so construction and operations trains would produce no adverse vibration impacts

2.4.9 AESTHETICS

The Mina rail corridor would pass primarily through Class III (the BLM designation that provides for the partial retention of the existing character of the landscape) and IV (the BLM designation that provides for management activities that require major modifications of the existing character of the landscape) areas. Railroad construction and operations in these areas would be consistent with the BLM management objectives for these areas. Therefore, DOE expects potential impacts to aesthetic resources would be small.

2.4.10 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 electric power. Regional service providers can be expected to adjust to 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 consumed during the construction phase such as concrete, steel, and rock are expected to be available from regional or national sources.

2.4.11 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, and associated hazardous wastes would be generated. Ample disposal capacity for hazardous wastes is available in the western United States.

DOE would dispose of nonrecyclable or nonreusable waste in permitted landfills. During construction, 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, the generation of wastes would be substantially less than during the construction phase.

2.4.12 ENVIRONMENTAL JUSTICE

Because there would be small changes in long-term population attributable to activities in the corridor, impacts or stresses to the housing stock, infrastructure systems, or social services would be unlikely. The largest concentration of low-income or minority populations in the Mina rail corridor occurs in Mineral County and on the Walker River Paiute Reservation.

The population on the Reservation is characterized as having 32 percent of its residents considered low income and 87 percent minority. The corridor would cross American Indian tribal lands, with the three Schurz bypass options almost entirely on the Walker River Paiute Reservation (DIRS 180222-BSC 2006, pp. 16 and 63)

A portion of the Mina rail corridor would cross lands in Esmeralda County where most of the land is managed by the BLM or owned by the Department of Defense, resulting in a sparse population. As a consequence, there are no concentrations of low-income or minority populations in Esmeralda County that the construction or operation of a railroad in the Mina rail corridor would be likely to affect.

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

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

Impacts from rail line construction and operations in the Mina rail corridor would be small overall and would be unlikely to cause a disproportionately high and adverse effect on the low-income or minority populations along the corridor. There are no special pathways for minority populations.

3. AFFECTED ENVIRONMENT AND EVALUATION OF IMPACTS – MINA RAIL CORRIDOR

This chapter describes the affected environment along the Mina rail corridor and potential impacts to environmental resources from constructing and operating a railroad in the corridor. Section 3.1 describes the bases and methodology DOE used to perform the evaluation; Section 3.2 describes the affected environment for each resource area and potential impacts to those resources.

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

3.1 Bases and Methodology

3.1.1 BASES FOR EVALUATION

To evaluate potential environmental ***impacts*** and determine if the Mina ***rail corridor*** warrants further study, the bases for corridor evaluation are the *Mina Rail Route Feasibility Study* (DIRS 180222-BSC 2006, all); baseline and affected environment information from federal, state, and local sources; public scoping comments; and design and engineering knowledge the U.S. Department of Energy (DOE or the Department) has derived from its analyses of the Caliente rail corridor at the alignment level (DIRS 180877-Nevada Rail Partners 2007, all). This Nevada Rail Corridor SEIS presentation of the Mina rail corridor analysis is commensurate in content and detail with the presentation of corridor-level information 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; DIRS 155970-DOE 2002, Chapter 6). This chapter describes the environmental attributes of the Mina rail corridor and potential impacts from implementing the Proposed Action.

3.1.2 METHODOLOGY

For the Mina rail corridor analysis, DOE performed a rail corridor design study to provide engineering, construction, and operations feasibility information (DIRS 180877-Nevada Rail Partners 2007, all). The study used many of the same methods used to advance the Caliente rail corridor design, as described in Section 2.2.3. DOE established baseline environmental conditions for each resource area through the collection of federal, State of Nevada, and local data commensurate with the information in the Yucca Mountain FEIS for the Mina rail corridor. Using the established baseline and ***affected environment***, while considering the evolution of engineering and design changes, DOE evaluated the magnitude and range of potential impacts for the Mina rail corridor.

For each resource area in this Nevada Rail Corridor SEIS, DOE evaluated impacts within a specified ***region of influence***. Table 3-1 lists information on the region of influence for each resource area; DOE used these same regions of influence for the cumulative impacts analysis (see Chapter 4).

Table 3-1. Regions of influence for each resource area analyzed in this Nevada Rail Corridor SEIS.

Resource area	Region of influence[a]
Land use and ownership	Land use and ownership entirely or partially within the 0.25-mile-wide rail corridor. Includes land use and ownership outside the corridor that could incur cumulative impacts.
Air quality	The U.S. Environmental Protection Agency (EPA)-designated air basins through which the corridor would pass.
Hydrology	*Surface water:* The 0.25-mile width of the corridor and a 0.6-mile-wide area along each side of the corridor. Includes areas near where construction would take place that would be susceptible to erosion, areas affected by permanent changes in flow, and areas downstream of construction that could be affected by eroded soil or potential spills of construction contaminants. *Groundwater:* Portions of aquifers that would underlie areas of construction and operations and those portions of aquifers DOE could use to obtain water for construction and operations support that could be affected by proposed groundwater withdrawals.
Biological resources	Resources within the 0.25-mile-wide corridor and a 3-mile-wide area along each side of the corridor. Includes habitat (including wetlands and riparian areas), sensitive species, and migratory ranges of big game animals and wild horses and burros that a rail line could affect.
Cultural resources	Coverage within the 0.25-mile-wide corridor. This area includes the area of potential disturbances that could have indirect impacts on cultural resources.
Occupational and public health and safety	*Traffic impacts:* The 0.25-mile width of the corridor and public highways used by workers and for shipments during construction and operations. *Worker industrial safety impacts:* The 0.25-mile-wide rail corridor. *Incident-free radiological and nonradiological impacts:* The 0.5-mile area on either side of the centerline of the rail corridor. *Radiological impacts in relation to accidents:* An area within a 50-mile radius from a potential occurrence location in the rail corridor.
Socioeconomics	Counties in Nevada the rail line would cross (Churchill, Lyon, Mineral, Esmeralda, and Nye) and the two areas where most workers would live, Clark County and the Carson City/Washoe County area.
Noise and vibration	Inhabited commercial and residential areas where noise and vibration from rail line construction and operations could be a concern.
Aesthetic resources	The viewshed around the rail corridor.
Utilities, energy, and materials	The regional supply infrastructure that would support rail line construction and operations.
Waste management	Counties in Nevada that a potential rail line would cross and that have existing municipal sanitary waste landfills; disposal facilities for other types of wastes.
Environmental justice	Locations of minority, low-income, and American Indian populations along the rail corridor; this includes the regions of influence listed above.

a. To convert feet to meters, multiply by 0.3048; to convert miles to kilometers, multiply by 1.6093.

3.2 Affected Environment and Potential Impacts – Mina Rail Corridor

3.2.1 LAND USE AND OWNERSHIP

In the Yucca Mountain FEIS, DOE determined that an evaluation of impacts to land use and ownership should identify the current ownership of the land that its activities could disturb, and the present and anticipated future uses of the land. The Department defined the region of influence for land-use and ownership impacts as land areas that would be disturbed or the ownership or use of which would change as a result of constructing and operating a railroad. In the Yucca Mountain FEIS, DOE evaluated land use and ownership in the 400-meter (0.25-mile)-wide corridor. The Department chose this width to provide enough space for the final alignment to route the rail line around sensitive land features or engineering obstacles. The Yucca Mountain FEIS anticipated actual construction and operations in the corridor would mostly require less than about 61 meters (200 feet) of the 400-meter width. DOE has since determined, based on the Department's conceptual engineering for the Caliente rail alignment, that actual construction in the corridor would likely require less than 300 meters (1,000 feet) of the 400-meter width (DIRS 180877-Nevada Rail Partners 2007, p. 2-10). However, for consistency with the Yucca Mountain FEIS analysis, this Nevada Rail Corridor SEIS analysis uses the 400-meter corridor width.

Based on these criteria, DOE evaluated the potential impacts to land use and ownership from proposed railroad construction and operations. The BLM administers more than 45,000 square kilometers (11 million acres) in Lyon, Mineral, Esmeralda, and Nye Counties. Traditional land uses in most of the Mina region of influence that would be directly and indirectly affected include grazing, mining, energy development, general recreation, utility rights-of-way, and wildlife management. Much of this land is not extensively disturbed, although it has been modified through activity such as grazing and mining.

Some BLM-administered lands have special designations that identify their uses or why they have been set aside. These include Wildlife Habitat Management Areas, Areas of Critical Environmental Concern, Wilderness Areas, and Wilderness Study Areas. Public lands in the Mina region of influence provide a number of diverse recreation opportunities, and the BLM has designated certain lands as Special Recreation Management Areas.

Figures 3-1 and 3-2 show land ownership along the Mina rail corridor and its options. Most of the land that would be used for construction and operation of a railroad in the Mina rail corridor would be BLM-administered land in Lyon, Mineral, Esmeralda, and Nye Counties. The proposed Mina rail corridor would cross three BLM administrative areas: Carson City, Battle Mountain, and Las Vegas. Each BLM Field Office manages lands within its administrative boundaries according to one or more management framework plans or resource management plans. The Las Vegas, Tonopah, and Carson City plans would apply to the Mina rail corridor. In addition to BLM authority, the range of potentially affected land ownership and management authority includes private land holdings (including land designated for commercial development), DOE lands, U.S. Department of Defense lands, and American Indian trust lands and reservations.

To evaluate land use and ownership in the Mina rail corridor, DOE obtained data from the latest editions of BLM Master Title Plats and online land record databases, such as BLM LR2000 (DIRS 182772-MTS 2007, p. 21). The Department also evaluated county and state land records and information from other federal agencies, universities, or commercial developments.

In response to a DOE application for a public land order, the BLM has segregated specific lands encompassing the Mina rail corridor from surface and mineral use for 2 years (until January 10, 2009), as described in the *Notice of Proposed Withdrawal and Opportunity for Public Meeting; Nevada* (72 *Federal Register* [*FR*] 1235, January 10, 2007).

3.2.1.1 Land Use and Ownership Affected Environment

Approximately 1 to 2 percent (1.6 to 2.7 square kilometers [400 to 670 acres) of the land in the Mina rail corridor is privately owned, with another 5 to 12 percent (12.5 to 20.1 square kilometers [3,100 to 5,000 acres], depending on option) on the Walker River Paiute Reservation (see Figures 3-1 and 3-2). Of the remaining land, approximately 3 percent (5.3 square kilometers [1,300 acres) is DOE-managed land on the Nevada Test Site. Approximately 3 percent (4.7 square kilometers [1,200 acres]) has been withdrawn to the U.S. Department of Defense for the Hawthorne Army Depot, through which the Mina rail corridor would pass. Most of the land in the Mina rail corridor, approximately 80 to 85 percent (132.1 to 133.9 square kilometers [32,900 to 34,000 acres]), depending on option, is BLM-administered public land. Specifically, the BLM Carson City Field Office manages the land containing portions of the three Schurz bypass options and the first half of Mina common corridor segment 1 in accordance with the *Carson City Field Office Consolidated Resource Management Plan* (DIRS 179560-BLM 2001, all). The remainder of the land encompassing the Schurz bypass options is on the Walker River Paiute Reservation. South of the Reservation, the corridor would cross through land managed by the BLM Battle Mountain Field Office/Tonopah Field Station, with land use and management objectives governed by the *Tonopah Resource Management Plan and Record of Decision* (DIRS 173224-BLM 1997, all). The BLM Las Vegas Field Office manages the remaining land the corridor would cross from approximately Beatty Wash to Yucca Mountain in accordance with the *Record of Decision for the Approved Las Vegas Resource Management Plan and Final Environmental Impact Statement* (DIRS 176043-BLM 1998, all).

Construction of a railroad in the Mina rail corridor would begin near Wabuska, Nevada. From there, on the Walker River Paiute Reservation, the corridor proceeds southeast toward the town of Schurz. The three Schurz bypass options would be primarily on the Walker River Paiute Reservation. Schurz bypass options 1 and 2 would leave the existing Department of Defense Branchline approximately 29 kilometers (18 miles) northwest of Schurz, continue east of the Weber Reservoir, and cross U.S. Highway 95 east of Schurz. The first 1.8 kilometers (1.1 miles) of Schurz bypass options 1 and 2 would cross BLM-administered land; the remaining portions would cross the Walker River Paiute Reservation. Schurz bypass options 1 and 2 would not cross any private allotments on the Reservation (DIRS 180222-BSC 2006, p. 16). Both bypass options cross the Black Mountain Grazing Allotment (DIRS 182772-MTS 2007, p. 21).

Schurz bypass option 3 would be almost entirely on the Walker River Paiute Reservation. This option would come within 91 meters (300 feet) of a private allotment along the Walker River and, as it bypassed the town of Schurz, would be about 800 meters (0.5 mile) east of private allotments that are used for agriculture and contain no private residences (DIRS 180222-BSC 2006, p. 16). Schurz bypass option 3 would also cross the Parker Butte Grazing Allotment (DIRS 182772-MTS 2007, p. 22).

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

Due east of the Hawthorne Army Depot, common corridor segment 1 would cross approximately 3.2 kilometers (2 miles) of private property. As it traveled south, the center of the corridor would be within 150 meters (500 feet) of three other private land parcels and then pass just to the east of private property in Soda Springs Valley, southeast of Luning, and near Sodaville. It would pass through a mineral material site (an area in which the BLM has granted temporary rights to another party to obtain materials

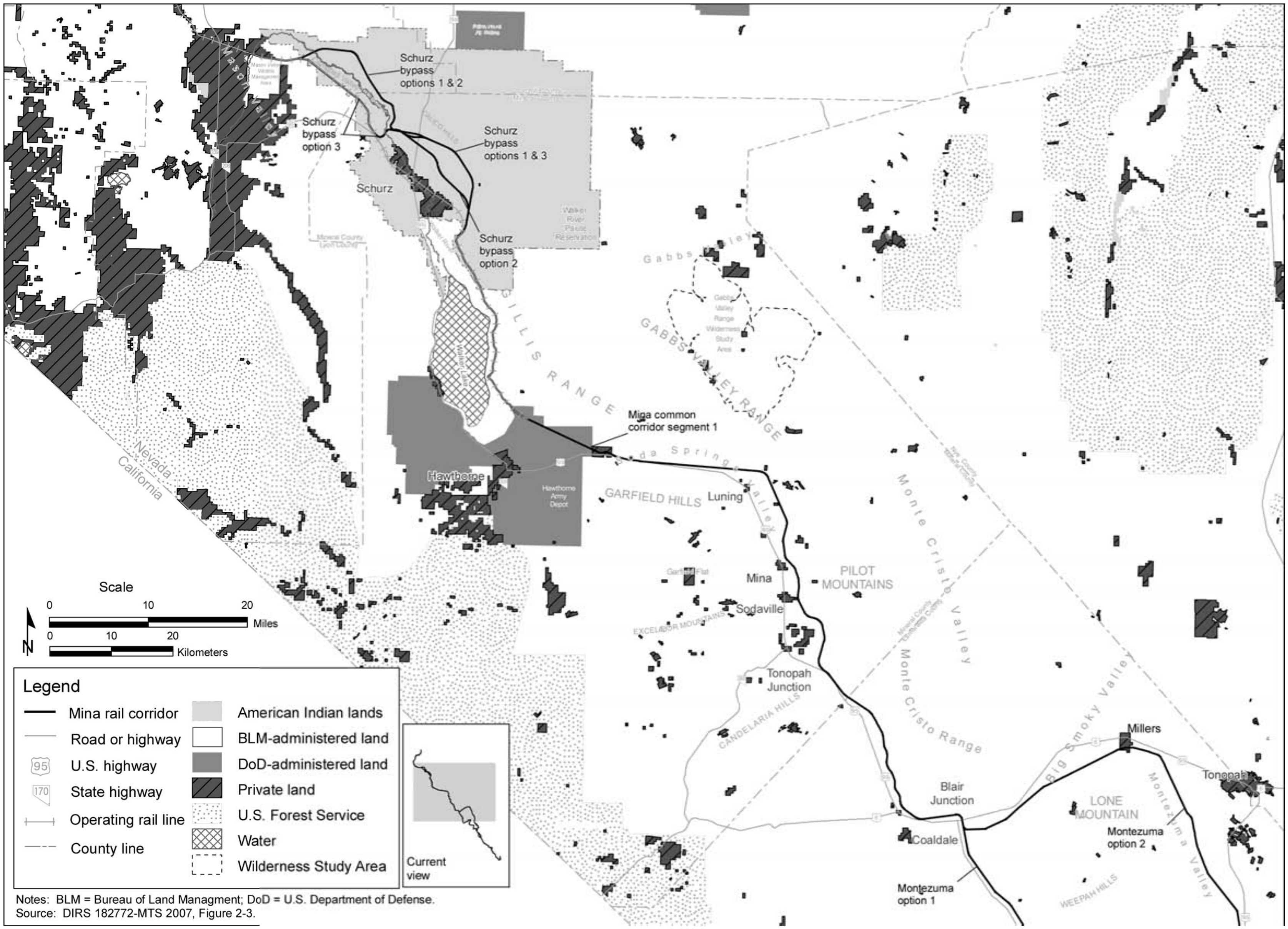
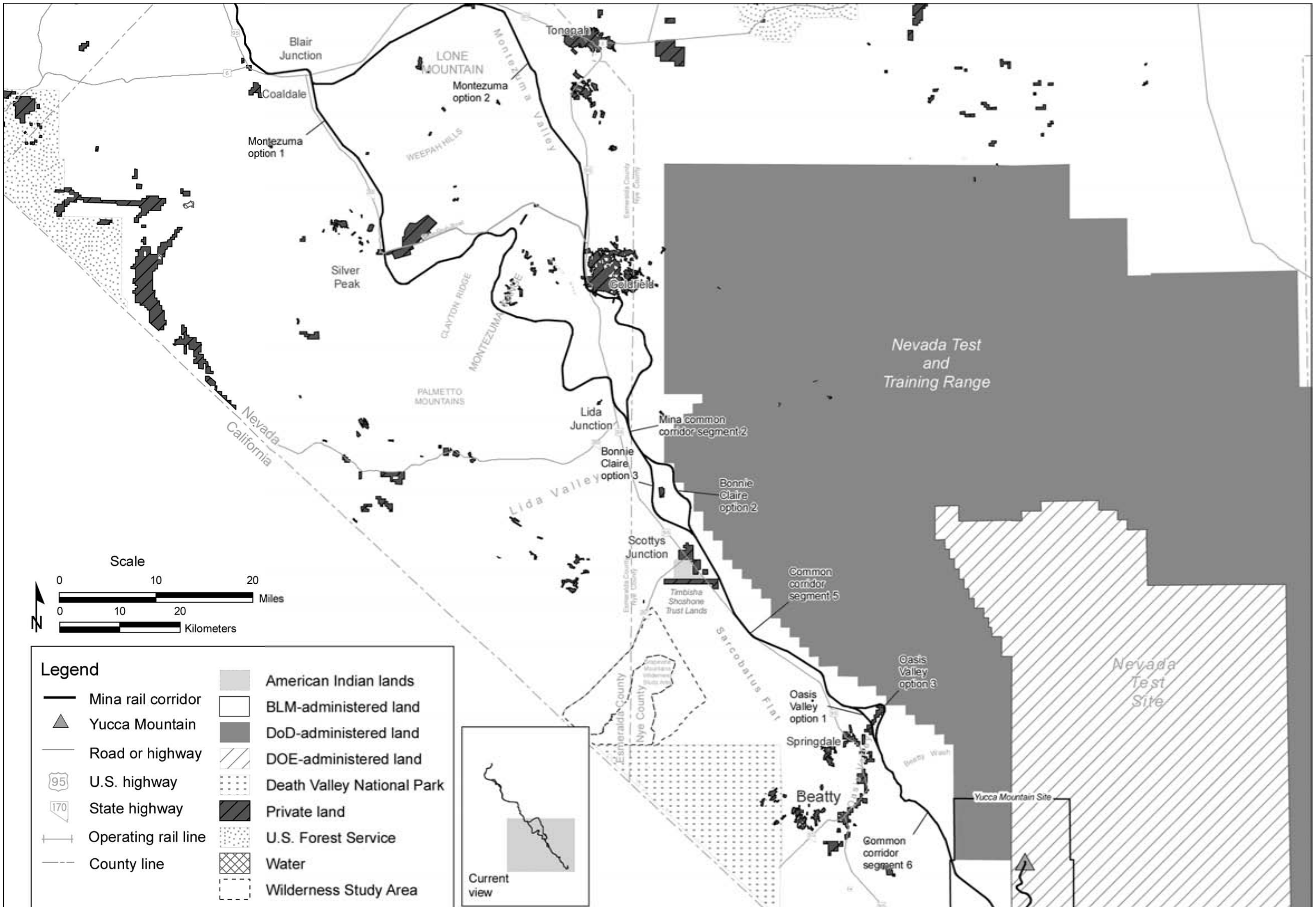


Figure 3-1. Mina rail corridor land use (north).



Notes: BLM = Bureau of Land Managment; DoD = U.S. Department of Defense; DOE = U.S. Department of Energy.
Source: DIRS 182772-MTS 2007, Figure 2-4.

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

such as sand and gravel) at Redlich Pass. Common corridor segment 1 would cross a portion of a mineral material site at Coaldale and Blair Junction and then pass through another mineral material site. In addition, it would cross the Gillis Mountain, Garfield Flat, Pilot-Table Mountain, Bellville, Monte Cristo, and Silver Peak Grazing Allotments and an allotment the BLM Battle Mountain District/Tonopah Field Office has designated as the Columbus Salt Marsh. The corridor would also cross linear rights-of-way that include power transmission lines, telephones lines, State Route 361, U.S. Highway 95, water pipelines, and roads (DIRS 182772-MTS 2007, p. 22).

At this point, there are two options for the Mina rail corridor, Montezuma options 1 and 2, to bypass the Montezuma Range. From about 5.3 kilometers (3.3 miles) north to 5 kilometers (3 miles) south of Silver Peak, Montezuma option 1 would cross land the BLM has designated as suitable for disposal (sale). Montezuma option 1 would cross rights-of-way for power transmission lines, State Route 265, and access roads. Specifically, it would cross three mineral material sites at Goldfield Hills, touch one site at Lida Junction, and cross another at Scottys Junction. Montezuma option 1 would cross the Sheep Mountain, Silver Peak, Yellow Hills, Montezuma, and Magruder Mountain Grazing Allotments. It would also cross an allotment the BLM Battle Mountain District/Tonopah Field Office has designated as the Columbus Salt Marsh, and another listed as an unallocated allotment. The BLM administers most of the land along Montezuma option 1, except for one small piece of private property near Silver Peak (DIRS 182772-MTS 2007, p. 22).

Montezuma option 2 would tend to follow an abandoned rail line of the former Tonopah and Goldfield Railroad through Montezuma Valley, bypassing Tonopah on the west side and continuing through the town of Goldfield to the south until it connected to common corridor segment 2. As with Montezuma option 1, the BLM administers most of the land along Montezuma option 2; a small percentage of the land is privately owned. Montezuma option 2 would cross approximately 1.6 kilometers (1 mile) of a private allotment commonly called Millers. This property had been the location of a mill site for silver ore and a station on the former Tonopah and Goldfield Railroad; a portion of this property is of cultural significance (see Section 3.2.5). The BLM has designated lands to the east and west of this property as suitable for disposal. The corridor would cross more than 40 privately owned parcels of land near the town of Goldfield. Montezuma option 2 would cross rights-of-way for access roads, power transmission lines, and water pipelines. It would pass through two mineral material sites. Montezuma option 2 would also cross the Monte Cristo and Montezuma Grazing Allotments and an allotment the BLM Battle Mountain District/Tonopah Field Office has designated as the Columbus Salt Marsh (DIRS 182772-MTS 2007, p. 22).

Common corridor segment 2 would begin at the end of Montezuma option 1 or 2 at a point just east of Lida Junction. All of common corridor segment 2 would cross BLM-administered land and the Montezuma and Razorback Grazing Allotments (DIRS 182772-MTS 2007, p. 22).

The Mina rail corridor would continue south into Bonnie Claire options 2 and 3, common corridor segment 5, Oasis Valley options 1 and 3, and common corridor segment 6. Bonnie Claire options 2 and 3 would cross the Montezuma Grazing Allotment. Common corridor segment 5 would cross the Montezuma and Magruder Mountain Grazing Allotments. Oasis Valley options 1 and 3 would cross private property and the Razorback Grazing Allotment. Common corridor segment 6 would cross the Montezuma and Razorback Grazing Allotments and a grazing allotment in Crater Flat west of Yucca Mountain the BLM has designated as unused (DIRS 182772-MTS 2007, p. 24).

DOE queried information for ***unpatented mining claims*** from the BLM LR2000 database (DIRS 182772-MTS 2007, p. 24) using the legal description for the Mina rail corridor (meridian, township, range, and section) and plotted locations of unpatented mining claims by sections (Figures 3-3 and 3-4). Of these, most of the unpatented mining claims are within the Goldfield area of the Mina rail corridor.

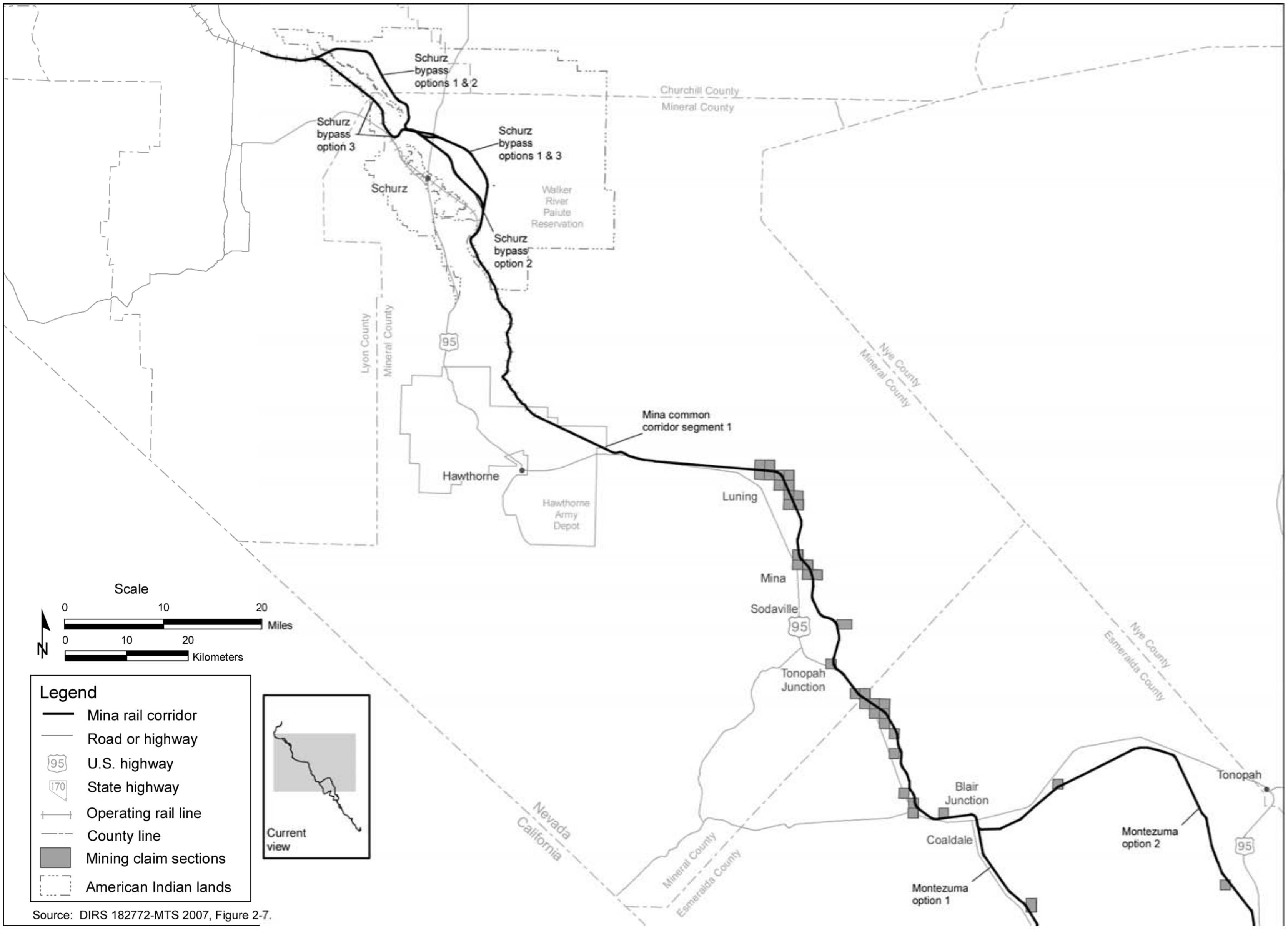


Figure 3-3. Sections containing unpatented mining claims within the Mina rail corridor (north).

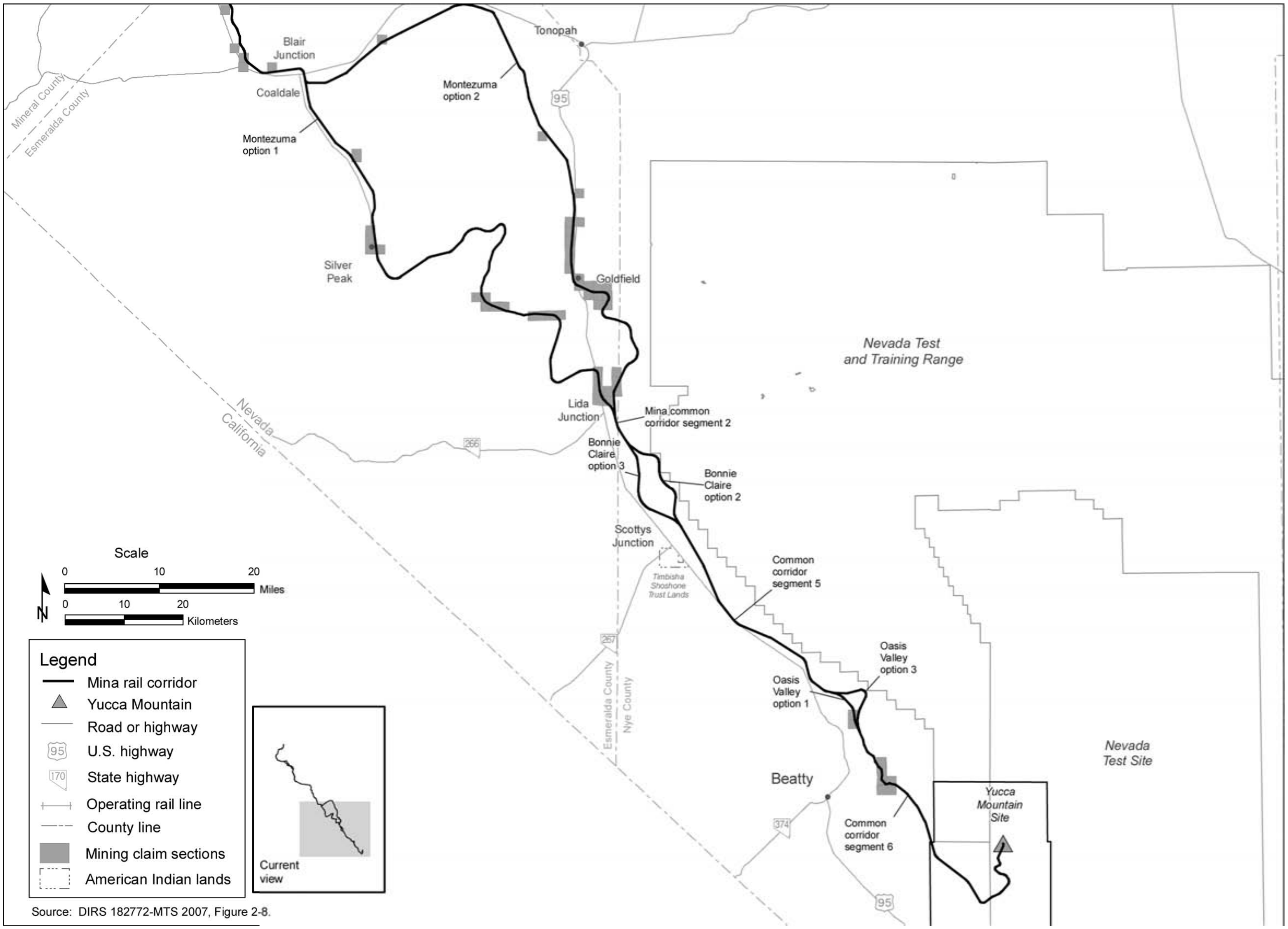


Figure 3-4. Sections containing unpatented mining claims within the Mina rail corridor (south).

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

3.2.1.2 Potential Impacts to Land Use and Ownership

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

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 option. The Mina rail corridor would cross up to 15 separate grazing allotments. The approximate disturbance area associated with the proposed Mina rail corridor would constitute less than 1 percent of the land within those 15 grazing allotments. Within this regional perspective of nearby existing and reasonably foreseeable land uses and land ownership, the commitment of land for the proposed Mina rail corridor would constitute a minor proportion of overall land commitment. DOE estimated that approximately 1.6 to 2.7 square kilometers (400 to 670 acres), of private land would be impacted, depending on option. This land consists of primarily agricultural and mineral uses and contains no private residences.

The Mina rail corridor would cross public lands managed by the BLM Carson City Field Office, the Battle Mountain/Tonopah offices, and the Las Vegas Field Office. Each has a resource management plan that establishes goals and objectives for the management of resources, which include public land uses and designations (DIRS 179560-BLM 2001, all; DIRS 173224-BLM 1997, all; DIRS 176043-BLM-1998, all). The Mina rail corridor would not cross or affect any Wilderness Areas, Wilderness Study Areas, or Areas of Critical Environmental Concern. The Mina rail corridor would be consistent with the goals and policies of the resource management plans in the BLM-administered areas through which it passes.

As described in Section 3.2.1.1, a rail line in the Mina rail corridor would cross private lands. If in locating the final rail alignment DOE could not avoid private lands, the Department would need to acquire access to them to construct and operate the railroad. If private property was divided by the rail line, access to the property could be disrupted.

The rail corridor would cross land on the Walker River Paiute Reservation. Construction and operation of a railroad on this land would require an agreement 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 Code of Federal Regulations (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." The Mina rail corridor would not cross any privately held lands on the Reservation. Schurz option 3 would be within 91 meters (300 feet) of a private allotment. This and other privately held lands near Schurz option 3 are used for agriculture; there are no private residences on this land.

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

Approximately 27 kilometers (17 miles) of common corridor segment 6 would be within the boundaries of the Yucca Mountain Site.

BLM would require DOE to obtain a right-of-way grant to construct and operate a railroad on public land. DOE anticipates the right-of-way would have a nominal width of approximately 300 meters (1,000 feet) during construction, which is within the 400-meter (0.25-mile)-wide corridor analyzed in this Nevada Rail Corridor SEIS and which was evaluated in the Yucca Mountain FEIS. The Department would adjust the width of the construction right-of-way where practicable to avoid or minimize land-use conflicts and restrictions. Construction and operation of the railroad in the Mina rail corridor through existing rights-of-way would require an evaluation of the impact to the road or utility or use of the right-of-way with both the right-of-way holder and the BLM. 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 land needed to operate the railroad would be generally less than the land needed during construction. Therefore, DOE would reclaim the land no longer needed in accordance with standards set forth by the BLM as a condition of the right-of-way grant.

There could be impacts to mining activities such as mine operations or exploration if access roads were temporarily blocked or altered, making development of a claim less profitable. The Mina region of influence contains a variety of mineral resources, with mining claims filed in accordance with BLM requirements, and several operating mines. Establishment of mining claims on federal land does not necessarily ever lead to actual development of mining operations on those sites. The implementation of several mining engineering practices in these areas could allow access to mining claims without affecting the claimant or the rail line, depending on the exact locations of the claims and access needs.

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

Grazing operations are a major BLM land-management program in the Mina region of influence. Rail line construction would result in loss of forage. Because the corridor intersects grazing allotments, a rail line could create a barrier to livestock movement. Livestock could have difficulty accessing water if there was a deep cut or a high fill associated with the rail line. Ranching 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 possibly by collisions with trains during the operations phase.

A rail line in the Mina rail corridor could impact access to land the public uses for recreation, requiring individuals to alter their access routes. Recreational events, such as off-highway vehicle racing, on courses that cross the area of the Mina rail corridor would need to be rerouted. Alterations in access to land used by hunters, hikers, and others could affect recreational experiences.

During the operations phase, train and track inspection and maintenance activities would be confined to areas disturbed during the construction phase. Therefore, there would be no additional disturbances to land use and ownership.

3.2.2 AIR QUALITY

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

The air quality region of influence includes the Environmental Protection Agency-designated air basins through which the corridor would pass.

The Mina rail corridor air quality evaluation used the same qualitative methods described in the Yucca Mountain FEIS (DIRS 155970-DOE 2002, Appendix G). DOE evaluated the route for identified ***nonattainment*** or maintenance areas, and identified ***criteria pollutants*** potentially generated by construction or operations activities. Because the Department did not identify any nonattainment or maintenance areas, no detailed estimates of emission rates or comparisons to threshold levels for conformity were made.

3.2.2.1 Air Quality Affected Environment

The Mina rail corridor would pass through rural parts of Nevada that are either ***in attainment*** or unclassifiable under U.S. Environmental Protection Agency criteria pollutant standards. If there are not enough air quality data to determine the status of a remote or sparsely populated area, then the Environmental Protection Agency lists the area as unclassifiable. The agency considers unclassifiable areas as any area that cannot be classified on the basis of available information as meeting or not meeting the National ***Ambient Air Quality Standards*** for the pollutant. Unclassifiable areas are treated as attainment areas under the Clean Air Act and its implementing regulations. Most rural areas of the United States are either in attainment or unclassifiable for all pollutants. Table 3-2 lists federal standards for criteria pollutants.

Monthly climate summaries for Beatty and Goldfield (DIRS 182772-MTS 2007, p. 27) indicate that the southern portions of the Mina rail corridor have the highest annual precipitation, with annual averages of about 16 centimeters (6.5 inches). The northern portions of the corridor through Mina, Hawthorne, Schurz, and Wabuska have less precipitation, about 11 to 13 centimeters (4.5 to 5 inches) annually. Goldfield, at an elevation of about 1,700 meters (5,700 feet), has the highest average annual snowfall, 38 centimeters (15 inches). Average annual snowfall for most of the rest of the corridor is 10 to 13 centimeters (4 to 5 inches). The southernmost portions of the corridor have even less snowfall. Average annual temperatures vary mainly by elevation, highest at the lower elevations such as Beatty at 1,000 meters (3,300 feet) and lowest at higher elevations such as Tonopah and Goldfield at 1,600 and 1,700 meters (5,400 and 5,700 feet), respectively (DIRS 182772-MTS 2007, p. 27).

3.2.2.2 Potential Air Quality Impacts

Pollutants from construction equipment emissions would include ***carbon monoxide***, ***nitrogen dioxide***, ***sulfur dioxide***, and ***particulate matter*** with aerodynamic diameters equal to or less than 10 micrometers (***PM_{10}***) and equal to or less than 2.5 micrometers (***$PM_{2.5}$***).

Construction activities such as surface disturbance and use of haul trucks in the Mina region of influence would emit PM_{10} and $PM_{2.5}$ in the form of ***fugitive dust***. Fugitive dust is a type of nonpoint source air pollution (small airborne particles that do not originate from a specific point). There could be short-term increases in concentrations of these air quality criteria pollutants as construction progressed along the corridor. The plumes associated with fugitive dust generation are often localized to the area being disturbed and are temporary. In ***arid*** areas such as the Mina region of influence, generation and control of fugitive dust will always be a concern. DOE would implement mitigation measures to minimize emissions, reduce dust concentrations during construction activities, and meet current air quality standards for these pollutants. Thus, impacts would be small.

During railroad operations, potential impacts to air quality would result from diesel locomotives, which would emit carbon monoxide, nitrogen dioxide, sulfur dioxide, PM_{10}, and $PM_{2.5}$. Fugitive dust emissions would be greatly reduced during railroad operations as excavation would cease and equipment traffic would be limited to maintenance vehicles.

Table 3-2. Federal standards for criteria pollutants.

		National Ambient Air Quality Standards[a]	
Pollutant	Averaging time	Primary[b]	Secondary[c]
Ozone (O_3)[d]	1-hour	0.12 parts per million (ppm) (235 micrograms per cubic meter [μg/m^3])	Same as primary standard
	8-hour	0.075 ppm	
Carbon monoxide (CO)	8-hour	9.0 ppm (10 μg/m^3)	None
	1-hour	35 ppm (40 μg/m^3)	
Nitrogen dioxide (NO_2)	Annual average	0.053 ppm (100 μg/m^3)	Same as primary standard
	1-hour	-	
Sulfur dioxide (SO_2)	Annual average	80 μg/m^3 (0.03 ppm)	-
	24-hour	365 μg/m^3 (0.14 ppm)	-
	3-hour	-	1,300 μg/m^3 (0.5 ppm)
	1-hour	-	-
Suspended particulate matter (PM_{10})	24-hour	150 μg/m^3	Same as primary standard
	Annual arithmetic mean	50 μg/m^3	
Fine particulate matter ($PM_{2.5}$)[d]	24-hour	35 μg/m^3	Same as primary standard
	Annual arithmetic mean	15 μg/m^3	
Lead (Pb)	30-day average	-	-
	Calendar quarter	1.5 μg/m^3	Same as primary standard

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

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

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

d. The Environmental Protection Agency revised the level of the 24-hour $PM_{2.5}$ standard to 35 micrograms per cubic meter (μg/m^3) and retained the level of the annual $PM_{2.5}$ standard at 15.μg/m^3 (71 *FR* 61144, October 17, 2006).

3.2.3 HYDROLOGY

This section describes surface-water and groundwater resources, and impacts to those resources. The hydrology region of influence includes surface-water and groundwater resources within the 400-meter (0.25-mile)-wide corridor and within a 1-kilometer (0.6-mile) region of influence along each side of the corridor. The region of influence for surface water includes areas near construction activities, areas that would be affected by permanent changes in surface-water flow, and areas downstream of construction. The region of influence for groundwater includes hydrographic regions.

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

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

DOE obtained information from (1) the National Hydrography Dataset Waterbody geospatial data that the U.S. Geological Survey developed in cooperation with the Environmental Protection Agency; (2) the Geographic Names Information System Nevada geospatial database developed by the U.S. Geological Survey and the BLM; and (3) the National Wetlands Inventory database managed by the U.S. Fish and Wildlife Service (DIRS 182772-MTS 2007, p. 30).

3.2.3.1 Hydrology Affected Environment

3.2.3.1.1 Surface Water

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

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

Table 3-3 summarizes surface-water resources within the region of influence and their proximity to the Mina rail corridor. This table also lists the location of a riparian area in relation to the corridor, further discussed in Section 3.2.4.

Table 3-3. Surface-water resources along the Mina rail corridor[a] (page 1 of 3).

Mina rail corridor option/common corridor segment	Distance from corridor[b]	Feature
Schurz bypass 1	Would be within/cross	Perennial stream/riparian area; corridor would cross the Walker River north of the Weber Reservoir.
Schurz bypass 1	Would be within/cross	Wetlands; corridor would cross and be adjacent to freshwater emergent wetland areas, where it would cross the Walker River.
Schurz bypasses 1 and 2	0.3 to 0.6 mile	Perennial lake/pond; corridor would be adjacent to Weber Reservoir.
Schurz bypass 3	Would be within/cross	Perennial stream; corridor would cross Walker River just north of the town of Schurz.
Schurz bypass 3	2.5 miles	Springs; Paiute Spring and one unnamed spring, 2 miles west of U.S. Highway 95, 6 miles from the town of Schurz.
Schurz bypasses 1 and 3	Would be within/cross	Playas; corridor would cross five unnamed playas and be adjacent to several other unnamed playas in an unnamed valley, just south of the Calico Hills, approximately 5 miles east of Schurz.
Schurz bypasses 1 and 2	Would be within/cross	Playas; corridor would cross two unnamed playas, approximately 2.8 miles east of Schurz.
Schurz bypasses 1 and 3	0.7 to 0.8 mile	Springs; Double Springs and an unnamed spring, 6 miles east of the town of Schurz on the Walker River Paiute Reservation.
Schurz bypass 1	0.1 to 0.6 mile	Playas; playas, freshwater emergent wetland areas, and freshwater forested/shrub wetland areas adjacent to the corridor as all options come together joining with the existing Union Pacific Railroad Hazen Branchline. These areas are north of Walker Lake, adjacent to U.S. Highway 95, 4.4 miles from the town of Schurz.
Schurz bypass 1	1.6 to 2.6 miles	Springs; three unnamed springs /seeps just north of Walker River, adjacent to U.S. Highway 95.
Common corridor segment 1	Would be within/cross	Playas; corridor would cross two unnamed playas about 9 miles east of the town of Hawthorne.
Common corridor segment 1	Would be within/cross	Playas; corridor would cross large playas at the foot of the Garfield Hills along U.S. Highway 95, 12 miles outside of Hawthorne.
Common corridor segment 1	0.3 mile	Playa; corridor would be adjacent to a playa in Soda Springs Valley, along U.S. Highway 95, about 14 miles outside of Hawthorne.
Common corridor segment 1	0.6 mile	Playa; corridor would be adjacent to a large playa in Alkali Flat, just south of the town of Luning.
Common corridor segment 1	Crosses/encroaches	Playa; corridor would encroach and cross a large playa in the town of Mina.

Table 3-3. Surface-water resources along the Mina rail corridor[a] (page 2 of 3).

Mina rail corridor option/common corridor segment	Distance from corridor[b]	Feature
Common corridor segment 1	2.2 miles	Spring; Southern Pacific Spring, 3 miles east of the town of Mina.
Common corridor segment 1	1.3 to 1.4 miles	Springs; Soda Springs, including two unnamed springs, just north of the town of Sodaville, along U.S. Highway 95.
Common corridor segment 1	1.6 miles	Springs; Martin Spring and an unnamed spring, 4 miles east of the town of Sodaville.
Common corridor segment 1	2.7 to 2.9 miles	Springs; three unnamed springs at the base of the Pilot Mountains, east of Sodaville.
Common corridor segment 1	2 to 3 miles	Springs; three unnamed springs within the Rhodes Salt Marsh, approximately 2 miles along U.S. Highway 95.
Common corridor segment 1	0.1 mile	Spring; corridor would encroach an unnamed spring 1.2 miles north of Coaldale.
Montezuma 2	Would be within/cross	Playas; corridor would cross two large playas and one small playa approximately 8 miles east of Blair Junction along U.S. Highway 95.
Montezuma 2	Would be within/cross	Playas; corridor would cross and be adjacent to several small playas, approximately 11 to 12 miles from Blair Junction.
Montezuma 2	Would be within/cross	Playas; corridor would cross three small playas, totaling 1 acre, 6 miles southwest of Tonopah.
Montezuma 2	0.6 mile	Playa; Millers Pond, a small playa, is adjacent to the corridor along U.S. Highway 95, approximately 3 miles from Millers.
Montezuma 2	1.1 to 1.2 miles	Springs; West Spring and three unnamed springs, 2 miles northwest of the town of Goldfield.
Montezuma 2	2.4 miles	Springs; Sulphur Spring and two unnamed springs, 2.5 miles west of Goldfield.
Montezuma 2	0.6 mile	Spring; Slaughterhouse Spring, 1 mile west of the town of Goldfield.
Montezuma 2	Would be within/cross	Springs; Rabbit Spring and one unnamed spring, within the outskirts of the town of Goldfield.
Montezuma 2	0.2 mile	Playa; large playa adjacent to the corridor in Stonewall Flat, 2 miles northeast of Lida Junction.
Montezuma 1	0.6 mile	Spring; Silver Peak Spring adjacent to the corridor in the town of Silver Peak.
Montezuma 1	0.1 to 6 miles	Pond; evaporative pond east of the corridor just outside of Silver Peak, associated with local mining operations.
Montezuma 1	Would be within/cross	Pond; corridor would cross a mine tailings pond in the town of Silver Peak.
Montezuma 1	2.8 to 2.9 miles	Springs; two springs (Twin Springs), 9 miles northeast of the town of Silver Peak.

Table 3-3. Surface-water resources along the Mina rail corridor[a] (page 3 of 3).

Mina rail corridor option/common corridor segment	Distance from corridor[b]	Feature
Montezuma 1	1.9 to 2.2 miles	Springs; two unnamed springs near the top of Montezuma Peak, in the Montezuma Range.
Bonnie Claire 3	Would be within/cross	Playa; corridor would cross a large playa along U.S. Highway 95, 4 miles south of Lida Junction.
Oasis Valley 1	0.2 to 2.8 miles	Springs; more than 40 springs in the area of Oasis Valley between Springdale and Beatty along U.S. Highway 95.
Oasis Valley 3	0.1 mile	Pond; perennial pond, Colson Pond, is adjacent to the corridor in Oasis Valley, 4.4 miles from Springdale.
Oasis Valley 3	Would be within/cross	Spring; Warm Springs located adjacent to Colson Pond, within the corridor in Oasis Valley, 4.4 miles from Springdale.

a. Source: DIRS 182772-MTS 2007, pp. 31 and 32.
b. To convert miles to kilometers, multiply by 1.6093, to convert acres to square kilometers, multiply by 0.0040469.

In addition to the surface-water resources identified in Table 3-3, the following floodplains occur within the region of influence of the Mina rail corridor:

<u>Montezuma option 1</u>

- Floodplain from Jackson Wash and Jackson Wash tributaries
- Alkali Lake Playa floodplain (not mapped by the Federal Emergency Management Agency)

<u>Montezuma option 2</u>

- Floodplain between Stonewall Mountains and Cuprite Hills and is associated with Stonewall Flat

<u>Bonnie Claire 3</u>

- Floodplains extending up tributaries of the Lida Valley Alkali Flat Playa and up the Stonewall Pass wash from the Bonnie Claire Flat area of Sarcobatus Flat

<u>Common corridor segment 5</u>

- Floodplain of the Amargosa River within Thirsty Canyon

<u>Oasis Valley option 1</u>

- Floodplain of the Amargosa River within Thirsty Canyon

<u>Oasis Valley option 3</u>

- Beatty Wash floodplain extending from the Amargosa River floodplain

<u>Common corridor segment 6</u>

- Busted Butte Wash draining east side of Yucca Mountain to Fortymile Wash (rail line would cross wash and tributaries)

- Drill Hole Wash draining east side of Yucca Mountain to Fortymile Wash (wash and tributary crossed)
- Midway Valley Wash draining east side of Yucca Mountain to Drill Hole Wash, then to Fortymile Wash

3.2.3.1.2 Groundwater

The State of Nevada is divided into hydrographic regions and subbasins (hydrographic areas).

The Mina rail corridor and its options would cross three hydrographic regions: Death Valley Basin (Region 14), Central (Region 10), and Walker River (Region 9). Figure 3-5 shows these hydrographic regions and their hydrographic areas. *Water Resources Assessment—Mina Rail Corridor* (DIRS 180887-Converse Consultants 2007, all) contains a quantitative overview of existing groundwater appropriations for each basin in the corridor and includes details on the status, type of use, and approximate quantity of water currently used in each basin.

3.2.3.2 Potential Impacts to Hydrology

3.2.3.2.1 Surface Water

Construction in previously undeveloped areas often results in changes to natural drainage. Construction could include regrading that would allow runoff from a number of minor drainage channels to collect in a single ***culvert*** or pass under a single bridge, which would result in water flowing from a single location on the downstream side rather than across a broader area. This would cause some localized changes in drainage patterns, but this probably would occur only in areas where natural drainage channels are small. Compaction of soil during construction could reduce water infiltration rates and change natural runoff and drainage patterns. However, some activities would disturb and loosen the ground for some time, which could cause higher infiltration rates. DOE would adhere to engineering design standards. Therefore, impacts associated with the alteration of drainage patterns or changes to erosion and sedimentation rates or locations would be small and localized.

Rail line construction could affect floodplains, either through direct alteration of the stream-channel cross section that would affect the flow pattern of the stream, or through indirect changes in the amount of impervious surfaces and additional water volume added to the floodplain.
Construction impacts associated with these floodplains would be similar to other identified drainage areas (the alteration of natural drainage patterns and possible changes in erosion and sedimentation rates or locations). Construction in washes or other flood-prone areas could reduce the area through which floodwaters would naturally flow, which could cause water levels to rise at the upstream side of crossings. Sedimentation would be likely to occur on the upstream side of crossings in areas where the flow of water was restricted enough to cause ponding. DOE would manage sedimentation of this type under a regular maintenance program (DIRS 155970-DOE 2002, p. 6-79). Sediment would generally be contained onsite through the use of best management practices, including erosion- and sedimentation-control measures. DOE would take appropriate and applicable measures to minimize alteration of natural drainage patterns, erosion, and sediment loading. Therefore, impacts to floodplains from construction of the rail line that result in restrictions in flow and sedimentation would be small.

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

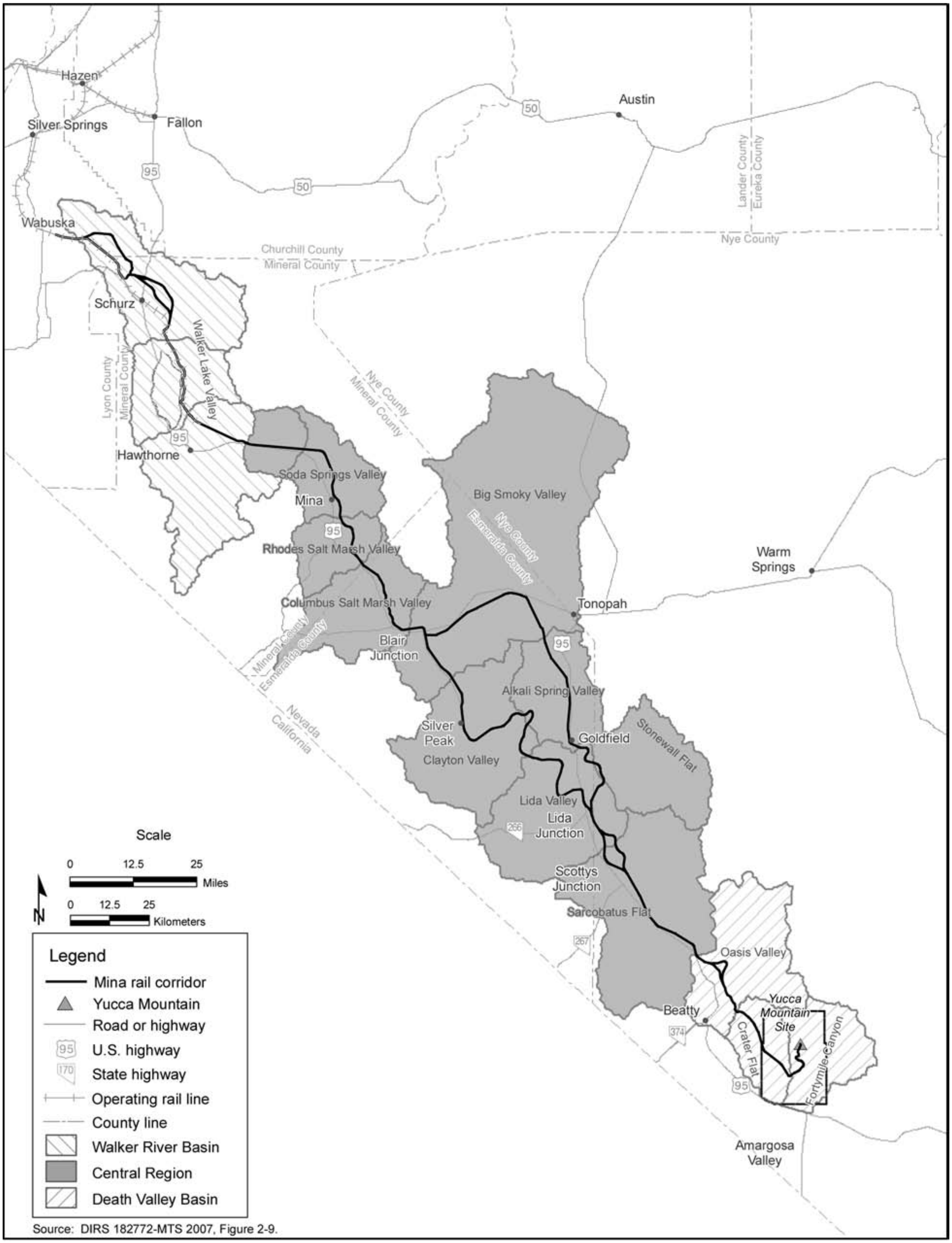


Figure 3-5. Hydrographic regions and areas associated with the Mina rail corridor.

Construction of a bridge over the Walker River could have a temporary impact on the quality and flow of the river. Bridge construction would occur during periods of low flow, and DOE would implement erosion-control measures to ensure that these temporary impacts would be small. Bridge construction also could cause the temporary disturbance of freshwater emergent wetlands adjacent to the Walker River.

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

Some streams, adjacent wetlands, and ephemeral washes within the interstate Walker River and Death Valley hydrographic regions (see Figure 3-5) could be regulated under Section 404 of the Clean Water Act. The Department would meet the requirements of the Act prior to constructing crossings of any regulated streams, wetlands, or washes, including conducting an evaluation of alternative crossing locations and designs that would minimize impacts to wetlands and other waters. Impacts to regulated drainages would be the same as those described above.

The Mina corridor would cross three springs: Rabbit Springs, Warm Springs, and an unnamed spring. All three are in the Mina rail corridor. DOE would adjust the rail alignment in the corridor to avoid conducting surface-disturbing activities that could impact these springs.

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

Railroad operations in the Mina rail corridor would have little impact on surface waters beyond the alterations to drainage during rail line construction. Access roads and the rail roadbed would have runoff rates different from those of the natural terrain but, given the relatively small size of the potentially affected areas in a single drainage system, there would be little impact on overall runoff quantities.

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

3.2.3.2.2 Groundwater

Rail line construction would require water for soil compaction, dust control, and workforce use. The water DOE would use during the construction phase would come from wells that would be installed within specified hydrographic basins. If the hydrographic basin is a designated groundwater basin, this means that the permitted groundwater rights approach or exceed the estimated ***perennial yield***, water resources are being depleted or require additional administration, and the State Engineer has declared preferred uses of the water. Table 3-4 lists the designation status of the hydrographic basins and the percentage of the Mina rail corridor that would be in the respective basin. Approximately 39 percent of the total Mina rail corridor would be in designated basins.

Table 3-4. Hydrographic basins the Mina rail corridor would cross.[a,b,c,d]

Hydrographic basin (and subbasin where applicable)	Length (miles)	Percent of total	Designated
Alkali Spring Valley	5	1.9	No
Big Smoky Valley/Tonopah Flat	15	5.8	Yes
Clayton Valley	33	12.8	No
Columbus Salt Marsh Valley	19	7.2	No
Crater Flat	18	7.0	No
Fortymile Canyon/Jackass Flats	9	3.4	No
Lida Valley	32	12.4	No
Oasis Valley	14	5.7	Yes
Rhodes Salt Marsh Valley	11	4.2	No
Sarcobatus Flat	30	11.7	Yes
Soda Springs Valley/Eastern Part	18	7.2	Yes
Soda Springs Valley/Western Part	11	4.5	Yes
Walker Lake Valley/Schurz Subarea	32	12.5	No
Walker Lake Valley/Whiskey Flat-Hawthorne Subarea	9	3.7	Yes

a. To convert miles to kilometers, multiply by 1.6093.
b. Source: DIRS 182772-MTS 2007, pp. 34 and 35.
c. To calculate water demand for each basin, multiply 5,600 acre-feet by the percentage of total.
d. Mina rail corridor basis of analysis consists of Schurz bypass option 1, common corridor segment 1, Montezuma option 1, common corridor segment 2, Bonnie Claire option 3, common corridor segment 5, Oasis Valley option 1, and common corridor segment 6.

DOE evaluated the water demand for rail line construction on the basis of earthwork needs and water needed for compaction. Earthwork needs would include excavation of common soil (alluvial material), ripable rock, and drill and blast (solid bedrock). Based on these considerations, total water demand for the Mina rail corridor would be approximately 7.32 million cubic meters (5,950 acre-feet) (DIRS 180877-Nevada Rail Partners 2007, p. 2-7).

DOE estimates that the number of wells required to support construction of a rail line in the Mina rail corridor ranges from 77 to 110 wells, depending on corridor option. Of these, some locations might have two wells where production is anticipated to be low. Consistent with the groundwater resources analysis in the Yucca Mountain FEIS, DOE also assumed a 1-year period for construction activities in the vicinity of each well. The pumping of groundwater from multiple wells for rail line construction could cause a temporary decrease in groundwater resources resulting from the increased demand. Groundwater withdrawal could temporarily decrease the amount of water available for underflow to a downgradient basin or spring discharge. The Nevada State Engineer would need to approve groundwater withdrawal from any well DOE proposed to install to support rail line construction. To grant approval, the State Engineer would have to determine that the short-term demand would not cause adverse impacts for other uses and users of the groundwater resource.

Other potential impacts to groundwater during the construction phase could include changes to infiltration rates, and new sources of contamination that could migrate to groundwater. Potential impacts would be spread over a large geographic area, so they would be small and temporary for a resource in a single area. The discussion of impacts to surface water in Section 3.2.3.2.1 describes potential contaminants that rail line construction could release. These contaminants would be the same for groundwater.

Construction activities would disturb and loosen the ground, which could produce greater infiltration rates. However, this situation would be short-lived because the access road and rail roadbed materials would become compacted and less porous. In either case, localized changes in infiltration would cause no noticeable change in the amount of recharge in the area.

If DOE obtained water from a source other than a newly installed well, such as importing water from another source, water would be obtained only from appropriated sources. That is, the water would be from allocations that the Nevada State Engineer had previously determined did not adversely affect groundwater resources.

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

3.2.4 BIOLOGICAL RESOURCES AND SOILS

This section describes biological resources along the Mina rail corridor. Consistent with the Yucca Mountain FEIS, DOE considered the potential for impacts to vegetation communities; special status species (plants and animals), including their habitat; springs, wetlands, and riparian areas; big game habitat; and wild horse and burro ***herd management areas*** that could occur within the 400-meter (0.25-mile)-wide corridor. The analysis considered special status species and big game habitat within 5 kilometers (3 miles) of the corridor that could be affected by rail line construction. DOE also analyzed springs and riparian areas that could be affected by permanent changes in surface-water flows (see Table 3-3). Finally, DOE characterized soils, including soils that could support prime farmland, within the 400-meter-wide corridor (DIRS 182772-MTS 2007, p. 37).

DOE obtained location records for special status species from a statewide database managed by the Natural Heritage Program (DIRS 182772-MTS 2007, p. 37) that contains records of incidental observations of rare or protected plants, fish, and wildlife species. Other information sources included (1) the *Carson City Field Office Consolidated Resource Management Plan* (DIRS 179560-BLM 2001, all); (2) the *Tonopah Resource Management Plan and Record of Decision* (DIRS 173224-BLM 1997, all); (3) the *Biological Field Findings Report for Potential Rail Alignments along the Mina Route* (DIRS 182760-URS Corporation/Potomac-Hudson Engineering 2006, all); and (4) the *Mina Rail Route Feasibility Study* (DIRS 180222-BSC 2006, all).

Additionally, DOE obtained location information from (1) the National Hydrography Dataset Waterbody geospatial data that the U.S. Geological Survey developed in cooperation with the U.S. Environmental Protection Agency (2) the Geographic Names Information System Nevada geospatial database developed by the U.S. Geological Survey and the BLM; (3) the National Wetlands Inventory database managed by the U.S. Fish and Wildlife Service; and (4) BLM Wild Horse and Burro Management Area Maps (DIRS 182772-MTS 2007, p. 37).

DOE used soil survey databases from the U.S. Department of Agriculture, Natural Resources Conservation Service (DIRS 176781-MO0603GSCSSGEO.000), to identify soil types and characteristics along the Mina rail corridor.

3.2.4.1 Biological Resources and Soils Affected Environment

3.2.4.1.1 Biological Resources

The following vegetation communities occur along the Mina rail corridor (DIRS 155970-DOE 2002, p. 3-70; DIRS 182760-URS Corporation/Potomac-Hudson Engineering 2006, all):

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

The corridor and its options would cross habitat for two species classified as threatened under the Endangered Species Act: the desert tortoise (*Gopherus agasizii*) and Lahontan cutthroat trout (*Oncorhynchus clarkii henshawi*). The desert tortoise also is classified as threatened by Nevada (Nevada Administrative Code 503.080). About 50 kilometers (30 miles) of the southern portion of the corridor from Beatty Wash to Yucca Mountain is habitat for desert tortoises. However, the abundance of desert tortoises along this portion of the corridor is low to very low (DIRS 103281-Karl 1981, pp. 76 to 92; DIRS 101914-Rautenstrauch and O'Farrell 1998, pp. 407 to 411). The corridor would cross potential habitat for the Lahontan cutthroat trout at the Walker River north or south of Weber Reservoir. The Lahontan cutthroat trout occurs in Walker Lake and in the Walker River upstream to the Weber Reservoir during spawning. The upstream spawning migration of trout is blocked by the Weber Reservoir dam, although the Bureau of Indian Affairs might build a fish ladder around that dam that will enable Lahontan cutthroat trout to migrate upstream of the dam. There are no areas classified as critical habitat for these threatened species within or near the corridor.

The Railroad Valley springfish (*Crenychthis nevadae*), which is federally and state (Nevada Administrative Code 503.065) classified as threatened, and the Sodaville milkvetch (*Atragalus lentiginousus Douglas* var. *sesquimetralis*), a species classified as critically endangered by Nevada (Nevada Administrative Code 527.010), occur in or near Soda Spring at Sodaville. This spring is about 2.1 kilometers (1.3 miles) from the Mina rail corridor (DIRS 180222-BSC 2006, p. 22). The Western Shoshone regard the Railroad Valley springfish to be sensitive. The federally and state-listed (Nevada Administrative Code 503.050) endangered Southwestern willow flycatcher (*Empidonax traillii extimus)* has been observed about 4.3 kilometers (2.7 miles) from the corridor north of Beatty along U.S. Highway 95 (DIRS 182772-MTS 2007, p. 38).

No plant species classified as sensitive by the BLM in Nevada have been found within the 400-meter (0.25-mile)-wide corridor. However, the following four BLM sensitive plant species have been observed within 5 kilometers (3 miles) of the corridor (DIRS 182772-MTS 2007, p. 38; DIRS 182760-URS Corporation/Potomac-Hudson Engineering 2006, all).

- Oryctes (*Oryctes nevadensis*) occurs about 5 kilometers (3 miles) from the southern portion of the Schurz bypass options, 2.6 kilometers (1.6 miles) from the start of common corridor segment 1, and about 0.64 kilometer (0.4 mile) from Mina common corridor segment 1 north of the town of Mina.
- Eastwood milkweed (*Asclepias eastwoodiana*) has been found about 4 kilometers (2.5 miles) east of Montezuma option 1 north of the town of Silver Peak and west of Weepah Hills.
- Nevada dune beardtongue (*Penstemon arenarius*) has been found about 0.64 kilometer (0.4 mile) west of common corridor segment 6 in Sarcobatus Flats.
- Two populations of the black woollypod (*Astragalus funereus)* have been documented 0.1 and 0.48 kilometer (0.06 and 0.3 mile) outside the corridor just south of Beatty Wash.

The Oasis Valley pyrg or springsnail (*Pyrgulopsis micrococcus*), a BLM-designated sensitive species, has been observed in springs from about 1.8 to more than 5 kilometers (1.1 to 3 miles) west of Oasis Valley option 1 and common corridor segment 6 north of Beatty (DIRS 182772-MTS 2007, p. 38).

The state-protected Amargosa toad (*Bufo nelsoni*) (Nevada Administrative Code 503.075) occurs in numerous springs in Oasis Valley from 1.1 to more than 5 kilometers (0.7 to 3 miles) west of Oasis Valley option 1. The Oasis Valley speckled dace (*Rhinichthys osculus* ssp.), which also is state protected (Nevada Administrative Code 503.065), occurs more than 2.6 kilometers (1.6 miles) from Oasis Valley option 1 in the same areas.

Portions of common corridor segment 6 cross habitat for the chuckwalla (*Sauromalus ater*), a lizard classified as sensitive by the BLM in Nevada.

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

A documented occurrence of the fringed myotis (*Myotis thysanodes*), a BLM-designated sensitive species and state-protected bat (Nevada Administrative Code 503.030), took place on the west edge of Jackass Flats about 5 kilometers (3 miles) from the corridor (DIRS 182772-MTS 2007, p. 38). Other BLM-designated sensitive bats that may occur along the Mina rail corridor include the Townsend's big-eared bat (*Corynorhinus townsendii*); the spotted bat (*Euderma maculatum),* a Nevada threatened species; the California myotis (*Myotis californicus*); the western small-footed bat (*Myotis ciliolabrum*); the western pipistrelle (*Pipistrellus hesperus*); and the state-protected pallid bat (*Antrozous pallidus*) (DIRS 182772-MTS 2007, p. 39). The corridor may cross habitat for other mammals classified as sensitive by the BLM in Nevada, including the pygmy rabbit (*Brachylagus idahoensis*), and the dark kangaroo mouse (*Microdipidops megacephalus albiventer*).

From Hawthorne to Redlich Pass, common corridor segment 1 would pass near areas designated by the BLM as desert bighorn sheep (*Ovis Canadensis nelsoni*) yearlong habitat, and common corridor segment 2 would pass near yearlong bighorn sheep habitat north of Lone Mountain. Mina common corridor segment 6 would cross a bighorn sheep movement corridor in the Beatty Wash area. Portions of Mina common corridor segment 1 from Thorne to Blair Junction would be within 5 kilometers (3 miles) of BLM-designated yearlong habitat for pronghorn antelope (*Antilocapra americana*) and mule deer (*Odocoileus hemionus*). Montezuma option 2 would cross yearlong pronghorn antelope habitat in

Montezuma Valley. Montezuma option 1 would cross yearlong mule deer habitat near the town of Silver Peak and in the Montezuma Range, and Oasis Valley option 3 would cross seasonal mule deer habitat. Mountain lions (*Felis concolor*), which are also classified as a game species in Nevada, are found throughout southern and central Nevada (DIRS 176043-BLM 1998, all, DIRS 173224-BLM 1997, all, DIRS 179560-BLM 2001, all).

The Mina rail corridor would cross four wild horse and burro herd management areas: Montezuma Peak, Goldfield, Stonewall, and Bullfrog. The corridor would pass within 5 kilometers (3 miles) of the Garfield Flat, Silver Peak, and Pilot Mountain (or Dunlap) Herd Management Areas (DIRS 182772-MTS 2007, p. 39).

The only riparian area the Mina rail corridor would cross would be along the Walker River (see Table 3-3). There are freshwater emergent wetlands and riparian habitat at both locations being considered for crossing that river. Section 3.2.3.1.1 describes playas and associated potential wetlands within and near the corridor.

Springs within the 400-meter (0.25-mile)-wide rail corridor are Rabbit Spring and one unnamed spring, which are on the upstream edge of Montezuma corridor option 2 near the town of Goldfield. Table 3-3 lists surface-water resources in the Mina rail corridor. Additional warm springs adjacent to Colson Pond in the Oasis Valley would be within the 400-meter-wide rail corridor.

3.2.4.1.2 Soils

The Farmland Protection Policy Act requires federal agencies to take into account the adverse effects of their programs on the preservation of farmlands, including the conversion of ***prime farmland***. DOE used the soil survey databases (DIRS 176781-MO0603GSCSSGEO.000) to locate soils along the corridor that are classified as supporting prime farmland. Less than 1 percent of the Mina rail corridor contains soils classified as prime farmland. Those soils are on the Walker River Paiute Reservation.

A number of soil types occur throughout the Mina rail corridor. The soil types in the vicinity of the corridor can be classified in more general terms as sandy soils or dune areas, which are characteristically alkaline, salty, and basic, containing calcium carbonate, and light-colored soils. These soils also include rocky outcrops, talus slopes, and granitic and gravelly areas (DIRS 182760-URS Corporation/Potomac-Hudson Engineering 2006, p. 31, Table 1). The Schurz bypass options would pass through areas of primarily sandy soils and between Hawthorne and Blair Junction, the corridor would contain mostly areas of alluvial soils. Montezuma option 1 would pass through areas of fine-grained soils at the playa in Clayton Valley, and Montezuma option 2 would pass through areas consisting of primarily sandy soils. The remainder of the corridor, south of Lida Junction, would pass through areas of alluvial and rocky soils (DIRS 180222-BSC 2006, p. 27, Table 3.2-1).

Other soil characteristics that are particularly relevant to the proposed rail corridor are ***erodes easily*** and ***blowing soil***. Soil with either of these characteristics can be quite susceptible to erosion. The erodes easily characteristic is a measure of the susceptibility of bare soil to be detached and moved by water. These soils, which tend to contain relatively high amounts of silts and ***loams***, tend to erode easily when disturbed. Approximately 19 percent of the Mina rail corridor has soils with this characteristic (DIRS 176781-MO0603GSCSSGEO.000). The blowing soil characteristic is based on the soil survey classification of susceptibility of a given soil to wind erosion. The blowing soil characteristic identifies areas where fine-textured, sandy materials predominate and where uncontrolled soil disturbance could result in increased wind erosion. Depending on options, between 23 and 26 percent of the Mina rail corridor would have soils with the blowing soil characteristic (DIRS 176781-MO0603GSCSSGEO.000).

3.2.4.2 Potential Impacts to Biological Resources and Soils

Rail line construction in the Mina rail corridor would involve clearing of vegetation, excavation, and filling for subgrade within the 400-meter (0.25-mile)-wide corridor. Maximum land disturbance within this area is approximately 37 to 41 square kilometers (9,000 to 10,000 acres).

With the exception of riparian areas, none of the vegetation communities in the Mina corridor (described in Section 3.2.4.1) are unique or rare in the region. A bridge over the riparian area along the Walker River would minimize disturbance to that vegetation community. The total land area disturbed within all community types would be small compared to the existing area of Nevada that supports those communities.

Clearing vegetation and disturbing the soil could create habitat for colonization by ***noxious weeds*** and ***invasive species*** in the Mina corridor. This could result in an increase in the abundance of such plants in the rail corridor, which in turn could lead to suppression of native species and increased fuel loads for wildfires. Reclamation of disturbed areas would enhance the recovery of native vegetation and reduce colonization by noxious weeds and invasive species.

There is desert tortoise habitat for about 50 kilometers (30 miles) along the southern end of the Mina rail corridor. Rail line construction would result in the permanent loss of desert tortoise habitat within the corridor. In addition, these construction activities could cause mortality of individual desert tortoises; however, desert tortoises are not abundant in this area and the likelihood of encountering tortoises would be low. Therefore, losses would be few. Relocating tortoises encountered along the route prior to construction would minimize losses of individuals. The presence of the rail line could interfere with the normal movements of individual tortoises. DOE would consult with the U.S. Fish and Wildlife Service (under Section 7 of the Endangered Species Act) regarding this species and would comply with all terms and conditions imposed by the U.S. Fish and Wildlife Service.

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

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

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

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

Rail line construction could impact BLM-designated sensitive birds and other migratory birds through loss of suitable nesting and foraging habitat, and birds avoiding areas where there were construction activities. Rail line construction could also impact BLM-designated sensitive bat and other mammal species through loss of suitable habitat, and avoidance of areas where there were construction activities. The area of permanent loss of habitat would be small compared to available habitat in the region.

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

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

The Mina rail corridor would cross three springs (see Table 3-3): Rabbit Springs, Warm Springs, and an unnamed spring. All three are in the Mina corridor. DOE would adjust the rail alignment to avoid conducting surface-disturbing activities that could affect these springs.

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

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

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

Impacts to soils during the operations phase would be small because train movement would not disturb soils, and maintenance of the railbed and rails would involve minimal disturbance beyond that which had occurred during the construction phase.

3.2.5 CULTURAL RESOURCES

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

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

3.2.5.1 Cultural Resources Affected Environment

In 2007, DOE conducted a records search for the Mina rail corridor for a width of 400 meters (0.25 mile) and identified several cultural resources sites along the Schurz bypass options, some of which are eligible or potentially eligible for listing on the *National Register of Historic Places*. These include the historic Rawhide Western Railroad grade and Reese River Road stage route, and several prehistoric sites.

The Mina rail corridor would follow various lengths of some historic railroads between Hawthorne and Tonopah Junction, south toward the town of Silver Peak, and intersect or follow many segments of the former Las Vegas and Tonopah line along common corridor segment 2, south of the town of Goldfield. In these locations, DOE would refurbish the historic rail beds for use with the proposed rail line. Eligible or unevaluated resources associated with the railroads include the Sodaville to Tonopah freight road, railroad stations, abandoned grades, construction-related features, workers' encampments, and resources associated with Luning, Mina, Coaldale, and other towns established along the rail lines.

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

A portion of the Mina rail corridor would run just west of the current boundary of the Goldfield Historic District, but early photographs of Goldfield reflect that the town extended west to the base of Malpais Mesa. To the north, a portion of the corridor would be just east of the Goldfield Cemetery, but there is historic confusion over some burial-plot locations, so the actual boundary location is in question. The corridor would also run through the extensive historic Goldfield dump, which is eligible for listing on the *National Register of Historic Places*. In addition, there is the potential for buried prehistoric sites at nearby springs, as evidenced by prehistoric rock art (DIRS 182772-MTS 2007, p. 42).

Other areas of the Mina rail corridor would be within 1.6 kilometers (1 mile) of several cultural resource sites, including a Western Shoshone village, petroglyphs near Beatty and Schurz, and Black Cone in Crater Flats, which ethnographers and American Indians have identified as places of religious significance or power (DIRS 102043-AIWS 1998, all).

The site-file search for the Mina rail corridor identified 132 previously recorded archaeological sites (see Table 3-5). The prehistoric and historic sites identified range in size from isolated artifacts and scatters of artifacts to town sites and transportation networks (such as stage roads and railroad grades). About 21 percent are considered to be eligible for listing on the *National Register of Historic Places*. There are 35 sites that have not been evaluated for eligibility. Based on the results of site-file searches for the Mina rail corridor, it appears that less than 5 percent of the corridor has been surveyed (DIRS 182772-MTS 2007, p. 43).

Table 3-5. Number of previously recorded cultural resource sites within the 400-meter (0.25-mile) area of the Mina rail corridor.[a]

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

a. Source: DIRS 182772-MTS 2007, p. 43.

3.2.5.2 Potential Impacts to Cultural Resources

Prior to construction of a rail line, field surveys to identify cultural resources and potentially, measures to mitigate impacts to those resources, would be required. If cultural resources were encountered, a qualified archaeologist coordinating with the Nevada State Historic Preservation Officer and DOE would participate in directing activities to ensure that the resources were properly protected or the impact mitigated. DOE would implement procedures to avoid or reduce direct impacts to cultural resources, including medicinal, mineral, and food plants, in construction areas of surface-disturbing activities. Nevertheless, there could be direct impacts to cultural resources (such as disturbing the sites or crushing artifacts) during construction activities.

There could be indirect impacts to cultural resources during the construction phase as a result of increased access and increased numbers of workers near cultural resource sites. These factors would increase the probability for either intentional or inadvertent indirect impacts to cultural resources. However, overall impacts would be small.

No additional direct or indirect impacts to cultural resources would be expected during the operations phase.

3.2.6 OCCUPATIONAL AND PUBLIC HEALTH AND SAFETY

The analysis for occupational and public health and safety focuses on traffic, worker industrial safety, incident-free radiological and nonradiological impacts, and radiological impacts related to accidents. To estimate transportation impacts, DOE defines the region of influence for the Mina rail corridor as beginning at the Hazen siding in Churchill County, Nevada, and ending at Yucca Mountain. The impacts do not include those from transportation from the Nevada border to the Hazen siding. The region of influence for each includes:

- Traffic impacts: The 400-meter (0.25-mile)-wide rail corridor and public highways that would be used by workers and for shipments of materials and supplies during the construction and operations phases
- Worker industrial safety impacts: The 400-meter (0.25-mile)-wide rail corridor

- Incident-free radiological and nonradiological impacts: The 800-meter (0.5-mile)-wide area on either side of the centerline of the rail corridor
- Radiological impacts related to accidents: An area within an 80-kilometer (50-mile) radius from a potential occurrence location in the rail corridor

DOE obtained information from the Bureau of Labor Statistics for 2005. The Department also used the RADTRAN 5 computer program (DIRS 150898-Neuhauser and Kanipe 2000, all; DIRS 155430-Neuhauser, Kanipe, and Weiner 2000, all) and the RISKIND computer program (DIRS 101483-Yuan et al. 1995, all) where applicable.

3.2.6.1 Occupational and Public Health and Safety Affected Environment

During the construction and operations phases, common industrial hazards could cause health and safety impacts to workers. The categories of worker impacts include total recordable cases per 100 full-time-equivalent workers, lost-workday cases per 100 full-time-equivalent workers, and fatalities per 100 full-time-equivalent workers. Total recordable cases are occupational injuries or occupation-related illnesses that result in (1) a fatality, regardless of the time between the injury or the onset of the illness and death, (2) lost workday cases (nonfatal), and (3) incidents that result in the transfer of a worker to another job, termination of employment, medical treatment, loss of consciousness, or restriction of motion during work activities.

Table 3-6 lists Bureau of Labor Statistics incident-rate statistics for 2005 used to estimate total recordable cases, lost workday cases, and fatalities for involved and noninvolved workers during the construction and operations phases. For this analysis, involved workers are personnel who would be involved in construction or operations activities. Noninvolved workers are personnel who would be involved in management, administration, and security. The Bureau of Labor Statistics compiled the health and safety statistics by employment sectors; the sectors used for this analysis include Heavy and Civil Engineering Construction; Management of Companies and Enterprises; Transportation and Warehousing: Rail Transportation; and Support Activities for Transportation. Sectors analyzed for fatality incident statistics included Construction, Professional and Business Services, and Transportation and Warehousing.

Table 3-6. Incident-rate statistics for estimation of industrial safety impacts from railroad construction and operations in the Mina rail corridor.[a]

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

a. Sources: DIRS 179129-BLS 2007, all; DIRS 179131-BLS 2006, all.
b. FTE = full-time equivalent; one full-time equivalent is 2,000 labor hours. FTEs are also referred to as worker-years.

3.2.6.2 Potential Impacts to Occupational and Public Health and Safety

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

3.2.6.2.1 Industrial Safety

The analysis based the estimates of industrial safety impacts from railroad construction on full-time-equivalent workers per year; with the assumption that there are 2,000 hours per worker-year (also referred to as full-time equivalent, or FTE), this would be about 6,500 full-time-equivalent worker-years (DIRS 182772-MTS 2007, p. 44). The analysis based the estimates of industrial safety impacts from railroad operations in the Mina rail corridor on about 60 full-time-equivalent workers each year, about 3,000 worker-years. Table 3-7 lists estimated industrial safety impacts to workers during construction and the estimated industrial safety impacts of railroad operations based on Bureau of Labor Statistics in the Mina rail corridor for up to 50 years.

Table 3-7. Impacts to workers from industrial hazards during the construction and operations phases.[a]

Group and industrial hazard category	Construction	Operations[b]	Total
Involved worker			
Total recordable cases[c]	300	60	360
Lost workday cases	170	40	210
Fatalities	0.6	0.4	1
Noninvolved worker			
Total recordable cases	30	20	50
Lost workday cases	16	10	26
Fatalities	0.04	0.03	0.07
Totals[d]			
Total recordable cases	330	80	410
Lost workday cases	180	50	230
Fatalities	0.6	0.4	1

a. Estimates of worker-years multiplied by accident rate (DIRS 179129-BLS 2007, all; DIRS 179131-BLS 2006, all).
b. Totals for up to 50 years of railroad operations.
c. Total recordable cases include injuries and illness.
d. Totals might differ from sums of values due to rounding.

3.2.6.2.2 Transportation

This analysis includes estimated impacts from the transportation of construction material to the construction sites and impacts from commuting workers. There could be traffic fatalities and vehicle emission impacts during the movement of equipment and delivery of materials for construction, worker commutes to and from construction sites, and transport of water to construction sites. Table 3-8 lists the estimated impacts of transportation during the construction phase. As shown, four of the fatalities during the construction phase would be from traffic accidents during the construction phase and an additional 0.54 fatality would be from cancer related to vehicle emissions.

Table 3-8. Transportation impacts during railroad construction in the Mina rail corridor.[a]

Transportation impact category	Traffic fatalities	Latent cancer fatalities	***Total***
Vehicle emission impacts (cancer fatality)			
Material delivery vehicles	–	0.04	0.04
Worker commuting	–	0.5	0.5
Subtotal		0.54	0.54
Transportation accidents (fatalities)			
Material delivery vehicles	0.3	–	0.3
Worker commuting	3.7	–	3.7
Subtotal	4.0		4.0
Totals[b]	4.0	0.54	4.6

a. Source: DIRS 182772-MTS 2007, p. 45.
b. Numbers are presented using two significant figures. Totals might differ from sums of values due to rounding.

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

To estimate transportation impacts, DOE defined the region of influence beginning at the Hazen siding in Churchill County, Nevada, and ending at Yucca Mountain. For incident-free transportation, the potential human-health impacts for transportation workers and populations along the corridor were estimated. Transportation workers would include train crews, security escorts, workers at the staging yard, and workers who could be exposed to radiation at sidings when a train carrying loaded casks passed. Members of the public would include people living within 0.8 kilometers (0.5 mile) of the Mina rail corridor and around the staging yard. The analysis used the RADTRAN 5 computer program (DIRS 150898-Neuhauser and Kanipe 2000; DIRS 155430-Neuhauser, Kanipe, and Weiner 2000) and the RISKIND computer program (DIRS 101483-Yuan et al. 1995) to estimate these impacts.

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

Chapter 6 and Appendix J of the Yucca Mountain FEIS describe the methods and data DOE used to estimate the radiation doses for workers and members of the public. Since DOE completed the Yucca Mountain FEIS, the repository design and operational plans have evolved. There have also been changes to some of the data DOE used to estimate radiation doses and radiological impacts. These changes include the use of updated latent cancer fatality conversion factors, radiation dosimetry, additional escorts, dedicated trains, 2000 Census data, shipment estimates, radionuclide inventories, exposure times and staffing estimates, and sabotage release fractions (DIRS 182772-MTS 2007, p. 46).

3.2.6.2.2.1 Workers along the Mina Rail Corridor. During the shipment of spent nuclear fuel and high-level radioactive waste from the Hazen siding to the repository, workers on the trains and those working along the rail line could be exposed to direct radiation from approximately 9,500 shipping casks. Table 3-9 lists the estimated radiation doses and impacts for involved workers. The estimated collective radiation dose for the operations phase would be 310 person-rem. The estimated number of latent cancer fatalities would be 0.18 (about 1 chance in 6 that there would be one cancer fatality in the exposed worker population) for a radiation-related latent cancer fatality in this group.

3.2.6.2.2.2 Workers at the Staging Yard. When shipping casks arrived at the staging yard, personnel would remove the railcars that carried the casks from the train, inspect them, and transfer them to another train for transport to Yucca Mountain. The escorts who had accompanied the shipping casks from their origin would be present during the inspection. For purposes of this analysis, DOE assumed these workers, inspectors, and escorts would be exposed to direct radiation from approximately 9,500 shipping casks. In addition, the analysis assumed that noninvolved workers would be exposed to direct radiation during these activities.

Table 3-9. Operations impacts of transportation for the Mina rail corridor.[a]

Transportation impact category	Traffic fatalities	Radiation dose (rem or person-rem)	Probability of LCFs[b]	Number of LCFs	***Total***
Maximally exposed individual		0.0078	0.0000047	–	
Workers		550		0.33	
Along corridor	–	310	–	0.18	
At staging yard		250		0.15	
Maximally exposed worker	–	17	0.01	–	
Incident-free radiological impacts (LCFs)					
Public	–	1.4	–	0.00082	
Radiological accident (LCFs)		0.012	–	0.0000074	
Vehicle emission impacts (cancer fatalities)					
Waste transportation	–	–	–	0.0034	
Worker commuting	–	–	–	0.4	
Transportation accidents (fatalities)					
Waste transportation	0.31	–	–	–	
Worker commuting	3.3	–	–	–	
Totals	3.6	–	–	0.7	4.3

a. Source: DIRS 182772-MTS 2007, p. 46.
b. LCF = latent cancer fatality.

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

3.2.6.2.2.3 Maximally Exposed Workers. The maximally exposed worker could be an escort. This person would receive an estimated radiation dose of about 25 rem, based on a 0.5-rem-per-year radiation dose administrative control level (DIRS 174942-BSC 2005, Section 4.9.3.3). The estimated probability of a latent cancer fatality for a maximally exposed worker would be 0.01. Escorts and other railroad workers would participate in a radiation protection program and would not be exposed to radiation greater than the radiation dose administrative control level for repository facilities of 0.5 rem per year (DIRS 174942-BSC 2005, Section 4.9.3.3). In some cases, this requirement could limit escorts to work fewer than 2,000 hours per year on the railroad.

3.2.6.2.2.4 Members of the Public along the Mina Rail Corridor. During the shipment of spent nuclear fuel and high-level radioactive waste from the Hazen siding to Yucca Mountain, people along the rail line could be exposed to direct radiation from approximately 9,500 shipping casks.

Table 3-9 lists the radiation impacts for members of the public along the Mina rail corridor. The estimated collective radiation dose over the operations phase for members of the public would be 1.4 person-rem. The estimated number of latent cancer fatalities would be 0.00082 (about 1 chance in 1,200 that there would be one cancer fatality in the group of exposed members of the public).

The ***maximally exposed individual*** is a resident who lives 18 meters (60 feet) from the rail line. This individual is assumed to be exposed to each of the 9,495 shipping casks that pass by on the rail line. The estimated probability of a latent cancer fatality for this individual would be 0.0000047.

People along the Mina rail corridor could be exposed to diesel exhaust and fugitive dust from railroad operations and maintenance. Table 3-9 lists estimated nonradiological vehicle emission impacts, of which there would be 0.0034 fatality from waste transportation and 0.4 fatality from workers commuting.

3.2.6.2.3 Accidents

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

Table 3-9 lists impacts from these types of accidents. Over the operations phase, the estimated dose risk from a radiological accident would be 0.0000074 latent cancer fatality. Over this same time period, the estimated risk of a nonradiological transportation accident fatality would be 0.31.

In summary, Table 3-9 lists the estimated radiological and nonradiological impacts for workers and members of the public from the transportation of spent nuclear fuel and high-level radioactive waste in the Mina rail corridor. The estimated total number of fatalities for rail corridor operations would be 4.3. Approximately three of these fatalities would be from traffic accidents that involved commuting workers; other estimated impacts would be about one fatality. Estimated radiological exposures to workers would account for about 8 percent of the estimated fatalities, while radiological exposure of members of the public and radiological accident risks would account for less than 0.1 percent of the total fatalities. Estimated fatalities from vehicle emissions would account for about 9 percent of the total fatalities.

3.2.7 SOCIOECONOMICS

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

The region of influence also includes the Timbisha Shoshone Trust Lands near Scottys Junction in Nye County. DOE examined the *Final Legislative Environmental Impact Statement for the Timbisha Shoshone Homeland* (DIRS 154121-DOI 2000, all), which stated that future development of the trust lands near Scottys Junction could include a service station/convenience store, a gift/souvenir shop, and single-family detached homes. However, no economic activity or growth has taken place on these lands, there are no current residents, and DOE has not identified any planning documents for the trust lands. Thus, while the Timbisha Shoshone Trust Lands are included in the region of influence, there is no information to perform a socioeconomics analysis for these trust lands.

DOE evaluated potential impacts to five socioeconomic variables (employment, population, economic measures, housing, and public services) and developed a profile of the existing socioeconomic conditions in the region of influence. The breadth and depth of the evaluation mirrors that of the original corridor-level analysis provided in the Yucca Mountain FEIS. The analysis includes the present and anticipated impacts to those variables. The region of influence for the socioeconomics analysis is defined as those Nevada counties the Mina rail corridor would cross, and the two areas where most workers would be expected to reside (the Carson City/Washoe County area and Clark County). DOE also developed a general profile of the Walker River Paiute Reservation. The analysis estimated potential changes that could result from railroad construction and operations.

To evaluate this resource area, DOE obtained data from the U.S. Census Bureau, the Nevada State Demographer, and other local and state sources. Census Bureau data are used in this section to ensure consistency across jurisdictions. In addition, the Department utilized estimates and projections from the *Policy Insight* (version 9) economic-demographic forecasting software program developed by Regional Economic Models, Inc. (REMI) to develop baselines and changes to the baselines as a result of the Proposed Action. The use of these sources is consistent with the Yucca Mountain FEIS in that the REMI projections include the same variables as those included in the Yucca Mountain FEIS.

3.2.7.1 Socioeconomics Affected Environment

3.2.7.1.1 Employment and Population

Table 3-10 lists population estimates and projections anticipated for the 50-year railroad operations phase through 2067, for the four counties the Mina rail corridor would cross. The table also lists population projections for Clark County and the Carson City/Washoe County area, because those jurisdictions, which represent the largest population centers in the southern and northern portions of the corridor, respectively, would potentially provide most of the rail line construction workers (DIRS 182772-MTS 2007, p. 48).

Table 3-10. Population baselines and projections for select Nevada counties and Nevada, 2005 to 2067.[a]

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

a. Source: DIRS 178610-Bland 2007, all

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

Carson City has a land area of about 360 square kilometers (140 square miles). The person-per-square-mile density is approximately 370, which is considerably more than the average population density in Nevada of 18.2 persons per square mile. Carson City had about 21,000 housing units in 2000 and a population of 52,500 that year. Carson City is the metropolitan center nearest the Mina rail corridor starting point. Per capita income in Carson City, $20,943, was near the state's average in the last decennial census. Carson City's unemployment rate of 4.6 was lower than Nevada's unemployment rate of 6.2 percent in 2000.

Washoe County has a land area of about 16,000 square kilometers (6,300 square miles) and a population density of approximately 54 persons per square mile, about three times the population density of the state. Washoe County had about 140,000 housing units in 2000 and a population of about 340,000. Washoe County has recently experienced strong growth; the 1990s saw an aggregate growth of nearly 33 percent and 2000-2005 saw an additional 16-percent growth in population. Per capita income in Washoe County was $24,277, about 10 percent higher than Nevada's per capita income that year. The Washoe County unemployment rate in 2000 was 5 percent; lower than the state's unemployment rate of 6.2 percent.

The Carson City/Washoe County area had a population of about 450,000 in 2005. The area's economy is dominated by the Services industry, in particular the Accommodations and Food Services sector. Services accounted for almost 42 percent of the area's employment in 2005. Table 3-11 displays information about the demographic, social, housing, and economic characteristics of the Carson City/Washoe County area in 2000.

Table 3-11. Demographic, social, housing, and economic characteristics for select Nevada counties, the Walker River Paiute Reservation, and Nevada.[a]

	Washoe County	Clark County	Esmeralda County	Lyon County	Mineral[b] County	Nye County	Walker River Paiute Reservation	Nevada
2000 population	340,000	1,380,000	970	35,000	5,100	32,000	850	2,000,000
Minority population[c]	92,000	547,000	190	5,700	1,500	5,000	740	695,000
Percent minority	27	40	20	17	30	15	87	35
Individuals in poverty, 2000	33,000	146,000	150	3,500	760	3,500	270	206,000
Percent in poverty	10	11	15	10	15	11	32	11
Per capita income, 1999[d]	$24,277	$21,785	$18,971	$18,543	$16,952	$17,962	$10,092	$21,989
Housing units	140,000	560,000	830	14,000	2,900	16,000	350	827,000
Housing units occupied	130,000	512,000	460	1,300	2,200	13,000	300	751,000
Percent occupied	92	92	55	91	77	84	87	91
Individuals in civilian labor force	180,000	682,000	460	17,000	2,400	13,000	340	995,000
Employed individuals	170,000	637,000	440	15,000	2,100	12,000	260	933,000
Unemployed individuals	9,000	45,000	15	1,100	310	940	77	62,000
Individuals enrolled in school: K through 12	62,000	250,000	190	7,300	970	5,700	260	367,000

a. Source: DIRS 182772-MTS 2007, pp. 49 and 50.
b. Mineral County numbers include the Walker River Reservation.
c. Minority population is all individuals other than those who classify themselves as "white alone."
d. Values, except per capita income, have been rounded to two or three significant places.

Mineral County continues to experience modest declines in population; its estimated 2005 population was 4,600. It was about 5,100 in 2000. Hawthorne, in Mineral County, had a 2000 estimated population of 3,100 and a 2005 estimated population of 3,000. In the Mina rail corridor, the U.S. Census Bureau identifies only the Hawthorne community as being urban. All other communities are classified as rural. Luning had an estimated 2000 population of 86 people and an estimated 2005 population of 87. Mina had a 2000 estimated population of 310 residents and an estimated 2005 population of 280 (DIRS 182772-

MTS 2007, p. 49). There are three major industries in Mineral County: Public Administration, Natural Resources/Mining/Utilities/Construction, and Services. Per capita income was estimated to be $16,952 in the last U.S. Census, about 77 percent of Nevada's per capita income. Unemployment in the county, 12.9 percent, was twice Nevada's unemployment rate in 2000. The county had about 2,900 housing units and a 23-percent vacancy rate in that year. Table 3-11 lists information about the demographic, social, housing, and economic characteristics of Mineral County in 2000.

Due to the nature of the census data, Mineral County's estimated and projected population figures include residents of the Walker River Paiute Reservation. The Reservation had an estimated population of 810 in 1990 and an estimated population of 850 in 2000 (DIRS 182772-MTS 2007, p. 50). There were about 350 housing units in 2000. Residents of the Reservation work primarily in retail trade, construction, and manufacturing. The 2000 unemployment rate was 22.6 percent, more than 3.5 times the Nevada unemployment rate in the same year. At the time of the last national census, per capita income on the Walker River Paiute Reservation, $10,092, was less than 50 percent of the Nevada per capita income in that year and about 60 percent of Mineral County per capita income. Table 3-11 lists information about the demographic, social, housing, and economic characteristics of the Walker River Paiute Reservation in 2000.

Lyon County has a land area of almost 5,200 square kilometers (2,000 square miles). The county has a population density of about 17.3 persons per square mile, reflecting the state's average population density per square mile. There were about 14,300 housing units in 2000 while the population was about 34,500. Lyon County grew almost as rapidly as Clark, Nye, and Washoe Counties. It had 49,000 residents in 2005, up from 21,000 in 1990 (DIRS 182772-MTS 2007, p. 50). Services provided about 30 percent of the county's jobs, Retail and Wholesale Trade about 20 percent, and Public Administration about 15 percent. Per capita income, $18,543, was about 14 percent lower than the state average in 2000. Unemployment was 6.9 percent, slightly higher than the state average unemployment rate. Table 3-11 lists information about the demographic, social, housing, and economic characteristics of Lyon County in 2000.

Esmeralda County experienced declines in population in the 1990s, but has reversed that trend in the 21st century, growing by approximately 20 percent from 2000 to 2005. An estimated 1,300 persons lived in Esmeralda County in 2005. In 2000, Goldfield, in Esmeralda County, had an estimated population of 420; in 2005, the estimated population was 440. Silver Peak had a 2000 estimated population of 160 and a 2005 estimated population of 130 (DIRS 182772-MTS 2007, p. 50). The approximately 9,300-square-kilometer (3,600-square-mile) county has a population density of just 0.3 persons per square mile. The county had 833 housing units in 2000, but a 45-percent vacancy rate. The population in 2000 was about 970. Most jobs in Esmeralda County are in the Services industry or in the Public Administration industry, which includes the state and local government sector. Esmeralda County's per capital income was $18,971 in 2000. Unemployment, 3.3 percent, was about 50 percent of Nevada's unemployment rate in 2000. Table 3-11 lists information about the demographic, social, housing, and economic characteristics of Esmeralda County in 2000.

Nye County's land area is more than twice that of Clark County, about 47,000 square kilometers (18,000 square miles). The population density is 1.8 persons per square mile, about a tenth of the state's average. Nye County had about 16,000 housing units and a population about 32,000 in 2000. Nye County joined the rapid population escalation by growing approximately 81 percent in the 1990s and another 25 percent from 2000 to 2005. The county's estimated population in 2005 was 41,000. Nye County is dominated by one of the Nation's fastest growing unincorporated communities, Pahrump. Growing in popularity as a residential destination, Pahrump had an estimated population of 33,000 people in 2005 (an increase of 37 percent in 5 years), which represents more than 80 percent of Nye County's total population that year. The Mina rail corridor would also pass near Beatty and Tonopah in Nye County. The estimated 2005 populations of Beatty and Tonopah were 1,000 and 2,600, respectively (DIRS 182772-MTS 2007, p. 51). Nye County's economy is driven by the Services industry, which accounts for 44 percent of the jobs in the county. Other major industries include Retail and Wholesale Trade and the Transportation/ Information/Finance/Accounting industry. The estimated per capita income in Nye County at the last national census, $17,962, was about 82 of the per capita income in Nevada. Unemployment was 7.1 percent, higher than the state's 6.2 percent unemployment rate. Table 3-11 lists information about the demographic, social, housing, and economic characteristics of Nye County in 2000.

Clark County has a land area of almost 21,000 square kilometers (8,000 square miles) and a population density of about 173.9 persons per square mile. Clark County had about 560,000 housing units in 2000 and a population of about 1.38 million that year. Clark County's population grew even faster than that of Washoe County – a total of 81 percent in the 1990s and approximately 29 percent, to 1.8 million persons, by 2005. Clark County is the metropolitan center nearest the Mina rail corridor ending point. Per capita income in Clark County was $21,785, about the average of Nevada's that year. Unemployment in Clark County, 6.6 percent, was slightly above the state's unemployment rate of 6.2 percent. The economy in Clark County is dominated by the Services industry, particularly the Accommodations and Food Services sector, which accounts for almost 50 percent of employment in the county. The Transportation/ Information/Finance/Accounting industry and the Trade industry, which is composed of retail and wholesale trade, are also major components of the economy. Table 3-11 lists information about the demographic, social, housing, and economic characteristics of Clark County in 2000.

Table 3-11 lists characteristics of the four counties along the Mina rail corridor, the Walker River Paiute Reservation, Clark County, Washoe County, and the State of Nevada. The information in the table is the baseline for determining potential impacts to employment, population, existing housing stock, and demands on educational facilities and other public services. Table 3-12 lists information about the employment baselines in the counties that the Mina rail corridor would cross and information about Clark County and the Carson City/Washoe County area because most rail line construction workers are expected to come from those areas. Information about the State of Nevada is provided for comparison purposes.

Table 3-12. Employment baseline projections in Nevada counties in the Mina rail corridor, 2005 to 2067.[a]

Jurisdiction	2005	2010	2015	2020	2025	2035	2067
Carson City/Washoe County employment baseline	310,000	330,000	360,000	370,000	380,000	410,000	580,000
Lyon County employment baseline	14,000	17,000	18,000	19,000	20,000	23,000	37,000
Mineral County employment baseline	2,500	2,400	2,500	2,300	2,300	2,300	2,100
Esmeralda County employment baseline	470	470	450	440	440	430	460
Nye County employment baseline	17,000	19,000	21,000	22,000	23,000	25,000	37,000
Clark County employment baseline	1,070,000	1,240,000	1,330,000	1,390,000	1,450,000	1,600,000	2,230,000
Nevada employment baseline	1,520,000	1,720,000	1,830.00	1,920,000	2,000,000	2,180,000	3,031,000

a. Source: DIRS 178610-Bland 2007, all.

3.2.7.1.2 Economic Measures

Baseline economic measures are provided for the four counties that the Mina rail corridor would cross, for Clark County and the combined Carson City/Washoe County area, and for the State of Nevada. Clark County dominates all economic measures in the state and is located near the southern end of the Mina corridor. The Carson City/Washoe County metropolitan area economy, near the northern end of the Mina corridor, is also much larger than the economies in the rural counties. Table 3-13 lists information on three economic measures: state/local government spending, real disposable income, and gross regional product.

Table 3-13. Economic measures: baselines and projections for select Nevada counties and Nevada, 2005 to 2067.[a,b]

	2005	2010	2015	2020	2025	2030	2035	2067
Carson City/Washoe County								
State/local government spending	1.90	2.17	2.56	2.89	3.18	3.47	3.77	5.85
Real disposable income	15.73	18.54	21.30	23.65	26.21	28.86	31.72	52.32
Gross regional product	23.00	27.72	33.96	39.31	44.85	51.00	57.82	103.07
Lyon County								
State/local government spending	0.19	0.24	0.30	0.35	0.40	0.44	0.49	0.85
Real disposable income	0.94	1.17	1.37	1.55	1.74	1.94	2.18	4.19
Gross regional product	0.75	0.96	1.17	1.36	1.56	1.78	2.03	4.04
Mineral County								
State/local government spending	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Real disposable income	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13
Gross regional product	0.16	0.14	0.16	0.16	0.18	0.19	0.21	0.25
Esmeralda County								
State/local government spending	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Real disposable income	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.06
Gross regional product	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.06
Nye County								
State/local government spending	0.16	0.20	0.25	0.29	0.32	0.36	0.39	0.64
Real disposable income	1.00	1.25	1.44	1.61	1.78	1.97	2.20	3.97
Gross regional product	1.06	1.30	1.55	1.80	2.05	2.34	2.67	4.95
Clark County								
State/local government spending	6.55	8.47	10.55	12.15	13.44	14.63	15.79	23.31
Real disposable income	54.70	69.02	79.89	89.56	99.85	111.59	124.94	207.81
Gross regional product	86.68	109.56	131.60	151.93	173.08	197.33	224.63	393.79
Nevada								
State/local government spending	9.71	12.09	14.77	16.85	18.55	20.17	21.78	32.33
Real disposable income	77.40	95.70	110.27	123.18	136.95	152.28	169.52	279.58
Gross regional product	118.32	147.38	177.24	204.50	232.79	264.98	301.08	526.81

a. Source: DIRS 178610-Bland 2007, all.
b. All values are in 2006 dollars, in billions.

3.2.7.1.3 Public Services

3.2.7.1.3.1 Health Care. Lyon, Mineral, Nye, and Esmeralda Counties have some health care facilities, although all four counties are federally designated as health professional shortage areas for primary, dental, and mental health care (DIRS 180466-State of Nevada 2005, all; DIRS 180467-State of Nevada 2005, all; DIRS 173559-State of Nevada [n.d.], all; and DIRS 173560-State of Nevada [n.d.], all). Health care services are concentrated in Clark County, particularly in the Las Vegas area.

There is a public health clinic on the Walker River Paiute Reservation in Schurz. This clinic is staffed full time with a doctor and a nurse. This facility also has emergency medical services and emergency medical technicians (DIRS 180118-Gormsen and Merritt 2007, all).

3.2.7.1.3.2 Education. Lyon, Mineral, and Nye Counties have elementary, middle, and high schools. In Nye County, the Pahrump Valley Branch Campus of Great Basin College provides postsecondary school education. There are elementary and middle schools in Esmeralda County; high-school students from Esmeralda County attend school in Tonopah, Nye County (DIRS 155970-DOE 2002, p. 3-156).

3.2.7.1.3.3 Fire Protection. Lyon, Mineral, Nye, and Esmeralda Counties have professional or volunteer fire departments. At present, the Nevada Test Site provides fire-protection services to the Yucca Mountain Site.

3.2.7.1.3.4 Law Enforcement. Lyon, Mineral, Nye, and Esmeralda Counties have sheriff's offices, with a ratio of 1.6, 3.9, 2.2, and 5 officers to 1,000 residents, respectively. The Walker River Paiute Reservation has a police department with four law enforcement officers, which yields a ratio of 3.4 officers per 1,000 residents (DIRS 182772-MTS 2007, p. 53).

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

3.2.7.2 Potential Socioeconomics Impacts

3.2.7.2.1 Construction Phase

Sections 3.2.7.2.1.1 through 3.2.7.2.1.3 describe potential impacts to socioeconomics associated with construction and operation of a railroad in the Mina rail corridor.

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

Mineral County had an estimated population of about 4,630 and an employment baseline of 2,550 jobs in 2005. Mineral County would gain an estimated 45 residents as a result of the construction of a rail line in the Mina rail corridor, an increase of less than 1 percent over the population baseline. Mineral County would gain an estimated 90 jobs in 2010, 70 jobs in 2011 and 2012, and 45 jobs over the baseline from 2013 to 2067. The 1-year spike in 2010 would be an increase of about 3.8 percent above the 2010 employment baseline. The average change of 45 jobs is an increase of about 1.8 percent above the employment baseline in 2013.

Generally, potential impacts in Mineral County are expected to be small and transitory in nature.

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

The construction labor pool in Clark County, the Carson City/Washoe County area and, to a lesser extent, Nye and Lyon Counties is large and would be able to provide most of the necessary construction workers.

DOE estimates that about 50 percent of the workers would come from Clark County and about 50 percent would come from the Carson City/Washoe County area. Therefore, there would be limited in-migration during the construction phase in these or other counties. The baseline projected population growth and development in Clark and Nye Counties (the escalating in-migration of retirees and other individuals) would lead to greater socioeconomic impacts on services, including schools. This projected population growth (unrelated to railroad construction activities) would mask potential impacts from construction activities associated with the rail line.

Estimates for railroad construction workers and expected residential distribution patterns compared to applicable baselines lead to the conclusion that impacts to Esmeralda County would be small. Because of the very large base of available construction workers in the Carson City/Washoe County area and in Clark County and the large labor pool in Lyon and Nye Counties, DOE anticipates that very few workers would be likely to relocate to these communities; therefore, impacts to population and employment baselines would be small.

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

Because of the temporary nature of a linear construction project, workers would not be likely to relocate their families to communities along the corridor. Based on these assumptions, DOE estimates that impacts to population, and therefore to housing and schools, in the counties along the corridor would be small. It is likely that workers would spend a portion of their wages on food, gasoline, and other incidentals, but would spend most earnings in the counties where they live. Therefore, estimated impacts from construction activities on local populations would be small.

The analysis of Mineral County includes potential impacts to the population and employment baseline of the Walker River Paiute Reservation. Impacts to population and employment on the Reservation, if any, when considered individually rather than as part of the impacts to Mineral County, would be small because there would be no change to the employment base from in-migrating workers and no change to population because there would be no change to the employment baseline. The nature of the construction activities is sufficiently short in duration and transitory in nature that migration to Reservation land is considered unlikely.

Of the areas considered, the two most likely to experience changes in population from construction of a railroad in the Mina rail corridor are Clark County and the Carson City/Washoe County area, which are assumed to provide most of the construction workers. Estimates regarding the number of construction workers could affect employment, which in turn could result in changes to population baselines. Because the employment baselines in these areas are large, the expected employment increases of much less than 1 percent in Clark County and the Carson City/Washoe County area, respectively, are small in relation to those baselines. Similarly, the population changes in relation to the baselines are expected to be small and would likely be temporary.

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

3.2.7.2.1.2 Economic Measures. The expected changes to economic measures attributable to the construction of a railroad in the Mina rail corridor would peak about 3 years after construction activities began. Changes to gross regional product, real disposable personal income, and spending by state and local governments would be less than 2 percent above the baselines. Because Clark County and the Carson City/Washoe County area would supply most of the workers and be the permanent residences of most of the workers, Nye and Mineral Counties would be unlikely to experience noticeable changes in economic measures. Esmeralda County would experience a short-term spike in real disposable personal income and in gross regional product of 16.5 percent and 14.5 percent, respectively. Almost all of the incremental change would occur in the Accommodations and Food Service industries. Spending by state and local governments would also have a short-term but moderate increase of 4.2 percent, as local governments increased oversight personnel. The changes above the baselines would have no long-term effects on the economy.

Socioeconomic impacts attributable to the construction phase would be small in the four counties the rail line would cross. The impacts would also be small in Clark County and in the Carson City/Washoe County area, the population centers where most workers would live. The impacts would be positive; jobs would be created, real disposal personal income would increase, gross regional product would increase more quickly, and local and state governments would receive more revenue to provide public services.

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

3.2.7.2.2 Operations Phase

Sections 3.2.7.2.2.1 through 3.2.7.2.2.3 describe potential socioeconomic impacts during the railroad operations phase.

3.2.7.2.2.1 Employment and Population. Changes from baseline employment and population for some counties during railroad operations could induce socioeconomic impacts. There would be workers boarding the train as it enters the region and there would be escorts who would arrive with the cask trains. Regional workers would be needed for each train crew. There would be an estimated 42 workers for railroad operations. Because these operations workers would live in the railhead county, the most discernable impacts to population and employment from railroad operations would likely occur in Mineral County. Mineral County would gain about 45 residents as a result of railroad operations in the Mina rail corridor, an increase of less than 1 percent over the population baseline. Mineral County would gain about 45 jobs over the baseline railroad operations. This would be about a 1.8-percent increase over the employment baseline in 2015. Because the estimated operations workforce is small, increases in baseline population projections in the counties would not be likely to change. No impacts to housing would be likely from train crews. Changes to the employment and population baselines in Clark, Lyon, Nye, and Washoe Counties would be nearly imperceptible because of the large labor forces and population bases in these counties; current population growth in these counties would mask additional requirements for housing and public education. No impacts would be expected in Esmeralda County.

3.2.7.2.2.2 Economic Measures. Changes to economic measures would be expected to end in the final year of the construction phase. The impacts to baseline gross regional product, real disposable personal income, and spending by state and local governments would be less than 1 percent in Clark and Nye Counties and the Carson City/Washoe County area. In Mineral County, the impact of changes to economic baselines would be less than 2 percent. In Esmeralda County, the changes from the baseline would be very small when construction activities are completed and measures return to the projected baselines.

Socioeconomic impacts attributable to the operations phase would be small in the four counties the rail line would cross. The impacts would be small in Nye County and in Mineral County where most operations workers would live. The impacts would be positive; jobs would be created, real disposal personal income would increase, gross regional product would increase more quickly, and local and state governments would receive more revenue to provide public services.

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

3.2.7.2.2.4 Shared Use. Shared use of the DOE rail line could allow business activity to develop and expand in the region of influence, which would result in some employment and income benefits. For some companies, especially those involved in the shipment of heavy or bulk products, the rail line could allow firms to access new markets and to ship greater quantities of products to existing and new markets. The impact assessment for railroad operations under the Shared-Use Option draws on information from a DOE analysis (DIRS 180694-Ang-Olson and Gallivan 2007, all). In the near term, commercial shippers using the DOE rail line would be existing nearby companies that currently transport materials and goods by truck. It is not likely that there would be noticeable increases in population associated with railroad operations under the Shared-Use Option. Increases in economic activity and associated indicators, particularly in terms of employment, would likely be limited and therefore would not generate substantial changes in permanent population. Based on these shipments, increases in revenue might generate small direct and indirect employment and income impacts.

In 2007, Nye County issued a report on shared use to cover the Mina route (DIRS 185244-Nuclear Waste Project Office 2007, all). Nye County's 2007 report estimated increases in employment and income due to shared use. The report estimated there would be approximately 230 direct jobs created in Nye County as a result of increased economic activity from shared use. This would be approximately 1 percent of the baseline number of direct jobs (23,000) estimated by DOE for 2025 (Table 3-12). Including indirect jobs, the total increase in jobs estimated by Nye County would be approximately 350 (1.5 percent of the baseline), and total new wages brought into the county would be approximately $7.6 million. Based on the Nye County 2007 report's estimated increase in wages, DOE used the REMI *Policy Insight* model to estimate that shared use would lead to an increase in population of approximately 500 above the DOE estimates after 10 years of operations, an increase of less than 1 percent (DIRS 185435-Bland 2008, all). If the Nye County employment and income estimates were to become true, then the impacts might be larger than DOE expects.

Railroad operations under the Shared-Use Option would generate limited employment and income impacts. It is expected that a crew of three people would be needed to operate the commercial train service, although depending on the total travel time for the commercial train, a crew change point might be needed. Train crews would use local commercial facilities for sleeping and provision needs, causing some small, but positive, impacts to employment and income. There might also be small economic benefits associated with maintenance of the commercial rail facilities by a commercial contractor.

3.2.8 NOISE AND VIBRATION

The Yucca Mountain FEIS analysis for noise considered typical day-night sound levels and the distance of the rail line from communities, and estimated the impacts to communities from railroad construction and operations. The Yucca Mountain FEIS analysis for vibration considered the typical background level of ground vibration, the number of trains, and the distance of the rail line from historic structures or sites of cultural significance, and estimated the impacts from railroad operations.

The Yucca Mountain FEIS noise analysis used daytime and nighttime noise standards adopted by the State of Washington (Washington Administrative Code 173-58-040 to 173-60-040) for residential and commercial areas as benchmarks and for establishing the region of influence for potential impacts. To evaluate the impacts of noise from construction and operations activities for receptors in the region of influence near transportation facilities and corridors, DOE used benchmarks of:

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

The analysis in the Yucca Mountain FEIS assumed that a limitation of 10 dBA above the benchmark is allowable if the duration is less than 5 minutes in an hour.

Day-night average noise level (DNL): The energy average of A-weighted decibel (dBA) sound levels over 24 hours; includes an adjustment factor for noise between 10 p.m. and 7 a.m. to account for the greater sensitivity of most people to noise during the night. The effect of nighttime adjustment is that one nighttime event, such as a train passing by between 10 p.m. and 7 a.m., is equivalent to 10 similar events during the daytime.

A-weighted decibels (dBA): A measure of noise level used to compare noise from various sources. A-weighting approximates the frequency response of the human ear.

DOE has updated the criteria to determine the level of potential impacts from noise and vibration along the Mina rail corridor. For noise impacts from construction activities, DOE used U.S. Department of Transportation, Federal Transit Administration, methods (DIRS 177297-Hanson, Towers, and Meister 2006, all) and construction noise guidelines listed in Table 3-14.

Table 3-14. Federal Transit Administration construction noise guidelines.[a,b]

Land use	8-hour L_{eq} (dBA) Day	8-hour L_{eq} (dBA) Night	30-day average DNL (dBA)
Residential	80	70	75[c]
Commercial	85	85	80[d]
Industrial	90	90	85[d]

a. Source: DIRS 177297-Hanson, Towers, and Meister 2006, p. 12-8.
b. dBA=A-weighted decibels; DNL = day-night average noise level; L_{eq} = equivalent sound level.
c. In urban areas with very high ambient noise levels (DNL greater than 65 dBA), DNL from construction projects should not exceed existing ambient +10 dBA.
d. Twenty-four hour L_{eq}, not DNL.

For operation of trains during the construction and operations phases, DOE analyzed noise impacts under established Surface Transportation Board (STB) criteria. The STB has environmental review regulations for noise analysis (49 CFR 1105.7e (6)), with the following criteria:

- An increase in noise exposure as measured by DNL of 3 dBA or more
- An increase to a noise level of 65 DNL or greater

If the estimated noise-level increase at a location would exceed either criterion, the STB then estimates the number of affected receptors (such as schools, libraries, residences, retirement communities, and nursing homes). The two components (3 dBA increase, 65 DNL) of the STB criteria are implemented separately to determine an upper bound of the area of potential noise impact. However, current noise research indicates that both criteria must be met to cause an adverse noise impact (DIRS 173225-STB 2003, p. 4-82). That is, sound levels would have to be greater than or equal to 65 DNL and increase by 3 dBA or more for an adverse noise impact to occur.

Consistent with the analysis conducted in the Yucca Mountain FEIS, DOE based the estimates of potential operations impacts from noise on the passage of a two-locomotive, 10-railcar train traveling at 80 kilometers (50 miles) per hour. Current estimates of train size are similar, with two to three locomotives and four to nine cask, buffer, and escort cars, with six railcars being typical (DIRS 175036-BSC 2005). DOE considered the proximity of the Mina rail corridor to centers of population and frequency of shipments. Table 3-15 lists communities within 5 kilometers (3 miles) of the Mina rail corridor.

There are three potential ground-borne vibration (vibration propagating through the ground) impacts of general concern: annoyance to humans, damage to buildings, and interference with vibration-sensitive activities. The approach for analyzing potential vibration impacts is based on estimates of project-generated vibration and measurements of current ambient vibration conditions. To evaluate potential vibration impacts from construction and operation activities, DOE used Federal Transit Administration building vibration damage and human annoyance criteria. Under these criteria, if vibration levels exceeded 80 VdB (human annoyance criterion for infrequent events) or if the vibration levels (measured as peak particle velocity) exceeded 0.20 inches per second for fragile buildings or 0.12 inches per second for extremely fragile historic buildings, then there could be a vibration impact (DIRS 177297-Hanson, Towers, and Meister 2006, all).

Table 3-15. Communities within 3 miles of the Mina rail corridor.

Community name	Approximate distance (miles)[a]
Goldfield	0.1
Silver Peak	0.2
Hawthorne	0.4
Mina	0.9
Schurz	1.1
Luning	1.7
Sodaville	1.7

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

The region of influence for noise and vibration for construction and operation of a railroad along the Mina rail corridor includes the construction right-of-way out to variable distances, depending on several analytical factors (***ambient noise*** level, train speed, number of trains per day, and number of railcars).

3.2.8.1 Noise and Vibration Affected Environment

Most of the Mina rail corridor would pass through unpopulated BLM-administered public lands, primarily in a quiet ***desert*** environment where natural phenomena such as wind, rain, and wildlife account for most of the ambient sound. The sound level at a specific location depends on nearby and distant sources of sound. Sound levels in populated areas tend to be higher than in unpopulated areas because of human activity and higher levels of transportation noise. Manmade noise in some areas of the region of influence is caused by vehicles traveling along public highways and high-altitude commercial jets. Baseline sound conditions vary somewhat in the Mina rail corridor and are site-specific. Most of the region of influence for the Mina rail corridor is typical of other desert environments in which the DNL values range from 14 dBA on calm days up to 38 dBA on windy days (DIRS 102224-Brattstrom and Bondello 1983, p. 170). In 2005, DOE conducted noise measurements in Goldfield. Ambient noise levels ranged from 30 to 44 dBA with a day-night sound level of 47 dBA (DIRS 182772-MTS 2007, p. 57). In March 2007, DOE conducted noise measurements near Silver Peak, Mina, and Schurz (DIRS

182772-MTS 2007, p. 57). The noise associated with railroad operations is part of the existing environment in the Schurz area where the presence of the railroad is very evident. The sounds associated with the existing branchline include wayside noise (noise generated by the cars and locomotives) and horn sounding. The Federal Railroad Administration requires train engineers to sound horns when approaching most grade crossings. Horn sounding is generally not required at private crossings. Wayside noise and horn sounding are common in Schurz and along other portions of the existing Department of Defense Branchline. The day-night sound levels ranged from 34 to 48 dBA, consistent with expectations for rural towns. The other rural communities along the Mina rail corridor would likely have similar background noise levels (DIRS 182772-MTS 2007, p. 57).

Ambient vibration levels were so low that they were essentially immeasurable for Schurz, Mina, and Silver Peak. The measured ambient vibration level in Goldfield was 25 VdB.

3.2.8.2 Potential Noise and Vibration Impacts

The conclusion of this analysis using the updated impact criteria from the Federal Transit Administration and STB is broadly consistent with the conclusion that would be obtained using the methodology presented in the Yucca Mountain FEIS.

3.2.8.2.1 Noise

3.2.8.2.1.1 Construction. For the most part, the Mina rail corridor would pass through areas that are remote from human habitation. Thus, the potential for noise impacts during the construction phase would be limited. Nevertheless, some people could be affected, including persons living near the corridor, using nearby recreational areas, or living in nearby rural communities. The distances from construction activities to the nearest receptors would be great; therefore, construction noise levels would be below the Federal Transit Administration noise guidelines listed in Table 3-14.

3.2.8.2.1.2 Construction Train Noise. As the rail roadbed, track, and bridges were completed, construction trains would be employed to move railroad ties, ballast, and other rail-construction equipment to other construction areas. Up to 16 one-way trains per day would pass by certain receptor locations during the construction phase. As with operations trains, locomotive horn sounding at grade crossings would be the dominant noise source.

DOE estimates that construction-train noise would be audible to receptors in Silver Peak and Goldfield. There would be no adverse noise impacts associated with these receptors because they would not experience a 3 dBA increase <u>and</u> 65 DNL or greater noise levels. The purpose of the 3 dBA increase component of STB noise guidelines is to identify potential impact areas and areas where train noise would be particularly audible. However, because transportation noise sources are audible throughout the United States, the audibility of train noise itself does not constitute an adverse noise impact.

3.2.8.2.1.3 Operations. DOE based the estimates of potential operations impacts from noise on the passage of a two- to three-locomotive, four- to eight-railcar train (one to five cask cars, two buffer cars, and one escort car). Because train speed has a direct correlation to noise generated, DOE used the top train speed to conservatively estimate potential noise levels. At present, there is no train activity in Mina, Silver Peak, or Goldfield.

DOE estimates that 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 they would not experience a 3 dBA increase <u>and</u> 65 DNL or greater noise levels. The purpose of the 3 dBA increase component of STB noise guidelines is to identify potential impact areas and areas where train noise would be particularly audible. However, because transportation noise sources are audible throughout the United States, the audibility of train noise itself does not constitute an adverse noise impact.

3.2.8.2.2 Vibration

3.2.8.2.2.1 Construction. Based on the proposed construction equipment and Federal Transit Administration vibration data, DOE estimated potential ground-borne vibration levels due to construction activity. The vibration levels would be below Federal Transit Administration building vibration damage criteria (0.20 inch per second for fragile buildings, and 0.12 inch per second for extremely fragile historic buildings). Therefore, DOE would expect no damage to buildings due to vibration during construction. In addition, because of relatively low vibration levels and the temporary nature of construction, human annoyance due to construction vibration would be low.

3.2.8.2.2.2 Construction and Operations Train Vibration. DOE evaluated the potential impacts from vibration for construction and operations trains by using train-induced vibration levels as a function of distance from a rail line, along with vibration levels likely to result in building damage or annoyance, in combination with information on the location of residences or other buildings in relation to the rail line.

Construction trains would travel at lower speeds than operations trains. Because vibration is a function of train speed, construction-train vibration would be lower than operations-train vibration. Freight trains operating at 80 kilometers (50 miles) per hour would produce an annoyance-based vibration contour extending approximately 24 meters (80 feet) from the tracks (DIRS 177297-Hanson, Towers, and Meister 2006, p. 10-3). There are no buildings within approximately 24 meters of the Mina rail corridor, so operations trains would produce no adverse vibration impacts; neither would there be adverse vibration impacts from construction trains.

Unlike noise, vibration impacts are evaluated on the basis of maximum level. A freight train traveling at 80 kilometers (50 miles) per hour will generate a vibration velocity level of 95 decibels with respect to 1 micro-inch per second (VdB), measured 3 meters (10 feet) from the tracks (DIRS 177297-Hanson, Towers, and Meister 2006, p. 10-3). This level of vibration is substantially lower than levels that can cause cosmetic building damage (0.20 inch per second), nominally a vibration velocity of 106 VdB, or 100 VdB, assuming a crest factor of 2 (DIRS 176857-Martin 1980, all). This level of vibration is even lower than that which can cause structural damage (126 VdB) (DIRS 175495-Nicholls, Johnson, and Duvall 1971, all). There are no buildings within 3 meters of the Mina rail corridor; therefore, there would be no adverse vibration impacts to buildings.

3.2.9 AESTHETICS

The region of influence for aesthetics is the ***viewshed*** surrounding the 400-meter (0.25-mile)-wide corridor and all support facilities.

Most of the land in the Mina rail corridor is BLM-administered land, with additional areas under the jurisdiction of the Walker River Paiute Tribe, the U.S. Army, or private land owners. Because the Mina rail corridor would primarily cross BLM-administered land, DOE used BLM methodologies for classifying visual resource quality and determining impacts to visual resources (DIRS 173053-BLM 1986, all; DIRS 173052-BLM 1984, all).

The BLM classifies lands under its jurisdiction using the visual resource management classification system. Classifications are based on a particular area's ***scenic quality***, visual sensitivity (***sensitivity levels***), and distance from travel or observation points (DIRS 101505-BLM 1986, all). The BLM uses a combination of the ratings of these three factors to assign a visual resource inventory class to a piece of land, ranging from Class I to Class IV, with Class I representing the highest visual values. Each visual resource class is subsequently associated with a management objective, defining the way the land may be developed or used. Each BLM district assigns visual resource management classes to its lands during the resource management planning process.

BLM management objectives associated with the four visual resource management classes are:

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

The BLM uses visual resource contrast ratings to assess the visual impacts of proposed projects and activities on the existing landscape (DIRS 173053-BLM 1986, all). The BLM looks at basic elements of design to determine levels of contrast created between a proposed project and the existing viewshed. Contrast ratings are determined from locations called "key observation points," which are usually along commonly traveled routes such as highways or frequently used county roads or in communities. Depending on the visual resource management objective for a particular location, varying levels of contrast are acceptable. BLM Handbook H-8431-1, *Visual Resource Contrast Rating* (DIRS 173053-BLM 1986, all), describes this process.

BLM visual resource management classifications for lands along the Mina rail corridor were primarily taken from the *Carson City Field Office Consolidated Resource Management Plan* (DIRS 179560-BLM 2001, all), the *Tonopah Resource Management Plan and Record of Decision* (DIRS 173224-BLM 1997, all), and the *Record of Decision for the Approved Las Vegas Resource Management Plan and Final Environmental Impact Statement* (DIRS 176043-BLM 1998, all). Visual resource management classifications for lands not administered by the BLM (tribal lands, lands administered by other federal or state agencies, and private lands) were assigned using BLM methodologies (DIRS 173053-BLM 1986, all; DIRS 173052-BLM 1984, all) and considering scenic quality ratings reported in the Yucca Mountain FEIS where applicable (DIRS 155970-DOE 2002, pp. 3-158 and 3-159).

3.2.9.1 Aesthetics Affected Environment

Applicable BLM resource management plans (DIRS 173224- BLM 1997, all; DIRS 103079-BLM 1998, all; DIRS 179560-BLM 2001, all) show that most of the Mina rail corridor would be in visual resource management Class III or IV lands, with the exception of a small section of existing rail line east of Walker Lake that crosses a Class II area. Other than east of Walker Lake, the Mina rail corridor in Churchill and Mineral Counties and on the Walker River Paiute Reservation would cross exclusively through areas considered Class III by default classification of the Carson City BLM office (DIRS 179571-Knight 2007, all). Montezuma option 1 would cross a Class III area centered on State Route 265 from Blair Junction to Silver Peak, and would be within about 2 kilometers (1.2 miles) of Class II areas in the Montezuma Range and Clayton Ridge areas. Approximately 10 kilometers (6 miles) of common corridor segment 6 would also be in Class III lands before it crossed the Yucca Mountain Site boundary.

3.2.9.2 Potential Aesthetics Impacts

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

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

Construction and operation of a railroad through the primarily Class III and IV areas along the Mina rail corridor would generally be consistent with the BLM visual resource management objectives for these areas. Therefore, DOE expects the potential impacts to aesthetic resources would be small.

3.2.10 UTILITIES, ENERGY, AND MATERIALS

3.2.10.1 Utilities, Energy, and Materials Affected Environment

The Mina rail corridor would be in remote Nevada countryside, but is within the southern Nevada supply chain for the commodities required during the construction and operations phases.

3.2.10.2 Potential Utilities, Energy, and Materials Impacts

This section describes potential impacts to utilities, energy, and materials as a result of constructing and operating a railroad in the Mina rail corridor. Consumption of motor fuel, steel, and concrete during the construction and operations phases could impact the availability of these materials in the region of influence.

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

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

Construction equipment would consume motor fuel (diesel and gasoline), which would represent the largest energy resource usage during the construction phase. The total motor fuel use in Nevada in 2005 was about 5.8 billion liters (1.5 billion gallons) (DIRS 182772-MTS 2007, p. 61). Table 3-16 includes the estimated amounts of diesel fuel and gasoline expected to be consumed during the construction phase.

Approximately 27 percent of the total construction phase fuel consumption would occur in the peak construction year. This would represent only about 0.6 percent of the motor fuel consumed annually in

Table 3-16. Construction materials and fuel estimates for the Mina rail corridor.[a]

Length (miles)[b,c]	Diesel fuel use (million gallons)[d]	Gasoline use (million gallons)	Steel (thousand tons)[e]	Concrete (thousand tons)
255	32	0.7	74	287

a. Sources: DIRS 180877-Nevada Rail Partners 2007, Table 2-1; DIRS 182772-MTS 2007, p. 61.
b. Corridor length listed for comparative evaluation.
c. To convert miles to kilometers, multiply by 1.6093.
d. To convert gallons to liters, multiply by 3.78533.
e. To convert tons to metric tons, multiply by 0.90718.

Nevada. Unlike overall state use, construction activities would use primarily diesel fuel, and during the peak year would consume about 2.2 percent of all special fuel (mainly diesel) used annually in Nevada. Nevada motor fuel use will continue to increase in the future, so the actual project percent use would be lower than these values (DIRS 182772-MTS 2007, p. 61).

Steel for rails, concrete (principally for rail ties, bridges, and drainage structures), and rock for ballast would be the primary materials that the construction of a rail line would consume. Table 3-16 lists estimates of steel and concrete consumption. Nationally, steel rail production often exceeds the need and there would be sufficient production flexibility and capacity to meet rail line construction demands. Thus, the impact on steel availability would be small. Because DOE would purchase precast concrete components from national suppliers in staggered preordered phases, and because construction would involve a small amount of cast-in-place concrete via the use of on-site batch plants, the impact on availability of concrete would be small.

During the operations phase, the amount of motor fuel used by locomotives would be small compared to regional availability. The amount of materials needed for rail line maintenance activities would be negligible and would not impact the supply.

3.2.11 WASTE MANAGEMENT

The region of influence for waste management includes counties the Mina rail corridor would cross and that have existing municipal sanitary waste landfills and disposal facilities for other types of wastes.

3.2.11.1 Waste Management Affected Environment

The Mina rail corridor would run through the Walker River Paiute Reservation and Lyon, Mineral, Esmeralda, and Nye Counties. Of these, Lyon County and the Walker River Paiute Reservation have no landfill. The Goldfield landfill, in Esmeralda County, which serves a population of fewer than 1,500 received about 3.6 metric tons (4 tons) of solid waste per day in 2003. Nye County disposed of about 250 metric tons (280 tons) of waste during 2003 at three different landfills, but the county plans to close two of these landfills by 2011, which would represent 96 percent of the county's current waste disposal capacity. The Hawthorne Landfill in Mineral County disposed of about 26 metric tons (28 tons) per day in 2003; it has an estimated closure date of 2031. In comparison, the Apex Landfill in Clark County, which serves the Las Vegas Valley and has an estimated closure data of 2150, received 10,600 metric tons (11,700 tons) daily during 2003 (DIRS 182772-MTS 2007, pp. 61 to 62).

3.2.11.2 Potential Waste Management Impacts

Construction activities would generate hazardous and nonhazardous solid wastes, and recyclable material. DOE would dispose of nonhazardous wastes in permitted landfills. Hazardous waste such as corrosives and solvents would be shipped to a permitted hazardous waste treatment and disposal facility. It is estimated that each year during the construction phase, approximately 18 metric tons (approximately 20 tons) of hazardous waste would be generated (a total of 74 metric tons [82 tons] over the entire construction phase), much of which could be recycled through existing Nevada municipal waste programs. During the railroad operations phase, approximately 17,010 metric tons (approximately 18,750 tons) of hazardous waste would be produced during the shipping campaign, much of which would also be recyclable through existing waste programs. The nonrecyclable hazardous wastes generated during the railroad construction and operations phases would be stored and disposed of in accordance with applicable federal and state regulations. All waste would be handled in accordance with applicable environmental, occupational safety, and public health and safety requirements.

Railroad construction and operations would generate solid municipal waste, estimated to be approximately 750 metric tons (830 tons) during the peak year of construction (DIRS 180922-Nevada Rail Partners 2007, Table 6-3). Approximately 25 percent of the generated waste would be recyclable, which would result in 550 metric tons (620 tons) of waste for disposal at municipal landfills (DIRS 180922-Nevada Rail Partners 2007, Table 6-3). The estimated total mass of waste during the construction phase would be about 2,000 metric tons (2,200 tons). This mass of waste would occupy about 5,000 cubic meters (6,600 cubic yards) of landfill volume at a waste density of 420 kilograms per cubic meter (700 pounds per cubic yard), which is typical of smaller landfills. The estimated average daily disposal mass would be about 1.5 metric tons (1.7 tons) (derived from DIRS 180922-Nevada Rail Partners 2007, Table 6-3).

For the landfills in rural counties, this would represent an increase in waste disposal volume. As an example, disposal of solid waste during the construction phase would represent a nearly 50-percent increase in daily waste volume for the Goldfield landfill and could hasten its closure (now estimated to be in 2023) (DIRS 182772-MTS 2007, p. 62). Waste generated during the construction phase could be trucked to larger landfills, where impacts on waste disposal capacity would be small.

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

3.2.12 ENVIRONMENTAL JUSTICE

3.2.12.1 Environmental Justice Affected Environment

For the Yucca Mountain FEIS, DOE followed the Council on Environmental Quality guidance (DIRS 177702-CEQ 1997, all) and the then-existing methodology of the U.S. Nuclear Regulatory Commission to identify low-income and minority communities (also called ***low-income*** and ***minority populations***). However, since that time, the Nuclear Regulatory Commission methodology used in the Yucca Mountain FEIS has been revised, and for this Nevada Rail Corridor SEIS, DOE used the revised methodology to identify low-income and minority communities (69 *FR* 52048). The revised methodology is, in part:

> Under current NRC [Nuclear Regulatory Commission] 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.

In Nevada, the percentage of people below the poverty threshold, as characterized by the U.S. Bureau of the Census (DIRS 174625-Census Bureau 2005, all), was approximately 11 percent at the last Decennial Census (DIRS 176856-Census Bureau 2003, Table 15). Thus, applying the U.S. Nuclear Regulatory

Commission guidance, 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.

Because the percentage of minorities in Nevada is approximately 34 percent (DIRS 173533-Census Bureau 2005, all), adding 20 percentage points would provide a threshold of 54 percent to identify minority communities. Instead, DOE identified minority communities as those affected areas (by census blocks) where the minority population exceeded 50 percent.

The largest concentration of ***low-income*** or ***minority populations*** in the Mina rail corridor occurs in Mineral County and on the Walker River Paiute Reservation. The corridor would cross American Indian tribal lands, with the three Schurz bypass options almost entirely on the Walker River Paiute Reservation (DIRS 180222-BSC 2006, p. 16).

There are approximately 1.4 square kilometers (350 acres) of Reservation lands in the corridor (DIRS 180222-BSC 2006, p. 15). The population of the Reservation, estimated to be 853 persons in 2000, is low-income and consists mainly of American Indians, a minority population. The minority population of the Reservation is 87 percent.

The poverty rate in Mineral County is 15 percent, which exceeds the rate of poverty (11 percent) in the State of Nevada, while the poverty rate of Walker River Paiute Reservation residents is 32 percent. Nevada's per capita income is approximately the same as the national average of about $22,000, but the per capita income on the Reservation is less than half that of residents in the state. Table 3-17 lists Walker River Paiute Reservation, Mineral County, and State of Nevada economic characteristics.

Table 3-17. Economic characteristics of the Walker River Paiute Reservation, Mineral County, and the State of Nevada, 2000.[a]

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

a. Source: DIRS 182772-MTS 2007, p. 63.

The Mineral County unemployment rate is approximately twice the rate of the state; with Nevada unemployment statistics mirroring the Nation's unemployment rate. The unemployment rate on the Walker River Paiute Reservation however, is more than three times that of the state. Table 3-18 lists labor and employment characteristics on the Walker River Paiute Reservation, in Mineral County, and in Nevada.

3.2.12.2 Potential Environmental Justice Impacts

Because there would be small changes in long-term population attributable to activities in the Mina rail corridor, impacts or stresses to the housing stock, infrastructure systems, or social services would be unlikely. A portion of the Mina rail corridor would cross lands in Esmeralda County where most of the land is administered by the BLM or owned by the U.S. Department of Defense, resulting in a sparse population. As a consequence, there are no concentrations of low-income or minority populations in Esmeralda County that construction or operation of a railroad in the Mina rail corridor would be likely to

Table 3-18. Labor and employment characteristics of the Walker River Paiute Reservation, Mineral County, and the State of Nevada, 2000.[a]

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

a. Source: DIRS 182772-MTS 2007, p. 64.

affect. DOE further concluded that there were no special pathways (unique practices and activities creating opportunities for increased impacts) that would result in high and adverse effects to low-income or minority communities. Likewise, a railroad in the corridor would be unlikely to affect low-income or minority populations in Lyon County.

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

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

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

4. CUMULATIVE IMPACTS – MINA RAIL CORRIDOR

This chapter describes potential cumulative impacts in connection with constructing and operating a railroad in the Mina rail corridor. This analysis considers past, present, and reasonably foreseeable future and continuing actions. This chapter also addresses unavoidable adverse impacts, the relationship between short-term uses and long-term productivity, and potentially irreversible or irretrievable commitments of resources for the Mina rail corridor.

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

4.1 Introduction

The U.S. Department of Energy (DOE or the Department) combined potential ***impacts*** reported in Chapter 3 of this Nevada Rail Corridor SEIS with the potential impacts of other relevant past, present, and reasonably foreseeable future actions in the ***regions of influence*** for the Mina rail corridor. These combined impacts are called ***cumulative impacts***. Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] 1500 to 1508) that implement the procedural requirements of the National Environmental Policy Act (42 United States Code [U.S.C.] 4321 *et seq.*) (NEPA) require a cumulative impacts analysis as part of the environmental impact statement (EIS) process.

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

DOE structured the cumulative impact assessments 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* (DIRS 155970-DOE 2002, Section 8.4.2) (Yucca Mountain FEIS) by identifying actions that could have effects that coincided in time and space with the effects from the proposed ***repository*** and associated transportation activities. The analysis of cumulative transportation impacts reported in the Yucca Mountain FEIS evaluated the environmental impacts of constructing and operating a branch rail line in Nevada combined with the impacts of other federal, non-federal, and private actions.

4.1.1 REGIONS OF INFLUENCE

DOE considered regions of influence in this cumulative impact analysis that extend beyond most of the resource-specific regions of influence (for example, width of the construction right-of-way) described in Section 3 of this Nevada Rail Corridor SEIS. 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 in this chapter). Clark, Churchill, and Washoe Counties are generally excluded from the cumulative impacts region of influence except as needed to maintain consistency with individual resource analyses in Section 3 of this Nevada Rail Corridor SEIS, such as socioeconomics or air quality.

4.1.2 APPROACH AND ANALYTICAL PERSPECTIVE

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

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

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

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

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

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

4.1.3 RELATIONSHIP OF THIS ANALYSIS TO THE YUCCA MOUNTAIN FEIS CUMULATIVE IMPACTS ANALYSIS

The Yucca Mountain FEIS provided an analysis of potential cumulative impacts associated with construction and operation of a repository at Yucca Mountain. The portions of that analysis relevant and still valid to the Mina rail corridor (DIRS 155970-DOE 2002, Section 8.4.2) are incorporated in this Nevada Rail Corridor SEIS cumulative impacts analysis, as appropriate.

To evaluate potential environmental impacts, including cumulative impacts, of the revised repository design and operational plans, DOE has prepared *Final Supplemental Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (DOE/EIS-0250F-S1) (Repository SEIS), which includes an analysis of cumulative impacts as they relate to the Yucca Mountain Repository. Section 4.2.1.2.1 includes a description of the repository, as currently proposed, and additional context about the repository as a reasonably foreseeable action. This Nevada Rail Corridor SEIS incorporates updated cumulative impacts analyses from the Repository SEIS, as appropriate.

4.1.4 MITIGATION OF POTENTIAL IMPACTS RELATING TO CUMULATIVE IMPACTS

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

To comply with requirements and to eliminate or reduce potential environmental impacts, DOE would implement a variety of engineering site planning actions and best management practices, all of which are parts of the Proposed Action. DOE best management practices include the practices, techniques, methods, processes, and activities commonly accepted and used throughout the construction and railroad industries that facilitate compliance with applicable requirements and that provide an effective and practicable means of preventing or minimizing the environmental impacts of an action. Such practices would avoid, minimize, or otherwise reduce the direct and indirect environmental impacts of the DOE Proposed Action, thereby avoiding or minimizing the DOE contribution to direct, indirect, and cumulative environmental impacts in the Mina rail corridor. Mitigation of impacts in rail corridors is discussed in the Repository SEIS, Chapter 9, and is incorporated by reference.

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

4.1.5 ORGANIZATION OF THE ANALYSIS

Section 4.2 summarizes potential cumulative impacts associated with implementing the Proposed Action in the Mina rail corridor. Section 4.3 addresses unavoidable adverse impacts and irretrievable commitments of resources. Section 4.4 provides the Nye County perspective on cumulative impacts.

4.2 Mina Rail Corridor

Section 4.2.1 summarizes the projects and activities considered in this Nevada Rail Corridor SEIS cumulative impacts analysis. Section 4.2.2 describes the potential cumulative impacts identified in this Nevada Rail Corridor SEIS. Figure 4-1 shows the locations of these major projects and activities, including:

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

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

- BLM planning and management actions – There are a variety of BLM past, present, and reasonably foreseeable actions within the three BLM management areas (Carson City, Battle Mountain, and Las Vegas) relevant to the Mina rail corridor.

- Various rights-of-way – Many future utility or other rights-of-way corridors and their specific routes are not known. In October 2007, DOE and the BLM issued the *Draft Programmatic Environmental Impact Statement of the Designation of Energy Corridors on Federal Land in the 11 Western States* (DOE/EIS-0386), which analyzes the potential designation of energy corridors on federal land in western states (DIRS 185274-DOE 2007, all). A number of energy corridors proposed in the Draft EIS run through the state of Nevada; one of these corridors would be located near the proposed Mina rail corridor (See Figure 4-1). The proposed energy corridor in western Nevada would enter the state north of Reno and travel southeast toward Las Vegas. This energy corridor would consist of both existing and new rights-of-way, and would parallel the proposed Mina rail corridor along nearly its entire length, crossing or overlapping the rail line in a number of locations.

- Energy and mineral development activities.

- Other regional economic development plans and activities within Lyon, Mineral, Esmeralda, and Nye Counties.

The Mina rail corridor ranges in length from about 410 to 450 kilometers (255 to 280 miles), depending on the option considered. As a linear project, land disturbance and other direct impacts are most likely to occur within the relatively narrow construction and operations rights-of-way. However, for some resources, there could be other direct and indirect impacts outside the rights-of-way.

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

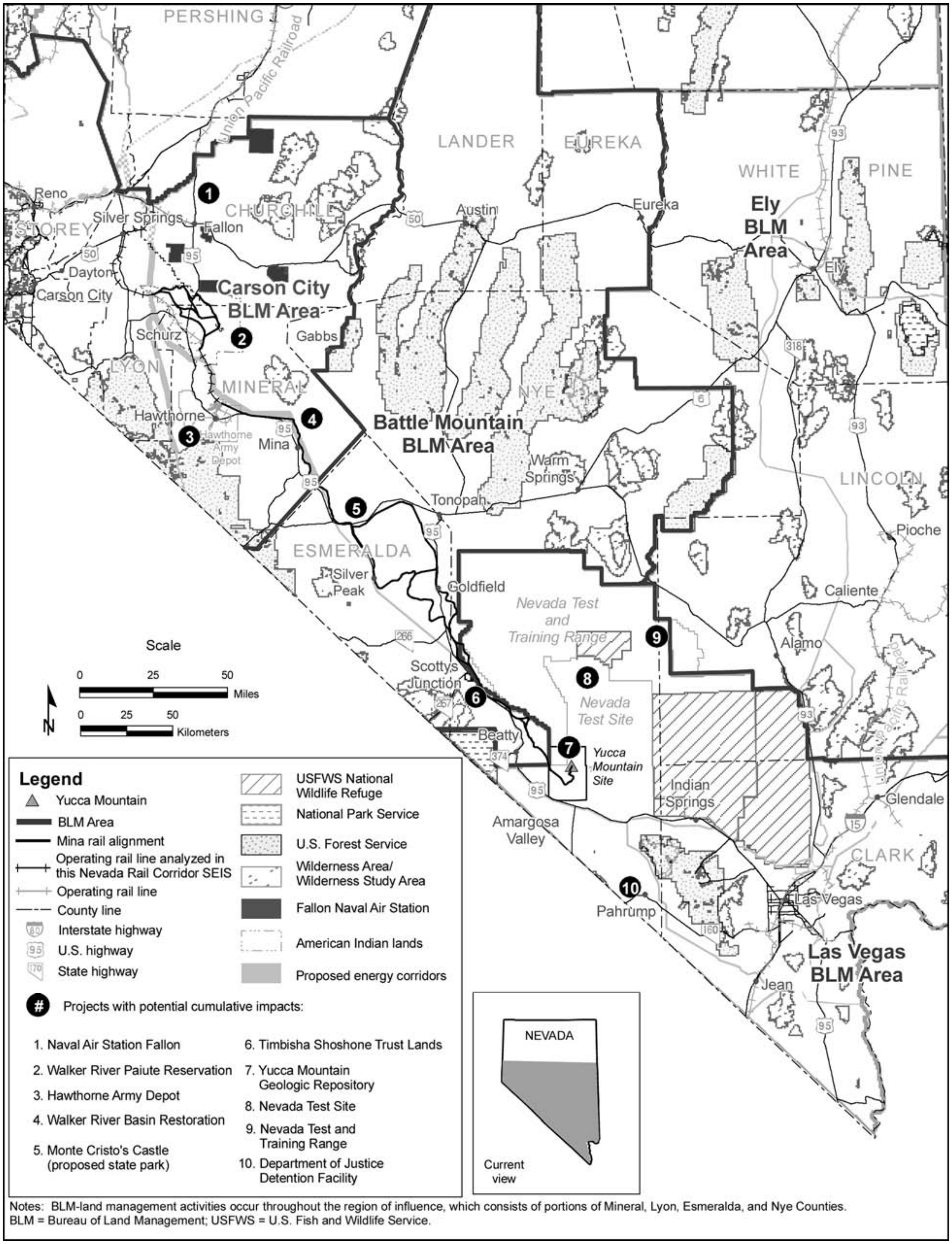


Figure 4-1. Major reasonably foreseeable future actions and continuing activities in the Mina region of influence.

4.2.1 PROJECTS AND ACTIVITIES INCLUDED IN THE CUMULATIVE IMPACTS ANALYSIS

4.2.1.1 Past and Present Actions

The descriptions of existing (baseline) environmental conditions and impacts (see Section 3) associated with the various environmental resource regions of influence for the Mina rail corridor considered in this Nevada Rail Corridor SEIS include the relationships between proposed railroad construction, operations, and abandonment, and past and present actions such as:

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

Reasonably foreseeable future actions and the continuation of existing actions in the region of influence were also considered. Figure 4-1 shows the locations of reasonably foreseeable projects and continuing activities in the Mina region of influence.

4.2.1.2 Reasonably Foreseeable Future and Continuing Federal Actions

Sections 4.2.1.2.1 through 4.2.1.2.9 describe reasonably foreseeable future and continuing federal agency actions that could result in cumulative impacts when combined with the potential impacts of constructing and operating the proposed railroad along the Mina rail corridor.

4.2.1.2.1 Yucca Mountain Repository

The Proposed Action in this Nevada Rail Corridor SEIS is directly related to the proposed geologic repository at Yucca Mountain, which is a reasonably foreseeable project (see Figure 4-1, Project #7). The repository would disturb about 6.3 square kilometers (1,600 acres) of land, most of which would be on the Nevada Test Site. In the Yucca Mountain FEIS (DIRS 155970-DOE 2002, all) and the Repository SEIS (DOE/EIS-0250F-S1), DOE proposed to construct, operate and monitor, and eventually close a geologic repository for the ***disposal*** of 70,000 metric tons (77,000 tons) of heavy metal of ***spent nuclear fuel*** and ***high-level radioactive waste*** in a repository at Yucca Mountain in Nye County, Nevada. The Department proposes to dispose of this material using the natural geologic features of Yucca Mountain, along with engineered barriers, as a total system to help ensure long-term ***isolation*** of the materials from the ***accessible environment***. As analyzed in the Repository SEIS, the repository design and associated construction and operational plans require the following:

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

- Most spent nuclear fuel and high-level radioactive waste would be transported from 72 commercial and 4 DOE sites to the repository in Nuclear Regulatory Commission-certified transportation casks placed on trains dedicated only to these shipments.
- At the repository, DOE would conduct waste handling activities to manage thermal output of the commercial spent nuclear fuel and to package the spent nuclear fuel into TAD canisters. The disposable canisters and TAD canisters would be placed into ***waste packages*** for disposal in the repository. A waste package is a container that consists of the barrier materials and internal components in which DOE would place the canisters that contained spent nuclear fuel and high-level radioactive waste.
- DOE would place approximately 11,000 waste packages, containing no more than a total of 70,000 metric tons (77,000 tons) of heavy metal, of spent nuclear fuel and high-level radioactive waste in the repository at Yucca Mountain.
- The surface and subsurface facilities and associated infrastructure, such as the on-site road and water distribution networks and emergency response facilities, would be constructed in phases to accommodate the expected receipt rates of spent nuclear fuel and high-level radioactive waste.
- DOE also would construct a four-lane access road that would extend from U.S. Highway 95 to the existing access road at Gate 510. This access road might be constructed using a phased approach, with initial construction of two lanes, and the road being widened later. The Department would also build a suitable intersection at U.S. Highway 95.
- DOE assumes that the following facilities would be constructed outside the repository land withdrawal area: a training facility to support the Project Prototype Testing and the Operator Training and Qualification programs; temporary accommodations for construction workers; a proposed Sample Management Facility to consolidate, upgrade, and improve storage and warehousing for scientific samples and materials; and a marshalling yard and warehouse, a proposed facility that would consolidate material shipment and receipt into a 0.2-square-kilometer (50-acre) facility to allow for off-site receipt, transfer, and staging of materials required to perform construction activities at the Yucca Mountain Site.

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

The Yucca Mountain FEIS and the Repository SEIS evaluate the cumulative impacts of two additional inventories, Modules 1 and 2. Under Module 1, DOE would emplace all of the projected spent nuclear fuel and high-level radioactive waste in Yucca Mountain. Inventory Module 1 includes all projected commercial spent nuclear fuel from currently licensed reactors (about 130,000 metric tons [about 143,000 tons]) (DIRS 182343-BSC 2006, all), all DOE spent nuclear fuel (about 2,500 metric tons [about 2,800 tons]) (DIRS 155970-DOE 2002, all) and all high-level radioactive waste (approximately 36,000 canisters) (DIRS 182702-Koutsandreas 2007, all). Under Module 2, DOE would emplace all of Inventory Module 1 plus other radioactive materials that could require disposal in a geologic repository. The Repository SEIS evaluates two disposal cases for Inventory Modules 1 and 2 that evaluate the effects of potential future recycling of spent nuclear fuel on the cumulative impacts in the Repository SEIS. Because Modules 1 and 2 exceed the NWPA disposal limit of 70,000 metric tons (77,000 tons) of heavy metal considered in the Repository SEIS, the emplacement of any such waste at Yucca Mountain would require legislative action by Congress. DOE also acknowledges that prior to disposal of spent nuclear fuel and high-level radioactive waste in excess of 70,000 metric tons of heavy metal, appropriate regulatory authorizations would be obtained from the Nuclear Regulatory Commission, including any necessary amendments to DOE's license for the operation of the Yucca Mountain Repository.

As shown in the Repository SEIS, the number of shipments through Nevada in the cases involving recycling would be less than that currently evaluated. Therefore, this cumulative impacts analysis only considers the base case without recycling.

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

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

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

4.2.1.2.2 Nevada Test Site (Continuation of Activities)

The Nevada Test Site, adjacent to the Nevada Test and Training Range, engages in a number of defense-related material and management activities, waste management, environmental restoration, and non-defense research and development (see Figure 4-1, Project #8). The Nevada Test Site was established in 1951 as the Nation's proving ground for developing and testing nuclear weapons. The site is on land administratively held by the BLM, but the Nevada Test Site land was withdrawn for use by the Atomic Energy Commission and its successors (including DOE). At present, the DOE National Nuclear Security Administration manages the site. It consists of about 3,200 square kilometers (800,000 acres) of land, and the proposed railroad would use about 4.12 square kilometers (1,020 acres) of this land.

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

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

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

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

Table 1-2 lists and briefly describes recent environmental assessments that describe Nevada Test Site operations, which includes a description of the *Draft Supplement Analysis for the Final Environmental*

Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada, DOE/EIS-0243-SA-03 (DIRS 185437-DOE 2008, all).

4.2.1.2.3 BLM Resource Planning and Management

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

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

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

4.2.1.2.4 Walker River Paiute Reservation (Federal Actions)

The Walker River Paiute Reservation consists of more than 130 square kilometers (323,000 acres) of land between Yerington, Nevada, and Walker Lake (See Figure 4-1, Project #2). Although the Reservation is recognized as a sovereign entity under the non-federal actions discussion below, federal agencies could also be taking actions on the Reservation. The Bureau of Indian Affairs operates the Weber Dam and Weber Reservoir, which impounds water from the Walker River just north of the community of Schurz for use on the Reservation. Constructed in the 1930s, the dam needs several repairs and modifications to address a number of deficiencies identified as a result of inspections and a safety analysis conducted in the 1980s under the Bureau of Indian Affairs Dam Safety Maintenance and Repair Program, created as part of the Indian Dams Safety Act. Additionally, the U.S. Fish and Wildlife Service is involved in recovery efforts for the threatened Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*). Lahontan cutthroat trout are stocked in Walker Lake and occur in the Walker River upstream to Weber Reservoir. Weber Dam currently blocks movement further upstream, and prevents spawning by cutthroat trout; however, in the near future a fish ladder might be developed at that dam to allow fish movement. Reestablishment of a self-sustaining population of Lahontan cutthroat trout in the Walker River system is a prerequisite for recovery of this species (see also Section 4.2.1.3.4 below).

4.2.1.2.5 Nevada Test and Training Range (Continuation of Activities)

The U.S. Air Force operates the Nevada Test and Training Range in south-central Nevada (see Figure 4-1, Project #9), a national test and training facility for military equipment and personnel consisting of approximately 12 million square kilometers (3 million acres). Military training maneuvers and jet aircraft are visible in the Mina rail corridor. In 2005, the U.S. Air Force designated the Indian Springs Air Force Auxiliary Airfield to Creech Air Force Base and expanded its mission and infrastructure to play a major role in the war on terrorism. The base is home to two key military operations: the MQ-1 unmanned aerial vehicle and the Unmanned Aerial Vehicle Battle laboratory.

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

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

In 2004, the BLM prepared a resource management plan for about 8,900 square kilometers (2.2 million acres) of withdrawn public lands within the Nevada Test and Training Range (DIRS 178102-BLM 2004, all). The plan guides the management of the affected Nevada Test and Training Range natural resources 20 years into the future (2024). The decisions, directions, allocations, and guidelines within the plan are based on the primary use of the withdrawn area for military training and testing purposes.

Table 4-1 lists and briefly describes recent environmental assessments that describe Nevada Test and Training Range operations.

Table 4-1. Recent environmental assessments describing Nevada Test and Training Range operations (page 1 of 2).

Title	Description
Final Environmental Assessment for Increased Depleted Uranium Use on Target 63-10, Nevada Test and Training Range (DIRS 181607-USAF 2006, all)	The proposed action was to increase the use of depleted uranium ammunition at the Nevada Test and Training Range to meet ongoing test and training requirements for A-10 aircraft. The Air Force was to increase the number of depleted uranium rounds authorized to be fired on Target 63-10 from 7,900 to 19,000 annually. The environmental assessment evaluated five resource areas—air quality, soils and water resources, health and safety, hazardous and radioactive materials and waste, and biological resources—in detail to identify potential environmental consequences. The Air Force issued a Finding of No Significant Impact.
Final Environmental Assessment for Predator Force Structure Changes at Indian Springs Air Force Auxiliary Field, Nevada (DIRS 172314-USAF 2003, all)	The proposed action included changes to personnel assignments, upgrades to existing facilities, construction of new facilities, and extension of a runway by 120 meters (400 feet). The Air Force completed facilities for the Predator unmanned aerial vehicles in 2006. The Air Force issued a Finding of No Significant Impact.
Expeditionary Readiness Training Course Expansion, Final Environmental Assessment, Creech AFB (DIRS 182838-USAF 2006, all)	Environmental assessment to increase the number of Security Forces personnel trained at the Regional Training Center at Silver Flag Alpha and Creech Air Force Base, Nevada, from an existing 2,520 to 6,000 students per year. The Air Force issued a Finding of No Significant Impact.

Table 4-1. Recent environmental assessments describing Nevada Test and Training Range operations (page 2 of 2).

Title	Description
Wing Infrastructure Development Outlook, Final Environmental Assessment, Nellis AFB (DIRS 182839-USAF 2005, all)	The proposed action consists of 630 Wing Infrastructure and Development Outlook projects in 11 categories as classified under 32 CFR Part 989, *Air Force EIAP*. A total of 18 new construction and demolition projects are proposed for Creech Air Force Base. On the Nevada Test and Training Range, the proposed action would implement four new construction projects at four locations. At Tonopah Test Range, three new construction projects are planned along with the demolition of 10 buildings. The Air Force issued a Finding of No Significant Impact.
Final Range 74 Target Complexes Environmental Assessment Nevada Test and Training Range, Nevada (DIRS 185372-USAF 2007, all)	The proposed action is to construct and operate three target complexes in mountainous terrain in Range 74 of the Nevada Test and Training Range at Saucer Mesa, Limestone Ridge, and Cliff Springs. The Saucer Mesa target array would employ both large-scale live and inert munitions; the Limestone Ridge sites would employ large-scale inert munitions; both target sites would employ small-scale live munitions. The Cliff Springs target complex would be laser and simulated attack targets and no munitions would be used. The Air Force issued a Finding of No Significant Impact.
A Final Base Realignment and Closure Environmental Assessment for Realignment of Nellis Air Force Base (DIRS 181492-USAF 2007, all)	The proposed action would affect the Nevada Test and Training Range by adding 1,400 F-16 sorties flown from Nellis Air Force Base, although they would not cause total annual sortie operations to exceed the current maximum of 300,000 at the Nevada Test and Training Range. The environmental assessment evaluated noise, air quality, socioeconomics and infrastructure, water and soil resources, biological resources, cultural resources, and hazardous materials and waste. The Air Force issued a Finding of No Significant Impact.
F-35 Force Development Evaluation and Weapons School Beddown Draft Environmental Impact Statement (DIRS 185373-USAF Air Combat Command 2008, all)	The proposed action would base 36 F-35 aircraft at Nellis Air Force Base to support the Force Development Evaluation program and the Weapons School. The F-35 beddown would require the construction, demolition, or modification of base facilities. The Air Force would conduct an additional 17,280 annual airfield operations at Nellis Air Force Base by 2022, and an additional 51,840 annual sortie operations at the Nevada Test and Training Range. A Record of Decision will not be issued until after the Final EIS is published.
BLM Communication Use Lease to USAF to Conduct Patriot Communications Exercises in Lincoln County, Nevada, Draft Environmental Assessment (DIRS 185370-BLM 2008, all)	The proposed action involves Nellis Air Force Base implementing a 15-year communications use lease from the BLM to support ground-based radar/communications exercises at fourteen 0.023-square-kilometer (5.7-acre) sites (for a total of 0.32 square kilometer [80 acres]) across Lincoln County. The Integrated Air Defense System and radar/communications systems would be deployed on the Nevada Test and Training Range in up to five annual exercises over 15 years.
Draft Environmental Assessment for the Integrated Natural Resource Management Plan, Nellis AFB and NTTR, NV (DIRS 181899-USAF 2007, all)	The proposed action provides guidance to establish mission actions that minimize impacts to natural resources at Nellis Air Force Base and the Nevada Test and Training Range as much as practicable. The Integrated Natural Resources Management Plan provides guidance for the conservation of natural resources at the Nevada Test and Training Range and Nellis Air Force Base. The Air Force issued a Finding of No Significant Impact.

The primary ordnance areas at Hawthorne Army Depot extend over 400 square kilometers (100,000 acres) that cross U.S. Highway 95. This area is surrounded on its northeast, east, south, and west by fencing and on its north and northwest by a boundary line that includes a portion of Walker Lake. The southern one-third of Walker Lake is within the ordnance area. The Mount Grant watershed is in the northwest part of the installation. This watershed consists of about 180 square kilometers (45,000 acres), and is a resource that Hawthorne Army Depot maintains to supply its primary potable water needs. Hawthorne Army Depot has 2,572 buildings and structures, which are comprised of offices, production buildings, ammunition storage magazines, and warehouses. The Depot is bordered by BLM-administered public grazing lands, and the installation completely surrounds the town of Hawthorne. Hawthorne Army Depot is planning to construct a rail siding, known as the Wabuska Spur, which would increase the Depot's outloading capacity.

4.2.1.2.7 Naval Air Station Fallon

Naval Air Station Fallon is in the Lahontan Valley of west-central Nevada, approximately 113 kilometers (70 miles) east of Reno and 10 kilometers (6 miles) southeast of the City of Fallon (See Figure 4-1, Project #1). NAS Fallon administers approximately 32 square kilometers (7,900 acres) of withdrawn and acquired land associated with the air station and 95 square kilometers (234,000 acres) of land associated with the Fallon Range Training Complex. The Fallon Range Training Complex airspace overlies portions of Washoe, Lyon, Churchill, Pershing, Mineral, Nye, Lander, and Eureka Counties, most of which is BLM-administered public land.

In January of 2005, the Navy and the BLM issued the *Final Environmental Impact Statement: Proposed Fallon Range Training Complex Requirements Naval Air Station Fallon, Nevada* (DIRS 182891-USN and BLM 2000, all). The Naval Strike and Air Warfare Center at Naval Air Station Fallon proposes to implement changes at the Fallon Range Training Complex to meet Chief of Naval Operations-mandated training requirements resulting from the real world threat environment. The proposed changes would allow the Navy to update and consolidate Navy training on public and Navy-administered lands and to update existing airspace overlying these lands. The changes evaluated in that EIS include developing new fixed and mobile electronic warfare sites, developing new tracking instrumentation subsystem sites, developing additional targets at two of its training ranges, laying fiber-optic cable to two training ranges, utilizing Navy-administered lands in Dixie Valley for close-air-support training, performing Hellfire missile and high altitude weapons delivery training at two of its training ranges, and changes to special use airspace. That EIS provided a comprehensive evaluation of the environmental impacts, including cumulative impacts, associated with the Navy's proposed changes.

4.2.1.2.8 Timbisha Shoshone Trust Lands (Federal Action)

The Secretary of the Interior issued a draft report to Congress (DIRS 103470-Timbisha Shoshone Tribe [n.d.], all) describing a plan to establish trust lands for people of the Timbisha Shoshone Tribe in portions of the Mojave Desert in eastern California and southwestern Nevada (See Figure 4-1, Project #6). On November 1, 2000, the President signed Bill S. 2102 (Public Law 106-423) to provide a permanent land base for the Timbisha Shoshone Tribe within its ancestral homeland in five separate parcels. Lands in the designated area for tribal purposes were then identified, including land parcels containing water rights. The parcel near Scottys Junction (about 11 square kilometers [2,800 acres]) is approximately 3.2 kilometers (2 miles) from the proposed Mina rail corridor. The Timbisha Shoshone Tribe is actively evaluating economic development opportunities on this Scottys Junction parcel, although no one is residing there at this time. The Final Legislative Environmental Impact Statement for the Timbisha Shoshone Homeland (DIRS 154121-DOI 2000, all) stated that expected development for the Trust Lands would include a service station/convenience store, a gift/souvenir shop, and single-family detached housing units.

4.2.1.2.9 Department of Justice Proposed Detention Facility

The U.S. Department of Justice Office of the Federal Detention Trustee and the U.S. Marshals Service determined that there is a need to house federal detainees at a facility located in proximity to Las Vegas. In March 2008, the Department of Justice published the *Final Environmental Impact Statement for the Proposed Contractor Detention Facility, Las Vegas, Nevada Area* (DIRS 185475-DOJ 2008, all). The agency preferred alternative identified in the EIS is a 0.49-square-kilometer (120-acre) site approximately

110 kilometers (68 miles) northwest of downtown Las Vegas, in Pahrump at 2250 East Mesquite Avenue (See Figure 4-1, Project #10). Development of the proposed facility would take about 12 to 15 months, and would employ 200 to 250 people.

4.2.1.3 Reasonably Foreseeable Future Non-Federal Actions

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

4.2.1.3.1 Walker River Paiute Reservation

The Walker River Paiute Reservation consists of more than 130 square kilometers (323,000 acres) of land between Yerington, Nevada, and Walker Lake (see Figure 4-1, Project #2). The 2000 census reported a population of 853 on the Reservation. The rural community of Schurz is the only community within the boundaries of the Reservation. Land use on the Reservation consists primarily of open range used for cattle grazing or other agricultural activities. The Department of Defense Branchline from Wabuska extends south through the Reservation to its termination point at the Hawthorne Army Depot.

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

There are transmission lines, pipelines, and telecommunications infrastructure within the Mina region of influence, which holds the potential for wind, solar, and geothermal energy development, although the magnitude and specific locations of these energy development projects are not known. As indicated in Section 4.2.1.2.3, the BLM may issue geothermal leases within the Mina region of influence. The approval of any leases and subsequent development of geothermal resources would be subject to environmental review and would be guided by BLM resource management plans.

The BLM has designated certain corridors in the area that should be used for most utility purposes; however, use of other BLM-administered land requiring new right-of-way grants has traditionally been considered on a case-by-case basis. As previously noted, in October 2007 DOE and the BLM issued the *Draft Programmatic Environmental Impact Statement of the Designation of Energy Corridors on Federal Land in the 11 Western States* (DOE/EIS-0386), which analyzes the potential designation of energy corridors on federal land in western states (DIRS 185274-DOE 2007, all). Proposed energy corridors in the Mina rail corridor region of influence are described in the introductory paragraphs of Section 4.2 and depicted in Figure 4-1.

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

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

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

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

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

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

- Desert Research Institute applied in May 2003 for a right-of-way permit for about 0.01 square kilometers (1.6 acres) of BLM land in the Smokey Valley area of Nye County (DIRS 185367-Seley 2008, all).

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

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

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

4.2.1.3.3 Mining

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

- Nevada Western Silica Corporation holds mining claims for a large, high-grade silica deposit near Lida Junction, south of Goldfield in Esmeralda County. There are at least 24 million cubic meters (32 million cubic yards) of silica onsite. The Mina rail corridor passes within 2.4 kilometers (1.5 miles) of the claims.
- Chemetall Foote Corporation runs an operation in Silver Peak, Nevada, that mines lithium carbonate. The company pumps lithium rich groundwater to the ground surface and then collects the lithium powder as the water evaporates. Chemetall Foote pumps the groundwater onto dry lake beds in the Clayton Valley to facilitate the evaporation process. Once removed from the water, the raw lithium material is processed in an on-site plant into market-ready, lithium-containing products.
- Metallic Ventures Gold holds mining claims near Goldfield in a historic high-grade gold-producing district. The project is currently in the pre-feasibility stage of development.

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

4.2.1.3.4 Walker River Basin Restoration

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

4.2.1.3.5 Monte Cristo's Castle (Proposed State Park) (This has a federal component involving the BLM.)

In 2005, the State of Nevada proposed a new state park near Blair Junction (See Figure 4-1, Project #5). If approved, the park would be known as Monte Cristo's Castle and would highlight the unique geology of the area. As proposed, the park would include approximately 23 square kilometers (5,800 acres) of land just north of the intersection of U.S. Highway 95 and State Route 265 at Blair Junction. As currently envisioned, the proposed park would include hiking areas and interpretive trails with displays about the unique geologic formations in the area. In June 2007, the Nevada State Legislature provided for establishment of the state park, which would be on land currently administered by the BLM. To transfer the land to the State of Nevada for establishment of the state park, the BLM would perform an environmental assessment and other work required as part of the Recreation and Public Purpose Lease process.

4.2.1.3.6 Other Regional Economic Development

Cumulative impacts issues associated with regional economic development actions include socioeconomic effects and overall growth in the region of influence. There are several ongoing or planned regional economic development initiatives in the northern portion of the Mina region of influence. For example, a county-owned airport near the community of Silver Springs, Nevada, plans to expand its operations, pave its runway, and promote the development of nearby industrial parks totaling approximately 3.8 square kilometers (950 acres). Western Nevada Rail Park is approximately 1 kilometer (35 miles) east of Reno along Alternate U.S. Highway 50. When complete, the rail park would include roughly 1 square kilometer (240 acres) of industrial park serviced by the Union Pacific Railroad Mainline. A master-planned community is being developed near the community of Dayton, Nevada. The development contains approximately 12 square kilometers (2,900 acres) consisting of approximately 2,300 single family homes, 0.02 square kilometer (4 acres) of multi-family units, 0.11 square kilometer (27 acres) of commercial land, 1 square kilometer of industrial land, and 0.08 square kilometer (20 acres) for a resort/casino and an improved 1,600-meter (5,400-foot) airstrip. Support infrastructure, including new elementary, middle, and high schools, fire station, municipal water and wastewater utilities, community center, and a health and fitness center, are already in place to support the development. As the Reno and Carson City metropolitan areas continue to grow and expand, additional privately sponsored developments can be expected within the northern portion of the Mina region of influence.

Additionally, major transportation corridors such as U.S. Highway 95 through the Mina region of influence into both the Reno and Las Vegas areas will continue to grow and expand, and present additional regional economic development opportunities. A perceived need for support to the Nevada Test Site has led the Nye County Economic Development Board to designate the Nevada Science and Technology Corridor. The Science and Technology Corridor extends from Indian Springs in Clark County in the south to Tonopah in the north, passing through the Pahrump Valley, Mercury (entrance to the Nevada Test Site), Amargosa Valley, Beatty, and Goldfield, with industrial park and technology initiatives associated with the Tonopah Aeronautics and Technology Park, the Nevada Science and Technology Park in Amargosa Valley, and the Pahrump Center for Technology Training and

Development. The locations and nature of specific future development opportunities are not known and are not considered to be reasonably foreseeable for the purposes of this cumulative impacts analysis.

Nye County has completed a Yucca Mountain Project Gateway Area Concept Plan with proposed activities for the area around the entrance to the proposed repository site (DIRS 182345-Giampaoli 2007, all). This plan presents Nye County's conceptual, multi-phased land-use guidance for communities adjacent to and near the site entrance area. Nye County proposed this plan with the objective that land development would occur in an orderly and consistent manner and to increase opportunities for industrial and commercial development beneficial to the repository program. Nye County views this plan as a starting point for development of the infrastructure, institutional capacity, and facilities to support the proposed repository. The county developed the plan to use and manage existing initiatives while expanding and improving the area. To facilitate Crater Flat development, Nye County will nominate these lands for disposal in the BLM Resource Management Plan amendment process. More information on the Nye County perspective is available in Section 4.4 of this Nevada Rail Corridor SEIS.

4.2.1.3.7 Proposed Future Water-Rights Locations

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

An application (NDWR application number 71204) has been filed for a proposed quasi-municipal water right that would be located in hydrographic area 227a. This water-right location, which has been assigned a status of Ready for Action, Protested, appears to be at the same location as an existing well (J-12), a USGS-cataloged well located in Jackass Flats based on information contained in the NDWR water rights database and location information for well J-12 (DIRS 182821–Converse Consultants 2005, Appendix A). The application indicates that the proposed water-rights location is associated with a previously constructed infrastructure device. The requested diversion rate for this proposed water right is 4.47 million cubic meters (3,620 acre-feet) per year, which is equivalent to an average pumping rate of approximately 8,500 liters (2,224 gallons) per minute; however, the requested annual duty that is identified for this proposed water right in the NDWR water-rights database is 0 acre-feet per year. Section 4.2.2.3.2 evaluates the potential for cumulative impacts associated with this proposed water-rights location.

4.2.2 POTENTIAL CUMULATIVE IMPACTS

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

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

The following analysis of potential cumulative impacts associated with the Mina rail corridor is organized by resource area, with Sections 4.2.2.1 through 4.2.2.12 summarizing potential cumulative impacts in the same order of resource discussions in Chapter 3.

4.2.2.1 Land Use and Ownership

Many of the past, present, and reasonably foreseeable future actions in the Mina region of influence result in land-use changes. Land-use change can also alter land ownership and land-management responsibilities, and preclude future activities from these areas. Most of the land in the Mina region of influence is BLM-administered public land in Lyon, Mineral, Esmeralda, and Nye Counties. The BLM administers more than 45,000 square kilometers (11 million acres) in those four counties. Grazing is a significant land use on public lands in and around the proposed Mina rail corridor. Section 4.2.1 describes existing and proposed projects that could impact land use in the Mina region of influence.

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

4.2.2.1.1 Existing or Potential Land-Use Conflicts

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

Over time, human activity in the area, while relatively minor on a regional basis, has begun to change the natural and traditional conditions, and land-use conflicts occasionally result from this human activity. The Nevada Test Site and Nevada Test and Training Range lands have been withdrawn for special purpose and use. Both of these areas are inaccessible to the general public and land use is that of “dominant use,” in which the specific DOE and U.S. Air Force missions, respectively, for these lands have ultimate priority over all other potential land uses. Hawthorne Army Depot and Naval Air Station Fallon lands were also withdrawn for special use, are inaccessible to the general public, and land use is that of dominant use in which the specific Army and Navy missions, respectively, for these lands have ultimate priority over all other potential land uses. Walker River Paiute Reservation lands are managed by a sovereign tribal government and used by Reservation inhabitants accordingly. Around these primary regional land uses are other uses, including mineral development, recreation, urban development, and rights-of-way for various infrastructure. All of these activities and land uses result from a much more intensive land usage involving human activity.

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

Between 1980 and 2004, there has been an almost 30-percent reduction in authorized animal unit months statewide. Within the Carson City District over that period, animal unit month decreased approximately 13 percent. The Tonopah District experienced the largest decline over that period, at 34 percent (DIRS 176949-Resource Concepts 2001, p. 94; DIRS 185482-U.S. G.A.O. 2005, p. 70). A 2001 study of grazing trends on federal lands in Nevada revealed that one-third of animal unit month reductions were the result of permit violations or for resource protection reasons, including trespass violations, non-payment, exceeding standards or guidelines, carrying capacity estimates, threatened and endangered species conflicts, wildlife conflicts, and wild horse competition (DIRS 176949-Resource Concepts 2001, p. 60). Other reasons for reductions included transfer of ownership and changes in class of livestock grazed.

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

While the number of animal unit months authorized in the state has declined over time, livestock grazing is an important land use, both historically and socioeconomically, to Nevada that will continue on federal lands. Through their respective resource management plans, each BLM district office aims to manage the land to allow grazing in a manner and at levels consistent with multiple use, sustained yield and the standards for rangeland health. As a result, although there are decreases in animal unit months since 1980 levels, there was an increase between 1999 and 2004 in the Carson City District (DIRS 176949-Resource Concepts 2001, p. 94; DIRS 185482-U.S. G.A.O. 2005, p. 70). Subsequently, the authorized grazing levels in the study area may continue to fluctuate based on a variety of factors, including BLM management goals and actions, permittee decisions, wildlife levels and use, and even natural processes, like rainfall levels, spread of invasive species, and wildland fire.

The proposed railroad could reduce animal unit months in the Mina region of influence by less than 2 percent under the Mina corridor (maximum of 190 animal unit months lost over seven active allotments).

Land disturbance from other proposed rights-of-way or projects on federal lands could also reduce animal unit months in the study area, although with the use of best management practices, these reductions would be minimal.

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

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

4.2.2.1.2 Energy and Mineral Development

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

Because of the scope and extent of typical mining operations, mineral resources that become actual operating mines could result in environmental and land-use issues. Within the Mina region of influence, most mining-and energy-development activities would occur on federal lands, and the BLM will have a major role in mitigating and monitoring potential effects through its mining and reclamation requirements, NEPA, and other elements of the regulatory framework. Mineral exploration will continue to occur in many parts of the Mina region of influence, and some level of conflict from mining exploration and development with other land uses could be unavoidable. Today's energy development environment includes a mix of old and new, involving both nonrenewable and renewable resource development. As described in Section 4.2.1.3.2, solar and wind-energy development on BLM-administered lands could be one of the biggest changes in the future landscape. The BLM has received 11 right-of-way permit applications for solar energy facilities in Nye County, totaling approximately 360 square kilometers (90,000 acres).

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

4.2.2.1.3 BLM Land Sales and Other Disposals

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

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

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

4.2.2.1.4 Recreational Land Use

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

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

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

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

4.2.2.1.5 BLM Rights-of-Way

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

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

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

4.2.2.1.6 Other BLM Land-Management Actions

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

Within the context of the Mina region of influence, the BLM planning process and management goals and objectives within BLM plans are key determinants of the compatibility of the proposed Mina rail corridor with other projects in region of influence. As noted in Section 4.2.1, there are many continuing and reasonably foreseeable activities that involve the BLM. Because the BLM is and will remain the major land manager in and around the Mina region of influence, BLM land-management goals, objectives, and subsequent land-management actions will largely determine if and how new projects and activities occur.

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

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

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

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

4.2.2.1.7 Urbanization and Economic Development Initiatives

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

4.2.2.1.8 Land Use and Ownership Conclusion

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

4.2.2.2 Air Quality

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

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

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

Existing projects that contribute to air quality impacts include operations at the Nevada Test Site, Nevada Test and Training Range, and Naval Air Station Fallon. The construction of proposed projects, including the repository and the proposed Department of Justice detention facility, could contribute to temporary impacts to air quality. The operation of some proposed projects, such as the Toquop power plant, could contribute to impacts to air quality.

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

4.2.2.3 Hydrology

4.2.2.3.1 Surface-Water Resources

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

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

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

As a linear project up to 450 kilometers (280 miles) long within the proposed Mina rail corridor, the proposed railroad would pose new surface drainage challenges because of the existing characteristics of terrain, topography, soils, and physical features. Construction activities that could temporarily block surface drainage channels include moving large amounts of soil and rock to develop the rail roadbed (subgrade) and constructing temporary access roads to reach construction initiation points and major structures, such as bridges, and to allow movement of equipment to construction initiation points.

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

4.2.2.3.1.2 Wetlands. The Department of Defense Branchline is south of the Walker River west of the town of Schurz. All Schurz alternative segments must connect to that branchline west of Schurz and cross the river to avoid the town and proceed to the east of Walker Lake. The wetlands along this reach of the Walker River are too wide to be completely spanned; therefore, DOE would have to place bridge piers in the wetlands. DOE would minimize impacts by constructing a bridge over the Walker River and its associated wetlands. The bridge would be about 300 meters (1,000 feet) long with 12-meter (40-foot) pier spacing. The only permanent fill would be the concrete pilings required to support the bridge piers. Using these methods, the only permanent fill or loss of wetlands would be a total of about 20 square meters (0.005 acre) for emplacement of about 10 piers in wetlands for Schurz alternative segments 1 and 4, or 28 square meters (0.007 acre) for emplacement of about 14 piers for Schurz alternative segments 5 and 6. By maximizing avoidance in this way, DOE would avoid filling of wetlands to the maximum extent practicable. There are no practicable design or construction options that would allow DOE to completely avoid impacting wetlands in the Mina rail corridor.

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

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

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

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

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

4.2.2.3.2 Groundwater Resources

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

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

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

It is estimated that a railroad in the proposed Mina rail corridor would use up to about 7.32 million cubic meters (5,950 acre-feet) of water during the construction phase, with about 80 percent of that water use occurring in the first 2 years of construction. About 23,000 cubic meters (17 acre-feet) of water would be needed annually during the operations phase. DOE would obtain water for railroad construction and operations from proposed new wells installed in various water basins along the rail corridor.

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

A number of scenarios have been developed to assess the potential effects of the proposed railroad's contribution to cumulative water demand in the Mina region of influence. Groundwater would need to be appropriated in 18 hydrographic areas. The assumption used for developing these scenarios is that water demands for railroad construction and operations along the Mina rail line would be met through installing and withdrawing groundwater from new wells, with pumping in individual wells at a constant rate occurring primarily over 9 months to support all rail line construction water needs, over 2 to 3 years at quarry sites, and over the railroad operations phase for facilities.

Depending on the specific combination of alternative segments, total water withdrawals associated with the proposed railroad could exceed annual perennial yield values for hydrographic areas 123, 144, and 229, and could be as high as 48 percent, 57 percent, 82 percent, 87 percent, and 99 percent of the annual perennial yield in hydrographic areas 145, 228, 110A, 121B, and 227A, respectively. In other areas, water withdrawals associated with the railroad would range from less than 1 percent to as high as approximately 28 percent of the annual perennial yield value.

The three applications (NDWR Application Numbers 74816 through 74818) that have been filed for commercial and mining and milling water rights that would be located in hydrographic area 229 are outside the region of influence considered for the new railroad wells proposed in hydrographic area 229 (Section 4.2.1.3.7). For this reason, no cumulative impacts would be expected to occur if these proposed water rights were to be approved and placed into operation at the same time as the proposed railroad wells in hydrographic area 229.

NDWR Application Number 71204, which has been filed for a proposed quasi-municipal water right that would be located in hydrographic area 227A, appears to be at the same location as an existing well (J-12) located in Jackass Flats and the application indicates that the proposed water-rights location is associated with a previously-constructed infrastructure device (Section 5.2.1.3.7). The J-12 well is proposed for use in supplying to the repository and to support rail alignment construction in hydrographic area 227A and granting of separate and distinct water rights simultaneously for the repository/railroad construction and for quasi-municipal use is considered very unlikely (to impossible) to occur given the established State Engineer’s water-rights approval process in Nevada. For this reason, it is considered very unlikely to impossible that there could be a cumulative impact associated with this proposed water-rights location.

By utilizing a combination of one or more specific approaches or methods to obtain water for construction (including methods that are tailored to a hydrographic area’s unique groundwater conditions), potential cumulative impacts to groundwater resources would be minimized. New groundwater withdrawals could, depending on a number of site-specific factors, cause some decrease in the amount of water that might be available to an existing well having a water right, an existing domestic well, an existing spring or seep discharge, or other existing surface-water-right location or downgradient groundwater basin. These factors include the withdrawal rate at the proposed new well location; hydrogeologic conditions present at the proposed pumping location and in the surrounding area; the location and characteristics of nearby groundwater resource features; and (for some locations) the timing of the proposed groundwater withdrawals with respect to the timing of existing pumping operations. Best management practices, including restricting the average groundwater withdrawal rate at some proposed well locations, using existing wells to obtain the amount of water needed (that is, by purchasing water) at some locations, or using other proposed groundwater-supply wells in the same general area for obtaining the required amount of water, would be implemented as required to minimize or avoid such impacts.

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

4.2.2.4 Biological Resources and Soils

4.2.2.4.1 Habitat Loss and Fragmentation

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

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

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

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

The Hawthorne Army Depot has an Integrated Natural Resources Management Plan (DIRS 182761-Larson 2007, all), which is being used to ensure that natural resource conservation and Army mission activities are integrated and are consistent with federal stewardship requirements on mission lands. The plan describes an ecosystem management approach that provides guidance to avoid the impacts of habitat loss and fragmentation, conserve biodiversity, and improve and enhance natural resource integrity while supporting sustainable economies and communities.

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

4.2.2.4.2 Invasive Species and Noxious Weeds

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

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

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

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

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

4.2.2.4.3 Special Status Species

Habitat for several special status species would be disturbed and several of those special status species could be harmedas a result of constructing and operating the proposed railroad in the Mina rail corridor. Through the NEPA and permitting processes, each proposed project and land-management planning effort in the Mina region of influence will face challenges for the protection of various special status species. There are a number of special status species that could be affected by cumulative impacts in the Mina region of influence. Recent attention has focused on several specific species, including the desert tortoise (*Gopherus agassizii*) and Lahontan cutthroat trout, as discussed below.

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

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

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

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

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

4.2.2.4.4 Known or Potentially Contaminated Soils

The major sources of existing soil contamination problems in the Mina region of influence are mining, the Nevada Test Site, and the Hawthorne Army Depot. There have been mining activities in the region for many years, and most wastes resulted from past operations when there was little regulatory framework requiring waste management and clean-up.

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

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

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

The Hawthorne Army Depot has an Installation Restoration Program that outlines proposed future investigations and remedial actions at each Solid Waste Management Unit and other areas of concern at the installation. There are soil and groundwater contamination issues, with the primary contaminants of concern being compounds associated with explosives and heavy metals. Environmental restoration and remediation is ongoing at a number of sites. Other sites have achieved the status of no further remedial action planned. Contaminated areas on the Hawthorne Army Depot are generally defined and access is restricted for reasons of safety and security.

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

4.2.2.4.5 Wildfires

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

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

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

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

4.2.2.4.6 Biological Resources Conclusion.

The cumulative impacts to biological resources from the proposed railroad and other existing and reasonably foreseeable projects could be small to moderate. As described above and in Chapter 9 of the Repository SEIS and Chapter 7 of the Rail Alignment EIS, mitigation measures would be implemented during the construction and operations phases to address impacts related to habitat loss and fragmentation, the introduction and spread of invasive species and noxious weeds, and the increased likelihood of wildfires. All existing and proposed projects, federal, state, or private, are subject to regulations that protect special status species, and protective habitat conservation plans are already underway for many of the proposed projects in the Mina rail corridor region of influence. The BLM administers most of the lands in the Mina rail corridor region of influence and has programs in place to minimize impacts to biological resources.

4.2.2.5 Cultural Resources

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

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

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

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

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

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

4.2.2.6 Occupational and Public Health and Safety

4.2.2.6.1 Nonradiological Health and Safety

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

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

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

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

From a transportation safety standpoint, railcars loaded with live munitions currently travel between Wabuska, Nevada, and the Hawthorne Army Depot. Under the Proposed Action, health and safety risks associated with accidents involving these railcars would be reduced as the trains would be routed away from the populated community of Schurz on the Walker River Paiute Reservation.

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

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

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

4.2.2.6.2 Radiological Health and Safety

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

Under assumed conditions, there is a small risk of radiological impacts to workers and the general public from external radiation exposure during normal operations and incident-free transportation. Staff at the Nevada Test Site and the Yucca Mountain Repository would be separate, and it is not anticipated that there would be any cumulative exposures to workers from both operations. The modes of transportation of radioactive wastes for the Nevada Test Site (shipment by truck) and the Yucca Mountain Repository (shipment by rail) would differ.

The Repository SEIS is evaluating the reasonably foreseeable scenarios for Inventory Modules 1and 2. The capacity of the proposed repository is statutory-limited to 70,000 metric tons (77,000 tons) of heavy metal of spent nuclear fuel and high-level radioactive waste, and any other waste that would not be accepted by the proposed repository would be evaluated in a separate analysis. Regardless of the number of shipments, the proposed railroad construction and operations would not be affected. The radiological risk relationships among the repository, the proposed Mina rail corridor, and Nevada Test Site operations are summarized below.

As part of the Repository SEIS process, DOE estimated that, under assumed conditions, 8.1 and 12 latent cancer fatalities for repository workers 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.

The projected population within the repository region of influence is 120,000 people. The region of influence for the Yucca Mountain Repository extends 84 kilometers (52 miles) to the northwest from the repository site boundary along the rail corridor, approximately to Scottys Junction; the remainder of the Mina rail corridor is outside of the Yucca Mountain Repository region of influence. Population within the area where the rail corridor region of influence and the Yucca Mountain Repository region of influence coincide (between the repository boundary and the Scottys Junction area) would receive radiation dose from both the repository and from railroad operations.

For members of the public, DOE estimated that, under assumed conditions, 18 and 27 latent cancer fatalities could result from 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.

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

4.2.2.7 Socioeconomics

The economy in the Mina region of influence has traditionally been based on mineral development, military operations and support, and livestock grazing. These activities will continue to be the primary economic drivers in the Mina region of influence. Additionally, the expansion of the Reno and Carson City metropolitan areas in the northern reaches of the Mina region of influence will continue to occur, providing additional economic inputs. While the proposed railroad would be a major development in the Mina region of influence, its long-term economic development potential would be limited and would primarily be related to construction activities. If the Shared-Use Option were chosen and implemented, there would be greater potential for positive economic development benefits compared to the Proposed Action.

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

The potential future land disposals identified in Section 4.2.2.1.4, if implemented by the BLM, could have the potential to provide land for private-sector projects such as housing, industrial or commercial facilities, or other developments.

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

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

Population projections are always subject to change with new information, and the Nevada State Demographer incorporates foreseeable economic development into the population projections.

Nye County's projected growth continues a recent trend, with growth in Pahrump very evident over the past several years. Growth in Pahrump is being driven by low-cost land, proximity to the Las Vegas metropolitan area, and relocation of retirees to the area. Growth in Nye County is also directly linked to existing and future Yucca Mountain Site operations. Nye County may also develop the Crater Flat area, resulting in potential new employment. See Section 4.4 for more information on the Nye County perspective.

Growth in Lyon County is due largely to its proximity to Carson City and Reno.

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

As discussed in Section 3.2.7, Socioeconomics, DOE used an economic model to estimate the potential socioeconomic impacts of the proposed railroad (DIRS 182251-REMI 2007, all). The model includes consideration of construction and operations employment and wages, project-related spending, and other parameters that could affect the socioeconomic environment. The model included a future baseline of socioeconomic parameters that would represent a cumulative impacts baseline without a railroad in the proposed Mina rail corridor.

Consistent with the methodology established in the Yucca Mountain FEIS (DIRS 155970-DOE 2002, p. 4-43), most of the construction workers for the proposed railroad are assumed to be residents of Clark County. This assumption is made because the construction sectors in Nye, Esmeralda, Lyon, and Mineral Counties are not large enough to provide enough workers for construction activities. Under this scenario, Clark County is projected to attain the largest levels of construction-related employment, income, and spending effects from the proposed project, followed by Mineral, Nye, Esmeralda, and Lyon Counties. Mineral County would experience the largest employment percentage increase during the construction phase, with an estimated increase of about 6 percent above baseline conditions. The socioeconomic analysis also considers a second scenario, which assumes that half of the construction workers for the Mina rail corridor reside in the combined Washoe County-Carson City area, and the other half reside in Clark County. This second scenario is considered because Washoe County and Carson City may be more likely than Clark County to supply construction workers for the northern portions of the Mina rail corridor. Under this second scenario, the beneficial economic effects on Clark County would be reduced, while the Washoe County-Carson City area would gain some of these beneficial aspects of the proposed railroad. In any case, the overall effects of the proposed Mina rail corridor project on the Clark County or Washoe County economies would still be relatively small.

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

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

Strains on housing infrastructure during the construction phase would not be anticipated because most construction workers could be housed in construction camps at strategic locations along the Mina rail corridor, rather than in nearby communities. Contractors might elect to use commercially available facilities to house construction personnel at locations such as Hawthorne, Tonopah, Goldfield, Beatty, and Pahrump.

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

The road network in the Mina region of influence consists generally of two-lane highways and unpaved roads. U.S. Highway 95 is the major north-south highway in the region of influence. In rural, less populated parts of the Mina region of influence, roads are adequate to handle existing and projected future traffic flow. However, the array of new and proposed activities throughout the Mina region of influence would have the potential to strain parts of the existing roadway infrastructure. There could be some traffic delays at existing rail-highway grade crossings, and grade separation might be necessary at some crossings in Churchill, Lyon, and Mineral Counties. However, cumulative traffic levels in the region would likely continue to increase as overall regional growth and development occurs.

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

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

4.2.2.8 Noise and Vibration

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

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

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

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

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

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

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

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

4.2.2.9 Aesthetic Resources

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

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

Visual resources within the Mina region of influence have been considered through application of the BLM visual resource management system. The BLM uses this system to identify and classify BLM-administered lands within established visual resource management objectives, and evaluates proposed activities within the visual resource management system framework to consider consistency with the visual resource management objectives. Without restoration and reclamation efforts, ground disturbances in the regional environment would last for long periods with restoration and reclamation, in some places, it could take several years for vegetation patterns to be indistinguishable from surrounding undisturbed areas. The magnitude and extent of potential impacts to visual resources would vary based on the number of viewers affected, distance and atmospheric conditions of viewing, degree of visual contrast compared to existing visual attributes, viewer sensitivity to the visual changes, and compatibility with existing land uses. The BLM generally requires disturbed areas be restored and reclaimed as part of project approval.

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

There would be no known interactions of the proposed railroad with other reasonably foreseeable activities that would affect a Class I or Class II area in the Mina rail corridor region of influence. The proposed railroad would, however, cause small to moderate impacts to a small proportion of the Class III and Class IV land near the Tonopah, Beatty, and Armargosa Valley areas visible from Highway 95 in the vicinity of a number of proposed solar and wind projects (see Section 4.2.1.3.2). The cumulative impacts to aesthetic resources caused by the proposed project and these reasonably foreseeable projects in this area would likely be consistent with the BLM management objectives for these low-visual-value areas. The cumulative impacts to aesthetic resources from the proposed railroad and other existing and reasonably foreseeable projects could be small to moderate in the Mina region of influence because of the potential impacts to the Class III and IV land.

4.2.2.10 Utilities, Energy, and Materials

4.2.2.10.1 Utilities

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

Many regional activities, including the proposed railroad, would increase demands on public water systems, wastewater systems, telecommunications systems, electric power systems, and other utilities. As described in Section 4.2.1.3.2:

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

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

4.2.2.10.2 Energy and Materials Usage

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

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

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

4.2.2.10.3 Utilities, Energy, and Materials Conclusion

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

4.2.2.11 Waste Management

4.2.2.11.1 DOE Waste-Management Activities

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

- Area 5 occupies 2.9 square kilometers (720 acres) and is in Frenchman Flat north of Mercury, Nevada.
- Area 3 occupies 0.52 square kilometer (130 acres) north of Mercury in Yucca Flat.

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

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

4.2.2.11.2 Sanitary and Construction Wastes

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

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

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

4.2.2.11.3 Hazardous Materials and Waste Conclusion

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

4.2.2.12 Environmental Justice

4.2.2.12.1 Potential Effects to Low-Income and/or Minority Populations

Environmental justice impacts result when high and adverse human-health or environmental impacts fall disproportionately on low-income and minority populations. If high and adverse impacts are found to have disproportionate impacts on environmental justice populations as compared to the general population of the area, the impacts would be mitigated to the extent practicable by the federal agencies involved in the proposed action. See Section 3.2.12.1 for a discussion of the environmental justice methodology.

Based on individual and group values, beliefs, and goals, there is a difference in perspective as to the potential effects of activities in the Mina region of influence on low-income and/or minority populations among the different stakeholders and other interested parties. *American Indian Perspectives on the Proposed Rail Alignment Environmental Impact Statement for the U.S. Department of Energy's Yucca Mountain Project* (DIRS 174205-Kane et al. 2005, all), prepared by the American Indian Writers Subgroup of the Consolidated Group of Tribes and Organizations, discusses cultural resources, American Indian values and their relationship to environmental justice, and broader American Indian values. DOE considers the American Indian Writers Subgroup conclusions to be responsible opposing viewpoints for purposes of its environmental justice responsibilities.

The largest concentration of low-income or minority populations along the Mina rail corridor occurs in Mineral County and on the Walker River Paiute Reservation. The corridor would cross American Indian tribal lands, with the three Schurz bypass options almost entirely on the Walker River Paiute Reservation (DIRS 180222-BSC 2006, pp. 15 and 16). There are approximately 1.4 square kilometers (350 acres) of Reservation lands in the corridor (DIRS 180222-BSC 2006, p. 15). The population of the Reservation, estimated to be 853 in 2000, is low income and consists mainly of American Indians, a minority population. The poverty rate in Mineral County is 15 percent, which exceeds the rate of poverty (11 percent) in the State of Nevada, while the poverty rate of Walker River Paiute Reservation residents is 32 percent, nearly three times the rate of poverty in the state. The only moderate or large impacts that were identified relate to noise impacts from construction. These impacts would not occur on the Walker River Paiute Reservation; therefore, there would be no high and adverse effects that would disproportionately affect a low-income or minority community, and there are no special pathways that would result in disproportionately high and adverse effects to low-income or minority communities.

DOE has concluded that there are no identifiable human-health or environmental impacts associated with the proposed railroad that are high and adverse and that would disproportionately affect low-income or minority populations, nor has the Department identified any special pathways for impacts (such as subsistence hunting and gathering) in the Mina region of influence. If, during the development of the inventory described in Section 4.3.13.4 of the Rail Alignment EIS, additional cultural resources related primarily to American Indian interests were discovered that could not be avoided, then the magnitude of environmental justice impacts might also be larger and disproportionately high and adverse. Similarly, if during development of ethnographic studies described in Section 3.4.5 of the Rail Alignment EIS, special pathways were identified, then the magnitude of environmental justice impacts might be larger. Other existing and reasonably foreseeable projects do not appear to have disproportionately high and adverse impacts to low-income or minority populations, but cumulative impacts of all projects, including cultural impacts, are uncertain.

4.3 Unavoidable Adverse Impacts/Irretrievable Commitments of Resources

This section addresses unavoidable adverse impacts that could remain after the application of mitigation measures, the relationship between short-term uses of the human environment and the maintenance and enhancement of long-term productivity, and potentially irreversible or irretrievable commitments of resources for the Mina rail corridor.

4.3.1 UNAVOIDABLE ADVERSE IMPACTS

This section summarizes potential impacts associated with construction and operation of a railroad in the Mina rail corridor that could be unavoidable and adverse and that could remain after DOE implemented mitigation measures.

4.3.1.1 Land Use and Ownership

Railroad construction and operation in the Mina rail corridor could result in altered access to some private land holdings, land associated with the Walker River Paiute Reservation, the Hawthorne Army Depot, ***unpatented mining claims***, rights-of-way, and grazing allotments (through loss of forage and grazing footprint).

4.3.1.2 Air Quality

Railroad construction in the Mina rail corridor would result in temporary increases in ***criteria pollutants***, mainly fugitive dust. Railroad operations would result in small increases in criteria air pollutants.

4.3.1.3 Hydrology

Railroad construction in the Mina rail corridor could alter natural surface-water drainage patterns. Impacts associated with the alteration of drainage patterns or changes to erosion and sedimentation rates or locations would be small and localized. In addition, construction could require the withdrawal and use of groundwater. In many areas the rail line could cross, other uses or commitments of groundwater resources would approach or exceed the perennial yields of the underlying groundwater basins. This would potentially be a small and adverse, although not permanent, impact.

4.3.1.4 Biological Resources and Soils

Railroad construction in the Mina rail corridor could cause habitat loss and the loss of small numbers of individual plants and animals. Disturbed soils could result in increased erosion during the construction phase, even with the implementation of best management practices.

4.3.1.5 Cultural Resources

Although DOE would implement best management practices and mitigation measures related to cultural resources, grading and other construction activities could degrade, cause the removal of, or alter the setting of archaeological sites or other cultural resources and cause the loss of archaeological information in the Mina rail corridor.

4.3.1.6 Socioeconomics

Population growth associated with railroad construction and operations in the Mina rail corridor could result in additional infrastructure and public services needs. This probably would occur in the communities with the largest labor pools and where the workers resided permanently – the Reno and Las Vegas areas.

4.3.1.7 Noise and Vibration

During the construction phase, noise levels at locations such as Goldfield would be noticeable, and could approach or potentially exceed Federal Transit Administration or Federal Housing Authority construction noise guidelines during events such as rock blasting. This unavoidable impact would be temporary. Railroad operations along the Mina rail corridor could lead to an unavoidable, but small increase in ambient noise from passing trains in residential areas near Silver Peak, Mina, and Goldfield. No unavoidable adverse impacts associated with vibration are expected for either the construction or operations phases.

4.3.2 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

Railroad construction could lead to a long-term loss of productivity in disturbed areas along the Mina rail corridor. In the context of transportation, long-term refers to the period of environmental recovery after the end of the construction phase or the active use of a transportation route for purposes supporting the Yucca Mountain Repository.

The land-cover types along the Mina rail corridor are widely distributed in the region. A loss of vegetation and grazing forage from a disturbed area in the corridor would have little effect on the regional productivity of plants and animals.

Productivity loss for soils would be limited to areas affected by land clearing and construction. These areas would not be available for revegetation and habitat for some time. Disturbed areas would recover, however, and eventually would return to pre-disturbance conditions, although the process of recovery would be slow in the arid environment.

4.3.3 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

Railroad construction would result in some irretrievable or irreversible commitments of resources. Many resources could be retrievable at a later date through such actions as removing roadbeds, revegetating land, and recycling materials. Land uses could change in the rail corridor until railroad operations were complete, thereby limiting or eliminating other land uses for that period. However, at the end of the operations phase land along the corridor could revert to public or private ownership.

The loss of cultural resources would result in an irretrievable commitment of resources. Mitigation approaches involving the recovery of archaeological resources before construction activities degraded the sites would reduce the finite number of such resources in the Yucca Mountain region. However, the context of the sites would be destroyed.

DOE would use about 125 million liters (33 million gallons) of diesel fuel and 2.5 million liters (0.66 million gallons) of gasoline in Nevada during the construction phase (DIRS 180877-Nevada Rail Partners 2007, p. 2-7). This would be about 0.6 percent of the annual motor fuel consumption in the state. Construction use of diesel fuel would be about 2.2 percent of annual consumption. Operational use of motor fuel by locomotives would be a very small fraction of Nevada motor fuel use.

4.4 Nye County Viewpoint

The viewpoints of the City of Caliente, Esmeralda County, and Lincoln County are provided in Chapter 7 of the Rail Alignment EIS. The text in this section, related to cumulative impacts, was provided by Nye County, and DOE has inserted the county's text verbatim in this Nevada Rail Corridor SEIS and in Chapter 5 of the Rail Alignment EIS. Nye County has also provided its viewpoints on mitigation, which are provided in Chapter 7 of the Rail Alignment EIS.

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

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

Nye County prefers the mostly rail transport of waste and a phased construction schedule in which DOE would construct the rail line and upgrade roads in the vicinity of Yucca Mountain prior to the beginning of repository construction. Nye County also prefers a through-going route with shared use. From the Nye County perspective, impacts, both beneficial and adverse, associated with the proposed transportation alternatives would be cumulative. To remind the reader, according to Section 1508.7 of NEPA, "cumulative impacts" are impacts on the environment that result from incremental impacts of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

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

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

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

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

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

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

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

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

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

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

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

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

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

5. NEW INFORMATION REGARDING OTHER RAIL CORRIDORS

This chapter summarizes environmental information from the Yucca Mountain FEIS regarding the Carlin, Jean, and Valley Modified rail corridors, provides updated information on these corridors as appropriate, and considers the effect of any changes on the potential environmental impacts of the Carlin, Jean, and Valley Modified rail corridors. This chapter also describes present and reasonably foreseeable actions that would affect direct, indirect, and cumulative impacts in the regions of influence for these rail corridors.

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

5.1 Introduction

In the Amended Notice of Intent dated October 13, 2006, the U.S. Department of Energy (DOE or the Department) announced that it would update as appropriate 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; DIRS 155970-DOE 2002, all) information and analyses for the Carlin, Jean, and Valley Modified ***rail corridors*** to determine if there are significant new circumstances or information relevant to environmental concerns (71 *Federal Register* [*FR*] 60484). The Department has eliminated the Caliente-Chalk Mountain rail corridor, which would intersect the Nevada Test and Training Range, from further review because of U.S. Air Force concerns that a rail line on the Range would interfere with the Air Force mission and objectives (DIRS 182772-MTS 2007, p. 9). For clarity, any options in the Carlin, Jean, and Valley Modified rail corridors that would cross onto the Nevada Test and Training Range are depicted in figures with dashed lines. Additionally, DOE has informed the Timbisha Shoshone Tribe that any corridor options that would cross Timbisha Shoshone Trust Lands have been eliminated from consideration (DIRS 174558-Sweeney 2004, all).

5.1.1 GENERAL METHODOLOGY

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

Since DOE completed the Yucca Mountain FEIS, the design and plans for the construction of a rail line within the Caliente rail corridor have advanced (see Section 2.2.3). The advanced Caliente rail design and plans provide a basis for updating information about and estimating environmental impacts for the other corridors analyzed in the Yucca Mountain FEIS. The approach DOE used to estimate changes in environmental impacts for the Carlin, Jean, and Valley Modified rail corridors is based on primary impact indicators. A primary impact indicator is the most important contributor or parameter used to determine the impacts of a particular environmental resource area. To update the information on the Carlin, Jean, and Valley Modified rail corridors, parameters that describe corridor characteristics (such as length of corridor and earthwork quantities) derived from Caliente rail alignment analyses provided ratios to estimate the data at a corridor level.

In addition, DOE updated the baseline environmental conditions for each resource area through the collection of federal, state, and local data commensurate with the information in the Yucca Mountain FEIS for the Carlin, Jean, and Valley Modified rail corridors. Using updated affected environments as the new baselines, while considering the evolution of engineering and design changes, DOE evaluated how the magnitude and range of potential impacts might have changed from those reported in the Yucca Mountain FEIS. DOE also considered present and reasonably foreseeable actions that would affect direct, indirect, and cumulative impacts within the regions of influence for these rail corridors.

Sections 5.1.1.1 through 5.1.1.12 describe the general approach DOE used to update the environmental conditions for each resource area for the Carlin, Jean, and Valley Modified rail corridors.

5.1.1.1 Land Use and Ownership

In the Yucca Mountain FEIS, DOE determined that an evaluation of impacts to land use and ownership should identify the current ownership of the land that its activities could disturb, and the present and anticipated future uses of the land. The Yucca Mountain FEIS defined the ***region of influence*** for impacts to land use and ownership as land areas that would be disturbed or whose ownership or use would change as a result of constructing and operating a railroad. In the Yucca Mountain FEIS, DOE evaluated land-use and ownership within the 400-meter (0.25-mile)-wide corridor. The update in this Nevada Rail Corridor SEIS used the same region of influence. Based on these criteria, DOE evaluated the potential impacts to land use and ownership from the construction and operation of the railroad. The Bureau of Land Management (BLM) manages most of the public lands through which the Carlin, Jean, and Valley Modified rail corridors would pass. Traditional land uses in most of the areas that would be directly and indirectly affected include grazing, mining, energy development, general recreation, utility rights-of-way, and wildlife management. Much of this land is not extensively disturbed, although it has been modified through activity such as grazing and mining.

Some BLM-administered lands have special designations that identify their uses or why they have been set aside. These include Wildlife Habitat Management Areas, Areas of Critical Environmental Concern, Wilderness Areas, and Wilderness Study Areas. Public lands in the Mina region of influence provide a number of diverse recreation opportunities, and the BLM has designated certain lands as Special Recreation Management Areas.

Most of the land encompassing the Carlin, Jean, and Valley Modified rail corridors is BLM-administered public land. Each BLM field office manages lands within its administrative boundaries according to one or more management framework plans or resource management plans. In addition to BLM-administered land, the range of potentially affected land ownership includes private land holdings (including land designated for commercial development), other federal lands (DOE lands, U.S. Department of Defense lands), and American Indian trust lands and reservations.

To evaluate land use and ownership in the Carlin, Jean, and Valley Modified rail corridors, DOE obtained data from the latest editions of BLM Master Title Plats and online land record databases, such as BLM LR2000 (DIRS 182772-MTS 2007, p. 66). The Department also evaluated county and state land records and information from other federal agencies, universities, or commercial developments.

5.1.1.2 Air Quality

The update to air quality information includes changes in attainment status for the counties through which the Carlin, Jean, and Valley Modified rail corridors would pass. As in the Yucca Mountain FEIS, DOE defined the regions of influence for air quality as the air basins through which the corridors would pass. To update this air quality information, DOE obtained data from the Nevada Bureau of Air Quality to determine attainment status for counties that could be affected, and used the same qualitative methods as the Yucca Mountain FEIS. Areas in violation of one or more of the ***criteria pollutant*** standards are classified as ***nonattainment areas***. If there are not enough air quality data to determine the status of a remote or sparsely populated area, then the U.S. Environmental Protection Agency lists the area as unclassifiable. Unclassifiable areas are considered to be in attainment.

The region of influence includes the air basins in the vicinity of sources of criteria pollutant emissions that could be affected during railroad construction and operations. In particular, the air basins of the Las Vegas Valley (for ***particulate matter*** with aerodynamic diameters equal to or less than 10 micrometers [***PM_{10}***] and ***carbon monoxide***) and the Pahrump Valley (for PM_{10}) where criteria pollutant concentrations are already an issue. If nonattainment or maintenance areas are not identified, detailed estimates of emission rates or comparisons to threshold levels for conformity were not made.

5.1.1.3 Hydrology

The Yucca Mountain FEIS analyzed surface-water resources within the 400-meter (0.25-mile)-wide corridor and within 1 kilometer (0.6 mile) of each side of the corridor. For this Nevada Rail Corridor SEIS, the region of influence for surface water, including springs, is the same as the Yucca Mountain FEIS. Information for this update was obtained from (1) the National Hydrography Dataset Waterbody geospatial data that the U.S. Geological Survey developed in cooperation with U.S. Environmental Protection Agency; (2) the Geographic Names Information System Nevada geospatial database developed by the U.S. Geological Survey and the BLM; and (3) the National Wetlands Inventory database managed by the U.S. Fish and Wildlife Service (DIRS 182772-MTS 2007, p. 66).

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

5.1.1.4 Biological Resources and Soils

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

DOE obtained location records for special status species from a statewide database managed by the Natural Heritage Program (DIRS 182772-MTS 2007, p. 67) that contains records of observations of rare or protected plants, fish, and wildlife species. Other information sources included (1) the *Carson City Field Office Consolidated Resource Management Plan* (DIRS 179560-BLM 2001, all); (2) the *Tonopah Resource Management Plan and Record of Decision* (DIRS 173224-BLM 1997, all); (3) the *Biological Field Findings Report for Potential Rail Alignments along the Mina Route* (DIRS 182760-URS Corporation/Potomac-Hudson Engineering 2006, all); and (4) the *Mina Rail Route Feasibility Study*

(DIRS 180222-BSC 2006, all). DOE obtained additional information from the National Hydrography Dataset Waterbody geospatial data that the U.S. Geological Survey developed in cooperation with the U.S. Environmental Protection Agency, the Geographic Names Information System Nevada geospatial database, and BLM Wild Horse and Burro Management Area Maps (DIRS 182772-MTS 2007, p. 67).

5.1.1.5 Cultural Resources

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

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

5.1.1.6 Occupational and Public Health and Safety

The update for occupational and public health and safety focuses on traffic, worker industrial safety, incident-free radiological and nonradiological impacts, and radiological impacts related to accidents. Since DOE completed the Yucca Mountain FEIS, there have been updates to the methods and data to estimate the radiation doses for workers and members of the public (DIRS 182757-MTS 2007, all). The impacts for the Carlin, Jean, and Valley Modified rail corridors reflect new information, as described in Section 3.2.6 of this Nevada Rail Corridor SEIS.

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

The region of influence for each includes:

- Traffic impacts: The 400-meter (0.25-mile) width of the corridor and public highways used by workers and for shipments during construction and operations.
- Worker industrial safety impacts: The 400-meter-wide rail corridor.
- Incident-free radiological and nonradiological impacts: The 800-meter (0.5-mile) area on either side of the centerline of the rail corridor.
- Radiological impacts with respect to accidents: An area within an 80-kilometer (50-mile) radius from a potential occurrence location in the rail corridor.

DOE obtained information from the Bureau of Labor Statistics for 2005, and used the RADTRAN 5 computer program (DIRS 150898-Neuhauser and Kanipe 2000, all; DIRS 155430-Neuhauser, Kanipe, and Weiner 2000, all) and the RISKIND computer program (DIRS 101483-Yuan et al. 1995, all) where applicable.

5.1.1.7 Socioeconomics

The update to information on socioeconomics includes changes to the employment and population baselines for the three corridors. The region of influence for this update is the Nevada counties through which the corridors would pass, and the two areas where most workers would be expected to reside (the Carson City/Washoe County area and Clark County).

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

5.1.1.8 Noise and Vibration

To assess and update the baseline conditions for noise and vibration, DOE reviewed the input parameters used for the noise and vibration analysis in the Yucca Mountain FEIS. This included the population within the region of influence for noise and vibration, relevant noise standards, and the frequency and number of trains. DOE has updated the criteria to determine the level of potential impacts from noise and vibration. For noise impacts from construction activities, DOE used U.S. Department of Transportation, Federal Transit Administration, methods (DIRS 177297-Hanson, Towers, and Meister 2006, all) and construction noise guidelines. For operation of trains during the construction and operations phases, DOE analyzed noise impacts under established Surface Transportation Board (STB) criteria (49 Code of Federal Regulations [CFR] 1105.7e(6)). To evaluate potential vibration impacts from construction and operations activities, DOE used Federal Transit Administration building vibration damage and human-annoyance criteria (DIRS 177297-Hanson, Towers, and Meister 2006, all). This update assessed the distance of the rail line from communities along the rail line and estimated the noise impacts from railroad construction and operations to these communities. For the update to impacts from vibration, DOE considered typical background levels of ground vibration, the number of trains, and the distance of the rail line from historic structures or sites of cultural significance. The updated criteria for noise and vibration do not affect the level of impacts presented in the Yucca Mountain FEIS.

5.1.1.9 Aesthetics

Consistent with the Yucca Mountain FEIS, the region of influence for aesthetics in this Nevada Rail Corridor SEIS is based on a 400-meter (0.25 mile)-wide corridor and its ***viewshed***. This update considered changes to the visual sensitivity ratings of viewsheds in Nevada and the BLM visual resource management system objectives as described BLM Handbook H-8431-1, *Visual Resource Contrast Rating* (DIRS 173053-BLM 1986, all). DOE reviewed BLM plans, including the Elko Resource Management Plan, the Las Vegas Resource Management Plan, and the Tonopah/Battle Mountain Resource Management Plan. The analysis of potential impacts on aesthetic resources considered BLM ratings for both federal and non-federal land areas. Non-federal lands were granted the rating of surrounding BLM lands or else assigned the BLM rating of Class III. The regions of influence included the landscapes along the rail corridor with aesthetic quality that construction and operations of a railroad could affect.

5.1.1.10 Utilities, Energy, and Materials

The Yucca Mountain FEIS evaluated utilities, energy, and materials impacts common to all corridors and noted that these impacts would include the use of motor fuel, steel, and concrete. Since DOE completed the Yucca Mountain FEIS, information on the baseline supply of utilities, energy, and construction materials has been updated. For example, annual motor fuel use in Nevada was updated from the Federal Highway Administration database. DOE applied the engineering methods used during recent work on the Caliente rail alignment to estimate the amount of earthwork for the Carlin, Jean, and Valley Modified rail corridors. The Department used the estimated amount of earthwork to determine fuel use because fuel use is proportional to the quantity of earthwork needed. In addition, applying the engineering methods used for the Caliente alignment, DOE developed material requirement estimates based on the length of rail line for steel (main track rail) and concrete (main track ties).

5.1.1.11 Waste Management

Waste-management impacts are based on the estimated generation of solid municipal waste from rail line construction in each of the three corridors. The Yucca Mountain FEIS evaluated common waste-management impacts for all corridors rather than for individual corridors. Information to allow differentiation between corridor waste-management impacts is now much more readily available. Consistent with the Yucca Mountain FEIS, this update estimated the peak annual generation of sanitary solid waste. However, based on advanced databases, this update was then able to estimate the impact that the waste generated would have on the individual landfills serving the respective corridor, rather than on landfills on a state-wide basis as the Yucca Mountain FEIS did. DOE obtained information on landfills from the Nevada Division of Environmental Protection database (DIRS 174041-State of Nevada 2004, all).

5.1.1.12 Environmental Justice

Consistent with the Yucca Mountain FEIS, for this Nevada Rail Corridor SEIS, DOE evaluated the potential impacts to two specific populations, those defined as low income and those defined as minority. For the Yucca Mountain FEIS, the region of influence for the environmental justice analysis was defined as the Nevada counties the corridors would cross. For the Yucca Mountain FEIS, DOE identified low-income and minority populations by examining 1990 and 2000 U.S. Census Bureau block group and block data in the region of influence.

Census data for the year 2000 concerning minority communities in Nevada was available at the block group level for the Yucca Mountain FEIS analysis; however, 2000 Census data on low-income communities were not. Therefore, the information on low-income communities was from the 1990 Census. As a consistent criterion for identifying minority and low-income blocks and block groups, DOE employed a 10-percent threshold, meaning that the environmental analysis focused on blocks and block groups in Nevada having a 10-percent or greater minority population or low-income population than the state averages. DOE adopted the 10-percent threshold for the Yucca Mountain FEIS from a 1995 Nuclear Regulatory Commission document, *Interim NRC Procedure for Environmental Justice Reviews* (DIRS 103426-NRC 1995, all).

As discussed in Section 3.2.12.1 of this Nevada Rail Corridor SEIS, DOE used the revised methodology of the U.S. Nuclear Regulatory Commission to identify low-income and minority communities (69 *FR* 52048). That is:

> Under current NRC [Nuclear Regulatory Commission] 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.

In Nevada, the percentage of persons below the poverty threshold, as characterized by the U.S. Bureau of the Census (DIRS 174625- Bureau of Census 2005, all), was approximately 11 percent at the last

Decennial Census (DIRS 176856-U.S. Census Bureau 2003, Table 15). Thus, applying the U.S. Nuclear Regulatory Commission guidance, DOE identified low-income communities as those affected areas (by census block groups) where the percentage of persons characterized as below the poverty threshold exceeded 31 percent.

Because the percentage of minorities in Nevada is approximately 34 percent (DIRS 173533-Bureau of Census 2005, all), adding 20 percentage points would provide a threshold of 54 percent to identify minority communities. Instead, DOE identified minority communities as those affected areas (by census blocks) where the minority population exceeded 50 percent.

5.2 Carlin Rail Corridor

Table 5-1 summarizes the results of the update to the primary impact indicators for the Carlin rail corridor and compares them with the corridor information reported in the Yucca Mountain FEIS. The information reflects the total for railroad construction and operations, unless otherwise noted.

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

Options to the Carlin rail corridor range from 510 kilometers to 540 kilometers (320 to 340 miles). The two main corridor options are the Big Smoky Valley option and the Monitor Valley option. The Yucca Mountain FEIS contains detailed descriptions of the Carlin rail corridor and its options, which are shown in Figure 5-1.

5.2.1 LAND USE AND OWNERSHIP

In the Yucca Mountain FEIS, DOE determined that an evaluation of impacts to land use and ownership should identify the current ownership of the land that its activities could disturb, and the present and anticipated future uses of the land. In the Yucca Mountain FEIS, DOE evaluated land use and ownership in the 400-meter (0.25-mile)-wide corridor. The region of influence for land-use and ownership impacts was defined as land areas that would be disturbed or whose ownership or use would change as a result of the construction and operation of a rail line within this corridor. The purpose of the 400-meter width was to provide sufficient space for the final alignment to route the rail line around sensitive land features or engineering obstacles. The region of influence for this Nevada Rail Corridor SEIS is the same as the Yucca Mountain FEIS.

Traditional land uses in most of the Carlin region of influence that would be directly and indirectly affected include grazing, mining, energy development, general recreation, utility rights-of-way, and wildlife management. Much of this land is not extensively disturbed, although it has been modified through activity such as grazing and mining.

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

Table 5-1. 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 5-1. 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

To obtain current land-use and ownership data, DOE consulted the latest edition of the BLM Master Title Plats and online land record databases, such as BLM LR2000. The Department also evaluated county and state land records, along with information managed by other federal agencies, universities, or commercial developments.

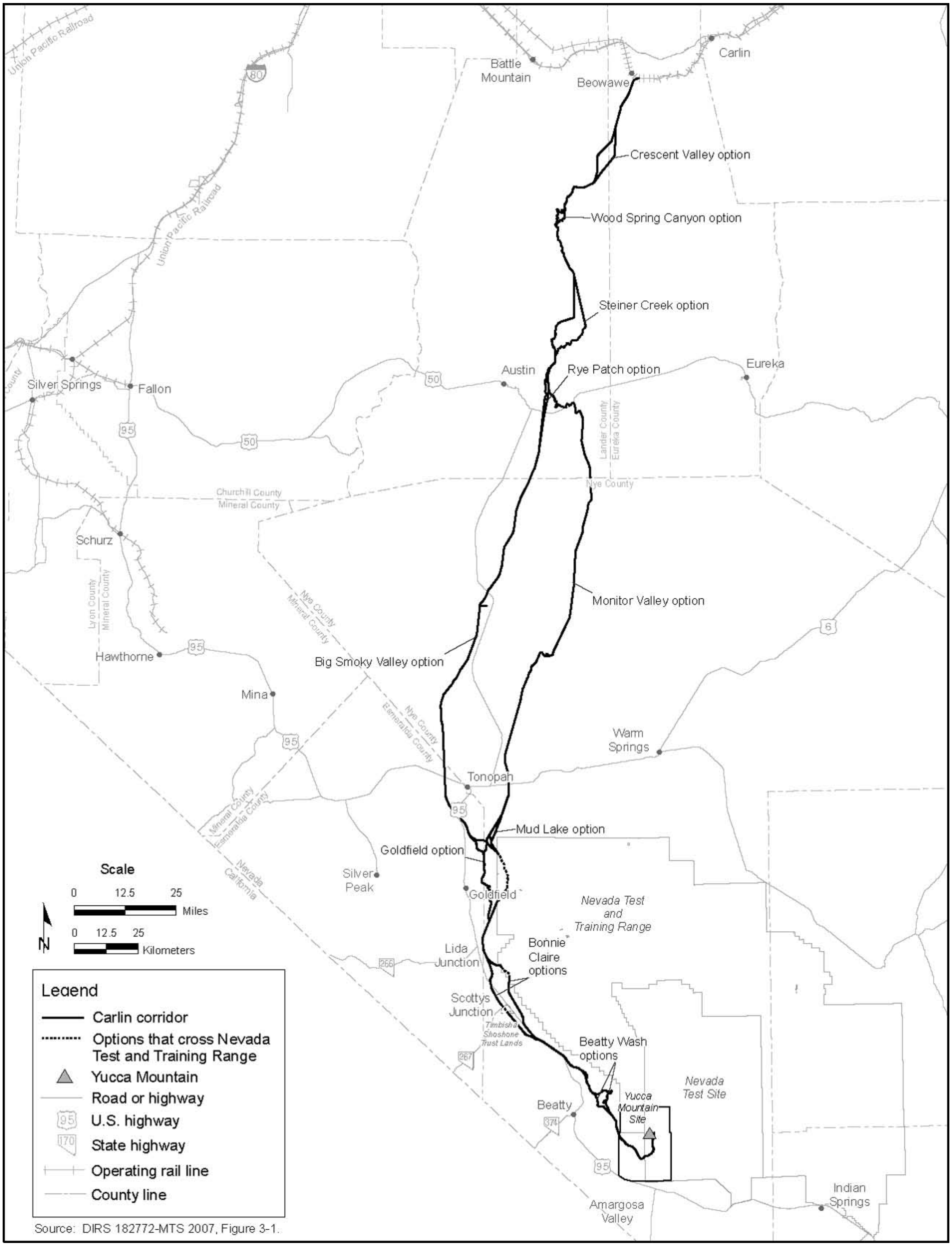


Figure 5-1. Carlin rail corridor and options (2002).

Potential impacts from construction and operation of a railroad in the Carlin rail corridor would be consistent with those that DOE reported in the Yucca Mountain FEIS (DIRS 155970-DOE 2002, Section 6.3.2.1.1). The following paragraphs discuss information gathered in relation to land use in the Carlin rail corridor since DOE completed the Yucca Mountain FEIS.

The Yucca Mountain FEIS reported that the BLM administered approximately 86 percent of the land in the corridor (180 to 200 square kilometers [44,000 to 49,000 acres]), the Department of Defense managed 5.2 percent (0 to 10.9 square kilometers), DOE managed 2.2 percent (4.6 square kilometers [1,100 acres]), and less than 1 percent (0 to 1.6 square kilometers) was held in trust by the Timbisha Shoshone Tribe. The Department of Defense lands were on the Nevada Test and Training Range.

Current land holdings for the Carlin rail corridor are as follows: BLM-administered land, approximately 88 to 94 percent (180 to 210 square kilometers [44,000 to 52,000 acres]); Department of Defense land, about 0 to 4.9 percent (0 to 11.4 square kilometers [2,800 acres]); DOE land, approximately 2 percent (unchanged); and Timbisha Shoshone trust lands, less than 1 percent (unchanged) (DIRS 182772-MTS 2007, p. 73). The change in estimates of the amount of BLM-administered land and private property within this corridor are, in part, the result of using databases whose land ownership data have been refined and enhanced since completion of the Yucca Mountain FEIS.

The Yucca Mountain FEIS reported that about 6.7 percent (7.3 to 15 square kilometers [1,800 to 3,700 acres]) of the land within the Carlin rail corridor was private property. Currently, DOE estimates that private property occupies about 3.3 to 4 percent (6.4 to 9.4 square kilometers [1,600 to 2,300 acres]) of the land in the corridor (DIRS 182772-MTS 2007, p. 73). Similar to changes in BLM-administered land, the change in the amount of private land reflects, in part, the use of more recent databases whose land ownership data have been enhanced since the Yucca Mountain FEIS. The highest density of private land occurs within the first 30 kilometers (19 miles) of the corridor (near Beowawe), although other concentrations of private property occur near Crescent Valley. In the Crescent Valley area, for instance, much of the private property lies in single sections (2.6 square kilometers [1 square mile]) of land that are separated by BLM-administered sections (as shown in Figure 5-3 for the area south of Crescent Valley). As a general criterion, DOE minimized crossing private property when it identified the Carlin rail corridor; however, as a result the corridor tends to cross private parcels of land owned by many individuals, which creates a correspondingly complex ownership pattern.

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

Since DOE completed the Yucca Mountain FEIS, the BLM has found that a 0.43-square-kilometer (100-acre) parcel of public land near Hadley, Nevada, is suitable for direct (noncompetitive) sale to Round Mountain Gold Corporation for expansion of the existing Hadley Airport (*Notice of Realty Action: Direct (Non-Competitive) Sale of Public Lands, Nye County, NV*; 72 *FR* 4290, January 30, 2007); Figure 5-2 shows the location of the airport in relation to the Carlin rail corridor. This land, which is approximately 2.6 kilometers (1.6 miles) from the center of the Carlin rail corridor, was purchased by the Round Mountain Gold Corporation on May 11, 2007.

The Carlin rail corridor would pass near historic and currently established mining districts. At the time DOE completed the Yucca Mountain FEIS, the number of unpatented claims staked in Nevada had been steadily dropping since the BLM instituted a requirement in 1991 for an annual fee for each claim. Since the DOE completed the Yucca Mountain FEIS, the prices of gold and other metallic resources have been steadily rising, which has caused a resurgence in the number of mining claims. Unpatented mining claims have been, and continue to be, staked along the corridor, with sections containing the greatest number of claims located near the Crescent Valley and Goldfield areas (see Figure 5-3). According to a mineral

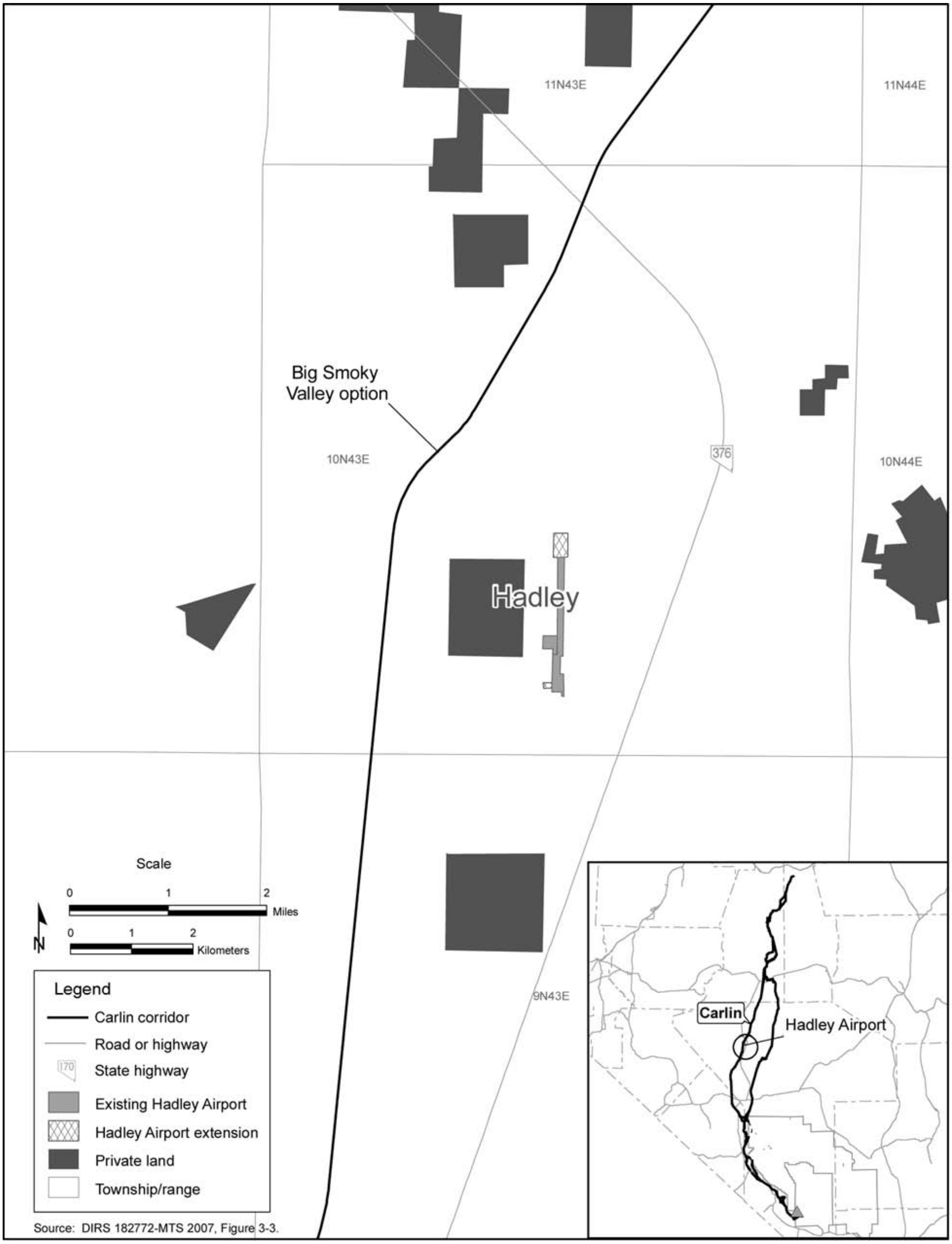


Figure 5-2. Hadley Airport location.

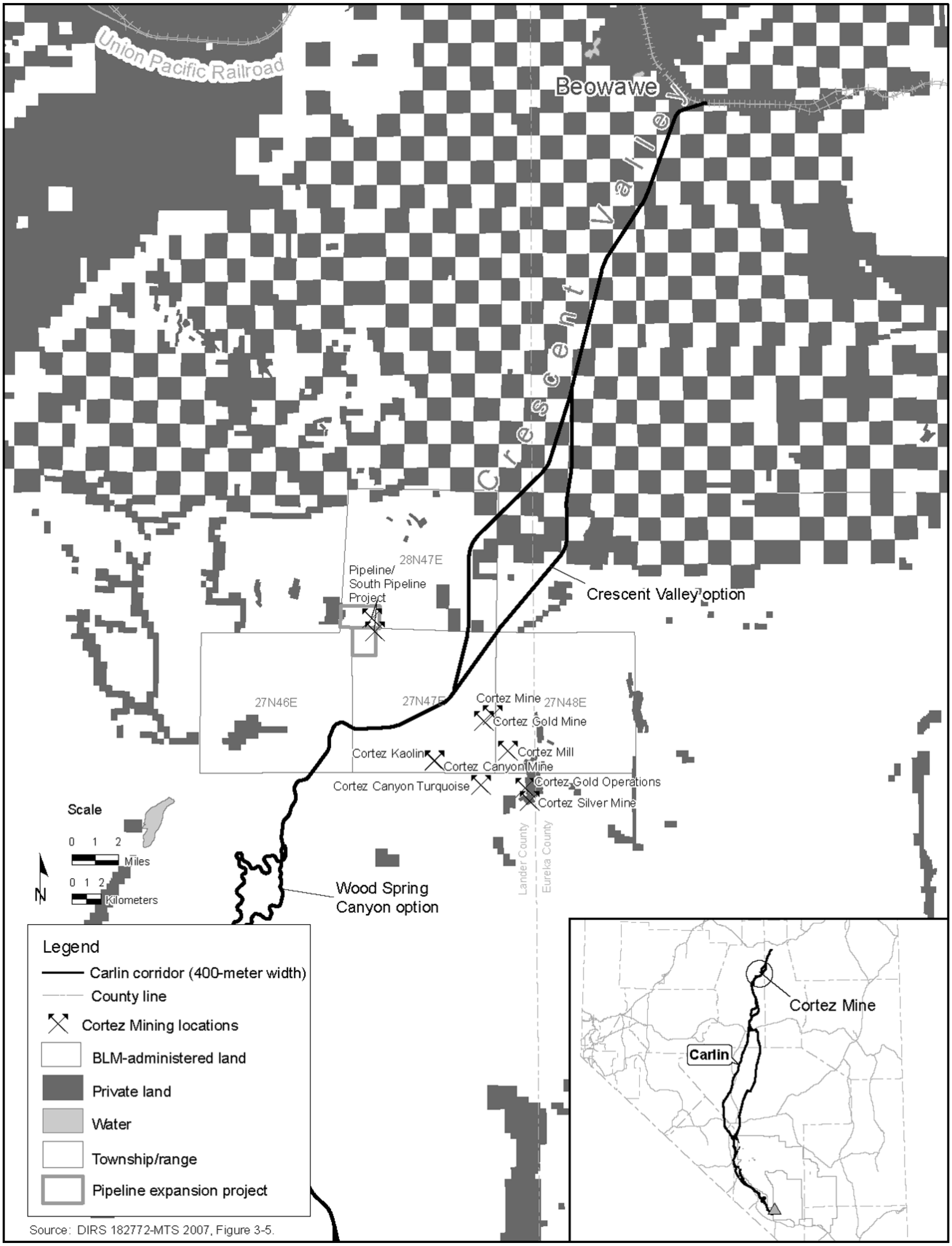


Figure 5-3. Cortez Mine location.

assessment prepared for Lander County, exploration and development activity is increasing in and around the Crescent Valley area for gold, silver, barite and geothermal resources (DIRS 182772-MTS 2007, p. 73).

The Cortez Gold Mines are near the northern end of the Carlin rail corridor, in the vicinity of Crescent Valley, and have been expanding their mining operations since DOE completed the Yucca Mountain FEIS. The Cortez Gold Mines, also called the Cortez Joint Venture, is the oldest continuously operating gold mining operation in Nevada; Figure 5-3 shows the location of the mine in relation to the Carlin rail corridor. The Cortez Gold Mines are among the largest annual producers of gold in the state of Nevada, and considered one of Nevada's major mines (DIRS 182772-MTS 2007, p. 74). Since DOE completed the Yucca Mountain FEIS, the Cortez Gold Mine has proposed an expansion of its Pipeline/South Pipeline Project, which is an open-pit gold mining and processing operation (*Notice of Intent To Prepare an Environmental Impact Statement To Analyze the Proposed Amendment to the Pipeline/South Pipeline Plan of Operations (NVN–067575) for the Cortez Hills Expansion Project*; 70 *FR* 72308, December 2, 2005). The BLM has granted authorization to Cortez Gold Mine to disturb approximately 37 square kilometers (9,000 acres) associated with the Pipeline/South Pipeline Project, which was under BLM consideration when DOE completed the Yucca Mountain FEIS. The proposed expansion would include an additional 25 square kilometers (6,100 acres). The proposed expansion is less than 1.6 kilometers (1 mile) from the outer boundary of the Carlin rail corridor. The EIS for the proposed expansion project is in preparation, so it is unknown what impacts it could have; in addition, the project could undergo modifications and boundary adjustments.

DOE reviewed information in the Mineral Resources Data System and the Abandoned Mine database (DIRS 182772-MTS 2007, p. 74) to determine if additional mines, active or abandoned, have been located and documented since DOE completed the Yucca Mountain FEIS. Updates to these data systems revealed that the Carlin rail corridor would cross Mammoth, Diamondfield Property, Aloha, Tognoni Spring, Goldfield Bullion, Future Group, and Wright Prospect mines. The Monitor Valley option would cross Nevada State Pit, and there is an abandoned mine on the Steiner Creek option. Of these, Nevada State Pit, Tognoni Spring, and Diamondfield Property are "past producers," meaning that mining activities occurred in the past but no mining operations are currently underway.

The classification for Wright Prospect and Future Group is "occurrence," meaning that discovery of an outcrop has occurred and there could be some land disturbance, but there is currently no mining operation underway. Aloha, Goldfield Bullion, and Mammoth are "prospect sites," meaning there has been discovery of a mineral resource but no mining (DIRS 182772-MTS 2007, p. 74).

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

During an evaluation of Wilderness Areas and Wilderness Study Areas potentially affected by the Carlin rail corridor, the Yucca Mountain FEIS determined that only the Steiner Creek option would encroach on the Simpson Park Wilderness Study Area. The status of this Wilderness Study Area has not changed; therefore, this constitutes a land-use conflict. The Yucca Mountain FEIS reported that the Carlin rail corridor and its options would cross 12 BLM grazing allotments. The BLM has since updated their grazing allotment information, which indicates Carlin and its options would now cross the Geyser, South Buckhorn, Carico Lake, Grass Valley, Simpson Park, Potts, Monitor, Hunts Canyon, Kingston, Wildcat Canyon, Smoky, Francisco, San Antone, Montezuma, and Razorback Grazing Allotments, along with an allotment the BLM has designated as being unused. According to this data source, the Carlin rail corridor also crosses the Ralston and Silver King Grazing Allotments; however, the BLM Battle Mountain District Office reports this same area as just the Ralston Grazing Allotment.

As reported in the Yucca Mountain FEIS, the corridor would cross six wild horse and burro herd management areas, the Bates Mountain pronghorn antelope release area, three riparian habitats, and the Simpson Park habitat management area (see Section 5.2.4). According to the Yucca Mountain FEIS, the Carlin rail corridor would cross a Desert Land Entry Withdrawal. Since DOE completed the Yucca Mountain FEIS, the BLM has authorized or received proposals for additional Desert Land Entry Withdrawals within or adjacent to the Carlin rail corridor (DIRS 182772-MTS 2007, p. 74). For example, the Monitor Valley option crosses or is adjacent to six Desert Land Entries. Of these, three have been issued patents, one has been authorized by the BLM and is awaiting patent, and two others have applications in process with the BLM. The BLM grants Desert Land Entry Withdrawals to individuals to reclaim, irrigate, and cultivate arid and semiarid public lands of the western United States. The Yucca Mountain FEIS reported that the Carlin rail corridor would cross linear land features such as rights-of-way for utilities and roads. A review of BLM land records, including Master Title Plats, indicated the authorization of additional rights-of-way since DOE completed the Yucca Mountain FEIS (DIRS 182772-MTS 2007, p. 75).

5.2.2 AIR QUALITY

The Yucca Mountain FEIS evaluated air quality impacts common to all of the proposed corridors and noted that these impacts would include temporary increases in criteria air pollutant concentrations from construction of a rail line. The Yucca Mountain FEIS did not identify any air quality impacts unique to the Carlin rail corridor. The update did not find any indication that the air quality status of the counties and areas along the Carlin rail corridor has changed since DOE completed the Yucca Mountain FEIS (DIRS 182772-MTS 2007, p. 82).

Areas in violation of one or more of the criteria pollutant standards are classified as nonattainment areas. If there is not enough air quality data to determine the status of a remote or sparsely populated area, then the Environmental Protection Agency lists the area as unclassifiable and the area is considered to be in attainment. The Carlin rail corridor would pass through rural parts of Nye, Esmeralda, Lander, and Eureka Counties in Nevada that are either in attainment or unclassifiable for criteria pollutants under the Environmental Protection Agency (DIRS 182772-MTS 2007, p. 82). Since no nonattainment or maintenance areas were identified, no detailed estimates of emission rates or comparisons to threshold levels for conformity were made.

Fuel use by construction equipment would emit carbon monoxide, ***nitrogen dioxide***, ***sulfur dioxide***, and particulate matter with diameters of 10 micrometers or less (PM_{10}) and 2.5 micrometers or less (***$PM_{2.5}$***) Construction activities would also emit PM_{10} in the form of ***fugitive dust*** from excavation, truck traffic, and operation of concrete batch plants (DIRS 180877-Nevada Rail Partners 2007, p. 2-6). The emissions would be temporary and would cover a sizeable area as construction progressed along the length of the corridor.

Air quality impacts common to all corridors during railroad operations would result from diesel locomotives, which would emit carbon monoxide, nitrogen dioxide, sulfur dioxide, PM_{10}, and $PM_{2.5}$. The number of locomotive engines in use and the associated operational characteristics would not differ appreciably from those in the Yucca Mountain FEIS. Therefore, there should be no measurable differences in potential impacts from those in the Yucca Mountain FEIS.

5.2.3 HYDROLOGY

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

5.2.3.1 Surface Water

The Yucca Mountain FEIS identified potential surface-water resources, which include springs, streams, riparian areas, and reservoirs within the region of influence along the corridor (DIRS 155970-DOE 2002, Table 6-37). As noted in the Yucca Mountain FEIS, the spread of construction-related materials by precipitation or intermittent runoff events, releases to surface waters, and the alteration of natural drainage patterns or runoff rates that could affect downgradient resources would be unlikely. Based on the information collected for this update, impacts to surface-water resources from construction of a rail line in the Carlin rail corridor would be the same as those reported in the Yucca Mountain FEIS.

The Carlin rail corridor, including all of its options, would cross 11 different mapped ***100-year flood*** zones or flood zone groups (DIRS 182772-MTS 2007, p. 82). These remain unchanged since DOE completed the Yucca Mountain FEIS. Although unlikely, the spread of construction-related materials by precipitation or intermittent runoff events could occur during the construction of a rail line. Impacts associated with changes in drainage patterns or to erosion and sedimentation rates or locations would be small and localized.

5.2.3.2 Groundwater

In the Yucca Mountain FEIS, the Department used terrain types to estimate total water demand. Since DOE completed the Yucca Mountain FEIS, DOE has canvassed similar projects throughout Nevada and determined that the amount and type of earthwork, not the terrain, would more accurately estimate total water demand associated with the construction of a rail line. Therefore, DOE updated the water demand based on earthwork needs. This resulted in an estimated water demand for the Carlin rail corridor of approximately 7.1 million cubic meters (5,800 acre-feet) (DIRS 180877-Nevada Rail Partners 2007, p. 2-7) compared to the estimate based on terrain types reported in the Yucca Mountain FEIS of 810,000 cubic meters (660 acre-feet). To accommodate this increase in estimated water demand, DOE would need to draw more water than originally estimated in the Yucca Mountain FEIS from the underlying hydrographic basins and pump from additional wells. Groundwater withdrawal could temporarily affect discharge from nearby wells or springs. DOE would conduct detailed analyses if new wells required for construction of the rail line were to be located near other water sources.

Construction of a rail line would require water for soil compaction, dust control, and workforce use. Water use during construction would come primarily from groundwater resources, specifically hydrographic basins. If the hydrographic basin is designated, permitted groundwater rights approach or exceed the estimated perennial yield, water resources are being depleted or require additional administration, and the Nevada State Engineer has declared preferred uses of water. Table 5-2 updates the designation status of the hydrographic basins and the percentage of the Carlin rail corridor that would be in the respective basin. The total percentage of the Carlin rail corridor that would be in designated basins is about 68 percent. The Yucca Mountain FEIS estimated that about 70 percent of the Carlin rail corridor would be in designated basins.

Railroad operations in the Carlin rail corridor would have little impact on groundwater resources. Possible changes in recharge, if any, would be the same as those at the completion of construction.

Table 5-2. Hydrographic basins associated with the Carlin rail corridor.[a,b]

Hydrographic basin (and subbasin where applicable)	Length (miles)[c]	Percentage of total[d]	Designated
Alkali Spring Valley	13	4	No
Big Smoky Valley/Northern Part	68	21	Yes
Big Smoky Valley/Tonopah Flat	47	14	Yes
Carico Lake Valley	2.7	0.82	No
Crater Flat	18	5.5	No
Crescent Valley	50	15	Yes
Fortymile Canyon/Jackass Flats	8	2.4	No
Grass Valley	34	10	No
Lida Valley	15	4.4	No
Oasis Valley	14	4.4	Yes
Ralston Valley	17	5.1	Yes
Sarcobatus Flat	30	9	Yes
Stonewall Flat	13	3.9	No

a. Source: DIRS 182772-MTS 2007, p. 83.
b. To calculate water demand for each basin, multiply the total water demand for a given corridor by the percentage of total.
c. To convert miles to kilometers, multiply by 1.6093.
d. Based on primary option in the Yucca Mountain FEIS.

5.2.4 BIOLOGICAL RESOURCES AND SOILS

Potential impacts to biological resources and soils from the construction and operation of a railroad in the Carlin rail corridor would be consistent with those reported in the Yucca Mountain FEIS. Maximum land disturbance for the construction of a rail line in the Carlin rail corridor would not differ from the estimates in the Yucca Mountain FEIS; therefore, the potential impacts would not change.

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

5.2.4.1 Biological Resources

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

Table 5-3 lists the special status species, big game habitat, and herd management areas identified in the Yucca Mountain FEIS and identifies additional information resulting from this update. The updated version of the Nevada Natural Heritage Program database examined for this Nevada Rail Corridor SEIS included observations of six additional sensitive species not included in the Yucca Mountain FEIS. They are:

- Lahontan cutthroat trout (*Oncorhynchus clarkii henshawi*)
- Southwestern willow flycatcher (*Empidonax traillii extimus*)
- Crescent Dunes serican scarab (*Serica ammomenisco*)
- Eastwood milkweed (*Asclepias eastwoodiana*)
- Ripley's springparsley/Sanicle biscuitroot (*Cymopterus ripleyi* var. *saniculoides*)
- Toquima milkvetch (*Astragalus toquimanus*)

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

Table 5-3. Special status species, big game habitat, and herd management areas associated with the Carlin rail corridor[a] (page 1 of 2).

		Yucca Mountain FEIS		Nevada Rail Corridor SEIS	
Resource	Type	In corridor	Within 3 miles[d]	In corridor	Within 3 miles
Threatened or endangered species (categorized by type)					
Southwestern willow flycatcher (*Empidonax traillii extimus*)	B				●
Desert tortoise (*Gopherus agasizii*)	A/R	●		●	
Lahontan cutthroat trout[b] (*Oncorhynchus clarkii henshawi*)	F			●	
Sensitive species					
Pygmy rabbit (*Brachylagus idahoensis*)	M		●		●
Fringed myotis (*Myotis thysanodes*)	M		●		●
San Antonio pocket gopher (*Thomomys bottae curtatus*)	M	●		●	
Ferruginous hawk (nesting area) (*Buteo regalis*)	B	●	●	●	●
Amargosa toad (*Bufo nelsoni*)	A/R		●		●
Oasis Valley speckled dace (*Rhinichthys osculus*)	F		●		●
Big Smoky Valley speckled dace (*Rhinichthys osculus lariversi*)	F		●		●
Oasis Valley springsnail (*Pyrgulopsis micrococcus*)	MO		●		●
Crescent Dune aegialian scarab (*Aegialia crescenta*)	I		●		
Crescent Dune serican scarab (*Serica ammomenisco*)	I				●
Eastwood milkweed (*Asclepias eastwoodiana*)	P				●

Table 5-3. Special status species, big game habitat, and herd management areas associated with the Carlin rail corridor[a] (page 2 of 2).

		Yucca Mountain FEIS		Nevada Rail Corridor SEIS	
Resource	Type	In corridor	Within 3 miles[d]	In corridor	Within 3 miles
Funeral Mountain milkvetch (*Astragalus funereus*)	P		●		●
Nevada sanddune beardtongue (*Penstemon arenarius*)	P	●	●	●	●
Ripley's springparsley/sanicle biscuitroot (*Cymopterus ripleyi* var. *saniculoides*)	P				●
Toquima milkvetch (*Astragalus toquimanus*)	P				●
Game habitat					
Elk *(Cervus canadensis)*	M	●		●	
Mule deer (*Odocoileus hemionus*)	M	●		●	
Pronghorn antelope (*Antilocapra americana*)	M	●		●	
Sage-grouse (*Centrocercus urophasianus*)[c]	B	●		●[c]	
Wild horse and burro herd management areas					
Bald Mountain		●		●	
Callaghan		●		●	
Hickison		●		●	
Saulsbury		●		●	
Goldfield		●		●	
Gold Mountain					●
Nevada Wild Horse Range				●	
Stonewall		●		●	
Bullfrog		●		●	

Species Type Key:

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

a. Sources: Data collected from DIRS 182772-MTS 2007, pp. 105 to 106; DIRS 182760-URS Corporation/Potomac-Hudson Engineering 2006, all.

b. Habitat for the Lahontan cutthroat trout, a threatened species under the Endangered Species Act, crosses the Big Smoky Valley and Monitor Valley options of the Carlin rail corridor north and northeast of Round Mountain in Nye County.

c. Portions of the Carlin rail corridor pass through winter habitat, brood rearing habitat, and nesting habitat of the sage-grouse (Centrocercus urophasianus). Conservation of the greater sage-grouse has become an important concern due to a decline in population and habitat. Since DOE completed the Yucca Mountain FEIS, the State of Nevada has developed a Greater Sage-Grouse Conservation Plan. This plan involves a number of state and federal agencies, including the Nevada Department of Wildlife, the California Department of Fish and Game, the Nevada and California BLM State Offices, and the U.S. Fish and Wildlife Service, among others. The Plan's highest priorities focus on maintaining sage-grouse habitats that are currently intact and highly productive. In addition, it emphasizes the enhancement of degraded seasonal habitats that have the greatest potential for recovery (DIRS 182772-MTS 2007, all).

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

5.2.4.2 Soils

The Yucca Mountain FEIS classified soils in the rail corridor with four attributes: shrink swell, erodes easily, unstable fill, and blowing soil. As noted in the Yucca Mountain FEIS, the shrink swell and erodes easily attributes are common in the Carlin rail corridor. The Yucca Mountain FEIS also reported that there were no soils classified as prime farmland within the Carlin rail corridor. For the update, no new information was identified on the attributes of the soils surveyed in the corridor (DIRS 182772-MTS 2007, p. 86).

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

5.2.5 CULTURAL RESOURCES

The effects of rail line construction in the Carlin rail corridor on cultural resources would be essentially the same as those DOE reported in the Yucca Mountain FEIS. Impacts to cultural resources from railroad operations in the Carlin rail corridor would be unlikely.

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

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

The records search revealed the presence of 120 known archaeological sites within the 400-meter (0.25-mile) width of the Carlin rail corridor. The difference between the 110 sites reported in the Yucca Mountain FEIS and the 120 identified in the new survey reflects the addition of sites recorded in the past decade, particularly in the vicinity of Yucca Mountain, where cultural resources inventories have been ongoing. Of the 120 known sites, 11 are eligible or potentially eligible for inclusion on the *National Register of Historic Places* (DIRS 182772-MTS 2007, p. 87).

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

5.2.6 OCCUPATIONAL AND PUBLIC HEALTH AND SAFETY

5.2.6.1 Industrial Safety

The categories of worker impacts include total recordable incidents, lost workdays, and fatalities. Recordable incidents or cases are occupational injuries or occupation-related illnesses that result in (1) a fatality, regardless of the time between the injury or the onset of the illness and death, (2) lost workday cases (nonfatal), and (3) incidents that result in the transfer of a worker to another job, termination of employment, medical treatment, loss of consciousness, or restriction of motion during work activities.

Revised estimates of the number of workers needed to construct the rail line resulted in 6,600 worker-years in comparison to the 1,230 worker-years estimated in the Yucca Mountain FEIS (2,000 hours per worker-year). Estimates of industrial safety impacts incorporate Bureau of Labor Statistics data for 2005 (DIRS 179131-BLS 2006, all; DIRS 179129-BLS 2007, all). The Yucca Mountain FEIS used 1998 data from the same source. Industrial safety impacts from operations in the Carlin rail corridor would be lower than those reported in the Yucca Mountain FEIS because of differences in the labor statistics used. Operation of the railroad would require about 60 workers each year, an increase from 47 workers estimated in the Yucca Mountain FEIS. Table 5-4 lists estimated industrial safety impacts reported in the Yucca Mountain FEIS as well as the updated information.

Table 5-4. Impacts to workers from industrial hazards during railroad construction and operations in the Carlin rail corridor.[a]

	Construction		Operations		Total	
Group and industrial hazard category	Yucca Mountain FEIS[b]	Update[c]	Yucca Mountain FEIS[d]	Update[e]	Yucca Mountain FEIS	Update
Involved worker						
Total recordable cases[f]	99	300	95	60	194	360
Lost workday cases	49	170	52	40	101	210
Fatalities	0.14	0.6	0.26	0.4	0.4	1
Noninvolved worker						
Total recordable cases	5.9	30	5.4	20	11.3	50
Lost workday cases	2.2	16	2.0	10	4.2	26
Fatalities	0.006	0.04	0.006	0.03	.012	0.07
Totals[g]						
Total recordable cases	110	330	100	80	210	410
Lost workday cases	51	180	54	50	105	230
Fatalities	0.14	0.6	0.27	0.4	0.41	1

a. Estimates of worker-years multiplied by accident rate (DIRS 179131-BLS 2006, all; DIRS 179129-BLS 2007, all).
b. Estimated workforce to construct the rail line would be 1,230 worker-years.
c. Estimated workforce to construct the rail line would be 6,600 worker-years.
d. Totals for 24 years for operations.
e. Totals for up to 50 years of operations.
f. Total recordable cases include injuries, illnesses, and fatalities.
g. Totals might differ from sums of values due to rounding.

5.2.6.2 Transportation

Since DOE completed the Yucca Mountain FEIS, there have been updates to the methods and data used to estimate the radiation doses for workers and members of the public. Section 3.2.6 of this Nevada Rail Corridor SEIS describes updates to the methods and data used to estimate impacts for the rail corridors. The impacts for the Carlin rail corridor reflect new information resulting from these changes.

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

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

Table 5-5. Transportation impacts during railroad construction for the Carlin rail corridor.[a]

	Traffic fatalities		Number of cancers		Total	
Transportation impact category	Yucca Mountain FEIS	Update	Yucca Mountain FEIS	Update	Yucca Mountain FEIS	Update
Vehicle emission impacts (cancer fatalities)						
Material delivery vehicles	–	–	0.04	0.04	0.04	0.04
Worker commuting	–	–	0.10	0.5	0.10	0.5
Transportation accidents (fatalities)						
Material delivery vehicles	0.3	0.3	–	–	0.3	0.3
Worker commuting	0.8	3.7	–	–	0.8	3.7
Totals[b]	1.1	4.0	0.14	0.6	1.54	4.6

a. Source: DIRS 182772-MTS 2007, p. 88.
b. Totals might differ from sums of values due to rounding.

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

Table 5-6 lists the impacts of using the Carlin rail corridor to ship spent nuclear fuel and high-level radioactive waste calculated using updated methods and data. The impacts presented reflect those from the mainline to the repository. This is in contrast to the Yucca Mountain FEIS, where the Nevada impacts started where the mainline intersects the Nevada border.

For members of the public, estimated radiological impacts from incident-free (routine) transportation decreased from those in the Yucca Mountain FEIS, from 0.0012 to 0.000088 latent cancer fatality. This would be due primarily to the change in analysis for the Nevada rail line to model dedicated trains for shipments to the repository (DIRS 182772-MTS 2007, p. 89), which would be partially offset by the increase in the latent cancer fatality conversion factor.

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

Table 5-6. Operations impacts of transportation for the Carlin rail corridor.[a]

Transportation impact category	Traffic fatalities		Number of cancers		Total	
	Yucca Mountain FEIS	Update	Yucca Mountain FEIS	Update	Yucca Mountain FEIS	Update
Incident-free radiological impacts (LCFs)[b]						
Public (LCFs)	–	–	0.0012	0.000088		
Workers (LCFs)	–	–	0.31	0.33		
Radiological accident risks (LCFs)			0.000000037	0.00000099		
Vehicle emission impacts (cancer fatalities)						
Waste transportation	–	–	0.0008	0.00038		
Worker commuting	–	–	0.09	0.4		
Transportation accidents (fatalities)						
Waste transportation	0.054	0.31	–	–		
Worker commuting	0.7	3.3	–	–		
Totals[c]	0.7	3.6	0.4	0.7	1.1	4.3

a. Source: DIRS 182772-MTS 2007, p. 90.
b. LCF = latent cancer fatality.
c. Totals might differ from sums of values due to rounding.

Estimated radiological accident risks would increase from 0.000000037 to 0.00000099 latent cancer fatality. This would be due primarily to the use of the combined Track Class 3 transportation accident rate (DIRS 182772-MTS 2007, p. 89) based on train-kilometers and railcar-kilometers and the increase in the latent cancer fatality conversion factor. Although this is an increase, radiological accident risk would still be a negligible contributor to the overall transportation risk.

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

Estimated impacts from nonradiological transportation accidents would increase from 0.054 to 0.31 fatality. This is the most notable change to accident risk and would be due primarily to the use of the updated rail fatality rate (DIRS 178016-DOT 2005, all) and from accounting for the presence of locomotives and buffer cars in the estimation of the number of nonradiological transportation accident fatalities. Due to the increase in the number of workers, traffic fatalities associated with commuting workers could also increase.

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

5.2.7 SOCIOECONOMICS

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

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

The Yucca Mountain FEIS estimated population baselines for Clark, Nye, and Lincoln Counties and the Rest of Nevada on projections by state and local agencies including the Nevada State Demographer, Nye County, and Clark County, which was prepared by the University of Nevada Las Vegas. The rest of Nevada included Eureka, Lander, and Esmeralda Counties. The original baseline estimate was that the 2006 population in the region of influence would be approximately 1.73 million. The updated baseline, which incorporates the Nevada State Demographer’s more current data, indicates that the estimated 2006 population in the region was approximately 1.94 million (DIRS 182772-MTS 2007, p. 90).

Clark County, which includes Las Vegas, dominates the region of influence with a 2006 estimated population of 1.89 million, which is approximately 7 percent more than the population that DOE reported in the Yucca Mountain FEIS. Population growth in the unincorporated town of Pahrump dominates Nye County’s growing popularity as a residential destination. Since DOE completed the Yucca Mountain FEIS, Pahrump, the largest population center in Nye County, has experienced double-digit growth. The estimated population of Pahrump increased from 23,000 in July 1999 to 33,000 by July 2005, an increase of about 45 percent. In the same period, the State Demographer estimates that Nye County as a whole grew from a population of about 31,000 to about 41,000. The Carlin rail corridor would pass near the towns of Beatty and Tonopah. The State Demographer estimated the 2005 population of Beatty to be slightly over 1,000 and the 2005 population of Tonopah to be about 2,600 (DIRS 182772-MTS 2007, p. 91). The average annual impact from the construction and operation of a railroad to the baseline populations in Clark, Nye, and Lincoln Counties and the rest of Nevada would be small.

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

5.2.8 NOISE AND VIBRATION

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

5.2.9 AESTHETICS

Based on a corridor-level analysis and an evaluation of current BLM resource management plans, there have been no changes to visual resource management classifications for the Carlin rail corridor since DOE completed the Yucca Mountain FEIS. Under the current BLM plans, the Carlin rail corridor would pass through visual resource management Class IV lands. Therefore, impacts would be the same as those discussed in the Yucca Mountain FEIS.

5.2.10 UTILITIES, ENERGY, AND MATERIALS

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

The Carlin rail corridor would pass through rural parts of Nye, Esmeralda, Lander, and Eureka Counties in Nevada that have little access to support services. Electric power for construction would be initially supplied by portable generators. New power lines would be installed to provide power for construction services and would be extended, via underground distribution along the rail roadbed, to meet all other construction and operations needs. Construction equipment would consume motor fuel (diesel and gasoline). The total motor fuel use in Nevada in 2005 was about 5.8 billion liters (1.5 billion gallons) (DIRS 182772-MTS 2007, p. 91). Highway motor fuel use in the state in 2005 increased 6.2 percent over that in 2004, the largest percentage increase for any state and attributable to Nevada's growing population. Table 5-7 lists the estimated amounts of diesel fuel and gasoline for construction in the Carlin rail corridor, which are higher than the estimates in the Yucca Mountain FEIS. The annual average use of motor fuel would be about 0.52 percent of that consumed annually in Nevada. Unlike overall state use, construction activities would use primarily diesel fuel, which would be about 2.1 percent of all special fuel (mainly diesel) used annually in Nevada.

Steel for rails, concrete (principally for rail ties, bridges, and drainage structures), and rock for ballast would be the primary materials that the construction of a rail line would consume. Table 5-7 lists estimates of steel and concrete consumption, which have changed from those in the Yucca Mountain FEIS.

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

Table 5-7. Construction fuel and materials impacts for the Carlin rail corridor.[a]

	Diesel fuel use (million gallons)[d]		Gasoline use (million gallons)		Steel (thousand tons)[e]		Concrete (thousand tons)	
Length (miles)[b,c]	Yucca Mountain FEIS	Update	Yucca Mountain FEIS	Update	Yucca Mountain FEIS	Update	Yucca Mountain FEIS	Update
329	11	29	0.2	0.6	82	95	456	364

a. Source of update: DIRS 180877-Nevada Rail Partners 2007, p. 2-7, Table 2-1; DIRS 182772-MTS 2007, p. 92.
b. Corridor length used for comparative evaluation.
c. To convert miles to kilometers, multiply by 1.6093.
d. To convert gallons to liters, multiply by 3.78533.
e. To convert tons to metric tons, multiply by 0.90718.

5.2.11 WASTE MANAGEMENT

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

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

The Yucca Mountain FEIS estimated the peak annual generation of sanitary solid waste would be 910 metric tons (1,000 tons). DOE now estimates that solid municipal waste from construction facilities would be 750 metric tons (830 tons) during the peak year of construction. An assumed 25 percent of the waste would be recyclable, which would result in 570 metric tons (620 tons) for disposal at municipal landfills. The estimated total mass of waste that would be generated during rail line construction is about 2,000 metric tons (2,200 tons). This mass of sanitary solid waste would occupy about 5,100 cubic meters (6,600 cubic yards) of landfill volume at a waste density of 410 kilograms per cubic meter (700 pounds per cubic yard) (DIRS 182772-MTS 2007, p. 92). The estimated average daily disposal mass would be about 1.6 metric tons (1.7 tons) per day.

For the landfills in rural counties, this would represent a potential increase in volume of waste requiring processing. The Goldfield landfill, which serves a population of fewer than 1,500 people in Esmeralda County, received about 3.6 metric tons (4 tons) of solid waste per day in 2003 (DIRS 182772-MTS 2007, p. 92). Disposal of solid waste generated during the construction phase would represent nearly a 50-percent increase in daily waste volume for the Goldfield landfill and could hasten its estimated closure date of 2023. Nye County disposed of about 250 metric tons (280 tons) of waste during 2003 at three different landfills (DIRS 182772-MTS 2007, p. 92), but the county plans to close two of these landfills by 2011, which would represent 96 percent of the county's current waste disposal capacity. The Austin and Battle Mountain landfills in Lander County disposed of about 2.7 and 12 metric tons (3 and 13 tons) per day, respectively, in 2003; their estimated closure dates are 2041 and 2069. For comparison, the Apex Landfill in Clark County, which serves the Las Vegas Valley, receives 8,000 metric tons (8,800 tons) each day (DIRS 174041-State of Nevada 2004, pp. 6 and 7). Waste generated during construction could be trucked to larger landfills with small impact on waste disposal capacity.

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

5.2.12 ENVIRONMENTAL JUSTICE

The Yucca Mountain FEIS environmental justice analysis considered the potential for disproportionately high and adverse impacts on two segments of the overall population – minority communities and low-income communities.

As discussed in Sections 3.2.12.1 and 5.1.1.12, for this Nevada Rail Corridor SEIS DOE used the revised methodology of the U.S. Nuclear Regulatory Commission to identify low-income and minority communities (69 *FR* 52048). See Section 5.1.1.12 for a discussion of the methodology. The region of influence identified in the Yucca Mountain FEIS for the Carlin rail corridor has remained the same. Furthermore, county-level U.S. Census Bureau data estimates for 2006 suggest that while the population in southern Nevada is growing rapidly, the locations of concentrations of minority and low-income populations have remained relatively constant and static since 2000 (DIRS 182772-MTS 2007, p. 93).

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

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

5.3 Jean Rail Corridor

Table 5-8 summarizes the results of the update to the primary impact indicators for the Jean rail corridor and compares them with the corridor information published in the Yucca Mountain FEIS. The information reflects the total for the construction and operation of the railroad in the Jean rail corridor unless otherwise noted.

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. The State Line option would pass near Primm, Nevada.

Jean rail corridor options would range from 180 to 200 kilometers (110 to 130 miles) long. Figure 5-4 shows the corridor and its options. The Yucca Mountain FEIS contains detailed corridor and option descriptions.

5.3.1 LAND USE AND OWNERSHIP

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

The Yucca Mountain FEIS reported that the BLM administered approximately 83 percent of the land in the corridor (60 to 69 square kilometers [15,000 to 17,000 acres]), DOE managed 12 percent (8.5 square kilometers [2,100 acres), and approximately 5 percent was private land (0.1 to 3.5 square kilometers [25 to 865 acres]).

Current land holdings for the Jean rail corridor are as follows: BLM-administered land, approximately 85 to 87 percent (61 to 73 square kilometers [15,000 to 18,000 acres); DOE land, approximately 10 to 13 percent (8.8 square kilometers [2,200 acres]); and private land, about 0.19 to 4.2 percent (0.1 to 3.5 square kilometers [25 to 870 acres]). The Jean rail corridor has two options, Wilson Pass and Stateline Pass, off the Union Pacific Railroad Mainline. The Wilson Pass option would cross private property at the

Bluejay, Snowstorm, and Pilgrim mines and run south of the Toiyabe National Forest in the Spring Mountains (Figure 5-4). The western option of the Jean rail corridor in Pahrump Valley also would intersect private property. The eastern option in that area would avoid those private parcels.

The Yucca Mountain FEIS reported that the Wilson Pass option would cross the Old Spanish Trail/Mormon Road Special Recreation Management Area, and four areas that the BLM has designated as available for sale or transfer. The option would be within approximately 1.6 kilometer (1 mile) of the

Table 5-8. 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)
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	Two 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

Table 5-8. 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)	
Workers	Yucca Mountain FEIS: 0.22 Updated analysis: 0.21
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 changes
Aesthetics	No changes
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 changes, none identified

Toiyabe National Forest. There have been no changes to the status of these areas since DOE completed the Yucca Mountain FEIS. The Yucca Mountain FEIS also reported that the Jean rail corridor would cross two wild horse and burro herd management areas and a BLM Class II visual resource area (see Sections 5.3.4 and 5.3.9, of this Nevada Rail Corridor SEIS, respectively).

The Stateline Pass option would begin in Ivanpah Valley and cross through the proposed Ivanpah Valley Airport in the area between Interstate Highway 15 and the Union Pacific Railroad rail line. Clark County was considering the construction of the airport when DOE completed the Yucca Mountain FEIS. On October 27, 2000, President Clinton signed the Ivanpah Valley Airport Public Land Transfer Act, which permitted the Secretary of the Interior to convey public lands for sale to the Clark County Department of Aviation (Public Law 106-362, 114 Stat. 1404). Since DOE completed the Yucca Mountain FEIS, the

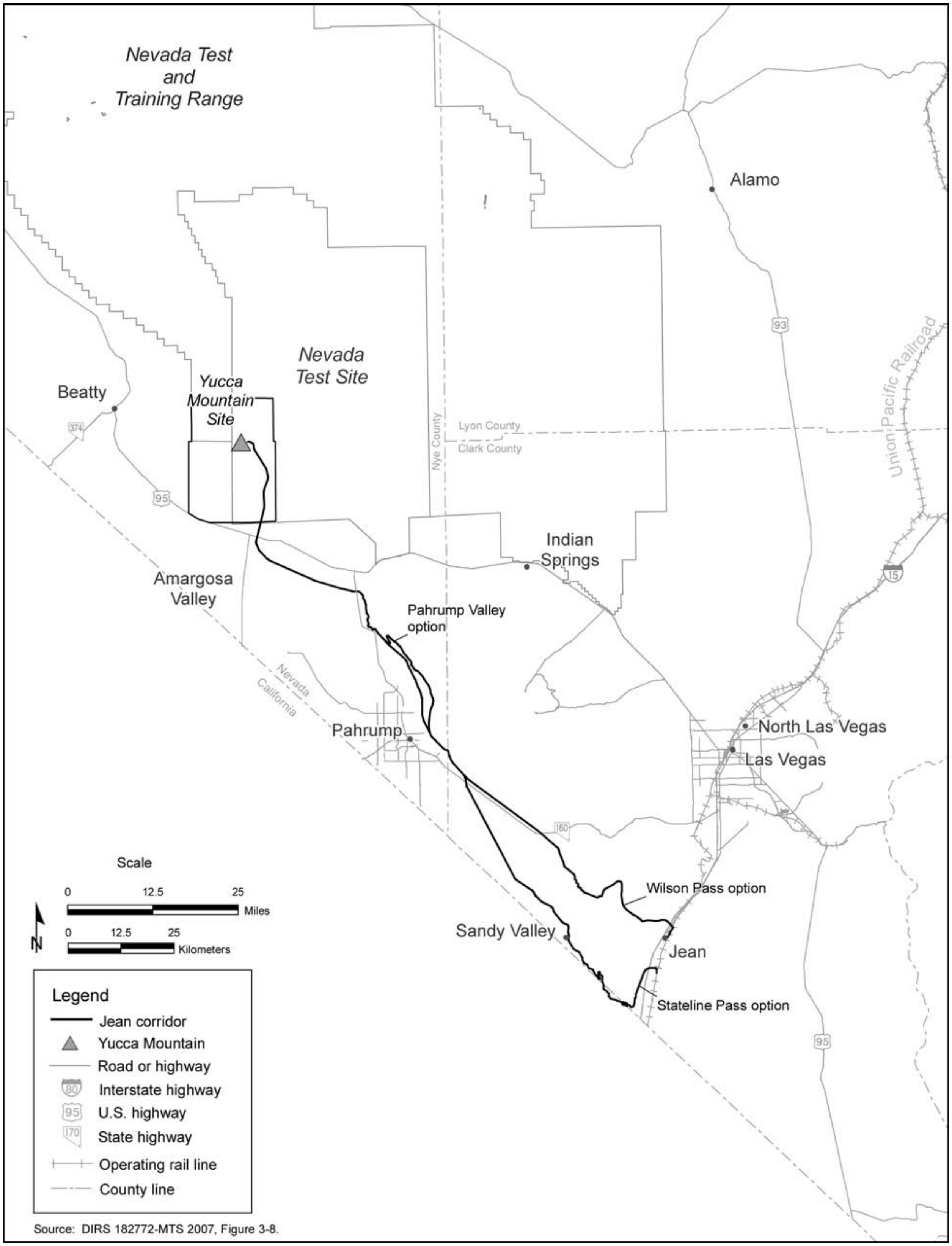


Figure 5-4. Jean rail corridor and options (2002).

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

The Stateline Pass option would cross the California-Nevada boundary and would cross into the Stateline Wilderness Area established by the California Desert Conservation Act. This Wilderness Area designation remains unchanged since DOE completed the Yucca Mountain FEIS.

DOE evaluated information in the Mineral Resources Data System and the Abandoned Mine database (DIRS 182772-MTS 2007, p. 96) to determine if there are any newly located mines, active or abandoned, since DOE completed the Yucca Mountain FEIS. In addition to the mines reported in the Yucca Mountain FEIS, the primary alignment for Jean would cross an abandoned mine and Purple Sage Claims. The Wilson Pass option would cross the Red Cloud Mine. Of these, Purple Sage Claims is an occurrence mine site, which means there has been discovery of an outcrop and there might be some land disturbance, but there is no mining operation underway at present. Red Cloud Mine is a past producer, which means mining occurred in the past but no mining operation is underway at present (DIRS 182772-MTS 2007, p. 96).

According to the Yucca Mountain FEIS, the Jean rail corridor would cross as many as eight BLM grazing allotments, depending on the option. The BLM has since updated their grazing allotment information. Updated information indicates that the Jean rail corridor and its options would cross up to 10 allotments: Mount Sterling, Wheeler Wash, Younts Spring, Stump Spring, Black Butte, Table Mountain, Spring Mountain, Roach Lake, two allotments BLM has designated as unused, and one designated as private (DIRS 182772-MTS 2007, p. 96).

The Yucca Mountain FEIS reported the Jean rail corridor would cross linear land features such as rights-of-way for utilities and roads. A review of BLM land records, including Master Title Plats, indicated the authorization of additional rights-of-way since DOE completed the Yucca Mountain FEIS (DIRS 182772-MTS 2007, p. 96).

5.3.2 AIR QUALITY

The Yucca Mountain FEIS evaluated air quality impacts common to all proposed rail corridors and noted that the impacts would include temporary increases in criteria pollutant concentrations from construction of the rail line. Construction equipment would emit carbon monoxide, nitrogen dioxide, sulfur dioxide, PM_{10}, and $PM_{2.5}$. Construction activities would emit PM_{10} and $PM_{2.5}$ in the form of fugitive dust from land clearing and filling, equipment traffic, activity of a quarry, and operation of concrete batch plants. The emissions would be temporary and would cover a large area as construction progressed along the length of the corridor.

Areas in violation of one or more of the criteria pollutant standards are classified as nonattainment areas. If there are not enough air quality data to determine the status of a remote or sparsely populated area, then the Environmental Protection Agency lists the area as unclassifiable and it is considered to be in attainment. The Jean rail corridor would pass through rural parts of Clark and Nye Counties in Nevada and one option would pass through a portion of rural San Bernardino County in California. A portion of

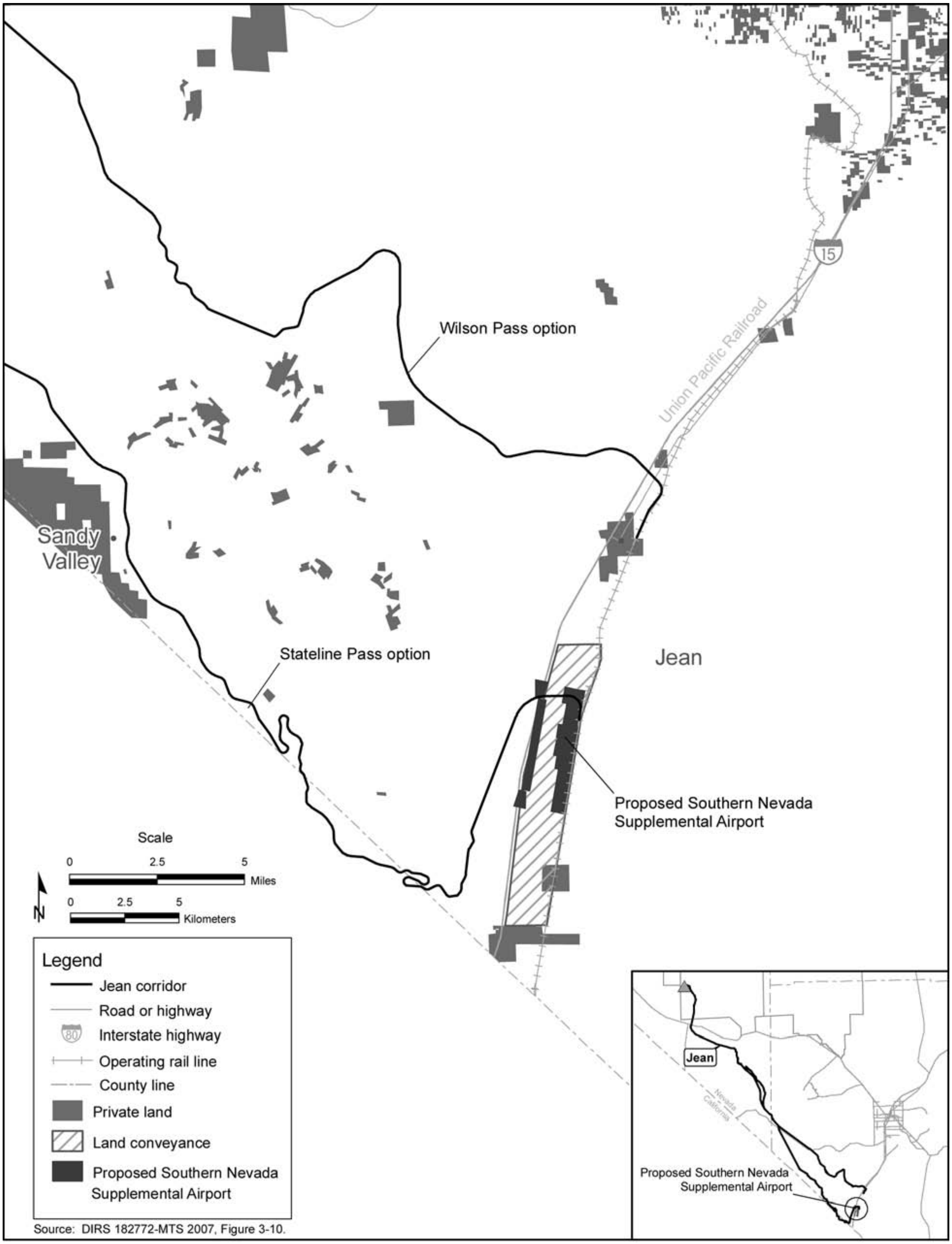


Figure 5-5. Location of proposed Southern Nevada Supplemental Airport.

the corridor would be in the Pahrump Valley in Nye County. At the time DOE completed the Yucca Mountain FEIS, these rural areas were all either unclassifiable or in attainment for criteria pollutants.

Since that time, however, the town of Pahrump and the nearby surrounding area have experienced double-digit growth and resultant development (DIRS 182772-MTS 2007, p. 102). The development has led to areas of cleared land, which has increased fugitive dust emissions. The Nevada Bureau of Air Quality Planning began monitoring the ambient air quality in Pahrump in January 2001. During 2001, 2002, and 2003, the 24-hour ambient air standard for PM_{10} was exceeded 27 times. Under the Clean Air Act, this means that Pahrump is no longer attaining the 24-hour standard of 150 micrograms per cubic meter (DIRS 182772-MTS 2007, p. 102). However, the U.S. Environmental Protection Agency has revoked, effective December 17, 2006 (71 *FR* 61144), the annual standard for PM_{10} from the National Ambient Air Quality Standards, citing a lack of evidence that links health problems to long-term exposure to coarse particle pollution.

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

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

During preparation of the Yucca Mountain FEIS, DOE conducted an air quality conformity review for the Jean rail corridor and determined that a conformity determination was not necessary because the entire corridor area was either in attainment or unclassifiable for criteria pollutants (DIRS 182772-MTS 2007, p. 102). Since the original air quality conformity review, the State of Nevada has monitored the town of Pahrump for ambient concentrations of PM_{10} and has signed the Memorandum of Understanding to improve air quality in the vicinity of Pahrump.

Because of the effective change in PM_{10} attainment status for the Pahrump Valley portion of the Jean rail corridor, this update used the air quality conformity review conducted for the Jean rail corridor in support of the Yucca Mountain FEIS to estimate potential PM_{10} emissions for comparison to the air quality General Conformity threshold level. A portion of the Jean rail corridor would cross the Las Vegas Valley, which was and remains a nonattainment area for PM_{10} and carbon monoxide (DIRS 182772-MTS 2007, p. 103).

The PM_{10} emissions for Jean rail corridor construction activities could exceed the General Conformity threshold level of 63 metric tons (70 tons) per year. Reviews of updated and more detailed information and methods (DIRS 182825-Nevada Rail Partners 2007, all; DIRS 180877-Nevada Rail Partners 2007, all) considered rail line construction and additional contributions from access roads, unpaved roads, storage piles, a batch plant, coarse stockpiles, and a quarry. The reviews indicated potential construction fugitive dust and PM_{10} emissions would increase above those originally estimated for the Yucca Mountain FEIS. Before any construction activities in the Jean rail corridor and Pahrump Valley, DOE would need to perform more detailed air quality calculations to evaluate the impacts of construction activities.

The State of Nevada has prepared a 2001 base-year emissions inventory for the Pahrump Valley area of 110,000 metric tons (120,000 tons) per year (DIRS 182772-MTS 2007, p. 103). The estimated emissions for rail line construction in the Jean rail corridor would be about 0.78 percent of this base-year inventory. A comparison for future years is not possible until finalization of the Clean Air Action Plan or State Implementation Plan.

Potential air quality impacts during rail line operation would result from diesel locomotives, which would emit carbon monoxide, nitrogen dioxide, sulfur dioxide, PM_{10}, and $PM_{2.5}$. Because the earthwork is complete, the extent of these impacts would be smaller during operations than during construction activities but would last longer. The number of locomotive engines in use and the associated operational characteristics would not differ appreciably from those in the Yucca Mountain FEIS. Therefore, there should be no measurable differences in potential impacts from those in the Yucca Mountain FEIS.

5.3.3 HYDROLOGY

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

5.3.3.1 Surface Water

There are no lakes, streams, or other perennial surface-water features along the Jean rail corridor or its options. The corridor and its options would cross seven mapped 100-year flood zones or flood zone groups (DIRS 155970-DOE 2002, Table 6-61). These remain unchanged since DOE completed the Yucca Mountain FEIS.

Impacts to surface-water resources from construction and operation of a railroad in the Jean rail corridor would be the same as those in the Yucca Mountain FEIS for all three options. Although unlikely, the spread of construction-related materials by precipitation or intermittent runoff events could occur during rail line construction. Impacts associated with changes in drainage patterns or to erosion and sedimentation rates or locations would be small and localized.

5.3.3.2 Groundwater

In the Yucca Mountain FEIS, the Department used terrain types to estimate total water demand. Since DOE completed the Yucca Mountain FEIS, DOE has canvassed similar projects throughout Nevada and determined that the amount and type of earthwork, not the terrain, would more accurately estimate total water demand associated with the construction of a rail line. Therefore, DOE updated the water demand based on earthwork needs. This resulted in an estimated water demand for the Jean rail corridor of approximately 4.17 million cubic meters (3,400 acre-feet) (DIRS 180877-Nevada Rail Partners 2007, p. 2-7) compared to the estimate based on terrain types reported in the Yucca Mountain FEIS of 500,000 cubic meters (410 acre-feet). To accommodate this increase in estimated water demand, DOE would need to draw more water than originally estimated in the Yucca Mountain FEIS from the underlying hydrographic basins and pump from additional wells. Groundwater withdrawal could temporarily affect discharge from nearby wells or springs. DOE would conduct detailed analyses if new wells required for construction of the rail line were to be located near other water sources.

Construction of a rail line would require water for soil compaction, dust control, and workforce use. Water use during construction would come primarily from groundwater resources, specifically from hydrographic basins. If the hydrographic basin is designated, permitted groundwater rights approach or exceed the estimated perennial yield, water resources are being depleted or require additional administration, and the Nevada State Engineer has declared preferred uses of the water. Table 5-9 updates the designation status of the hydrographic basins and the percentage of the Jean rail corridor that is in the respective basins. The total percentage of the Jean rail corridor in designated basins is about 87 percent. The Yucca Mountain FEIS estimated that about 90 percent of the length of the Jean rail corridor would be in designated basins.

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

Table 5-9. Hydrographic basins associated with the Jean rail corridor.[a,b]

Hydrographic basin (and subbasin where applicable)	Length (miles)[c]	Percentage of total[d]	Designated
Amargosa Desert	26	23	Yes
Fortymile Canyon/Jackass Flats	13	12	No
Ivanpah Valley/Southern Part	19	17	Yes
Mesquite Valley	12	11	Yes
Pahrump Valley	40	35	Yes
Rock Valley	2.1	1.8	No

a. Source: DIRS 182772-MTS 2007, p. 104.
b. To calculate water demand for each basin, multiply the total water demand for a given corridor by the percentage of total.
c. To convert miles to kilometers, multiply by 1.6093.
d. Based on primary option in the Yucca Mountain FEIS.

5.3.4 BIOLOGICAL RESOURCES AND SOILS

Potential impacts to biological resources and soils from the construction and operation of a railroad in the Jean rail corridor would be consistent with those reported in the Yucca Mountain FEIS. Maximum land disturbance for the construction of a rail line in the Jean rail corridor would not differ from the estimates in the Yucca Mountain FEIS and therefore the potential impacts would not change.

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

5.3.4.1 Biological Resources

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

Table 5-10 presents the special status species, big game habitat, and herd management areas identified in the Yucca Mountain FEIS and identifies additional information resulting from this update. The updated version of the Nevada Natural Heritage Program database examined for this Nevada Rail Corridor SEIS included observations of two additional sensitive species not included in the Yucca Mountain FEIS. They are the half-ring milkvetch/ Mojave milkvetch (*Astragalus mohavensis* var. *hemygurus*) and the Spring Mountains pyrg (*Pyrgulopsis deaconi*).

Table 5-10. Special status species, big game habitat, and herd management areas associated with the Jean rail corridor[a] (page 1 of 2).

		Yucca Mountain FEIS		Nevada Rail Corridor SEIS	
Resource	Type	In corridor	Within 3 miles[b]	In corridor	Within 3 miles
Threatened or endangered species (separated by type)					
Desert tortoise (*Gopherus agasizii*)	A/R	●		●	
Pahrump poolfish (*Empertrichthys latos)*	F				●
Sensitive Species					
Allen's big-eared bat (*Idionycteris phyllotis*)	M		●		●
Fringed myotis (*Myotis thysanodes*)	M		●		●
Long-legged myotis (Myotis volans)	M		●		●
Townsend's big-eared bat (*Corynorhinus townsendii*)	M	●		●	
Yuma myotis *(Myotis yumanensis*)	M	●		●	
Gila monster (*Heloderma suspectum cinctum)*	A/R		●		●
Oasis Valley springsnail (*Pyrgulopsis micrococcus*)	MO		●		●
Spring Mountains pyrg (*Pyrgulopsis deaconi*)	MO				●
Redheaded sphecid wasp (*Eucerceris ruficeps*)	I		●		●
Death Valley beardtongue (*Penstemon fruticiformis ssp. amargosae*)	P		●		●
Desert bearpoppy (*Arctomecon merriamii*)	P		●		●
Half-ring milkvetch/ Mojave milkvetch (*Astragalus mohavensis* var. *hemygurus)*	P				●
Pinto beardtongue (*Penstemon bicolor* spp.)	P	●	●	●	●
Pahrump Valley buckwheat (*Eriogonum bifurcatum*)	P		●		●
Rusby's globemallow (*Sphaeralcea rusbyi*)	P		●		●
Sheep fleabane (*Erigeron ovinus*)	P		●		●
Spring Mountain milketch (*Astragalus remotus*)	P		●		●
White-margined beardtongue (*Penstemon albomarginatus*)	P	●		●	
Wolly sage (*Salvia funerea*)	P	●		●	

Table 5-10. Special status species, big game habitat, and herd management areas associated with the Jean rail corridor[a] (page 2 of 2).

		Yucca Mountain FEIS		Nevada Rail Corridor SEIS	
Resource	Type	In corridor	Within 3 miles[b]	In corridor	Within 3 miles
Game habitat					
Bighorn sheep *(Ovis canadensis)*	M	●		●	
Mule deer *(Odocoileus hemionus)*	M	●		●	
Chukar *(Alectoris chukar)*	B	●		●	
Quail *(Callipepla gambelii)*	B	●		●	
Wild horse and burro herd management areas					
Ash Meadows					●
Johnnie		●		●	
Wheeler Pass		●		●	
Red Rock		●		●	

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

a. Sources: Data collected from DIRS 182772-MTS 2007, pp. 105 to 106; DIRS 182760-URS Corporation/Potomac-Hudson Engineering 2006, all).
b. To convert miles to kilometers, multiply by 1.6093.

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

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

5.3.4.2 Soils

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

The Yucca Mountain FEIS reported the construction of the Jean rail corridor would temporarily disturb soils in and adjacent to 9.3 square kilometers (2,300 acres) of land. Disturbance of erodible soils could lead to increased silt loads in water courses or increased soil transport by wind. Erosion control during construction, and revegetation or other means of soil stabilization after construction, would minimize these concerns. Impacts to soils in the corridor, including its options, would be small, but could occur throughout construction. The soils within the Jean rail corridor and the potential impacts to these soils remain unchanged since DOE completed the Yucca Mountain FEIS.

5.3.5 CULTURAL RESOURCES

The effects of rail line construction in the Jean rail corridor on cultural resources would be essentially the same as those DOE reported in the Yucca Mountain FEIS. Impacts to cultural resources from operation of a rail line in the Jean rail corridor would be unlikely.

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

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

The records search revealed the presence of 45 known archaeological sites within the 400-meter (0.25-mile) width of the Jean rail corridor. The difference between the six sites reported in the Yucca Mountain FEIS and the 45 identified in the new survey reflects the addition of sites recorded in the past decade, particularly in the vicinity of Yucca Mountain, where cultural resources inventories have been ongoing. Of the 45 known sites, 11 are eligible or potentially eligible for inclusion on the *National Register of Historic Places* (DIRS 182772-MTS 2007, p. 107).

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

5.3.6 OCCUPATIONAL AND PUBLIC HEALTH AND SAFETY

5.3.6.1 Industrial Safety

The categories of worker impacts include total recordable incidents, lost workdays, and fatalities. Recordable incidents or cases are occupational injuries or occupation-related illnesses that result in (1) a fatality, regardless of the time between the injury or the onset of the illness and death, (2) lost workday cases (nonfatal), and (3) incidents that result in the transfer of a worker to another job, termination of employment, medical treatment, loss of consciousness, or restriction of motion during work activities.

Revised estimates of the number of workers needed to construct the rail line resulted in 4,100 worker-years in comparison to the 855 worker-years estimated in the Yucca Mountain FEIS (2,000 hours per worker-year). Estimates of industrial safety impacts incorporate updated Bureau of Labor Statistics data for 2005 (DIRS 179131-BLS 2006, all; DIRS 179129-BLS 2007, all). The Yucca Mountain FEIS used 1998 data from the same source. Industrial safety impacts from operations in the Jean rail corridor would be lower than those in the Yucca Mountain FEIS because of differences in the labor statistics used. Operation of the railroad would require about 45 workers each year. Table 5-11 lists estimated industrial safety impacts reported in the Yucca Mountain FEIS as well as the updated information.

5.3.6.2 Transportation

Since DOE completed the Yucca Mountain FEIS, there have been updates to the methods and data used to estimate the radiation doses for workers and members of the public. Section 3.2.6 of this Nevada Rail

Table 5-11. Impacts to workers from industrial hazards during railroad construction and operations for the Jean rail corridor.[a]

Group and industrial hazard category	Construction: Yucca Mountain FEIS [b]	Construction: Update[c]	Operations: Yucca Mountain FEIS [d]	Operations: Update[e]	Total: Yucca Mountain FEIS	Total: Update
Involved worker						
Total recordable cases[f]	67	180	73	42	140	220
Lost workday cases	33	100	40	32	73	130
Fatalities	0.09	0.4	0.20	0.3	0.29	0.7
Noninvolved worker						
Total recordable cases	4.0	19	4.1	14	8.1	33
Lost workday cases	1.5	10	1.5	7	3.0	17
Fatalities	0.004	0.03	0.004	0.02	.008	.04
Totals[g]						
Total recordable cases	71	200	77	56	148	260
Lost workday cases	35	110	41	39	76	150
Fatalities	0.10	0.4	0.20	0.3	0.3	0.7

a. Estimates of worker-years multiplied by accident rate (DIRS 179131-BLS 2006, all; DIRS 179129-BLS 2007, all).
b. Estimated workforce to construct the railroad would be 855 worker-years.
c. Estimated workforce to construct the railroad would be 4,100 worker-years.
d. Totals for 24 years for operations.
e. Totals for up to 50 years of operations.
f. Total recordable cases include injuries, illnesses, and fatalities.
g. Totals might differ from sums of values due to rounding.

Corridor SEIS describes updates to the methods and data used to estimate impacts for the rail corridors. The impacts for the Jean rail corridor reflect new information resulting from these changes.

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

The Yucca Mountain FEIS evaluated traffic fatalities and vehicle emission impacts from the movement of equipment and delivery of materials for construction, worker commutes to and from construction sites, and transport of water to construction sites. Table 5-12 lists the impacts of transportation during the construction period. Due to the increased number of construction workers from the estimate in the Yucca Mountain FEIS, estimated traffic fatalities would increase from 0.7 to 2.5, and fatalities from exposure to vehicle emissions would increase from 0.09 to 0.3. Total transportation impacts from construction would be about 2.8 fatalities.

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

Table 5-12. Transportation impacts during railroad construction for the Jean rail corridor.

Transportation impact category	Traffic fatalities		Number of cancers		Total	
	Yucca Mountain FEIS	Update	Yucca Mountain FEIS	Update	Yucca Mountain FEIS	Update
Vehicle emission impacts (cancer fatalities)						
Material delivery vehicles	–	–	0.02	0.02	0.02	0.02
Worker commuting	–	–	0.07	0.3	0.07	0.3
Transportation accidents (fatalities)						
Material delivery vehicles	0.2	0.2	–	–	0.2	0.2
Worker commuting	0.5	2.3	–	–	0.5	2.3
Totals[b]	0.7	2.5	0.09	0.3	0.79	2.8

a. Source: DIRS 182772-MTS 2007, p. 109.
b. Totals might differ from sums of values due to rounding.

Table 5-13 lists the impacts of using the Jean rail corridor to ship spent nuclear fuel and high-level radioactive waste calculated using updated methods and data. The impacts presented reflect those from the mainline to the repository. This is in contrast to the Yucca Mountain FEIS, where the Nevada impacts started where the mainline intersects the Nevada border.

Table 5-13. Operations impacts of transportation for the Jean rail corridor.

Transportation impact category	Traffic fatalities		Number of cancers	
	Yucca Mountain FEIS	Update	Yucca Mountain FEIS	Update
Incident-free radiological impacts (LCFs)[b]				
Public (LCFs)	–	–	0.00085	0.00019
Workers (LCFs)	–	–	0.22	0.21
Radiological accident risks (LCFs)	-	-	0.000000015	0.0000018
Vehicle emission impacts (cancer fatalities)				
Waste transportation	–	–	0.00032	0.00083
Worker commuting	–	–	0.07	0.3
Transportation accidents (fatalities)				
Waste transportation	0.019	0.11	–	–
Worker commuting	0.5	2.0	–	–
Totals[c]	0.52	2.1	0.3	0.5

a. Source: DIRS 182772-MTS 2007, pp. 109 to 110.
b. LCF = latent cancer fatality.
c. Totals might differ from sums of values due to rounding.

For members of the public, estimated radiological impacts from incident-free (routine) transportation decreased from those in the Yucca Mountain FEIS, from 0.00085 to 0.00019 latent cancer fatality. This would be due primarily to the change in analysis for the Nevada rail line to model dedicated trains for shipments to the repository (DIRS 182772-MTS 2007, p. 110), which would be partially offset by the increase in the latent cancer fatality conversion factor.

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

Estimated radiological accident risks increased from 0.000000015 to 0.0000018 latent cancer fatality. This would be due primarily to the use of the combined Track Class 3 transportation accident rate (DIRS 182772-MTS 2007, p. 110) based on train-kilometers and railcar-kilometers and the increase in the latent cancer fatality conversion factor, and the increase in the population along the Jean rail corridor. Although this is an increase, radiological accident risk would still be a negligible contributor to the overall transportation risk.

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

Estimated impacts from nonradiological transportation accidents would increase from 0.019 to 0.11 fatality. This is the most notable change to accident risk and would be due primarily to the use of the updated rail fatality rate (DIRS 178016-DOT 2005, all) and from accounting for the presence of locomotives and buffer cars in the estimation of the number of nonradiological transportation accident fatalities. Traffic fatalities associated with commuting workers could also increase due to the increase in the numbers of workers.

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

5.3.7 SOCIOECONOMICS

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

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

Clark County, which includes Las Vegas, dominates the region of influence with a 2006 estimated population of 1.89 million, which is approximately 7 percent more than the population that DOE reported in the Yucca Mountain FEIS. Population growth in the unincorporated town of Pahrump dominates Nye County's growing popularity as a residential destination. Since DOE completed the Yucca Mountain FEIS, Pahrump, the largest population center in Nye County, has experienced double-digit growth. The estimated population of Pahrump increased from 23,000 in July 1999 to 33,000 by July 2005, an increase of about 45 percent (DIRS 182772-MTS 2007, p. 111). In the same period, the State Demographer estimates that Nye County as a whole grew from about 31,000 to about 41,000. The average annual impact from the construction and operation of a railroad to the baseline populations in Clark and Nye Counties would be small.

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

5.3.8 NOISE AND VIBRATION

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

5.3.9 AESTHETICS

Based on a corridor-level analysis and an evaluation of current BLM resource management plans, there have been no changes to visual resource management classifications for the Jean rail corridor since DOE completed the Yucca Mountain FEIS. As discussed in the Yucca Mountain FEIS, the Wilson Pass option of the Jean rail corridor would pass through visual resource management Class II areas. The BLM established objective for Class II areas, in order to retain the existing character of the landscape, is that the level of change to the characteristic landscape should be low. Therefore, impacts from the construction and operation of the railroad would continue to be a conflict with the visual resource classification.

5.3.10 UTILITIES, ENERGY, AND MATERIALS

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

The Jean rail corridor would pass through rural parts of Clark and Nye Counties in Nevada, and one of the options would cross a portion of rural San Bernardino County in California, that have little access to support services for much of the corridor. Electric power for construction would be initially supplied by portable generators. New power lines would be installed to provide power for construction services and would be extended, via underground distribution along the rail roadbed, to meet all other construction and operations needs. Construction equipment would consume motor fuel (diesel and gasoline). The total motor fuel use in Nevada in 2005 was about 5.8 billion liters (1.5 billion gallons) (DIRS 182772-MTS 2007, p. 111). Highway motor fuel use in the state in 2005 increased 6.2 percent over that in 2004, the largest percentage increase for any state and attributable to Nevada's growing population. Table 5-14 lists the estimated amounts of diesel fuel and gasoline for rail line construction in the Jean rail corridor, which are higher than the estimates in the Yucca Mountain FEIS. Based on a construction period of 43 months, the annual average use of motor fuel would be about 0.42 percent of that consumed annually in Nevada. Unlike overall state use, construction activities would use primarily diesel fuel, which would be about 1.6 percent of all special fuel (mainly diesel) used annually in Nevada.

Steel for rails, concrete (principally for rail ties, bridges, and drainage structures), and rock for ballast would be the primary materials that the construction of a rail line would consume. Table 5-14 lists estimates of steel and concrete consumption, which have increased over those reported in the Yucca Mountain FEIS.

Table 5-14. Construction fuel and materials impacts for the Jean rail corridor.[a]

	Diesel fuel use (million gallons)[d]		Gasoline use (million gallons)		Steel (thousand tons)[e]		Concrete (thousand tons)	
Length (miles)[b,c]	Yucca Mountain FEIS	Update	Yucca Mountain FEIS	Update	Yucca Mountain FEIS	Update	Yucca Mountain FEIS	Update
112	7	23	0.1	0.4	29	33	165	132

a. Update source: DIRS 180877-Nevada Rail Partners 2007, p. 2-7, Table 2-1; DIRS 182772-MTS 2007, p. 112.
b. Corridor length used for comparative evaluation.
c. To convert miles to kilometers, multiply by 1.6093.
d. To convert gallons to liters, multiply by 3.78533.
e. To convert tons to metric tons, multiply by 0.90718.

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

5.3.11 WASTE MANAGEMENT

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

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

The Yucca Mountain FEIS estimated the peak annual generation of sanitary solid waste would be 910 metric tons (1,000 tons). DOE now estimates that solid municipal waste from construction facilities would be 500 metric tons (550 tons) during the peak year of construction. An assumed 25 percent of the waste would be recyclable, which would result in about 380 metric tons (410 tons) of waste to be disposed of at municipal landfills. The estimated total mass of waste that would be generated during construction of the rail line is about 1,200 metric tons (1,300 tons). This mass of sanitary solid waste would occupy about 2,900 cubic meters (3,800 cubic yards) of landfill volume at a waste density of 410 kilograms per cubic meter (700 pounds per cubic yard) (DIRS 182772-MTS 2007, p. 112). Heavier equipment used at large facilities such as the Apex Landfill in Clark County would result in greater waste compaction and less waste volume. The estimated average daily disposal mass would be about 1 metric ton (1.1 tons) per day.

A rail line in the Jean rail corridor would represent an increase in waste volume requiring processing for rural counties. Nye County disposed of about 250 metric tons (280 tons) of waste during 2003 at three different landfills (DIRS 182772-MTS 2007, p. 112), but the county plans to close two of these landfills by 2011, which represent 96 percent of the county's current waste disposal capacity. The Apex Landfill in Clark County serves the Las Vegas Valley and receives 8,000 metric tons (8,800 tons) each day (DIRS 174041-State of Nevada 2004, pp. 6 and 7). The estimated closure for this landfill is in 2047. Waste generated during construction could be trucked to the larger landfill with negligible impact on waste disposal capacity.

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

5.3.12 ENVIRONMENTAL JUSTICE

The Yucca Mountain FEIS environmental justice analysis considered the potential for disproportionately high and adverse impacts on two segments of the overall population – minority communities and low-income communities.

As discussed in Sections 3.2.12.1 and 5.1.1.12, for this Nevada Rail Corridor SEIS DOE used the revised methodology of the U.S. Nuclear Regulatory Commission to identify low-income and minority communities (69 *FR* 52048). See Section 5.1.1.12 for a discussion of the methodology. The region of influence identified in the Yucca Mountain FEIS for the Jean rail corridor has remained the same. Furthermore, county-level U.S. Census Bureau data estimates for 2006 suggest that while the population in southern Nevada is growing rapidly, the locations of concentrations of minority and low-income populations have remained relatively constant and static since 2000 (DIRS 182772-MTS 2007, p. 113).

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

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

5.4 Valley Modified Rail Corridor

Table 5-15 summarizes the results of the update to the primary impact indicators for the Valley Modified rail corridor and compares them with the corridor information published in the Yucca Mountain FEIS. The information reflects the total for the construction and operation of the rail corridor unless otherwise noted.

The Valley Modified rail corridor would originate near the existing Apex rail siding off the Union Pacific Railroad Mainline. It would travel northwest and pass north of the City of North Las Vegas and Las Vegas, and near the Town of Indian Springs and parallel to U.S. Highway 95 before it entered the southwest corner of the Nevada Test Site and reached Yucca Mountain (see Figure 5-6).

Table 5-15. 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 sensitive species recorded
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 5-15. 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 changes
Aesthetics	No changes
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 changes, none identified

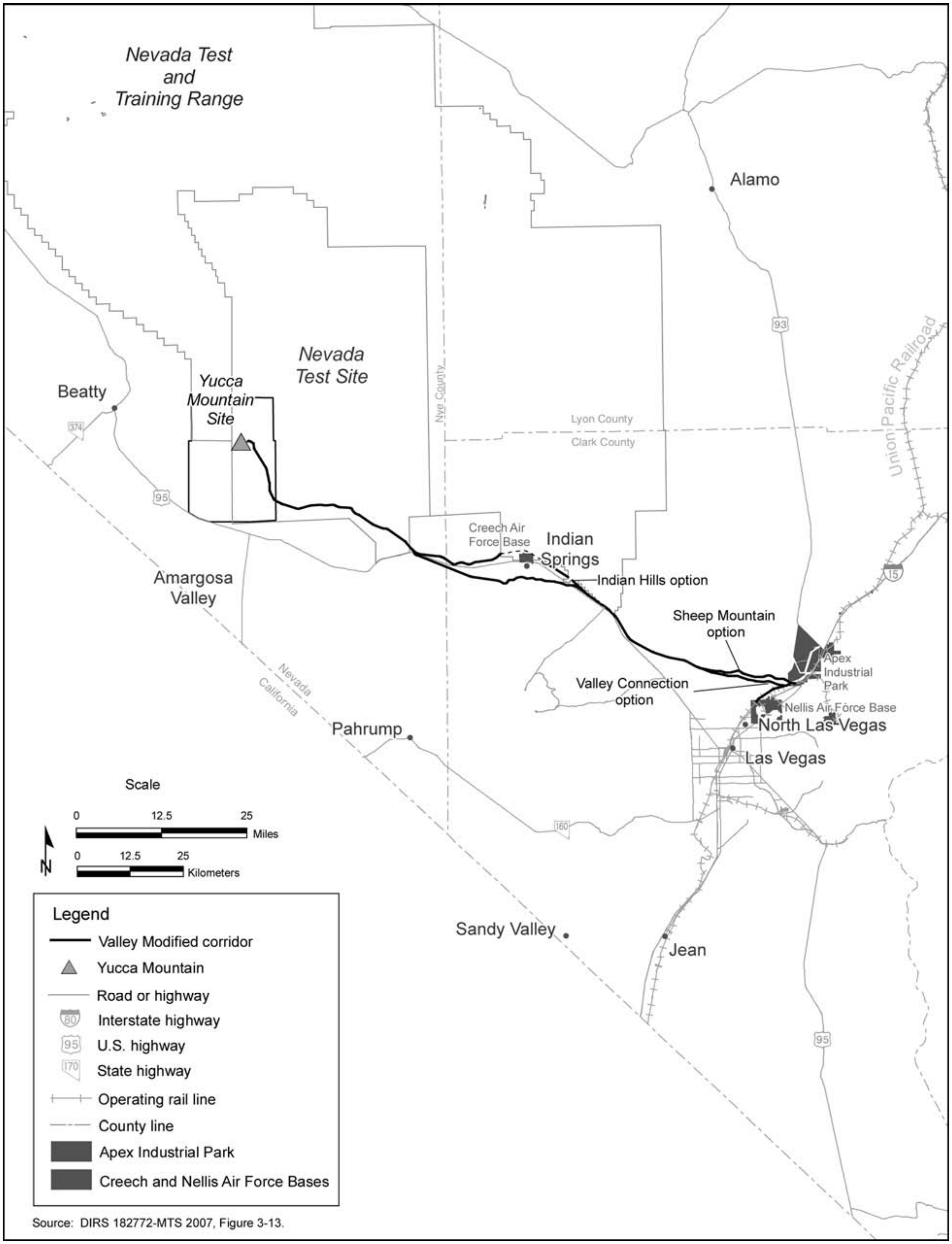


Figure 5-6. Valley Modified rail corridor and options (2002).

Valley Modified rail corridor options would range from 157 to 163 kilometers (98 to 101 miles) long. Figure 5-6 shows the corridor and its options. The corridor has two possible starting locations and two possible options until they merge north of the City of Las Vegas in the Apex area. The Valley Modified rail corridor has three options – Valley Connection, Sheep Mountain, and Indian Hills. The Yucca Mountain FEIS contains detailed descriptions of the corridor and its options.

5.4.1 LAND USE AND OWNERSHIP

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

The Yucca Mountain FEIS reported that the BLM administered approximately 53 percent (30 to 37 square kilometers [7,400 to 9,000 acres]) of the land in the corridor, the Department of Defense managed 11 percent (3.6 to 7.5 square kilometers [900 to 1,900 acres]), DOE managed 32 percent (20.6 square kilometers [5,100 acres]), the U.S. Fish and Wildlife Service controlled 3 percent (1.7 to 4.1 square kilometers [420 to 1,000 acres]), and less than 1 percent was private land (DIRS 182772-MTS 2007, p. 115).

Current land holdings for the Valley Modified rail corridor are as follows: the BLM administers about 51 to 54 percent (31 to 36 square kilometers [7,700 to 8,900 acres]), the Department of Defense manages 7.5 to 13 percent (4.3 to 9.4 square kilometers [1,100 to 2,300 acres]), DOE manages 32 percent (unchanged), the U.S. Fish and Wildlife Service controls about 3 percent (unchanged), and less than 1 percent is private land (unchanged) (DIRS 182772-MTS 2007, p. 115).

In 2005, the U.S. Air Force designated the Indian Springs Air Force Auxiliary Airfield to Creech Air Force Base and expanded its mission and infrastructure (GlobalSecurity.org 2005). The base is home to two key military operations: the MQ-1 Predator unmanned aerial vehicle and the Unmanned Aerial Vehicle Battle laboratory. The Yucca Mountain FEIS reported the Valley Modified rail corridor would pass through this area, which at the time was predominantly vacant land under Air Force management. At present, the corridor would cross infrastructure the Air Force constructed to support the mission of Creech Air Force Base. The Indian Hills option would bypass this land-use conflict.

The Apex Industrial Park is an 85-square-kilometer (21,000-acre) area privately held by the VesCor real estate development company. It is approximately 21 kilometers (13 miles) northeast of downtown Las Vegas and about 6 kilometers (4 miles) from the Las Vegas metropolitan area. It is one of the few large contiguous industrial properties in Southern Nevada. Since DOE issued the Yucca Mountain FEIS, this industrial park has gone beyond a proposed activity to one in which 24 square kilometers (6,000 acres) are available for immediate sale and development, with nearly half already sold (DIRS 182772-MTS 2007, p. 116). The Valley Modified rail corridor would cross approximately 0.5 square kilometer (110 acres) of the Apex Industrial Park.

The BLM is currently preparing an EIS and initiating public scoping for UNEV, LLC, proposal to construct and operate a liquid petroleum products pipeline from Woods Cross, Utah, to the Apex Industrial Park in Nevada. This proposed activity is approximately 13 kilometers (8 miles) north of the Valley Modified rail corridor.

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

The Yucca Mountain FEIS reported the Sheep Mountain option would pass through the Desert National Wildlife Refuge. Upon further evaluation, the Sheep Mountain and Valley Connection options, and a portion of the common corridor segment just north of these options would pass through the Desert National Wildlife Refuge. The Desert National Wildlife Refuge, established in 1936, includes a 610-square-kilometer (1.5-million-acre) area to protect the desert bighorn sheep and its habitat. In 1979, approximately 580 square kilometers (1.4 million acres) of this land were found to be suitable for further consideration as wilderness and were proposed for designation as a unit of the National Wilderness Preservation System. This means the area remains in proposed wilderness status and is managed as wilderness in accordance with National Wildlife Refuge System policy; public use is limited to wildlife observation, primitive camping, and picnicking. This current land status would present a land-use conflict. According to the U.S. Fish and Wildlife Service, the Comprehensive Conservation Plan Environmental Impact Statement process, currently underway, is evaluating the wilderness status of this area (DIRS 182772-MTS 2007, p. 116).

The Yucca Mountain FEIS reported the corridor would cross three BLM grazing allotments (Wheeler Slope, Indian Springs, and Las Vegas Valley). The BLM has since updated their grazing allotment information. The Valley Modified rail corridor now would cross the Mount Sterling, Indian Springs, Wheeler Wash (formerly Wheeler Slope), Lucky Stripe, and the Las Vegas Valley Grazing Allotments, depending on the option.

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

The Yucca Mountain FEIS reported that the Valley Modified rail corridor would cross linear land features such as rights-of-way for utilities, and roads. A review of BLM records, including Master Title Plats, indicated the authorization of additional rights-of-way since DOE completed the Yucca Mountain FEIS (DIRS 182772-MTS 2007, pp. 116 to 117).

5.4.2 AIR QUALITY

The Yucca Mountain FEIS evaluated air quality impacts common to all proposed corridors and noted these would include temporary increases in criteria pollutant concentrations from construction of the rail line. Construction equipment would emit carbon monoxide, nitrogen dioxide, sulfur dioxide, PM_{10}, and $PM_{2.5}$. Construction activities would emit PM_{10} in the form of fugitive dust from land clearing and filling, equipment traffic, activity of a quarry, and operation of concrete batch plants. The emissions would be temporary and would cover a sizeable area as construction progressed along the corridor.

The Valley Modified rail corridor would pass north of the Las Vegas metropolitan area and on through rural parts of Clark and Nye Counties. A portion of the corridor would be in the Las Vegas Valley in Clark County. When DOE prepared the Yucca Mountain FEIS, the Las Vegas Valley was in nonattainment for the criteria pollutants, carbon monoxide and PM_{10}. Areas in violation of one or more of the criteria pollutant standards are classified as nonattainment areas. The Las Vegas Valley remains officially in nonattainment for these two criteria pollutants (DIRS 182772-MTS 2007, p. 119), although progress has been made since 2000; the Valley is attaining the carbon monoxide National Ambient Air Quality Standard (70 *FR* 31353), and the U.S. Environmental Protection Agency approved implementation plans for PM_{10} in 2004 (69 *FR* 32277).

During preparation of the Yucca Mountain FEIS, DOE conducted an air quality conformity review for areas of the Valley Modified rail corridor in the Las Vegas Valley (DIRS 182772-MTS 2007, p. 119). This review determined that construction activities in the Las Vegas Valley would be likely to exceed the General Conformity threshold level for PM_{10}. Reviews of updated and more detailed information and methods (DIRS 182825-Nevada Rail Partners 2006, all; DIRS 180877-Nevada Rail Partners 2007, all) considered rail line construction and additional contributions from construction of access roads, unpaved roads, storage piles, batch plants, coarse stockpiles, and a quarry. The reviews indicated potential construction fugitive dust and PM_{10} emissions would increase above those originally estimated for the Yucca Mountain FEIS. Before any construction activities in the Valley Modified rail corridor, DOE would need to perform more detailed air quality calculations to evaluate the impacts of construction activities.

Potential air quality impacts during railroad operations would result from diesel locomotives, which would emit carbon monoxide, nitrogen dioxide, sulfur dioxide, PM_{10}, and $PM_{2.5}$. Because the earthwork is complete, the extent of these impacts would be smaller during operations than during construction activities but would last longer. The number of locomotives in use and the associated operational characteristics would not differ appreciably from those described in the Yucca Mountain FEIS. Therefore, measurable differences in potential impacts from those described in the Yucca Mountain FEIS are unlikely and remain small.

5.4.3 HYDROLOGY

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

5.4.3.1 Surface Water

The corridor and its options would cross only two mapped 100-year flood zones or flood zone groups (DIRS 155970-DOE 2002, Table 6-74). These remain unchanged since DOE published the Yucca Mountain FEIS. Impacts to surface-water resources from rail line construction in the Valley Modified rail corridor would be the same as those reported in the Yucca Mountain FEIS for all three options. Although unlikely, the spread of construction-related materials by precipitation or intermittent runoff events could occur during the construction of the rail line. Impacts associated with altering drainage patterns or changing erosion and sedimentation rates or locations would be small and localized.

5.4.3.2 Groundwater

In the Yucca Mountain FEIS, the Department used terrain types to estimate total water demand. Since DOE completed the Yucca Mountain FEIS, the Department has canvassed similar projects throughout

Nevada and determined that the amount and type of earthwork, not the terrain, would more accurately estimate total water demand associated with the construction of a rail line. Therefore, DOE updated the water demand based on earthwork needs. This resulted in an estimated water demand for the Valley Modified rail corridor of approximately 3.44 million cubic meters (2,800 acre-feet) (DIRS 180877-Nevada Rail Partners 2007, p. 2-7) compared to the estimate based on terrain types reported in the Yucca Mountain FEIS of 395,000 cubic meters (320 acre-feet). To accommodate this increase in estimated water demand, DOE would need to draw more water than originally estimated in the Yucca Mountain FEIS from the underlying hydrographic basins and pump from additional wells. Groundwater withdrawal could temporarily affect discharge from nearby wells or springs. DOE would conduct detailed analyses if new wells required for construction of the rail line were to be located near other water sources.

Water use during construction would come primarily from groundwater resources, specifically from hydrographic basins. If the hydrographic basin is designated, permitted groundwater rights approach or exceed the estimated perennial yield, water resources are being depleted or require additional administration, and the Nevada State Engineer has declared preferred uses of the water. Table 5-16 updates the designation status of the hydrographic basins and the percentage of the Valley Modified rail corridor that is in the respective basin. The total percentage of the Valley Modified rail corridor in

Table 5-16. Hydrographic basins associated with the Valley Modified rail corridor.[a,b]

Hydrographic basin (and subbasin where applicable)	Length (miles)[c]	Percentage of total[d]	Designated
Fortymile Canyon/Jackass Flats	11	11	No
Indian Springs Valley	18	18	Yes
Las Vegas Valley	35	36	Yes
Mercury Valley	12	12	No
Rock Valley	11	12	No
Three Lakes Valley	12	12	No

a. Source: DIRS 182772-MTS 2007, p. 120.
b. To calculate water demand for each basin, multiply the total water demand for a given corridor by the percentage of total.
c. To convert miles to kilometers, multiply by 1.6093.
d. Based on primary option in the Yucca Mountain FEIS.

designated basins is about 54 percent. The Yucca Mountain FEIS estimated that about 70 percent of the length of the Valley Modified rail corridor would be in designated basins.

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

5.4.4 BIOLOGICAL RESOURCES AND SOILS

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

Consistent with the Yucca Mountain FEIS, this update considered the potential for impacts to vegetation communities; special status species (plants and animals), including their habitat; springs, wetlands, and riparian areas; big game habitat; and wild horse and burro herd management areas that may occur within the 400-meter (0.25-mile)-wide corridor. The analysis considered special status species and big game habitat within 5 kilometers (3 miles) of the corridor that may be affected by construction of the rail line.

DOE also analyzed springs and riparian areas that could be affected by permanent changes in surface-water flows.

5.4.4.1 Biological Resources

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

Table 5-17 presents the special status species, big game habitat, and herd management areas identified in the Yucca Mountain FEIS and identifies additional information resulting from this update. The updated version of the Nevada Natural Heritage Program database examined for this Nevada Rail Corridor SEIS included observations of six additional sensitive species not included in the Yucca Mountain FEIS. They include the:

- Southwestern willow flycatcher (*Empidonax traillii extimus*)
- Clarke phacelia *(Phacelia filiae)*
- Clokey buckwheat (*Eriogonum heermannii* var. *clokeyi*)
- Fringed myotis (*Myotis thysanodes*)
- Las Vegas buckwheat (*Eriogonum corymbosum* var. *nilesii*)
- Planoconvex cordmoss (*Entosthodon planoconvexus*)

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

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

5.4.4.2 Soils

The Yucca Mountain FEIS classified soils in the Valley Modified rail corridor with four attributes: shrink swell, erodes easily, unstable fill, and blowing soil. As noted in the Yucca Mountain FEIS, the shrink swell and blowing soil attributes are common in the Valley Modified rail corridor. The Yucca Mountain FEIS also reported that there were no soils classified as prime farmland within the Valley Modified rail corridor. No significant new information was readily available about the attributes of the soils surveyed in the corridor.

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

Table 5-17. Special status species, big game habitat, and herd management areas associated with the Valley Modified rail corridor[a] (page 1 of 2).

		Yucca Mountain FEIS		Nevada Rail Corridor SEIS	
Resource	Type	In corridor	Within 3 miles[c]	In corridor	Within 3 miles
Threatened or endangered species (separated by type)					
Southwestern willow flycatcher (*Empidonax traillii extimus*)	B				●
Desert tortoise (*Gopherus agasizii*)	A/R	●		●	
Pahrump poolfish (Empetrichthys latos)[b]	F		●		●
Razorback sucker (*Xyrauchen texanus)*	F		●		●
Sensitive Species					
Fringed myotis (*Myotis thysanodes*)	M				●
Townsend's big-eared bat (*Corynorhinus townsendii*)	M	●		●	
Clarke phacelia *(Phacelia filiae)*	P			●	
Beatley's scorpionweed (*Phacelia beatleyae*)	P		●		●
California bearpoppy (*Arctomecon californica*)	P		●		●
Clokey buckwheat (*Eriogonum heermannii* var. *clokeyi*)	P				●
Death Valley beardtongue (*Penstemon fruticiformis* ssp. *amargosae*)	P		●		●
Desert/white/Merrium bearpoppy (*Arctomecon merriamii*)	P		●	●	●
Half-ring milkvetch/ Mojave milkvetch (*Astragalus mohavensis* var. *hemygurus)*	P	●		●	●
Largeflower suncup (*Camissonia megalantha*)	P		●		●
Las Vegas buckwheat (*Eriogonum corymbosum* var. *nilesii*)	P				●
Parish scorpionweed (*Phacelia parishii*)	P	●	●	●	●
Pinto beardtongue (*Penstemon bicolor* ssp.)	P		●	●	●
Planoconvex cordmoss (*Entosthodon planoconvexus*)	P				●
Ripley's springparsley/sanicle biscuitroot *(Cymopterus ripleyi* var. *saniculoides)*	P	●		●	
White-margined beardtongue (*Penstemon albomarginatus*)	P	●		●	

Table 5-17. Special status species, big game habitat, and herd management areas associated with the Valley Modified rail corridor[a] (page 2 of 2).

		Yucca Mountain FEIS		Nevada Rail Corridor SEIS	
Resource	Type	In corridor	Within 3 miles[c]	In corridor	Within 3 miles
Game habitat					
Bighorn sheep (*Ovis Canadensis*)	M	●		●	
Mule deer (*Odocoileus hemionus*)	M	●		●	
Quail (*Callipepla gambelii*)	B	●		●	
Wild horse and burro herd manaagement areas					
Johnnie				●	
Wheeler Pass			●		●
Species Type Key	*M = Mammal* *B = Bird* *A/R = Amphibian or Reptile* *F = Fish*		*MO = Mollusk* *I = Insect* *P = Plant*		

a. Sources: Data collected from DIRS 182772-MTS 2007, pp. 121 and 122; DIRS 182760-URS Corporation/Potomac-Hudson Engineering 2006, all.
b. Pahrump pool fish have been introduced into ponds in Floyd Lamb State Park and into the outflow of Corn Creek Springs, both of which are outside the region of influence for surface waters.
c. To convert miles to kilometers, multiply by 1.6093.

5.4.5 CULTURAL RESOURCES

The effects of rail line construction in the Valley Modified rail corridor on cultural resources would be essentially the same as those DOE reported in the Yucca Mountain FEIS. Impacts to cultural resources from operation of a railroad in the Valley Modified rail corridor would be unlikely.

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

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

The records search revealed the presence of 45 known archaeological sites within the 400-meter (0.25-mile) width of the Valley Modified rail corridor. The difference between the 19 sites reported in the Yucca Mountain FEIS and the 45 identified in the new survey reflects the addition of sites recorded in the past decade, particularly in the vicinity of Yucca Mountain, where cultural resources inventories and improvements in cultural resources records have been ongoing. Of the 45 known sites, 12 are eligible or potentially eligible for inclusion on the *National Register of Historic Places* (DIRS 182772-MTS 2007, p. 123).

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

5.4.6 OCCUPATIONAL AND PUBLIC HEALTH AND SAFETY

5.4.6.1 Industrial Safety

The categories of worker impacts include total recordable incidents, lost workdays, and fatalities. Recordable incidents or cases are occupational injuries or occupation-related illnesses that result in (1) a fatality, regardless of the time between the injury or the onset of the illness and death, (2) lost workday cases (nonfatal), and (3) incidents that result in the transfer of a worker to another job, termination of employment, medical treatment, loss of consciousness, or restriction of motion during work activities.

Revised estimates of the number of workers needed to construct the rail line resulted in 2,500 worker-years in comparison to the 405 worker-years estimated in the Yucca Mountain FEIS (2,000 hours per worker-year). Estimates of industrial safety impacts incorporate updated Bureau of Labor Statistics data for 2005 (DIRS 179131-BLS 2006, all; DIRS 179129-BLS 2007, all). The Yucca Mountain FEIS used 1998 data from the same source. Industrial safety impacts from operations in the Valley Modified rail corridor would be lower than those in the Yucca Mountain FEIS because of differences in the labor statistics used. Operation of the railroad would require about 45 workers each year. Table 5-18 lists estimated industrial safety impacts reported in the Yucca Mountain FEIS as well as the updated information.

Table 5-18. Impacts to workers from industrial hazards during railroad construction and operations for the Valley Modified rail corridor.[a]

	Construction		Operations		Total	
Group and industrial hazard category	Yucca Mountain FEIS[b]	Update[c]	Yucca Mountain FEIS[d]	Update[e]	Yucca Mountain FEIS	Update
Involved worker						
Total recordable cases[f]	32	120	73	42		160
Lost workday cases	16	64	40	32		100
Fatalities	0.04	0.2	0.20	0.3		0.5
Noninvolved worker						
Total recordable cases	1.9	12	4.1	14		26
Lost workday cases	0.7	6	1.5	7		13
Fatalities	0.002	0.02	0.004	0.02		0.04
Totals[g]						
Total recordable cases	34	130	77	60	111	190
Lost workday cases	16	70	41	40	57	110
Fatalities	0.05	0.2	0.20	0.3	0.25	0.5

a. Estimates of worker-years multiplied by accident rate (DIRS 179131-BLS 2006, all; DIRS 179129-BLS 2007, all).
b. Estimated workforce to construct the railroad would be 405 worker-years.
c. Estimated workforce to construct the railroad would be 2,500 worker-years.
d. Totals for 24 years for operations.
e. Totals for up to 50 years of operations.
f. Total recordable cases include injuries, illnesses, and fatalities.
g. Totals might differ from sums of values due to rounding.

5.4.6.2 Transportation

Since DOE completed the Yucca Mountain FEIS, there have been updates to the methods and data used to estimate the radiation doses for workers and members of the public. Section 3.2.6 of this Nevada Rail

Corridor SEIS describes updates to the methods and data used to estimate impacts for the rail corridors. The impacts for the Carlin rail corridor reflect new information resulting from these changes.

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

The Yucca Mountain FEIS evaluated traffic fatalities and vehicle emissions impacts from the movement of equipment and delivery of materials for construction, worker commutes to and from construction sites, and transport of water to construction sites. Table 5-19 lists the impacts of transportation during the construction phase. Due to the increased number of construction workers from the estimate in the Yucca Mountain FEIS, estimated traffic fatalities would increase from 0.4 to 1.5, and fatalities from exposure to vehicle emissions would increase from 0.05 to 0.2. Total transportation impacts from construction would be about 1.7 fatalities.

Table 5-19. Transportation impacts during railroad construction for the Valley Modified rail corridor.[a]

Transportation impact category	Traffic fatalities		Number of cancers		Total	
	Yucca Mountain FEIS	Update	Yucca Mountain FEIS	Update	Yucca Mountain FEIS	Update
Vehicle emission impacts (cancer fatalities)						
Material delivery vehicles	–	–	0.02	0.02		
Worker commuting	–	–	0.03	0.2		
Transportation accidents (fatalities)						
Material delivery vehicles	0.1	0.1	–	–		
Worker commuting	0.2	1.4	–	–		
Totals[b]	0.4	1.5	0.05	0.2	0.45	1.7

a. Source: DIRS 182772-MTS 2007, p. 125.
b. Totals might differ from sums of values due to rounding.

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

Table 5-20 lists the impacts of using the Valley Modified rail corridor to ship spent nuclear fuel and high-level radioactive waste calculated using updated methods and data. The impacts presented reflect those from the mainline to the repository. This is in contrast to the Yucca Mountain FEIS, where the Nevada impacts started where the mainline intersects the Nevada border.

Table 5-20. Operations impacts of transportation for the Valley Modified rail corridor.[a]

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

a. Source: DIRS 182772-MTS 2007, p. 126.
b. LCF = latent cancer fatality.
c. Totals might differ from sums of values due to rounding.

For members of the public, estimated radiological impacts from incident-free (routine) transportation decreased from those in the Yucca Mountain FEIS, from 0.00065 to 0.00014 latent cancer fatality. This would be due primarily to the change in analysis for the Nevada rail line to model dedicated trains for shipments to the repository (DIRS 182772-MTS 2007, p. 125), which would be partially offset by the increase in the latent cancer fatality conversion factor.

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

Estimated radiological accident risks increased from 0.0000000029 to 0.0000013 latent cancer fatality. This would be due primarily to the use of the combined Track Class 3 transportation accident rate (DIRS 182772-MTS 2007, p. 125) based on train-kilometers and railcar-kilometers and the increase in the latent cancer fatality conversion factor, and the increase in the population along the Valley Modified rail corridor. Although this is an increase, radiological accident risk would still be a negligible contributor to the overall transportation risk.

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

Estimated impacts from nonradiological transportation accidents would increase from 0.016 to 0.095 fatality. This is the most notable change to accident risk and would be due primarily to the use of the updated rail fatality rate (DIRS 178016-DOT 2005, all) and from accounting for the presence of locomotives and buffer cars in the estimation of the number of nonradiological transportation accident fatalities. Traffic fatalities associated with commuting workers could also increase.

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

5.4.7 SOCIOECONOMICS

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

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

Operation of the railroad would require about 32 workers each year in comparison to the 36 workers estimated in the Yucca Mountain FEIS. Increased workforce estimates would not notably affect the regional economy. Given the relatively low number of employees necessary for the operation of the railroad, the potential for socioeconomic impacts in the corridor would be 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 that DOE reported in the Yucca Mountain FEIS. Population growth in the unincorporated town of Pahrump dominates Nye County’s growing popularity as a residential destination. Since DOE completed the Yucca Mountain FEIS, Pahrump, the largest population center in Nye County, has experienced double-digit growth. The estimated population of Pahrump increased from 23,000 in July 1999 to 33,000 by July 2005, an increase of about 45 percent (DIRS 182772-MTS 2007, p. 127). In the same period, the State Demographer estimates that Nye County, as a whole, grew from about 31,000 to about 41,000. The average annual impact from the construction and operation of a railroad to the baseline populations in Clark and Nye Counties would be small.

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

5.4.8 NOISE AND VIBRATION

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

5.4.9 AESTHETICS

Based on a corridor-level analysis and an evaluation of current BLM resource management plans, there have been no changes to visual resource management classifications for the Valley Modified rail corridor since DOE completed the Yucca Mountain FEIS and, therefore, impacts would be the same as those discussed in the Yucca Mountain FEIS. As stated in the Yucca Mountain FEIS, operation of a railroad in the Valley Modified rail corridor would cause small impacts to visual resources in the area because the entire corridor would fall within the BLM Class III designation.

5.4.10 UTILITIES, ENERGY, AND MATERIALS

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

The Valley Modified rail corridor would pass north of the Las Vegas metropolitan area. Electric power for construction would be initially supplied by portable generators. New power lines would be installed to provide power for construction services and would be extended, via underground distribution along the rail roadbed, to meet all other construction and operations needs. Construction equipment would also consume motor fuel (diesel and gasoline). The total motor fuel use in Nevada in 2005 was about 5.8 billion liters (1.5 billion gallons) (DIRS 182772-MTS 2007, p. 127). Highway motor fuel use in the state in 2005 increased 6.2 percent over that in 2004, the largest percentage increase for any state and attributable to Nevada’s growing population. Table 5-21 lists the estimated amounts of diesel fuel and gasoline for construction in the Valley Modified rail corridor, which are higher than the estimates in the Yucca Mountain FEIS. Based on a construction period of 40 months, the annual average use of motor fuel would be about 0.27 percent of that consumed annually in Nevada. Unlike overall state use, construction activities would use primarily diesel fuel, which would be about 1 percent of all special fuel (mainly diesel) used annually in Nevada.

Table 5-21. Construction fuel and materials impacts for the Valley Modified rail corridor.[a]

	Diesel fuel use (million gallons)[d]		Gasoline use (million gallons)		Steel (thousand tons)[e]		Concrete (thousand tons)	
Length (miles)[b,c]	Yucca Mountain FEIS	Update	Yucca Mountain FEIS	Update	Yucca Mountain FEIS	Update	Yucca Mountain FEIS	Update
99	3	13	0.1	0.3	24	29	143	110

a. Sources: DIRS 180877-Nevada Rail Partners 2007, p. 2-7, Table 2-1; DIRS 182772-MTS 2007, p. 128.
b. Rail corridor length used for comparative evaluation.
c. To convert miles to kilometers, multiply by 1.6093.
d. To convert gallons to liters, multiply by 3.78533.
e. To convert tons to metric tons, multiply by 0.90718.

Steel for rails, concrete (principally for rail ties, bridges, and drainage structures), and rock for ballast would be the primary materials that the construction of a rail line would consume. Table 5-21 lists estimates of steel consumption, which have increased over those in the Yucca Mountain FEIS, and concrete consumption, which have decreased from those in the Yucca Mountain FEIS.

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

5.4.11 WASTE MANAGEMENT

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

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

The Yucca Mountain FEIS estimated that the peak annual generation would be 910 metric tons (1,000 tons) of sanitary solid waste. DOE now estimates solid municipal waste from construction facilities would be 380 metric tons (410 tons) during the peak year of construction. An assumed 25 percent of the waste generated would be recyclable, which would result in about 280 metric tons (310 tons) of waste for disposal at municipal landfills. The estimated total mass of waste generated during construction of the rail line would be about 760 metric tons (840 tons). This mass of sanitary solid waste would occupy about 1,800 cubic meters (2,400 cubic yards) of landfill volume at a waste density of 410 kilograms per cubic meter (700 pounds per cubic yard) (DIRS 182772-MTS 2007, p. 128). Heavier equipment used at large facilities such as the Apex Landfill in Clark County would result in greater waste compaction and less waste volume. The estimated average daily disposal mass would be about 0.6 metric ton (0.7 ton) per day.

Nye County disposed of about 250 metric tons (280 tons) of waste during 2003 at three different landfills (DIRS 182772-MTS 2007, p. 128), but the county plans to close two of these landfills by 2011, which would represent 96 percent of the county's current waste disposal capacity. The Apex Landfill in Clark County serves the Las Vegas Valley and receives 8,000 metric tons (8,800 tons) each day (DIRS 174041-State of Nevada 2004, pp. 6 and 7). The estimated closure is in 2047. Waste generated during construction could be trucked to larger landfills with small impact on waste disposal capacity.

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

5.4.12 ENVIRONMENTAL JUSTICE

The Yucca Mountain FEIS environmental justice analysis considered the potential for disproportionately high and adverse impacts on two segments of the overall population – minority communities and low-income communities.

As discussed in Sections 3.2.12.1 and 5.1.1.12, for this Nevada Rail Corridor SEIS DOE used the revised methodology of the U.S. Nuclear Regulatory Commission to identify low-income and minority communities (69 *FR* 52048). See Section 5.1.1.12 for a discussion of the methodology. The region of influence identified in the Yucca Mountain FEIS for the Valley Modified rail corridor has remained the same. Furthermore, county-level U.S. Census Bureau data estimates for 2006 suggest that while the population in southern Nevada is growing rapidly, the locations of concentrations of minority and low-income populations have remained relatively constant and static since 2000 (DIRS 182772-MTS 2007, p. 129).

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

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

6. CONCLUSION

DOE concludes that the Mina rail corridor warrants further study at the alignment level under the National Environmental Policy Act, although as a nonpreferred alternative. In addition, DOE concludes that, based on the analyses described herein, there are no significant new circumstances or information relevant to environmental concerns that would warrant further consideration of the Carlin, Jean, or Valley Modified rail corridor at the alignment level.

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

The U.S. Department of Energy (DOE or the Department) concludes that the Mina ***rail corridor*** warrants further study to determine an alignment for the construction and operation of a ***railroad***. In reaching this conclusion, DOE considered the environmental conditions and associated potential environmental 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 construction earthworks (***cuts*** and ***fills***); this would tend to reduce environmental impacts. Cumulative impacts to groundwater resources for construction and operation of a railroad in the Mina ***region of influence*** would be small to moderate.

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

In addition, the Department has updated the environmental information in 12 resource areas for three of the other rail corridors (Carlin, Jean, and Valley Modified) evaluated in detail 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). For the most part, 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, land-use and ownership conflicts in the Jean and Valley Modified 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) since DOE completed the Yucca Mountain FEIS, the complex land-ownership pattern resulting from the mix of private and public lands the corridor would cross remains unchanged. Such land-use and ownership conflicts and complexity increase the potential to adversely affect construction of a railroad, and to increase the potential for delays that could affect the availability of a railroad in these corridors. Moreover, air quality management goals in the Jean corridor have changed since DOE completed the Yucca Mountain FEIS, and construction of a railroad could increase the potential for conflicts with these goals. For these reasons, the Department concludes there are no significant new circumstances or information relevant to environmental concerns that would warrant further consideration of these three rail corridors at the alignment level.

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1. PURPOSE AND NEED FOR AGENCY ACTION

This chapter explains why DOE needs to construct and operate a railroad in Nevada, summarizes the process leading to the selection of the Caliente and Mina rail corridors for further study, and describes the interests and roles of cooperating agencies. It describes the Nevada Rail Corridor SEIS and Rail Alignment EIS scoping process, and summarizes public scoping comments and how DOE acted on those comments. It also describes the Draft EIS public hearings and public comment process.

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

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.

Spent nuclear fuel is fuel that has been withdrawn from a nuclear 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 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 this Rail Alignment ***Environmental Impact Statement*** (EIS) refers to as the NWPA, identifies the ***Yucca Mountain Site*** in Nye County, Nevada, as the site to be studied as a potential location for a geologic repository.

After completion of ***site characterization*** studies at Yucca Mountain, the Secretary of Energy found the site to be scientifically and technically suitable for development of a ***repository***. On February 14, 2002, the Secretary submitted his recommendation, along with a comprehensive statement of the basis for the recommendation, to the President of the United States, George W. Bush, for approval of the Yucca Mountain Site for the development of a ***nuclear waste*** repository. As required by the NWPA, the U.S. Department of Energy (DOE or the Department) had prepared an EIS, *Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (DIRS 155970-DOE 2002, all) (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 before the repository at Yucca Mountain is scheduled to open. Therefore, the number of DOE sites is four.) Figure 1-1 shows the locations of the commercial and DOE sites that would ship spent nuclear fuel and high-level radioactive waste to Yucca Mountain.

The Yucca Mountain FEIS examined various national transportation scenarios and Nevada transportation scenarios to evaluate and compare the range of potential transportation ***impacts*** to human health. 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.” In the Yucca Mountain FEIS, DOE identified the mostly rail scenario as its preferred mode of transportation, both nationally and in Nevada (DIRS 155970-DOE 2002, p. 1-3), due in part to lower potential impacts to the health and safety of workers and the public.

1.2 Purpose and Need

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 (DIRS 155970-DOE 2002, Chapter 6). Figure 1-2 shows the five rail corridors analyzed in the Yucca Mountain FEIS.

The Yucca Mountain FEIS did not specify a rail corridor preference, but on December 29, 2003, in the subsequent *Notice of Preferred Nevada Rail Corridor* (68 *Federal Register* [*FR*] 74951) (see Appendix A), DOE announced its preference for the Caliente rail corridor. Figure 1-3 shows the Caliente ***rail alignment***, including ***alternative segments*** considered, as analyzed in this Rail Alignment

Rail corridor: A strip of land 400 meters (0.25 mile) wide through which DOE would identify an alignment (***rail alignment***) for the construction of a ***rail line*** in Nevada to a ***geologic repository*** at Yucca Mountain.

Rail 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.

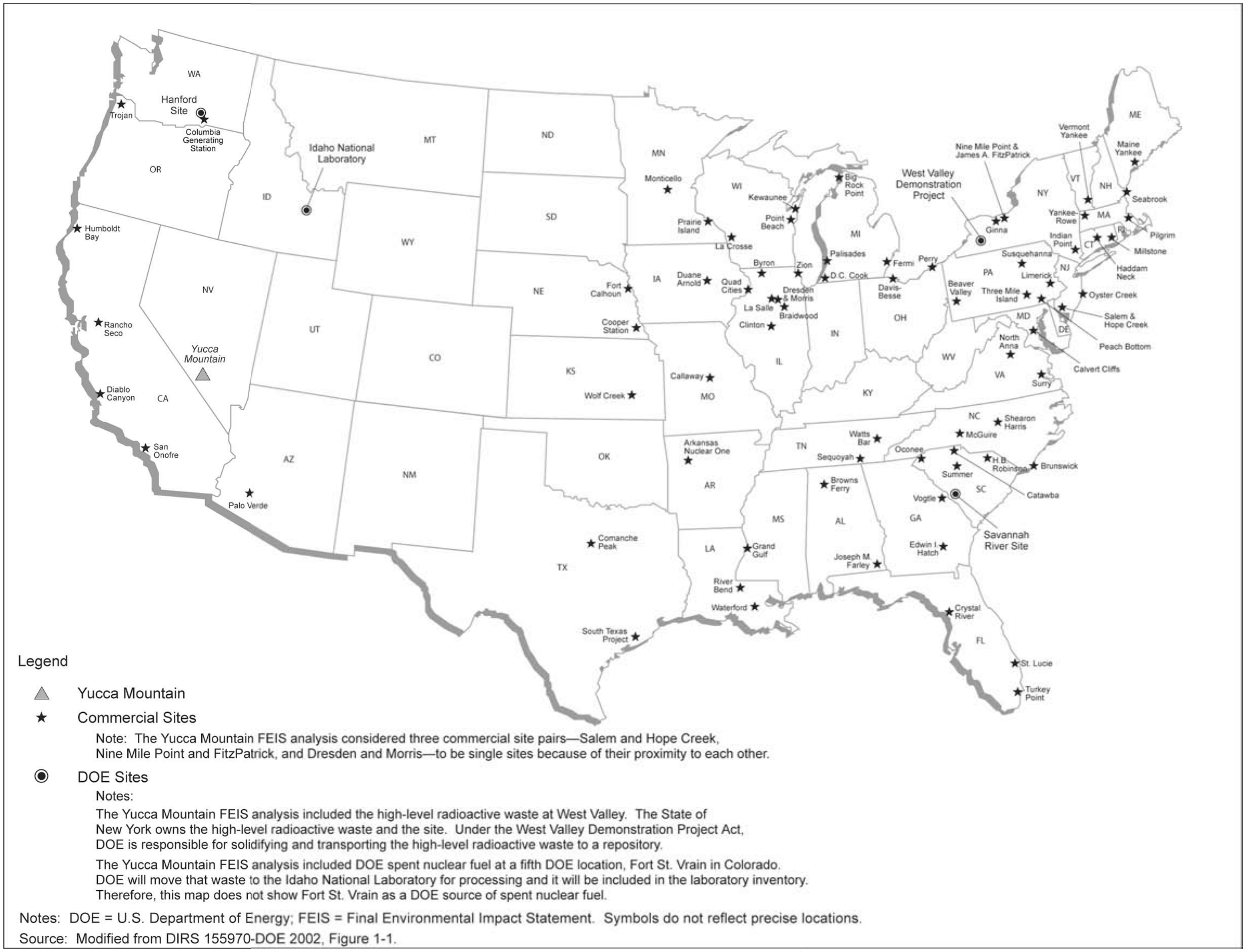


Figure 1-1. Locations of commercial and DOE sites that would ship spent nuclear fuel and high-level radioactive waste to Yucca Mountain.

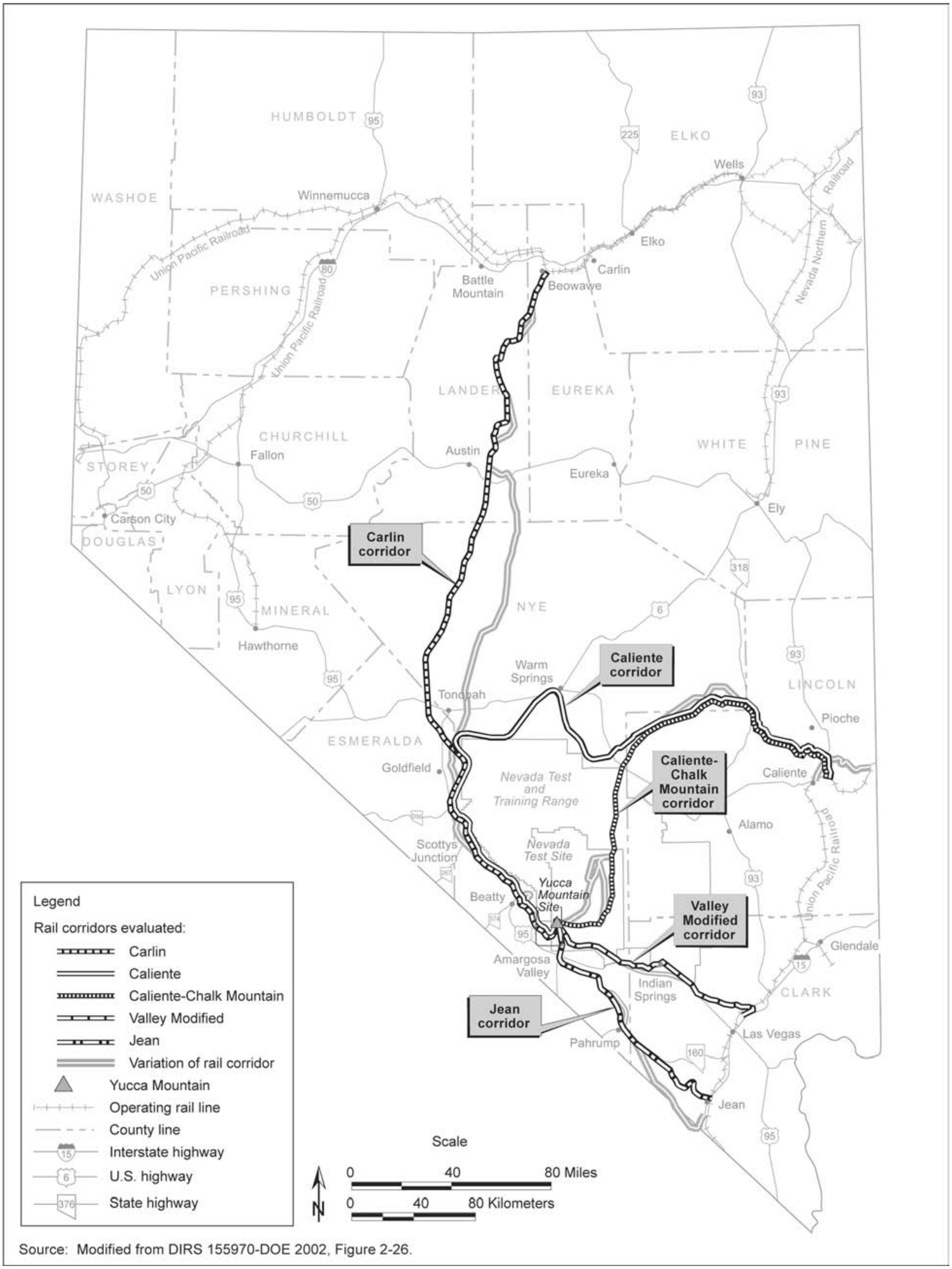
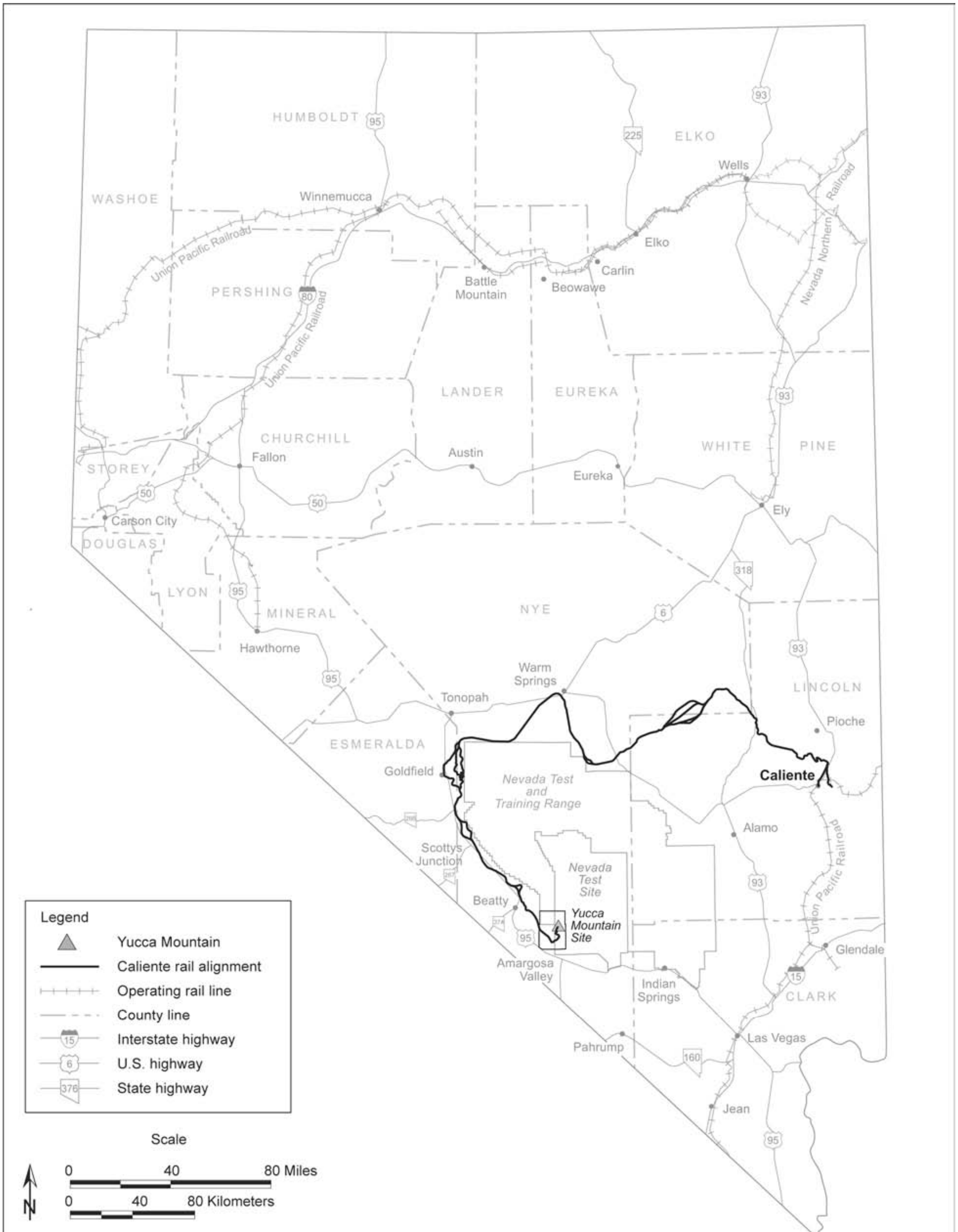


Figure 1-2. Five rail corridors evaluated in the Yucca Mountain FEIS.



Source: Modified from DIRS 104560-YMP 1998, all.

Figure 1-3. Caliente rail alignment analyzed in this Rail Alignment EIS.

EIS. The Caliente rail alignment is an engineered refinement of the Caliente rail corridor analyzed in the Yucca Mountain FEIS.

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). 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. 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. (The Record of Decision referred to construction and operation of a rail line. However, this Rail Alignment EIS refers to construction and operation of a railroad, which better describes the ***infrastructure*** required under the Proposed Action.)

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 the review of the scoping comments, DOE held discussions with the Walker River Paiute Tribe and, in May 2006, the Tribal Council informed DOE that it would allow the Department to consider the potential impacts of constructing and operating a railroad to transport spent nuclear fuel and high-level radioactive waste across its reservation. On October 13, 2006, after a preliminary evaluation of the feasibility of the Mina rail corridor, DOE announced its intent to expand the scope of the Rail Alignment EIS to include the Mina corridor (*Amended Notice of Intent to Expand the Scope of the Environmental Impact Statement for the Alignment, Construction, and Operation of a Rail Line to a Geologic Repository at Yucca Mountain, Nye County, NV;* 71 *FR* 60484). Although the expanded NEPA analysis, the Nevada Rail Corridor SEIS and the Rail Alignment EIS, analyzes the potential environmental impacts associated with the Mina rail corridor, it identifies the Mina alternative as nonpreferred because the Tribe renewed its prior objection to the transportation of nuclear waste across the Reservation. Figure 1-4 shows the existing rail lines, alternative segments, and ***common segments*** along the Mina rail alignment, as analyzed in this Rail Alignment EIS.

1.3 Selection of the Caliente Rail Corridor for Further NEPA Evaluation

In the Yucca Mountain FEIS, DOE identified the mostly rail scenario as its preferred mode for transporting spent nuclear fuel and high-level radioactive waste to a repository at Yucca Mountain, both nationally and in Nevada (DIRS 155970-DOE 2002, p. 1-3). DOE stated that the Yucca Mountain FEIS could be used to support the choice among Nevada rail corridors (DIRS 155970-DOE 2002, p. 1-3), but additional field surveys, state and local government and American Indian tribal consultations, environmental and engineering analyses, and further National Environmental Policy Act (NEPA; 42 U.S.C. 4321 *et seq.*) review would be required to support a decision about the selection of a specific rail alignment within a rail corridor.

DOE also stated that if the Yucca Mountain Site was approved, it would issue at some future date a Record of Decision to select a mode of transportation and that if mostly rail was selected, DOE would announce a preference for one of the rail corridors and then publish a Record of Decision announcing the selection of a rail corridor (DIRS 155970-DOE 2002, p. 1-3). On December 29, 2003, DOE announced

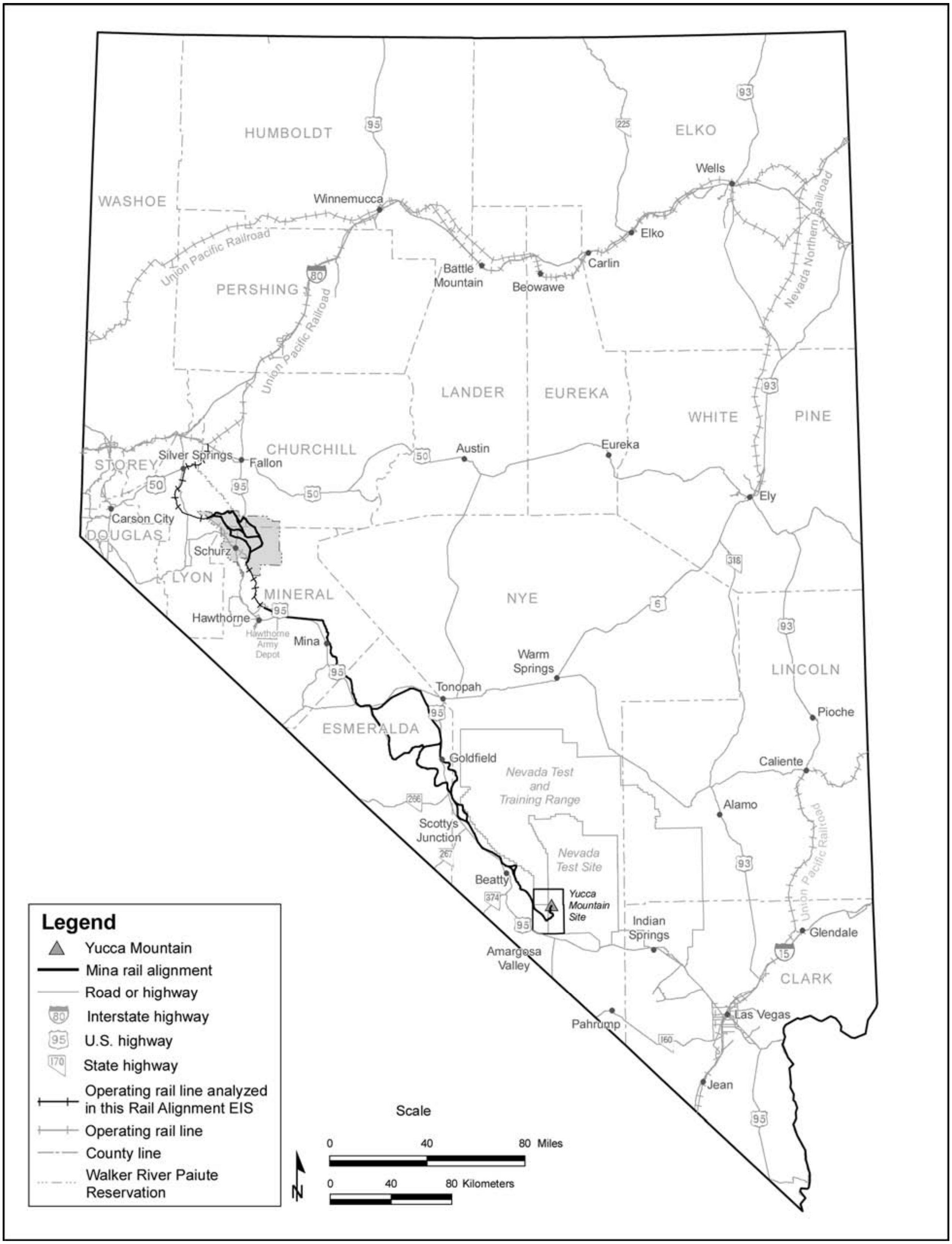


Figure 1-4. Mina rail alignment analyzed in this Rail Alignment EIS.

its preference for the Caliente rail corridor (68 *FR* 74951). On April 8, 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 (69 *FR* 18557). The DOE decision to select the mostly rail scenario was based on analyses in the Yucca Mountain FEIS (specifically those analyses related to impacts on the health and safety of workers and the public), preferences expressed by the State of Nevada, consideration of irreversible and irretrievable commitments of resources, and ***cumulative impacts*** from transporting other radioactive materials. DOE also announced that it had selected the Caliente rail corridor for further evaluation for the construction and operation of a railroad within Nevada. This decision was based primarily on the analyses in the Yucca Mountain FEIS, including land-use conflicts and their potential to adversely affect railroad construction. DOE considered the direct and indirect costs associated with railroad construction and operations within each rail corridor, potential for construction delay, and comments received from the public. DOE received comments from the public stating opposition to all the rail corridors and, in particular, stating that DOE should avoid rail corridors in the Las Vegas Valley. The DOE preference for the Caliente rail corridor considered many factors, including its more remote location, the diminished likelihood of land-use conflicts, concerns raised by Nevadans, and national security issues the U.S. Air Force raised regarding the Caliente-Chalk Mountain rail corridor.

Overall, it appeared that the Caliente rail corridor would have the fewest land-use or other conflicts that could lead to substantial delays in acquiring the necessary land and rights-of-way or that could lead to substantial delays in beginning construction. DOE also considered the direct costs of constructing and operating the proposed railroad, and the indirect costs resulting from potential delays in the availability of the railroad. The Jean and Valley Modified rail corridors are the shortest and would have the lowest estimated construction costs. The Carlin and Caliente rail corridors are the longest and, on the basis of construction cost alone, would be more expensive to develop. However, railroad construction delays because of land-use or other conflicts, and the resulting inability to accept large amounts of spent nuclear fuel and high-level radioactive waste transported via a railroad to the repository in a timely manner, could add both to the liability costs for delayed acceptance of ***commercial spent nuclear fuel*** and to the costs of continued ***storage*** of DOE wastes. Therefore, DOE concluded that the Caliente rail corridor would be preferable to the other rail corridors and selected the Caliente rail corridor as the one within which to evaluate possible alignments for the rail line connecting the repository to an existing rail line in Nevada (69 *FR* 18557, April 8, 2004).

1.4 Selection of the Mina Rail Corridor for Further NEPA Evaluation

DOE originally identified the Mina rail corridor in a series of three transportation studies prior to preparation of the Yucca Mountain FEIS, as follows:

- *Preliminary Rail Access Study* (DIRS 104792-YMP 1990, all)
- *Nevada Potential Repository Preliminary Transportation Strategy Study 1* (DIRS 104795-CRWMS M&O 1995, all)
- *Nevada Potential Repository Preliminary Transportation Strategy Study 2* (DIRS 101214-CRWMS M&O 1996, all)

The Department did not study the Mina rail corridor in detail in the Yucca Mountain FEIS because a railroad in that corridor could only connect to an existing rail line in Nevada by crossing the Walker River Paiute Reservation, and the Walker River Paiute Tribe had informed DOE in 1991 that it would not allow nuclear waste to be transported across its Reservation.

During the first scoping period for this Rail Alignment EIS, DOE received comments from the public suggesting that the Department consider the Mina rail route. DOE held discussions with the Walker River Paiute Tribe regarding the availability of the Mina route for evaluation. In May 2006, the Tribal Council informed DOE that it would allow the Department to evaluate the environmental impacts of transporting nuclear waste across the Reservation.

DOE prepared a preliminary feasibility study of the Mina ***rail route*** to identify a specific rail corridor and associated preliminary common segments and alternative segments (DIRS 180222-BSC 2006, all). The preliminary feasibility study considered the original Mina rail route, which was referred to as Option 6 in the *Preliminary Rail Access Study*, and refined the route using updated design criteria, literature reviews, limited field studies, and initial design analyses. The feasibility study concluded that construction, operation, and maintenance of a railroad in the Mina rail corridor appeared to be feasible.

On October 13, 2006, DOE announced its intent to expand the scope of this Rail Alignment EIS to incorporate analysis of the potential environmental impacts associated with constructing and operating a railroad within the Caliente rail corridor or the Mina rail corridor. DOE also announced that it would supplement the rail corridor analysis of the Yucca Mountain FEIS. DOE announced that it would update, as appropriate (that is, identify any significant new circumstances or information relevant to environmental concerns), the information and analysis for other rail corridors analyzed in the Yucca Mountain FEIS. 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* (DOE/EIS-0250F-S2; the Nevada Rail Corridor SEIS) provides the analysis and information regarding the Mina rail corridor and updates information regarding the other rail corridors analyzed in the Yucca Mountain FEIS. In the Nevada Rail Corridor SEIS, DOE concludes that the Mina rail corridor warrants further study to determine an alignment for the construction and operation of a railroad. That alignment-level study is included in this Rail Alignment EIS.

1.5 Cooperating Agencies

Pursuant to the NWPA, DOE is responsible for the disposal of spent nuclear fuel and high-level radioactive waste to protect public health, safety, and the environment, and for developing and implementing a plan for transporting spent nuclear fuel and high-level radioactive waste to a repository at Yucca Mountain. Council on Environmental Quality 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 federal cooperating agencies in 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 Nevada Rail Corridor SEIS and Rail Alignment EIS. Since the Draft Nevada 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 the role of cooperating agencies in the development of the Nevada Rail Corridor SEIS and Rail Alignment EIS (see Sections 1.5.4 to 1.5.7), 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 the 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.

During preparation of the Nevada Rail Corridor SEIS and the Rail Alignment EIS, DOE interacted with the Walker River Paiute Tribe, other federal agencies, and Nevada state and local agencies (see Appendix B).

1.5.1 BUREAU OF LAND MANAGEMENT

The BLM is an agency within the U.S. Department of the Interior and is responsible for administering more than 1 million square kilometers (250 million acres) of ***public lands***, mostly in 12 western states, including Alaska. Congress enacted the Federal Land Policy and Management Act (43 U.S.C. 1701 *et seq*.) "to establish public land policy; to establish guidelines for its administration; to provide for the management, protection, development, and enhancement of the public lands; and for other purposes." It is the primary legislation guiding the BLM in its responsibility to manage the public lands and resources in a combination of ways that best serve the present and future needs of the American people.

To construct that portion of the proposed railroad that would cross public land, DOE must obtain a ***right-of-way grant*** from the BLM. BLM regulations at 43 CFR Part 2800 establish the procedures for processing right-of-way applications from federal agencies. DOE submitted a right-of-way application to the BLM on March 4, 2008 (DIRS 185486-Larson 2008, all). The right-of-way application includes public land required for the rail line, access roads, ***construction camps***, water wells, and other facilities that would be part of the proposed railroad. The BLM may adopt this Rail Alignment EIS as authorized by 40 CFR 1506.3 to satisfy the NEPA requirements for the right-of-way application. The BLM will determine whether to grant a right-of-way for the construction and operation of the DOE-proposed railroad.

Resource management plan: A land-use plan for public lands as described by the Federal Land Management and Policy Act. Among other things, it establishes land areas for limited, restricted, or exclusive use; allowable resource uses; resource condition goals and objectives; general management practices to achieve the goals; the need for more specific management plans for certain areas; general implementation sequences; and monitoring intervals and standards (43 CFR Part 1610).

Right-of-way grants on public lands must be consistent with the applicable BLM ***resource management plan***(s). Four resource management plans cover the areas of the Caliente rail alignment and the Mina rail alignment. These resource management plans are included in the following four documents:

- *Ely Proposed Resource Management Plan/Final Environmental Impact Statement* (DIRS 184767-BLM 2007, all)
- *Tonopah Resource Management Plan and Record of Decision* (DIRS 173224-BLM 1997, all)
- *Record of Decision for the Approved Las Vegas Resource Management Plan and Final Environmental Impact Statement* (DIRS 176043-BLM 1998, all)
- *Carson City Field Office Consolidated Resource Management Plan* (DIRS 179560-BLM 2001, all)

The Ely Resource Management Plan has been undergoing revision for several years. In November 2007, the BLM issued its *Ely Proposed Resource Management Plan/Final Environmental Impact Statement* (DIRS 184767-BLM 2007, all). DOE recognizes that this resource management plan does not come into effect until the BLM issues a Record of Decision. The BLM expects to issue a Record of Decision for the Ely Proposed Resource Management Plan shortly after publication of this Rail Alignment EIS. Therefore, DOE has used the Ely Proposed Resource Management Plan as the reasonably foreseeable management plan against which to analyze the potential impacts of the proposed railroad.

The BLM will determine whether the proposed railroad is consistent with these resource management plans and, if not, whether to amend them.

> **Free-use permit:** An authorization to extract mineral materials from public lands at no charge. The BLM issues free-use permits to a federal or state agency when the materials are for use in a public project (43 CFR Part 3620).

DOE could need one or more quarries to provide rail line construction materials. The potential quarry sites analyzed in this Rail Alignment EIS are all on BLM-administered land, with the exception of one potential site, which would be partially on private land. Before excavating materials at any of the potential quarry sites, DOE would obtain ***free-use permits*** from the BLM. Additional rights-of-way might also be required to facilitate transporting the materials to the construction site. Free-use permits are issued to federal and state agencies under the Materials Act of 1947 (30 U.S.C. 601 *et seq.*) for use of common varieties of sand, stone, and gravel. BLM regulations at 43 CFR Part 3604 establish procedures for the designation of free-use permits.

The BLM agreed to be a cooperating agency in the preparation of this Rail Alignment EIS to increase the potential for the Bureau to adopt and use the EIS to process a DOE right-of-way application for access to the public lands that would be required for construction and operation of the proposed railroad. The procedures for BLM adoption of another agency's EIS (DIRS 182299-BLM 1988, all) specify that the BLM conduct an independent review of the EIS and issue its own Record of Decision. Cooperating agency status provides the Bureau the opportunity to work closely with the lead agency during development of the NEPA document to encourage a product that meets the NEPA requirements for processing a right-of-way application. Cooperating agency status does not imply endorsement of the lead agency's preferred alternative.

> **Public land order:** An order affecting, modifying, or canceling a withdrawal or reservation that has been issued by the Secretary of the Interior pursuant to powers of the President delegated to the Secretary by Executive Order 9146 of April 24, 1942, or 9337 of April 24, 1943.

In December 2003, DOE notified the BLM that it would be submitting an application for a ***public land order*** to administratively withdraw 1,249 square kilometers (308,600 acres) of public land encompassing the Caliente rail corridor, from surface and mineral entry for up to 20 years, to evaluate the land for the potential construction, operation, and maintenance of the proposed railroad for the transportation of spent nuclear fuel and high-level radioactive waste to a geologic repository at Yucca Mountain. Upon receipt of the DOE notification, the BLM issued a notice announcing the segregation of the land from surface and mineral entry for up to 2 years to allow a ***case file*** containing various studies and analyses to be prepared to support a final decision on the ***withdrawal*** application (*Notice of Proposed Withdrawal and Opportunity for Public Meeting; Nevada*, 68 *FR* 74965, December 29, 2003). Although in its 2003 withdrawal application DOE sought a 20-year land withdrawal, DOE determined that a 10-year land withdrawal would be adequate for conducting necessary activities. DOE prepared *Environmental Assessment for the Proposed Withdrawal of Public Lands Within and Surrounding the Caliente Rail Corridor* (DIRS 176452-DOE 2005, all) to support the public land order request. The BLM was a cooperating agency in the preparation of that environmental assessment.

The BLM processed the DOE public land order request in accordance with its regulations at 43 CFR Part 2310, which define the procedures and analyses necessary to meet public involvement requirements and to develop and process the case file for submission to the Secretary of the Interior. The Secretary of the Interior issued Public Land Order No. 7653, withdrawing the requested public lands within the Caliente rail corridor from surface and mineral entry for 10 years to allow DOE to evaluate the lands for the potential construction, operation, and maintenance of the proposed railroad (*Public Land Order No. 7653; Withdrawal of Public Lands for the Department of Energy to Protect the Caliente Rail Corridor; Nevada*, 70 *FR* 76854, December 28, 2005). The public land order does not affect existing ***mining claims*** or other activities such as grazing rights, water rights, and recreational uses. Some of the Caliente alternative segments evaluated in this Rail Alignment EIS are outside the land subject to Public Land Order No. 7653.

In December 2006, DOE filed another application with the BLM to withdraw an additional 842 square kilometers (208,037 acres) of public lands from surface and mineral entry through December 27, 2015 (the same date as the expiration of Public Land Order No. 7653), to evaluate the lands for the potential construction, operation, and maintenance of the proposed railroad. This application included 278 square kilometers (68,646 acres) of public lands that encompass the Caliente rail alignment that fall outside of Public Land Order No. 7653 and 564 square kilometers (139,391 acres) of public lands encompassing the Mina rail alignment. The BLM issued a notice of proposed withdrawal and announced the segregation of the lands for up to 2 years to allow a case file to be prepared to support the final decision on the withdrawal application (*Notice of Proposed Withdrawal and Opportunity for Public Meeting; Nevada*, 72 *FR* 1235, January 10, 2007).

1.5.2 SURFACE TRANSPORTATION BOARD

The STB is an economic regulatory agency that Congress charged with the fundamental missions of resolving railroad rate and service disputes and reviewing proposed railroad constructions, acquisitions, mergers, and abandonments. The STB is decisionally independent, although it is administratively affiliated with the U.S. Department of Transportation. The ICC (Interstate Commerce Commission) Termination Act of 1995 (Public Law No. 104-88) created the STB, which is the successor agency to the Interstate Commerce Commission.

The STB has jurisdiction over railroad rate and service issues, and rail structuring transactions such as new line construction, line sales, line abandonments, and railroad mergers. The STB has exclusive jurisdiction over rail transportation that is part of the interstate rail network. All railroads (except private carriers) have a common-carrier obligation to provide reasonable service upon reasonable request.

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 from the STB to construct and operate the railroad. Although DOE has not made a decision on whether to construct and operate a railroad, DOE submitted an application to the STB for a certificate of public convenience and necessity to construct and operate the proposed railroad as a common-carrier railroad on March 17, 2008 (DIRS 185339-Vandeberg 2008, all). As part of its review process, the STB must consider the environmental effects of railroad construction and operations. The STB Section of Environmental Analysis is responsible for preparing the appropriate NEPA documentation for railroad construction and operation cases under the jurisdiction of the STB. If any NEPA documentation were required in addition to this Rail Alignment EIS to support an STB decision on whether to issue a certificate of public convenience and necessity, that additional NEPA documentation would be prepared by the STB.

1.5.3 U.S. AIR FORCE

The mission of the U.S. Air Force, in conjunction with the other armed services, is to preserve the peace and security and provide for the defense of the United States, its Territories, Commonwealths, and possessions, and any U.S.-occupied areas. The Caliente rail corridor skirts the northern and western boundaries of the Nevada Test and Training Range. The Air Force agreed to become a cooperating agency as a consequence of its jurisdiction over airspace and land on the Nevada Test and Training Range that would be affected by one or more of the alternative segments. DOE coordinates and at times obtains approval from the responsible armed service when DOE actions might encroach on U.S. Department of

Defense land and potentially affect military operations. Although DOE has decided not to pursue alternative segments that would have entered the Nevada Test and Training Range, DOE is coordinating with the Air Force (for example, on the nature, extent, and location of Air Force overflights) to minimize any impacts of the proposed railroad to Air Force operations. In addition, the U.S. Air Force offers special expertise associated with the project area around the Nevada Test and Training Range.

1.5.4 NYE COUNTY

Nye County, Nevada, is the situs jurisdiction of the Yucca Mountain Repository and contains portions of the proposed railroad. Nye County has special expertise on the relationship of DOE's Proposed Action to the objectives of regional and local land-use plans, policies and controls, and to the current and planned infrastructure in the county, including public services and traffic conditions. Subsequent to the release of the Draft Rail Alignment EIS, DOE invited and Nye County accepted cooperating agency status on this Rail Alignment EIS and the Rail Corridor SEIS. Consistent with Council on Environmental Quality regulations and guidance on cooperating agencies, Nye County accepts and acknowledges DOE's authority as the lead agency with respect to the Yucca Mountain Project. Participation as a cooperating agency is consistent with the stated county policy of constructive engagement with DOE (Nye County Board of Commissioners Resolution No. 2002-22) and with the objectives of the county's Community Protection Plan (approved August 2006). Representatives from Nye County attended public, project, and technical working group meetings; participated on interdisciplinary teams; compiled and provided socioeconomic data such as population, housing, and other forecasting information; provided relevant reports and studies prepared or conducted by the county; assisted with the identification of environmental issues and with environmental analyses; reviewed working draft and preliminary draft documents; and assisted with the resolution of comments.

1.5.5 ESMERALDA COUNTY

Esmeralda County, Nevada, contains portions of the proposed railroad and has special expertise on the relationship of DOE's Proposed Action to the objectives of regional and local land-use plans, policies and controls, and to the current and planned infrastructure in the county, including public services and traffic conditions. Subsequent to the release of the Draft Rail Alignment EIS, DOE invited and Esmeralda County accepted cooperating agency status on this Rail Alignment EIS and the Rail Corridor SEIS. Consistent with Council on Environmental Quality regulations and guidance on cooperating agencies, Esmeralda County accepts and acknowledges DOE's authority as the lead agency with respect to the Yucca Mountain Project. Representatives from Esmeralda County attended public, project, and technical working group meetings; participated on interdisciplinary teams; compiled and provided socioeconomic data such as population, housing, and other forecasting information; provided relevant reports and studies prepared or conducted by the county; assisted with the identification of environmental issues and with environmental analyses; reviewed working draft and preliminary draft documents; and assisted with the resolution of comments.

1.5.6 LINCOLN COUNTY

Lincoln County, Nevada, contains portions of the proposed railroad and has special expertise on the relationship of DOE's Proposed Action to the objectives of regional and local land-use plans, policies and controls, and to the current and planned infrastructure in the county, including public services and traffic conditions. Subsequent to the release of the Draft Rail Alignment EIS, DOE invited and Lincoln County accepted cooperating agency status on this Rail Alignment EIS and the Rail Corridor SEIS. Consistent with Council on Environmental Quality regulations and guidance on cooperating agencies, Lincoln County accepts and acknowledges DOE's authority as the lead agency with respect to the Yucca Mountain Project. Representatives from Lincoln County attended public, project, and technical working group meetings; participated on interdisciplinary teams; compiled and provided socioeconomic data such as population, housing, and other forecasting information; provided relevant reports and studies prepared or conducted by the county; assisted with the identification of environmental issues and with environmental analyses; reviewed working draft and preliminary draft documents; and assisted with the resolution of comments.

1.5.7 CITY OF CALIENTE

The City of Caliente, Nevada, contains portions of the proposed railroad and has special expertise on the relationship of DOE's Proposed Action to the objectives of local land-use plans, policies and controls, and to the current and planned infrastructure in the city, including public services and traffic conditions. Subsequent to the release of the Draft Rail Alignment EIS, DOE invited and the City of Caliente accepted cooperating agency status on this Rail Alignment EIS and the Rail Corridor SEIS. Consistent with Council on Environmental Quality regulations and guidance on cooperating agencies, the City of Caliente accepts and acknowledges DOE's authority as the lead agency with respect to the Yucca Mountain Project. Representatives from the City of Caliente attended public, project, and technical working group meetings; participated on interdisciplinary teams; compiled and provided socioeconomic data such as population, housing, and other forecasting information; provided relevant reports and studies prepared or conducted by the city; assisted with the identification of environmental issues and with environmental analyses; reviewed working draft and preliminary draft documents; and assisted with the resolution of comments.

1.6 National Environmental Policy Act Process

Council on Environmental Quality regulations that implement the procedural requirements of NEPA (40 CFR Parts 1500 through 1508) and DOE NEPA regulations (10 CFR Part 1021) provide procedures to use when preparing an EIS. A major emphasis of the NEPA process is to promote public awareness of the environmental impacts of the proposed action and its alternatives and to provide opportunities for public involvement. This is accomplished in a series of steps: (1) by publishing a Notice of Intent to prepare an EIS and implementing a process known as "scoping," whereby comments are solicited from federal, state, and local agencies, American Indian tribes and organizations, other organizations, and the general public to assist in defining the proposed action, alternatives, and impacts and issues requiring analysis; (2) by preparing a Draft EIS for public review and comment; (3) by preparing a Final EIS that incorporates and responds to all comments received on the Draft EIS; and (4) by preparing a Record of Decision to announce the agency's decision on a project and explaining the reasons for the decision.

In the Yucca Mountain FEIS, DOE noted that determining the specific rail alignment in which to construct the proposed railroad would require further NEPA analysis. This Rail Alignment EIS addresses the selection of a rail alignment within which to construct, operate, and possibly abandon the proposed 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, Nye County, Nevada.

DOE will use this Rail Alignment EIS to decide whether to construct and operate the proposed railroad, and if so, to:

- Select a rail alignment in which to construct the railroad.
- Select the common segments and combination of alternative segments within the selected alignment.
- Decide where to construct certain proposed railroad operations support facilities.

- Decide whether to restrict use of the rail line to DOE trains, or whether to allow common carriers to operate over the rail line (the Shared-Use Option).
- Determine what mitigation measures to implement.

1.6.1 DEPARTMENT OF ENERGY NOTICES OF INTENT AND SCOPING MEETINGS

On April 8, 2004, DOE published a Notice of Intent (69 *FR* 18565) announcing that it would prepare an EIS for the alignment, construction, and operation of a railroad (called rail line in the Notice of Intent) for shipment of spent nuclear fuel, high-level radioactive waste, and other materials from a site near Caliente, Lincoln County, Nevada, to a geologic repository at Yucca Mountain, Nye County, Nevada. The Notice also announced the schedule for public scoping meetings, and invited and encouraged comments on the scope of this Rail Alignment EIS to ensure that all relevant environmental issues and reasonable alternatives would be addressed. To facilitate the scoping process, in the Notice of Intent DOE identified a preliminary list of issues and environmental resources that might be considered in this Rail Alignment EIS, and specifically invited comments on the following six questions to help define the scope of the EIS.

1. Should additional alternatives be considered that might minimize, avoid, or mitigate adverse environmental impacts (for example, looking beyond the 400-meter [0.25-mile]-wide corridor, avoiding ***Wilderness Study Areas***, American Indian trust lands, or encroachment on the Nevada Test and Training Range)?
2. Should any of the preliminary alternatives be eliminated from detailed consideration?
3. Should additional environmental resources be considered?
4. Should DOE allow private entities to ship commercial commodities on the rail line?
5. What mitigation measures should be considered?
6. Are there national security issues that should be addressed?

The scoping comment period began with publication of the Notice of Intent in the *Federal Register* and was originally scheduled to close on May 24, 2004. In response to a request from the State of Nevada, DOE extended the comment period by 7 days, to June 1, 2004 (69 *FR* 22496, April 26, 2004), bringing the total length of the scoping comment period to 55 days. DOE held five public scoping meetings on this Rail Alignment EIS at the following locations on the following dates in Nevada:

- Amargosa Valley, NV – Longstreet Hotel Casino, Nevada State Highway 373, May 3, 2004
- Goldfield, NV – Goldfield Community Center, 301 Crook Street, May 4, 2004
- Caliente, NV – Caliente Youth Center, U.S. Highway 93, May 5, 2004
- Reno, NV – University of Nevada, Reno, Fifteenth and North Virginia, May 12, 2004
- Las Vegas, NV – Cashman Center, 850 North Las Vegas Boulevard, May 17, 2004

In addition to the *Federal Register* notices announcing the meetings, DOE advertised the meetings in five local newspapers that have a total circulation of approximately 250,000; sent four separate press releases to media outlets, industry, and stakeholders; mailed several thousand letters to stakeholders, members of the public, and other interested parties; and distributed over 1,000 handbills in Lincoln, Nye, and Esmeralda Counties.

DOE conducted the public scoping meetings in an open-house format. Members of the public were invited to attend the meetings at their convenience, any time during meeting hours, and submit their comments in writing at the meeting, or in person to a court reporter who was available throughout the meeting. The open-house format provided for one-on-one discussions with DOE representatives responsible for the preparation of this Rail Alignment EIS. Approximately 440 people attended the meetings (this count is approximate because not all attendees signed in), and 86 submitted oral comments (that the court reporters later transcribed) on the scope of this Rail Alignment EIS.

DOE considered all comments received on the scope of this Rail Alignment EIS, along with information the BLM received, including results of interviews with ***grazing allotment*** permittees and other interested parties documented in *Proposed Yucca Mountain Corridor Affected Grazing Permittees* (DIRS 173845-Resource Concepts 2005, all). DOE considered American Indian perspectives documented in *American Indian Perspectives on the Proposed Rail Alignment Environmental Impact Statement for the U.S. Department of Energy's Yucca Mountain Project* (DIRS 174205-Kane et al. 2005, all). DOE also considered information obtained through sources such as the interviews Lincoln and Nye Counties conducted under a cooperative agreement with the Department.

On October 13, 2006, DOE published an Amended Notice of Intent (71 *FR* 60484) announcing the expanded scope of this Rail Alignment EIS to include detailed analysis of alternative segments (called alternative alignments in the Amended Notice of Intent) within the Mina rail corridor, should the Mina corridor warrant further consideration based on the Nevada Rail Corridor SEIS analysis. The Notice also announced the schedule for public scoping meetings, and invited and encouraged comments on the scope of this Rail Alignment EIS to ensure that all relevant environmental issues and reasonable alternatives would be addressed. To facilitate the scoping process, in the Amended Notice of Intent DOE provided a brief summary of public comments received during the previous scoping period and identified a preliminary list of issues and environmental resources that might be considered in this Rail Alignment EIS. DOE also specifically invited comments on the following four questions related to the Mina rail corridor to help define the scope of the analysis:

1. Should additional alternative alignments (now called alternative segments) be considered that might minimize, avoid, or mitigate adverse environmental impacts (for example, looking beyond the 400-meter [0.25-mile]-wide Mina corridor, avoiding environmentally sensitive areas)?
2. Should any of the preliminary alternative segments be eliminated from detailed consideration?
3. Should additional environmental resources be considered?
4. What mitigation measures should be considered?

The second scoping comment period began with publication of the Amended Notice of Intent in the *Federal Register* and was originally scheduled to close on November 27, 2006. In response to requests from the public, DOE extended the comment period by 15 days, to December 12, 2006 (71 *FR* 65785, November 9, 2006), bringing the total length of the scoping comment period to 61 days. DOE held eight public scoping meetings during the second public scoping period at the following locations on the following dates in Nevada and Washington, D.C.:

- Washington, D.C. – L'Enfant Plaza Hotel, 480 L'Enfant Plaza, SW, October 30, 2006
- Amargosa Valley, NV – Longstreet Hotel Casino, Nevada State Highway 373, November 1, 2006
- Las Vegas, NV – Cashman Center, 850 North Las Vegas Boulevard, November 2, 2006
- Caliente, NV – Caliente Youth Center, U.S. Highway 93, November 8, 2006
- Goldfield, NV – Goldfield School Gymnasium, Hall and Euclid, November 13, 2006
- Hawthorne, NV – Hawthorne Convention Center, 932 E. Street, November 14, 2006
- Fallon, NV – Fallon Convention Center, 100 Campus Way, November 15, 2006

- Reno, NV – University of Nevada, Reno, Lawlor Event Center, 1500 N. Virginia Street, November 27, 2006

In addition to the *Federal Register* notices announcing the meetings, DOE advertised the meetings in eight local newspapers, including the Washington Post. Total circulation of the newspapers is approximately 280,000 plus an additional 750,000 for the Washington Post. DOE sent four separate press releases to media outlets, industry, and stakeholders; mailed several thousand letters to stakeholders, members of the public, and other interested parties; and distributed over 1,300 handbills in Washoe, Churchill, Lyon, Mineral, Esmeralda, Lincoln, and Nye Counties.

DOE conducted the public scoping meetings in an open-house format. Members of the public were invited to attend the meetings at their convenience, any time during meeting hours, and submit their comments in writing at the meeting, or in person to a court reporter who was available throughout the meeting. The open-house format provided for one-on-one discussions with DOE representatives responsible for the preparation of this Rail Alignment EIS. Approximately 330 people attended the meetings (this count is approximate because not all attendees signed in), and 63 submitted oral comments (that the court reporters transcribed) on the scope of this Rail Alignment EIS.

In addition to the second public scoping period for this Rail Alignment EIS, DOE held concurrent public scoping periods for its Repository SEIS and the Nevada Rail Corridor SEIS. To ensure proper consideration of all public comments, DOE assigned each comment to one or more SEIS or EIS. The Department reviewed all comments for applicability to the Nevada Rail Corridor SEIS, this Rail Alignment EIS, and the Repository SEIS and assigned them accordingly. DOE has considered all comments, including those received after the close of the scoping period, on the scope of these documents.

1.6.2 SCOPING COMMENTS

Section 1.6.2.1 summarizes the scoping comments received during the first scoping period and refers to the Caliente rail alignment. Section 1.6.2.2 summarizes scoping comments received during the second scoping period, in which most comments referred to the Mina rail alignment.

1.6.2.1 Caliente Rail Alignment

DOE received more than 4,100 comments during the first public scoping period for this Rail Alignment EIS, and some after the close of the scoping period. DOE summarized all comments received (including those submitted after the close of the scoping period) in *Summary of Public Scoping Comments Related to the Environmental Impact Statement for the Alignment, Construction, and Operation of a Rail Line to a Geologic Repository at Yucca Mountain, Nye County, NV* (DIRS 176463-Craig, Lechel, and Morton 2004, all), and considered the content of all comments in determining the scope of this Rail Alignment EIS. Table 1-1 summarizes the comments that address the six questions listed in the Notice of Intent and any other comments that led to changes in the scope of this Rail Alignment EIS. Table 1-1 also notes DOE responses to those comments and directs the reader to sections of this Rail Alignment EIS that address certain issues.

1.6.2.2 Mina Rail Alignment

DOE received nearly 800 comments during the second public scoping period for this Rail Alignment EIS, and some comments after the close of the scoping period. DOE summarized all comments received (including those submitted after the close of the scoping period) in *Summary of Public Scoping Comments on the Expanded 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 (DIRS 181379-DOE 2007, all), and considered the content of all comments in determining the scope of this Rail Alignment EIS. Table 1-2 summarizes the comments that address the four questions listed in the Amended Notice of Intent and any other comments that led to changes in the scope of this Rail Alignment EIS. Many of the comments received were similar in nature to comments received during the first scoping period. Table 1-2 focuses on comments that changed the scope of this Rail Alignment EIS beyond those listed in Table 1-1. Table 1-2 also notes DOE responses to those comments and directs the reader to sections of this Rail Alignment EIS that address certain issues.

1.6.3 TRIBAL UPDATE MEETINGS

The Consolidated Group of Tribes and Organizations is composed of 17 tribes and organizations with appointed representatives who are responsible for representing their respective tribal concerns and perspectives. In 1987, DOE began a long-term relationship with the Consolidated Group of Tribes and Organizations to inventory and evaluate the American Indian cultural resources in the Yucca Mountain area. The primary focus of the group has been the protection of cultural resources and environmental restoration.

The American Indian Writers Subgroup is composed of representatives from the Western Shoshone, Owens Valley Paiute and Shoshone, and Southern Paiute groups. The Consolidated Group of Tribes and Organizations appointed these representatives to write the American Indian perspective of a proposed railroad in the Caliente corridor. DOE has provided members of the American Indian Writers Subgroup with opportunities to travel along the Caliente rail corridor, funding, technical assistance, and other resources necessary to develop a resource document that expresses American Indian perspectives on the proposed railroad.

DOE held a tribal update meeting in Las Vegas, Nevada, on June 2 and June 3, 2004, to obtain comments from tribal representatives from the Consolidated Group of Tribes and Organizations. During the second scoping comment period for this Rail Alignment EIS, DOE held another meeting for the Consolidated Group of Tribes and Organizations on November 29, 2006, in Pahrump, Nevada. DOE considered all comments submitted during the meetings in the development of the scope of this 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, not only in Nevada but across the country. DOE is committed to continuing the consultation process throughout the development of this Rail Alignment EIS and plans to continue consultation with American Indians to ensure that tribal concerns and perspectives are considered. In response to comments received from the Consolidated Group of Tribes and Organizations, and as a result of DOE cultural resource surveys, the Department avoided certain American Indian sites in the areas of North Pahroc summit, Reveille Valley, and Beatty. Appendix B contains information on additional American Indian consultation and input to this Rail Alignment EIS.

DOE supported the American Indian Writers Subgroup, which submitted input to this Rail Alignment EIS. The subgroup developed *American Indian Perspectives on the Proposed Rail Alignment Environmental Impact Statement for the U.S. Department of Energy's Yucca Mountain Project* (DIRS 174205-Kane et al. 2005, all). The Subgroup prepared the document for the Caliente rail alignment. No such document was prepared for the Mina rail alignment.

Table 1-1. Summary of Rail Alignment EIS scoping comments and DOE responses related to the Caliente rail alignment[a] (page 1 of 5).

Notice of Intent question	Scoping comment summary	DOE response summary
Should additional alternatives be considered that might minimize, avoid, or mitigate adverse environmental impacts?	DOE received many comments regarding proposed alternative segments or rail corridors that should either be included for consideration or dismissed. Justifications for new alternative segments included minimizing risks to population centers, avoiding American Indian trust lands, bypassing private lands, avoiding impacts to mining and ranching operations, maintaining access to the local transportation network, avoiding sensitive biological and cultural resource areas, and avoiding impacts to the Nevada Test and Training Range.	DOE considered changes to the alternative segments identified in the Notice of Intent and the new alternative segments suggested during scoping. Some of these proposed alternative segments are studied in detail in this Rail Alignment EIS, and others were eliminated from detailed study. Chapter 2 of this Rail Alignment EIS provides information about the proposed alternative segments considered in detail. Appendix C discusses other alternative segments suggested during scoping but dismissed from further consideration, and describes the evolution of the rail alignments considered in this Rail Alignment EIS and the reasons for dismissing certain alternative segments.
	Commenters suggested a rail alignment along, but outside, the western boundary of the Nevada Test and Training Range.	As described in Chapter 2 of this Rail Alignment EIS, DOE investigated alternative segments along, but outside, the western boundary of the Nevada Test and Training Range. DOE analyzed several alternative segments close to the boundary of the Nevada Test and Training Range in detail. All common segments and alternative segments analyzed in detail in this Rail Alignment EIS are outside the Nevada Test and Training Range.
	DOE received comments regarding potential environmental impacts associated with constructing and operating the proposed railroad. A number of commenters expressed concern about the proximity of the rail line to Wilderness Study Areas and suggested that DOE avoid those areas. The President signed the Lincoln County Conservation, Recreation, and Development Act into law on December 1, 2004 (Public Law 108-424). It designates Wilderness Areas in Lincoln County, including the Weepah Springs Wilderness Area.	DOE adjusted or eliminated alternative segments to avoid Wilderness Study Areas and Wilderness Areas. For example, one of the proposed alternative segments that would have passed through the White River area (White River 2) would have crossed into the Weepah Springs Wilderness Area for a short distance. DOE adjusted this alternative segment to avoid the Wilderness Area. In addition, the common segment of the rail alignment that would pass through Reveille Valley would cross into the Reveille Valley Wilderness Study Area for a short distance. DOE identified two new alternative segments (South Reveille 2 and 3) to avoid the Wilderness Study Area.
	Commenters urged DOE to adopt an alternative segment that would bypass Garden Valley. Commenters suggested an alternative segment that would follow existing highways from Caliente to Tonopah (U.S. Highway 93 to Route 375 to Route 6). Other commenters suggested an alternative segment that would pass through Coal Valley and Murphy Gap in the Golden Gate Range.	DOE considered several alternative segments that would bypass Garden Valley. While the alternative segments that would avoid Garden Valley were determined not to be reasonable and were eliminated from detailed study due to feasibility and cost issues, DOE added and studied in detail, Garden Valley 3 and Garden Valley 8 to the proposed alternative segments to provide more alternatives within Garden Valley and to reduce environmental impacts.

Table 1-1. Summary of Rail Alignment EIS scoping comments and DOE responses related to the Caliente rail alignment[a] (page 2 of 5).

Notice of Intent question	Scoping comment summary	DOE response summary
Should additional alternatives be considered that might minimize, avoid, or mitigate adverse environmental impacts? (continued)	Commenters suggested interfacing with the Union Pacific Railroad Mainline at Elgin.	DOE considered the Elgin alternative segment to connect to the Union Pacific Railroad Mainline. However, the Elgin alternative segment would cross several areas of private land and would require steep grades coming out of Rainbow Canyon. DOE determined that this alternative segment was not reasonable and eliminated it from detailed study.
	Commenters suggested relocating the Goldfield alternative segments farther west to avoid the historic mining district, private property, and access roads.	DOE added Goldfield alternative segment 4, which would run to the west of Goldfield and avoid the mining district.
Should any of the preliminary alternatives be eliminated from detailed consideration?	Commenters suggested that a Bonnie Claire alternative segment (Bonnie Claire 1) should either be eliminated from consideration or moved, because it would cross Timbisha Shoshone Trust Lands. The Air Force indicated that Bonnie Claire 2 was unacceptable because it would enter the Nevada Test and Training Range.	DOE eliminated Bonnie Claire 1 from detailed study, adjusted Bonnie Claire 2 to avoid the Nevada Test and Training Range, and added a new alternative segment (Bonnie Claire 3, which would avoid the Timbisha Shoshone Trust Lands and the Nevada Test and Training Range) for detailed study.
Should additional environmental resources be considered?	Commenters expressed concern about potential impacts to private land, ranching, mining, and other land-use issues. Commenters expressed interest in how construction and operation of the proposed railroad might affect access to public and private lands. Commenters requested that DOE provide maps showing the proposed railroad in relation to grazing allotments and private property. DOE and the BLM also solicited and received comments from grazing permittees that described the potential impacts to ranching operations that could occur if DOE constructed the proposed railroad (see DIRS 173845-Resource Concepts 2005, all). Comments from grazing permittees also included suggested measures DOE could consider to mitigate potential impacts.	DOE initially selected the Caliente rail corridor in which to determine an alignment for a rail line, in part to minimize private land-use conflicts. This Rail Alignment EIS analyzes potential land-use impacts, including impacts to ranching (see Section 4.2.2, Land Use and Ownership). DOE has prepared a detailed Map Atlas (DIRS 182844-DOE 2007, Part B) that shows the proposed locations of the rail line and the infrastructure associated with construction and operation of the proposed railroad. The Map Atlas also shows private property and grazing allotment boundaries.

Table 1-1. Summary of Rail Alignment EIS scoping comments and DOE responses related to the Caliente rail alignment[a] (page 3 of 5).

Notice of Intent question	Scoping comment summary	DOE response summary
Should additional environmental resources be considered? (continued)	Commenters stated that the impacts of the rail line to the *City* sculpture in Garden Valley must be thoroughly assessed in terms of disturbance of viewsheds, loss of visual resources, and noise. One commenter stated that the prevailing silence and the undisturbed environment are essential to the character of the sculpture.	DOE conducted ***ambient noise*** monitoring in Garden Valley and in other locations along the Caliente rail corridor to provide a ***baseline*** from which to analyze potential noise impacts (see Sections 3.2.8 and 4.2.8, Noise and Vibration). DOE also prepared photo simulations of the four Garden Valley alternative segments and used BLM methodology for analyzing impacts to visual resources (see Sections 3.2.3 and 4.2.3, Aesthetic Resources).
	Commenters asked how silica and ***erionite*** would be disposed of, and how DOE would prevent worker and public exposure to these materials.	DOE has analyzed the potential risks of exposure to silica and erionite and has identified best management practices to reduce public and worker exposure (see Section 4.2.10, Occupational and Public Health and Safety).
	Commenters highlighted the generation of dust and impacts to air resources that could occur during construction and noted potential impacts on fragile ***desert*** soils.	DOE has analyzed the potential for impacts to air resources and desert soils and identified the best management practices and mitigation measures to control dust generation and soil erosion (see Section 4.2.1, Physical Setting, and Section 4.2.4, Air Quality and Climate).
	Commenters requested that DOE analyze the socioeconomic impacts of construction and operations jobs on rural communities.	This Rail Alignment EIS includes analysis of socioeconomic impacts from railroad construction and operations on rural communities (see Section 4.2.9, Socioeconomics).
	Commenters stated that the Rail Alignment EIS must fully analyze the possible environmental impacts of potential ***accidents*** and train derailments, and the potential for an attack on a train carrying spent nuclear fuel or high-level radioactive waste, making the assumption that the ***cask*** sustains significant damage and is breached. One commenter noted that the dismissal of this concern on the grounds that such an event is not likely enough to be significant would not be acceptable. Commenters stated that the Rail Alignment EIS must identify the methodology DOE would employ to regularly inspect the rail line to ensure its integrity and safety.	DOE has analyzed the risks of accidents and releases that could occur during the railroad operations phase (see Section 4.2.10, Occupational and Public Health and Safety). This Rail Alignment EIS also analyzes releases that could occur from acts of terrorism. In the Yucca Mountain FEIS, DOE analyzed the environmental implications of transporting spent nuclear fuel and high-level radioactive waste throughout the United States by rail. DOE has incorporated security measures into its planning for transportation of these materials, both nationally and in Nevada.

Table 1-1. Summary of Rail Alignment EIS scoping comments and DOE responses related to the Caliente rail alignment[a] (page 4 of 5).

Notice of Intent question	Scoping comment summary	DOE response summary
Should additional environmental resources be considered? (continued)	Commenters expressed concern about the potential impact to local economies and communities from development of the proposed railroad. These concerns included the potential economic loss resulting from restricted access to the land adjacent to the rail line, and the negative public perception of the area of the railroad. One commenter expressed concern about the possible displacement of community members through the government's use of eminent domain.	DOE has analyzed the potential socioeconomic impacts of the proposed railroad, and the potential land-use conflicts that could occur (see Section 4.2.9, Socioeconomics, and Section 4.2.2, Land Use and Ownership).
	Several commenters stated that the Rail Alignment EIS must thoroughly address the safety measures and adequacy of emergency response in case of a rail accident or accidental release of radioactive material. Specifically, commenters mentioned addressing the need to provide support facilities close to established communities and the need to define the acceptable statistical probabilities of health and environmental risks.	DOE has evaluated the risk of accidents and releases of radioactive material (see Section 4.2.10, Occupational and Public Health and Safety). Appendix L, Supplemental Transportation Information, discusses emergency response.
Should DOE allow private entities to ship commercial commodities on its rail line?	Commenters expressed support for public or commercial use of the rail line. Commenters noted the potential for economic development (that is, maximize value and minimize risk); shipping of various commodities such as building materials, oil, and minerals from mining; and use by passengers or tourists pursuing various recreational interests.	As described in Chapter 2, DOE prepared a shared-use report to assess the demand for shared use and to identify a potential level of rail traffic that could be generated under shared use. The Department has analyzed the ***Shared-Use Option*** in this Rail Alignment EIS to make an informed decision on shared use.
	Other commenters stated that the rail line should be used only for DOE shipments and should not be made available for shared use.	DOE has analyzed the Shared-Use Option in this Rail Alignment EIS to provide decisionmakers with enough information to make an informed decision on shared use.

Table 1-1. Summary of Rail Alignment EIS scoping comments and DOE responses related to the Caliente rail alignment[a] (page 5 of 5).

Notice of Intent question	Scoping comment summary	DOE response summary
What mitigation measures should be considered?	Various commenters noted best management practices and mitigation issues surrounding impacts to livestock, fencing, revegetation of disturbed areas, waterways and washes, mining and mineral development, and truck transportation. More than 200 commenters indicated that the Rail Alignment EIS should address how ranchers and miners would be compensated for loss of grazing and mineral development rights, either financially or through granting of new grazing rights in other areas.	DOE developed a series of mitigation measures to avoid, minimize, rectify, reduce, or compensate for potential impacts associated with construction and operation of the proposed railroad. DOE and the BLM solicited comments on potential mitigation measures from grazing permittees along the rail alignment, and considered these comments when developing mitigation measures. Chapter 7 describes potential mitigation measures. In addition, DOE would implement best management practices during construction and operation of the railroad. Best management practices are considered part of the Proposed Action and are also described in Chapter 7.
Are there national security issues that should be addressed?	The Air Force indicated that for national security, safety, and training reasons, it would be unacceptable for alternative segments to enter the Nevada Test and Training Range.	DOE concluded that such alternative segments would not be reasonable and eliminated from detailed study all proposed alternative segments that would have entered the Nevada Test and Training Range.
Other comments that affected the scope of this Rail Alignment EIS	Commenters suggested that DOE identify and analyze the entire infrastructure necessary to construct and operate the proposed railroad, including construction camps, ***ballast*** sources, borrow and fill areas, access roads, rail yards, maintenance facilities, and an operations center.	DOE has identified the entire infrastructure necessary for construction and operation of the proposed railroad (see Chapter 2), and this Rail Alignment EIS analyzes the potential impacts associated with that infrastructure.

a. Source: DIRS 176463-Craig, Lechel, and Morton 2004, all.

Table 1-2. Summary of Rail Alignment EIS scoping comments and DOE responses related to the Mina rail alignment[a] (page 1 of 3).

Amended Notice of Intent question	Scoping comment summary	DOE response summary
Should additional alternative alignments (segments), be considered that might minimize, avoid, or mitigate adverse environmental impacts?	DOE received many comments regarding proposed alternative segments. For example, commenters suggested that DOE avoid Silver Peak in favor of a route that avoids the steep grades, length, and construction costs associated with Montezuma alternative segment 1. Other commenters suggested linking the Silver Peak and Goldfield alternative segments (Montezuma alternative segments 1 and 2). Other commenters suggested that DOE avoid all communities in the Mina rail corridor.	As described in Chapter 2, DOE added Montezuma alternative segment 3, which provides an alternative that avoids the communities of Silver Peak and Goldfield. Montezuma alternative segment 3 incorporates parts of Montezuma alternative segments 1 and 2 and links them at the northern end of the Montezuma Range. DOE has avoided the communities of Luning, Mina, and Sodaville by keeping Mina common segment 1 on the eastern side of Soda Spring Valley.
	DOE received a suggestion that Mina common segment 1 in the Redlich area be moved east due to mining exploration.	DOE moved Mina common segment 1 east to avoid mining operations.
	Commenters suggested that DOE evaluate alternative segments in the Crater Flat area to facilitate possible rail spurs to areas identified by Nye County for potential industrial development.	DOE evaluated the location of common segment 6 in the Crater Flat area and determined that rail line construction sidings could be left in place to facilitate shared use in this area. Shared-use opportunities are described in Chapter 2 and shared-use impacts are described in Chapter 4.
Should any of the preliminary alternatives be eliminated from detailed consideration?	Commenters suggested that DOE move Oasis Valley alternative segments 1 and 3 at least 5 miles[b] east of their current location. These commenters expressed concerns about potential noise and vibration to a ranch located approximately 8 miles north of Beatty.	As described in Chapter 2, DOE considered the suggestion of moving Oasis Valley alternative segments 1 and 3 to the east, but decided that this was not feasible due to land-use conflicts with the Nevada Test and Training Range.

Table 1-2. Summary of Rail Alignment EIS scoping comments and DOE responses related to the Mina rail alignment[a] (page 2 of 3).

Amended Notice of Intent question	Scoping comment summary	DOE response summary
Should additional environmental resources be considered?	Commenters requested that DOE consider the impacts on grade crossings in Lyon County on the existing Union Pacific Railroad Hazen Branchline. Commenters questioned whether the grade crossings at Hazen (Alternate U.S. Highway 50), Silver Springs (U.S. Highway 50), Fort Churchill State Historic Park (Alternate U.S. Highway 95), and at Wabuska (Alternate U.S. Highway 95) would need to be grade separated due to the increase in rail traffic proposed by DOE.	DOE performed a ***quantitative*** analysis of the impacts to all of the public road grade crossings along the existing Union Pacific Railroad and Department of Defense Branchlines. The analysis included consideration of whether any existing grade crossings need to be grade separated. This analysis is described in Section 4.3.9, Socioeconomics.
	Commenters suggested that the Rail Alignment EIS address a planned industrial and rail park in the Hazen area. Other commenters suggested inclusion of a planned airport in the Hazen area.	The Western Nevada Rail Park and the expansion of the airport near Silver Springs are considered in the cumulative impacts analysis (see Chapter 5).
	Commenters suggested that the scope of the Rail Alignment EIS include sufficiently large regions of influence for each resource studied so that real impacts can be assessed from railroad construction and operations. For example, commenters suggested that the scope for the Mina rail alignment should be from Hazen to Yucca Mountain.	The scope of this Rail Alignment EIS for the Mina rail alignment considers railroad operations impacts and rail traffic during construction from Hazen to Yucca Mountain. For rail line and facilities construction, the scope includes Wabuska to Yucca Mountain (Wabuska being the most northerly location where DOE is proposing any rail line construction, in this case, a siding). The scope does include construction impacts from Hazen to Wabuska, but only in relation to the increase in rail traffic from trains carrying construction materials during the construction phase. Chapters 2, 3, and 4 describe this approach in more detail.
	DOE received comments highlighting plans to establish a new state park at Monte Cristo's Castle near Blair Junction. The comments suggested that the Mina rail alignment could interfere with and prevent access to the park from U.S. Highways 95 and 96.	DOE considered potential impacts associated with the Mina rail alignment on the development of the new park at Monte Cristo's Castle (see Section 4.3.2, Land Use and Ownership, and Chapter 5, Cumulative Impacts).
	Commenters requested that the Rail Alignment EIS describe the fiscal consequences of ***stigma***-induced impacts to counties and cities along all waste-shipment routes in Nevada and along the Caliente and Mina rail alignments. Commenters suggested that the Rail Alignment EIS analyze stigma effects from both routine shipments and accidents. Commenters also suggested that DOE conduct a perceived risk assessment to evaluate cultural concerns along the rail alignments.	DOE considered stigma-induced impacts and perceived risk but found that analysis of impacts is highly uncertain. Section 4.1.3 describes the Department's consideration of stigma and perceived risk.

Table 1-2. Summary of Rail Alignment EIS scoping comments and DOE responses related to the Mina rail alignment[a] (page 3 of 3).

Amended Notice of Intent question	Scoping comment summary	DOE response summary
What mitigation measures should be considered?	Commenters suggested that the Rail Alignment EIS discuss all proposed efforts to monitor and mitigate impacts from construction and operation of the railroad.	Chapter 7 describes potential mitigation measures. In addition, DOE would implement best management practices during construction and operation of the railroad. Best management practices are considered part of the Proposed Action and are also described in Chapter 7.
Other comments that affected the scope of this Rail Alignment EIS	Commenters urged DOE to begin working with affected jurisdictions and individual property owners to ensure that they are involved in the decisionmaking process.	In addition to the scoping meetings, DOE has held several informational meetings with affected units of local government and has involved the counties in discussions about shared-use opportunities. Appendix B provides a description of interagency, intergovernmental, and stakeholder interactions.
	Commenters suggested that DOE include a list of the environmental features and engineering and design factors used to determine the range of reasonable alternatives.	Appendix C describes the environmental and engineering factors DOE used in developing the range of reasonable alternatives.
	Commenters suggested that the Rail Alignment EIS include detailed maps and plan views of all common segments and alternative segments for the Caliente and Mina rail alignments. Commenters suggested that the maps show the relationship of the proposed railroad to the existing transportation network, including all highway and road crossings, rights-of-way according to ownership, and land use.	DOE prepared a detailed Map Atlas (DIRS 182843 and DIRS 182844-DOE 2007, all) that shows the proposed locations of the Caliente and Mina rail alignments and the infrastructure associated with construction and operation of the railroad. The Map Atlas shows the existing transportation network, proposed road crossings, ***cut*** and ***fill*** areas, rights-of-way, private property, and grazing allotment boundaries.

a. Source: DIRS 181379-DOE 2007, all.
b. To convert miles to kilometers, multiply by 1.6093.

1.6.4 BLM NOTICE OF INTENT AND 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 20 years to evaluate the land for the potential construction, operation, and maintenance of a railroad for the transportation of spent nuclear fuel and high-level radioactive waste (68 *FR* 74965). 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. Many of the comments the BLM received were similar to those DOE received (as described in Table 1-1). For example, many of the alternatives suggested in the BLM scoping meetings were the same as those DOE received. Commenters also raised concerns about impacts to mining, grazing, visual resources, water resources, and recreation. DOE considered all comments the BLM received in developing the scope for this Rail Alignment EIS and some of these comments led to the actions described in Table 1-1.

1.6.5 ADDITIONAL INFORMATION

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 this Rail Alignment EIS. The Department 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 this Rail Alignment 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 previously 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 railroad and possible measures to mitigate those impacts. In addition, 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 railroad and for their input on potential mitigation measures. DOE used the information obtained through these interviews and surveys to help define the scope of this Rail Alignment EIS.

1.6.6 DRAFT EIS PUBLIC COMMENT PROCESS AND PUBLIC HEARINGS

On October 12, 2007, the Environmental Protection Agency 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, and announced the schedule for public hearings. DOE made the NEPA documents available on the Internet, sent copies of the Summary or the full Draft EIS to everyone on the project mailing list, and made the documents available in five reading rooms in Nevada and one in Washington, D.C. DOE distributed approximately 3,700 copies of the Summary and approximately 400 full copies of the Draft EIS.

DOE held eight public hearings on the Draft Repository SEIS, and Draft Nevada Rail Corridor SEIS and Draft Rail Alignment EIS at the following locations in Nevada, California, and Washington, D.C.:

- Hawthorne, NV – Hawthorne Convention Center, 932 E. Street, November 13, 2007
- Caliente, NV – Caliente Youth Center, U.S. Highway 93, November 15, 2007
- Reno/Sparks, NV – Reno/Sparks Convention Center, 4590 South Virginia Street, November 19, 2007
- Amargosa Valley, NV – Longstreet Inn and Casino, Nevada State Highway 373, November 26, 20007
- Goldfield, NV – Goldfield School Gymnasium, Hall and Euclid, November 27, 2007
- Lone Pine, CA – Statham Hall, 138 North Jackson Street, November 29, 2007
- Las Vegas, NV – Cashman Center, 850 North Las Vegas Boulevard, December 3, 2007
- Washington, D.C. – Marriott at Metro Center, 775 12th Street, NW, December 5, 2007

DOE conducted the public hearings in a format in which the first hour was reserved for open-house interactions where members of the public could engage DOE representatives in discussions followed by a formal oral statement process. DOE also provided public hearing attendees the opportunity to submit comments in writing at the hearing or in person with a court reporter who was available throughout the hearing. 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 in Pahrump on November 27, 2007 to take comments on the NEPA documents.

In total, DOE received approximately 4,000 comments on the NEPA documents from nearly 1,100 commenters. DOE reviewed all the comments for applicability to each of the NEPA documents. 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 this Final Rail Alignment EIS) that addresses the issues raised during the public comment period. DOE considered all comments that were received, including those that came after the close of 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 this Final Rail Alignment EIS analysis resulting from the comments on the Draft Rail Alignment EIS. Changes to sections of this Final Rail Alignment EIS resulting from comments on the Draft Rail Alignment EIS are noted in the responses in the Comment-Response Document. The comments received from the public during the comment period identified a variety of key issues for the Draft Rail Alignment EIS. The key issues cover the inclusion of the Mina rail alignment in the Rail Alignment EIS; suggestions that the STB should be the lead agency for preparation of the Rail Alignment EIS; inadequate consideration of alternatives; suggestions that the No-Action Alternative include the mostly legal-weight truck scenario analyzed in the Yucca Mountain FEIS; inadequate commitment to mitigation; and the risks of sabotage and terrorism. These key issues are described in the Introduction to the Comment-Response Document.

1.6.7 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 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 the BLM's Final EIS for the Ely Proposed Resource Management Plan.

1.7 Relationship to Other NEPA-Related Documents

A number of completed, in-preparation, or proposed DOE NEPA documents relate to this Rail Alignment EIS. The Foreword to this Rail Alignment EIS describes the relationships between the Yucca Mountain FEIS, the Repository SEIS (DOE/EIS-0250F-S1), the Rail Corridor SEIS (DOE/EIS-0250F-S2), and the Rail Alignment EIS (DOE/EIS-0369).

In addition, other federal agencies have prepared related EISs. Consistent with Council on Environmental Quality regulations that implement the provisional requirements of NEPA (40 CFR Parts 1500 through 1508), DOE has used information from these documents in its analysis and has incorporated this material by reference as appropriate throughout this Rail Alignment EIS. Table 1-3 lists these documents.

Table 1-3. NEPA documentation related to the proposed railroad[a] (page 1 of 4).

Document	Relationship to this Rail Alignment EIS
Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada, DOE/EIS-0250F (DIRS 155970-DOE 2002, all)	Examines the impacts of constructing, operating, monitoring, and eventually closing a geologic repository at Yucca Mountain. Examines the potential impacts of transporting spent nuclear fuel and high-level radioactive waste nationally and in the State of Nevada.
Notice of Preferred Nevada Rail Corridor (68 *FR* 74951, December 29, 2003)	Announces the Caliente rail corridor, from the five rail corridors studied in the Yucca Mountain FEIS, as the DOE preferred rail corridor in which to construct a railroad.
Notice of Proposed Withdrawal and Opportunity for Public Meeting; Nevada (68 *FR* 74965, December 29, 2003)	Announced BLM receipt of a request from DOE to withdraw public land in the Caliente rail corridor from surface and mineral entry for a period of 20 years to evaluate the land for the potential construction, operation, and maintenance of a railroad for the transportation of spent nuclear fuel and high-level radioactive waste in Nevada. Segregates the land from surface and mineral entry for up to 2 years while various studies and analyses are made to support a final decision on the withdrawal application.
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)	Selected the mostly rail scenario analyzed in the Yucca Mountain FEIS as the mode of transportation nationally and within the State of Nevada. Selects the Caliente rail corridor for alignment, construction, and operation of a proposed railroad to Yucca Mountain.
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)	Announced DOE intent to prepare an EIS for the alignment, construction, and operation of a railroad for the shipment of spent nuclear fuel, high-level radioactive waste, and other materials from a site near Caliente, Lincoln County, Nevada, to a geologic repository at Yucca Mountain, Nye County, Nevada.
Environmental Assessment for the Proposed Withdrawal of Public Lands Within and Surrounding the Caliente Corridor, DOE/EA-1545 (DIRS 176452-DOE 2005, all)	Examines the environmental impacts of withdrawing public lands from surface and mineral entry for up to 20 years to allow evaluation of the land for the proposed railroad.

Table 1-3. NEPA documentation related to the proposed railroad[a] (page 2 of 4).

Document	Relationship to this Rail Alignment EIS
Notice of Availability of Draft Supplemental Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, NV (DOE/EIS-0250F-S1D) *and the Draft Supplemental Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada-Nevada Rail Transportation Corridor* (DOE/EIS-0250F-S2D) *and Draft Environmental Impact Statement for a Rail Alignment for the Construction and Operation of a Railroad in Nevada to a Geologic Repository at Yucca Mountain, Nye County, NV* (DOE/EIS-0369) (72 *FR* 58071)	Announced the availability of two draft NEPA documents related to the Yucca Mountain Project.
Notice of Intent to Prepare an Environmental Impact Statement for the Disposal of Greater-Than-Class-C Low-Level Radioactive Waste (72 *FR* 40135, July 23, 2007)	Announced DOE intent to prepare an EIS to evaluate disposal options for Greater-Than-Class-C ***low-level radioactive waste***.
Draft Complex Transformation Supplemental Programmatic Environmental Impact Statement. DOE/EIS-0236-S4. (DIRS 185273-DOE 2007, all)	Analyzes the potential environmental impacts of reasonable alternatives to continue transformation of the nuclear weapons complex to be smaller, and more responsive, efficient, and secure in order to meet national security requirements.
Notice of Intent to Prepare a Programmatic Environmental Impact Statement for the Global Nuclear Energy Partnership (72 *FR* 331, January 4, 2007)	Announced DOE intent to prepare a programmatic EIS to analyze the potential environmental impacts of alternatives to support an expansion of nuclear energy production, while reducing the risks of nuclear proliferation, and reducing the impacts associated with the disposal of future spent nuclear fuel (for example, by reducing the volume, thermal output, or radiotoxicity of waste requiring geologic disposal).
Public Land Order No. 7653; Withdrawal of Public Lands for the Department of Energy to Protect the Caliente Rail Corridor; Nevada (70 *FR* 76854, December 28, 2005)	Withdraws public lands within the Caliente rail corridor from surface and mineral entry, subject to valid existing rights, for 10 years to allow DOE to evaluate the lands for the potential construction, operation, and maintenance of a rail line.
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)	Announced DOE intent to expand the scope of the Rail Alignment EIS to include the Mina rail alignment.

Table 1-3. NEPA documentation related to the proposed railroad[a] (page 3 of 4).

Document	Relationship to this Rail Alignment EIS
Notice of Proposed Withdrawal and Opportunity for Public Meeting; Nevada (72 *FR* 1235, January 10, 2007)	Announced BLM receipt of an application from DOE to withdraw public lands from surface and mineral entry through December 27, 2015, to evaluate the lands for the potential construction, operation, and maintenance of a rail line. This covers the Mina rail alignment and segments of the Caliente rail alignment not covered in Public Land Order No. 7653. Segregates the land from surface and mineral entry for up to 2 years while various studies and analyses are made to support a final decision on the withdrawal application.
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	Updates the Yucca Mountain FEIS and examines the impacts of construction, operation, monitoring, and eventual closure of a geologic repository at Yucca Mountain. Examines the potential impacts of transporting spent nuclear fuel and high-level radioactive waste nationally.
Record of Decision for the Approved Las Vegas Resource Management Plan and Final Environmental Impact Statement (DIRS 176043-BLM 1998, all)	Examines implementation of BLM management goals and actions in the Las Vegas area.
Tonopah Resource Management Plan and Final Environmental Impact Statement (DIRS 173224-BLM 1997, all)	Examines implementation of BLM management goals and actions in the Tonopah area.
Ely Proposed Resource Management Plan/Final Environmental Impact Statement (DIRS 184767-BLM 2007, all)	Examines implementation of BLM resource management plans, actions, and goals in the Ely area.
Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada. DOE/EIS-0243. Las Vegas, Nevada: U.S. Department of Energy, Nevada Field Office. (DIRS 101811-DOE 1996, all)	Examines the impacts from the continued operations of the Nevada Test Site.
Supplement Analysis for the Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada: DOE/EIS-0243-SA-01. Las Vegas, Nevada: U.S. Department of Energy, National Nuclear Security Administration, Nevada Field Office. (DIRS 162638-DOE 2002, all)	Documents the ***affected environment*** in 2002 and discusses any changes from the 1996 site-wide EIS (DOE/EIS-0243). Provides the status of new programs as of 2002.
Draft Supplement Analysis for the Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada: DOE/EIS-0243-SA-03. U.S. Department of Energy, National Nuclear Security Administration, Nevada Field Office. (DIRS 185437-DOE 2008, all)	Presents a systematic environmental impacts review to determine if there were substantial changes in the actions proposed in the 1996 site-wide EIS (DOE/EIS-0243) or significant new circumstances or information relevant to environmental concerns.

Table 1-3. NEPA documentation related to the proposed railroad[a] (page 4 of 4).

Document	Relationship to this Rail Alignment EIS
Draft Programmatic Environmental Impact Statement of the Designation of Energy Corridors in the 11 Western States (DIRS 185274-DOE 2007, all)	Addresses the environmental impacts from designation of corridors on federal land in the 11 western states for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities (energy corridors), as required by Section 368 of the Energy Policy Act of 2005 (Public Law 109-58). DOE and the BLM co-led this effort, with the U.S. Department of Agriculture's Forest Service, the Department of Defense, and the Department of the Interior's Fish and Wildlife Service participating as federal cooperating agencies. Potential corridors cross Nevada.
Notice of Availability of the Draft Environmental Assessment for the Proposed Infrastructure Improvements for the Yucca Mountain Project, Nevada (71 *FR* 38391, July 6, 2006)	DOE released a Draft Environmental Assessment in 2006 that evaluated several proposed improvements to infrastructure at the Yucca Mountain Repository Site and adjacent portions of the Nevada Test Site. Proposed infrastructure improvements that were analyzed in the Draft EA are being analyzed in the Yucca Mountain Repository Supplemental EIS. Hence, a Final Infrastructure EA will not be published.
Final Environmental Impact Statement: Weber Dam Repair and Modification Project (DIRS 182302-Miller Ecological Consultants 2005, all)	Examines potential environmental impacts to the Walker River from repair and modification of the Weber Dam.

a. BLM = Bureau of Land Management; DOE = U.S. Department of Energy; EA = environmental assessment; EIS = environmental impact statement; FEIS = final environmental impact statement; *FR* = *Federal Register*.

2. PROPOSED ACTION AND ALTERNATIVES

2.1 Introduction

This chapter describes the ***Proposed Action*** and ***No-Action Alternative*** analyzed in this Rail Alignment ***Environmental Impact Statement*** (EIS). As shown in Figure 2-1, the Proposed Action includes two implementing ***alternatives***, each with a ***Shared-Use Option***. Glossary terms are shown in ***bold italics***.

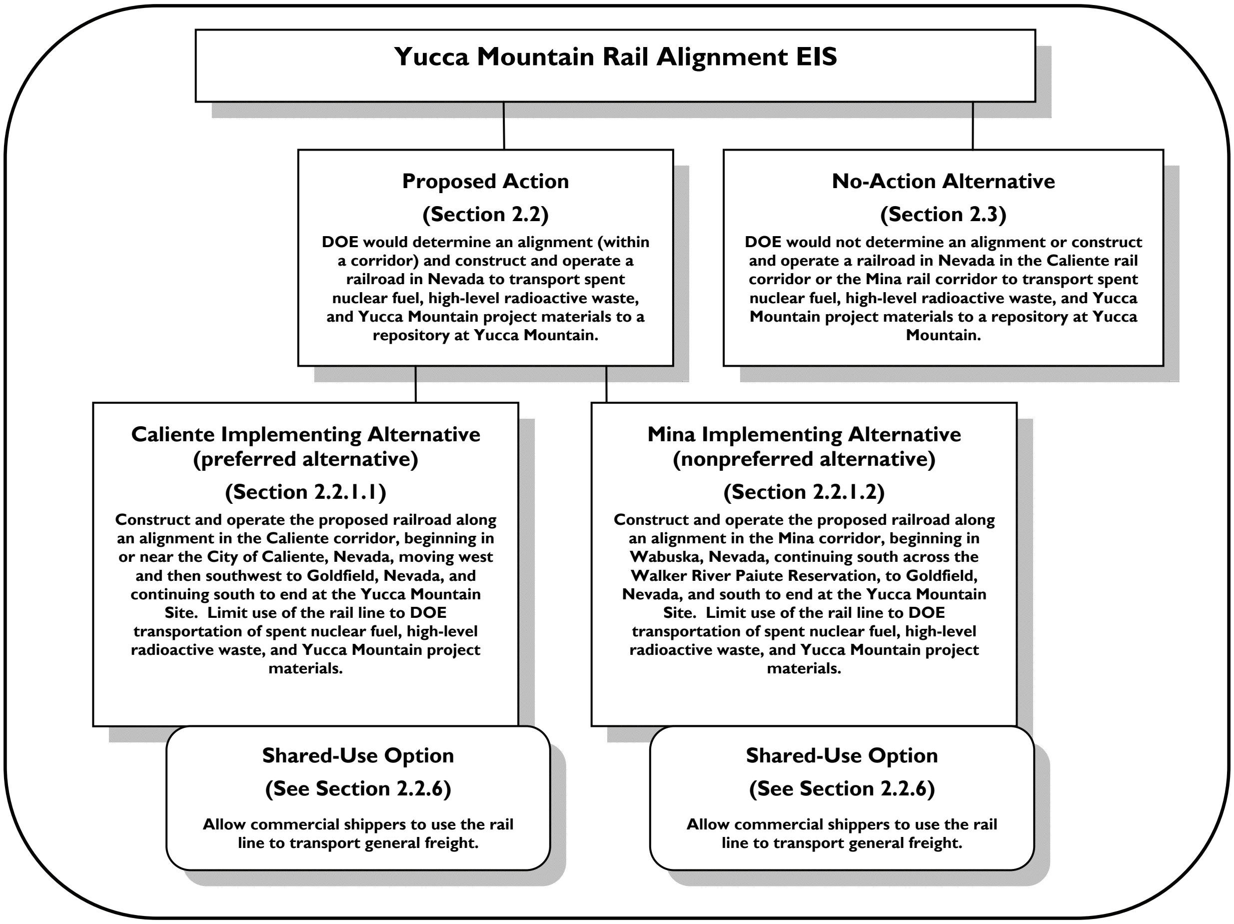


Figure 2-1. Alternatives analyzed in this Rail Alignment EIS.

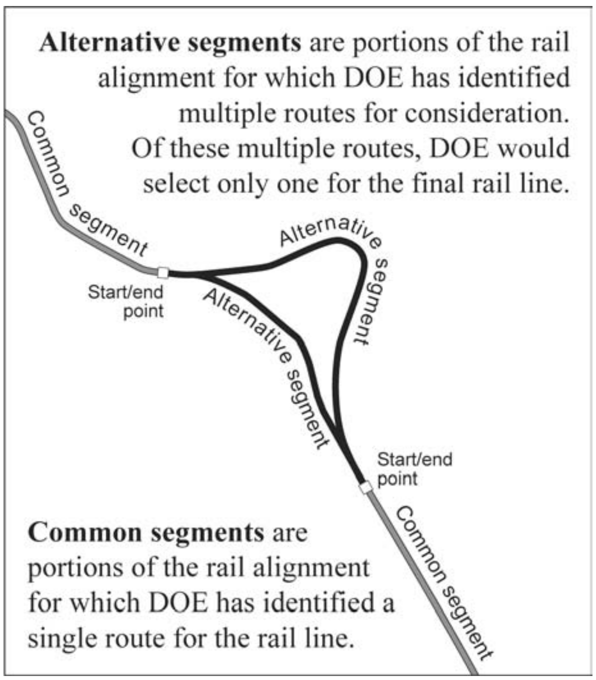
Under the Proposed Action **Caliente Implementing Alternative**, the U.S. Department of Energy (DOE or the Department) would determine a ***rail alignment*** within the Caliente ***rail corridor*** and would construct, operate, and potentially abandon a ***railroad*** for the ***shipment*** of ***spent nuclear fuel***, ***high-level radioactive waste***, and ***other materials*** within Nevada. The proposed railroad would run from a site in or near the City of Caliente, Lincoln County, Nevada, to a ***geologic repository*** at Yucca Mountain, Nye County, Nevada. The Caliente Implementing Alternative (with the Shared-Use Option implemented) is the DOE **preferred alternative** (see Section 2.4). Section 2.2.1.1 describes the Caliente Implementing Alternative.

Under the Proposed Action **Mina Implementing Alternative**, DOE would determine a rail alignment within the Mina rail corridor and would construct, operate, and potentially abandon a railroad for the shipment of spent nuclear fuel, high-level radioactive waste, and other materials within Nevada. The proposed railroad would run from Wabuska, Lyon County, Nevada, to a geologic ***repository*** at Yucca Mountain, Nye County, Nevada. The Mina Implementing Alternative is the DOE **nonpreferred alternative** (see Section 2.4). Section 2.2.1.2 describes the Mina Implementing Alternative.

In each of the rail corridors, DOE considered a range of ***alternative segments*** and a series of ***common segments*** and eliminated the unreasonable alternative segments from detailed analysis based on environmental criteria and engineering factors. Appendix C, Evolution of Common Segments and Alternative Segments, describes the elimination process.

Under either Proposed Action ***implementing alternative***, the **Shared-Use Option** would allow commercial and other shippers to use the ***rail line***. Under the Shared-Use Option, other organizations could construct commercial ***sidings*** (see Section 2.2.2.8) and additional facilities that would allow commercial commodities (such as nonmetallic minerals or stone) to be transported on the rail line. Section 2.2.6 describes the Shared-Use Option.

Council on Environmental Quality regulations (40 Code of Federal Regulations [CFR] 1502.14) that implement the procedural requirements of the National Environmental Policy Act (NEPA; 42 United States Code [U.S.C.] 4321 *et seq.*) require that the alternatives analysis in an EIS include the alternative of no action. Under the **No-Action Alternative**, DOE would not determine a rail alignment or construct the proposed railroad within the Caliente rail corridor or the Mina rail corridor. The No-Action Alternative provides a basis for comparison with the Proposed Action. Section 2.3 describes the No-Action Alternative in greater detail.



Council on Environmental Quality regulations require an agency to identify its preferred alternative, if one or more exists, in the draft EIS (40 CFR 1502.14[e]). For this Rail Alignment EIS, the DOE preferred alternative would be to construct, operate, and possibly abandon a railroad along the Caliente rail alignment for the shipment of spent nuclear fuel, high-level radioactive waste, and other materials within Nevada to the ***Yucca Mountain Site***, and to implement the Shared-Use Option. Section 2.4 describes the DOE preferred and nonpreferred alternatives in greater detail.

Section 2.5 summarizes potential environmental ***impacts*** under the Proposed Action (Caliente Implementing Alternative and Mina Implementing Alternative) and the No-Action Alternative.

2.2 Proposed Action

Under the Proposed Action, DOE would determine an alignment (within a corridor) and construct and operate a railroad (called a rail line in the Notice of Intent [69 *Federal Register* {*FR*} 18565, April 8, 2004] and the Amended Notice of Intent [71 *FR* 60484, October 13, 2006]) in Nevada to transport spent nuclear fuel, high-level radioactive waste, and other materials to a repository at Yucca Mountain. There are two implementing alternatives under the Proposed Action – the Caliente Implementing Alternative, under which the Department would construct the proposed railroad in the Caliente rail corridor, and the Mina Implementing Alternative, under which the Department would construct the proposed railroad in the

Mina rail corridor (Figure 2-2). DOE would also use the railroad to transport materials needed for construction, operation, and maintenance of the proposed railroad and the proposed repository at Yucca Mountain.

A rail line in the Caliente rail corridor 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) (DIRS 180916-Nevada Rail Partners 2007, Tables E-3 through E-14), depending on the combination of alternative segments.

A rail line in the Mina rail corridor would extend from near Wabuska, Nevada, in a southeasterly direction to Yucca Mountain. The total length of the rail line could range from approximately 452 to 502 kilometers (281 to 312 miles), including the existing Department of Defense Branchlines. The portions of the Mina rail alignment that would require construction of a new rail line could range in length from approximately 410 to 459 kilometers (255 to 285 miles), depending on the combination of alternative segments (DIRS 180872-Nevada Rail Partners 2007, Tables 4-2, D-2, D-3, D-4, and DIRS 180916-Nevada Rail Partners 2007, Tables E-1 through E-14).

The southern portion of each rail alignment would be the same for approximately 190 kilometers (120 miles) from south of Goldfield to Yucca Mountain.

As discussed in Section 1.5.1, the Proposed Action includes acquiring a ***right-of-way grant*** from the U.S. Department of the Interior, Bureau of Land Management (BLM), which would authorize DOE access to sufficient lands for the rail alignment, rail facilities, and associated construction ***infrastructure*** (for example, ***construction camps***, access roads, and quarries for ***ballast***). DOE would also need to obtain access to some private land. In addition, under the Mina Implementing Alternative, DOE would need to obtain right-of-way access from the Walker River Paiute Tribe/Bureau of Indian Affairs to access lands on the Walker River Paiute Reservation. Sections 3.2.2 and 3.3.2 describe land use and ownership along the Caliente rail alignment and the Mina rail alignment, respectively.

During construction of the proposed railroad, a ***construction right-of-way*** would be established that would nominally occupy a 300-meter (1,000-foot)-wide strip of land centered on the rail alignment (that is, 150 meters [500 feet] on either side of the rail alignment centerline).

Right-of-way grant: Authorization from the BLM to use a specific portion of public land for construction and operation of the proposed railroad. The land covered by the right-of-way grant would include the area of construction, known as the construction right-of-way, and the area of operations, known as the operations right-of-way.

Construction right-of-way: Property over which DOE would obtain access for construction of the railroad, nominally 150 meters (500 feet) on either side of the centerline of the rail alignment (for a total width of nominally 300 meters [1,000 feet]). The width could vary at specific locations to accommodate, for example, certain deep cuts and fills, and construction of drainage controls. The construction right-of-way would also include the locations of construction support facilities (such as quarries) and operations support facilities (such as the Staging Yard).

Operations right-of-way: Property over which access would be obtained for operation of the proposed railroad. In most cases, the width of the operations right-of-way would be less than that of the construction right-of-way (nominally 61 meters [200 feet] on either side of the rail line centerline, for a total width of 122 meters [400 feet]). The width could vary at specific locations to accommodate, for example, access and maintenance roads and drainage structures. The operations right-of-way would also include the locations of operations support facilities (such as the Staging Yard).

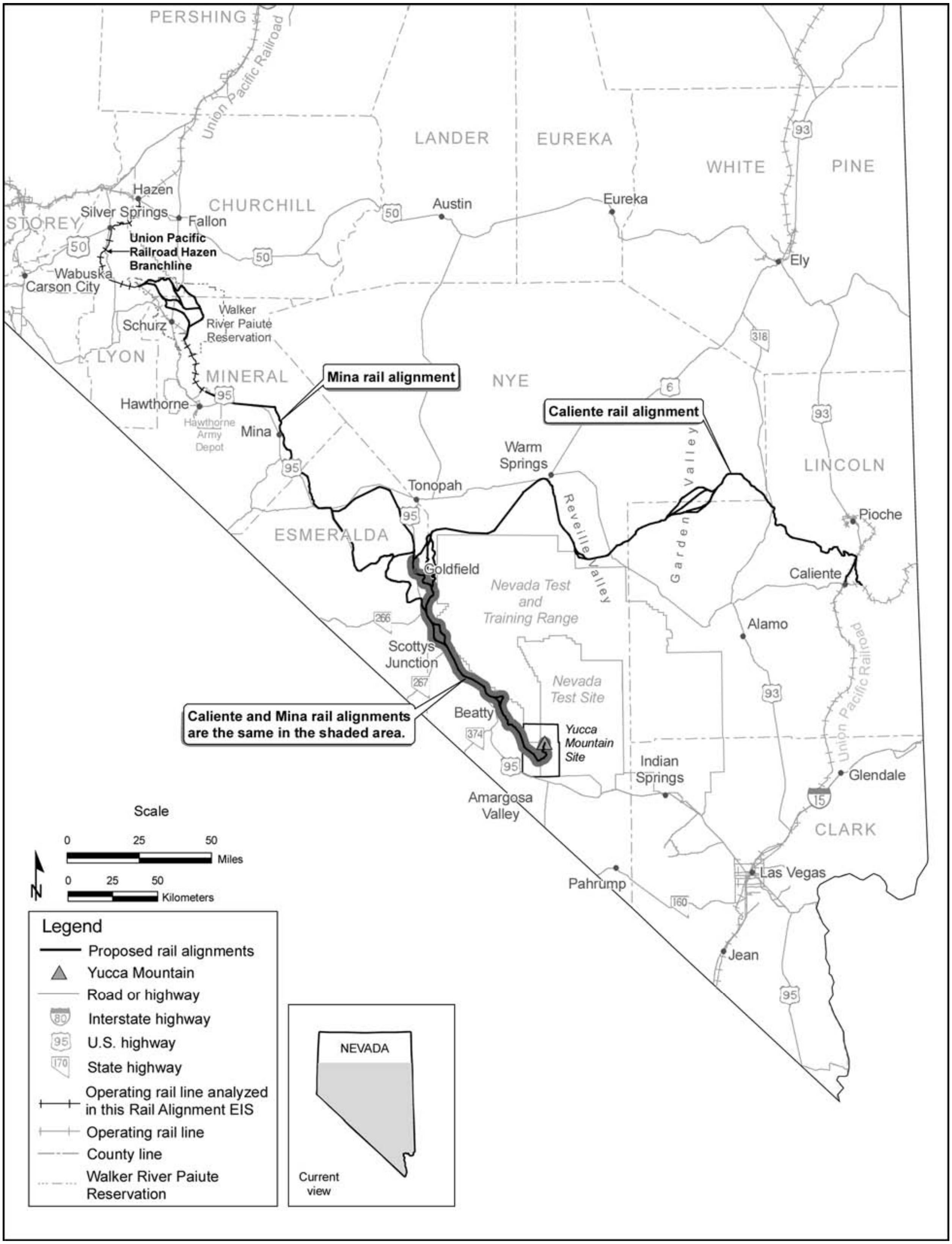


Figure 2-2. The proposed Caliente and Mina rail alignments.

The width of the construction right-of-way would vary as necessary and would be minimized to reduce impacts to, for example, sensitive environmental features (Figure 2-3) (DIRS 182824-Nevada Rail Partners 2007, p. iii).

During the railroad operations phase, the right-of-way would be reduced to a smaller width (nominally 61 meters [200 feet] on either side of the centerline of the rail line). DOE would minimize this ***operations right-of-way*** to the extent practicable and would determine the operations right-of-way in consultation with the BLM. Lands formerly inside the construction right-of-way but not included in the operations right-of-way would be reclaimed (restored to natural conditions), as appropriate.

Under the Caliente Implementing Alternative, the Department estimates the total cost to construct the railroad would be approximately $2.57 billion (in year 2008 dollars) (DIRS 185365-Garfield 2008, all). Under the Mina Implementing Alternative, the Department estimates that the total cost of construction would be approximately $2.03 billion (in year 2008 dollars) (DIRS 185365-Garfield 2008, all).

Both implementing alternatives would require operations support facilities (see Section 2.2.4). Under the Caliente Implementing Alternative, facilities would include:

- ***Interchange Yard***
- ***Staging Yard***
- Maintenance-of-Way Facility:
  - Maintenance-of-Way Headquarters Facility and Maintenance-of-Way Trackside Facility (if Goldfield alternative segment 1 or 3 is selected)
  - Maintenance-of-Way Facility (if Goldfield alternative segment 4 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
- 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

Although the specific facilities identified under each implementing alternative are different, in total they would provide the same functions under either implementing alternative. For example, 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.

Under the Caliente Implementing Alternative, the Department is analyzing two options for the Maintenance-of-Way Facility. If the Department were to construct Goldfield alternative segment 1 or Goldfield alternative segment 3, the functions of the Maintenance-of-Way Facility would be divided between a Maintenance-of-Way Headquarters Facility near Tonopah and a Maintenance-of-Way

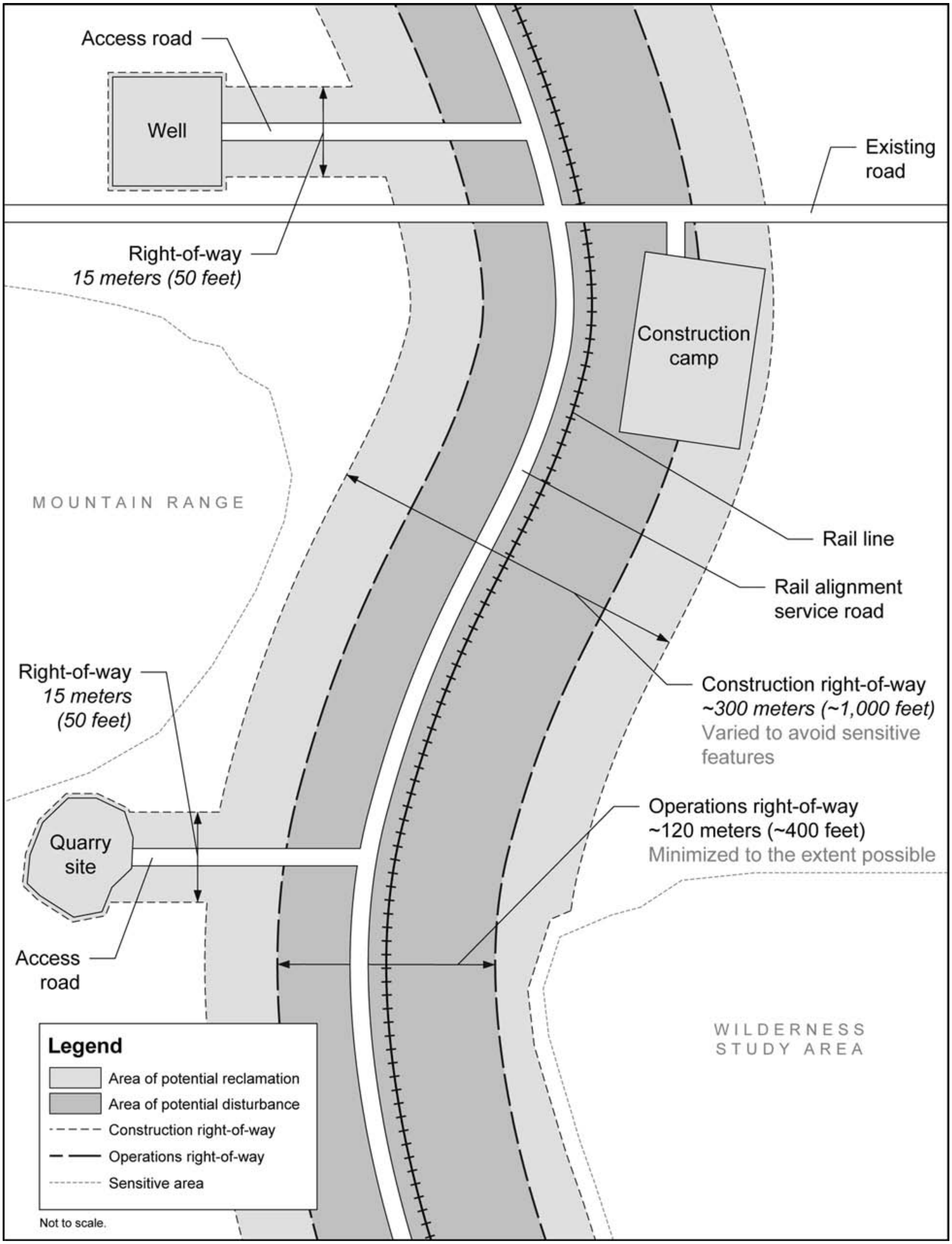


Figure 2-3. The construction and operations rights-of-way.

Trackside Facility along Caliente common segment 3. If the Department were to construct Goldfield alternative segment 4, all of the functions would be housed in a single Maintenance-of-Way Facility along Goldfield alternative segment 4.

Best management practices: Practices, techniques, methods, processes, and activities commonly accepted and used throughout the construction and railroad industries that DOE would implement as part of the Proposed Action to facilitate compliance with applicable requirements and that provide an effective and practicable means of preventing or minimizing the environmental impacts of an 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. Chapter 6, Statutory, Regulatory, and other Applicable Requirements, describes such requirements. 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. Chapter 7, Best Management Practices and Impacts Mitigation, describes representative best management practices DOE would implement during construction and operation of the proposed railroad.

Mitigation (40 CFR 1508.20) includes:

- Avoiding the impact altogether by not taking a certain action or parts of an action.
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- Compensating for the impact by replacing or providing substitute resources or environments.

Chapter 4, Environmental Impacts, describes the potential environmental impacts of constructing and operating a railroad under the Proposed Action. Where impact analyses results indicate the potential for environmental impacts despite DOE engineering and site evaluation and planning practices and implementation of best management practices, DOE has developed potential ***mitigation*** measures as a step toward reducing the environmental impacts of the project. Chapter 7 identifies the measures DOE would consider to mitigate impacts remaining after engineering and site evaluation and planning, and the implementation of best management practices.

Under the Proposed Action without shared use, use of the railroad would be restricted to DOE shipments; DOE would not allow commercial use of the rail line. DOE would use the railroad to ship approximately 9,500 ***casks*** containing spent nuclear fuel and high-level radioactive waste from the Caliente or Wabuska areas to the repository over an operations phase of up to 50 years (DIRS 182826-Nevada Rail Partners 2007, p. 4-1). Each cask would be shipped on an individual ***cask car***. DOE would also ship approximately 29,000 railcars of other materials, which would include repository construction materials, materials necessary for day-to-day operations of the railroad and the repository, and waste materials for disposal, such as scrap metal and ***solid waste*** (DIRS 182826-Nevada Rail Partners 2007, p. 4-2). Together, these activities equal approximately 17 one-way trips per week during railroad operations along either the Caliente or Mina rail alignment. Table 2-1 summarizes the expected frequencies of the types of trains that would operate on the railroad.

During planning and design of the proposed railroad, DOE employed various engineering and site evaluation measures to avoid, minimize, or otherwise reduce environmental impacts. As the environmental analyses have progressed, DOE has refined the design of the railroad to avoid certain sensitive environmental features and reduce potential impacts to sensitive areas by, for example, limiting the project's ***footprint*** in such areas. As part of the Proposed Action, the Department would continue to incorporate refinements through final engineering and design. The following are examples of the types of design and engineering factors DOE has and will continue to consider, as practicable:

Table 2-1. Summary of potential train frequencies.[a,b]

Train type	Approximate peak frequency (one-way, per week)
Cask trains	8
Repository construction materials and supplies trains	7
Maintenance-of-way trains	2
Total	17[c]

a. Source: DIRS 175036-BSC 2005, Table 4.2.
b. Average frequencies; actual frequencies would vary from year to year over the operating life of the railroad.
c. The equivalent of 8.5 round-trip trains going from the Staging Yard to the repository and back in 1 week.

- Follow the contours of the land to the greatest extent practicable to reduce earthwork, ground disturbance, and visual intrusion.
- Design the rail line and facilities to be consistent with appropriate Nevada building codes.
- Where necessary, limit the area of disturbance (the footprint) to minimize potential impacts to ***wetlands***, highways, and private lands to the extent practicable.
- Reduce the potential for erosion, landslides, mudslides, and rockfalls by establishing proper rail ***roadbed*** grades; building mid-slope benches; varying ***cut*** slope dimensions (depending on the strength and stability of the bedrock); implementing additional stabilization measures (such as rock-bolting or slope terracing); and using stormwater erosion control measures.
- Where practicable, use abandoned rail roadbeds to limit construction impacts.
- Avoid springs, ***riparian*** areas, and wetland ***habitats*** or narrow the project footprint in such areas to the extent practicable.
- Avoid, minimize, or otherwise reduce impacts to special status species to the greatest extent practicable by making adjustments to site locations during final design.
- Design communications systems to be used during construction so as to not interfere with other services operating in the same geographic areas.
- Incorporate hydraulic modeling into the final design process to ensure that ***ephemeral stream*** crossings are properly engineered so that they would not contribute to erosion and sediment pollution, and to minimize impacts to downstream surface-water resources.
- Ensure roadway improvements are in accordance with Nevada Department of Transportation, county, and BLM requirements.
- During final design of the railroad, consider the specific locations of manmade surface-water features in relation to the rail alignment and include consultations with the owners to develop, as appropriate, measures to minimize or otherwise mitigate potential impacts to such manmade systems.
- Minimize filling of wetlands by incorporating avoidance into final engineering and design of the railroad to the extent practicable.
- Incorporate hydraulic modeling into the engineering design process to ensure that all stream crossings would be designed to limit the adverse impacts of flooding to nearby populations and resources.
- Design the railroad to avoid springs and other surface-water resources whenever practicable. In the few cases where there would be springs inside the construction right-of-way, incorporate avoidance into final engineering and design of the railroad to the extent practicable.

This chapter describes the Proposed Action in detail. Tables 2-2 through 2-7 summarize and briefly describe the project attributes associated with the Proposed Action along each of the rail alignments, including operations support facilities.

2.2.1 RAIL ALIGNMENTS

This section describes the Caliente rail alignment alternative segments and common segments (Section 2.2.1.1) and the Mina rail alignment existing rail lines, alternative segments, and common segments (Section 2.2.1.2).

Common segments are portions of the rail alignments for which DOE has identified a single route for the rail line. Along the Caliente rail alignment, there are six common segments, starting with Caliente common segment 1 south of Panaca, and moving west sequentially to common segment 6 near Yucca Mountain. In total, the common segments constitute approximately 380 kilometers (235 miles) of the total length of the Caliente rail alignment (DIRS 180916-Nevada Rail Partners 2007, p. 4-6).

There are four common segments along the Mina rail alignment – Mina common segment 1, which would start west of Hawthorne and continue to Blair Junction; Mina common segment 2, which would start south of Lida Junction; common segment 5; and common segment 6. (Common segments 5 and 6 are the same as common segments 5 and 6 along the Caliente rail alignment.) In total, the common segments (new rail) constitute approximately 211 kilometers (131 miles) of the Mina rail alignment (DIRS 180872-Nevada Rail Partners 2007, p. 4-2).

Alternative segments are portions of the rail alignments for which DOE is considering two or more reasonable alternative routes for the rail line. The alternative segments were originally numbered sequentially as they were proposed or developed (for example, Garden Valley 1, Garden Valley 2, and so on); however, DOE eliminated some of those alternative segments from detailed analysis because they were unreasonable. As a result, the remaining alternative segments analyzed in this Rail Alignment EIS are not necessarily numbered sequentially. For example, DOE eliminated the South Reveille 1 and South Reveille 4 alternative segments from consideration; thus, only South Reveille 2 and South Reveille 3 remain. Appendix C describes alternative segments eliminated from detailed study for both the Caliente and Mina rail alignments.

In some cases, two or more alternative segments follow the same route for a few kilometers before splitting and following unique paths. When this occurs, the route on the map is designated with the names of both alternative segments. For example, along the Caliente rail alignment, Garden Valley alternative segments 1 and 2 follow the same route for a few kilometers.

DOE applied various environmental, engineering, and design criteria to generate the common segments and alternative segments to be evaluated in this Rail Alignment EIS. Appendix C provides a detailed discussion of the alternative-segment selection and elimination process; Table C-1 lists the engineering criteria the Department utilized in the identification and analysis of alternative segments and common segments along the Caliente and Mina rail alignments.

DOE based the conceptual design of the rail line on the application of specific criteria used by the commercial rail industry. These criteria govern the horizontal and vertical geometry, structural integrity, and other factors critical to safe and sustained operation of a railroad. In addition, other factors such as environmental constraints and community concerns have been important to the rail alignment-development process. These factors include for example, the consideration of Wilderness Areas and ***Wilderness Study Areas***, avoiding disturbance of private lands where practicable, and avoidance of culturally or biologically sensitive areas.

Table 2-2. General project attributes associated with the Proposed Action.

Attribute	Caliente Implementing Alternative	Mina Implementing Alternative
Length	Total length (all new construction): 328 to 336 miles (528 to 541 kilometers)	Total length: 281 to 312 miles (452 to 502 kilometers) New construction: 255 to 285 miles (410 to 459 kilometers)
Construction phase	4 to 10 years (depending on funding availability for construction activities)	
Operations phase	Up to 50 years	
Construction right-of-way	Nominally 500 feet (150 meters) on either side of the centerline of the rail alignment	
Operations right-of-way	Nominally 200 feet (61 meters) on either side of the centerline of the rail line	

Table 2-3. Project attributes associated with construction of the proposed railroad (page 1 of 2).

Attribute	Caliente Implementing Alternative	Mina Implementing Alternative
Estimated number of bridges	Approximately 215 to 240, ranging in length from 24 to 1,000 feet (7.3 to 300 meters)	Approximately 58 to 69, ranging in length from 50 to 1,000 feet (16 to 300 meters)
Estimated number of culverts	Approximately 96 to 138	Approximately 38 to 60
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 7,000 to 12,000 feet (2,100 to 3,700 meters)	12 sidings, ranging in length from 7,000 to 19,000 feet (2,100 to 5,800 meters)
Construction camps	Number: Up to 12; with up to 6 operating at one time	Number: Up to 10; with up to 6 operating at one time
Total construction employment (required over the entire construction phase)	8,100 full-time equivalents (FTEs)	7,600 FTEs
Peak employment (in any given year during construction)	2,160 FTEs	2,160 FTEs
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.	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.

Table 2-3. Project attributes associated with construction of the proposed railroad (page 2 of 2).

Attribute	Caliente and Mina Implementing Alternatives	
Rail alignment service road	The rail 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	Function: To house construction workers and provide a logistical support area for construction	
	Location: One approximately every 30 miles (50 kilometers) along the rail alignment	
	Employment: Up to 360 per camp (106 support staff and 254 construction staff)	
	Disturbed area: 25 acres (0.10 square kilometer) per camp	
Ballast quarries	Employment:	Up to 30 at each quarry
	Disturbed area:	240 to 930 acres (0.97 to 3.8 square kilometers)
Construction-train traffic (one-way traffic; that is, one train per day is the equivalent of one trip between the beginning of the line and Yucca Mountain)	Ballast trains:	Approximately 8 per day
	Concrete tie trains:	Approximately 2 per day
	Rail section trains:	Approximately 4 per day
	Other material trains:	Approximately 2 per day
	Total:	Approximately 16 per day
Communications towers	Approximately every 10 to 20 miles (16 to 32 kilometers) along the rail alignment, approximately 75 to 100 feet (23 to 30 meters) tall	

Table 2-4. Project attributes associated with the operation and maintenance of the proposed railroad.

Attribute	Caliente and Mina Implementing Alternatives	
Train traffic (one-way traffic)	Cask trains:	Approximately 8 per week
	Maintenance-of-way trains:	Approximately 2 per week
	Repository supply/construction trains:	Approximately 7 per week
	Total:	Approximately 17 per week
Operational characteristics	Travel time:	Less than 10 hours from the Staging Yard to the Rail Equipment Maintenance Yard
	Train operating speed limits:	25 to 50 miles (40 to 80 kilometers) per hour
	Number of casks to be shipped:	Approximately 9,500 total casks containing spent nuclear fuel or high-level radioactive waste
Cask train components	Locomotives:	2 to 3
	Cask cars:	1 to 12 (3 typical)
	Buffer cars:	2
	Escort cars:	1 to 2

Table 2-5. Project attributes associated with railroad operations support facilities along the Caliente rail alignment (excluding segments in common with the Mina rail alignment).

Facility	Description	
Interchange Yard	Function:	Handling point for the exchange of railcars containing construction and other materials between the Union Pacific Railroad Mainline and the proposed railroad
	Location:	Beginning of the Eccles or Caliente alternative segment
	Employment:	0 (employees would be based at the Staging Yard)
	Disturbed area:	Caliente: 15 acres (0.061 square kilometer)
		Eccles: 30 acres (0.12 square kilometer)
Staging Yard	Function:	Transfer point for casks and other materials shipped to the proposed railroad
	Location:	Caliente alternative segment, Indian Cove; Caliente alternative segment, Upland; or Eccles alternative segment, Eccles-North
	Employment:	50
	Disturbed area:	50 acres (0.20 square kilometer)
Maintenance-of-Way Facility (if Goldfield 4 is constructed)	Function:	Coordination center and operational base for all maintenance and inspection activities for the proposed railroad
	Location:	Goldfield alternative segment 4: Approximately 1 mile (1.6 kilometers) north of Goldfield
	Employment:	50
	Disturbed area:	15 acres (0.061 square kilometer)
Maintenance-of-Way Headquarters Facility (if Goldfield 1 or Goldfield 3 is constructed)	Function:	Coordination center for all maintenance and inspection activities on the proposed railroad
	Location:	Approximately 5 miles (8 kilometers) south of Tonopah
	Employment:	10
	Disturbed area:	3.2 acres (0.013 square kilometer)
Maintenance-of-Way Trackside Facility (if Goldfield 1 or Goldfield 3 is constructed)	Function:	Operational base for maintenance and inspection activities
	Location:	Caliente common segment 3: Approximately 30 miles (50 kilometers) southeast of Tonopah
	Employment:	40
	Disturbed area:	15 acres (0.061 square kilometer)

Table 2-6. Project attributes associated with railroad operations support facilities along the Mina rail alignment (excluding segments in common with the Caliente rail alignment) (page 1 of 2).

Facility	Description	
Staging Yard	Function:	Transfer point for casks and other materials shipped to the proposed railroad
		Handling point for the exchange of railcars containing construction and other materials between the Union Pacific Railroad and the proposed railroad
	Maintenance-of-way trains:	Approximately 2 per week
	Location:	Mina common segment 1, Hawthorne
	Employment:	40
	Disturbed area:	50 acres (0.20 square kilometer)

Table 2-6. Project attributes associated with railroad operations support facilities along the Mina rail alignment (excluding segments in common with the Caliente rail alignment) (page 2 of 2).

Facility	Description	
Maintenance-of-Way Facility	Function:	Coordination center and operational base for all maintenance and inspection activities for the proposed railroad
	Location:	Montezuma alternative segment 1, Silver Peak; or Montezuma alternative segments 2 and 3, Klondike
	Employment:	40
	Disturbed area:	15 acres (0.061 square kilometer)

Table 2-7. Project attributes associated with the common railroad operations support facilities along the Caliente and Mina rail alignments.

Facility	Caliente and Mina Implementing Alternatives	
Rail Equipment Maintenance Yard	Function:	The termination point for the proposed railroad and the staging area for the delivery of loaded cask cars and other materials to the repository receiving and inspection area
	Location:	Less than 1 mile (1.6 kilometers) south of the southern boundary of the geologic repository operations area
	Employment:	40 (including employees for the Nevada Railroad Control Center and National Transportation Operations Center)
	Disturbed area:	100 acres (0.41 square kilometer)
Cask Maintenance Facility	Function:	Processing location for empty transportation casks used to transport canistered fuel, including testing, inspection, maintenance, and decontamination
	Location:	For purposes of analysis, collocated with the Rail Equipment Maintenance Yard
	Employment:	30
	Disturbed area:	20 acres (0.081 square kilometer)
Satellite Maintenance-of-Way Facilities	Function:	Dispatch point for maintenance activities along the first third and final third of the rail line
	Location:	Two locations: one at the Rail Equipment Maintenance Yard and one at the Staging Yard
	Employment:	Employees housed at the Rail Equipment Maintenance Yard and the Staging Yard
	Disturbed area:	0 (along the Caliente rail alignment, employees housed at the Maintenance-of-Way Facilities; along the Mina rail alignment, employees housed at the Maintenance-of-Way Facility)
Nevada Railroad Control Center and National Transportation Operations Center	Function:	Nevada Railroad Control Center would control operations along the rail line in Nevada; National Transportation Operations Center would coordinate the national shipment of casks and other materials to the proposed railroad
	Location:	Integrated with either the Rail Equipment Maintenance Yard or the Staging Yard
	Employment:	15 (included in the employment number for the Rail Equipment Maintenance Yard)
	Disturbed area:	0 (integrated with the Rail Equipment Maintenance Yard or the Staging Yard)

Design requirements for the proposed railroad would meet or exceed American Railway Engineering and Maintenance-of-Way Association recommendations (DIRS 162040-AREMA 2001, all) consistent with common industry practice for a ***Class 1 commercial railroad***. Appendix C provides a more detailed explanation of the engineering and design considerations DOE used to develop the rail alignment common segments and alternative segments.

Class 1 commercial railroad: The Surface Transportation Board defines a Class 1 commercial railroad as one with an annual operating revenue exceeding $277.7 million.

Section 2.4 identifies the DOE preferred alternative segments.

2.2.1.1 Caliente Rail Alignment

This section describes the alternative segments and common segments along the Caliente rail alignment, beginning in or near the City of Caliente and moving north, west, and then south along the rail alignment toward Yucca Mountain. Figure 2-4 shows the Caliente rail alignment divided into seven map areas, starting with Caliente map area 1 at the beginning of the rail alignment (the east side) and ending with Caliente map area 7 at the end of the rail alignment (the southwest side). Figures in Sections 2.2.1.1.1 through 2.2.1.1.12 show the alternative segments and common segments. The Map Atlas (DIRS 185492-DOE 2008, all) contains more than 500 detailed maps depicting all of the Caliente rail alignment alternative segments and common segments, railroad ***construction and operations support facilities***, and engineered features, such as cut and ***fill*** areas.

2.2.1.1.1 Alternative Segments at the Interface with the Union Pacific Railroad Mainline

DOE is considering either the Caliente or the Eccles alternative segment to connect the proposed railroad to the existing Union Pacific Railroad Mainline in or near the City of Caliente, as shown in the Map Atlas (DIRS 185492-DOE 2008, Plates 1 through 24) and on Figure 2-5.

The Caliente alternative segment would begin in Caliente, enter Meadow Valley at Indian Cove, and extend generally north through Meadow Valley and along U.S. Highway 93. This alternative segment would then cross U.S. Highway 93 about 5 kilometers (3 miles) southwest of Panaca and connect to Caliente common segment 1 about 1 kilometer (0.6 mile) northwest of U.S. Highway 93 and 18 kilometers (11 miles) south of Pioche. The Caliente alternative segment would be approximately 18 kilometers long (DIRS 180916-Nevada Rail Partners 2007, p. E-3).

The Eccles alternative segment would begin along Clover Creek about 8 kilometers (5 miles) east of Caliente and trend generally north to enter Meadow Valley from the southeast (see Figure 2-5). This alternative segment would then cross U.S. Highway 93 about 5 kilometers (3 miles) southwest of Panaca and connect to Caliente common segment 1 about 1 kilometer (0.6 mile) northwest of U.S. Highway 93 and 18 kilometers (11 miles) south of Pioche. The Eccles alternative segment would be about 19 kilometers (12 miles) long (DIRS 180916-Nevada Rail Partners 2007, p. E-3).

2.2.1.1.2 Caliente Common Segment 1 (Dry Lake Valley Area)

Caliente common segment 1 is shown in the Map Atlas (DIRS 185492-DOE 2008, Plates 25 through 107) and on Figures 2-5 and 2-6. It would begin at the end of the Caliente or Eccles alternative segment. Common segment 1 would trend generally west from Meadow Valley through the Chief Range (Bennett Pass) and across Dry Lake Valley and the North Pahroc Range. On the west side of the North Pahroc Range, common segment 1 would cross Nevada Route 318 near Timber Mountain about 5 kilometers (3 miles) southeast of the Lincoln and Nye County line. It would continue to the northwest

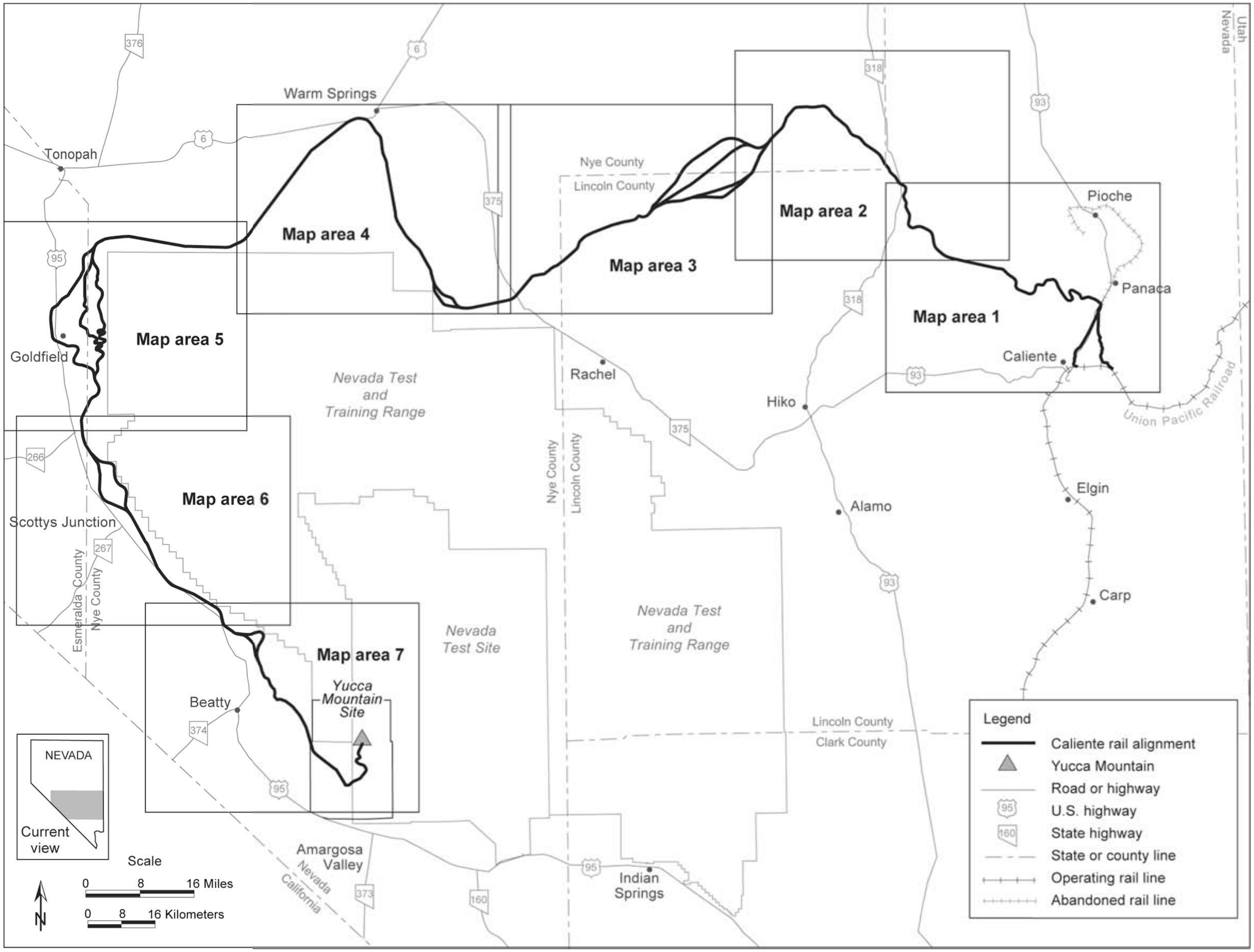


Figure 2-4. Map key for areas along the Caliente rail alignment.

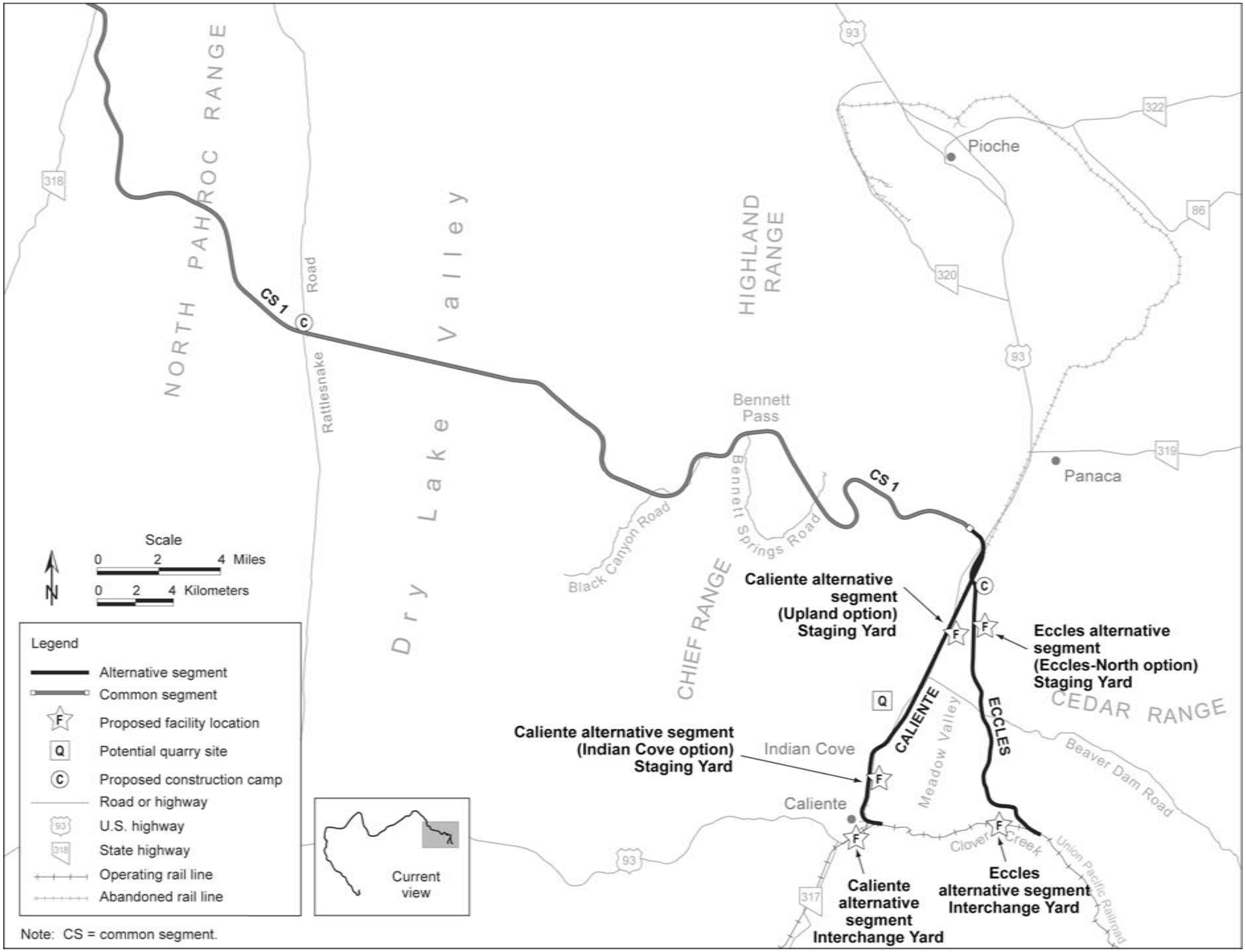


Figure 2-5. Common segments, alternative segments, and related sites within Caliente map area 1.

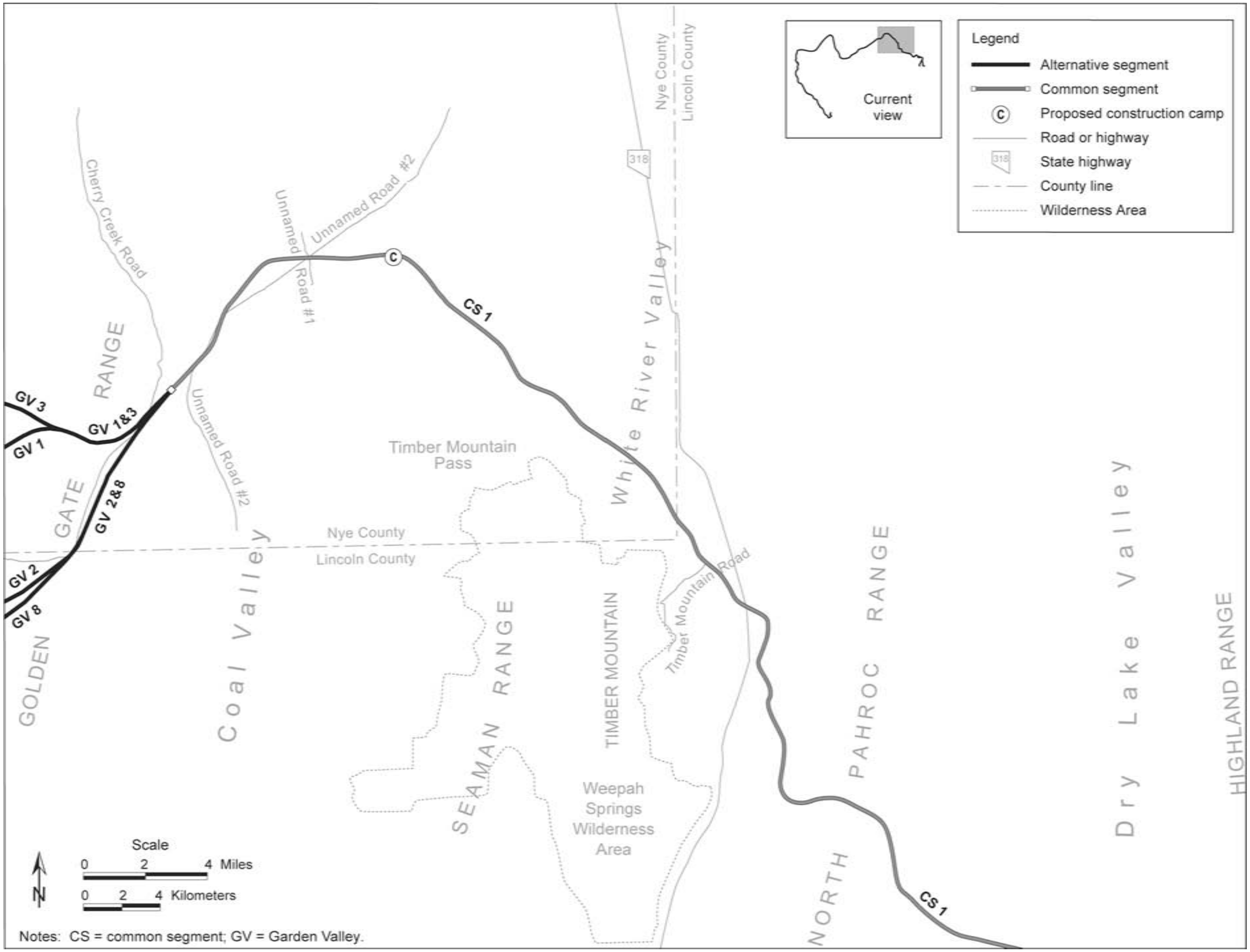


Figure 2-6. Common segments, alternative segments, and related sites within Caliente map area 2.

and then west, passing the northern end of the Seaman Range before turning southwest through Coal Valley. It would then connect to one of the Garden Valley alternative segments about 8 kilometers (5 miles) north of the Lincoln and Nye County line and 28 kilometers (17 miles) west of Nevada Route 318 (see Figure 2-7). Caliente common segment 1 would be approximately 110 kilometers (71 miles) long (DIRS 180916-Nevada Rail Partners 2007, p. E-4).

2.2.1.1.3 Garden Valley Alternative Segments

DOE is considering four alternative segments in the Garden Valley area, referred to as Garden Valley 1, 2, 3, and 8, and shown in the Map Atlas (DIRS 185492-DOE 2008, Plates 110 through 179) and on Figure 2-7.

Garden Valley alternative segment 1 would begin at the end of Caliente common segment 1 and run due west through the Golden Gate Range for about 7 kilometers (4 miles), trend in a southwesterly direction through Garden Valley, cross the Lincoln and Nye County line, and connect to Caliente common segment 2 about 5 kilometers (3 miles) north of the Worthington Mountains Wilderness Area. Garden Valley alternative segment 1 would be approximately 35 kilometers (22 miles) long (DIRS 180916-Nevada Rail Partners 2007, p. E-5).

Garden Valley alternative segment 2 would begin at the end of Caliente common segment 1 and run to the south of the locations of Garden Valley alternative segments 1 and 3 (see below), crossing the Lincoln and Nye County line. Garden Valley 2 would continue southwestwardly through the Golden Gate Range at Water Gap, turn westward through Garden Valley, and continue southwesterly to connect to Caliente common segment 2 about 5 kilometers (3 miles) north of the Worthington Mountains Wilderness Area. Garden Valley alternative segment 2 would be about 35 kilometers (22 miles) long (DIRS 180916-Nevada Rail Partners 2007, p. E-5).

Garden Valley alternative segment 3 would begin at the end of Caliente common segment 1 and run due west through the Golden Gate Range and then in a northwesterly direction until turning southwest to run along the southeast base of the Quinn Canyon Range. Continuing in a southwesterly direction, it would run through Garden Valley, cross the Lincoln and Nye County line, and connect to Caliente common segment 2 about 5 kilometers (3 miles) north of the Worthington Mountains Wilderness Area. Garden Valley alternative segment 3 would be approximately 37 kilometers (23 miles) long (DIRS 180916-Nevada Rail Partners 2007, p. E-5).

Garden Valley alternative segment 8 would begin at the end of Caliente common segment 1 and run to the south of the locations of Garden Valley alternative segments 1 and 3, crossing the Lincoln and Nye County line and paralleling Cherry Creek Road. It would continue southwestwardly through the Golden Gate Range at Water Gap, would turn westward through Garden Valley, parallel Garden Valley Road, and run in a southwesterly direction before turning sharply westward. Garden Valley alternative segment 8 would proceed westward and connect to Caliente common segment 2 about 5 kilometers (3 miles) north of the Worthington Mountains Wilderness Area. Garden Valley alternative segment 8 would be about 37 kilometers (23 miles) long (DIRS 180916-Nevada Rail Partners 2007, p. E-5).

2.2.1.1.4 Caliente Common Segment 2 (Quinn Canyon Range Area)

Caliente common segment 2 is shown in the Map Atlas (DIRS 185492-DOE 2008, Plates 180 through 219) and on Figures 2-7 and 2-8. It would begin at the west end of Garden Valley and would trend southwest through Sand Springs Valley. It would cross State Route 375 near the south end of Railroad Valley before connecting to one of the South Reveille alternative segments near the southern end of the Reveille Range. Caliente common segment 2 would be approximately 50 kilometers (31 miles) long (DIRS 180916-Nevada Rail Partners 2007, p. E-6).

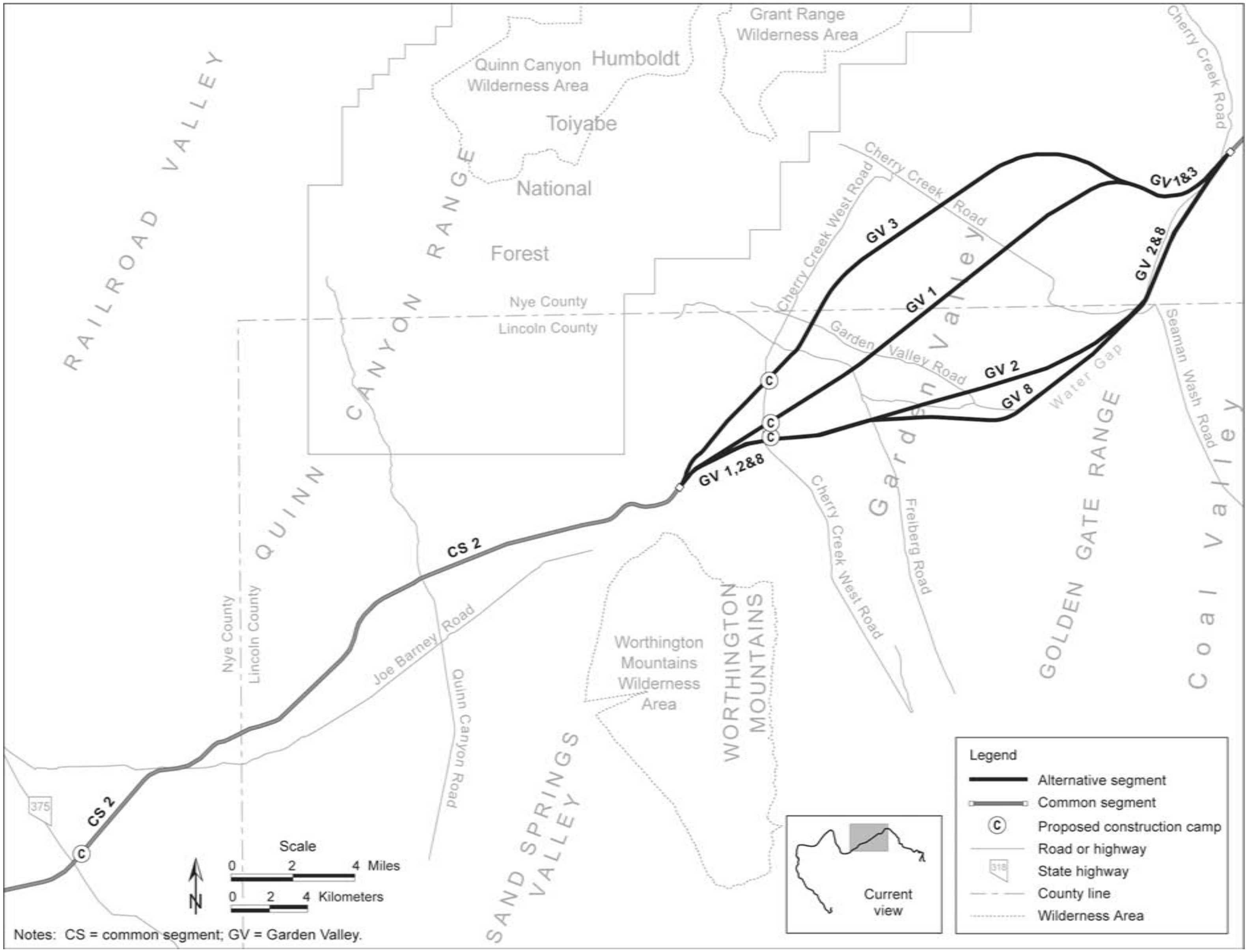


Figure 2-7. Common segments, alternative segments, and related sites within Caliente map area 3.

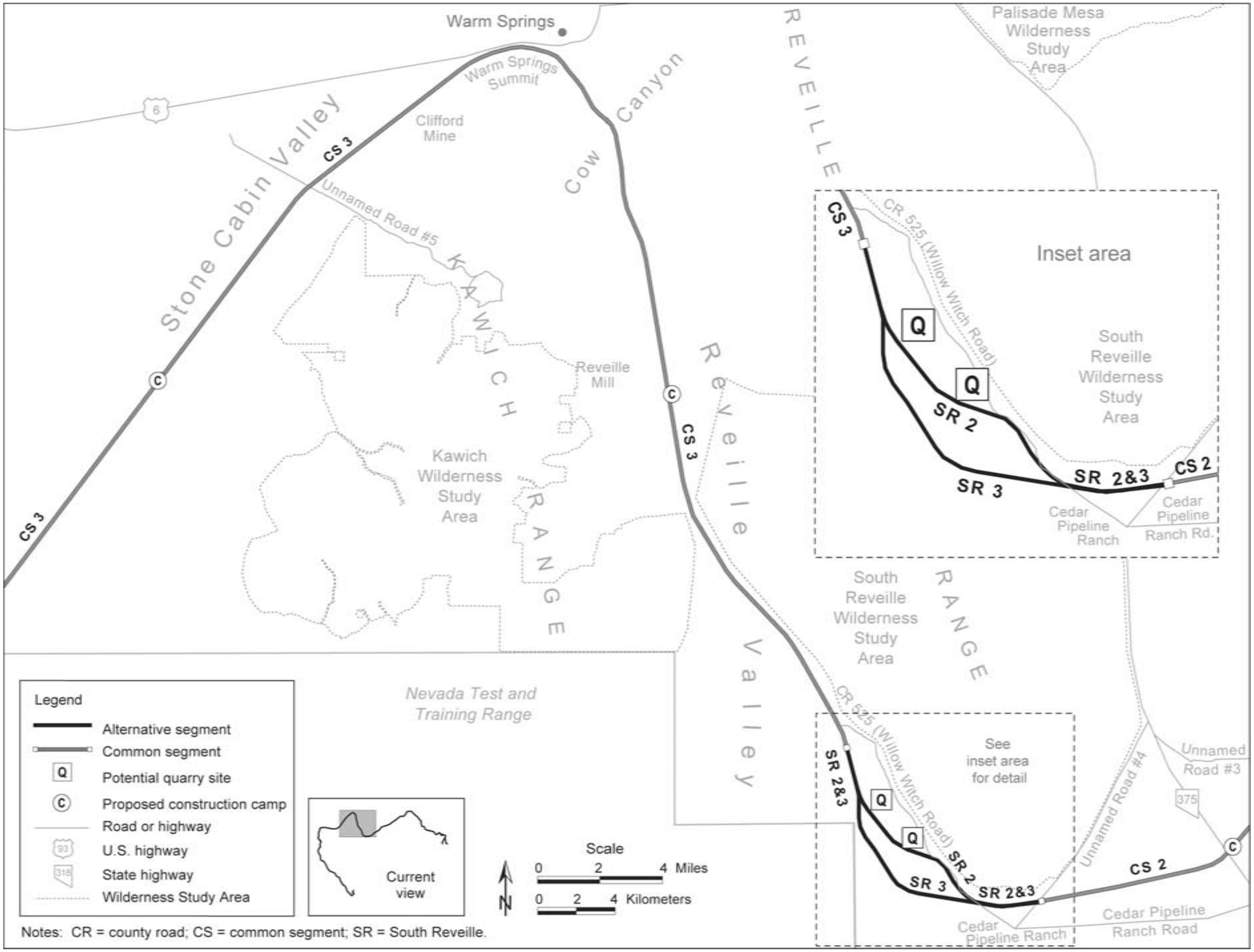


Figure 2-8. Common segments, alternative segments, and related sites within Caliente map area 4.

2.2.1.1.5 South Reveille Alternative Segments

DOE is considering two alternative segments southwest of the South Reveille Wilderness Study Area. These are referred to as South Reveille alternative segments 2 and 3 and are shown in the Map Atlas (DIRS 185492-DOE 2008, Plates 220 through 238) and on Figure 2-8.

Either of these alternative segments would begin 5 kilometers (3 miles) south of the South Reveille Wilderness Study Area at the end of Caliente common segment 2. South Reveille alternative segment 2 would trend to the northwest along the border of the South Reveille Wilderness Study Area. South Reveille alternative segment 3 would trend northwest a few kilometers to the west and roughly parallel to South Reveille alternative segment 2. South Reveille alternative segment 2 or 3 would connect to Caliente common segment 3 in Reveille Valley about 14 kilometers (9 miles) west of State Route 375. South Reveille alternative segment 2 would be approximately 18.8 kilometers (11.7 miles) long and South Reveille alternative segment 3 would be approximately 19.8 kilometers (12.3 miles) long (DIRS 180916-Nevada Rail Partners 2007, p. E-7).

2.2.1.1.6 Caliente Common Segment 3 (Stone Cabin Valley Area)

Caliente common segment 3 is shown in the Map Atlas (DIRS 185492-DOE 2008, Plates 239 through 319) and on Figures 2-8 and 2-9. It would begin at the end of South Reveille alternative segment 2 or 3 in Reveille Valley, run north across Cow Canyon before turning to the southwest at Warm Springs Summit in the Kawich Range, and run to the southwest around the Kawich Range and turn to the west approximately 3 kilometers (2 miles) north of the Nevada Test and Training Range. It would continue west through Ralston Valley before connecting to one of the Goldfield alternative segments, just east of the Esmeralda and Nye County line. Caliente comment segment 3 would be approximately 110 kilometers (70 miles) long (DIRS 180916-Nevada Rail Partners 2007, p. E-8).

2.2.1.1.7 Goldfield Alternative Segments

DOE is considering three alternative segments in the Goldfield area. These are referred to as Goldfield alternative segments 1, 3, and 4 and are shown in the Map Atlas (DIRS 185492-DOE 2008, Plates 320 through 392) and on Figure 2-9.

Goldfield alternative segment 1 would extend south into the Goldfield Hills area, passing east of Black Butte. It would turn east near Espina Hill and head south to the east of Blackcap Mountain. It would wind around a series of hills and valleys to maintain an acceptable ***grade*** to meet the rail line design criteria. Goldfield 1 would run for approximately 11 kilometers (7 miles) along an abandoned rail line before joining Caliente common segment 4. In total, Goldfield alternative segment 1 would be approximately 47 kilometers (29 miles) long (DIRS 180916-Nevada Rail Partners 2007, p. E-9).

Goldfield alternative segment 3 would extend south into the Goldfield Hills area and farther to the east than the other Goldfield alternative segments. Similar to Goldfield alternative segment 1, Goldfield alternative segment 3 would wind around a series of hills and valleys to maintain an acceptable grade to meet the rail line design criteria. Also like Goldfield alternative segment 1, Goldfield alternative segment 3 would run for approximately 11 kilometers (7 miles) along an abandoned rail line before joining Caliente common segment 4. In total, Goldfield alternative segment 3 would be approximately 50 kilometers (31 miles) long (DIRS 180916-Nevada Rail Partners 2007, p. E-9).

The western Goldfield alternative segment, Goldfield 4, would depart Caliente common segment 3 to the north of Black Butte and trend southwest. It would then cross U.S. Highway 95 and turn south toward Goldfield. After passing through the southwestern edge of Goldfield and crossing U.S. Highway 95

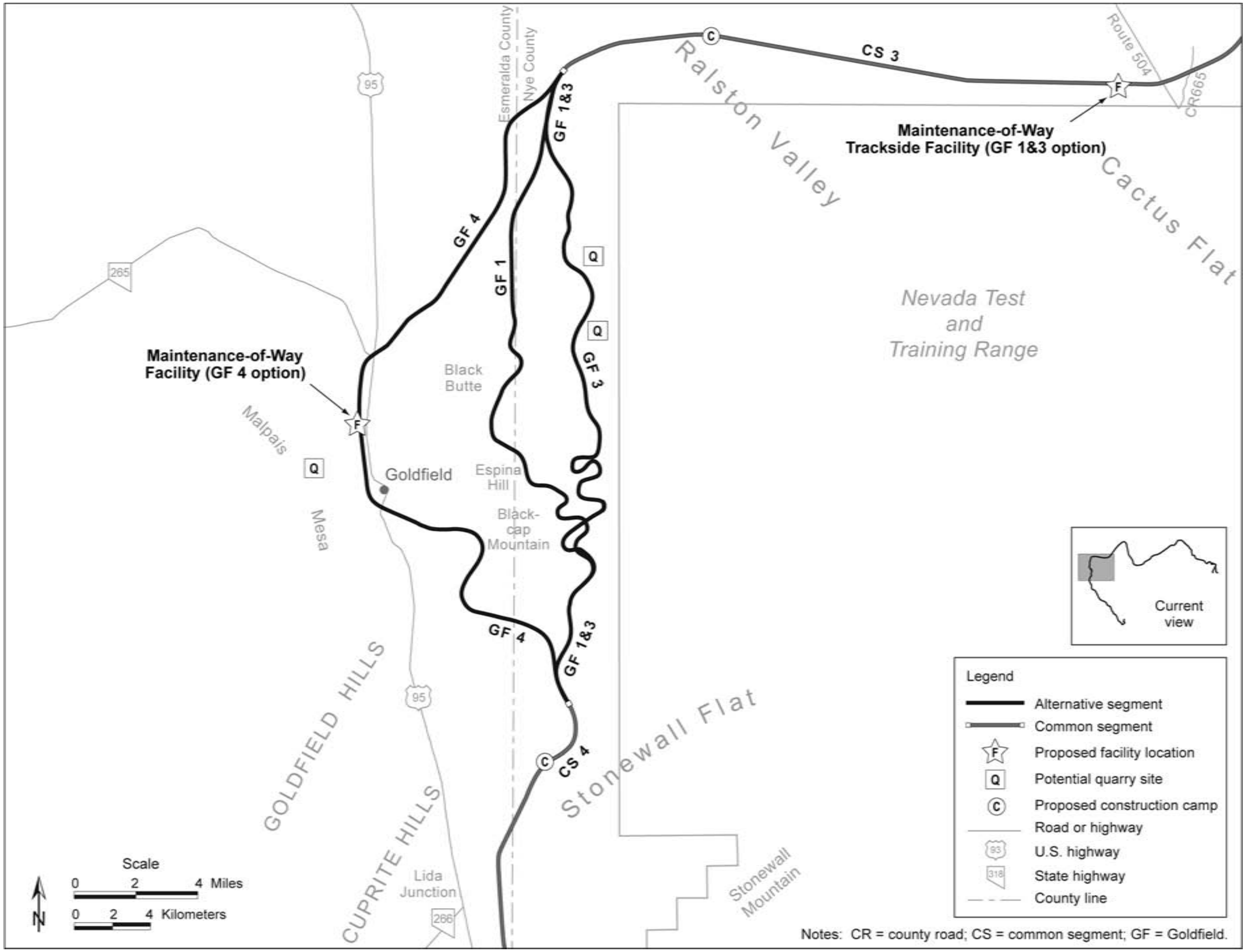


Figure 2-9. Common segments, alternative segments, and related sites within Caliente map area 5.

again, Goldfield alternative segment 4 would turn south to connect with Caliente common segment 4. Goldfield alternative segment 4 would be approximately 53 kilometers (33 miles) long (DIRS 180916-Nevada Rail Partners 2007, p. E-9).

2.2.1.1.8 Caliente Common Segment 4 (Stonewall Flat Area)

Caliente common segment 4 is shown in the Map Atlas (DIRS 185492-DOE 2008, Plates 393 through 399) and on Figures 2-9 and 2-10. It would run south through Stonewall Flat along the Esmeralda and Nye County line. It would end about 6 kilometers (3.5 miles) southeast of the intersection of State Route 266 and U.S. Highway 95, and 8 kilometers (5 miles) north of Stonewall Pass, where it would connect to one of the Bonnie Claire alternative segments. Caliente common segment 4 would be approximately 11 kilometers (7 miles) long (DIRS 180916-Nevada Rail Partners 2007, p. E-10).

2.2.1.1.9 Bonnie Claire Alternative Segments

DOE is considering two alternative segments in the area north of Scottys Junction, Bonnie Claire alternative segments 2 and 3, which are shown in the Map Atlas (DIRS 185492-DOE 2008, Plates 399 through 424) and on Figure 2-10.

Bonnie Claire alternative segment 3 would begin at the end of Caliente common segment 4 about 8 kilometers (5 miles) north of Stonewall Pass. Bonnie Claire alternative segment 3 would trend generally south, paralleling U.S. Highway 95 to the east. After approximately 10 kilometers (6 miles), it would turn southeast and continue for an additional 10 kilometers through Sarcobatus Flat, where it would join common segment 5 approximately 4 kilometers (2 miles) north of Scottys Junction near the intersection of State Route 267 and U.S. Highway 95. Bonnie Claire alternative segment 3 would be approximately 19 kilometers (12 miles) long (DIRS 180916-Nevada Rail Partners 2007, p. E-11).

Bonnie Claire alternative segment 2 would begin at the end of Caliente common segment 4 about 8 kilometers (5 miles) north of Stonewall Pass and would trend east toward the Nevada Test and Training Range for about 5 kilometers (3 miles) before turning south for an additional 17 kilometers (11 miles). Bonnie Claire alternative segment 2 would generally follow the Nevada Test and Training Range boundary and would join common segment 5 in Sarcobatus Flat to the north of Scottys Junction near the intersection of State Route 267 and U.S. Highway 95. Bonnie Claire alternative segment 2 would be approximately 21 kilometers (13 miles) long (DIRS 180916-Nevada Rail Partners 2007, p. E-11).

2.2.1.1.10 Common Segment 5 (Sarcobatus Flat Area)

Common segment 5 is shown in the Map Atlas (DIRS 185492-DOE 2008, Plates 425 through 452) and on Figures 2-10 and 2-11. This common segment would begin 4 kilometers (2 miles) north of Scottys Junction and trend generally southeast through the Sarcobatus Flat area, approximately 100 meters (330 feet) east of U.S. Highway 95 at its closest point. Common segment 5 would end approximately 6 kilometers (4 miles) north of Springdale, where it would connect to one of the Oasis Valley alternative segments. Common segment 5 would be about 40 kilometers (25 miles) long (DIRS 180916-Nevada Rail Partners 2007, p. E-12).

2.2.1.1.11 Oasis Valley Alternative Segments

DOE is considering two alternative segments in the Oasis Valley area, Oasis Valley alternative segments 1 and 3, which are shown in the Map Atlas (DIRS 185492-DOE 2008, Plates 453 through 466) and on Figure 2-11.

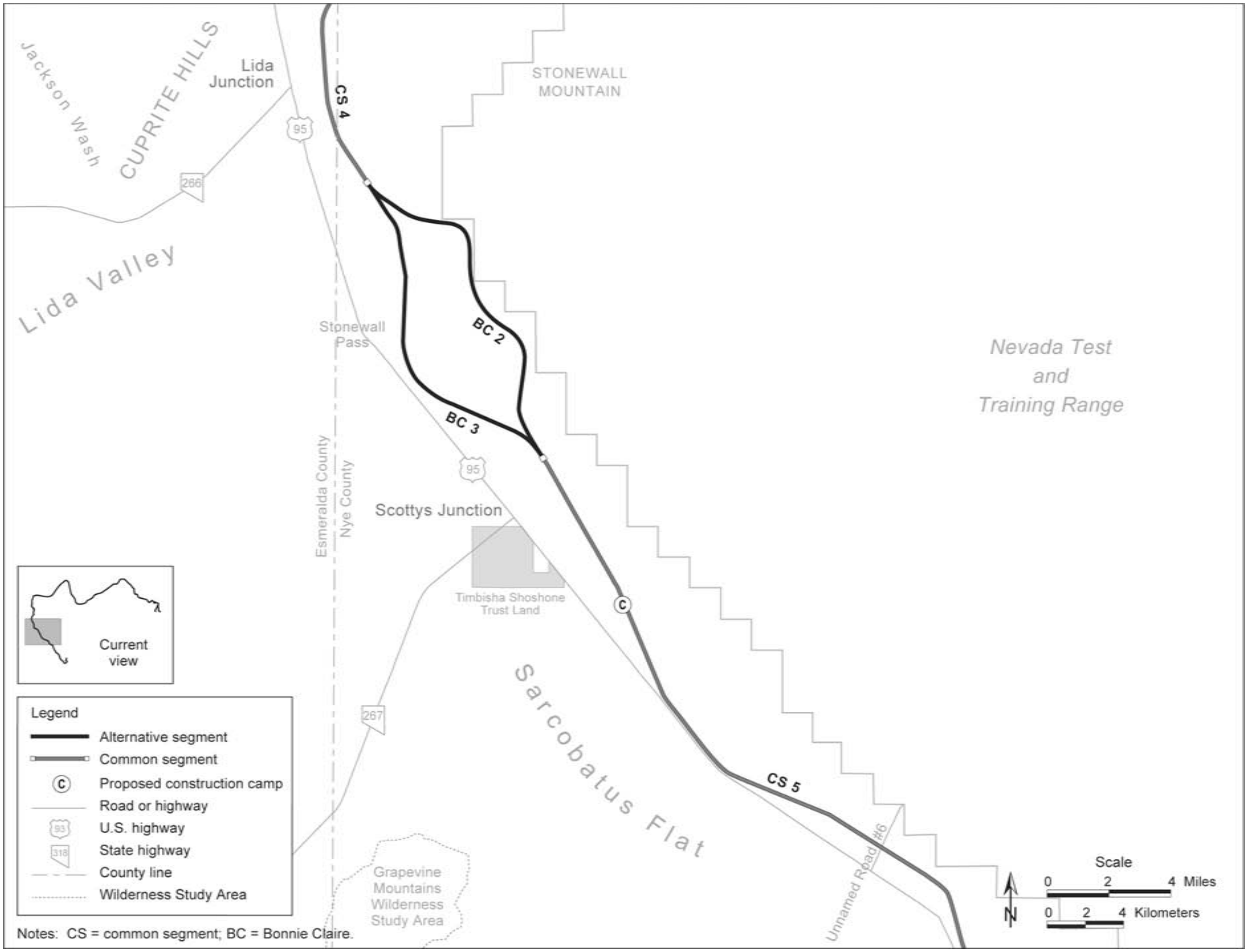


Figure 2-10. Common segments, alternative segments, and related sites within Caliente map area 6.

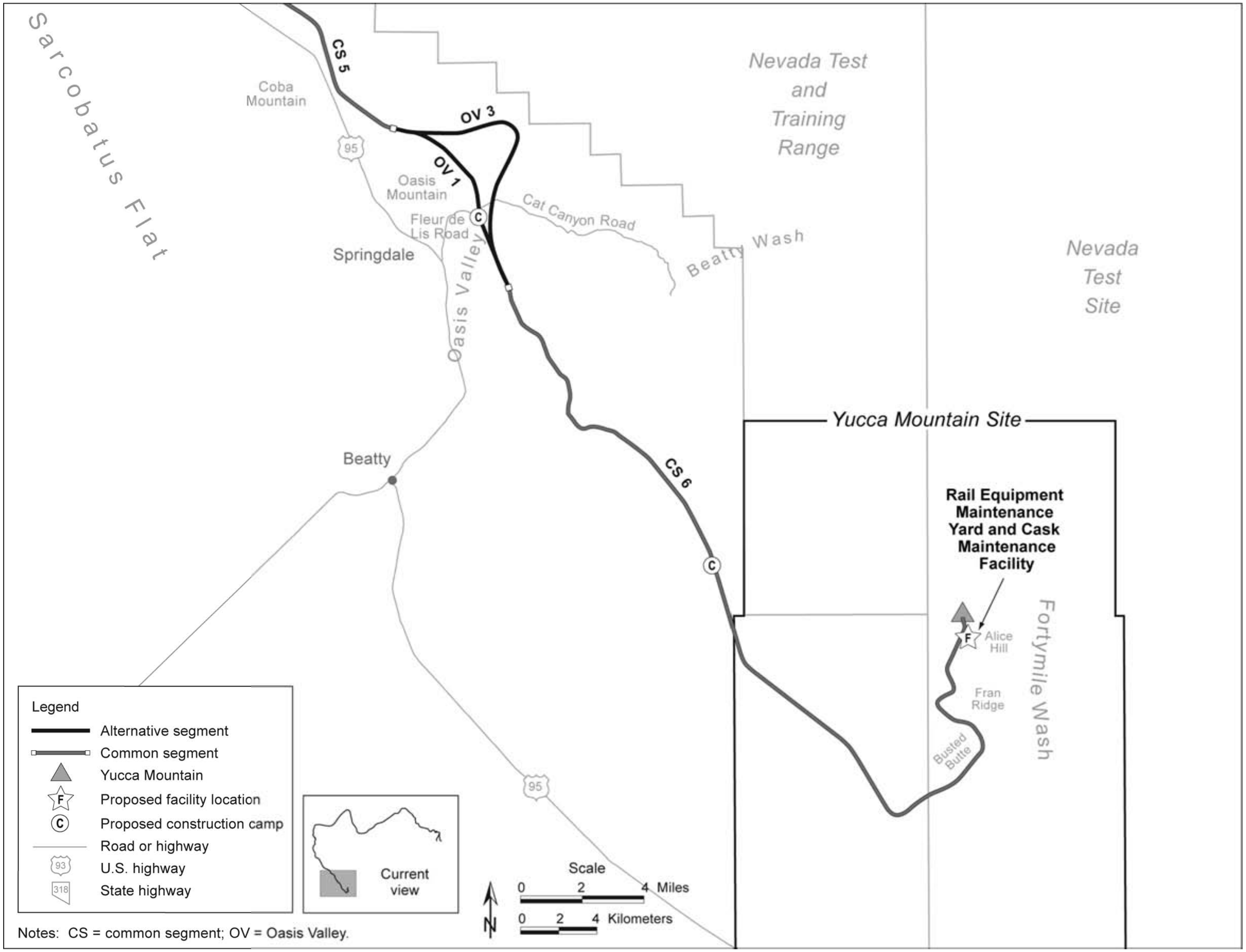


Figure 2-11. Common segments, alternative segments, and related sites within Caliente map area 7.

Oasis Valley alternative segment 1 would begin at the end of common segment 5 approximately 6 kilometers (4 miles) north of Springdale, and would run southeast to connect to common segment 6. Oasis Valley alternative segment 1 would be approximately 10 kilometers (6 miles) long (DIRS 180916-Nevada Rail Partners 2007, p. E-13).

Oasis Valley alternative segment 3 would begin at the end of common segment 5 approximately 6 kilometers (4 miles) north of Springdale, and would run generally east and then south before crossing Oasis Valley farther to the east than Oasis Valley 1 and connecting to common segment 6. Oasis Valley alternative segment 3 would be 14 kilometers (9 miles) long (DIRS 180916-Nevada Rail Partners 2007, p. E-13).

2.2.1.1.12 Common Segment 6 (Yucca Mountain Approach)

Common segment 6, shown in the Map Atlas (DIRS 185492-DOE 2008, Plates 466 through 500) and on Figure 2-11, would begin about 3 kilometers (2 miles) east of U.S. Highway 95. This common segment would trend generally southeast for 40 kilometers (25 miles) from Oasis Valley to Crater Flat. It would then turn northeast for about 11 kilometers (7 miles), passing Busted Butte and trending north on the west side of Fran Ridge until terminating at the Rail Equipment Maintenance Yard inside the ***Yucca Mountain Site boundary***. Common segment 6 would be approximately 51 kilometers (32 miles) long (DIRS 180916-Nevada Rail Partners 2007, p. E-14).

2.2.1.2 Mina Rail Alignment

This section describes the existing Union Pacific Railroad Hazen Branchline between Hazen and Wabuska and the existing rail lines, alternative segments, and common segments along the Mina rail alignment, which would extend from near Wabuska to the Rail Equipment Maintenance Yard inside the Yucca Mountain Site boundary.

DOE would need to ship spent nuclear fuel, high-level radioactive waste, and other materials over the existing Union Pacific Railroad Hazen Branchline before transferring the cargo to the proposed railroad. This shipping activity would increase train traffic from approximately eight one-way trains to 17 one-way trains per week. Because this activity would cause rail traffic on the branchline to increase by more than 100 percent, Surface Transportation Board (STB) regulations require that DOE analyze the operations impacts of the increased traffic along the line. Therefore, although DOE does not consider the Union Pacific Railroad Hazen Branchline part of the Mina rail alignment, it is included in this Rail Alignment EIS for the purposes of analyzing these operations impacts.

Operation of the proposed railroad along the Mina rail alignment would also require operating on portions of existing Department of Defense Branchlines. These existing rail lines are described below for purposes of proposed railroad operations only; there would be no new track construction along these existing rail lines. However, DOE would install sidings (described in Section 2.2.6.2) and a fiber-optic communications cable (described in Section 2.2.2.9) along these existing branchlines. Additionally, as part of routine operations and maintenance, DOE would expect to perform maintenance activities along Department of Defense Branchlines North and South. Section 2.2.3.2 describes these maintenance activities.

Figure 2-12 shows the Union Pacific Railroad Hazen Branchline and the Mina rail alignment divided into eight map areas, starting with Mina map area 1 near Hazen (to the north) and ending with Mina map area 8 at the end of the rail alignment (to the south). Figures in Section 2.2.1.2.1 through 2.2.1.2.11 show existing rail lines, alternative segments, and common segments within each of these map areas. The Map Atlas (DIRS 185510-DOE 2008, all) contains more than 500 detailed maps depicting all of the Mina

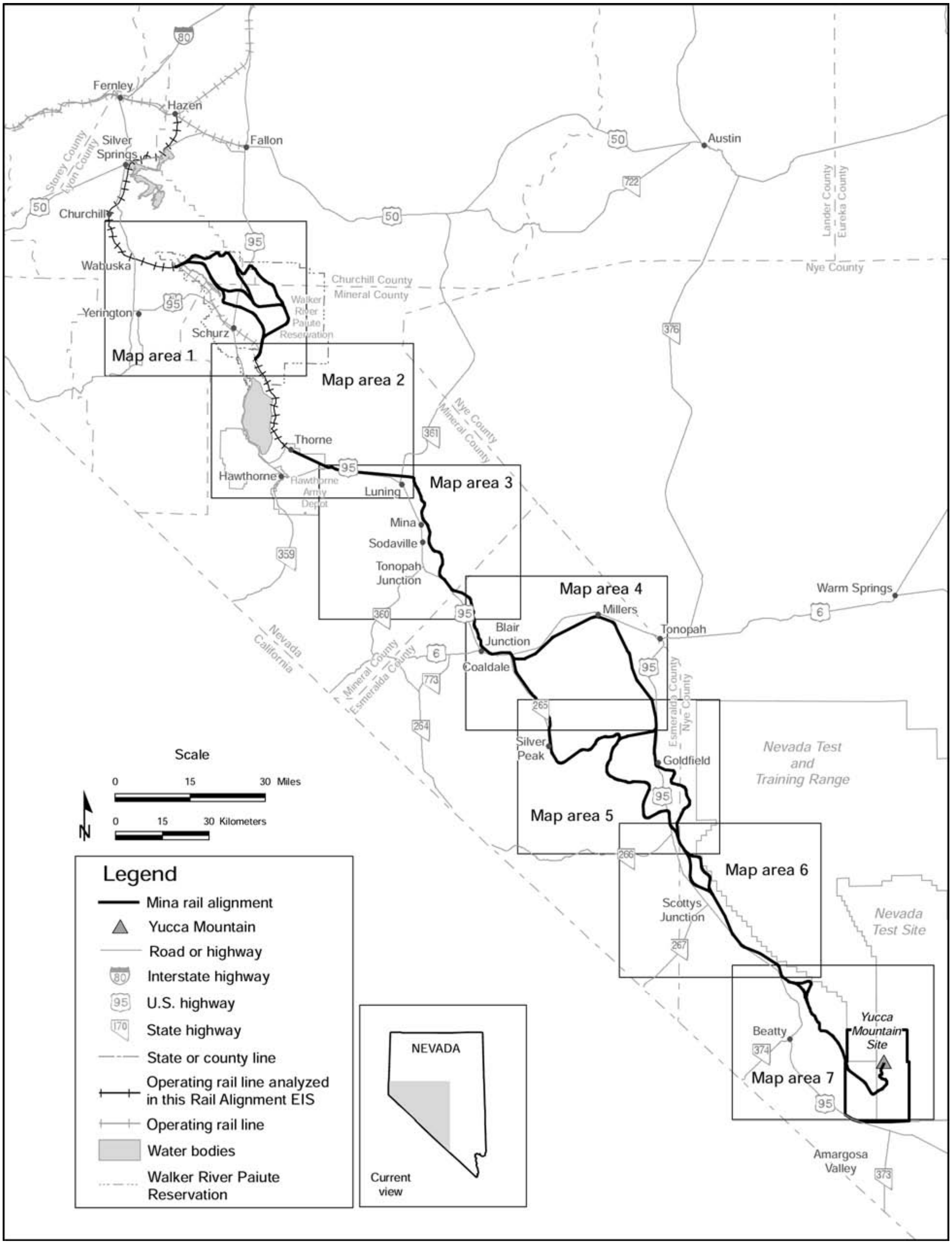


Figure 2-12. Map key for areas along the Mina rail alignment.

alternative segments and common segments, railroad operations support facilities, and engineered features, such as cut and fill areas.

2.2.1.2.1 Union Pacific Railroad Hazen Branchline

The Union Pacific Railroad Hazen Branchline, shown in the Map Atlas (DIRS 185510-DOE 2008, Plates 1 to 46) and on Figure 2-13, is an existing rail line that begins near Hazen, Nevada. From Hazen, it runs south and then southwest for approximately 11 kilometers (7 miles) before meeting and paralleling U.S. Highway 50 west for about 13 kilometers (8 miles) north of the Lahontan Reservoir. The rail line then crosses U.S. Highway 50 and turns southwest about 1.5 kilometers (1 mile) east of Silver Springs. It continues south for the next 16 kilometers (10 miles), flanking Alternate U.S. Highway 95 to the east. The rail line then crosses Alternate U.S. Highway 95 and trends southwest for about 3 kilometers (2 miles) before turning south for the next 14 kilometers (9 miles). The rail line then turns east for 4 kilometers (2.5 miles) and crosses Alternate U.S. Highway 95 at Wabuska. The Union Pacific Railroad Hazen Branchline connects with Department of Defense Branchline North approximately 3 kilometers after crossing Alternate U.S. Highway 95. In total, the Union Pacific Railroad Hazen Branchline is approximately 69 kilometers (43 miles) long, as shown in the Map Atlas (DIRS 185510-DOE 2008, Plates 1 to 46).

There is existing rail traffic along the Union Pacific Railroad Hazen Branchline that would continue during and after construction of the proposed railroad. For purposes of analysis in this Rail Alignment EIS, DOE estimated that approximately four one-way Union Pacific Railroad trains en route to Wabuska and four one-way Department of Defense trains en route to the Hawthorne Army Depot would run on this portion of the rail line per week.

2.2.1.2.2 Department of Defense Branchline North

Department of Defense Branchline North is shown in the Map Atlas (DIRS 185510-DOE 2008, Plates 47 through 55) and on Figure 2-13. It is an existing rail line that begins east of Wabuska. It trends east through a valley just south of Parker Butte and north of the Mason Valley Wildlife Management Area. In total, Department of Defense Branchline North is about 8.1 kilometers (5 miles) long, as shown in the Map Atlas (DIRS 185510-DOE 2008, Plates 47 to 55).

There is existing rail traffic along Department of Defense Branchline North that would continue after construction of the proposed railroad. For purposes of analysis in this Rail Alignment EIS, DOE estimated that approximately four one-way Department of Defense trains would run on this portion of the rail line per week.

2.2.1.2.3 Schurz Alternative Segments

At present, the Department of Defense Branchline runs south directly through Schurz on the Walker River Paiute Reservation. This Rail Alignment EIS refers to this portion of existing rail line as Department of Defense Branchline through Schurz. Under the Mina Implementing Alternative, DOE would remove this portion of the Department of Defense Branchline, and by way of the Schurz alternative segments, the rail alignment would bypass Schurz. Rail line removal activities would include removing all portions of the track and ties, but leaving the rail roadbed in place. DOE is considering four alternative segments to bypass Schurz to the east and connect the proposed railroad to existing Department of Defense Branchline North east of Wabuska. These four alternative segments are referred to as Schurz 1, 4, 5, and 6 and are shown in the Map Atlas (DIRS 185510-DOE 2008, Plates 54 to 154) and on Figure 2-13.

Schurz alternative segment 1 would begin at the end of the existing Department of Defense Branchline North, would cross the Walker River, and would trend east and then southeast, roughly parallel to the

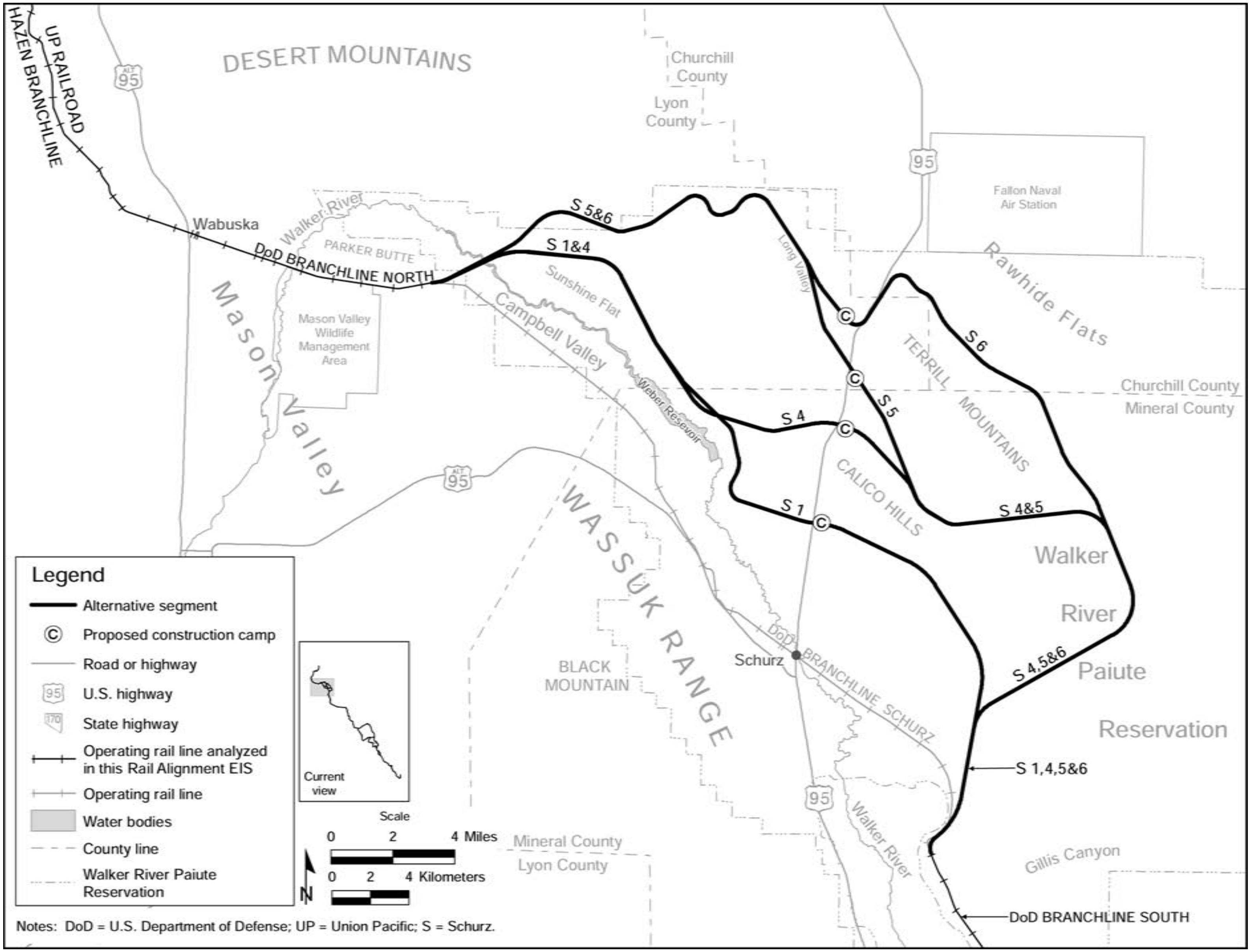


Figure 2-13. Mina rail alignment map area 1.

Walker River, for approximately 10 kilometers (6 miles). From the Walker River, Schurz alternative segment 1 would continue in a southeasterly and then easterly direction for approximately 6 kilometers (4 miles). It would trend to the south through Sunshine Flat for approximately 19 kilometers (12 miles). After crossing U.S. Highway 95 with a ***grade-separated crossing***, the rail line would pass south of the Calico Hills. Schurz alternative segment 1 would continue south for another 6 kilometers before joining the existing Department of Defense Branchline South. Schurz alternative segment 1 would be about 52 kilometers (32 miles) long (DIRS 180872-Nevada Rail Partners 2007, Table D-2).

Schurz alternative segment 4 would begin at the end of the existing Department of Defense Branchline North, would cross the Walker River, and would trend east and then southeast, roughly parallel to the Walker River, for approximately 10 kilometers (6 miles). From the Walker River, the rail line would trend generally southeast and east for about approximately 12 kilometers (7.5 miles) and would cross U.S. Highway 95 with a grade-separated crossing. Between the Terrill Mountains and Calico Hills, it would run due east for about 11 kilometers (7 miles). It would then trend southwest for approximately 16 kilometers (10 miles) and would continue in a roughly southern direction for about 6 kilometers (4 miles) before joining the existing Department of Defense Branchline South. Schurz alternative segment 4 would be about 64 kilometers (40 miles) long (DIRS 180872-Nevada Rail Partners 2007, Table D-2).

Schurz alternative segment 5 would begin at the end of the existing Department of Defense Branchline North, would cross the Walker River, and would run east for approximately 14 kilometers (9 miles). This alternative segment would then turn southeast and travel through Long Valley and across U.S. Highway 95 with a grade-separated crossing. South of the Terrill Mountains, it would turn due east and run for about 11 kilometers (7 miles). It would then trend south and southwest for approximately 16 kilometers (10 miles). It would continue in a roughly southern direction for about 6 kilometers (4 miles) before joining the existing Department of Defense Branchline South. Schurz alternative segment 5 would be approximately 71 kilometers (44 miles) long (DIRS 180872-Nevada Rail Partners 2007, Table D-2).

Schurz alternative segment 6 would begin at the end of existing Department of Defense Branchline North, would cross the Walker River, and would run east for approximately 14 kilometers (9 miles). This alternative segment would then turn southeast and travel through Long Valley before turning sharply northeast and crossing U.S. Highway 95 and into Churchill County. After following U.S. Highway 95 for about 4 kilometers (2.5 miles), the rail line would then turn southeast and run along the eastern edge of the Terrill Mountains for approximately 16 kilometers (10 miles) and into Mineral County. It would then trend southwest for approximately 16 kilometers. The rail line would continue south for about 6 kilometers (4 miles) before joining the existing Department of Defense Branchline South. Schurz alternative segment 6 would be approximately 72 kilometers (45 miles) long (DIRS 180872-Nevada Rail Partners 2007, Table D-2).

Following construction of one of the Schurz alternative segments, rail traffic on the existing Department of Defense Branchline through Schurz would be diverted to the proposed railroad. For purposes of analysis in this Rail Alignment EIS, DOE estimated that approximately two Department of Defense trains en route to the Hawthorne Army Depot would run on this portion of the rail line per week.

2.2.1.2.4 Department of Defense Branchline South

Department of Defense Branchline South is shown in the Map Atlas (DIRS 185510-DOE 2008, Plates 156 through 175) and on Figure 2-14. It is existing track that starts where the Schurz alternative segments would end, about 13 kilometers (8 miles) south of Schurz. The rail line trends generally south for 10 kilometers (6 miles) before leaving the Walker River Paiute Reservation, and continues generally south for another 24 kilometers (15 miles) on the east side of Walker Lake. Department of Defense Branchline South ends near Hawthorne, where it would join Mina common segment 1. Department of

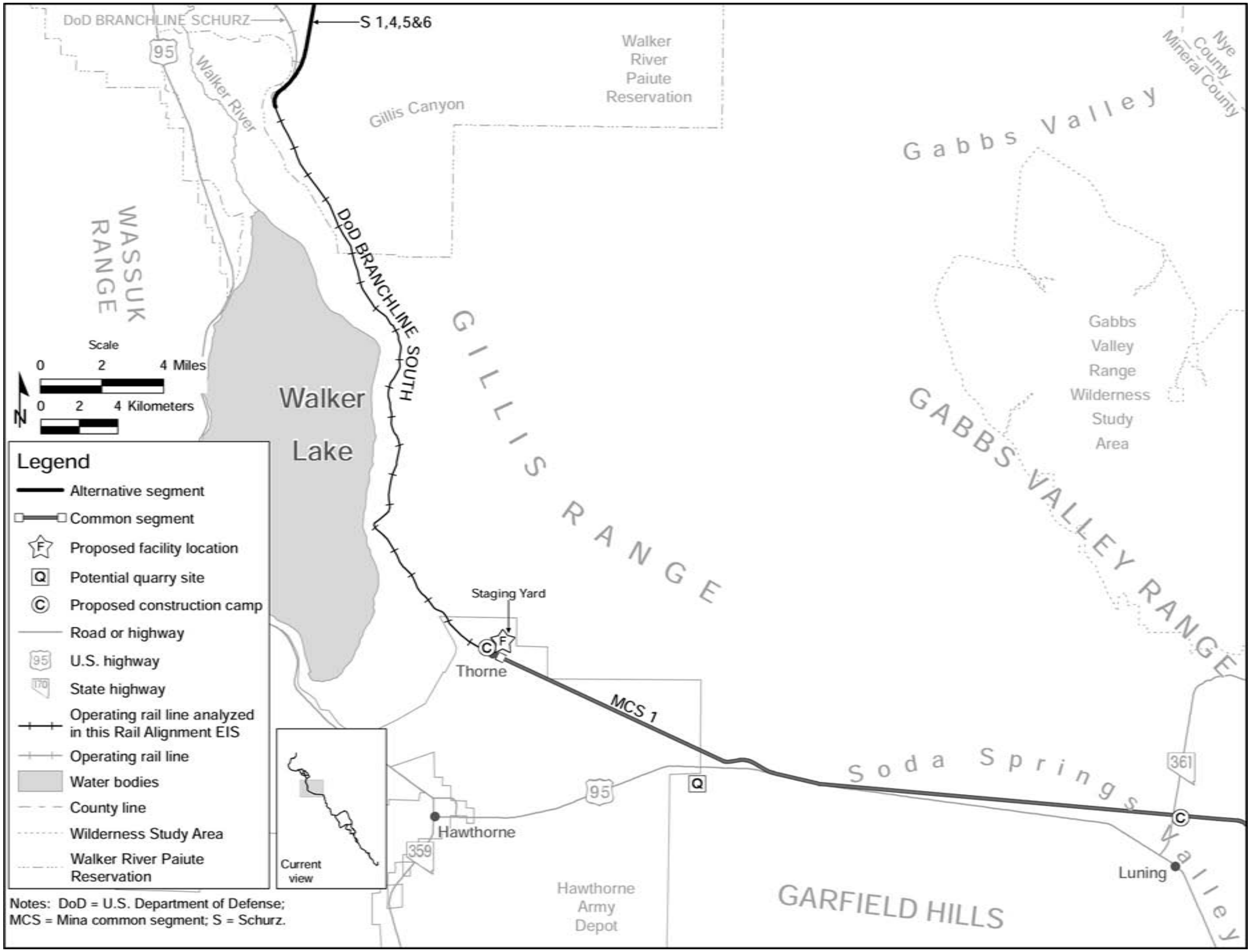


Figure 2-14. Mina rail alignment map area 2.

Defense Branchline South is approximately 35 kilometers (22 miles) long, as shown in the Map Atlas (DIRS 185510-DOE 2008, Plates 156 to 175).

There is existing rail traffic along Department of Defense Branchline South that would continue during and after construction of the proposed railroad. For purposes of analysis in this Rail Alignment EIS, DOE estimated that approximately four one-way Department of Defense trains en route to the Hawthorne Army Depot would run on this portion of the rail line per week.

2.2.1.2.5 Mina Common Segment 1 (Soda Spring Valley Area)

Mina common segment 1 is shown in the Map Atlas (DIRS 185510-DOE 2008, Plates 174 through 255) and on Figures 2-15 and 2-16. It would begin north of Hawthorne and would trend southeast before turning east at U.S. Highway 95. It would trend east along U.S. Highway 95 through Soda Springs Valley for approximately 40 kilometers (25 miles). Continuing to parallel U.S. Highway 95, the rail line would cross State Route 361 and turn south for approximately 64 kilometers (40 miles). It would pass Luning and Mina, which are along U.S. Highway 95 and would be approximately 1.5 to 3 kilometers (1 to 2 miles) to the east of the rail alignment. The rail line would then turn east before crossing U.S. Highway 95 with a grade-separated crossing in the area of Blair Junction and continuing for about 1.5 kilometers (1 mile) before joining one of the Montezuma alternative segments. Mina common segment 1 would be approximately 116 kilometers (72 miles) long (DIRS 180872-Nevada Rail Partners 2007, Table D-3).

2.2.1.2.6 Montezuma Alternative Segments

DOE is considering three alternative segments in the Montezuma area, referred to as Montezuma alternative segments 1, 2, and 3 and shown in the Map Atlas (DIRS 185510-DOE 2008, Plates 255 through 416) and on Figures 2-16 and 2-17.

Montezuma alternative segment 1 would begin at the end of Mina common segment 1 just southeast of Blair Junction. It would trend roughly southeast along State Route 265 through part of the Big Smoky Valley and west of the Weepah Hills for approximately 37 kilometers (23 miles), passing to the east of Silver Peak in Clayton Valley. It would then turn to the northwest through Clayton Valley and run through a pass between Clayton Ridge and Paymaster Ridge close to Silver Peak Road. It would then trend south for the next 11 kilometers (7 miles) between Clayton Ridge on the west and Montezuma Peak on the east before turning east for about the next 13 kilometers (8 miles), passing to the south of Montezuma Peak. The rail alignment would again turn roughly south for approximately 11 kilometers, traveling to the west of the Goldfield Hills. It would then travel northwest, cross U.S. Highway 95, and turn south before joining Mina common segment 2 near Lida Junction. Montezuma alternative segment 1 would be approximately 117 kilometers (73 miles) long (DIRS 180872-Nevada Rail Partners 2007, Table D-4).

Montezuma alternative segment 2 would begin at the end of Mina common segment 1 just southeast of Blair Junction. It would trend northeast for about 35 kilometers (22 miles) just south of U.S. Highway 95. Northeast of Lone Mountain, it would turn south into Montezuma Valley and run south for 59 kilometers (31 miles) before turning east and crossing U.S. Highway 95 south of Goldfield. It would then trend south for about 37 kilometers (23 miles) before joining Mina common segment 2 near Lida Junction. Montezuma alternative segment 2 would be approximately 119 kilometers (74 miles) long (DIRS 180872-Nevada Rail Partners 2007, Table D-4). Montezuma alternative segment 3 would begin at the end of Mina common segment 1 just southeast of Blair Junction. It would trend northeast for about 35 kilometers (22 miles) just south of U.S. Highway 95. Northeast of Lone Mountain, it would turn south into Montezuma Valley and trend south for 37 kilometers (23 miles). North of Goldfield, it would turn west and trend along the northern portion of the Montezuma Range for 12 kilometers (7.5 miles).

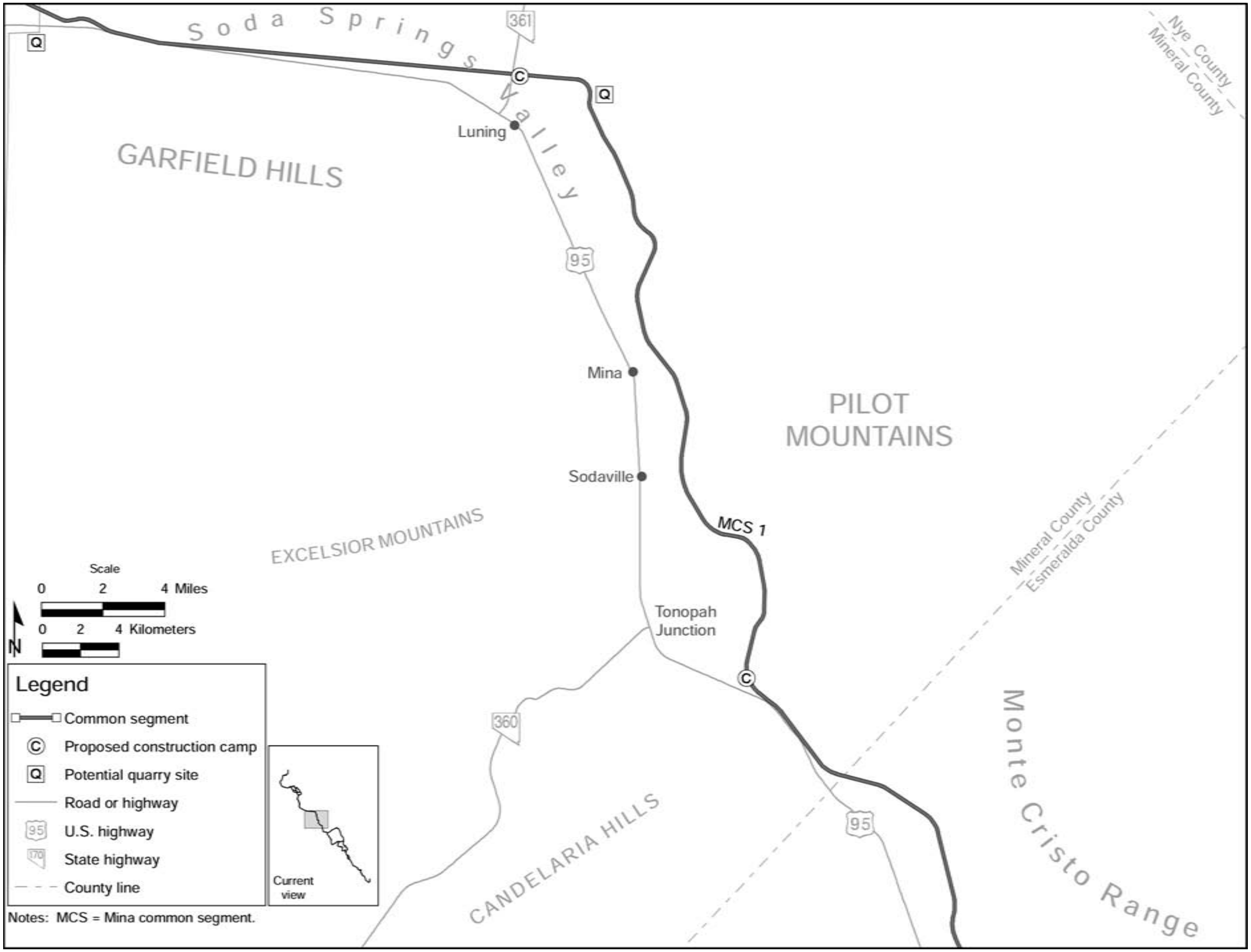


Figure 2-15. Mina rail alignment map area 3.

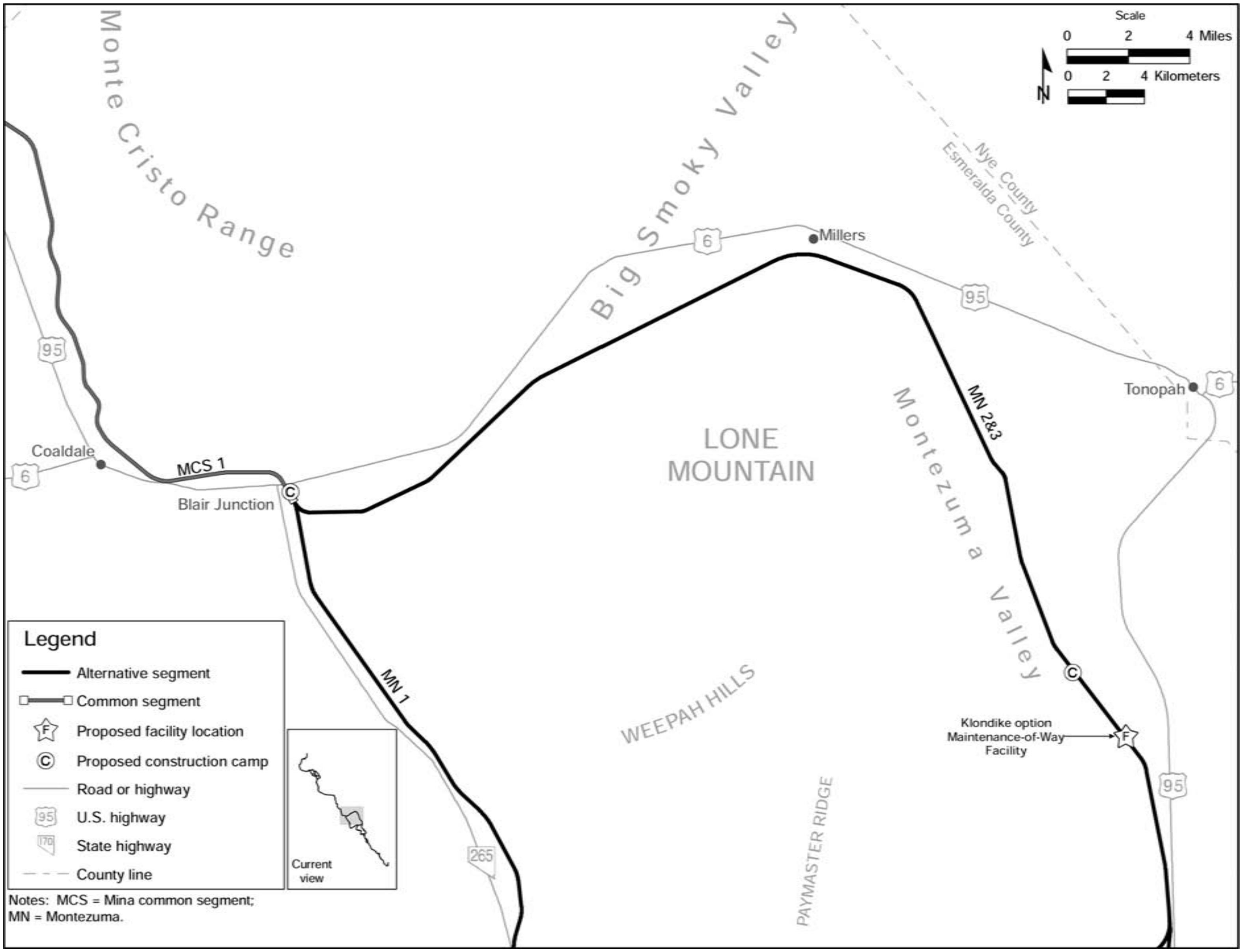


Figure 2-16. Mina rail alignment map area 4.

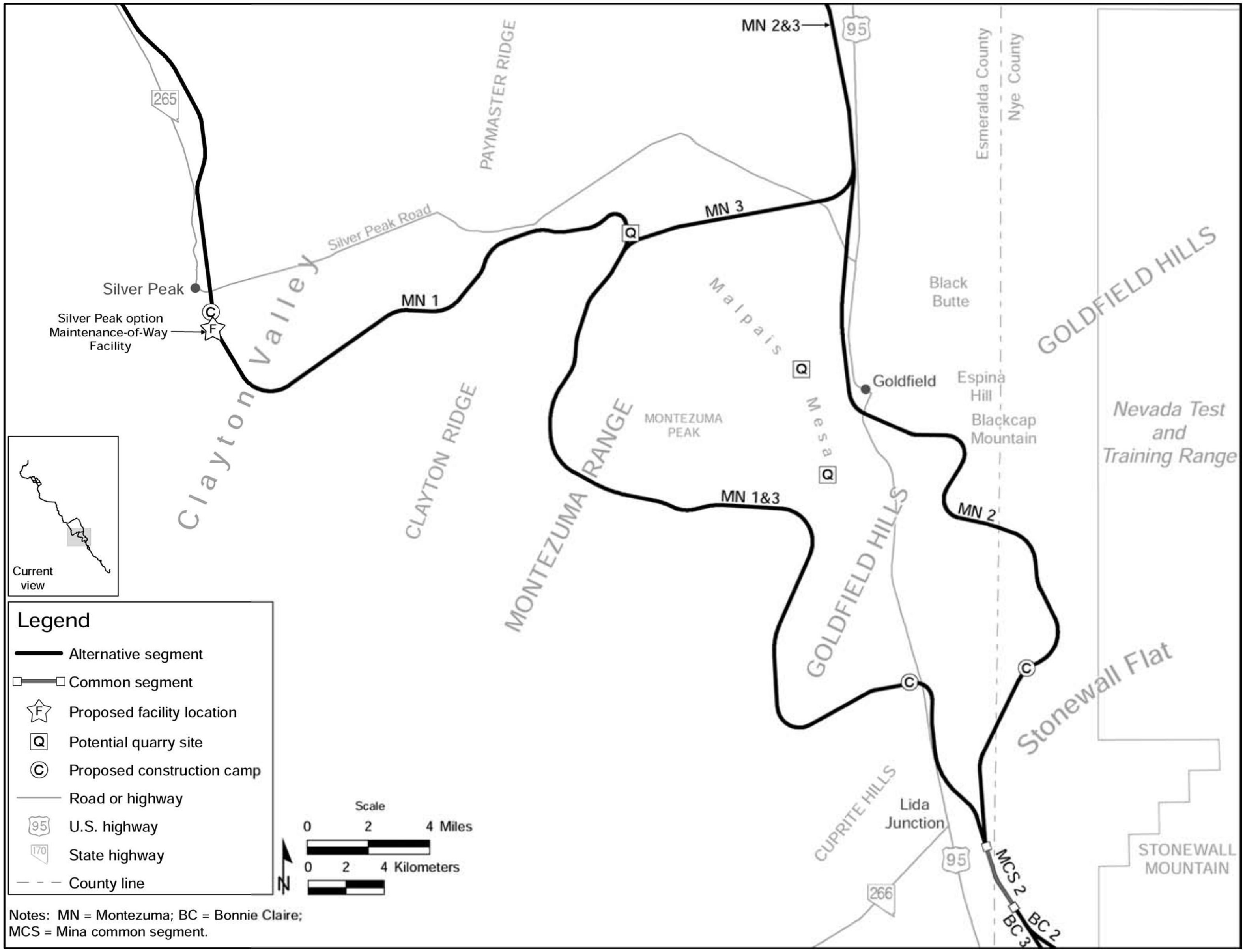


Figure 2-17. Mina rail alignment map area 5.

It would then trend south for the next 11 kilometers (7 miles) between Clayton Ridge on the west and Montezuma Peak on the east before turning east for about the next 13 kilometers (8 miles), passing to the south of Montezuma Peak. The rail alignment would again turn roughly south for approximately 11 kilometers, traveling to the west of the Goldfield Hills. It would then travel northwest, cross U.S. Highway 95, and turn south before joining Mina common segment 2 near Lida Junction. Montezuma alternative segment 3 would be approximately 140 kilometers (88 miles) long (DIRS 180872-Nevada Rail Partners 2007, Table D-4).

2.2.1.2.7 Mina Common Segment 2 (Lida Junction Area)

Mina common segment 2 is shown in the Map Atlas (DIRS 185510-DOE 2008, Plates 417 through 418) and on Figures 2-17 and 2-18. It would begin at the end of one of the Montezuma alternative segments and run roughly southeast for about 3.4 kilometers (2.1 miles) before joining one of the Bonnie Claire alternative segments (DIRS 180916-Nevada Rail Partners 2007, p. E-12).

2.2.1.2.8 Bonnie Claire Alternative Segments

DOE is considering two alternative segments in the area north of Scottys Junction, Bonnie Claire alternative segments 2 and 3, which are shown in the Map Atlas (DIRS 185510-DOE 2008, Plates 419 through 441) and on Figure 2-18.

Bonnie Claire alternative segment 3 would begin at the end of Mina common segment 2 about 8 kilometers (5 miles) north of Stonewall Pass, and would trend generally south, paralleling U.S. Highway 95 to the east. After approximately 10 kilometers (6 miles), it would turn southeast and continue for an additional 10 kilometers through Sarcobatus Flat, where it would join common segment 5 approximately 4 kilometers (2.5 miles) north of Scottys Junction near the intersection of State Route 267 and U.S. Highway 95. Bonnie Claire alternative segment 3 would be approximately 19 kilometers (12 miles) long (DIRS 180916-Nevada Rail Partners 2007, p. E-11).

Bonnie Claire alternative segment 2 would begin at the end of Mina common segment 2 about 8 kilometers (5 miles) north of Stonewall Pass and would trend east toward the Nevada Test and Training Range for about 5 kilometers (3 miles) before turning south for an additional 17 kilometers (11 miles). Bonnie Claire 2 would generally follow the Nevada Test and Training Range boundary and would join common segment 5 in Sarcobatus Flat to the north of Scottys Junction near the intersection of State Route 267 and U.S. Highway 95. Bonnie Claire alternative segment 2 would be approximately 21 kilometers (13 miles) long (DIRS 180916-Nevada Rail Partners 2007, p. E-11).

2.2.1.2.9 Common Segment 5 (Sarcobatus Flat Area)

Common segment 5 is shown in the Map Atlas (DIRS 185510-DOE 2008, Plates 441 through 467) and on Figures 2-18 and 2-19. This common segment would begin 4 kilometers (2.5 miles) north of Scottys Junction and trend generally southeast through the Sarcobatus Flat area, approximately 100 meters (330 feet) east of U.S. Highway 95 at its closest point. Common segment 5 would end approximately 6 kilometers (4 miles) north of Springdale, where it would connect to one of the Oasis Valley alternative segments. Common segment 5 would be approximately 40 kilometers (25 miles) long (DIRS 180916-Nevada Rail Partners 2007, p. E-12).

2.2.1.2.10 Oasis Valley Alternative Segments

DOE is considering two alternatives in the Oasis Valley area, Oasis Valley 1 and Oasis Valley 3, which are shown in the Map Atlas (DIRS 185510-DOE 2008, Plates 467 through 479) and on Figure 2-19.

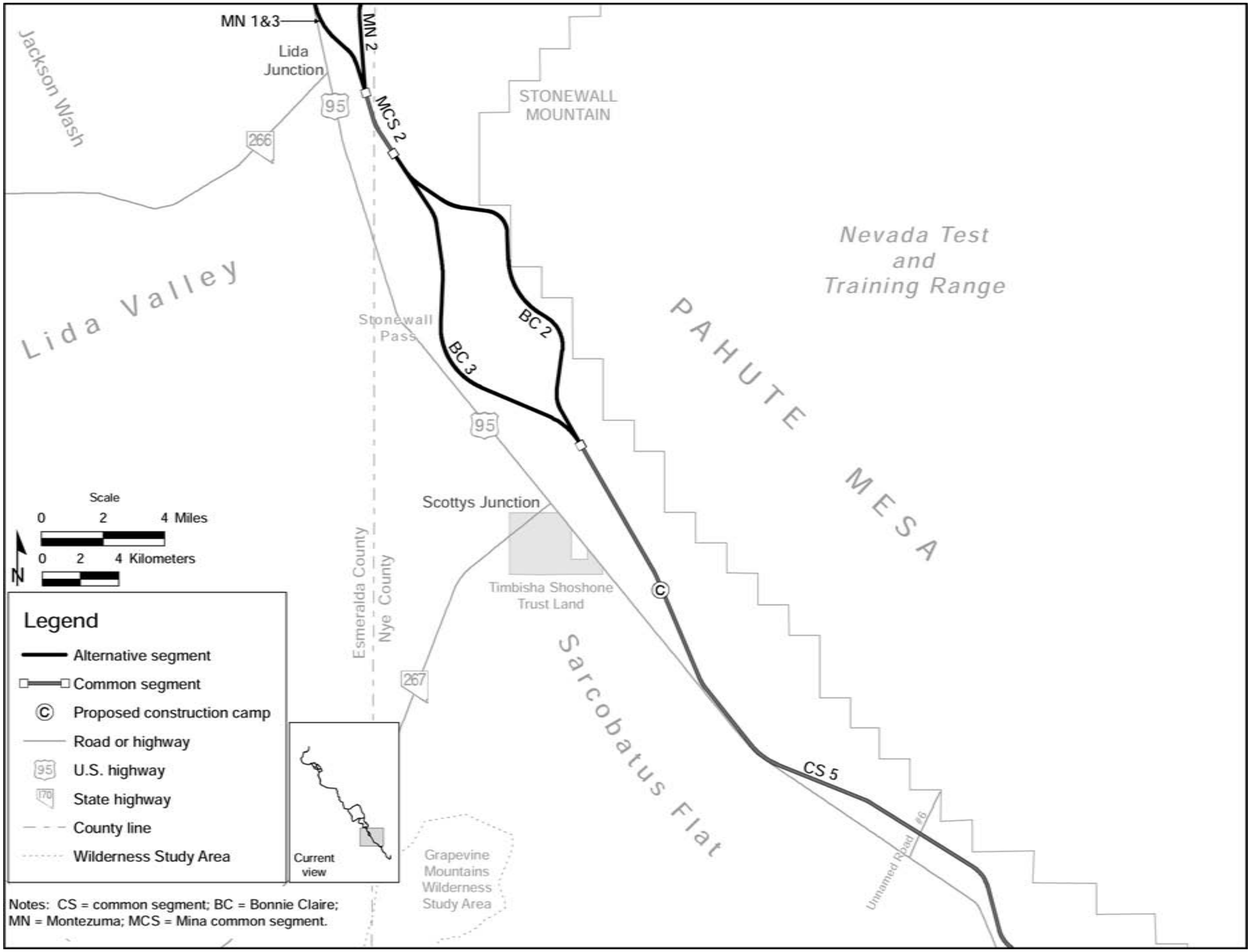


Figure 2-18. Mina rail alignment map area 6.

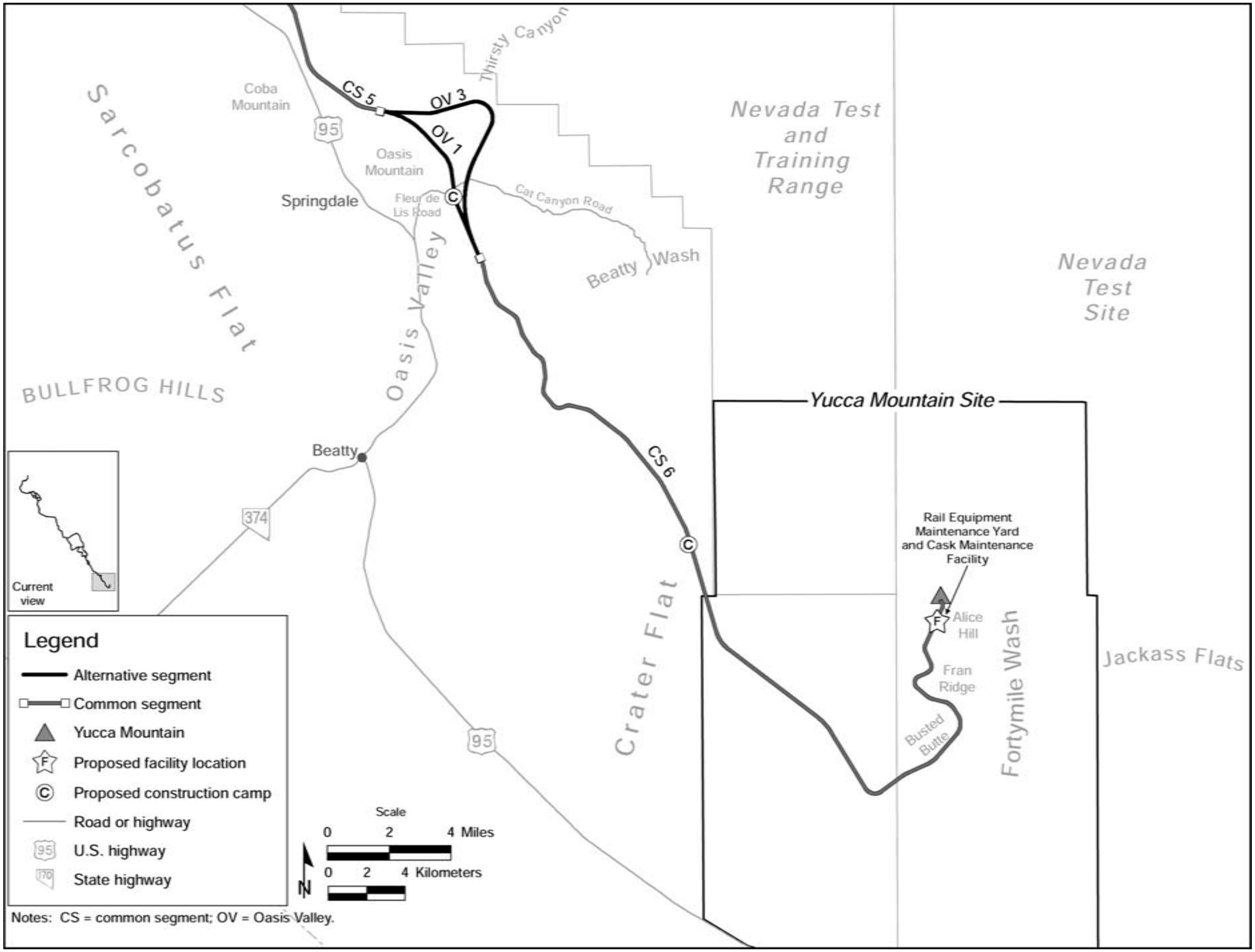


Figure 2-19. Mina rail alignment map area 7.

Oasis Valley alternative segment 1 would begin at the end of common segment 5 approximately 6 kilometers (4 miles) north of Springdale, would run southeast and connect to common segment 6. Oasis Valley 1 would be approximately 10 kilometers (6.1 miles) long (DIRS 180916-Nevada Rail Partners 2007, p. E-13).

Oasis Valley alternative segment 3 would begin at the end of common segment 5 approximately 6 kilometers (4 miles) north of Springdale, and would run generally east and then south before crossing Oasis Valley farther to the east than Oasis Valley 1 and connecting to common segment 6. Oasis Valley 3 would be approximately 14 kilometers (8.8 miles) long (DIRS 180916-Nevada Rail Partners 2007, p. E-13).

2.2.1.2.11 Common Segment 6 (Yucca Mountain Approach)

Common segment 6, shown in the Map Atlas (DIRS 185510-DOE 2008, Plates 479 through 511) and on Figure 2-19, would begin about 3 kilometers (2 miles) east of U.S. Highway 95. This common segment would trend generally southeast for 40 kilometers (25 miles) from Oasis Valley to Crater Flat. It would then turn northeast for about 11 kilometers (7 miles), passing Busted Butte and trending north on the west side of Fran Ridge until terminating at the Rail Equipment Maintenance Yard inside the Yucca Mountain Site boundary. Common segment 6 would be approximately 51 kilometers (32 miles) long (DIRS 180916-Nevada Rail Partners 2007, p. E-14).

2.2.2 RAILROAD CONSTRUCTION

DOE anticipates that it would take a minimum of 4 years to construct the proposed railroad under either implementing alternative. As illustrated in Figure 2-20, the construction phase would begin with the construction of water wells, construction camps, and quarries; and with the procurement of concrete ties and rail for track construction and steel for bridge construction. Approximately 1 month after beginning construction and while these previous activities were in progress, construction of the rail roadbed, ***culverts***, bridges, and grade-separated crossings would begin simultaneously at multiple points along the rail alignment. Near the start of year 2, quarries would begin to produce ballast and stockpiling of rails would begin. Shortly thereafter, track construction would begin and would move sequentially along the rail alignment toward Yucca Mountain. Construction would begin on signals and communications structures shortly after the end of year 1 (DIRS 180922-Nevada Rail Partners 2007, Section 7.0).

As shown in Figure 2-20, under the Caliente Implementing Alternative, construction of railroad operations support facilities would begin with construction of the Interchange Yard and the Staging Yard. Next, near the start of year 2, construction of the Cask Maintenance Facility would begin. At the end of year 2, DOE would begin constructing the Maintenance-of-Way Facilities (if Goldfield alternative segment 1 or 3 is constructed, this would include the Maintenance-of-Way Trackside Facility and Maintenance-of-Way Headquarters Facility) and the Rail Equipment Maintenance Yard.

Under the Mina Implementing Alternative, construction of railroad operations support facilities would begin with construction of the Staging Yard. Next, near the start of year 2, DOE would begin constructing the Cask Maintenance Facility. Finally, at the end of year 2, the Department would begin constructing the Maintenance-of-Way Facility and the Rail Equipment Maintenance Yard.

Although DOE anticipates that construction would take a minimum of approximately 4 years, this Rail Alignment EIS accounts for the possibility that it could take longer (up to 10 years) because annual funding levels might not be sufficient to complete construction in 4 years. The construction sequence under a 10-year schedule would be largely the same as for the 4-year schedule, except that under the 10-year schedule construction of the rail roadbed would occur sequentially, starting at the beginning of the rail alignment and moving toward Yucca Mountain.

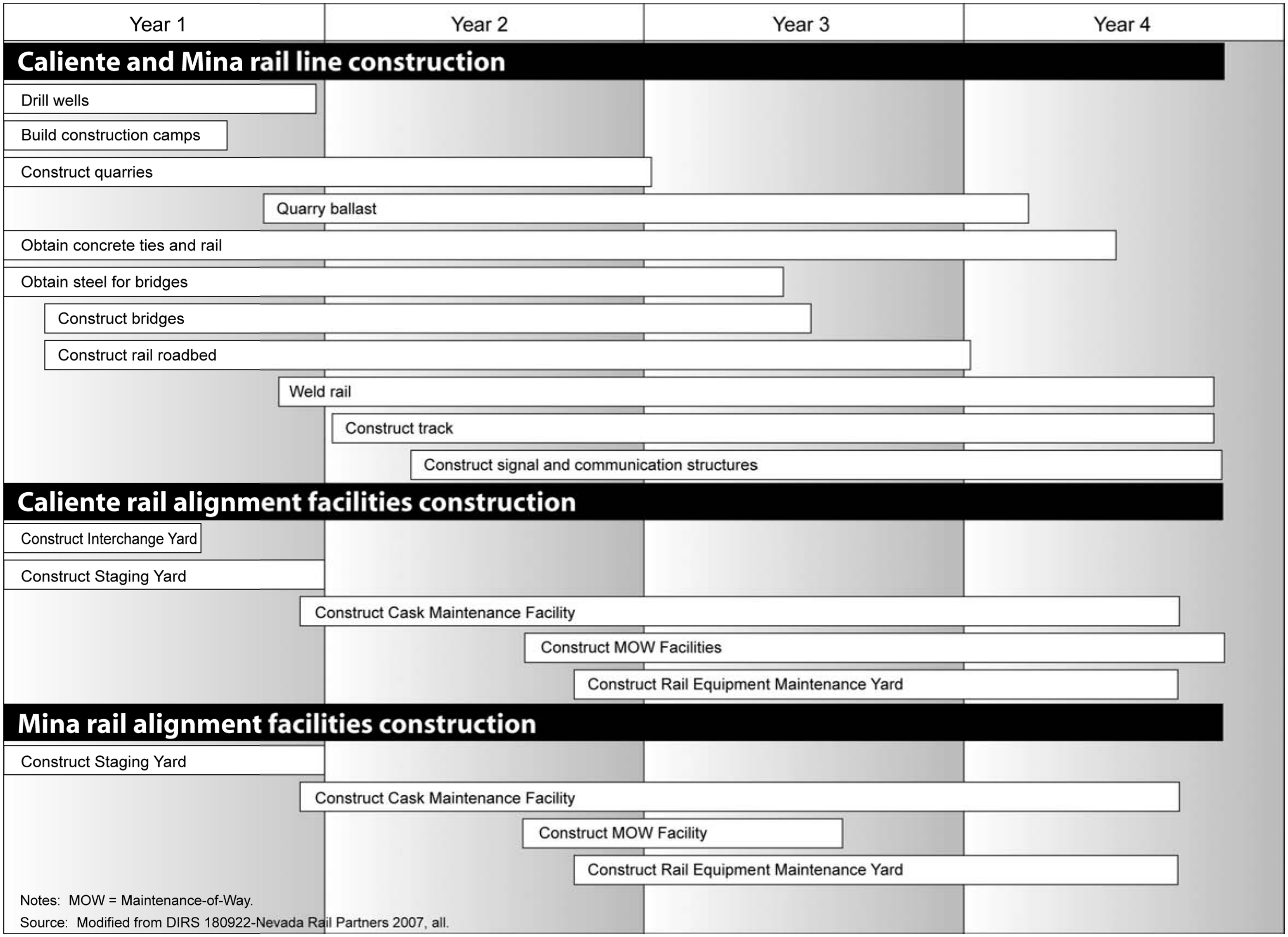


Figure 2-20. Four-year schedule for railroad construction.

Unless otherwise indicated, all construction activities would occur inside the construction right-of-way (nominally 150 meters [500 feet] on either side of the rail alignment centerline, resulting in a ***nominal*** total width of 300 meters [1,000 feet]). In some areas requiring deep cuts or high fills, the construction right-of-way could extend beyond this nominal width. Under the Caliente Implementing Alternative, the total construction footprint resulting from establishing this construction right-of-way would be approximately 164 square kilometers (40,600 acres), but would vary depending on alternative segments. Under the Mina Implementing Alternative, the total construction footprint would be approximately 125 square kilometers (30,900 acres), but would vary depending on alternative segments.

DOE would implement best management practices during this entire construction process (see Chapter 7). Additionally, Chapter 7 describes measures the Department would consider to mitigate adverse impacts from constructing and operating the railroad.

2.2.2.1 Geotechnical Exploration Program

The Department has conducted a preliminary inventory of the subsurface conditions along both the Caliente and Mina rail alignments, the results of which are presented in two geotechnical reports (DIRS 183639-Shannon & Wilson 2007, all; DIRS 180880-Shannon & Wilson 2007, all). These reports address potential geologic hazards such as rockfalls, earthquakes, debris flows, surface erosion, and land subsidence from mining. Before constructing the proposed railroad, DOE would conduct a geotechnical exploration program to gather data on subsurface conditions along the rail alignment and address any hazards previously identified in the preliminary inventory. These data would support the final design of bridge foundations, embankments, deep cuts, major culverts, potential quarry sites, fills, and excavations. This work would involve collecting geotechnical information by drilling ***boreholes*** at locations along the rail alignment within the construction right-of-way. Under the Caliente Implementing Alternative, there would be approximately 3,200 boreholes; under the Mina Implementing Alternative, there would be approximately 2,100 boreholes. DOE would obtain any other required permits and approvals for these activities, as necessary.

Drilling would be done with portable rigs, assumed for purposes of assessment to be diesel-powered rigs on wheels or skids. The land area disturbed for each borehole would be approximately 6 by 15 meters (20 by 50 feet). On average, borings would reach a depth of about 15 meters (50 feet) or less; however, some borings might be 30 to 60 meters (100 to 200 feet) deep.

There are various areas along the Caliente and Mina rail alignments that would cross, intersect, or parallel areas with abandoned mines. In these areas, DOE would drill boreholes to sample the subsurface conditions to help indicate the presence of an underground void. If either a borehole or obvious surface subsidence indicated the possible presence of such a void, the Department would conduct further investigations, including additional boreholes, ground-penetrating radar, and/or ***seismic*** analysis, to determine the extent of the feature. In all cases, the Department would develop appropriate engineered solutions to address the situation.

If DOE encountered such features during the construction phase, similar processes, as outlined above, would be employed to determine the appropriate engineering solution. Only if the discovered feature was so extensive that constructing the rail line would be infeasible would the Department consider realignment around the feature.

2.2.2.2 Construction Camps

Construction of the proposed railroad would take place in areas with low population densities and an insufficient workforce. To maintain an adequate workforce during the construction phase, DOE would establish construction camps along the rail alignment to provide housing for construction workers and a logistical base from which to conduct construction activities. These camps would be located approximately every 50 kilometers (30 miles) along the rail alignment. Under the Caliente Implementing Alternative, the Department would establish up to 12 construction camps (Figure 2-21). Under the Mina Implementing Alternative, the Department would establish up to 10 construction camps (Figure 2-22). Along either rail alignment, up to six of these camps could be operational at any one time.

With the exception of construction camp 12, all camps would be operational on an as-needed basis during the rail line construction phase. If needed, DOE might utilize construction camp 12 for repository construction activities beyond the rail line construction phase. However, the design of the camp would not be altered for this purpose.

Each construction camp would be fenced and would occupy approximately 0.10 square kilometer (25 acres). Each site would consist of office space; housing for approximately 360 workers; a utility zone dedicated to power supply; temporary trash storage, ***wastewater-treatment*** and potable water-treatment areas; a worker support area consisting of first aid facilities and a service station with above-ground storage tanks for construction vehicles and equipment fueling and maintenance; dining facilities; and a material laydown and maintenance area. Figure 2-23 shows the typical site layout for a construction camp. Each camp would be secured and guarded (DIRS 180922-Nevada Rail Partners 2007, Section 4.1). Water demand for the construction camps is anticipated to be approximately 110,000 liters (29,000 gallons) per day per camp and would be met from new wells drilled near each construction camp (DIRS 180922-Nevada Rail Partners 2007, p. 4-6). Water would be stored onsite in tanks for camp use. Each camp would generate approximately 95,000 liters (25,000 gallons) of wastewater per day, which would be processed in a temporary wastewater-treatment facility. DOE anticipates that it would use the wastewater effluent (that is, ***gray water***) produced at the wastewater-treatment facility along the rail alignment for soil compaction and dust suppression. Power needs would be met at each camp through a substation connecting to the power line that would be laid along the rail line (see Section 2.2.2.7), with backup generators available at each camp for emergencies. Each camp would use approximately 54,000 kilowatt-hours of energy per day (DIRS 180922-Nevada Rail Partners 2007, p. 4-6).

For ease of access, DOE would establish construction camps close to public roads. In most cases, the Department would develop additional access roads to connect the construction camps to these public roads. With the exception of a new roadway that would be constructed to access proposed construction camp 12 (for either the Caliente or the Mina rail alignment), all of these access roads would be developed by improving existing unpaved public roads that would intersect the rail line. Tables 2-8 and 2-9 list the roads the Department would improve to access each construction camp along the Caliente rail alignment and the Mina rail alignment, respectively. Improvements would consist of grading the existing unpaved roads and constructing a gravel surface on the roads when necessary (DIRS 180922-Nevada Rail Partners 2007, pp. 4-2 to 4-9).

The locations and characteristics of access roads are discussed here and in subsequent sections. The locations of all access roads (to water wells, quarry sites, and construction camps) in this Rail Alignment EIS are considered representative and subject to change during the design and construction process.

For purposes of analysis, DOE estimates that railroad construction workers would work a 3-week work cycle, with 2 straight weeks working from the construction camps and 1 week off (DIRS 180922-Nevada Rail Partners 2007, p. 4-5). Construction would occur continuously throughout the year, with multiple crews rotating in and out of the construction camps to ensure continuity.

All railroad construction workers would complete cultural and biological resources sensitivity and protection training to minimize the potential for intentional or unintentional harm to cultural and biological sites. The training would include descriptions of different biological and cultural resources

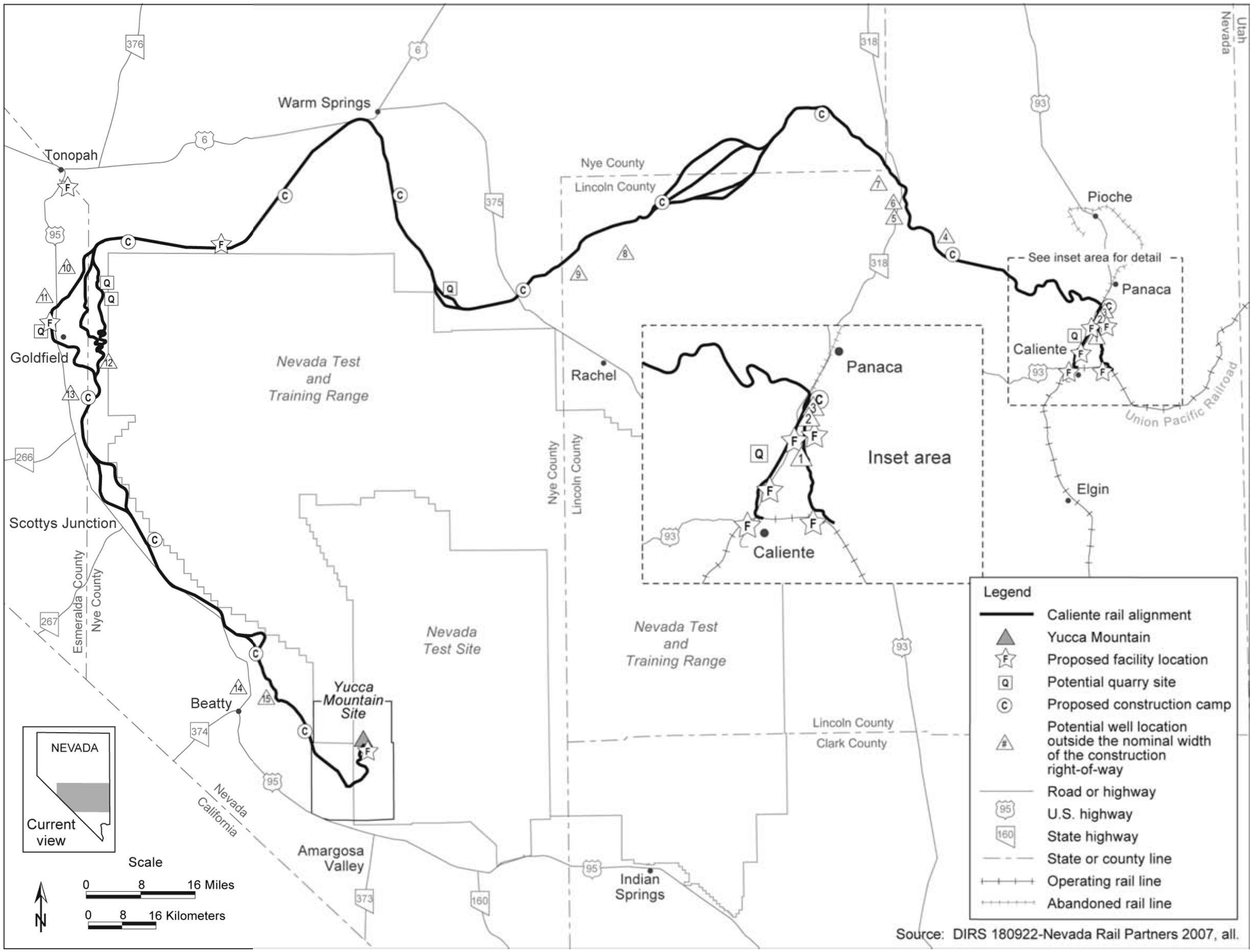


Figure 2-21. Potential quarry, water-well, and construction-camp locations along the Caliente rail alignment.

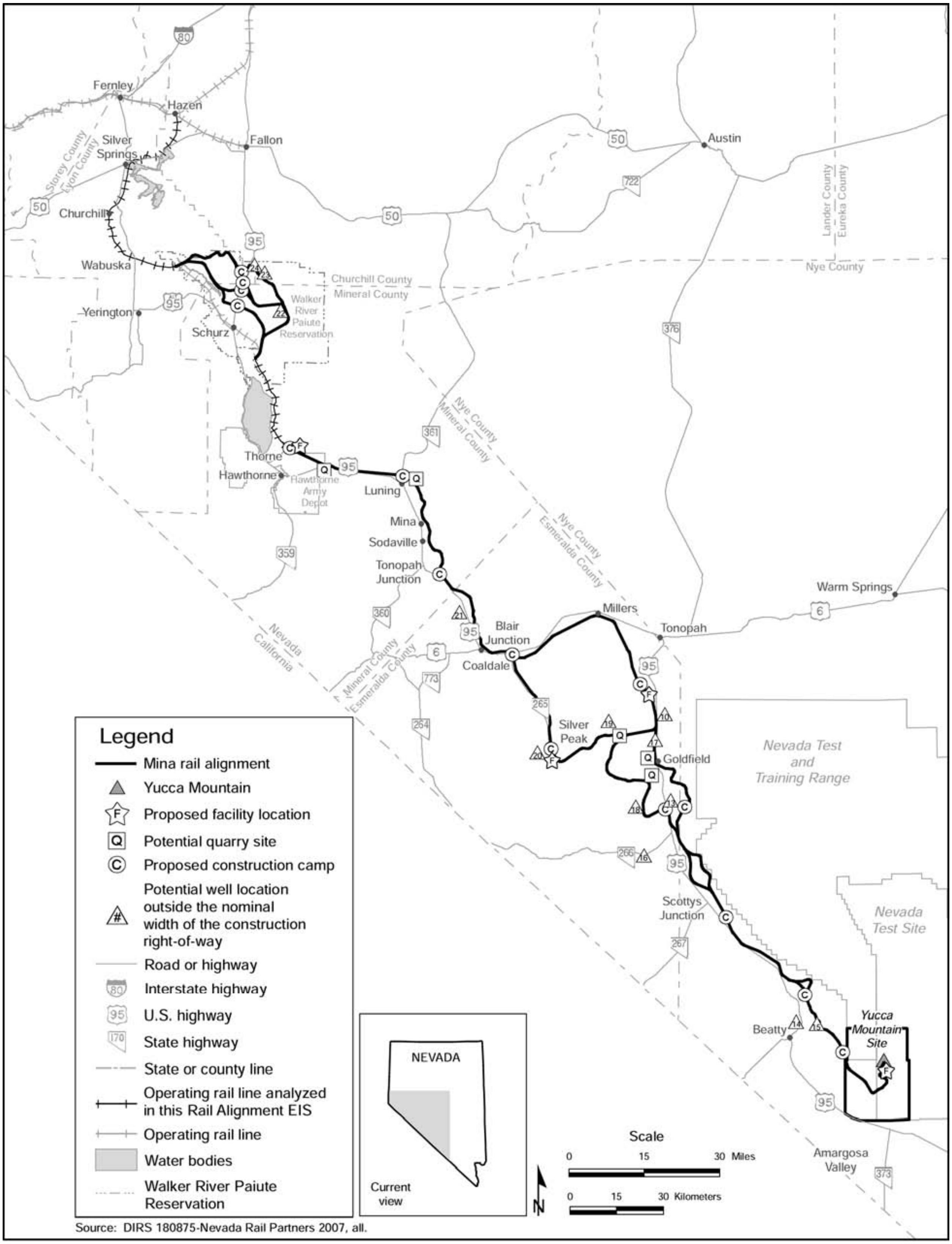
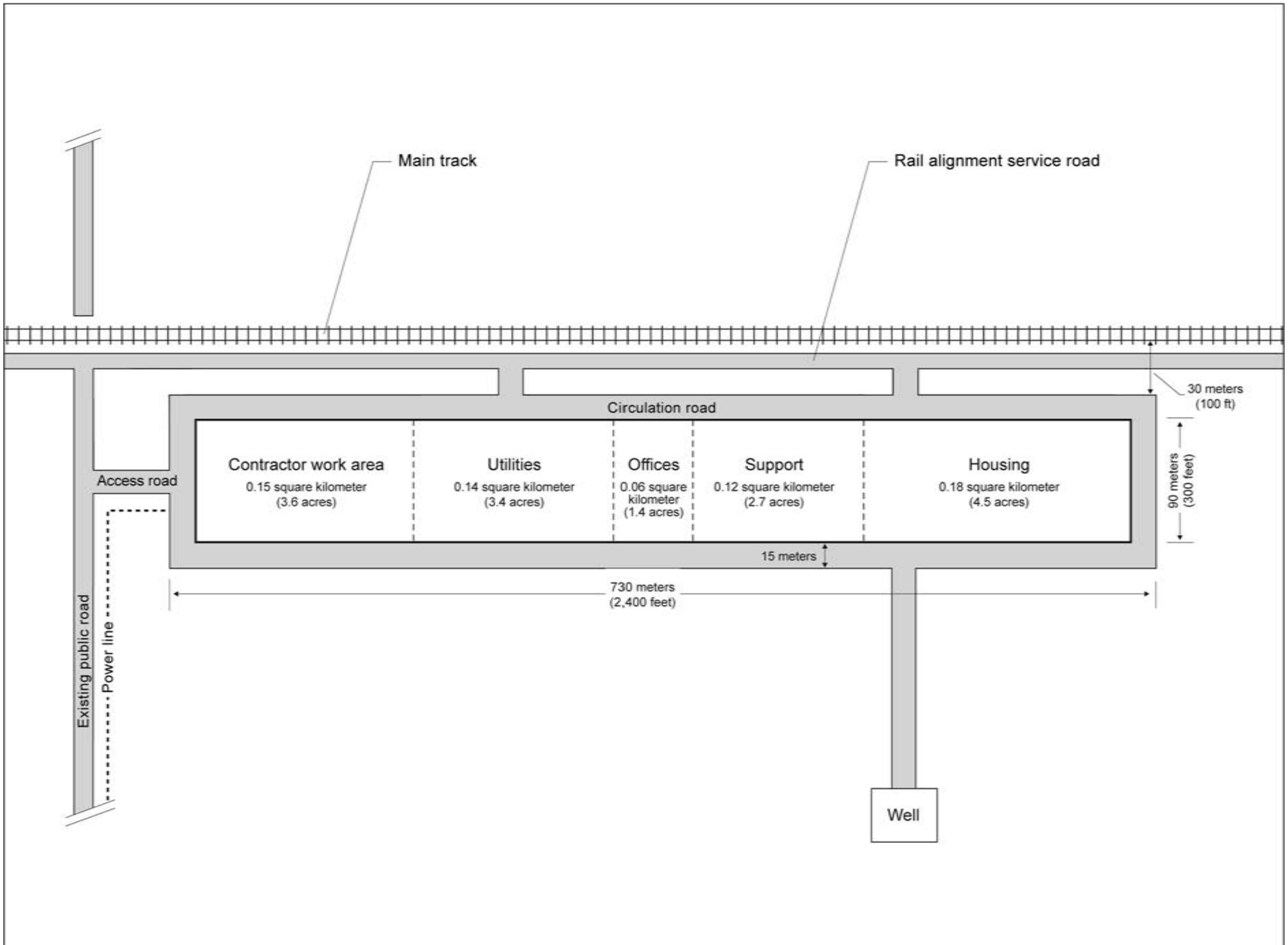


Figure 2-22. Potential quarry, water-well, and construction-camp locations along the Mina rail alignment.



Notes: To convert meters to feet, multiply by 3.2808.

Not to scale.

Source: DIRS 180922-Nevada Rail Partners 2007, p. 4-3.

Figure 2-23. Typical construction camp layout.

Table 2-8. Caliente rail alignment construction camp access road locations.[a]

Construction camp number	Segment	Name of roadway to be improved	Estimated length (miles)[b,c]	Map Atlas Part A reference[d]
1	Caliente and Eccles alternative segments	Unnamed road	1.5	Plates 21 and 22
2	Caliente common segment 1	Rattlesnake Road	17	Plates 60 and 61
3	Caliente common segment 1	Unnamed road	15	Plates 97 and 98
4a	Garden Valley alternative segment 3	Freiburg Road-Joe Barney Pass Road-Shadow Road	31	Plate 128
4b	Garden Valley alternative segment 1	Freiburg Road-Joe Barney Pass Road-Shadow Road	30	Plate 147
4c	Garden Valley alternative segments 2 and 8	Freiburg Road-Joe Barney Pass Road-Shadow Road	29	Plate 178
5	Caliente common segment 2	No road necessary	0	Plate 210
6	Caliente common segment 3	Unnamed road	15	Plate 249
7	Caliente common segment 3	Unnamed road	11	Plate 281
8	Caliente common segment 3	Unnamed road	9.3	Plate 314
9	Caliente common segment 4	Unnamed road	5.8	Plate 391
10	Common segment 5	Unnamed road	1.4	Plates 429 and 430
11	Oasis Valley alternative segments 1 and 3[e]	Fleur de Lis Road-Cat Canyon Road	2.7	Plate 464
12	Common segment 6	Nye County Road 295-unnamed road	10.5 (5 would be new construction)	Plates 472 and 473

a. Source: DIRS 180922-Nevada Rail Partners 2007, Tables 4-1 and 4-7.
b. To convert miles to kilometers, multiply by 1.6093.
c. Numbers rounded to two significant figures.
d. Source: DIRS 185492-DOE 2008, all.
e. For Oasis Valley alternative segment 3, the required access road would be slightly longer than the distance listed here.

Table 2-9. Mina rail alignment construction camp access road locations[a] (page 1 of 2).

Construction camp number	Segment	Name of roadway to be improved	Estimated length (miles)[b,c]	Map Atlas Part B reference[d]
18a	Schurz alternative segment 1	No improvements	0	Plate 75
18b	Schurz alternative segment 4	No improvements	0	Plate 89
18c	Schurz alternative segment 5	No improvements	0	Plate 110
18d	Schurz alternative segment 6	Unnamed road	0.80	Plate 124
17	Department of Defense Branchline South	No improvements	0	Plate 174
16	Mina common segment 1	No improvements	0	Plate 205
15	Mina common segment 1	Unnamed road	0.90	Plate 227
14	Mina common segment 1	No improvements	0	Plate 255
13a	Montezuma alternative segment 1	Silver Peak Road	1.2 (0.40 would be shared with the alignment access road)	Plate 275
13b	Montezuma alternative segments 2 and 3	Unnamed road	4.1	Plate 336

Table 2-9. Mina rail alignment construction camp access road locations[a] (page 2 of 2).

Construction camp number	Segment	Name of roadway to be improved	Estimated length (miles)[b,c]	Map Atlas Part B reference[d]
9	Montezuma alternative segment 2	Unnamed road	5.8	Plate 366
9a	Montezuma alternative segments 1 and 3	No improvements	0	Plate 411
10	Common segment 5	Unnamed road	1.4	Plate 446
11	Oasis Valley alternative segments 1 and 3[e]	Fleur de Lis Road-Cat Canyon Road	2.7	Plate 477
12	Common segment 6	Nye County Road 295-unnamed road	10.5 (5 would be new construction)	Plates 491 and 492

a. Source: DIRS 180875-Nevada Rail Partners 2007, pp. 4-14 and 4-17.
b. To convert miles to kilometers, multiply by 1.6093.
c. Numbers rounded to two significant figures.
d. Source: DIRS 185510-DOE 2008, all.
e. For Oasis Valley alternative segment 3, the required access road would be slightly longer than the distance listed here.

types and their importance, procedures to follow if resources are encountered in the field, and employment-related and legal penalties for not following the requirements. For example, workers could encounter desert tortoises, an ***endangered species***, in the field during construction activities. Personnel would be trained to recognize them and then notify the appropriate authorities of any desert tortoise sightings. DOE would develop procedures that would outline the necessary steps that need to be taken in the event of an encounter with a desert tortoise.

Following the completion of construction, DOE would consult with the BLM regarding abandonment and reclamation of the construction camps. The abandonment process would include dismantling each camp, dismantling the electrical substation, removing the temporary wastewater-treatment facility, and reclaiming the land by returning it to as natural a state as practicable.

2.2.2.3 Rail Alignment Service Road

During the construction phase, DOE would install an unpaved service road parallel to the rail line within the construction right-of-way. This rail alignment service road would be utilized primarily to provide construction workers access to rail line construction sites. In some locations, this service road would be utilized as a public road. In these locations, the service road would be two lanes and 7.3 meters (24 feet) wide. Where the service road is used solely for accessing the rail line, it would be a single lane and 4.3 meters (14 feet) wide.

Under both implementing alternatives, the rail alignment service road would parallel the entire length of the rail line except over bridges, and through environmentally or culturally sensitive areas. Under the Mina Implementing Alternative, the rail alignment service road would parallel only the newly constructed portions of the rail line. The existing branchlines that are part of the Mina rail alignment would be accessed by existing roads.

The rail alignment service road could improve land access along most of the rail alignment. While most of the rail alignment would follow or be within a few kilometers of existing unpaved roads and trails that are currently open for public use, the new service road could be of better quality in some areas than nearby existing roads, increasing the likelihood of use. Recreational use of public land along the access road (as with other similar roads on public land) would be monitored by the BLM to ensure compliance with its land-management goals, as stated in applicable BLM ***resource management plans***.

After the construction phase, the rail alignment service road would remain in place to provide additional access to the rail line for maintenance and emergency response, and to act as a firebreak. It is important to note that DOE would not maintain the service road as a public road and the Department would post signs indicating potential users would proceed on the service road at their own risk.

2.2.2.4 Acquisition of Materials

Water, ballast, ***subballast***, steel for bridges, concrete ties, and rail would be required for construction of the proposed railroad. This section briefly describes acquisition and use of these materials.

2.2.2.4.1 Water

For purposes of analysis, DOE assumed that it would obtain all required water from ***groundwater*** pumped from new water-supply wells the Department would construct along the rail alignment inside, and in selected locations, outside the nominal 300-meter (1,000-foot)-wide construction right-of-way (see Sections 4.2.6 and 4.3.6, Groundwater Resources). DOE is aware that there could be other approaches for obtaining some of the water required for construction, including purchasing or leasing water from established municipalities or other existing permitted water-rights holders. This approach, if used for satisfying part of the total water demand, would result in the need for fewer new water-supply wells than are assumed and described in this Rail Alignment EIS. DOE anticipates obtaining all water from groundwater basins along either rail alignment regardless of the method used. Constructing new water-supply wells is the only method for obtaining water that would require new construction; therefore, this Rail Alignment EIS analyzes the impacts of obtaining all required water from new water-supply wells to illustrate the maximum impacts of the suite of potential water obtainment activities. Table 2-10 lists construction-water requirements for the Caliente and Mina rail alignments.

Table 2-10. Construction-water requirements.[a]

Water-usage category	Caliente rail alignment (acre-feet)[b,c]	Mina rail alignment (acre-feet)
Earthwork compaction	5,500	5,350
Construction personnel	370	370
Dust control along access roads	200	200
Quarry operations	30	30
Totals	6,100	5,950

a. Sources: DIRS 180875-Nevada Rail Partners 2007, Section 4.4.2; DIRS 180922-Nevada Rail Partners 2007, Section 4.4.2.
b. To convert acre-feet to cubic meters, multiply by 1,233.49.
c. Numbers rounded to two significant figures.

The amount of water needed for earthwork compaction would be directly related to the amount of fill required. Most of the water needed during the construction phase would be for earthwork compaction. Although the Caliente and Mina rail alignments are different lengths (the Caliente rail alignment would be about 120 kilometers [75 miles] longer than the Mina rail alignment), the amount of fill for the two alignments would be similar (see Tables 2-24 and 2-25). Therefore, the amount of water needed for earthwork compaction would be similar for the two alignments.

For new well construction, DOE would submit an application to the State of Nevada to appropriate groundwater for use during the railroad construction phase. Table 2-11 lists the number of potential water wells and well sites the Department has identified along the Caliente and Mina rail alignments and the number of wells estimated to be required to satisfy construction-water demand.

Figure 2-21 shows the locations of wells outside the nominal width of the Caliente rail alignment construction right-of-way; Figure 2-22 shows the locations of wells outside the nominal width of the Mina rail alignment construction right-of-way; and Table 2-12 lists the number of well sites at each mapped location on both figures.

Table 2-11. Water wells.

Description	Caliente rail alignment[a]		Mina rail alignment[b]	
	Minimum	Maximum	Minimum	Maximum
Total number of unique well sites (each well site contains one or more potential wells)	94	107	58	74
Total number of potential wells	150	176	77	110
Number of potential well sites inside the nominal width of the construction right-of-way	84	93	51	65
Number of potential well sites outside the nominal width of the construction right-of-way	10	14	7	9

a. Source: DIRS 182822-Converse Consultants 2006, Appendices A and C.
b. Sources: DIRS 182822-Converse Consultants 2006, Appendices A and C; DIRS 180888-Converse Consultants 2007, Appendices A and C.

Table 2-12. Number of wells at each mapped well site outside the nominal width of the construction right-of-way (page 1 of 2).

Mapped well site outside construction right-of-way	Rail line segment	Number of wells at each location	Mapped well site outside construction right-of-way	Rail line segment	Number of wells at each location
Caliente rail alignment (Figure 2-21)[a]			*Mina rail alignment* (Figure 2-22)[b]		
1	Eccles alternative segment	1	16	Montezuma alternative segments 1 and 3	1
2	Eccles alternative segment	1	18	Montezuma alternative segments 1 and 3	1
3	Caliente and Eccles alternative segments	1	19	Montezuma alternative segment 1	2
4	Caliente common segment 1	1	20	Montezuma alternative segment 1	1
5	Caliente common segment 1	1	21	Mina common segment 1	1
6	Caliente common segment 1	1	22	Schurz alternative segments 4 and 5	1
7	Caliente common segment 1	1	23	Schurz alternative segment 6	1
8	Caliente common segment 2	2	24	Schurz alternative segment 6	1
9	Caliente common segment 2	3			
11	Goldfield alternative segment 4	2			
12	Goldfield alternative segments 1 and 3	6			

Table 2-12. Number of wells at each mapped well site outside the nominal width of the construction right-of-way (page 2 of 2).

Mapped well site outside construction right-of-way	Rail line segment	Number of wells at each location	Mapped well site outside construction right-of-way	Rail line segment	Number of wells at each location
Well sites common to both the Caliente and Mina rail alignments (Figures 2-21 and 2-22)[c]					
10	Goldfield alternative segment 1	4			
	Goldfield alternative segment 4	10			
	Montezuma alternative segments 2 and 3	8			
13	Goldfield alternative segment 4 or Montezuma alternative segment 2	7			
14	Common segment 6	4			
15	Common segment 6	1			

a. Source: DIRS 182822-Converse Consultants 2006, Appendices A and C.
b. Source: DIRS 180888- Converse Consultants 2007, Appendices A and C.
c. Sources: DIRS 182822-Converse Consultants 2006, Appendices A and C; DIRS 180888-Converse Consultants 2007, Appendices A and C.

A 3-meter (10-foot)-wide unimproved dirt access road and a 10- to 15-centimeter (4- to 6-inch)-diameter water pipeline would be required from the well locations along the rail alignment (both inside and outside the construction right-of-way) to lined and fenced earthen reservoirs located immediately along the rail alignment and would be approximately 930 square meters (10,000 square feet) in area by 3 meters (10 feet) deep. These earthen reservoirs would be constructed to temporarily store the water needed to meet daily water demand during construction. DOE would determine the exact number of earthen reservoirs based on the number of wells constructed and the location of those wells in relation to one another. After the completion of rail line construction, DOE would fill the reservoirs with soil and reclaim them (DIRS 180922-Nevada Rail Partners 2007, Section 4.4.4).

Some wells would continue to operate after the completion of construction to serve as the water source for facility operations (discussed in Section 2.2.4). Well closure would be conducted in compliance with State of Nevada regulations. The well sites and access roads would be reclaimed accordingly (DIRS 180922-Nevada Rail Partners 2007, Section 4.4). For some wells constructed outside the construction right-of-way, DOE would need access roads from the well location to the rail line. Most of these access roads could be existing roads, which DOE could improve. Improvements might consist of grading or resurfacing the existing unpaved roads. In addition, a few well locations would require new roads (DIRS 180922-Nevada Rail Partners 2007, pp. 4-2 to 4-9). For the Caliente rail alignment, Figure 2-21 shows the locations of wells that would require access roads, and Table 2-13 lists the estimated lengths of the access roads to these wells. For the Mina rail alignment, Figure 2-22 shows the locations of wells that would require access roads and Table 2-14 lists the estimated lengths of the access roads to these wells.

As shown in Table 2-10, approximately 90 percent of the water that would be used during construction would be used for earthwork compaction and control of excavation dust (DIRS 180922-Nevada Rail Partners 2007, p. 4-2). DOE would use standard construction dust-control measures, including routine watering of unpaved surfaces; wet suppression for material storage, handling, and transfer operations; and application of appropriate and approved chemical dust suppressants. The efficiency of these controls varies depending on site characteristics, but typically ranges from a 50- to 80-percent reduction in ***fugitive dust*** emissions (DIRS 103676-Cowher, Muleski, and Kinsey 1988, all).

Table 2-13. Lengths of well access roads – Caliente rail alignment.[a]

Mapped well location	Rail line segment	Name of road to be improved	Road type	Estimated length of road (miles)[b,c]
1	Eccles alternative segment	Beaver Dam Road	Existing unpaved road, and new road	Existing: 0.66 New: 0.17
2	Eccles alternative segment	None	New road	New: 0.17
3	Caliente and Eccles alternative segments	Unnamed road	Existing unpaved road	Existing: 0.93
4	Caliente common segment 1	Unnamed road	Existing unpaved road	Existing: 0.87
5	Caliente common segment 1	Unnamed road	Existing unpaved road	Existing: 1.2
6	Caliente common segment 1	None	New road	New: 0.73
7	Caliente common segment 1	Unnamed road	Existing unpaved road	Existing: 1.6
8	Caliente common segment 2	McCutchen Spring Road	Existing unpaved road	Existing: 1.9
9	Caliente common segment 2	Unnamed road	Existing unpaved road	Existing: 2.4
10	Goldfield alternative segment 4	Unnamed road	Existing unpaved road	Existing: 3
11	Goldfield alternative segment 4	Silver Peak Road	Existing unpaved road	Existing: 0.3
12	Goldfield alternative segments 1 and 3	Unnamed road	Existing unpaved road	Existing: 1.5
13	Goldfield alternative segment 4	Unnamed road	Existing unpaved road, and new road	Existing: 3.8 New: 0.35
14	Common segment 6	Unnamed road	Existing unpaved road, and new road	Existing: 4.1 New: 1
15	Common segment 6	Beatty Wash Road	Existing unpaved road	Existing: 0.80

a. Source: DIRS 180922-Nevada Rail Partners 2007, Table 4-7.
b. To convert miles to kilometers, multiply by 1.6093.
c. Numbers rounded to two significant figures.

Table 2-14. Lengths of well access roads – Mina rail alignment[a] (page 1 of 2).

Mapped well location	Rail line segment	Name of road to be improved	Road type	Estimated length of road (miles)[b,c]
24	Schurz alternative segment 6	None	New road	New: 0.60
23	Schurz alternative segment 6	Unnamed road	Existing unpaved road	Existing: 1.8
22	Schurz alternative segments 4 and 5	Unnamed road	Existing unpaved road	Existing: 1.3

Table 2-14. Lengths of well access roads – Mina rail alignment[a] (page 2 of 2).

Mapped well location	Rail line segment	Name of road to be improved	Road type	Estimated length of road (miles)[b,c]
21	Mina common segment 1	Unnamed road	Existing unpaved road	Existing: 3.1
20	Montezuma alternative segment 1	Nivioc Road	Existing unpaved road	Existing: 3.2
19	Montezuma alternative segment 1	Unnamed road	Existing unpaved road	Existing: 3.6
18	Montezuma alternative segments 1 and 3	None	New road	New: 1.5
13	Montezuma alternative segment 2	Unnamed road	Existing unpaved road, and new road	Existing: 3.8 New: 0.35
10	Montezuma alternative segments 2 and 3	Unnamed road	Existing unpaved road	Existing: 2.6
16	Montezuma alternative segments 1 and 3	Unnamed road and State Route 266	Existing unpaved road	Existing: 1.2
14	Common segment 6	Unnamed road	Existing unpaved road, and new road	Existing: 4.1 New: 1.0
15	Common segment 6	Beatty Wash Road	Existing unpaved road	Existing: 0.80

a. Source: DIRS 180875-Nevada Rail Partners 2007, pp. 4-14 to 4-17.
b. To convert miles to kilometers, multiply by 1.6093.
c. Numbers rounded to two significant figures.

2.2.2.4.2 Ballast

Approximately 4.9 metric tons of ballast per meter (1.7 tons of ballast per foot) of track construction would be needed along the rail line. Table 2-15 lists the total ballast requirements for rail line construction along the Caliente and Mina rail corridors. Under either implementing alternative, DOE proposes to obtain ballast from new quarries developed along the rail alignment. The number and location of quarries developed would depend on the alternative segments selected. The potential environmental impacts of developing quarries along either the Caliente or Mina rail alignment are analyzed in this Rail Alignment EIS.

Table 2-15. Ballast requirements for rail line construction.

Rail alignment	Ballast required (tons)[a,b]
Caliente[c]	3.44 million to 3.52 million
Mina[d]	2.74 million to 3.01 million

a. To convert tons to metric tons, multiply by 0.90718.
b. Numbers rounded to three significant figures.
c. Source: Derived from DIRS 180922-Nevada Rail Partners 2007, p. 3-1.
d. Source: Derived from DIRS 180875-Nevada Rail Partners 2007, p. 3-1.

Table 2-16 lists potential quarry sites along the Caliente and Mina rail alignments. DOE has identified six potential quarry sites at four general locations along the Caliente rail alignment that have adequate quantities and quality of suitable material to produce ballast for rail line construction. The Department would develop up to four of the six identified potential quarries (DIRS 180922-Nevada Rail Partners 2007, pp. 3-1 to 3-6). Figures 2-24 to 2-27 show the site layouts for each of the potential quarry sites along the Caliente rail alignment. Each quarry site layout outlines the maximum quarry impact area, which is the best estimate of the extent of the area that would be needed to house all of the facilities at each quarry site.

Table 2-16. Potential quarry sites.

Caliente rail alignment[a]		Mina rail alignment[b]	
Up to four sites developed from the following six potential locations:	Maximum quarry impact area (acres)[c]	Two sites developed from the following five potential locations:	Maximum quarry impact area (acres)
Quarry site CA-8B (Caliente alternative segment)[d]	400	Garfield Hills quarry site (Mina common segment 1)	350
Quarry site NN-9A (South Reveille alternative segment 2 or 3)	500	Gabbs Range quarry site (Mina commonsegment 1)	240
Quarry site NN-9B (South Reveille alternative segment 2 or 3)	320	North Clayton quarry site (Montezuma alternative segment 1 or 3)	440
Quarry site ES-7 (Goldfield alternative segment 4)	360	Quarry site ES-7 (Montezuma alternative segment 2)	360
Quarry site NS-3A (Goldfield alternative segment 1 or 3)	930	Malpais Mesa quarry site (Montezuma alternative segment 1)	660
Quarry site NS-3B (Goldfield alternative segment 1 or 3)	370		

a. Source: DIRS 180922-Nevada Rail Partners 2007, p. 3-4.
b. Source: DIRS 180875-Nevada Rail Partners 2007, p. 3-4.
c. To convert acres to square kilometers, multiply by 0.0040469.
d. The siding shown on Figure 2-24 was moved about 1.2 miles (about 1.9 kilometers) north from that shown on the corresponding figure in the Draft Rail Alignment EIS in order to avoid impacting approximately 20 acres (approximately 0.08 square kilometer) of wetlands. This would not result in additional land disturbance from that analyzed in the Draft Rail Alignment EIS.

Under the Mina Implementing Alternative, the Department has identified five potential quarry sites, two of which would be developed on an as-needed basis. Figures 2-28 through 2-32 show the site layouts for each of the potential quarry sites along the Mina rail alignment. Each quarry site layout outlines the quarry impact area, which is the best estimate of the extent of the area that would be needed to house all of the facilities at each quarry site.

Figure 2-33 shows the layout of a typical quarry site. Each quarry would occupy a maximum footprint of approximately 0.97 to 3.8 square kilometers (240 to 930 acres) and would consist of a 24-meter (80-foot)-deep by 0.04-square-kilometer (10-acre) pit, a 12-meter (40-foot)-tall by 0.057-square-kilometer (14-acre) tailings disposal area, and a railroad siding large enough to accommodate up to 80 railroad ballast cars. Thirty employees would be needed to operate each quarry during peak years (DIRS 180922-Nevada Rail Partners 2007, Section 3.1.3).

In the Draft Rail Alignment EIS under the Caliente Implementing Alternative, the Department identified a potential location along the Caliente alternative segment for a railroad siding to service quarry site CA-8B. In response to comments on the Draft EIS concerning potential wetlands impacts, the Department identified and analyzed a new potential location for this siding in order to minimize the potential wetland impacts (Figure 2-24). The new location would be approximately 1.9 kilometers (approximately 1.2 miles) north of the location analyzed in the Draft Rail Alignment EIS. It would be located within the construction right-of-way and would not result in any additional land disturbance from that analyzed in the Draft Rail Alignment EIS.

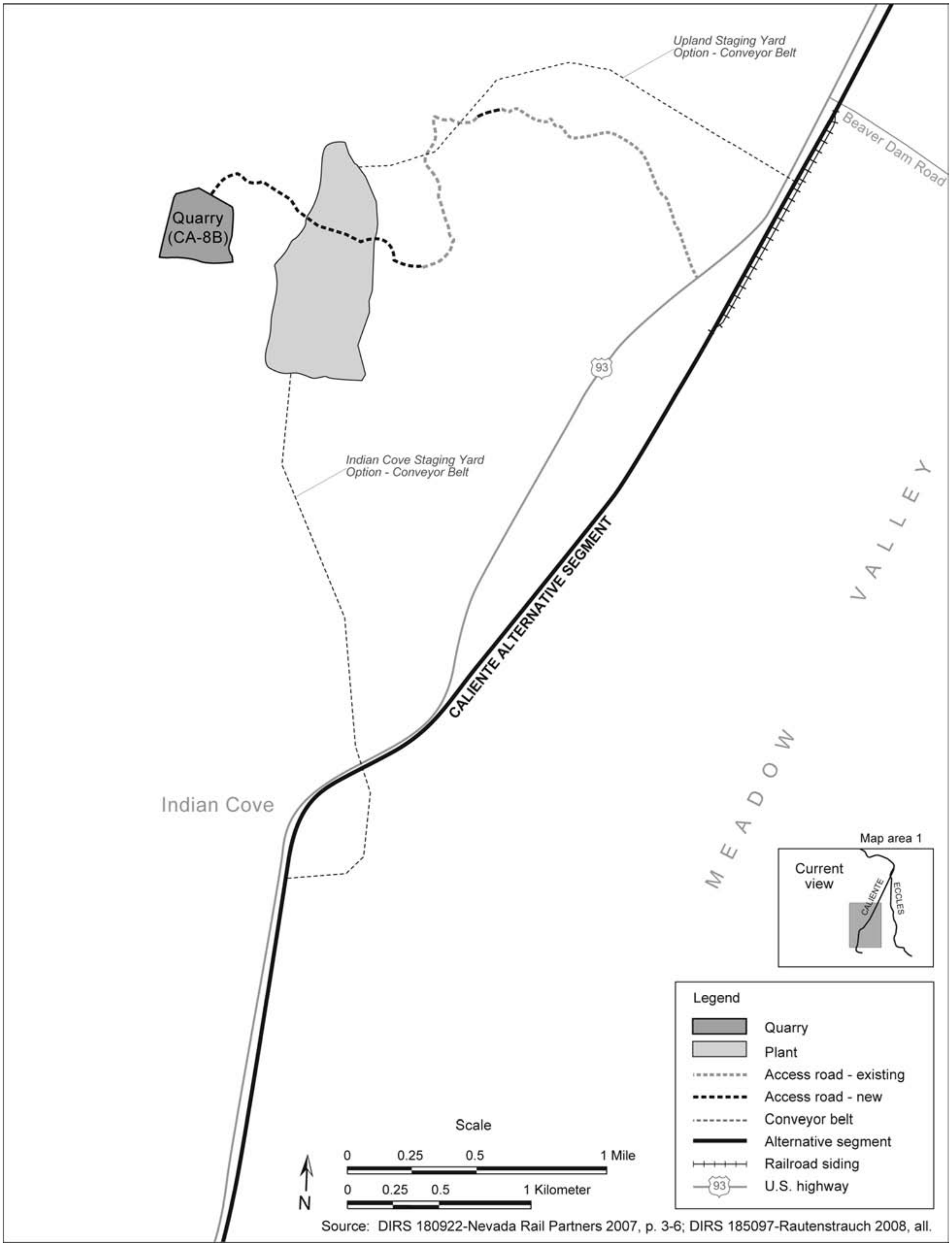


Figure 2-24. Caliente potential quarry site CA-8B northwest of the City of Caliente.

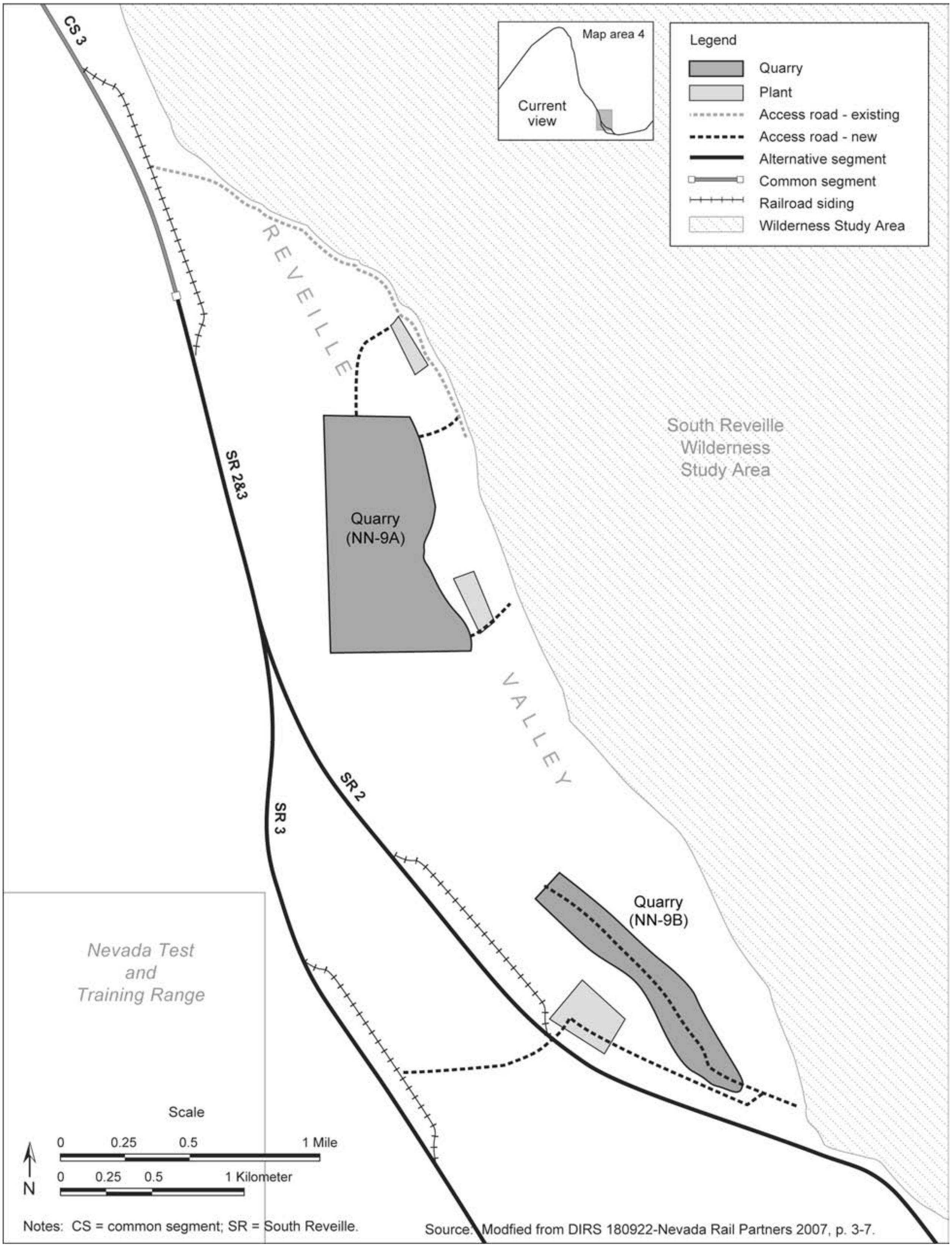


Figure 2-25. Caliente potential quarry sites NN-9A and NN-9B in South Reveille Valley.

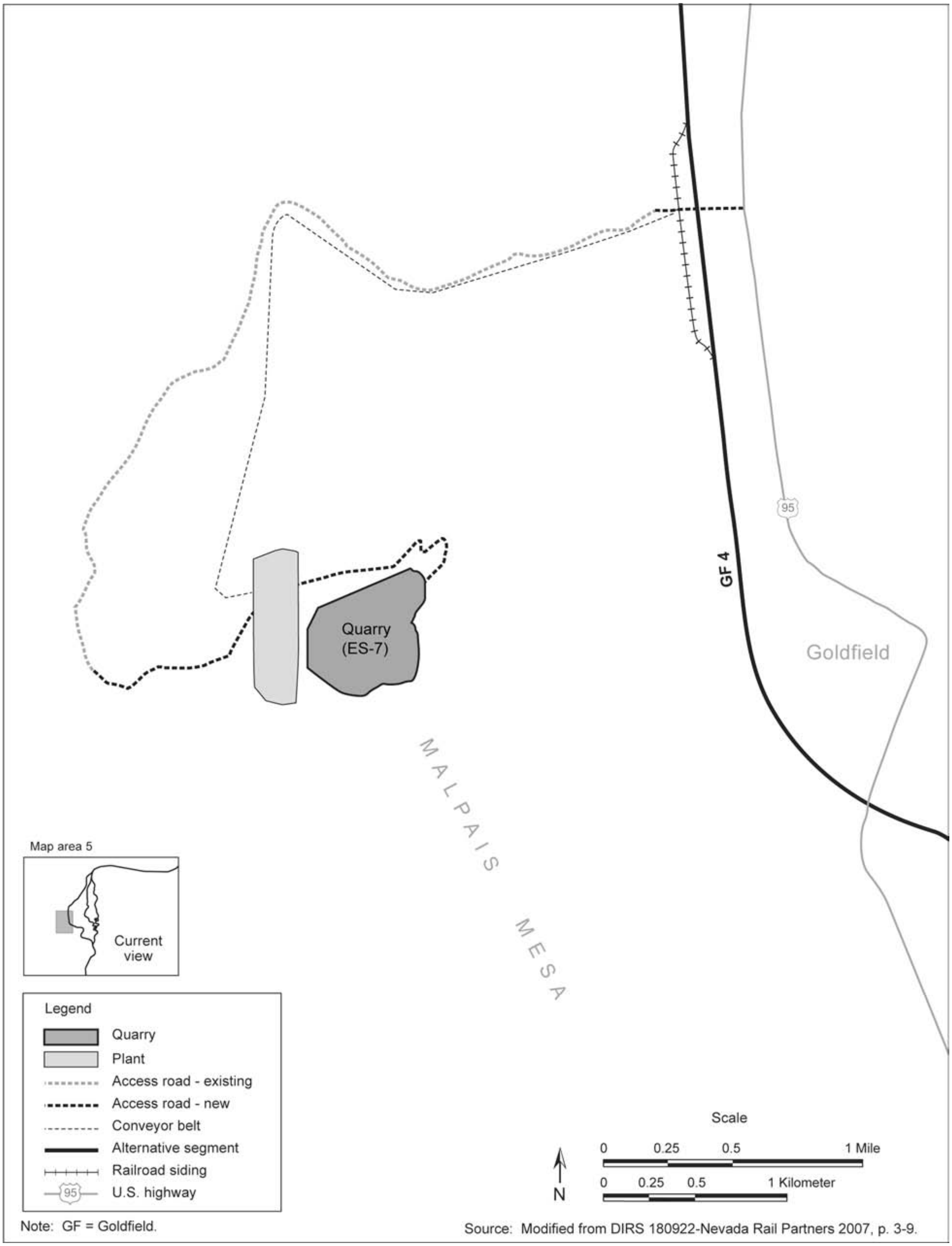


Figure 2-26. Caliente potential quarry site ES-7 west of Goldfield.

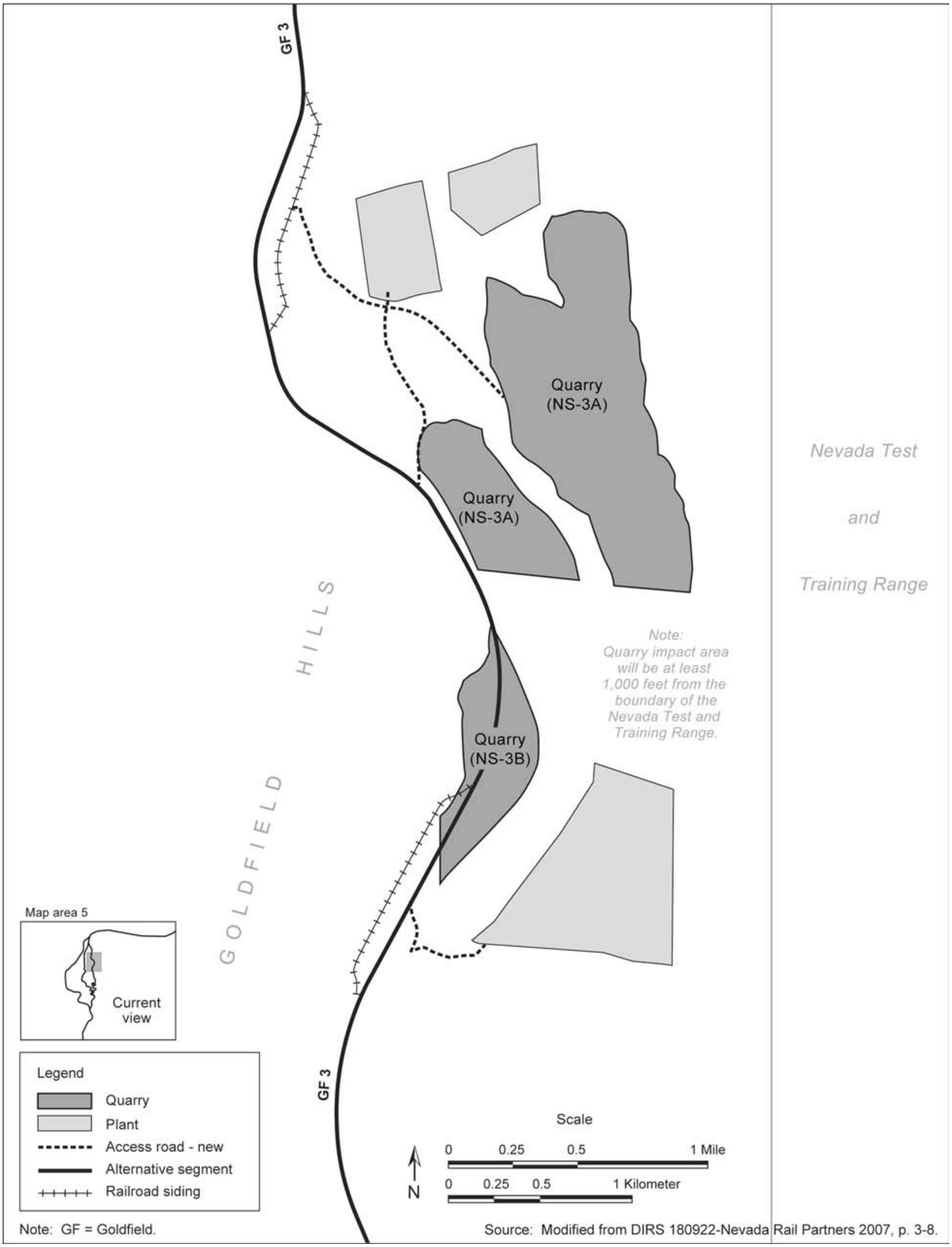
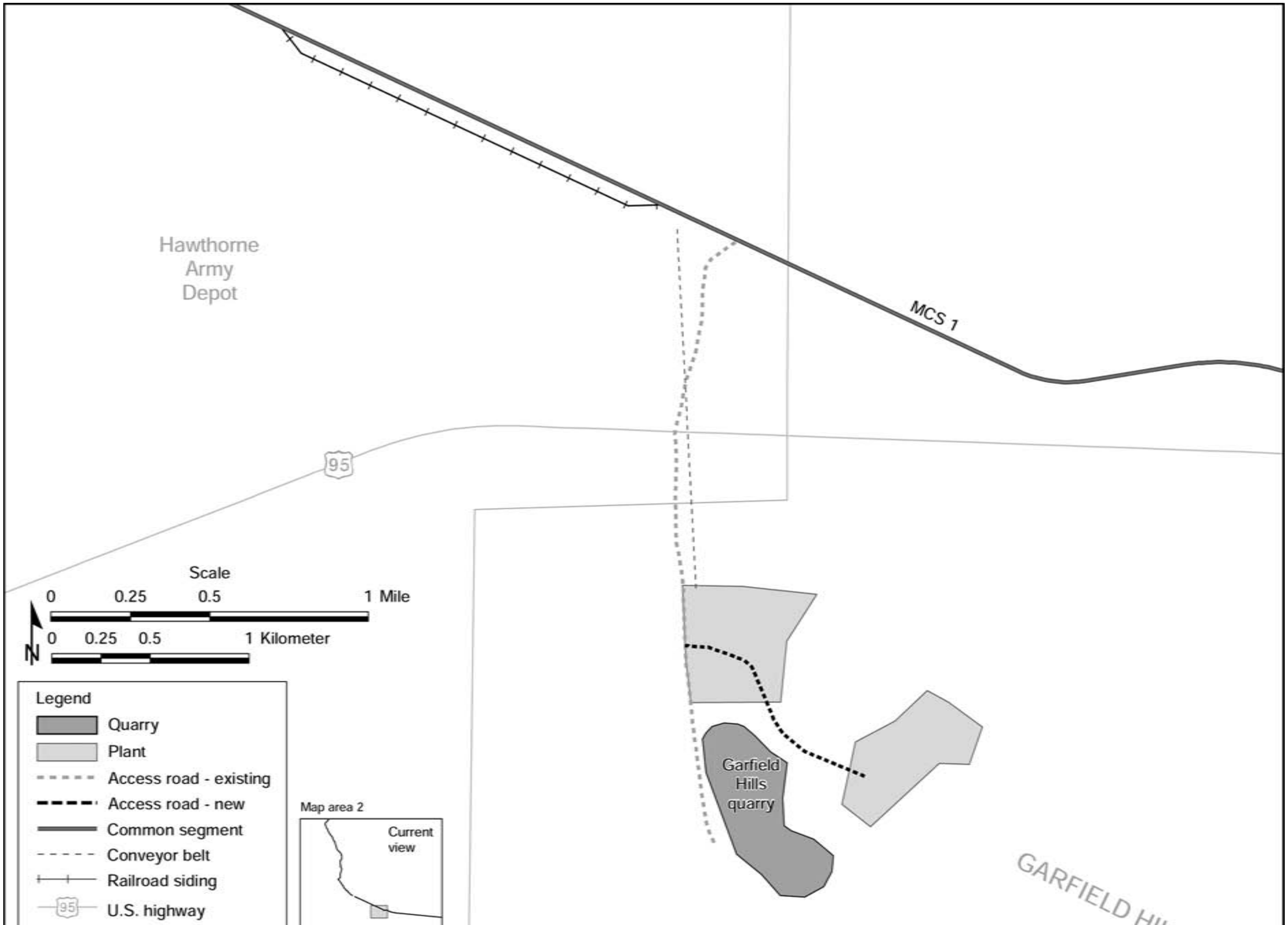


Figure 2-27. Caliente potential quarry sites NS-3A and NS-3B northeast of Goldfield.



Notes: MCS = Mina common segment.
Source: DIRS 180875-Nevada Rail Partners 2007, p. 3-6.

Figure 2-28. Mina potential quarry site at Garfield Hills.

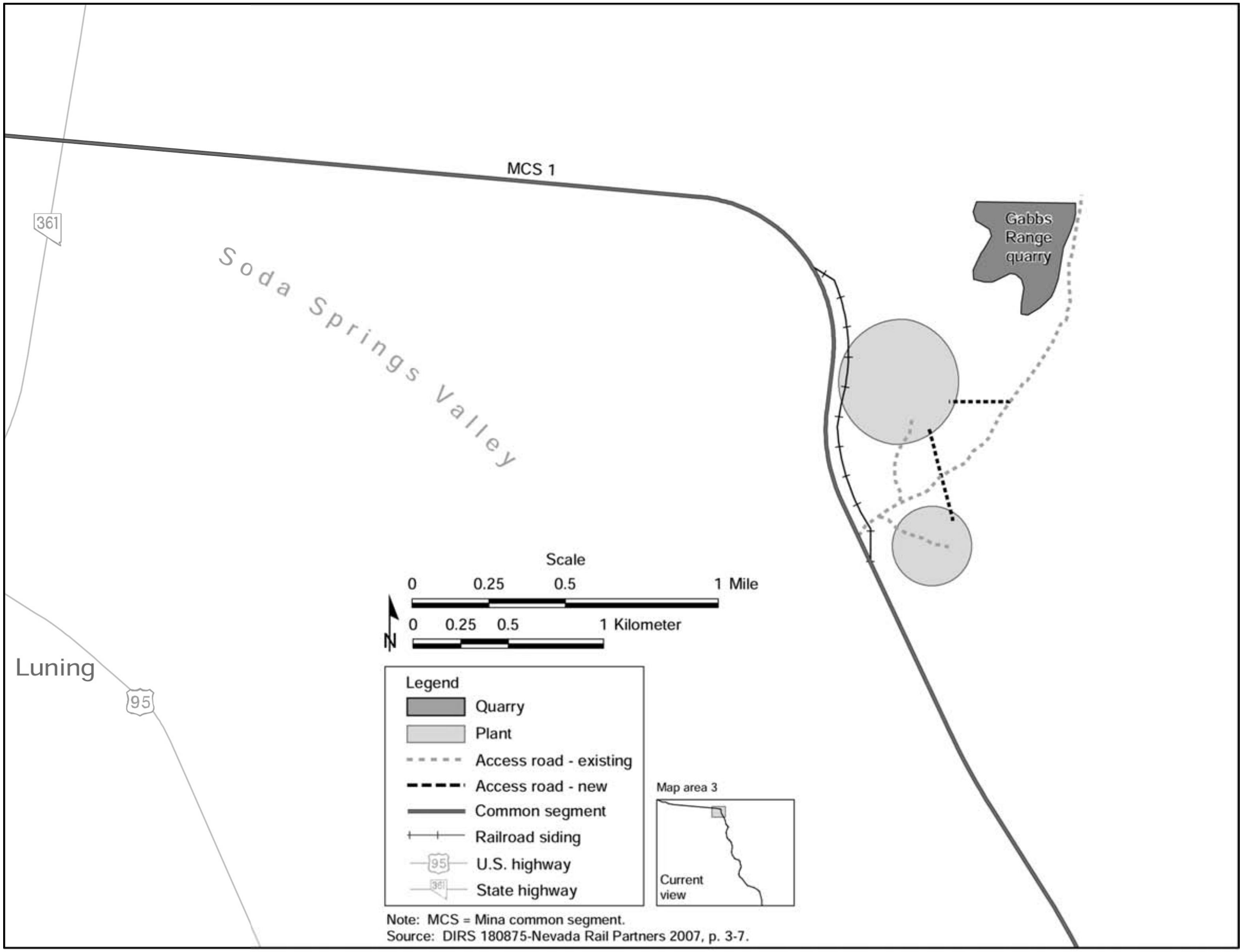


Figure 2-29. Mina potential quarry site at Gabbs Range.

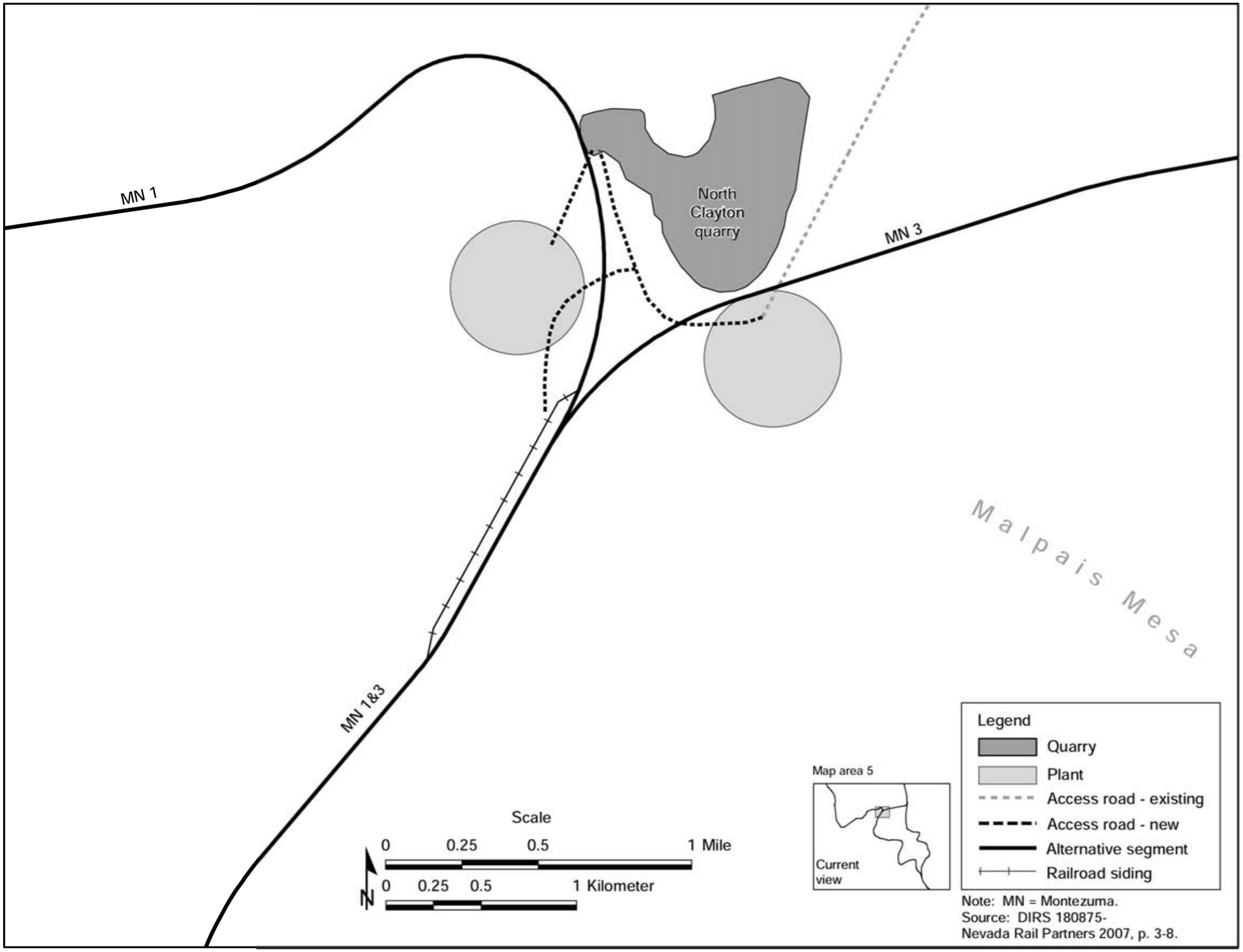


Figure 2-30. Mina potential quarry site at North Clayton.

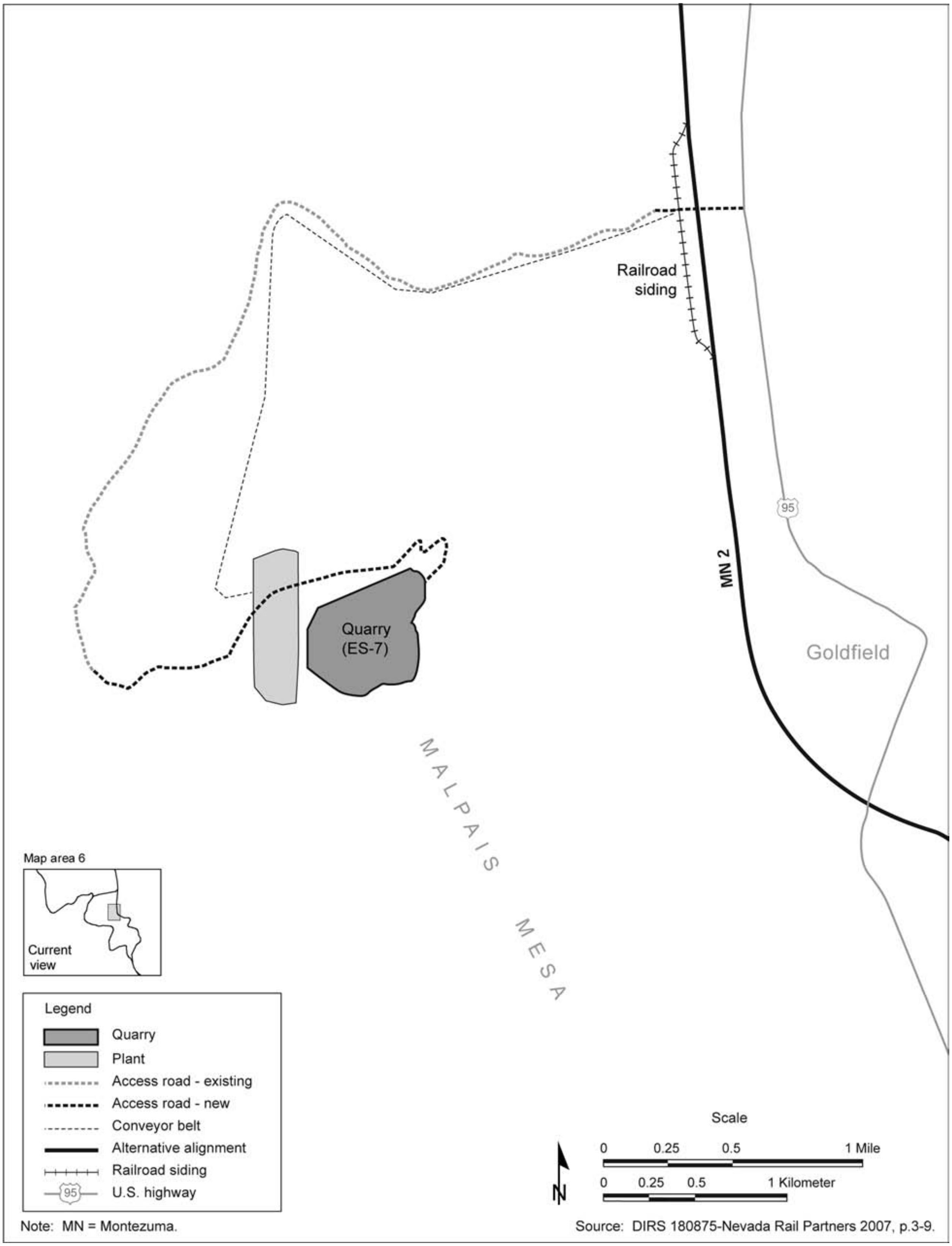


Figure 2-31. Mina potential quarry site ES-7 west of Goldfield.

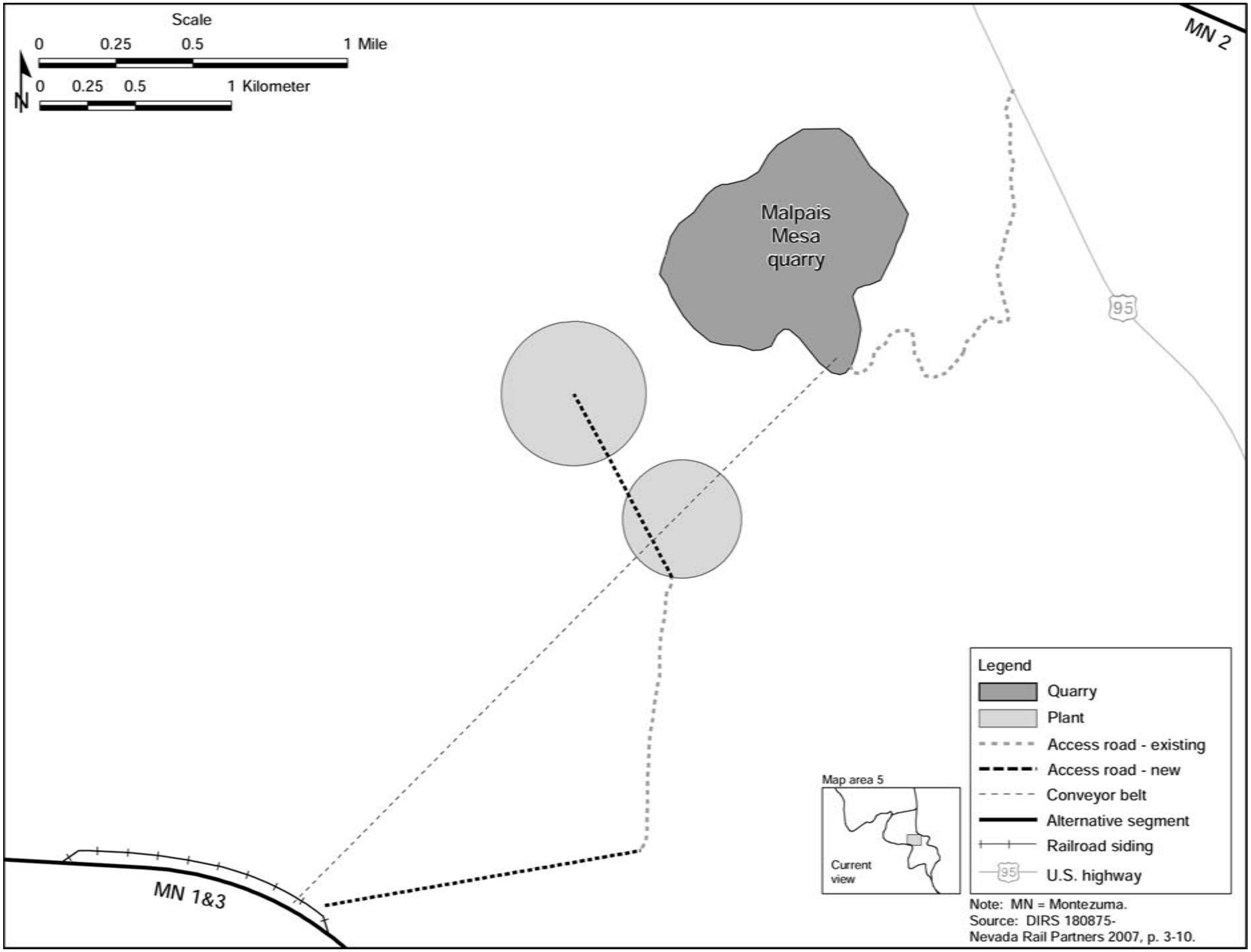


Figure 2-32. Mina potential quarry site at Malpais Mesa.

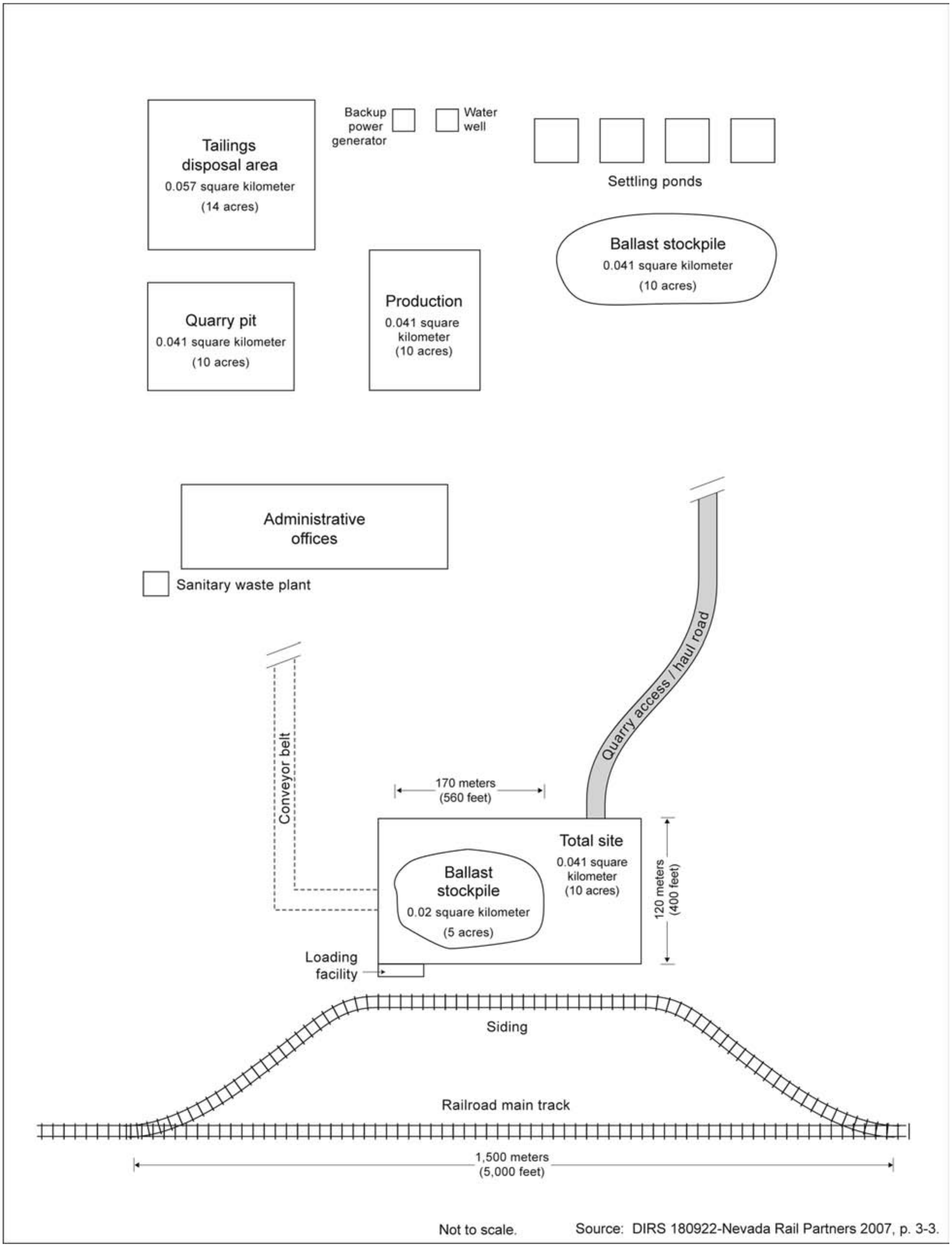


Figure 2-33. Typical quarry site.

Each quarry site would require both power and water for operations. Power would be provided by connecting to the local power supply grid and constructing substations on site. Each quarry would be anticipated to use approximately 28,000 kilowatt-hours of electricity per day of operations. In case of emergency, backup power would be available through on-site backup generators. Water needs would be met through wells constructed near the quarry sites. Water needs would vary depending on the specific process selected at each site to wash the excavated rock during the crushing and screening processes, but are estimated to be approximately 140,000 liters (37,000 gallons) of water per day of operations at each quarry site (DIRS 180922-Nevada Rail Partners 2007, p. 3-2).

For any new quarry developed along either rail alignment, DOE would need to obtain a ***free-use permit*** from the BLM, which would allow DOE to mine ballast on BLM-administered lands (DIRS 180922-Nevada Rail Partners 2007, pp. 3-1 to 3-6).

DOE would haul the quarried ballast by truck or mechanical conveyor from the quarry pit to the railroad siding and then transport it to the track under construction. Rail transportation would be possible because each quarry would be operational only after construction of the rail line had reached the quarry rail sidings (DIRS 180922-Nevada Rail Partners 2007, pp. 3-1 to 3-6). DOE would need to construct new or improve existing access roads to each quarry site from the rail line. Improvements would consist of grading the existing unpaved roads and constructing a gravel surface on the roads when necessary. Tables 2-17 and 2-18 list the estimated length of road improvements and new quarry access roads along the Caliente and Mina rail alignments, respectively.

DOE considered whether it would be feasible to obtain ballast from existing commercial ballast quarries such as those in Milford, Utah; Cheyenne, Wyoming; and Oroville, California. At this time, however, commercial quarries are unable or unwilling to provide information as to their ability to supply the quantity of ballast required several years into the future and whether meeting DOE's needs would require an expansion of capacity (DIRS 185441-Gehner 2008). Accordingly, DOE is unable to further evaluate the impacts of obtaining commercially supplied ballast. For this reason, it is not clear whether obtaining ballast from commercial quarries would reduce or increase the environmental impacts and costs compared to those of obtaining ballast from new quarries.

2.2.2.4.3 Subballast

Approximately 4.6 metric tons of subballast per meter (1.5 tons of subballast per foot) of track construction would be required. Table 2-19 lists the total subballast requirements for rail line construction along the Caliente and Mina rail alignments.

> A **borrow site** is an area where material (usually soil, gravel, or sand) is excavated for use in engineered embankments.

Under the Caliente Implementing Alternative, the Department would obtain subballast primarily from materials excavated during rail roadbed construction and from ***borrow sites*** established inside the rail line construction right-of-way. Additionally, subballast could be produced by crushing rock in quarries or crushing rock from major excavations. Subballast would be trucked along the proposed rail alignment and placed as the final step in the construction of the rail roadbed. DOE would establish borrow sites inside the construction right-of-way, as necessary, during grading and leveling activities and would use suitable excavated material as fill whenever practicable.

Any excess material from these activities would be distributed evenly along embankments as nonstructural fill (DIRS 180922-Nevada Rail Partners 2007, pp. 3-1 to 3-6).

Under the Mina Implementing Alternative, the Department would obtain subballast from one (or more) of four sources: by utilizing waste rock generated at ballast quarry sites; from materials excavated during

Table 2-17. Caliente rail alignment potential quarry access road locations, types, and lengths.[a]

Potential quarry	Location	Name of road to be improved	Road type	Estimated length of road (miles)[b,c]	Map Atlas Part A reference[d]
Caliente CA-8B	Caliente alternative segment	Unnamed road	Existing unpaved road, and new road	Existing (to be improved): 2.7 New: 3.4	Plate 7
South Reveille NN-9A and NN-9B	South Reveille alternative segment 2 or 3	County Road 525	Existing unpaved road, and new road	Existing (to be improved): 9.5 New: 4.4	NN-9A: Plates 234 and 236 NN-9B: Plates 227, 228, 231, and 232
Goldfield ES-7	Goldfield alternative segment 4	Unnamed road	Existing unpaved road, and new road	Existing (to be improved): 4.1 New: 5.2	Plates 519 through 523
Goldfield NS-3A and NS-3B	Goldfield alternative segment 1 or 3	Unnamed road	Existing unpaved road, and new road	Existing (to be improved): 8 New: 2.2	NS-3A: Plates 369 through 371 NS-3B: Plates 371 and 372

a. Source: DIRS 180922-Nevada Rail Partners 2007, Table 4-7.
b. To convert miles to kilometers, multiply by 1.6093.
c. Numbers rounded to two significant figures.
d. Source: DIRS 185492-DOE 2008, all.

Table 2-18. Mina rail alignment potential quarry access road locations, types, and lengths.[a]

Potential quarry	Location	Name of road to be improved	Road type	Estimated length of road (miles)[b,c]	Map Atlas Part B reference[d]
Garfield Hills	Mina common segment 1	Garfield Flats Road	Existing unpaved road, and new road	Existing (to be improved): 2 New: 1.9	Plates 512 through 514
Gabbs Range	Mina common segment 1	Unnamed road	Existing, unpaved road, and new road	Existing (to be improved): 5.5 (3.5 kilometers is shared with the alignment service road) New: 0.50	Plate 515
North Clayton	Montezuma alternative segment 1 or 3	Powerline Road	Existing unpaved road, and new road	Existing (to be improved): 3.6 New: 1.9	Plates 295 and 380
Goldfield ES-7	Montezuma alternative segment 2	Unnamed road	Existing unpaved road, and new road	Existing (to be improved): 4.1 New: 5.2	Plates 519 through 523
Malpais Mesa	Montezuma alternative segment 1 or 3	Unnamed road	Existing unpaved road, and new road	Existing (to be improved): 3.3 New: 4.2	Plates 516 through 518

a. Source: DIRS 180875-Nevada Rail Partners 2007, pp. 4-14 to 4-17.
b. To convert miles to kilometers, multiply by 1.6093.
c. Numbers rounded to two significant figures.
d. Source: DIRS 185510-DOE 2008, all.

rail roadbed construction; from existing borrow sites along the rail alignment; or from the development of new subballast borrow sites along the rail alignment. New subballast borrow sites would be required for construction along the Mina rail alignment because rail roadbed construction would not generate enough material to meet subballast requirements. New subballast borrow sites would be located approximately every 16 to 32 kilometers (10 to 20 miles) along the rail alignment, which would result in the development of approximately 15 to 30 new sites. Figure 2-33a illustrates potential existing and new subballast borrow sites along the Mina rail alignment. Figure 2-34 illustrates a typical subballast borrow site.

2.2.2.4.4 Concrete Ties and Rail

Approximately one concrete tie for every 0.6 meter (2 feet) of track construction would be needed along the entire length of the rail line (DIRS 180922-Nevada Rail Partners 2007, p. 3-1). Concrete ties would be shipped to the Staging Yard by rail and then distributed when needed for use.

Table 2-19. Subballast requirements for rail line construction.

Rail alignment	Subballast required (tons)[a,b]
Caliente[c]	3.0 million to 3.1 million
Mina[d]	2.4 million to 2.64 million

a. To convert tons to metric tons, multiply by 0.90718.
b. Numbers rounded to three significant figures.
c. Source: DIRS 182825-Nevada Rail Partners 2007, p. A-5.
d. Source: DIRS 180875-Nevada Rail Partners 2007, p. A-6.

DOE would obtain rail from commercial sources and weld it into 440-meter (1,440-foot) strings at a portable welding plant located within the construction right-of-way. Under the Caliente Implementing Alternative, this plant would initially be established near Caliente. Under the Mina Implementing Alternative, this plant would initially be established near Hawthorne. In either case, the welding plant would later be relocated at 80- to 160-kilometer (50- to 100-mile) increments along the rail alignment as construction progressed. Once ready for use, the strings would be transported by rail to the construction sites (DIRS 180922-Nevada Rail Partners 2007, p. 3-2).

2.2.2.4.5 Bridge Steel and Concrete

For either the Caliente or the Mina rail alignment, existing commercial manufacturers would supply the steel required for bridges. The bridge steel would be transported to the construction site by rail or by truck.

DOE would obtain concrete for site placement activities at bridge construction sites from portable concrete batch plants established near construction sites. Precast concrete bridge elements would be manufactured at existing commercial sources off the project site and trucked to bridge construction sites.

2.2.2.5 Bridge, Culvert, and Grade Crossing Construction

DOE would start constructing bridges, large culverts, and grade-separated crossings before other infrastructure because these features would take longer to construct. DOE would analyze the construction and use of bridges and culverts case-by-case and could utilize culverts whenever feasible.

Tables 2-20 and 2-21 list the approximate number of bridges and large culverts (those with a diameter greater than 0.91 meter [3 feet]) proposed for each alternative segment and common segment along the Caliente rail alignment and Mina rail alignment, respectively. Numerous smaller culverts would also be utilized along the rail alignment, but would not be identified until a later design stage. Fewer bridges and culverts would be required for the Mina rail alignment because it would only pass through two mountain ranges (versus seven for the Caliente rail alignment) and would pass through more flat areas.

Construction of bridges and culverts across areas of intermittent water flow would minimize physical changes to drainage channels. Most of the bridges would be short-span, precast concrete bridges. These would be shipped to the construction sites in pieces and assembled onsite. Figure 2-35 shows a schematic of a typical precast concrete bridge. In a few places, DOE would construct ***plate girder bridges*** instead of precast concrete bridges. In addition to the bridges listed in Tables 2-20 and 2-21, on common segment 6 of both the Caliente and the Mina rail alignments, DOE would construct one longer, specially designed bridge across Beatty Wash. This bridge would span 313 meters (1,027 feet) at an elevation of 52 meters (170 feet) and would take approximately 2 years to construct (DIRS 180922-Nevada Rail Partners 2007, p. 7-1). Figure 2-36 shows a schematic of the planned bridge.

Table 2-20. Bridges and culverts for a rail line along the Caliente rail alignment.[a]

Rail line segment	Number of bridges	Range of estimated total bridge lengths (feet)[b]	Number of large culvert[c] installation locations
Caliente alternative segment	10 precast concrete 1 plate girder	75 to 700	0
Eccles alternative segment	8 precast concrete 1 thru-plate girder	75 to 480	8
Caliente common segment 1	36 precast concrete	90 to 1,000	25
Garden Valley alternative segment 1	15 precast concrete	72 to 860	8
Garden Valley alternative segment 2	15 precast concrete	60 to 800	4
Garden Valley alternative segment 3	20 precast concrete	24 to 630	8
Garden Valley alternative segment 8	15 precast concrete	130 to 810	0
Caliente common segment 2	25 precast concrete	72 to 320	15
South Reveille alternative segment 2	12 precast concrete	120 to 320	1
South Reveille alternative segment 3	14 precast concrete	90 to 320	3
Caliente common segment 3	55 precast concrete	60 to 900	16
Goldfield alternative segment 1	11 precast concrete	99 to 200	3
Goldfield alternative segment 3	16 precast concrete	60 to 480	5
Goldfield alternative segment 4	18 precast concrete	60 to 540	2
Caliente common segment 4	2 precast concrete	210 to 400	0
Bonnie Claire alternative segment 2	10 precast concrete	140 to 640	7
Bonnie Claire alternative segment 3	9 precast concrete	150 to 520	26
Common segment 5	19 precast concrete	50 to 590	19
Oasis Valley alternative segment 1	6 precast concrete	200 to 760	7
Oasis Valley alternative segment 3	5 precast concrete	150 to 460	9
Common segment 6	23 precast concrete 1 plate girder	96 to 1,000	4

a. Source: DIRS 180916-Nevada Rail Partners 2007, Appendix D, Tables D-2 and D-3.
b. To convert feet to meters, multiply by 0.3048.
c. Large culverts are all culverts greater than 0.91 meter (3 feet) in diameter.

Table 2-21. Bridges and culverts for a rail line along the Mina rail alignment[a].

Rail line segment	Number of bridges	Range of estimated total bridge lengths (feet)[b]	Number of large culvert[c] installation locations
Schurz alternative segment 1	1 precast concrete and plate girder	1,000	0
Schurz alternative segment 4	1 precast concrete and plate girder	1,000	0
Schurz alternative segment 5	1 precast concrete and plate girder	1,000	0
Schurz alternative segment 6	1 precast concrete 1 precast concrete and plate girder	200 to 1,000	0
Mina common segment 1	0	Not applicable	0
Montezuma alternative segment 1	0	Not applicable	1
Montezuma alternative segment 2	9 precast concrete	140 to 450	2
Montezuma alternative segment 3	0	Not applicable	1
Mina common segment 2	0	Not applicable	0
Bonnie Claire alternative segment 2	10 precast concrete	140 to 640	7
Bonnie Claire alternative segment 3	9 precast concrete	150 to 520	26
Common segment 5	19 precast concrete	50 to 590	19
Oasis Valley alternative segment 1	6 precast concrete	200 to 760	7
Oasis Valley alternative segment 3	5 precast concrete	150 to 460	9
Common segment 6	23 precast concrete 1 plate girder	96 to 1,000	4

a. Source: DIRS 180872-Nevada Rail Partners 2007, Appendix G.
b. To convert feet to meters, multiply by 0.3048.
c. Large culverts are all culverts greater than 0.91 meter (3 feet) in diameter.

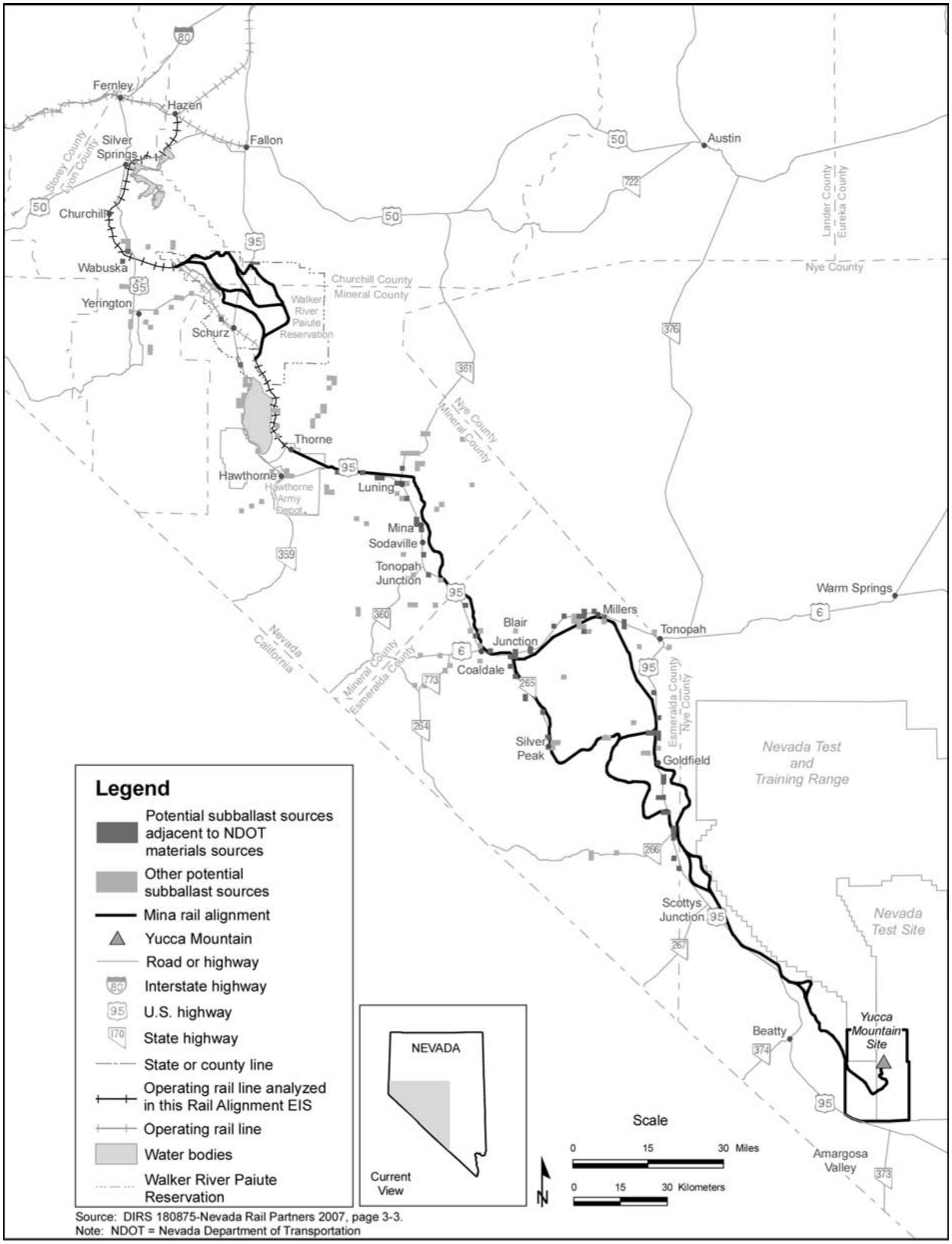


Figure 2-33a. Potential existing and new subballast borrow sites along the Mina rail alignment.

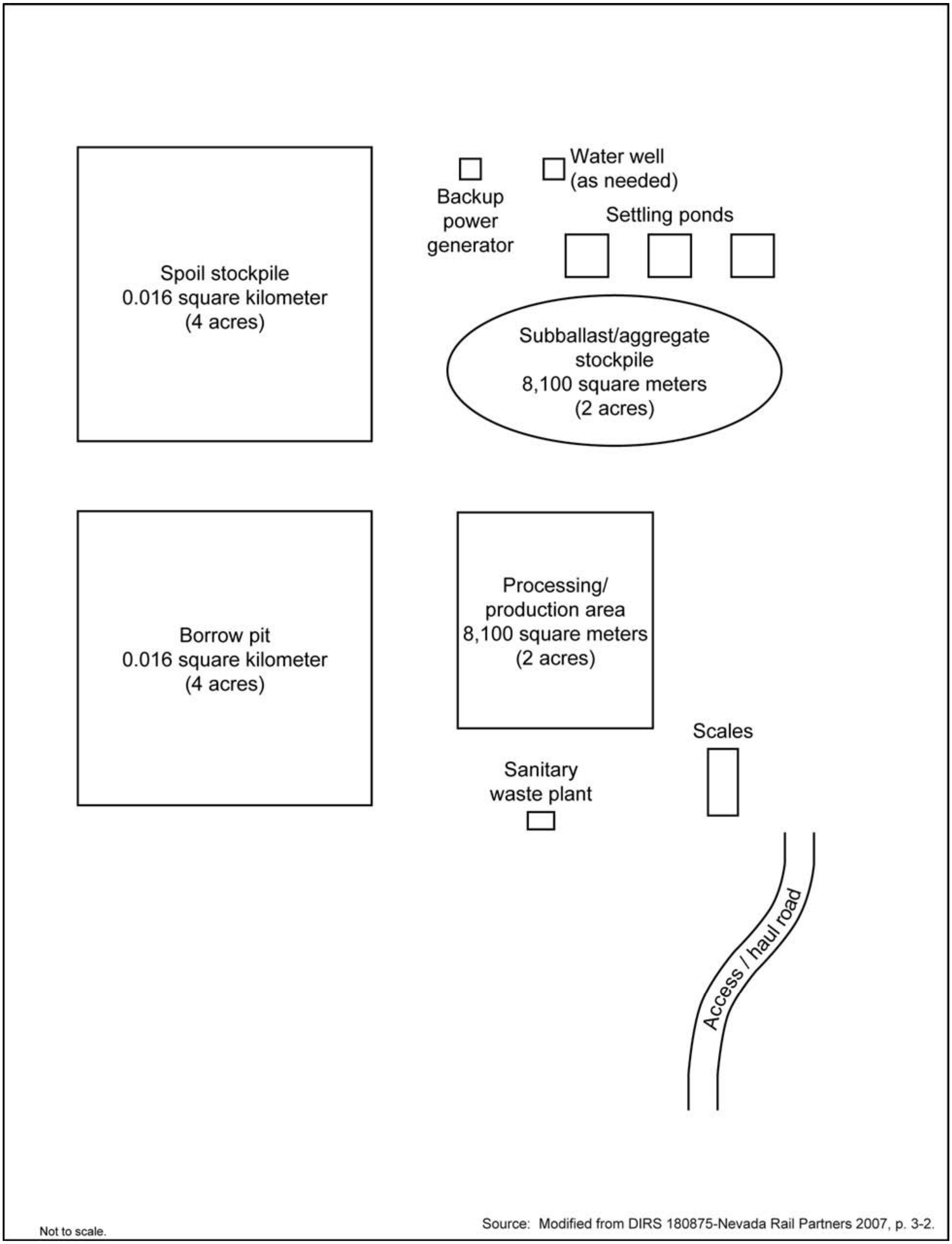
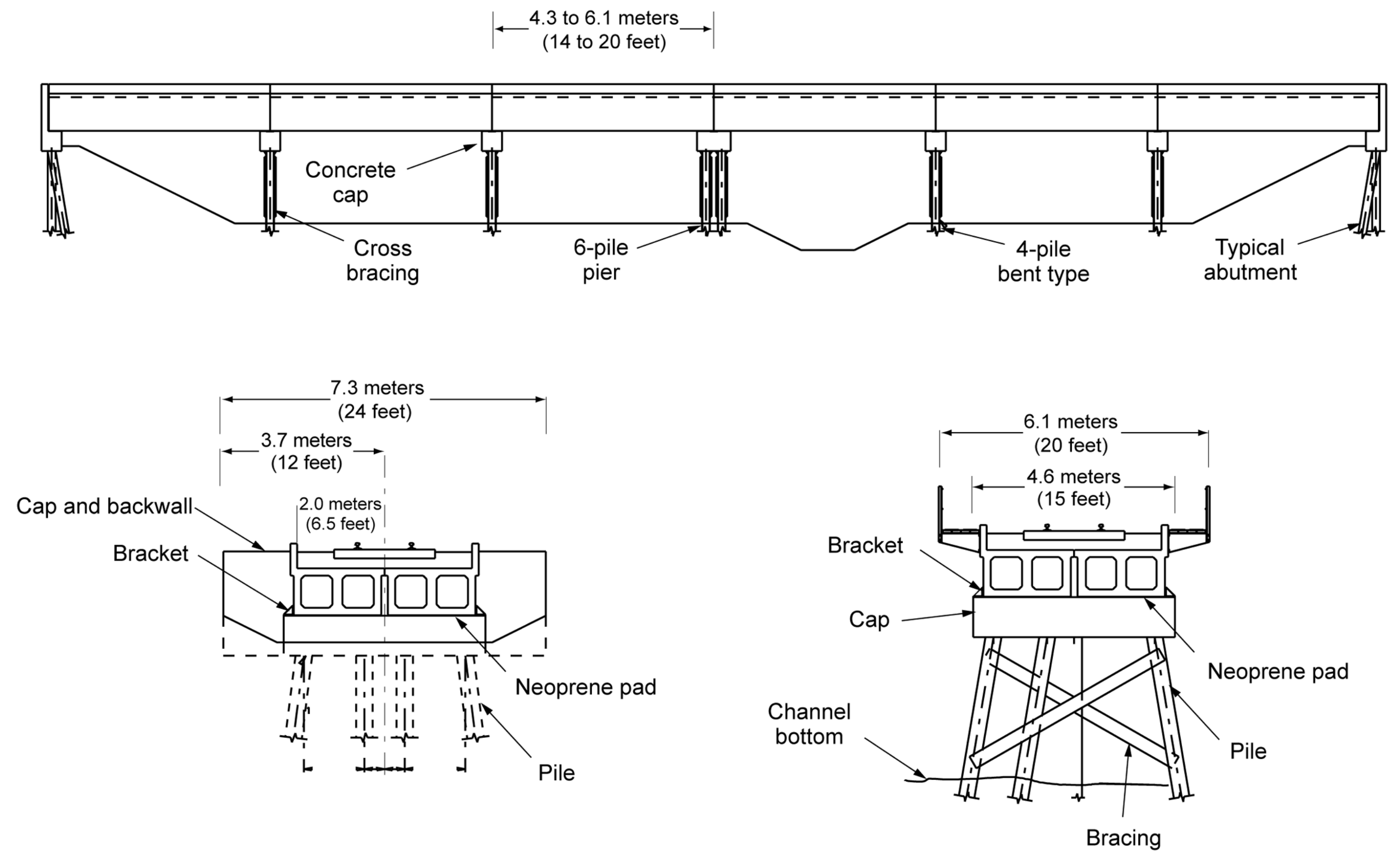


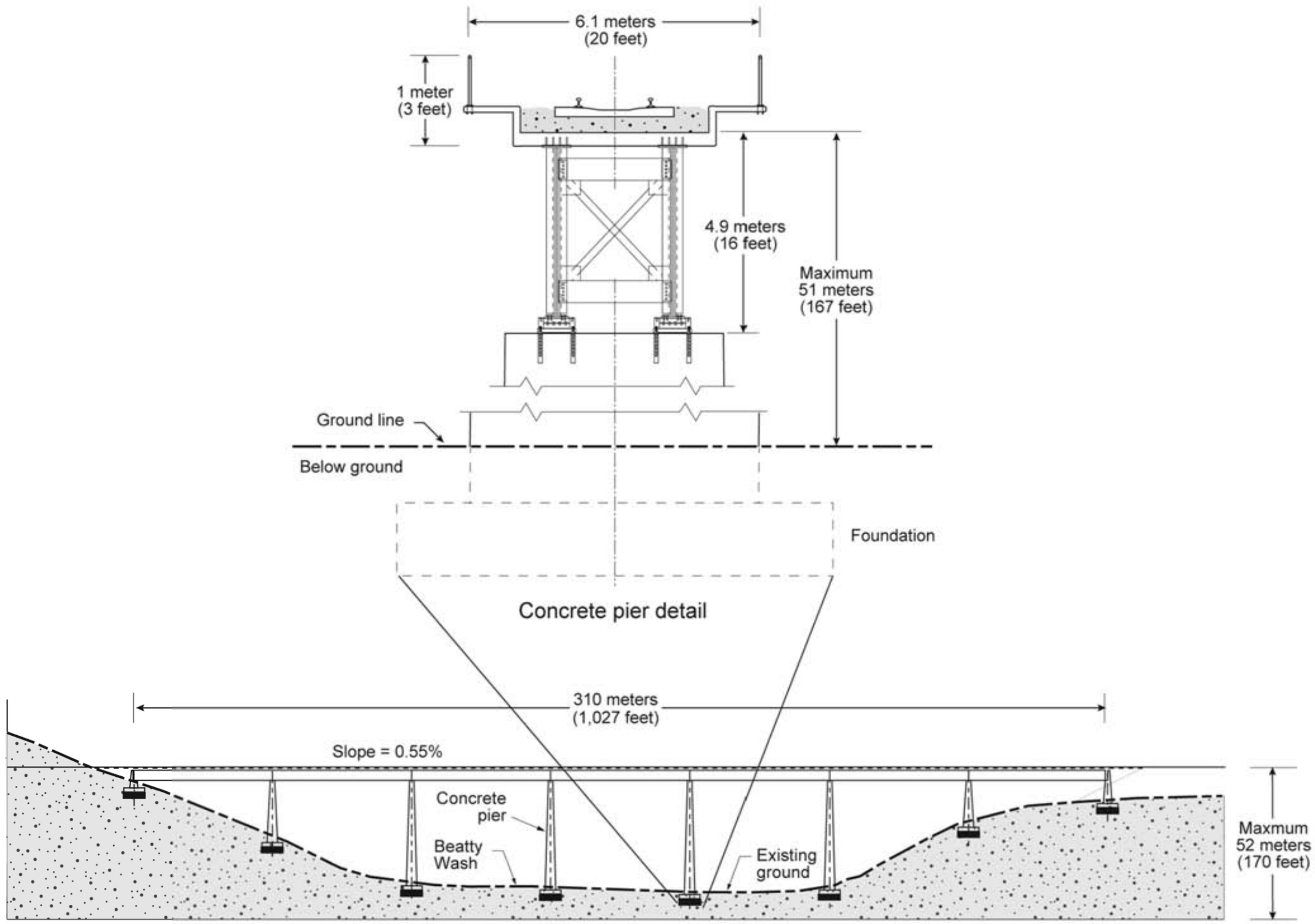
Figure 2-34. Typical subballast borrow site.



Not to scale.

Source: Modified from DIRS 182824-Nevada Rail Partners 2007, p. 16.

Figure 2-35. Cross-section of a typical bridge.



Not to scale.

Source: Modified from DIRS 182824-Nevada Rail Partners 2007, p. 20.

Figure 2-36. Cross-section of a planned bridge across Beatty Wash.

Culverts are features that would be built into the rail roadbed to allow water to flow under the rail line. Intense, short-duration rainfalls in the area of the Caliente and Mina rail alignments can cause high peak flows that include relatively large volumes of sediment. These sediment-laden flows create a need for drainage structures where the flows would cross the proposed rail line. Culverts and bridges can be incorporated into track construction to manage rainfall and sediment flow. When flow rates would be higher than 28,000 liters (1,000 cubic feet) per second, bridges might be the most desirable alternative to accommodate sediment and rain flow. Where very wide and shallow depths of flow would occur during a ***100-year flood*** event, or the flow would be divided into multiple natural channels that would cross the rail line, multiple culverts could be constructed, along with some small bridges where the main flow would occur (DIRS 182824-Nevada Rail Partners 2007, p. ii).

To maintain access to existing private and public roads across the proposed rail line, DOE would install grade crossings where the rail line would cross a roadway (see Tables 2-22 and 2-23). In places where the rail line would cross a highway (for example, U.S. Highways 93 and 95, and State Routes 318 and 375), the routes would be grade-separated. Where the rail line would cross paved public roadways, the routes would cross ***at-grade*** and active warning devices, such as flashing lights and gates, would be installed. Where the rail line would cross unpaved roads and private crossings, DOE would install passive warning devices such as crossbucks and stop signs (DIRS 182826-Nevada Rail Partners 2007, p. 6-9). At locations where several road crossings would occur in close proximity (generally over a distance of 0.8 kilometer [0.5 mile] or less) some minor rerouting and consolidation of crossings could occur but would not prevent crossing of the rail line. The regulatory authority to make decisions regarding roads, road closures, and rail line crossings rests with the BLM and county and local

Table 2-22. Grade-separated crossings along the Caliente rail alignment.[a]

Rail line segment	Road[b]	Type of crossing
Caliente alternative segment	U.S. Highway 93	Grade-separated: highway over railroad
Eccles alternative segment	U.S. Highway 93	Grade-separated: highway over railroad
Caliente common segment 1	State Route 318	Grade-separated: railroad over highway
Caliente common segment 2	State Route 375	Grade-separated: highway over railroad
Goldfield alternative segment 4	U.S. Highway 95 (#1)	Grade-separated: railroad over highway
	U.S. Highway 95 (#2)	Grade-separated: railroad over highway

a. Source: DIRS 180916-Nevada Rail Partners 2007, Appendix D.
b. Does not include off-road-vehicle crossings.

Table 2-23. Grade-separated crossings along the Mina rail alignment.[a]

Segment	Road[b]	Type of crossing
Schurz alternative segment 1	U.S. Highway 95	Grade-separated: highway over railroad
Schurz alternative segment 4	U.S. Highway 95	Grade-separated: highway over railroad
Schurz alternative segment 5	U.S. Highway 95	Grade-separated: highway over railroad
Schurz alternative segment 6	U.S. Highway 95	Grade-separated: railroad over highway
Mina common segment 1	State Route 361	Grade-separated: highway over railroad
	U.S. Highway 6/95	Grade-separated: highway over railroad
Montezuma alternative segment 1	U.S. Highway 95	Grade-separated: highway over railroad
Montezuma alternative segment 2	U.S. Highway 95	Grade-separated: highway over railroad
Montezuma alternative segment 3	U.S. Highway 95	Grade-separated: highway over railroad

a. Sources: DIRS 180872-Nevada Rail Partners 2007, Appendix D; DIRS 180916-Nevada Rail Partners 2007, Appendix D.
b. Does not include off-road-vehicle crossings.

governments. DOE would work in close consultation with these groups to assure access is maintained. Tables 2-22 and 2-23 list proposed grade-separated crossings along the Caliente and Mina rail alignments, respectively.

2.2.2.6 Rail Roadbed Construction

Before any track could be placed, DOE would have to construct a suitable rail roadbed. The rail roadbed would form the base upon which the ballast, concrete ties, and rail would be laid. Figure 2-37 shows a cross-section of the design of the track and rail roadbed. Under the Caliente Implementing Alternative with a 4-year construction schedule, construction of the rail roadbed would begin simultaneously at multiple points along the rail alignment; however, under a 10-year construction schedule, rail roadbed construction would start near Caliente and progress toward Yucca Mountain. Under the Mina Implementing Alternative, construction would follow the same progression as the Caliente rail alignment under either the 4- or 10-year schedule; however, under a 10-year construction schedule, rail roadbed construction would start near Wabuska and progress toward Yucca Mountain. Along either alignment, the rail roadbed would be constructed along the centerline of the proposed rail line (DIRS 180922-Nevada Rail Partners 2007, p. 7-1).

Construction of the rail roadbed would require clearing, excavating earth and rock on previously undisturbed lands, and removing and stockpiling topsoil where needed. Construction would require both cuts and fills. Figure 2-38 illustrates a typical cut area and a typical fill area. Tables 2-24 and 2-25 list the proposed level of disturbance, volume of cuts, and volume of fills for each segment of the Caliente rail alignment and the Mina rail alignment, respectively. The volume of cuts generated would vary depending on the rock type or material where the cut occurred.

Typical heavy-duty construction equipment (including front-end loaders, bulldozers, graders, water wagons, compactors, excavators, drill rigs, cranes, scrapers, generators, compressors, dump trucks, and other diesel-powered and gas-powered support equipment) would be used for drilling, blasting, clearing, excavation, screening, and crushing work (DIRS 180922-Nevada Rail Partners 2007, p. 7-1). To establish a stable rail roadbed for the track, construction crews would excavate some areas and fill others, as determined by terrain features. Suitable material excavated from one area would be used in an area that would require fill material, unless the distance was excessive. In such a case, DOE would establish a borrow site adjacent to the area requiring fill material and would dispose of the unused excavated material along the embankments of the rail line. In most cases, borrow and disposal sites would be inside the construction right-of-way.

Under the Mina Implementing Alternative, portions of the rail line would be built on existing rail roadbeds. A short portion of Schurz alternative segments 4, 5, and 6, Mina common segment 1, and Montezuma alternative segments 2 and 3 all contain existing rail roadbeds that would be suitable for construction of the proposed railroad.

2.2.2.7 Power Distribution Line

Under either the Caliente or the Mina Implementing Alternative, the Department would build a distribution line for electric power along the entire length of the rail alignment. The purpose of this distribution line would be to provide electric power to equipment needed for normal operation of the railroad, such as signals and switches, and to be able to provide the capacity to meet expected power loads for facilities and operation of the railroad.

An underground high-voltage 25-kilovolt distribution line would be placed inside a trench that would be laid within the rail roadbed as it was prepared for the rail line. DOE would use the same trench to

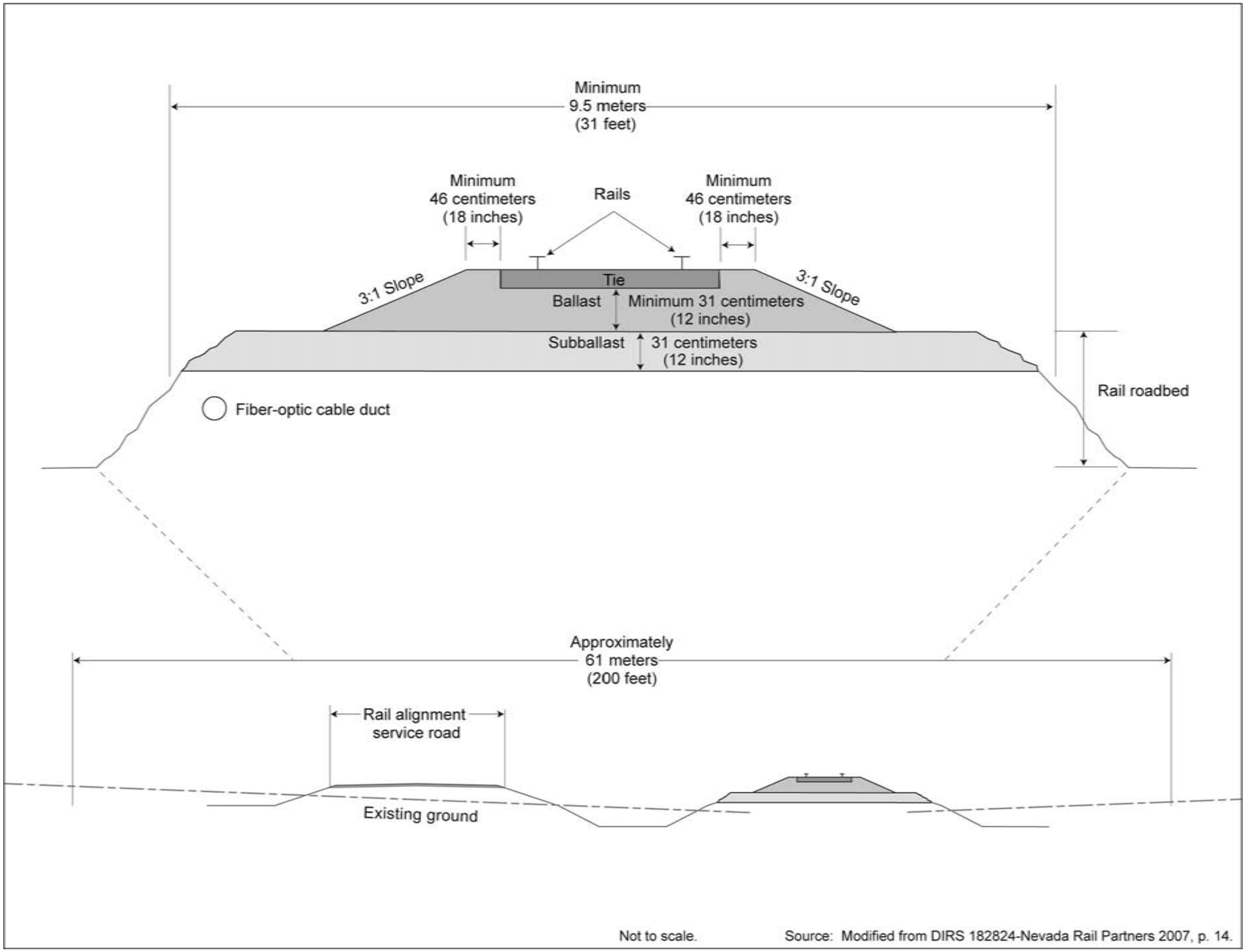
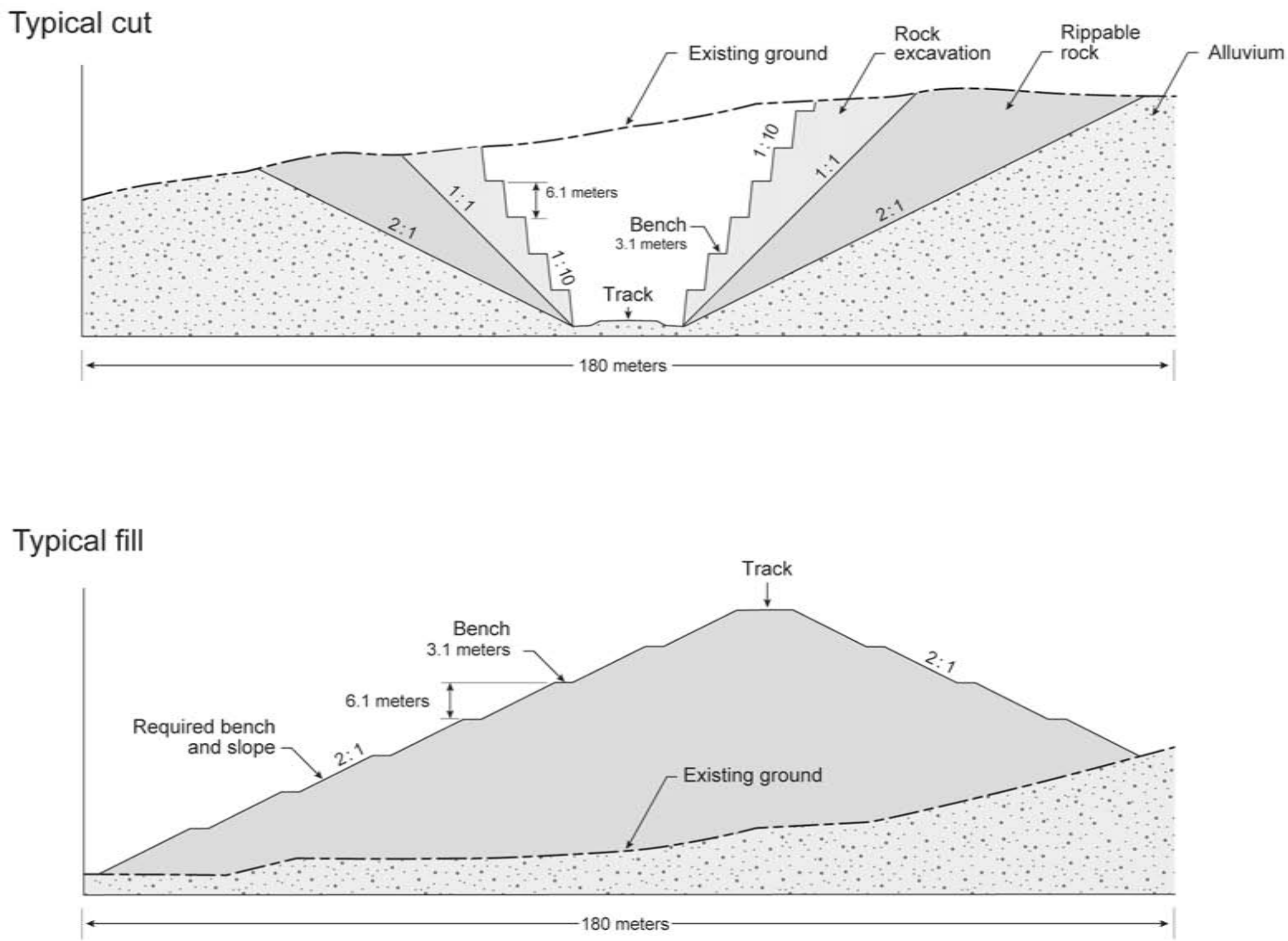


Figure 2-37. Cross-section of a typical rail and roadbed design.



Note: To convert meters to feet, multiply 3.2808. Not to scale Source: Modified from DIRS 180918-Nevada Rail Partners 2007, pp. 4 to 5.

Figure 2-38. Cross-sections of a representative cut and representative fill area along the rail alignment.

Table 2-24. Construction disturbance – Caliente rail alignment.[a,b]

Rail line segment	Earthwork: cut (cubic yards)[c]	Earthwork: fill (cubic yards)	Surface area disturbed (acres)[d]
Caliente alternative segment	630,000	220,000	370
Eccles alternative segment	2,390,000	1,300,000	470
Caliente common segment 1	12,200,000	7,700,000	2,700
Garden Valley alternative segment 1	360,000	1,100,000	720
Garden Valley alternative segment 2	940,000	690,000	770
Garden Valley alternative segment 3	650,000	690,000	780
Garden Valley alternative segment 8	1,160,000	840,000	800
Caliente common segment 2	1,560,000	680,000	1,000
South Reveille alternative segment 2	660,000	290,000	360
South Reveille alternative segment 3	430,000	190,000	420
Caliente common segment 3	3,050,000	2,530,000	2,400
Goldfield alternative segment 1	4,010,000	2,540,000	1,100
Goldfield alternative segment 3	3,000,000	5,900,000	1,200
Goldfield alternative segment 4	2,450,000	4,360,000	1,200
Caliente common segment 4	300,000	260,000	250
Bonnie Claire alternative segment 2	600,000	1,240,000	470
Bonnie Claire alternative segment 3	310,000	920,000	460
Common segment 5	590,000	1,320,000	770
Oasis Valley alternative segment 1	66,000	720,000	240
Oasis Valley alternative segment 3	160,000	1,340,000	320
Common segment 6	7,690,000	3,850,000	1,300

a. Sources: DIRS 180916-Nevada Rail Partners 2007, Appendix E; DIRS 182825-Nevada Rail Partners 2007, Appendix B.
b. Numbers are rounded to two significant figures or three significant figures if the number is more than 1 million.
c. To convert cubic yards to cubic meters, multiply by 0.76456.
d. To convert acres to square kilometers, multiply by 0.0040469.

Table 2-25. Construction disturbance – Mina rail alignment.[a,b] (page 1 of 2)

Rail line segment	Earthwork: cut (cubic yards)[c]	Earthwork: fill (cubic yards)	Surface area disturbed (acres)[d]
Department of Defense Branchline North	0.0	56,000	40
Schurz alternative segment 1	1,630,000	2,010,000	1,100
Schurz alternative segment 4	4,570,000	5,660,000	1,500
Schurz alternative segment 5	8,350,000	6,350,000	1,700
Schurz alternative segment 6	6,310,000	8,960,000	1,600
Department of Defense Branchline South	0.0	56,000	40
Mina common segment 1	920,000	6,740,000	2,500
Montezuma alternative segment 1	6,280,000	9,950,000	2,700
Montezuma alternative segment 2	3,010,000	5,900,000	2,400
Montezuma alternative segment 3	4,770,000	5,030,000	3,000
Mina common segment 2	0.0	130,000	70
Bonnie Claire alternative segment 2	600,000	1,240,000	470
Bonnie Claire alternative segment 3	310,000	920,000	460

Table 2-25. Construction disturbance – Mina rail alignment.[a,b] (page 2 of 2)

Rail line segment	Earthwork: cut (cubic yards)[c]	Earthwork: fill (cubic yards)	Surface area disturbed (acres)[d]
Bonnie Claire alternative segment 3	310,000	920,000	460
Common segment 5	590,000	1,320,000	770
Oasis Valley alternative segment 1	66,000	720,000	240
Oasis Valley alternative segment 3	160,000	1,340,000	320
Common segment 6	7,690,000	3,850,000	1,300

a. Sources: DIRS 180874-Nevada Rail Partners 2007, Appendix B; DIRS 180916-Nevada Rail Partners 2007, Appendix E; DIRS 182825-Nevada Rail Partners 2007, Appendix B.
b. Numbers are rounded to two significant figures or three significant figures if the number is more than 1 million.
c. To convert cubic yards to cubic meters, multiply by 0.76456.
d. To convert acres to square kilometers, multiply by 0.0040469.

accommodate a fiber-optic line that would be the backbone for a signals and communication system for the railroad (as discussed in Section 2.2.2.9). This trench could be encased in concrete when further protection was needed. Bridge crossings would be accomplished by attaching a conduit for the distribution line to the bridge. Power to the distribution system would be fed from five locations where existing high-voltage transmission lines intersected the rail alignment. At these intersections, DOE would construct electric substations to feed the 25-kilovolt distribution line from the 115-kilovolt and/or 138-kilovolt transmission lines inside the construction right-of-way. These substations would occupy a fenced area of 15-by-15 meters (50-by-50 feet). Along the Mina rail alignment, the underground distribution line would be buried along existing Department of Defense Branchlines North and South. This underground distribution line could be considered as existing in sections, each end being fed at 25-kilovolts from a substation from each transmission-line intersection. If more transmission-line intersections were later identified beyond the five initially planned, shorter sections (under 80 kilometers [50 miles]) and lower line losses would allow a lower operating voltage of 13.5 kilovolts to become feasible. A 13.5-kilovolt distribution line would be more desirable from engineering and cost perspectives. Where DOE needed power to operate railroad systems, the Department would place step-down transformers trackside within 3-by-3 meter (10-by-10 foot) fenced areas.

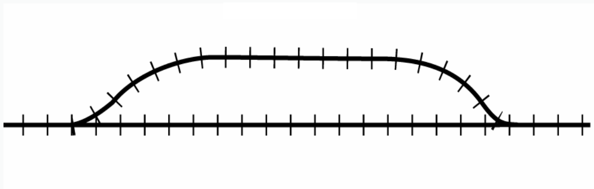
2.2.2.8 Track Construction

Under the Caliente Implementing Alternative, track construction would begin at the start of the proposed railroad near Caliente and move west and then south along the rail alignment until it reached the Rail Equipment Maintenance Yard. Under the Mina Implementing Alternative, track construction would begin near Wabuska and move south until it reached the Rail Equipment Maintenance Yard.

Track construction would consist of placing concrete ties, rail, and ballast on top of the rail roadbed. First, concrete ties would be placed on the subballast; then DOE would use special rail equipment to unload and secure 440-meter (1,440-foot) rail strings onto the concrete ties with rail fasteners; and finally, DOE would unload ballast from rail ballast cars and dump the ballast evenly on the skeleton track in successive passes. The Department would use special equipment to raise and line the track with 7 to 10 centimeters (3 to 4 inches) of ballast on successive passes until the total depth of the ballast was a minimum of 30 centimeters (12 inches) under the ties (DIRS 180922-Nevada Rail Partners 2007, pp. 7-1 and 7-2). Figure 2-37 shows a typical cross section of the rail and underlying rail roadbed.

Along both the Caliente and Mina rail alignments, DOE would construct sidings approximately every 40 kilometers (25 miles) so that trains running in opposite directions could pass one another. This spacing would result in approximately 12 sidings along the rail line.

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.



Sidings would be placed inside the operations right-of-way (nominally 61 meters [200 feet] on either side of the rail line centerline). Under the Caliente Implementing Alternative, sidings would range in length from approximately 2,100 to 3,700 meters (7,000 to 12,000 feet) (DIRS 180922-Nevada Rail Partners 2007, p. 2-3). Under the Mina Implementing Alternative, sidings would range in length from 2,100 to 5,800 meters (7,000 to 19,000 feet). In both cases, sidings would be designed to accommodate a maximum train length of 1,700 meters (5,500 feet). Along the Mina rail alignment, DOE would also install sidings along existing Department of Defense Branchlines North and South.

In some locations in Garden Valley where the presence of the newly constructed rail line would be incompatible with BLM management objectives for visual resources, DOE could construct low, rolling, earthwork berms with soils and vegetation that match the surroundings to mask the linear track from viewers.

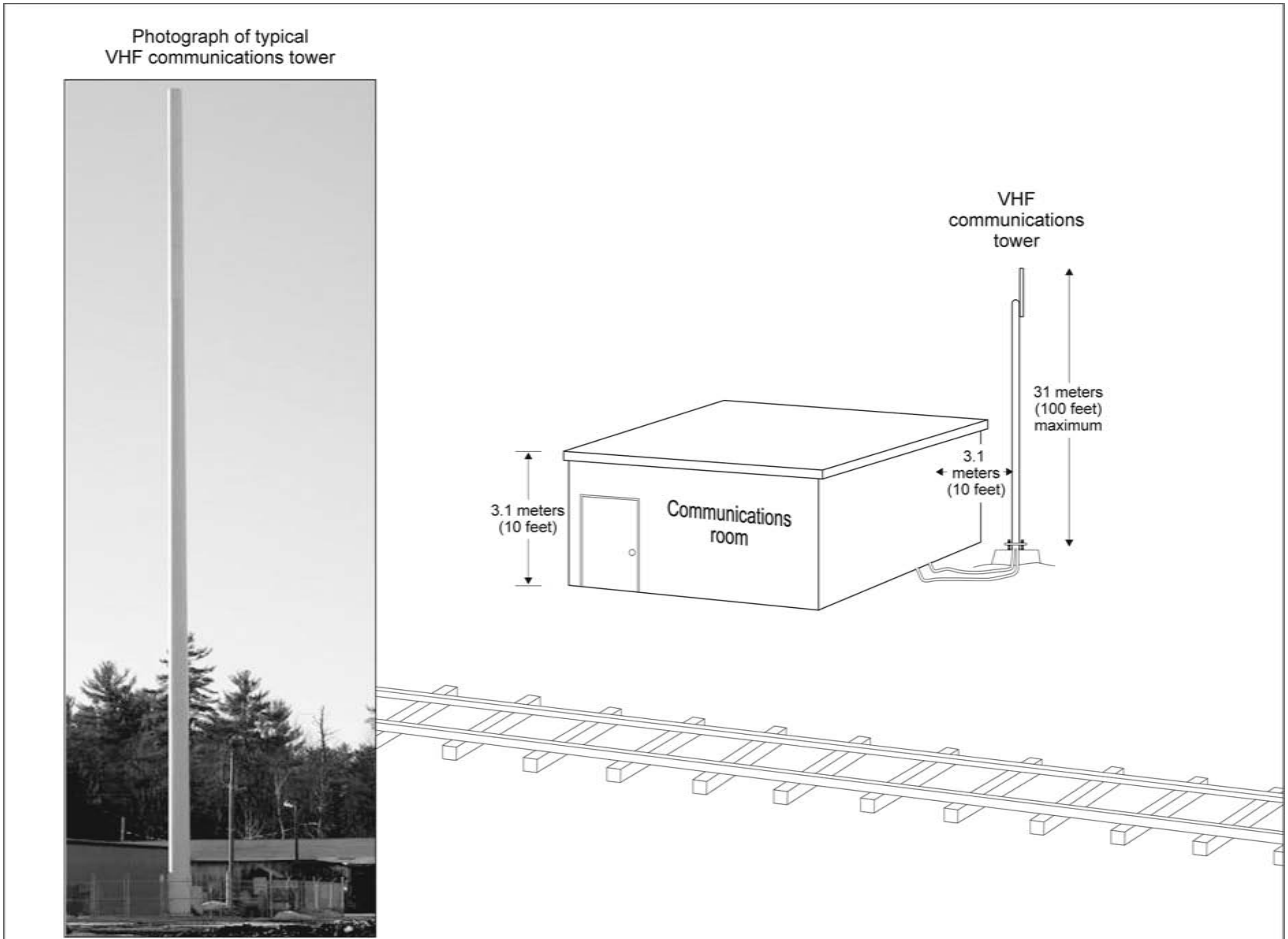
2.2.2.9 Signals and Communications Construction

Along both the Caliente and Mina rail alignments, DOE would install a communications system utilizing a fiber-optic communications cable, very-high-frequency (VHF) radio, satellite radios, and possibly satellite or cellular telephones. These systems would facilitate communications between the train operator, the Nevada Railroad Control Center (see Section 2.2.3.1.3), maintenance personnel, and ***signal blocks***. The backbone of the communications system would be the fiber-optic communications cable. This cable, which would be buried along the entire length of the rail line, would provide a common high-speed communication medium for communications applications and the control systems. To ensure continuous communications along the entire length of the Mina rail alignment, DOE would also bury this cable along existing Department of Defense Branchlines North and South.

DOE would position communications towers at the beginning, end, and approximately every 16 to 32 kilometers (10 to 20 miles) along the rail line. These towers would be approximately 23 to 30 meters (75 to 100 feet) tall, would be fenced, and would enable VHF radio communication between railroad personnel working in remote locations along the rail line. Figure 2-39 shows an example of a typical remote communications facility (DIRS 182826-Nevada Rail Partners 2007, Section 6.0).

In the case of a complete failure of the VHF radio communications system, communications would continue through a dispatch radio system utilizing satellite radios. DOE would install these backup systems in maintenance equipment, in its locomotives, and at the Nevada Railroad Control Center. In addition, DOE is considering outfitting all relevant personnel with satellite telephones, which would allow communication to continue if both the VHF and satellite radio systems failed.

DOE would use a railroad control signaling system to maintain safe train separation during operation of the proposed railroad. The proposed centralized traffic control system is a typical railroad system that uses electronic track circuits to control signal blocks and authorize train movements. DOE would install 4.6-meter (15-foot)-tall ***wayside signals*** along the rail line to control train movements. At ***at-grade crossings*** with paved public roadways, DOE would install active warning devices in the form of flashing lights, gates, and barriers. At at-grade crossings with unpaved roadways and private crossings, DOE would install passive warning devices (signs only). In addition, the signaling system would have the



Notes: VHF = very high frequency.

Not to scale.

Source: Modified from DIRS 182826-Nevada Rail Partners 2007, pp. 6-5 and 6-6.

Figure 2-39. An example of a typical remote communications facility.

capability to warn the train operators about broken rails, rockslides, and certain equipment defects (DIRS 182826-Nevada Rail Partners 2007, Section 6.0).

2.2.2.10 Restoration of Areas Disturbed During Construction

Under the Caliente Implementing Alternative, DOE would construct the railroad in accordance with BLM rights-of-way; under the Mina Implementing Alternative, DOE would construct the railroad in accordance with BLM and/or Bureau of Indian Affairs rights-of-way. During and following construction, DOE would implement a program to:

- Identify the methods of restoration required on lands disturbed during the construction phase
- Restore and revegetate disturbed lands not required for railroad operations
- Monitor restoration programs and remediate revegetated areas as required

This program would meet DOE and BLM requirements for the restoration of disturbed sites. As part of the program, DOE would conduct reclamation inventories and develop site-specific restoration plans prior to construction. These plans would include recommendations for topsoil salvage depth, topsoil stockpile placement and stabilization, vegetation salvation, recontouring, and use of native seed mixes. DOE would stockpile topsoil onsite and manage it to prevent erosion and maintain soil viability, as appropriate. The removal of cacti and yucca without permission of the landowner, if prohibited, and the removal for commercial purposes, is regulated by the State of Nevada (Nevada Revised Statutes 527.060 through 527.120 and Nevada Administrative Code 527.500). Cacti and yucca would be salvaged for replanting pursuant to BLM protocols for land reclamation. Restored sites would be monitored periodically to evaluate soil erosion, the presence of invasive species, and the abundance of native plants.

An associated program would be implemented to prevent the spread of noxious and other invasive weeds during construction and operation of the railroad. An inventory of noxious and invasive weeds would be conducted prior to construction as part of the development of this program. Weeds would be controlled on disturbed and reclaimed sites as necessary using mechanical and chemical methods throughout construction and operation of the railroad.

2.2.2.11 Commissioning of Train Operations

The final step in railroad construction would be the commissioning of train operations. Each time a section of the track was completed and the signals and communications systems installed and tested, integrated testing would commence utilizing train equipment to validate that all components were operating as designed. Successful testing would result in final jurisdictional inspection and commissioning of the railroad for normal operations by the appropriate regulatory body.

2.2.3 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 Yucca Mountain. DOE would operate and maintain the railroad in accordance with applicable regulations, guidelines, and standards of the Federal Railroad Administration, the Union Pacific Railroad, and the Association of American Railroads.

Operation of the proposed railroad would begin immediately after construction was completed. At that time, the railroad would be available to deliver materials to support construction of the repository. Maintenance of the proposed railroad would be an ongoing process that would be concurrent with the operations phase of both the railroad and the repository. Following the final shipment of spent nuclear fuel, high-level radioactive waste, and other materials to the repository, DOE could abandon the railroad (including its facilities) (see Section 2.2.5) or could make them available to local communities or the private sector for other uses.

Unless otherwise noted, all descriptions of railroad operations and maintenance activities apply to both the Caliente and Mina rail alignments.

2.2.3.1 Railroad Operations

The proposed railroad would operate dedicated trains carrying spent nuclear fuel and high-level radioactive waste and trains carrying other materials, which could include construction materials, diesel fuel, and repository equipment. During the operations phase, DOE would use the railroad 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. The frequency of trains going to the repository would vary slightly, but would average 17 one-way trains per week (see Table 2-4) (calculated from DIRS 175036-BSC 2005, Table 4.2).

Under the Mina Implementing Alternative, the region-of-influence for analyses of potential impacts on ***air quality***, noise and vibration, socioeconomics, and occupational and public health and safety would include railroad operations along the Mina rail alignment and the existing Union Pacific Railroad Hazen Branchline (that is, the entire length of the rail line from Hazen to Yucca Mountain). At present, the Union Pacific Railroad and the Department of Defense operate a few trains per week along the existing branchlines. This rail traffic would continue after DOE constructed the proposed railroad. From Hazen to Wabuska, there are approximately four one-way Union Pacific Railroad trains per week that operate on the Hazen Branchline. From Hazen to Hawthorne, there are approximately four one-way Department of Defense trains per week that operate on the Hazen Branchline and the Department of Defense Branchlines (DIRS 180154-Sullivan 2007, all).

2.2.3.1.1 Operation of Spent Nuclear Fuel and High-Level Radioactive Waste Trains

Under the Proposed Action, Union Pacific Railroad trains carrying casks of spent nuclear fuel and high-level radioactive waste would arrive in Nevada via the Union Pacific Railroad Mainline and would proceed directly to the Staging Yard (see Section 2.2.4.1.1.2 [Caliente rail alignment] and Section 2.2.4.2.1 [Mina rail alignment]). Under the Caliente Implementing Alternative, trains would arrive at the proposed railroad 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 via the Union Pacific Railroad Hazen Branchline, the Department of Defense Branchline North, one of the Schurz alternative segments, and the Department of Defense Branchline South.

A **buffer car** is a railcar that would be placed at the front of a cask train between the locomotive and the first cask car and at the back of the train between the last cask car and the escort car.

A **cask car** is a railcar that would be used to transport casks of spent nuclear fuel or high-level radioactive waste.

An **escort car** is a passenger car that would carry security personnel.

Once at the Staging Yard, Union Pacific Railroad locomotives would uncouple from cask cars and return to the mainline. The cask cars would be inspected in accordance with Federal Railroad Administration regulations (49 CFR Part 232 and 49 CFR Part 215). Qualified inspectors would conduct all inspections, which would include an inspection of the suspension system, car body, draft system, air brakes, and wheels. DOE would maintain records of these inspections. Following completion of the inspections, cask cars would be coupled to dedicated railroad cask trains (DIRS 182826-Nevada Rail Partners 2007, Section 7.2).

The dedicated cask trains on the proposed railroad would 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. A typical ***DOE spent nuclear fuel***/high-level radioactive waste train carrying three loaded cask cars would weigh approximately 1,300 metric tons (1,400 tons) (see Table 2-26) (DIRS 182826-Nevada Rail Partners 2007, Section 4.3). Figure 2-40 shows an artist's conception of a repository train. 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.

Following the inspection process and the assembly of dedicated cask trains, trains would depart the Staging Yard and proceed along the proposed railroad to the Rail Equipment Maintenance Yard (see Section 2.2.4.3.1). In accordance with U.S. Department of Transportation regulations (49 CFR 174.14) railcars with spent nuclear fuel or high-level radioactive waste casks would have to be moved within 48 hours of arriving at the Staging Yard (DIRS 182826-Nevada Rail Partners 2007, Section 5.1).

Trains would require fewer than 10 hours for the trip between the Staging Yard and the Rail Equipment Maintenance Yard (DIRS 182826-Nevada Rail Partners 2007, Section 5.1). The federal hours-of-service regulations (49 CFR Part 228) limit train and engine crews to 12 hours on duty. If the trip were to exceed 12 hours, a crew-change point and local crew-welfare arrangements would be required. Although 49 CFR Part 228 would not apply to the Proposed Action, DOE would adopt the regulation's policies regarding a crew's maximum hours on duty.

The Rail Equipment Maintenance Yard would serve as the termination point of the proposed railroad and the staging area for delivery of loaded cask cars to be accepted at the Yucca Mountain Repository. Once at the Rail Equipment Maintenance Yard, casks would be transferred to the geologic repository operations area for removal of the spent nuclear fuel or high-level radioactive waste. A railroad crew would bring cask cars from the Rail Equipment Maintenance Yard to the boundary of the geologic repository operations area. After casks were unloaded at the repository, the empty casks would be transferred back to railroad control. Before casks were returned to the Staging Yard for shipment where needed to sites across the United States, the empty casks might be sent to the Cask Maintenance Facility (see Section 2.2.4.3.2). Cask Maintenance Facility personnel would perform testing, inspections, maintenance, minor decontamination, and routine repair of the casks.

Sections 3.2.10 and 4.2.10 (Caliente rail alignment) and 3.3.10 and 4.3.10 (Mina rail alignment), Occupational and Public Health and Safety, discuss the ***affected environment*** and potential occupational health and safety impacts for operation of the Cask Maintenance Facility. DOE would ensure worker radiological health and safety by maintaining compliance with the requirements outlined in 10 CFR 835 and/or 10 CFR 20. Chapter 6 discusses regulations that would apply to the Cask Maintenance Facility.

2.2.3.1.2 Operation of Trains Carrying Other Materials

Under the Caliente Implementing Alternative, freight trains carrying construction and other materials (such as fuel oil and empty ***waste packages***) would arrive in Nevada via the Union Pacific Railroad Mainline and proceed directly to the Interchange Yard (see Section 2.2.4.1.1.1). Once at the Interchange Yard, Union Pacific Railroad locomotives would uncouple from their freight cars on the interchange tracks and continue on their route. Locomotives would move from the Staging Yard to the Interchange Yard, be coupled with the freight cars, and train crews would bring them to the Staging Yard for further administrative processing and inspection. From the Staging Yard, locomotives would transport the

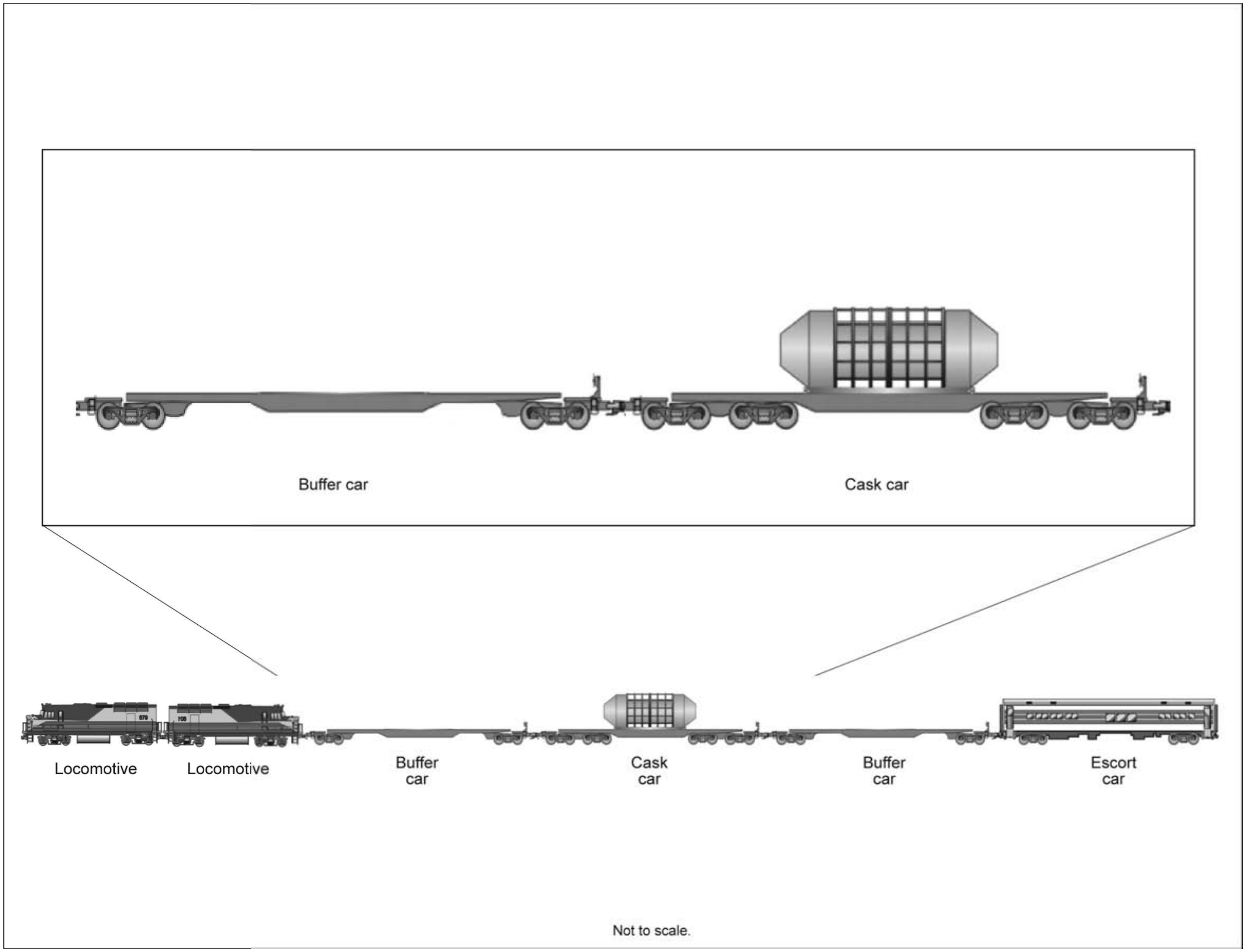


Figure 2-40. Artist's conception of a repository train carrying one cask.

Table 2-26. Train components, weights, and lengths.[a]

Component	Weight (tons)[b]	Length (feet)[c]	Number
Locomotive (DOE and Navy)	154 to 198	76	2 to 3
DOE cask and cask car	264	59 to 89	1 to 5
Naval cask and cask car	390	59 to 89	1 to 12
Buffer car (DOE and Navy)	79	59[d]	2
Escort car (DOE and Navy)	79 to 131	79[e]	DOE trains: 1 Navy trains: 1 to 2

a. Source: DIRS 182826-Nevada Rail Partners 2007, Section 5.2.2.
b. To convert tons to metric tons, multiply by 0.90718.
c. To convert feet to meters, multiply by 0.3048.
d. Buffer cars could be up to 76 feet long, but as analyzed in this Rail Alignment EIS, are assumed to be 59 feet long.
e. Escort cars could range in length from 59 to 85 feet long, but as analyzed in this Rail Alignment EIS, are assumed to be 79 feet long.

materials along the rail line to the Rail Equipment Maintenance Yard. Railcars for return to the Union Pacific Railroad would be handled in the reverse order (DIRS 182826-Nevada Rail Partners 2007, Section 5.0).

Under the Mina Implementing Alternative, freight trains carrying construction and other materials would arrive in Nevada via the Union Pacific Railroad Mainline and proceed to the Staging Yard at Hawthorne via the Union Pacific Railroad Hazen Branchline, Department of Defense Branchline North, one of the Schurz alternative segments, and Department of Defense Branchline South. DOE does not plan a separate Interchange Yard along the Mina rail alignment because there is enough space to house the interchange tracks and the Staging Yard in the same location. Once at the Staging Yard, casks would go through administrative processing and inspection. From the Staging Yard, locomotives would transport the materials along the rail line to the Rail Equipment Maintenance Yard.

The same level of security necessary for railcars carrying spent nuclear fuel or high-level radioactive waste would not be necessary for railcars carrying construction or other materials. Therefore, no escort cars would be required for trains transporting construction or other materials.

2.2.3.1.3 Coordination of Shipments

The Nevada Railroad Control Center, in coordination with the DOE National Transportation Operations Center, would control the operation of the proposed railroad. Both of these facilities would be either at the Rail Equipment Maintenance Yard (see Section 2.2.4.3.1) or at the Staging Yard (see Section 2.2.4.1.1.2 [Caliente rail alignment] and Section 2.2.4.2.1 [Mina rail alignment]). The National Transportation Operations Center would oversee the shipment of casks from sites throughout the United States to the proposed railroad. All train movements, rail operations, and emergency response operations along the proposed railroad would be coordinated from the Nevada Railroad Control Center, which would have a link to both the National Transportation Operations Center and the geologic repository operations area. Section 2.2.4.3.3 describes the Nevada Railroad Control Center and the Nation Transportation Operations Center in more detail (DIRS 182826-Nevada Rail Partners 2007, Section 6.1).

DOE would use a satellite-based transportation tracking and communication system to track rail shipments of spent nuclear fuel and high-level radioactive waste to the repository. This system would provide government personnel (for example, DOE, Nuclear Regulatory Commission, and state and tribal governments) with information about shipments to the repository and would enable routine communications between government escorts accompanying shipments and the National Transportation Operations Center (DIRS 182826-Nevada Rail Partners 2007, Section 6.1). Communications between government escorts accompanying shipments, the National Transportation Operations Center, and rail carriers handling the shipments would occur in a variety of ways, as required in support of normal operations and in response to off-normal or emergency situations.

2.2.3.1.4 Coordination with State and Local Governments

Under Nuclear Regulatory Commission interim guidance, NUREG 0561, *Requirements for Physical Protection of Irradiated Reactor Fuel in Transit* (10 CFR 73.37), DOE would make available to state governors specific information about shipments, such as departure times and locations during travel.

Section 180(c) of the Nuclear Waste Policy Act (NWPA, as amended [42 U.S.C. 10101]) requires DOE to provide technical assistance and funding to states and American Indian tribes for training public safety officials and tribes in jurisdictions through which it plans to transport spent nuclear fuel and high-level radioactive waste. The training, including drills and exercises, would include procedures for the safe routine transportation of these materials, and ***accident*** and emergency response procedures. DOE would provide carriers with shipping papers containing emergency information, including contacts and telephone numbers, which would be readily available during transport for inspection by appropriate officials, and would provide clearly identifiable markings, labels, and placards of hazardous contents.

DOE is developing the policy and procedures for implementing this assistance and would institute these plans before it began shipments to the repository. In the event of an incident involving a shipment of spent nuclear fuel or high-level radioactive waste, the dispatcher in the Nevada Railroad Control Center would notify local authorities and the National Transportation Operations Center.

Chapter 6 provides a more detailed description of applicable laws and regulations.

2.2.3.2 Maintenance

2.2.3.2.1 Railroad Maintenance

Under the Caliente implementing alternative, if the Department constructed Goldfield alternative segment 1 or 3, most of the maintenance and inspections required to operate a safe and reliable railroad would be performed out of the Maintenance-of-Way Facilities, which consist of the Maintenance-of-Way Trackside Facility (see Section 2.2.4.1.2.1), Maintenance-of-Way Headquarters Facility (see Section 2.2.4.1.2.2), and two Satellite Maintenance-of-Way Facilities (see Section 2.2.4.1.2.3), Staff at the headquarters facility would plan and schedule all maintenance and inspection activities originating from the trackside and satellite facilities in coordination with the Nevada Railroad Control Center. Maintenance activities would be scheduled to minimize the impact on planned train movements (DIRS 182826-Nevada Rail Partners 2007, Section 10.0).

The Maintenance-of-Way Trackside Facility would serve as the base of operations for most maintenance activities on the proposed railroad. The two Satellite Maintenance-of-Way Facilities, which would be located at the Staging Yard and the Rail Equipment Maintenance Yard, would be the dispatch points for routine maintenance along the first third (in the case of the Staging Yard location) and the final third (in the case of the Rail Equipment Maintenance Yard location) portions of the rail line. The primary maintenance and inspection functions of these facilities would include track inspection; signal testing and inspection; minor rail, tie, and turnout replacement; and routine ballasting and surfacing tasks. Additional maintenance to be performed on an as-needed basis would include:

- Ultrasonic rail testing (performed annually) to detect internal flaws such as cracks in the rail
- Rail grinding to maintain the structural integrity of the rail, reduce noise, and prevent wear and tear to the trains

- Weed and brush control (annually or as needed)
- Vehicle and equipment maintenance (as needed)
- Track surfacing (as needed) to maintain a level and aligned track

Maintenance crews would access the work area using ***hi-rail trucks***, rail mounted machinery (such as a tamper or track liner), or maintenance trains, all of which would originate from the Maintenance-of-Way Headquarters Facility, the Maintenance-of-Way Trackside Facility, or one of the two Satellite Maintenance-of-Way Facilities. During rail line construction, DOE would install an unpaved service road parallel to the rail line inside the construction right-of-way. The Department would leave this rail alignment service road in place to provide additional access to the rail line for maintenance and emergency response, and to act as a firebreak. Because all maintenance would be performed using on-rail vehicles or trains, no bridges would need to be constructed for the service road (DIRS 182826-Nevada Rail Partners 2007, Section 10.0).

In the case of a maintenance train dispatched for activities that would extend for more than 1 day, the maintenance train would be moved to the nearest siding to allow line traffic to pass. Slow-order running (that is, reduced speed limit) could be necessary for the trains running through the area undergoing track maintenance. Maintenance trains might consist of a locomotive and crew cars with provisions, and human habitability systems, such as toilets. Power for lighting, cooling, and refrigeration would be provided from the locomotive; external lighting and equipment would be powered using diesel generators (DIRS 182826-Nevada Rail Partners 2007, Section 10.0).

DOE would implement an asset protection program based on American Railway Engineering and Maintenance-of-Way Association guidelines and industry practices. Examples include:

- Detectors to determine if any wheel bearings are overheating, which could cause the train to derail.
- Impact detectors to indicate that a wheel is warped or has flat spots. Wheels having these defects can shatter or damage miles of rail due to excessive impacts.
- Dragging-detection equipment to indicate if objects are dragging under the train, which could damage the track structure.

In addition to maintenance activities, the staff at the Maintenance-of-Way Headquarters Facility would be responsible for responding to any minor rail accident or derailment. They would coordinate response activities to recover locomotives, railcars, casks, or other equipment that might have derailed. In the event of an accident requiring additional capability, an outside contractor would be retained to assist with any repair or recovery activities (DIRS 182826-Nevada Rail Partners 2007, Section 10.0).

If the Department were to construct Goldfield alternative segment 4, the functionalities described above for the Maintenance-of-Way Trackside Facility and the Maintenance-of-Way Headquarters Facility would be combined and housed in a single Maintenance-of-Way Facility. All maintenance activities would be performed out of this facility and two Satellite Maintenance-of-Way Facilities, one at the Staging Yard and one at the Rail Equipment Maintenance Yard.

> **Hi-rail trucks** are vehicles capable of traveling on roads or on railroad tracks.

Under the Mina Implementing Alternative, the functionalities described above for the Maintenance-of-Way Trackside Facility and the Maintenance-of-Way Headquarters Facility would be combined and housed in a single Maintenance-of-Way Facility. All maintenance activities would be performed out of this facility and two Satellite Maintenance-of-Way Facilities, one at the Staging Yard and one at the Rail

Equipment Maintenance Yard. Maintenance activities along the Mina rail alignment would include maintaining the existing Department of Defense Branchlines as needed (DIRS 180876-Nevada Rail Partners 2007, Section 10.0).

2.2.3.2.2 Maintenance of the Fleet of Locomotives and Railcars

Locomotive maintenance would be an ongoing activity that would occur at the locomotive light repair shop at the Rail Equipment Maintenance Yard. This facility would be responsible for servicing, cleaning, fueling, washing, inspecting, provisioning, and maintaining locomotives and buffer cars. Heavy repair of locomotives would be performed, on a scheduled basis and for any major breakdowns, at an off-site commercial locomotive repair facility. Escort cars would be maintained at the escort car service shop, which would be at the Rail Equipment Maintenance Yard. This facility would be responsible for cleaning the cars, restocking supplies, and servicing toilets. Cask cars and buffer cars would be maintained at the Rail Equipment Maintenance Yard.

2.2.4 RAILROAD OPERATIONS SUPPORT FACILITIES

The Proposed Action includes the construction and operation of several facilities that would be required for operation of the proposed railroad. Under the Caliente Implementing Alternative, these would include, as described in Table 2-27 and shown in Figure 2-41:

- Facilities at the Interface with the Union Pacific Railroad Mainline (Staging and Interchange Yards)
- Maintenance-of-Way Facility:
  - Maintenance-of-Way Headquarters Facility and Maintenance-of-Way Trackside Facility (if Goldfield alternative segment 1 or 3 is selected)
  - Maintenance-of-Way Trackside Facility (if Goldfield alternative segment 4 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, as described in Table 2-27 and shown in Figure 2-42:

- Staging 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

For both the Caliente and Mina rail alignments, the Rail Equipment Maintenance Yard would be in the same location and would have the same functions.

Sections 2.2.4.1 and 2.2.4.2 describe the functions, sizes, and possible locations of these facilities along the Caliente and Mina rail alignments. The locations analyzed for each facility were chosen based primarily on finding a location that best suited the operational characteristics of each facility after considering environmental avoidance criteria (for example, floodplains). A secondary consideration was locating the facility close to existing public roads for ease of access. DOE would construct these facilities at the same time it is constructing the rail line, and would coordinate facilities construction with rail line

Table 2-27. 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 (see Section 2.2.4.1)			
Facilities at the Interface with the Union Pacific Railroad Mainline (see Section 2.2.4.1.1)			
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 cask trains and other materials delivered to the proposed railroad from around the country	50 (including employees for the Nevada Railroad Control Center and National Transportation Operations Center if at the Staging Yard)
Maintenance-of-Way Facilities (see Section 2.2.4.1.2)			
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	Staging Yard and Rail Equipment Maintenance Yard Lincoln County and Nye County	Dispatch point for maintenance activities along the first third and final third of the rail line	0 (employees housed at the Maintenance-of-Way Facility)
Facilities along the Mina rail alignment (see Section 2.2.4.2)			
Staging Yard	Mina common segment 1 near Hawthorne Mineral County	Handling point for the exchange of railcars containing construction and other materials between the Union Pacific Railroad and the proposed railroad Transfer point for casks and other materials delivered to the proposed railroad from around the country	40

Table 2-27. 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 (see Section 2.2.4.2) (continued)			
Maintenance-of-Way Facility	Montezuma alternative segment 1, Silver Peak option Montezuma alternative segments 2 and 3, Klondike option Esmeralda County	Coordination center and base of operations for all maintenance activities along the proposed railroad	40
Satellite Maintenance-of-Way Facility	Staging Yard and Rail Equipment Maintenance Yard Mineral County and Nye County	Dispatch point for maintenance activities along the first third and final third of the rail line	0 (employees based a the Maintenance-of-Way Facility)
Facilities common to both the Caliente and Mina rail alignments (see Section 2.2.4.3)			
Rail Equipment Maintenance Yard	Less than 1 mile south of the southern boundary of the geologic repository operations area Nye County	Termination point for the proposed railroad and the staging area for the delivery of loaded cask cars and other materials to the repository receiving and inspection area	40 (including employees for the Nevada Railroad Control Center and National Transportation Operations Center if located at the Rail Equipment Maintenance Yard)
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 (see Section 2.2.3)	Collocated with the Rail Equipment Maintenance Yard or the Staging Yard Nye County, Lincoln County, or Mineral County	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.

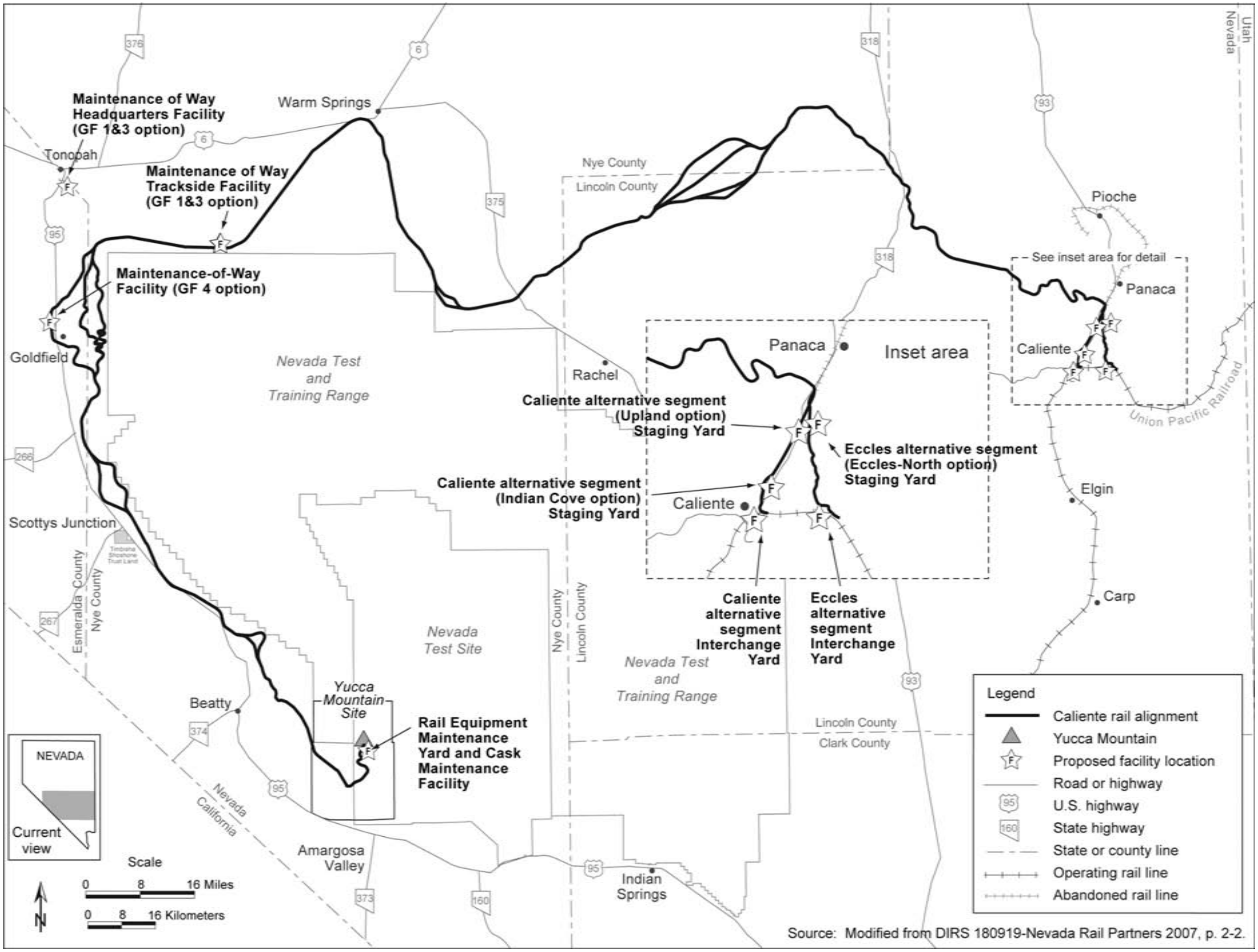


Figure 2-41. Proposed facilities along the Caliente rail alignment.

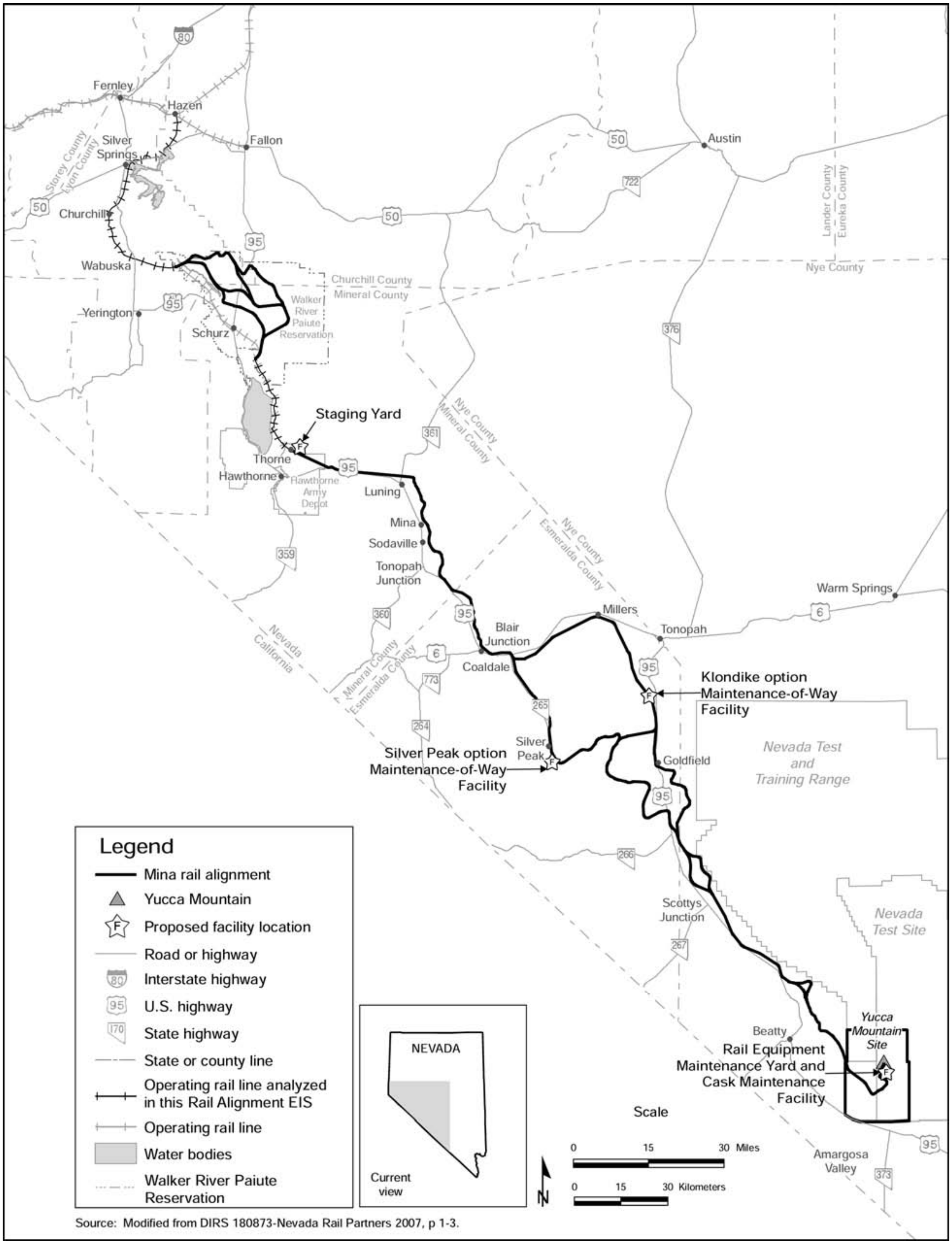


Figure 2-42. Proposed facilities along the Mina rail alignment.

construction. DOE would use typical heavy construction equipment and employ best management practices during construction of these railroad facilities.

2.2.4.1 Caliente Rail Alignment Facilities

2.2.4.1.1 Facilities at the Interface with the Union Pacific Railroad Mainline

2.2.4.1.1.1 Interchange Yard. The purpose of the Interchange Yard would be to allow the exchange of railcars containing construction and other materials between the Union Pacific Railroad and the proposed railroad. It would consist of three tracks constructed along the existing Union Pacific Railroad Mainline (DIRS 180919-Nevada Rail Partners 2007, p. 4-1). Under the Caliente Implementing Alternative, the Department would locate the Interchange Yard either at the beginning of the Eccles alternative segment (see Figure 2-43 and the Map Atlas [DIRS 185492-DOE 2008, Plate 2]) or the beginning of the Caliente alternative segment (see Figure 2-44 and the Map Atlas [DIRS 185492-DOE 2008, Plates 12 and 13]).

The Interchange Yard at Caliente would be in the City of Caliente across from the former Union Pacific Railroad Caliente station. The site is flat, open, and not occupied by any structures. Site preparation for the Interchange Yard at Caliente would be minimal.

The Interchange Yard at Eccles would be approximately 8 kilometers (5 miles) east of the City of Caliente. It would be constructed immediately adjacent to the Union Pacific Railroad Mainline within the confines of Clover Creek (DIRS 180919-Nevada Rail Partners 2007, p. 4-2). Clover Creek drains an area of about 970 square kilometers (240,000 acres) east of the site. Drainage through the site is from east to west, toward Meadow Valley and Caliente. Construction of the Interchange Yard at Eccles would require portions of Clover Creek to be filled to elevate the site out of the ***floodplain***. For construction of the interchange tracks, the fill would extend approximately 15 to 23 meters (50 to 75 feet) into the creek for a length of approximately 1,400 meters (4,600 feet) along the creek. For construction of the interchange siding, the fill would extend approximately 7.6 meters (25 feet) into the ***ephemeral creek*** bed for a length of approximately 900 meters (3,000 feet) on the east end and 600 meters (2,000 feet) on the west end of the interchange tracks. Dikes may also be placed in the creek bed to properly direct water and maintain the track embankment. DOE would perform this work in compliance with Section 404 of the Clean Water Act permitting requirements and all applicable federal and state regulations.

The conceptual design for the Interchange Yard includes a ***wye track,*** which would allow trains to change directions. The design for the Interchange Yard in Caliente includes such a wye track; however, at the site for the Eccles Interchange Yard, grades would prohibit construction of a wye track. If DOE selected the Eccles alternative segment, the wye track would have to be at the Eccles-North location for the Staging Yard (see Section 2.2.4.1.1.2).

2.2.4.1.1.2 Staging Yard. The Staging Yard would be used to hold cask cars and hold and sort cars containing construction and other materials for movement to the Rail Equipment Maintenance Yard. The Staging Yard would include a ***locomotive sanding area*** and fueling area, a maintenance warehouse, a Satellite Maintenance-of-Way Facility (see Section 2.2.4.1.2.3), and a yard office, which could serve as the location of the Nevada Railroad Control Center and National Transportation Operations Center (see Section 2.2.4.3.3). The Staging Yard would be one of the first facilities constructed and would serve as the staging area for materials to be used during the construction phase. When construction was complete, DOE would use this yard to support the shipment of supplies to Yucca Mountain (DIRS 180919-Nevada Rail Partners 2007, p. 5-2).

> A **wye track** is a triangular arrangement of tracks coming off of the mainline that allows a train or locomotive to safely turn around.

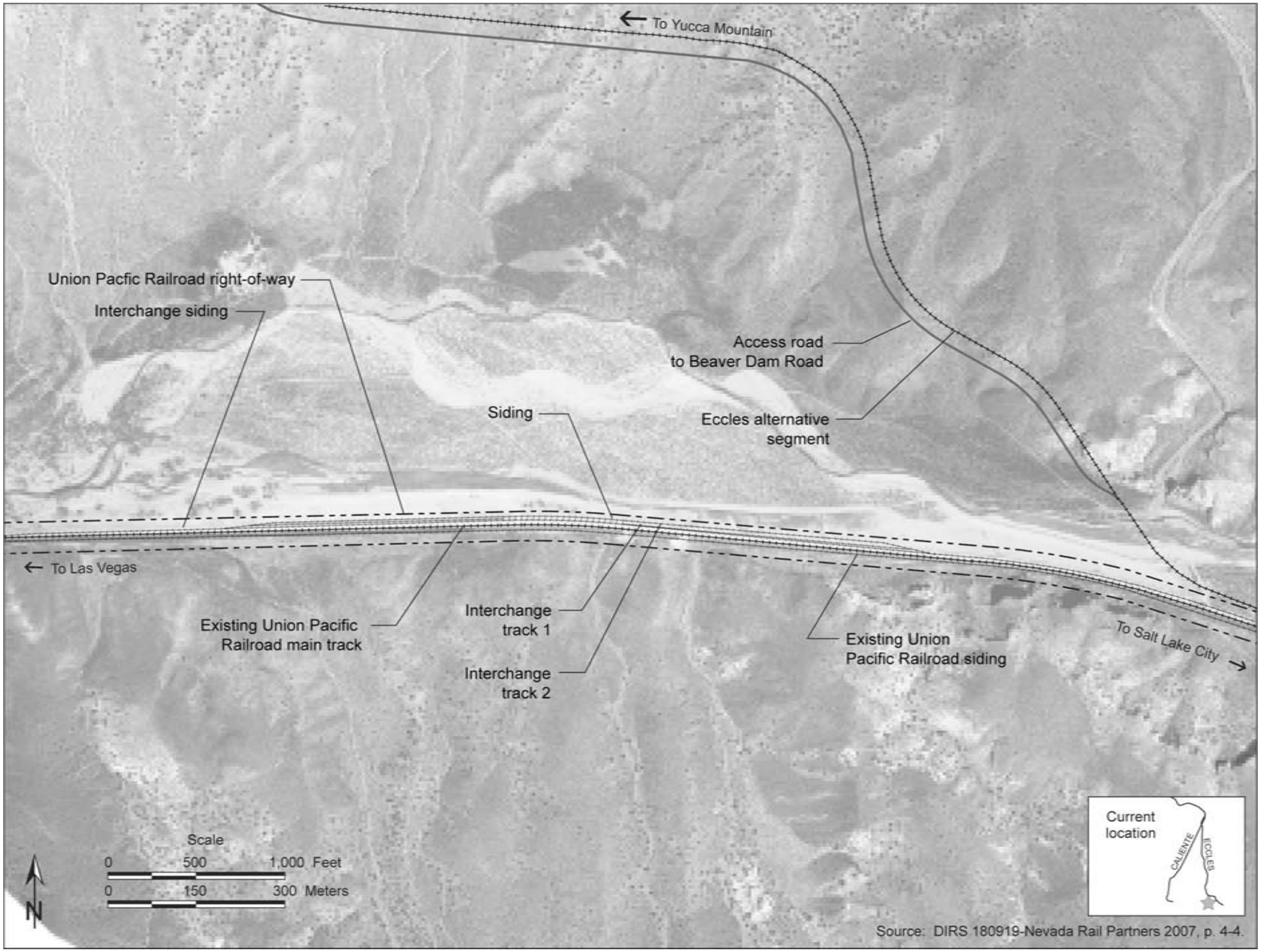
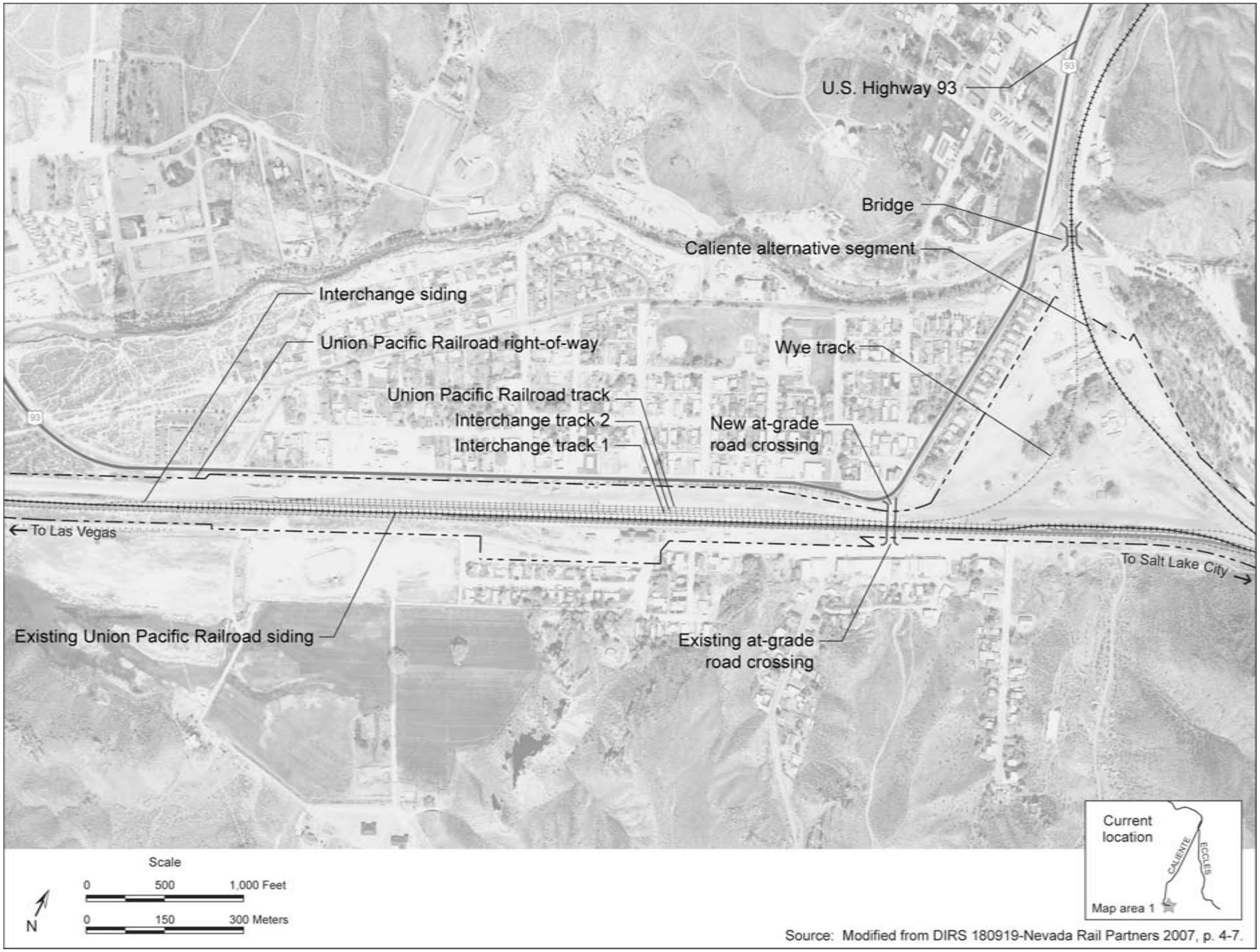


Figure 2-43. Interchange Yard – Eccles.



Source: Modified from DIRS 180919-Nevada Rail Partners 2007, p. 4-7.

Figure 2-44. Interchange Yard – Caliente.

DOE is considering three locations for the Staging Yard: two along the Caliente alternative segment (Indian Cove [Figure 2-45 and the Map Atlas [DIRS 185492-DOE 2008, Plates 3 and 4] and Upland [Figure 2-46 and the Map Atlas [DIRS 185492-DOE 2008, Plate 9]) and one along the Eccles alternative segment (Eccles-North [Figure 2-47 and the Map Atlas [DIRS 185492-DOE 2008, Plates 20 and 21]). DOE is considering these locations because of their proximity to the Union Pacific Railroad Mainline, proximity to a major road, and engineering feasibility. The Staging Yard would occupy approximately 0.20 square kilometer (50 acres).

The Staging Yard would have a normal power demand of 386 kilowatts (or 290 kilowatts without the Nevada Railroad Control Center and National Transportation Operations Center). DOE would build a substation connected to existing transmission lines to supply this power at the selected location for the Staging Yard, and would use diesel-powered backup generators. Approximately 21,000 liters (5,500 gallons) of water per day would be needed during the operations phase at the Staging Yard. These needs would be met by connecting to wells drilled during the construction phase. Approximately 21,000 liters (5,500 gallons) of wastewater per day would be generated at the Staging Yard. Wastewater disposal would be by local septic systems and leach fields (DIRS 180919-Nevada Rail Partners 2007, p. 5-4).

Operation of the Interchange Yard and the Staging Yard would require a workforce of approximately 50.

2.2.4.1.2 Maintenance-of-Way Facilities

Under the Caliente Implementing Alternative, the Department is analyzing two options for the Maintenance-of-Way Facility. If the Department were to construct Goldfield alternative segment 1 or Goldfield alternative segment 3, the functions of the Maintenance-of-Way Facility would be divided between a Maintenance-of-Way Headquarters Facility near Tonopah and a Maintenance-of-Way Trackside Facility along Caliente common segment 3. If the Department were to construct Goldfield alternative segment 4, all of the functions would be housed in a single Maintenance-of-Way Facility along Goldfield alternative segment 4.

2.2.4.1.2.1 Maintenance-of-Way Facility. If Goldfield alternative segment 4 was constructed, maintenance of track, bridges, culverts, grade crossings, signal equipment, communications equipment, and other wayside facilities and equipment would be performed from the Maintenance-of-Way Facility and two Satellite Maintenance-of-Way Facilities (DIRS 180919-Nevada Rail Partners 2007, p. 7-1).

The Maintenance-of-Way Facility would occupy approximately 0.06 square kilometer (15 acres) and would be located along Goldfield alternative segment 4, approximately 1.6 kilometers (1 mile) north of Goldfield (Figure 2-49a). The proposed location of this facility is shown in the Map Atlas (DIRS 185492-DOE 2008, Plates 335 to 337). It would consist of an administrative building, a warehouse for storage of spare parts and small tools, a parking area for hi-rail trucks needed for maintenance activities, and an outside storage area for heavy materials (for example, spare concrete ties, rail, and ballast) and large on-track track maintenance machines. The administrative building would house the maintenance organization supervisory and administrative staff.

Construction of the Maintenance-of-Way Facility would require closing approximately 1.6 kilometers (1 mile) of Esmeralda County Road CR-211, which is currently used to access the county landfill. Access to the landfill would be ensured by improving approximately 2.4 kilometers (1.5 miles) of Esmeralda County Road CR-212.

Water needs at the Maintenance-of-Way Facility could be met by tapping into the existing Goldfield municipal water system. Approximately 11,000 liters (3,000 gallons) of water per day would be required during the operations phase. Normal power demand would be approximately 484 kilowatts, which would be met by tying into nearby commercial electric-power distribution lines. In addition, electric power from the proposed railroad distribution line could be available for use, as would diesel-power standby generators. Approximately 11,000 liters (3,000 gallons) of wastewater per day would be generated at the Maintenance-of-Way Facility, which would be handled using new local septic systems and leach fields or by connecting to the existing Goldfield sewer system with an underground sewer line that would be constructed within the construction right-of-way.

Approximately 50 people would be employed at the Maintenance-of-Way Facility.

2.2.4.1.2.2 Maintenance-of-Way Facilities. If the Department were to construct Goldfield alternative segment 1 or Goldfield alternative segment 3, the functions of the Maintenance-of-Way Facility would be divided between a Maintenance-of-Way Headquarters Facility near Tonopah and a Maintenance-of-Way Trackside Facility along Caliente common segment 3.

Maintenance-of-Way Trackside Facility The Trackside Facility would occupy approximately 0.61 square kilometer (15 acres) and would consist of an administrative building, a warehouse for storage of spare parts and small tools, and an outside storage area for heavy materials (for example, spare concrete ties, rail, and ballast) and large on-track track maintenance machines. Figure 2-48 is a schematic of the Maintenance-of-Way Trackside Facility (DIRS 180919-Nevada Rail Partners 2007, p. 7-2); the proposed location of this facility is shown in the Map Atlas (DIRS 182843-ICF 2007, Part A, Plates 303 to 305).

The Trackside Facility would be located along Caliente common segment 3 approximately 48 kilometers (30 miles) southeast of Tonopah.

Water needs at the Maintenance-of-Way Trackside Facility would be met by using wells drilled during the construction phase. Approximately 9,500 liters (2,500 gallons) of water per day would be required during the operations phase. The Maintenance-of-Way Trackside Facility would have a normal power demand of 78 kilowatts, which would be met by tying into nearby commercial electric-power distribution lines. In addition, electric power from the proposed railroad distribution line could be available for use, as would diesel-power standby generators. Approximately 9,100 liters (2,400 gallons) of wastewater per day would be generated at the Trackside Facility, which would be disposed of using new, local septic systems and leach fields.

Approximately 40 people would be employed at the Maintenance-of-Way Trackside Facility.

Maintenance-of-Way Headquarters Facility The Maintenance-of-Way Headquarters Facility would occupy less than 0.013 square kilometer (3.2 acres) of land. This building would house the maintenance organization supervisory and administrative staff, have parking for hi-rail trucks needed for maintenance activities, and also have space for storage of spare parts, tools, and small track-maintenance machines. Figure 2-49 is a schematic of the Maintenance-of-Way Headquarters Facility (DIRS 180919-Nevada Rail Partners 2007, p. 7-2).

The Headquarters Facility would be located 8 kilometers (5 miles) south of Tonopah near the intersection of U.S. Highway 95 and U.S. Highway 6.

Water needs at the Maintenance-of-Way Headquarters Facility would be met by using water wells drilled during construction or supplied by a local municipality. Approximately 11,000 liters (3,000 gallons) of water per day would be required. The Maintenance-of-Way Headquarters Facility would have a normal power demand of 406 kilowatts, which would be met by tying into nearby commercial electric-power distribution lines. Approximately 2,300 liters (600 gallons) of wastewater per day would be generated at the Maintenance-of-Way Headquarters Facility, which would be disposed of using local septic systems and leach fields.

Approximately 10 people would be employed at the Maintenance-of-Way Headquarters Facility.

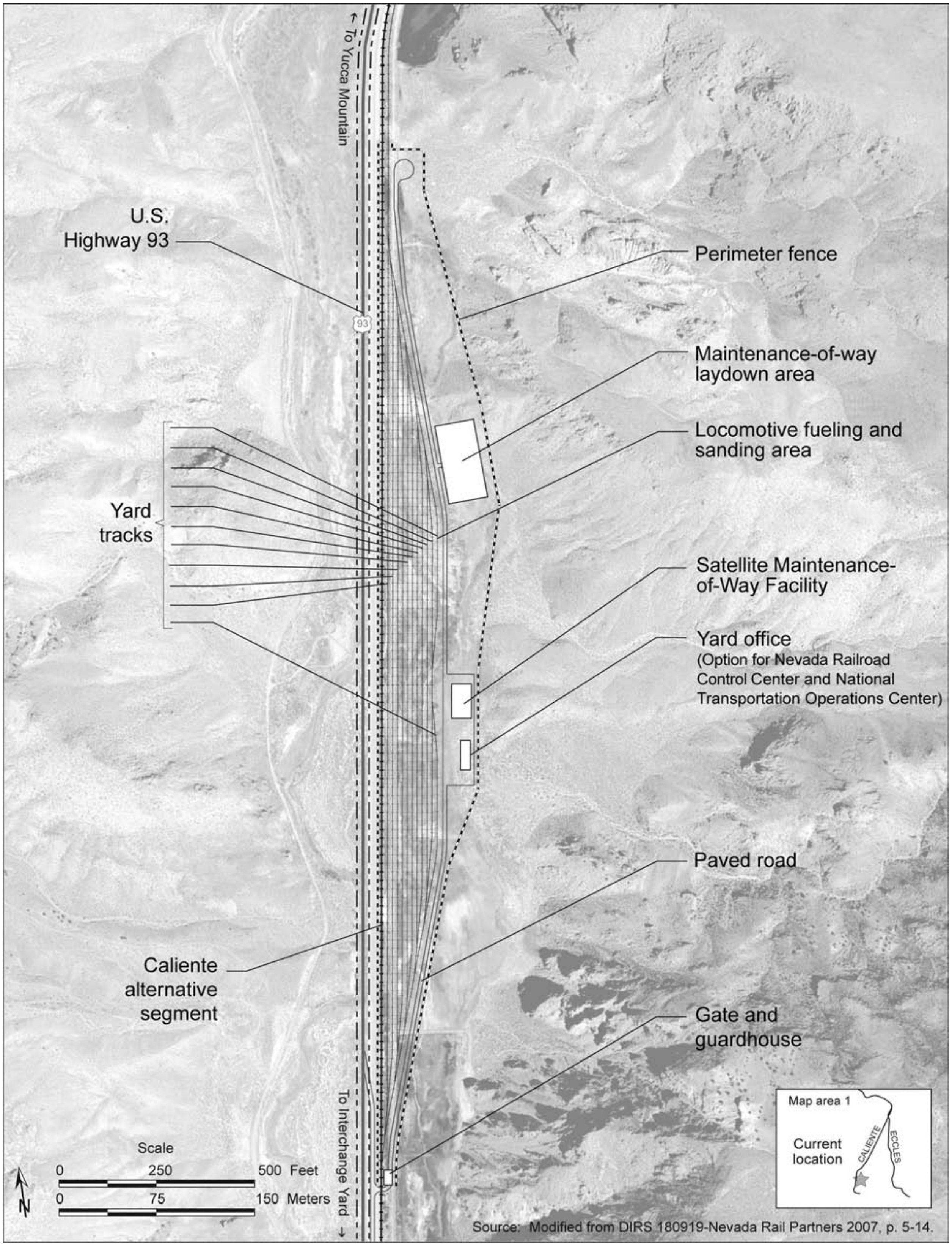


Figure 2-45. Staging Yard – Caliente-Indian Cove option.

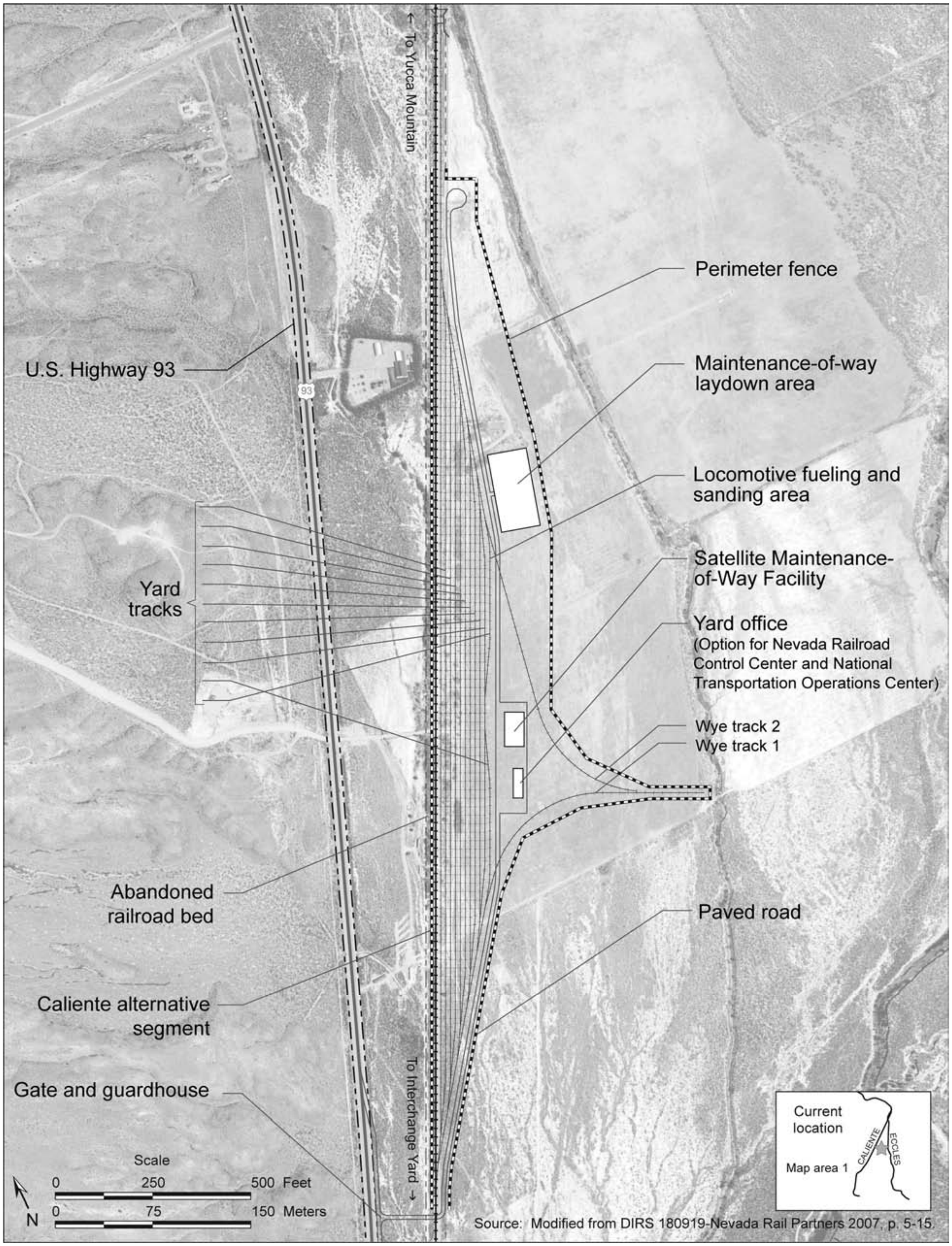


Figure 2-46. Staging Yard – Caliente-Upland option.

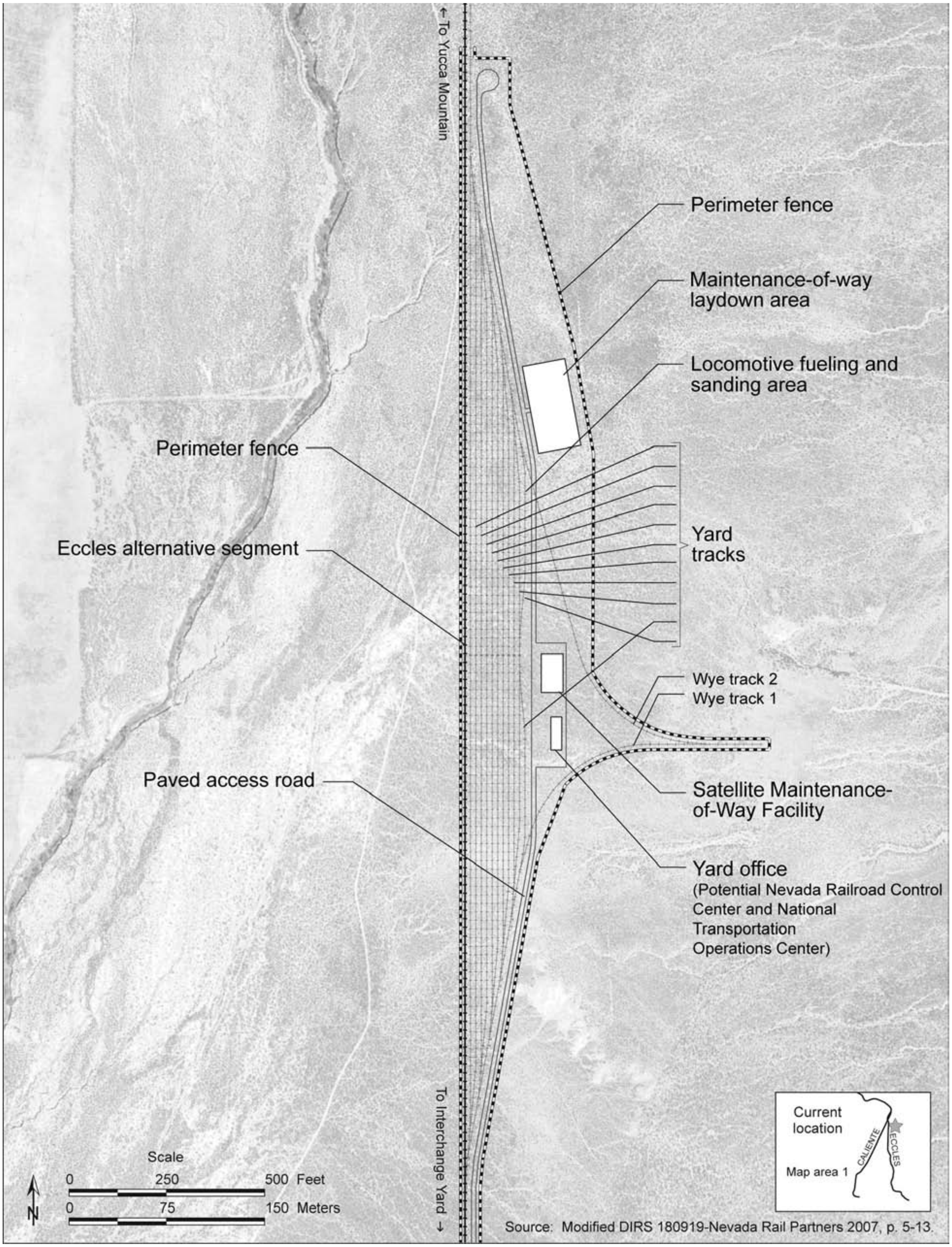


Figure 2-47. Staging Yard – Eccles-North option.

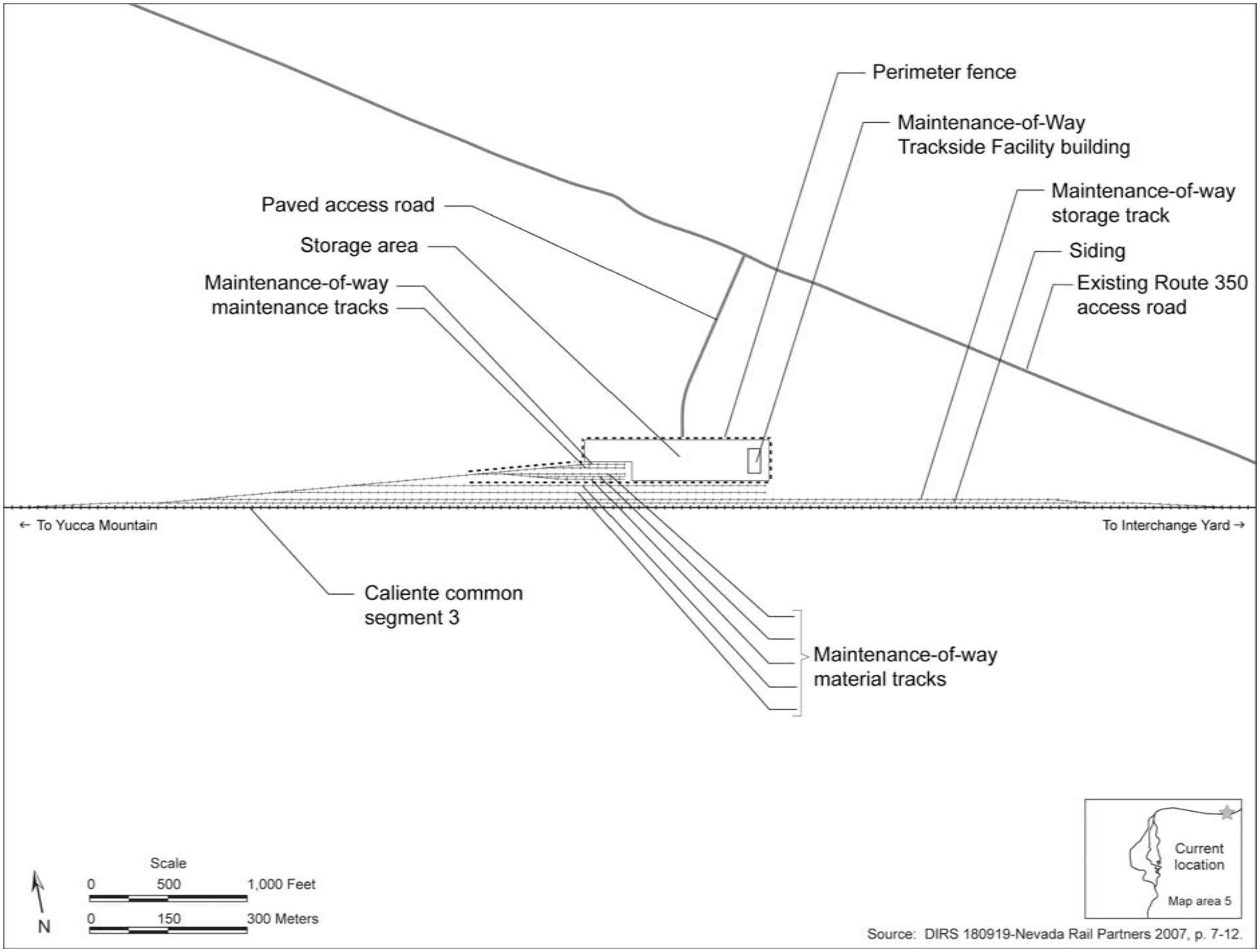
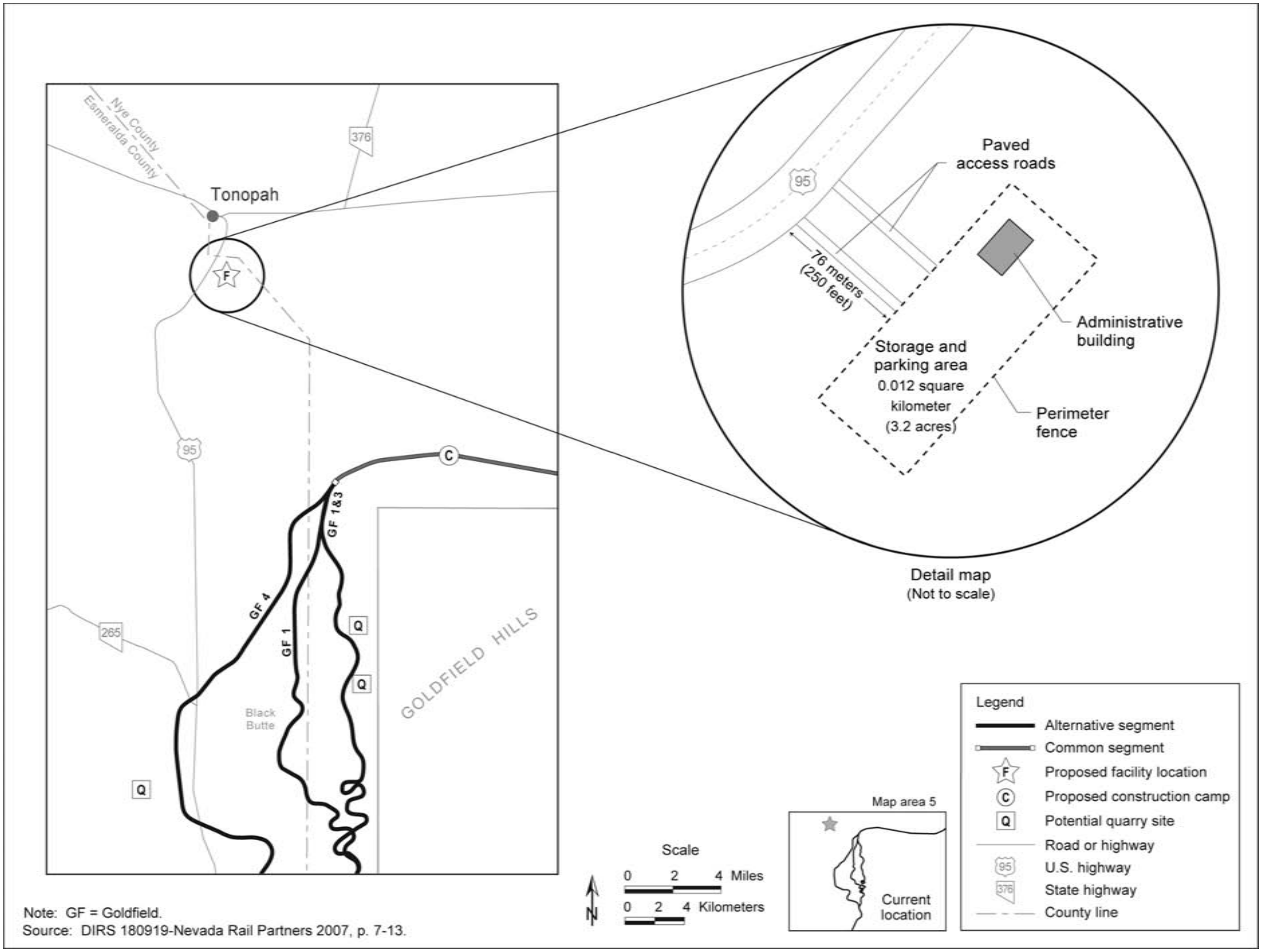


Figure 2-48. Maintenance-of-Way Trackside Facility schematic (GF 1&3 option).



Note: GF = Goldfield.
Source: DIRS 180919-Nevada Rail Partners 2007, p. 7-13.

Figure 2-49. Maintenance-of-Way Headquarters Facility schematic (GF 1&3 option).

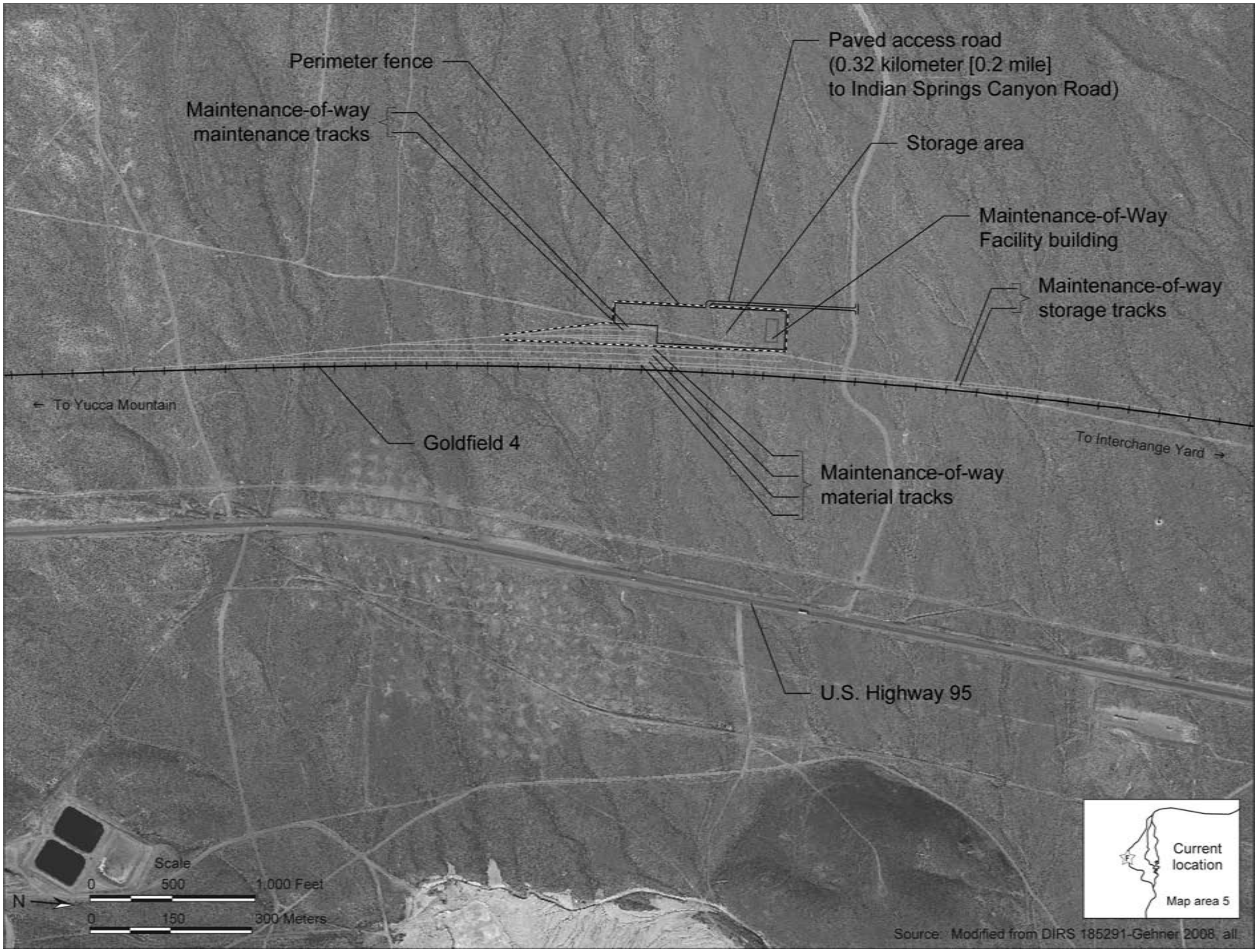


Figure 2-49a. Maintenance-of-Way Facility schematic.

2.2.4.1.2.3 Satellite Maintenance-of-Way Facilities. The Satellite Maintenance-of-Way Facilities would be at the Staging Yard and the Rail Equipment Maintenance Yard (see Sections 2.2.4.1.1.2 and 2.2.4.3.1). The Satellite Facility at the Staging Yard would handle the maintenance needs of the eastern third of the rail line. The Satellite Facility at the Rail Equipment Maintenance Yard would handle the maintenance needs of the Rail Equipment Maintenance Yard and the western third of the rail line approaching the Rail Equipment Maintenance Yard (DIRS 180919-Nevada Rail Partners 2007, p. 7-1).

Sections 2.2.4.1.1.2 and 2.2.4.3.1 describe power, water, and wastewater-handling needs for the Satellite Maintenance-of-Way Facilities because these facilities would be housed at the Staging Yard and the Rail Equipment Maintenance Yard. Employees for the Satellite Maintenance-of-Way Facilities would be based at the Maintenance-of-Way Facility.

2.2.4.2 Mina Rail Alignment Facilities

2.2.4.2.1 Staging Yard

Along the Mina rail alignment, the Staging Yard would include the functions described for the Interchange Yard and the Staging Yard along the Caliente rail alignment (see Sections 2.2.4.1.1.1 and 2.2.4.1.1.2).

For the Mina rail alignment, the Staging Yard would be near Hawthorne along Mina common segment 1. The Staging Yard would be used to hold cask cars and hold and sort cars containing construction and other materials for movement to the Rail Equipment Maintenance Yard. The Staging Yard would include a locomotive fueling and sanding area, a maintenance warehouse, a Satellite Maintenance-of-Way Facility (see Section 2.2.4.2.2.2), the Interchange Yard, and a yard office, which could serve as the location of the Nevada Railroad Control Center and the National Transportation Operations Center (see Section 2.2.4.3.3). The Staging Yard would be one of the first facilities constructed and would serve as the staging area for materials to be used during the construction phase. When construction was complete, DOE would use this yard to support the shipment of supplies to Yucca Mountain (DIRS 180919-Nevada Rail Partners 2007, p. 5-2). Figure 2-50 is a schematic of the proposed Staging Yard at Hawthorne; the proposed location of this facility is shown in the Map Atlas (DIRS 185510-DOE 2008, Plates 173 and 174).

The purpose of the Interchange Yard would be to allow the exchange of railcars containing construction and other materials between the Union Pacific Railroad Mainline and the proposed railroad. The conceptual design for the Interchange Yard includes a wye track, which would allow trains to change directions.

The Staging Yard would have a normal power demand of 386 kilowatts with the Nevada Railroad Train Control Center and National Transportation Operations Center (or 290 kilowatts without). DOE would build a substation connected to existing transmission lines to service this power need, and would use diesel-powered backup generators.

Approximately 21,000 liters (5,500 gallons) of water per day would be needed during the operations phase at the Staging Yard. These needs would be met by connecting to wells drilled during the construction phase or from the Hawthorne Army Depot potable and nonpotable water systems. Approximately 21,000 liters (5,500 gallons) of wastewater per day would be generated at the Staging Yard. Wastewater disposal would be by local septic systems and leach fields (DIRS 180919-Nevada Rail Partners 2007, p. 5-4). Operation of the Staging Yard, including the Interchange Yard, would require a workforce of approximately 40 onsite.

2.2.4.2.2 Maintenance-of-Way Facilities

2.2.4.2.2.1 Maintenance-of-Way Facility. Maintenance of track, bridges, culverts, grade crossings, signal equipment, communications equipment, and other wayside facilities and equipment would be performed from the Maintenance-of-Way Facility and two Satellite Maintenance-of-Way Facilities (DIRS 180919-Nevada Rail Partners 2007, p. 7-1).

The Maintenance-of-Way Facility would occupy approximately 0.06 square kilometer (15 acres) and would be located either along Montezuma alternative segment 1 near Silver Peak (Figure 2-51) or along Montezuma alternative segments 2 and 3 near Klondike (Figure 2-52). The proposed locations of this facility are shown in the Map Atlas (DIRS 185510-DOE 2008, Plates 275 and 338). It would consist of an administrative building, a warehouse for storage of spare parts and small tools, a parking area for hi-rail trucks needed for maintenance activities, and an outside storage area for heavy materials (for example, spare concrete ties, rail, and ballast) and large on-track track maintenance machines. The administrative building would house the maintenance organization supervisory and administrative staff.

Water needs at the Maintenance-of-Way Facility would be met by using wells drilled during the construction phase. Approximately 11,000 liters (3,000 gallons) of water per day would be required during the operations phase. Normal power demand would be approximately 484 kilowatts, which would be met by tying into nearby commercial electric power distribution lines. In addition, electric power from the proposed railroad distribution line could be available for use, as would diesel-power standby generators. Approximately 11,000 liters (3,000 gallons) of wastewater per day would be generated at the Maintenance-of-Way Facility, which would be handled using local treatment systems.

Approximately 40 people would be employed at the Maintenance-of-Way Facility.

2.2.4.2.2.2 Satellite Maintenance-of-Way Facilities. The Satellite Maintenance-of-Way Facilities would be at the Staging Yard and the Rail Equipment Maintenance Yard (see Sections 2.2.4.2.1 and 2.2.4.3.1). The Satellite Facility at the Staging Yard would handle the maintenance needs of the eastern third of the rail line. The Satellite Facility at the Rail Equipment Maintenance Yard would handle the maintenance needs of the Rail Equipment Maintenance Yard and the western third of the rail line approaching the Rail Equipment Maintenance Yard (DIRS 180919-Nevada Rail Partners 2007, p. 7-1).

Sections 2.2.4.2.1 and 2.2.4.3.1 describe power, water, and wastewater-handling needs for the Satellite Maintenance-of-Way Facilities because these facilities would be housed at the Staging Yard and the Rail Equipment Maintenance Yard. Employees for the Satellite Maintenance-of-Way Facilities would be based at the Maintenance-of-Way Facility.

2.2.4.3 Facilities Common to both the Caliente and Mina Rail Alignments

2.2.4.3.1 Rail Equipment Maintenance Yard and Interface with the Geologic Repository Operations Area

The Rail Equipment Maintenance Yard would be the termination point for the proposed railroad and would serve as the staging area for the delivery of loaded cask cars and other materials to the repository receiving and inspection area. The facility would be on a 0.41-square-kilometer (100-acre) site, less than 1.6 kilometers (1 mile) south of the southern boundary of the geologic repository operations area. This area would include a Satellite Maintenance-of-Way Facility (see Sections 2.2.4.1.2.3 and 2.2.4.2.2.2), a locomotive light repair facility, a car repair shop, and an escort-car service facility, and could serve as the location of the Cask Maintenance Facility (see Section 2.2.4.3.2) and the Nevada Railroad Control Center

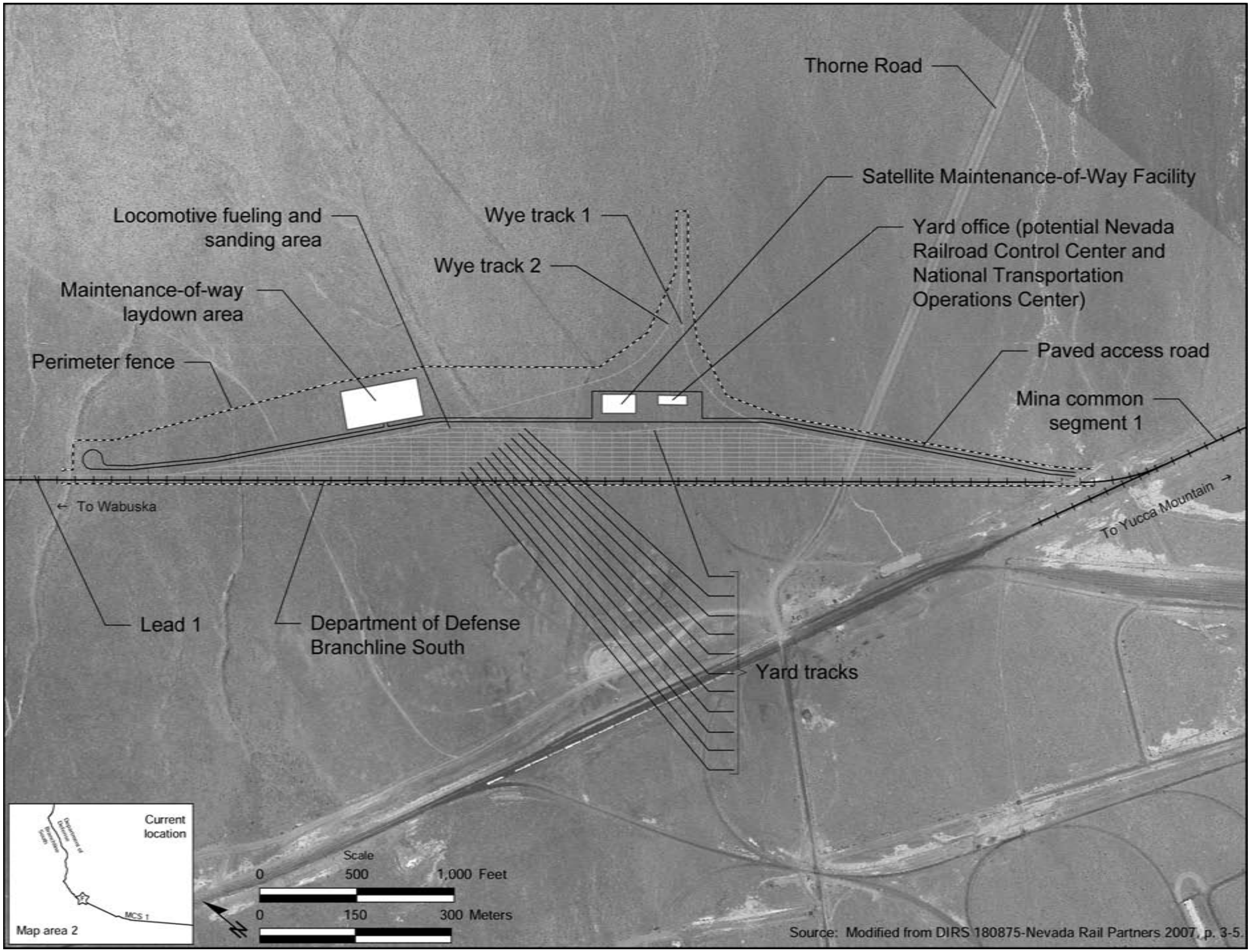


Figure 2-50. Staging Yard – Hawthorne.

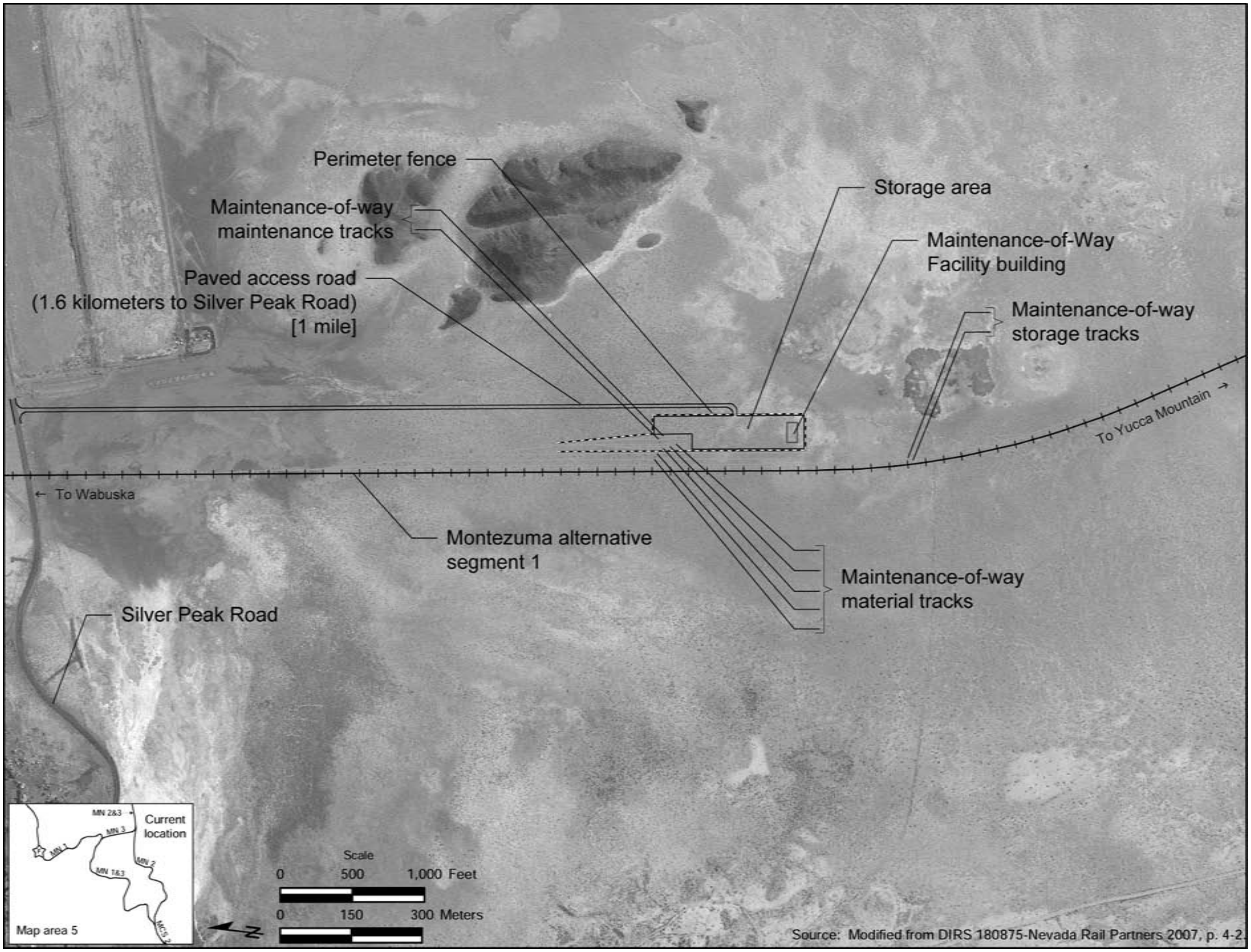


Figure 2-51. Maintenance-of-Way Facility – Silver Peak option.

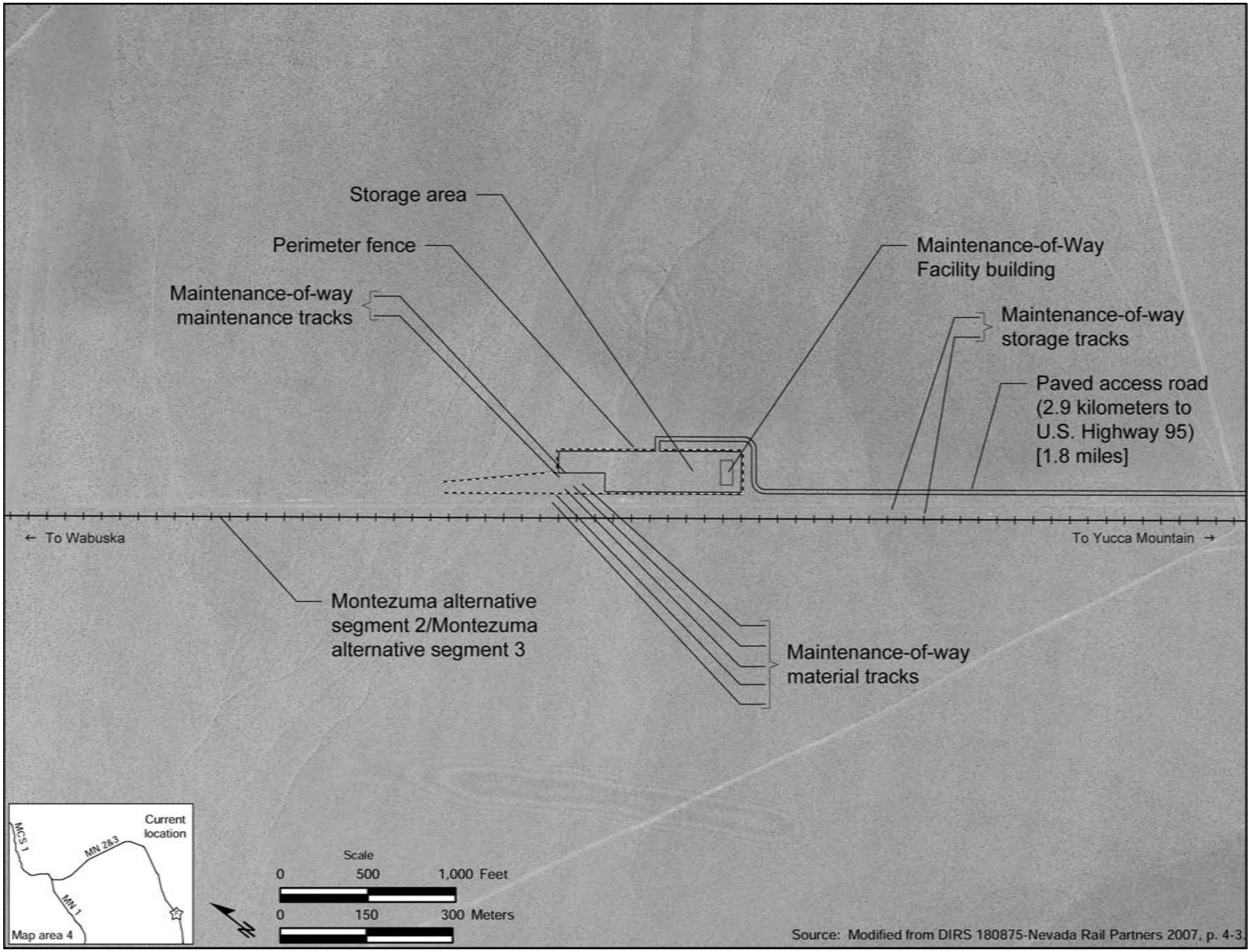


Figure 2-52. Maintenance-of-Way Facility – Klondike option.

and National Transportation Operations Center. Figure 2-53 is a schematic of the Rail Equipment Maintenance Yard incorporating the Cask Maintenance Facility (DIRS 180919-Nevada Rail Partners 2007, p. 6-1); the proposed location of the Rail Equipment Maintenance Yard is shown in the Map Atlas (DIRS 185492-DOE 2008, Plates 499 and 500; DIRS 185510-DOE 2008, Plates 510 and 511).

The Rail Equipment Maintenance Yard would include a shop for washing, inspecting, and repairing locomotives and railcars; communications equipment; and housing for train crews and escort personnel (located in the same building as the Nevada Railroad Control Center and National Transportation Operations Center). This facility would also house a 190,000-liter (50,000-gallon) above-ground diesel fuel storage tank (for locomotive fueling); an 830,000-liter (220,000-gallon) fire-water storage tank; an access road; parking areas; areas for railcar storage; train makeup and locomotive sanding areas; and escort car maintenance and replenishing areas (DIRS 180919-Nevada Rail Partners 2007, pp. 6-3 and 6-4).

The interface with the geologic repository operations area would consist of a double track spur leading into the repository area for delivery of casks and supplies to the repository (DIRS 180919-Nevada Rail Partners 2007, p. 6-3).

Water needs at the Rail Equipment Maintenance Yard would be met by tapping into the geologic repository operations area water supply and constructing pipelines to the Rail Equipment Maintenance Yard. Approximately 23,000 liters (6,000 gallons) of water per day would be required during the operations phase (DIRS 180919-Nevada Rail Partners 2007, p. 6-6). Power requirements would be approximately 6 megawatts and would be met by tying into a new substation built for the facility or by tapping into an existing nearby power source (DIRS 181033-Hamilton-Ray 2007, all). Approximately 23,000 liters (6,000 gallons) of wastewater per day would be generated at the Rail Equipment Maintenance Yard, which would be handled using local treatment systems (DIRS 180919-Nevada Rail Partners 2007, p. 6-6).

The Rail Equipment Maintenance Yard would require an estimated 40 people to operate, including employees for the Nevada Railroad Control Center and National Transportation Operations Center.

2.2.4.3.2 Cask Maintenance Facility

The primary purpose of the Cask Maintenance Facility would be to process empty transportation casks used for shipping canistered fuel to ensure that all casks are road-ready. Transportation casks used for shipping bare spent nuclear fuel would be sent to an outsourced licensed facility elsewhere in the United States.

The basic functions of the Cask Maintenance Facility would be those necessary to ensure cask compliance with a Nuclear Regulatory Commission-issued Certificate of Compliance. The facility would consist of a 2,800-square-meter (30,000-square-foot) building with four tracks leading in and out. DOE anticipates that a staff of 30 would be required to operate the facility, which would be collocated with the Rail Equipment Maintenance Yard.

By being collocated with the Rail Equipment Maintenance Yard, the Cask Maintenance Facility would interface with repository operations. This location would allow the facility to service the casks prior to their return to the nuclear utility sites and would allow Cask Maintenance Facility personnel to take advantage of infrastructure and support services already available at the repository site. The power, water, and sewage needs of the Cask Maintenance Facility would be met by tapping into infrastructure developed at Yucca Mountain to support construction and operation of the repository. Power requirements would be approximately 2 megawatts and would be supplied from the newly constructed

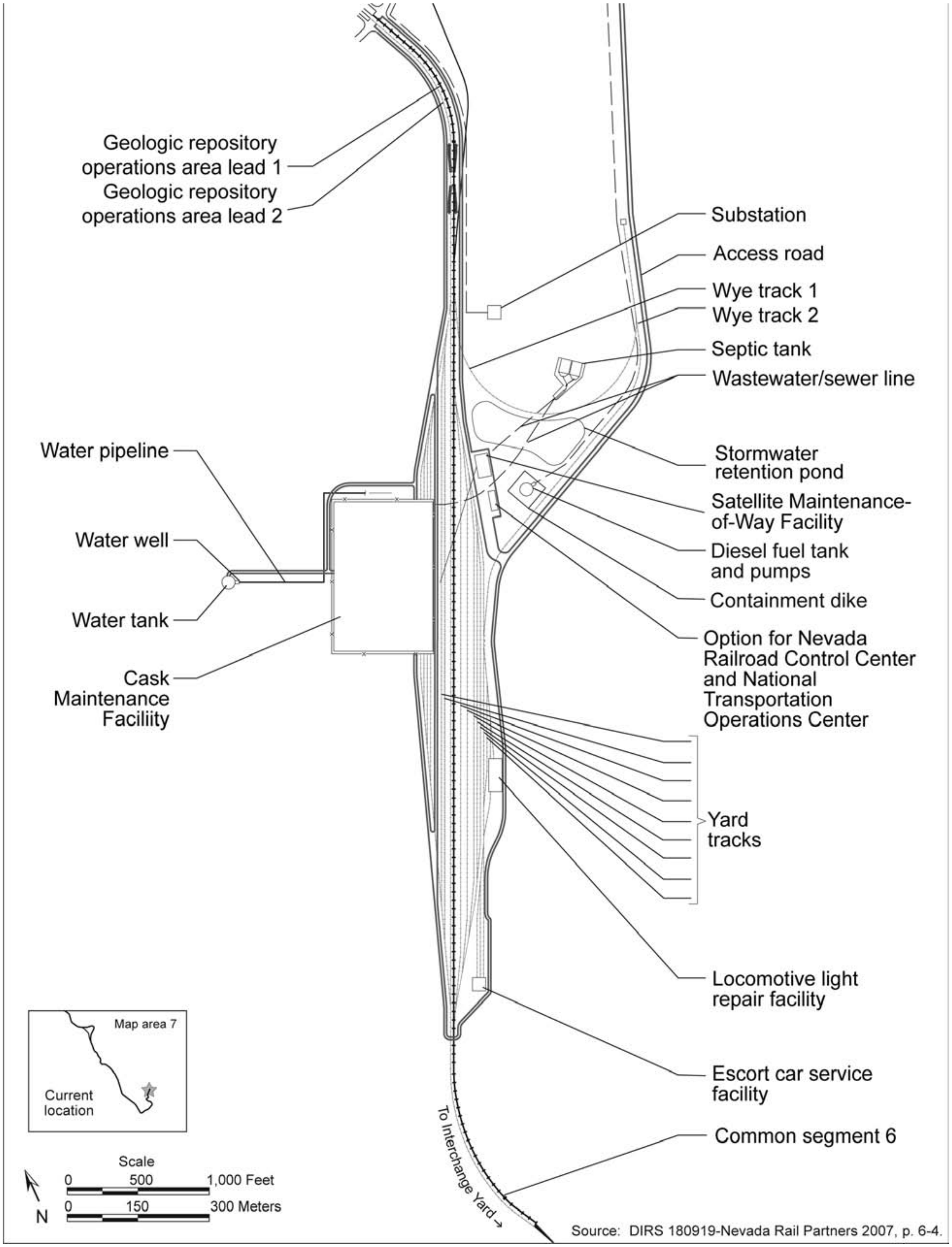


Figure 2-53. Potential Rail Equipment Maintenance Yard.

substation connected to the proposed 138-kilovolt transmission-line system into the nearby geologic repository operations area (DIRS 181033-Hamilton-Ray 2007, all). Wastewater would be handled by the geologic repository operations area septic and wastewater-treatment system.

2.2.4.3.3 Nevada Railroad Control Center and National Transportation Operations Center

The National Transportation Operations Center would oversee the shipment of casks from sites throughout the United States to the proposed railroad. Once casks arrived at the railroad in Nevada, the Nevada Railroad Control Center would oversee their shipment to the repository at Yucca Mountain. The Nevada Railroad Control Center would oversee all train movements, rail operations, and emergency response operations along the proposed railroad (DIRS 182826-Nevada Rail Partners 2007, Section 6.1).

The Nevada Railroad Control Center and National Transportation Operations Center would be at either the Rail Equipment Maintenance Yard or the Staging Yard. Together, these facilities would require approximately 320 square meters (3,400 square feet) of office space and would require approximately 15 employees to operate. Personnel at the Nevada Railroad Control Center would primarily be responsible for directing all rail operations along the proposed railroad, including coordinating shipments to the proposed railroad with the National Transportation Operations Center; coordinating maintenance-of-way trains along the rail line; coordinating with security personnel; and maintaining communications with emergency response personnel during an accident (DIRS 182826-Nevada Rail Partners 2007, Section 6.1).

Sections 2.2.4.1.1.2, 2.2.4.2.1, and 2.2.4.3.1 describe power, water, and wastewater-handling needs for the Nevada Railroad Control Center and National Transportation Operations Center because these facilities would be housed at either the Rail Equipment Maintenance Yard or the Staging Yard.

2.2.5 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, and 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.

2.2.6 SHARED-USE OPTIONS

2.2.6.1 Overview

Under each Implementing Alternative, DOE has analyzed a Shared-Use Option, under which the Department would allow commercial shippers to use the rail line for general freight shipments. General freight would include stone and other nonmetallic minerals, petrochemicals, nonradioactive waste materials, or other commodities that private companies would ship or receive. Implementation of the Shared-Use Option would require an STB certificate of public convenience and necessity to construct and operate the railroad as a common-carrier rail line.

The Shared-Use Option would entail construction of commercial sidings to provide access for potential commercial shippers, and facilities for operation of commercial rail service. Funding for such construction and commercial rail service could be provided by either the private sector or other government sources. The Shared-Use Option would not require any changes to the design (for example, grade or curvature) of the proposed rail line from that described for the Proposed Action without 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.

Under a DOE-funded cooperative agreement, Nye County commissioned a study of the potential economic benefits to Nye, Esmeralda, and Lincoln Counties of the rail line along the Caliente rail alignment (DIRS 174090-Wilbur Smith Associates 2005, all). This report presented low-, mid-, and high-range estimates of commercial freight shipments on the rail line, based on interviews with potential shippers. Nye County commissioned a second study of the potential economic benefits to the counties along each of the proposed rail alignments (DIRS 185244-Wilbur Smith Associates 2007, all). This report presented low- and high-range estimates of commercial freight shipments on each rail line, based on interviews with potential shippers. The report updated the information presented in the 2005 report for the Caliente rail alignment and developed new information for the Mina rail alignment.

While preparing this Rail Alignment EIS, DOE conducted independent telephone interviews with each of the potential shippers identified in the Nye County study. Further consultation with representatives from Nye, Esmeralda, Mineral, and Churchill Counties, and with other ***stakeholders***, identified additional potential shippers along the Mina rail alignment. DOE interviewed these potential shippers in person and via telephone. Through these efforts, DOE estimated different levels of commercial freight demand for the Caliente and Mina rail alignments (DIRS 180694-Ang-Olson and Gallivan 2007, all).

DOE projected the total commercial freight demand on a rail line along the Caliente rail alignment would be approximately 223 carloads weekly (Table 2-28), which is similar to the mid-range demand scenario in the Nye County study (DIRS 174090-Wilbur Smith Associates 2005, all) and approximately twice the low-range estimate in the more recent Nye County study (DIRS 185244-Wilbur Smith Associates 2007, all).

Table 2-28. Potential commercial freight shipments under the Shared-Use Option – Caliente rail alignment.[a]

Commodity	Weight (tons)[b]		Carloads	
	Per week	Per year	Per week	Per year
Stone	3,580	186,000	36	1,860
Other nonmetallic minerals	10,580	550,000	106	5,500
Petrochemicals	5,770	300,000	58	3,000
Nonradioactive waste materials	1,350	70,000	13	700
Other commodities	920	48,000	10	480
Totals	22,200	1,154,000	223	11,540

a. Source: DIRS 180694-Ang-Olson and Gallivan 2007, all.
b. To convert tons to metric tons, multiply by 0.90718.

DOE projected that total freight demand on a rail line along the Mina rail alignment would be approximately 514 carloads per week. Of this total, approximately 210 carloads would travel on dedicated unit trains that would not pass south of the Walker River Paiute Reservation (Table 2-29).

Most potential shippers expressed a willingness to truck their product to or from a siding, although the maximum acceptable trucking distance varied considerably among the shippers. Some shippers would need to construct storage or loading/unloading facilities at the sidings. Potential shippers did not express any interest in either a long spur or a short spur/siding location that would not be served by existing paved or gravel roads.

Table 2-29. Potential commercial freight shipments under the Shared-Use Option – Mina rail alignment.[a]

Commodity	Weight (tons)[b]		Carloads	
	Per week	Per year	Per week	Per year
Stone	18,580	966,000	186	9,660
Other nonmetallic minerals	5,310	276,000	50	2,760
Petrochemicals	260	14,000	3	140
Nonradioactive waste materials [c]	22,440	1,167,000	224[c]	11,650[c]
Other commodities	5,580	290,000	51	2,900
Totals	52,170	2,713,000	514	27,110

a. Source: DIRS 180694-Ang-Olson and Gallivan 2007, all.
b. To convert tons to metric tons, multiply by 0.90718.
c. Twenty-one thousand one hundred ten tons (211 carloads) weekly would travel on dedicated unit trains that would not pass south of the Walker River Paiute Reservation.

2.2.6.2 Facilities and Sidings

2.2.6.2.1 Commercial-Use Sidings

Under the Shared-Use Option, DOE would construct the proposed rail line as described in Section 2.2.2, and others would construct commercial-use sidings. At these commercial-use sidings, which would be constructed within the operations right-of-way, commercial freight railcars would be set out and picked up. Commercial-use sidings would be constructed adjacent to passing sidings. As described in Section 2.2.2.8, DOE would construct passing sidings approximately every 40 kilometers (25 miles) so that trains running in opposite directions would be able to pass one another. Along the Caliente rail alignment, these passing sidings would be approximately 1,800 to 3,700 meters (7,000 to 12,000 feet) long to accommodate a maximum train length of 1,700 meters (5,500 feet). Along the Mina rail alignment, these passing sidings would be 2,100 to 5,800 meters (7,000 to 19,000 feet) long. For purposes of analysis, DOE assumed it would construct passing sidings in locations where commercial access would be needed. A commercial access siding (also known as a ***team track***) could then be constructed as a third track parallel to the mainline and the passing siding. Commercial-access sidings would generally be less than 300 meters (980 feet) long and would be double-ended (switches at both ends). Figure 2-54 is a schematic of a typical commercial access siding. To the extent practicable and appropriate, DOE also would accommodate the construction of additional access sidings, or short-spur lines, by private shippers. Commercial-access sidings could be constructed for use by any shipper or for use by a single shipper (called an ***industry track***). Possible locations for access sidings along the Caliente rail alignment include Caliente, the Panaca/Bennett Pass area, the Warm Springs Summit area, the Tonopah area, Goldfield, and the Beatty/Oasis Valley area. Possible locations for new access sidings along the Mina rail alignment include Luning, Mina, the Goldfield area, Silver Peak, and the Beatty/Oasis Valley area.

DOE assumes that the commercial-access sidings would be constructed at the same time as the proposed railroad, although construction could occur at a later date. The construction approach would be the same as described in Section 2.2.2, with phased construction and implementation of appropriate best management practices. Because commercial sidings would be built at the locations of passing sidings, the incremental effort to construct commercial sidings would be minimized. Although some additional materials and labor would be needed, the increase beyond that described in Section 2.2.2 would be small and additional construction camps would not be required. Temporary access roads built for the construction of the proposed railroad would also be used for construction of commercial sidings; therefore, no new roads would be needed to support construction of commercial sidings. The commercial sidings proposed to be constructed under the Shared-Use Option would represent an increase of less than 0.5 percent over the entire length of track laid under the Proposed Action without the Shared-Use Option for either the Caliente or Mina rail alignment. The land area disturbed under the Shared-Use Option as compared to the Proposed Action without the Shared-Use Option would be less than 0.1 percent.

Commercial sidings and the additional facilities for shared use described in Section 2.2.6.2.2 would be constructed within the operations right-of-way, as practicable. Any facilities constructed outside the operations right-of-way would need the appropriate approval from the BLM.

2.2.6.2.2 Additional Facilities for Shared Use

The supporting infrastructure at team tracks and industry tracks would vary with the types and amounts of commodities being shipped. Most, or all, commercial-access sidings would have facilities for transferring freight between railcars and trucks. They might require a paved or unpaved parking area where trucks could access the freight cars, along with a loading dock (for transferring machinery or pallets) and possibly other specialized loading equipment (such as tanks for storing petroleum products or conveyers for moving some nonmetallic minerals).

An existing paved or unpaved road would provide truck access to the loading facilities. Commercial sidings and truck-loading facilities would be on relatively flat terrain near existing roads whenever feasible. Some improvements to existing roads might be required.

The Shared-Use Option could require construction and operation of one or more facilities to allow commercial rail service, which would be funded by the private sector or other government sources. Commercial trains would not have access to the restricted areas at the Cask Maintenance Facility or the restricted area designated for the geologic repository operations area, including the Rail Equipment Maintenance Yard. A commercial-service end-of-line facility could be constructed at or near the last commercial stop, probably in the Beatty/Oasis Valley area, which would provide an area for locomotive and railcar parking. Commercial railcars would be serviced at one or more separate maintenance facilities, possibly in the Caliente area (Caliente rail alignment), the Tonopah/Goldfield area (Caliente or Mina rail alignment), the Hawthorne area (Mina rail alignment), or at the commercial service end-of-line facility. These facilities would consist of about 100 meters (330 feet) of track (in addition to the access sidings) for parking and maintenance of locomotives and other railcars.

2.2.6.3 Operation and Maintenance under the Shared-Use Option

The commercial rail service and facilities would be operated and maintained in accordance with the appropriate Federal Railroad Administration standards and requirements, and applicable regulations of the State of Nevada. All such work would also be conducted in accordance with other appropriate industry

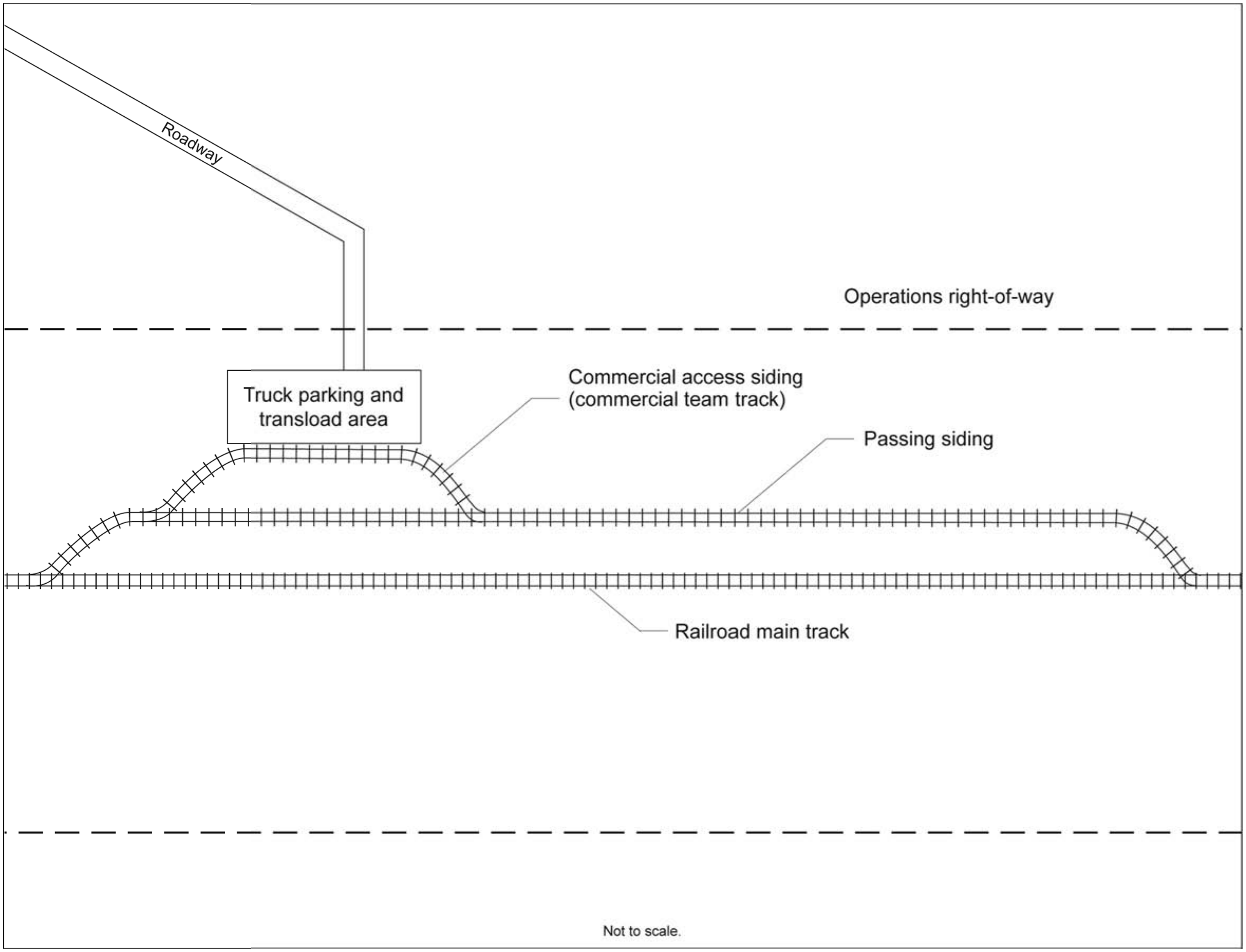


Figure 2-54. Commercial access siding schematic (conceptual).

codes, standards, engineering principles, and practices, with particular attention to those that incorporate system safety, human factors, reliability, availability, maintainability, habitability standards, and environmental protection. Shared-use rail service would begin after the completion of proposed railroad construction. Maintenance of the commercial rail facilities would be an ongoing process that would be concurrent and coordinated with maintenance of the proposed railroad, as described in Section 2.2.3.2.

2.2.6.3.1 Operations

During the proposed railroad operations phase, approximately eight one-way commercial trains would run per week along the Caliente rail alignment. Along the Mina rail alignment, approximately 18 one-way commercial trains would run per week, eight of which would travel only on the northern portions of the rail alignment. Ten trains per week would pass south of Hawthorne. For comparison, an average total of 17 one-way trains would run between the Staging Yard and the Rail Equipment Maintenance Yard each week, carrying casks and other materials, as described in Section 2.2.3. The commercial trains (not including the locomotive) could consist of up to 60 cars and would be approximately 1,100 meters (3,600 feet) long. Depending on the weight of the train, three or four locomotives could be required. Commercial trains would haul a range of products to and from businesses, including stone and other nonmetallic minerals, oil and petroleum products, and nonradioactive waste materials. Commercial railcars would also be hauled in trains carrying materials related to the construction (for example, reinforcing steel and cement) and operation (for example, waste packages, fuel oil) of the repository.

The operating characteristics of these commercial trains cannot be accurately defined; therefore, DOE cannot describe the travel times and operational movements of these trains. The Nevada Railroad Control Center described in Section 2.2.4.3.3 would control and coordinate commercial rail service movements and would therefore maintain overall safety of operations along the railroad. During operation of commercial service, there would be an increase in truck traffic to and from the commercial sidings, but an overall decrease in truck traffic due to the shift to rail for transporting commercial freight. Under the Proposed Action without shared use, private companies near the rail line would continue to ship and receive freight using truck-only transport. Under the Shared-Use Option, some of those shipments would be diverted to rail, generally using trucks to access the commercial rail sidings.

2.2.6.3.2 Maintenance

Industry-track owners would likely perform maintenance of the industry track sidings, and commercial operators would likely perform maintenance of team track sidings. Because the commercial rail service would primarily use the same track as the cask trains, there would be only minimal need for maintenance beyond the anticipated levels of the Proposed Action without shared use. Maintenance techniques for commercial facilities would be similar to those described in Section 2.2.3.2.

2.2.6.4 Abandonment

Under the Shared-Use Option, the current assumption is that DOE would not abandon the proposed railroad upon completion of the DOE shipping campaign. Local communities or the private sector could maintain the rail line, and possibly some facilities not within the Yucca Mountain Site boundary, for other uses. DOE would decommission and dismantle facilities that would not be useful to local communities or the private sector.

2.3 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.

In the event that DOE were not to 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 EIS and in the Nevada Rail Corridor SEIS. Further consideration of these possibilities may require additional NEPA reviews, as appropriate.

2.4 DOE Preferred Alternative

The Council on Environmental Quality NEPA implementing regulations require an agency to identify its preferred alternative in the EIS (40 CFR 1502.14[e]). For this Rail Alignment EIS, the DOE preferred alternative is to construct and operate a railroad along the Caliente rail alignment and to implement the Shared-Use Option. DOE identified preferred alternative segments within the Caliente rail alignment based on analysis of environmental impacts, engineering and cost factors, and regulatory compliance issues, including permit requirements and challenges, land-use conflicts, and uncertainties (see Table 2-30, which discusses only those factors that offered the Department a means to discriminate between alternative segments). All six of the common segments along the Caliente rail alignment are part of the DOE preferred alternative (Figure 2-55).

Table 2-30. Caliente rail alignment preferred alternative segments[a] (page 1 of 2).

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.

Table 2-30. Caliente rail alignment preferred alternative segments[a] (page 2 of 2).

Preferred alternative segment	Analysis factors
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.

2.5 Comparison of Environmental Impacts

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

Tables 2-31 through 2-33 highlight the differences in potential impacts under the Proposed Action Caliente and Mina Implementing Alternatives and the No-Action Alternative. Table 2-31 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 2-31 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 2-32 and 2-33 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

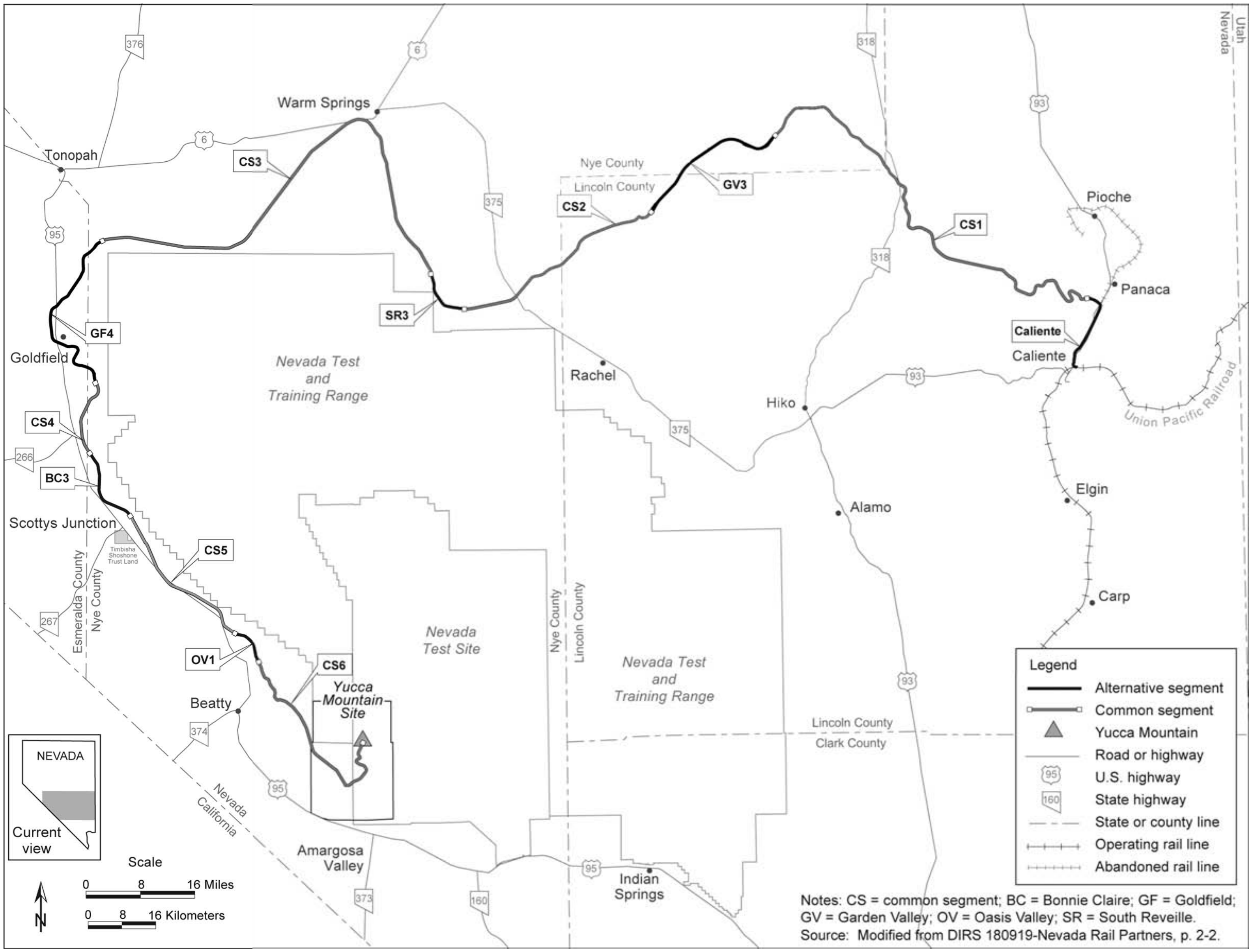


Figure 2-55. Preferred Caliente rail alignment, combination of common segments and alternative segments.

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 2-31. 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: Caliente Implementing Alternative	Proposed Action: Mina Implementing Alternative	No-Action 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 2-31. 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 2-31. 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 2-31. 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		
	Caliente Implementing Alternative	Mina Implementing Alternative	No-Action 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 2-31. 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 2-31. 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 2-31. 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		
	Caliente Implementing Alternative	Mina Implementing Alternative	No-Action 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 proposed wells located sufficiently far away	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 2-31. 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: Caliente Implementing Alternative	Proposed Action: Mina Implementing Alternative	No-Action Alternative
Groundwater resources (continued)	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.	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.	Same as the Caliente Implementing Alternative.	
	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.	Same as the Caliente Implementing Alternative.	

Table 2-31. 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		
	Caliente Implementing Alternative	Mina Implementing Alternative	No-Action 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 2-31. 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		
	Caliente Implementing Alternative	Mina Implementing Alternative	No-Action 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 2-31. 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		
	Caliente Implementing Alternative	Mina Implementing Alternative	No-Action 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 2-31. 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 2-31. 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 2-31. 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 2-31. 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		
	Caliente Implementing Alternative	Mina Implementing Alternative	No-Action 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 2-31. 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 2-31. 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: 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.	Wastewater treatment systems: Same as Caliente Implementing Alternative.	
	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.	Fossil fuels: Demand would be approximately 6 percent of statewide use during construction and less than 0.25 percent of statewide use during operations. Demand could be met by existing regional supply systems and suppliers.	
	Materials: Requirements generally would be very small in relation to supply capacity.	Materials: Same as Caliente Implementing Alternative.	
	Shared-Use Option 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.	*Shared-Use Option* Fossil fuels: 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 2-31. 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		
	Caliente Implementing Alternative	Mina Implementing Alternative	No-Action 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 2-32. 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 2-32. 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 2-32. 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 2-32. 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 2-32. 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 2-32. 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.	Private parcels crossed: 2 patented mining claims.	Private parcels crossed: 33 plus at least 2 patented mining claims (at least 35).
	Area of private land affected: 0.61 square kilometer (150 acres).	Area of private land affected: 0.19 square kilometer (46 acres).	Area of private land affected: 0.49 square kilometer (120 acres).
	Unpatented mining claims the alignment would cross: 14 sections with 375 claims.	Unpatented mining claims the alignment would cross: 14 sections with 205 claims.	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 2-32. 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 2-32. 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 2-33. 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 2-33. 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 2-33. 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 2-33. 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 2-33. Comparison of potential impacts under the Proposed Action – Mina rail alignment existing rail line, alternative segments, and common segments[a] (page 5 of 8).

	Existing rail line/alternative segments/common segments		
Resource area	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 2-33. 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 2-33. 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.	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 North Clayton and Malpais Mesa quarry sites.		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 2-33. 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.