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Mina Rail Route Feasibility Study

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ACRONYMS AND ABBREVIATIONS

BC2	Bonnie Claire 2 Alternative Alignment
BC3	Bonnie Claire 3 Alternative Alignment
BIA	U.S. Bureau of Indian Affairs
BLM	U.S. Bureau of Land Management
BSC	Bechtel SAIC
CRC	Caliente Rail Corridor
CS5	Common Segment 5
CS6	Common Segment 6
DoD	U.S. Department of Defense
DOE	U.S. Department of Energy
DRI	Desert Research Institute
EOL	End of Line Facility
FEIS 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	
GIS	Geographic Information System
MCS0	Mina Common Segment 0
MCS 1	Mina Common Segment 1
MCS2	Mina Common Segment 2
MN1	Montezuma Range 1 Alternative Alignment
MN2	Montezuma Range 2 Alternative Alignment
MOW	Maintenance-of-Way Facility
MRR	Mina Rail Route
MTS	Management and Technical Support Services
OV 1	Oasis Valley 1 Alternative Alignment
OV3	Oasis Valley 3 Alternative Alignment
NDOT	Nevada Department of Transportation
NRHP	National Register of Historic Places
NRP	Nevada Rail Partners
NWPA	Nuclear Waste Policy Act
ROW	Right-of-Way
S1	Schurz Bypass 1 Alternative Alignment
S2	Schurz Bypass 2 Alternative Alignment
S3	Schurz Bypass 3 Alternative Alignment

ACRONYMS AND ABBREVIATIONS (CONTINUED)

UPRR	Union Pacific Railroad
USGS	U.S. Geological Survey
WRPT	Walker River Paiute Tribe

EXECUTIVE SUMMARY

In this study, the feasibility of the Mina rail route is considered in light of literature reviews, limited field studies, and preliminary design analyses that cover land use and route alignment design. This study broadly evaluates biological, cultural, archeological, and historical elements of the proposed Mina corridor. Potentially impacted federal and private lands are evaluated. Initial, preliminary alternative rail alignment design was performed to evaluate alignments that would:

- Avoid potential land-use conflicts,
- Maximize use of Federal lands, except where those lands have been withdrawn as a result of conflicting public-use issues (e.g., wilderness study areas),
- Meet the requirements of current railroad engineering practices, and
- Provide access to regional rail carriers.

The preliminary Mina corridor common segments and alternative alignments are based upon initial alignment design, using available U.S. Geological Survey (USGS) mapping. The design evaluation includes rail construction feasibility, operational considerations, and an order-of-magnitude cost estimate.

This study compares the features, aspects, and complexities of the Mina corridor. Known key issues and problems are noted, and a high-level summary is provided.

For the purpose of this study, the Mina corridor originates at an existing rail line (Fort Churchill Siding) near Wabuska, Nevada, where it proceeds southeasterly through Hawthorne to Blair Junction, and then on to Lida Junction. At that point, it continues southeasterly through Oasis Valley before turning north-northeast to Yucca Mountain. The Mina corridor is about 280 miles in length; however, construction of new rail line would range between about 240 and 254 miles, because the corridor includes the existing Department of Defense (DoD) rail line which starts at the Fort Churchill Siding and continues for approximately 54 miles to the Thorne Siding in Hawthorne, Nevada.

For this feasibility study, three alternatives were developed to bypass the town of Schurz. Schurz Bypass 1 (S1) and Schurz Bypass 2 (S2) depart from the existing rail 18 miles northwest of Schurz, past east of the Weber Reservoir and cross U.S. 95 east of Schurz. S1 crosses U.S. 95 further east and remains on the far east side of the valley until rejoining the existing rail line 8 miles south of Schurz. S2 crosses U.S. 95 between 51 and Schurz and remains between S1 and Schurz before rejoining the existing rail at the same point as S1, 8 miles south of Schurz.

Schurz Bypass 3 (S3) originates at the same point as S1 and S2 but follows the existing rail line to 6 miles northwest of Schurz where it would cross the Walker River. S3 then crosses U.S. 95 at about the same point as S1 and remains on the far east side of the valley until rejoining the existing rail line 8 miles south of Schurz.

Also for the feasibility study, two additional alternatives were developed for the Mina corridor: Montezuma Range 1 (MN1) and Montezuma Range 2 (MN2). The MN1 route is similar to the route described/depicted in earlier studies. This route follows U.S. 95 from Hawthorne to Blair Junction, and then proceeds south to Silver Peak, across Clayton Valley, and across the Montezuma Range. It then departs to the east through a low pass in the middle of the Montezuma Range, thereby avoiding Railroad Pass. MN1 then trends south and east around the south end of the Goldfield Hills, and crosses U.S. 95.

After review of regional geography and possible engineered alignments, it became clear that the original railroad to Goldfield provided an excellent alternative to traversing Clayton Valley. MN2 follows the old Tonopah & Goldfield rail line through Montezuma Valley to Klondike (a point halfway between Goldfield and Tonopah). From there, MN2 proceeds through Goldfield to the south to merge with MN1. Once across the Montezuma Range (or the Goldfield Hills, as applicable) the routes join near U.S. 95 north of Scottys Junction. From that point, the Mina corridor follows common segments and alignment alternatives to Yucca Mountain that are the same as the Caliente corridor. Those common segments are Mina Common Segment 2, alternative alignments Bonnie Claire 2 and 3, Common Segment 5, alternative alignments Oasis Valley 2 and 3, and Common Segment 6.

Based upon this preliminary study, the Mina corridor common segments and alternative alignments appear to be feasible to construct, operate, and maintain.

1. INTRODUCTION AND BACKGROUND

As required by the Nuclear Waste Policy Act of 1982, as amended (NWPAA), the U.S. Department of Energy (DOE or 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) (FEIS). The FEIS examined a proposed action under which DOE would construct, operate and monitor, and eventually close a geologic repository at Yucca Mountain. The FEIS evaluated various scenarios for the shipment of spent nuclear fuel and high-level radioactive waste from 72 commercial and 5 DOE sites to the repository at Yucca Mountain; these included legal-weight truck, commercial rail, heavy-haul truck, and barge. Under the mostly rail scenario in Nevada, the FEIS considered five rail corridors for the possible construction of a rail line: Caliente, Caliente-Chalk Mountain, Carlin, Jean, and Valley Modified.

In the FEIS, DOE indicated its shipping preference was the mostly rail scenario, both nationally and in the State of Nevada. On April 8, 2004, the Department issued a Record of Decision (69 FR 18557) announcing its selection, both nationally and in the State of Nevada, of the mostly rail scenario analyzed in the FEIS. This decision will ultimately 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 for the shipment of spent nuclear fuel and high-level radioactive waste. To that end, the Department also selected the Caliente rail corridor (CRC) in which to examine possible alignments for construction of that rail line. On April 8, 2004, DOE issued a Notice of Intent (69 FR 18565) to prepare an EIS to consider the environmental impacts of alternative alignments within the Caliente corridor of a rail line for shipments of spent nuclear fuel, high-level radioactive waste, and other materials to a geologic repository at Yucca Mountain, Nevada (the Rail Alignment EIS).

In the FEIS, DOE considered, but eliminated from detailed study, other potential rail routes. These rail routes were identified in a series of three transportation *studies*—*Preliminary Rail Access Study* (January, 1990), the *Nevada Potential Repository Preliminary Transportation Strategy, Study 1* (February, 1995), and the *Nevada Potential Repository Preliminary Transportation Strategy, Study 2* (February, 1996).

In the 1996 study, the Mina rail route (MRR) was not recommended for further 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 Tribe Reservation, and the Tribe had informed DOE that it would refuse to allow nuclear waste to be transported across its reservation. For this reason, the Department considered the MRR to pose an unavoidable land use conflict and thus to be unavailable for further consideration.

Following review of the scoping comments for the Rail Alignment EIS, DOE held discussions with the Walker River Paiute Tribe regarding the availability of the MRR. Subsequently, in May 2006, the Walker River Paiute Tribe informed DOE that the Tribal Council had withdrawn its objection to the completion of an EIS studying the transportation of nuclear waste across its reservation. The Tribe stated that its Tribal Council had not decided to allow such shipments, but indicated that inclusion of the MRR in an EIS would allow the Tribe to make a more informed, final decision about the matter.

As a result, **DOE** requested that **BSC** and others to conduct a feasibility study of the **MRR**, and to identify a specific corridor and associated preliminary alternative alignments. The **MRR** was identified and evaluated as a potential rail route in 1990, 1995, and 1996, using five criteria:

1. Maximize the use of Federal lands,
2. Provide access to any of the regional rail carriers,
3. Avoid obvious or potential land-use conflicts,
4. Meet the requirements of current railroad engineering practices, and
5. Avoid lands withdrawn from public use by Federal actions.

This feasibility study considers the original Mina route, which is referred to as Option **6** in the Preliminary Rail Access Study of 1990. Since the time of the 1990 study, requirements for rail transportation to Yucca Mountain have been refined, resulting in updated design criteria for the potential railroad. This study considered the feasibility of the **MRR** using the same selection criteria used in the earlier evaluations, and includes recently available information pertaining to potential alternatives.

1.1 STUDY OBJECTIVES AND APPROACH

The objective of this study is to consider the feasibility of the **MRR**, and identify a specific corridor and associated preliminary alternative alignments. This study relies on literature reviews, limited field studies, and initial design analyses. The study outlines aspects (e.g., land use, resource conflicts, engineering feasibility, and potential railroad operations) of the overall Mina corridor and its associated preliminary alternative alignments. Known key issues and problems are noted.

1.2 DESCRIPTIONS OF THE CORRIDOR AND ALTERNATIVE ALIGNMENTS

This section describes the Mina corridor and associated preliminary engineered alternative alignments, and presents figures and tables to aid the reader in interpreting the information contained therein. Throughout the report, the term "alignment" refers to the engineered centerline within the corridor along which the rail line would be constructed.

The Mina corridor originates at an existing rail line (Fort Churchill Siding) near Wabuska, Nevada, where it proceeds southeasterly through Hawthorne to Blair Junction, and then on to Lida Junction. At that point, it continues southeasterly through Oasis Valley before turning north-northeast to Yucca Mountain. The Mina corridor is about 280 miles in length; however, construction of new rail line would range between about 240 and 254 miles, because the corridor includes the existing Department of Defense (**DoD**) rail line which starts at the Fort Churchill Siding and continues for approximately 54 miles to the Thorne Siding in Hawthorne, Nevada. The **DoD** rail line handles general freight and services for the Hawthorne Army Depot.

The Mina corridor comprises a series of common segments (i.e., region of the alignment for which a single route has been identified) and alternative alignments (i.e., region of the alignment for which multiple routes have been identified). These include:

Mina Common Segment 0 (MCSO): Common Segment 0 would originate near Wabuska east of the Fort Churchill Siding on the DoD rail line, traveling on the existing line to a point about 18 miles northwest of the Town of Schurz. MCSO is about 5 miles long.

Town of Schurz (S1): Schurz Bypass 1 would depart from the existing rail line about 18 miles northwest of the Town of Schurz passing along the eastern side of the valley (Sunshine Flat). From there, the alignment passes east of Weber Reservoir and crosses U.S. 95 about 5 miles north of the intersection of U.S. 95 and Alternate U.S. 95. Schurz Bypass 1 then trends southeast remaining on the far side of the valley to where it rejoins the existing rail line about 8 miles south of Schurz. Schurz Bypass 1 would be 32 miles long.

Schurz Bypass 2 (S2) also would depart the existing line at the same point of departure as Schurz Bypass 1, and would pass along the eastern side of Sunshine Flat. From there, the alignment passes east of Weber Reservoir and crosses U.S. 95 about 4 miles north of the intersection of U.S. 95 and Alternate U.S. 95. The alignment then trends to the southeast but stays to the east of Schurz and west of Schurz Bypass 1 until it rejoins the existing rail line about 8 miles south of Schurz. Schurz Bypass 2 would be 31 miles long.

Schurz Bypass 3 (S3) follows the existing rail line starting about 18 miles northwest of Schurz to about 6 miles northwest of Schurz where it would depart the existing rail line to cross the Walker River. The alignment then crosses U.S. 95 about 5 miles north of the intersection of U.S. 95 and Alternate U.S. 95 at which point it continues southeasterly to a point where it rejoins the existing rail line about 8 miles south of Schurz, on the east side of the valley. Alternative alignment S3 is about 31 miles long.

Mina Common Segment 1 (MCS1): MCS1 would start about 8 miles south of Schurz, where the Schurz bypass alternative alignments rejoin the DoD rail line, traveling about 21 miles on the existing DoD rail line to the Thorne Siding in Hawthorne. From the Thorne Siding, this common segment generally follows U.S. 95 from Hawthorne south along the floor of Soda Springs Valley. The Carson-Colorado rail bed (narrow gage, constructed in 1881, abandoned in 1938) would be followed initially, but as the valley veers southward, the segment is located on the east side of the valley, on the opposite side of the valley from U.S. 95. The common segment then bypasses the small towns of Luning, Mina, Sodaville, and Coaldale, and maintains a position approximately 2 to 3 miles east of U.S. 95. At Tonopah Junction, the segment follows the old rail roadbed (abandoned in 1946) southward. At Redlich Pass (at the Mineral/Esmeralda County border), the segment parallels U.S. 95 immediately on the east. From Redlich Pass to Blair Junction, the segment traverses the alluvial fans on the east side of the valley, within approximately 1 mile of U.S. 95. The common segment crosses over U.S. 95 about 0.5 mile east of Blair Junction, and the Mina corridor splits into two alternative alignments to bypass the Montezuma Range.

Montezuma Range: Two alternative alignments depart near Blair Junction at the intersection of U.S. 95 and U.S. 6 to avoid the Montezuma Range; they rejoin at a point just east of Lida

Junction. The first alignment, Montezuma Range 1 (MN1), would depart Blair Junction paralleling State Route 265 (NV-265) to the Town of Silver Peak where it would proceed north to follow the western side of Clayton Ridge. The alignment would then turn south approximately 10 miles before Railroad Pass at which point it would turn east between the southern end of the Goldfield Hills and the Cuprite Hills. The alignment would then cross U.S. 95 about 5 miles north of Lida Junction and, paralleling U.S. 95, then head south to a point just east of Lida Junction. Montezuma Range 1 would be about 83 miles long.

Montezuma Range 2 (MN2), after departing from the intersection of U.S. 95 and U.S. 6, would follow the abandoned Tonopah & Goldfield rail roadbed east to the north of Lone Mountain, at which point the alignment would head south following the abandoned roadbed. The alignment would traverse Montezuma Valley south to Klondike and would then parallel U.S. 95 as it approaches the Town of Goldfield. Montezuma Range 2 would stay west of Goldfield and then trend southeasterly to a point just east of Lida Junction where it would reconnect with Montezuma Range 1. Montezuma Range 2 would be about 84 miles long.

Mina Common Segment 2 (MCS2): MCS2 would begin at the point just east of Lida Junction, where alternative alignments MN1 and MN2 meet, and would follow the proposed CRC for about 5 miles to the northern end of the Bonnie Claire alternatives.

Bonnie Claire: Bonnie Claire 2 would depart MCS2 about 5 miles north of Stonewall Pass and would trend east toward the Nevada Test and Training Range for about 3 miles before turning south for an additional 11 miles. Bonnie Claire 2 generally would follow the Nevada Test and Training Range boundary and would join Common Segment 5 in Sarcobatus Flats to the north of Scottys Junction near the intersection of State Route 267 (NV-267) and U.S. 95. Bonnie Claire 2 would be approximately 12 miles long.

Bonnie Claire 3 would depart MCS2 about 5 miles north of Stonewall Pass. Bonnie Claire 3 would trend generally south, paralleling U.S. 95 to the east. After approximately 6 miles, Bonnie Claire 3 would turn southeast and continue for an additional 6 miles through Sarcobatus Flats. It would then join Common Segment 5 approximately 2 miles north of Scottys Junction near the intersection of NV-267 and U.S. 95. Bonnie Claire 3 would be approximately 12 miles long.

Common Segment 5 (CS5): CS5 would begin about 2 miles east of U.S. 95 and trend southeast through the Sarcobatus Flat Area, and along U.S. 95. CS5 would end approximately 4 miles north of Springdale, where it would connect to the Oasis Valley alternative alignments. CS5 would be about 25 miles long.

Oasis Valley: Oasis Valley 1 would depart Common Segment 5 about 2 miles north of Oasis Mountain and would run southeast and connect to Common Segment 6. Oasis Valley 1 would be approximately 6 miles long.

Oasis Valley 3 would also depart Common Segment 5 about 2 miles north of Oasis Mountain and would run generally east and then south before crossing Oasis Valley farther to the east than Oasis Valley 1, and then connecting to Common Segment 6. Oasis Valley 3 would be 9 miles long.

Common Segment 6 (CS6): CS6 would begin about 3 miles southeast of Springdale and 2 miles east of U.S. 95. Common segment 6 would trend generally southeast for 25 miles to the boundary of the Nevada Test Site. It would then turn north near the southern end of Busted Butte, running west of Fran Ridge and then trending generally north for an additional 7 miles until terminating at Yucca Mountain. CS6 would be approximately 32 miles long.

Figure 1.2-1 provides a regional perspective showing the Mina corridor from Interstate 80 to the proposed Yucca Mountain geologic repository site. Figure 1.2-2 is a key map for thirteen detailed maps presented in Appendix B. Each map focuses on a unique geographical area along the route. These maps should be used in conjunction with the information in Appendix A.

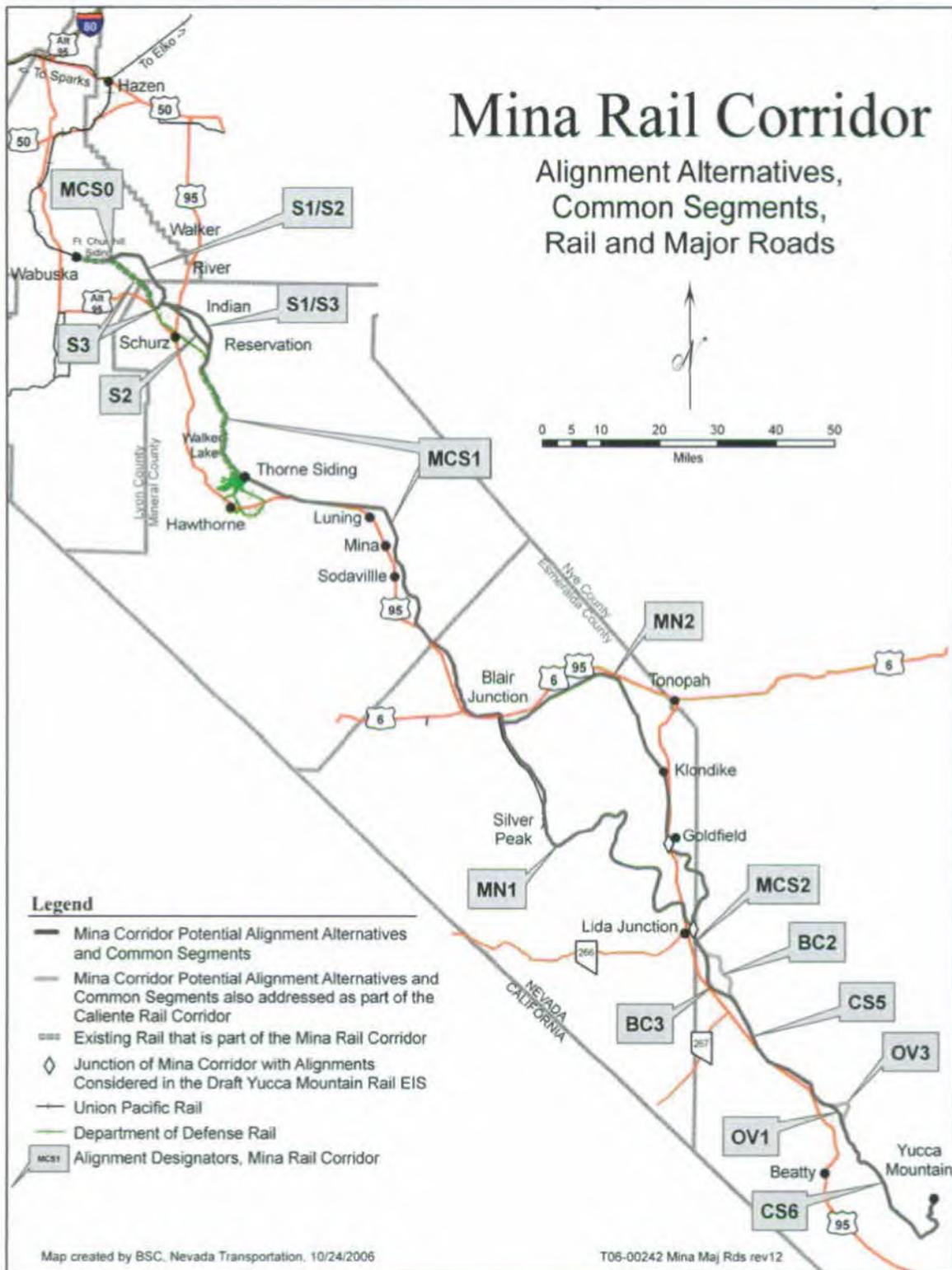


Figure 1.2-1. Alignment Alternatives, Rail and Major Roads

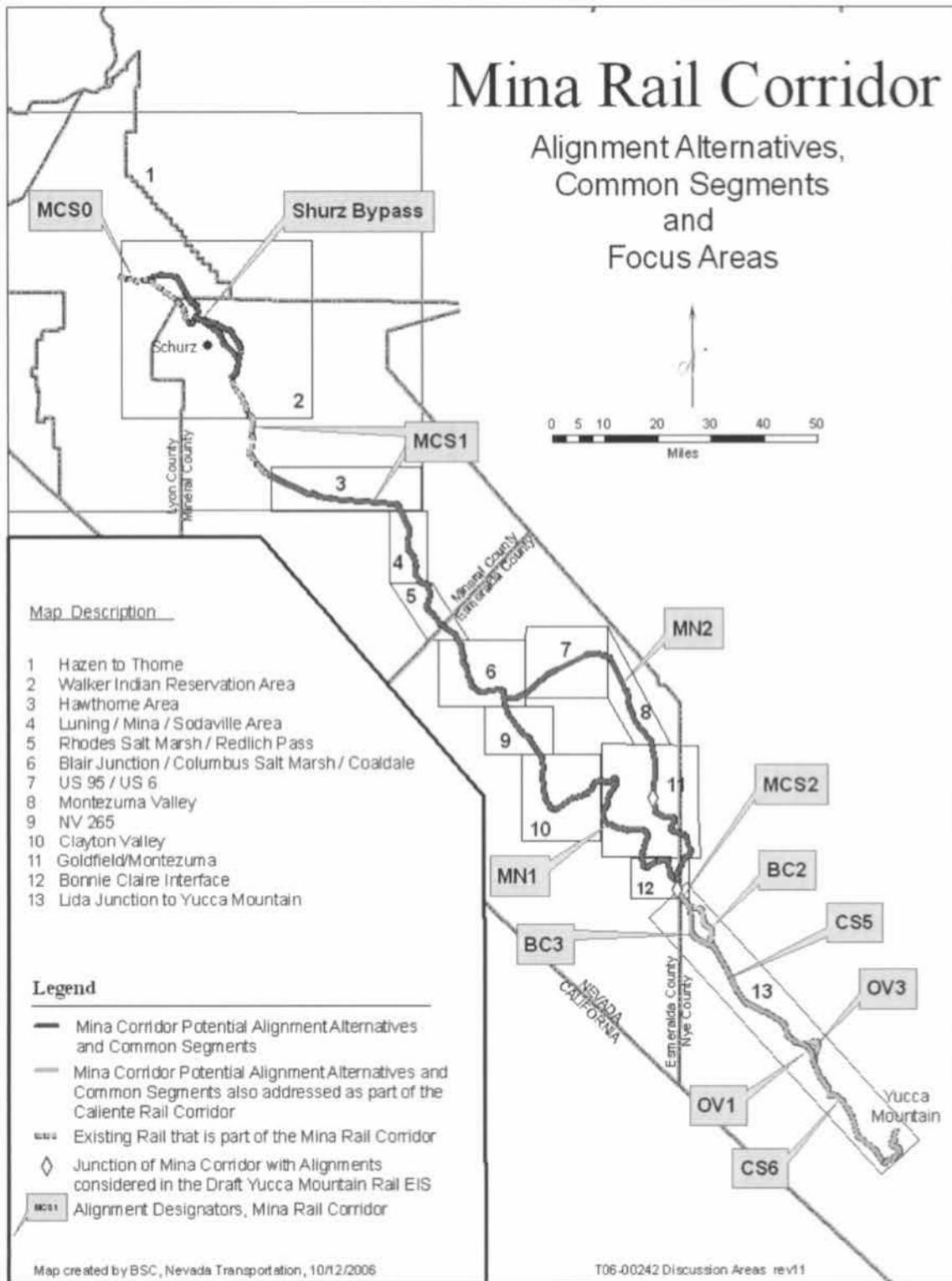


Figure 1.2-2. Alignment Alternatives and Focus Areas

2. LAND USE AND RESOURCE CONFLICTS

This section describes land ownership and potential land use along the Mina corridor. It also describes what is known about the presence of hazardous and solid-waste disposal sites (Section 2.2), cultural resources (Section 2.3), biological resources (Section 2.4), and surface waters (Section 2.5), from the Thorne Siding to Yucca Mountain as these may influence the location or timing of rail-line construction. Land ownership and management are also examined for the area near Wabuska and the Fort Churchill Siding where a staging yard may be constructed. Land use and resource conflicts are not examined along the existing track from the Fort Churchill Siding to the Thorne Siding.

The information presented in this section and in the corresponding references was used to develop the common segments and alternative alignments described in this study, and to meet the design criteria described in Section 3.1. The team developing this study worked collaboratively to collect information on potential land-use conflicts and to review potential changes that avoided conflicts and met the design criteria.

2.1 LAND OWNERSHIP AND MANAGEMENT

Land ownership and potential land use conflicts were identified along the corridor using data obtained from the U.S. Bureau of Land Management (BLM) and U.S. Bureau of Indian Affairs (BIA). Data included detailed information on property ownership, mining claims, grazing allotments, and other land uses along the Mina corridor.

Areas of land ownership within the right-of-way (ROW) of the Mina corridor are presented in Table 2.1-1. Approximately 90% to 91% of the total land for the Mina corridor is on BLM land; 3% is on the property of the Hawthorne Army Depot, owned by the DoD; 4% is on land owned by DOE; 1% to 2% is on privately owned land; and the Town of Schurz alternative alignments cross the Indian Reservation for 1% of the total land for the Mina corridor.

The Mina corridor would cross two BLM resource management and planning areas. North and west of the boundary of Mineral and Esmeralda counties, Mina Common Segment 1 (MCS1) and a small portion of two of the three Schurz Bypass alternative alignments are within the Carson City Field Office resource management area. Management goals and objectives for that area are described in the Carson City Field Office Consolidated Resource Management Plan (BLM 2001). The remainder of the corridor is within the BLM Tonopah resource management area. Management objectives for that land are described in the Tonopah Resource Management Plan and Record of Decision (BLM 1997).

Table 2.1-1. Land Areas contained within the Right-of-Way of the Mina corridor, including Schurz Bypass 1 (S1)

Land Owner	Mina corridor via MN1		Mina corridor via MN2	
	Acres	Percent	Acres	Percent
BLM	25,015	91	24,938	90
DoD	837	3	837	3
DOE	985	4	985	4
Private	292	1	505	2
WRPT	354	1	354	1
Totals	27,483	100	27,619	100

Notes:

1. WRPT = Walker River Paiute Tribe.
2. ROW for WRPT lands calculated at 100 ft.
3. ROW for all others based on 1,000 ft.
4. Land areas for existing track are not included.

From the Hawthorne Army Depot to Yucca Mountain, the corridor does not cross any wilderness areas, wilderness study areas, areas of critical environmental concern, or special recreation management areas. Depending upon the alternative, the corridor crosses 9 (MN2) or 12 (MN1) grazing allotments, and 3 (MN 1) or 4 (MN2) wild horse or burro herd management areas.

The corridor would require three grade-separated crossings of U.S. 95: one north of Schurz (using any of the Schurz Bypass alternative alignments); one east of Blair Junction (MCS1); and one south of Goldfield (MN1 and MN2) (Appendix B, Maps 1, 2, 6, 11, and 12). These crossings over U.S. 95 would require an occupancy permit from the Nevada Department of Transportation (NDOT), and approval from the Nevada Public Utility Commission. Crossings of roads may also require permissions from other affected stakeholders (e.g., county governments). Such specific requirements will be identified through stakeholder interfaces, as appropriate.

Construction and operational Rights-of-Way (ROW) will need to be negotiated in order to build and operate a rail line within the Mina corridor. It is anticipated that a nominal 1000-foot construction ROW across BLM lands, narrowing as appropriate where existing land uses (private land, existing ROWs, etc.) may restrict construction operations, will be required. On lands owned by the Walker River Paiute Tribe, the required ROW will be designated in accordance with 25 CFR 169 (Bureau of Indian Affairs, Department of Interior, Part 169, Right of Way Over Indian Lands).

Schurz Bypass—The Schurz Bypass alternative alignments are located primarily within the Walker River Paiute Tribe Reservation. Portions (either one-quarter, one-eighth, or one-sixteenth of a section parcels, as depicted in parcel maps from the BIA) of this Reservation were distributed to tribal members as private allotments held in trust by the United States for the benefit of those members. These lands are now private lands, and border or encompass the Walker River and/or the Weber Reservoir.

The northern alternatives of the Schurz Bypass (S1 and S2), which are approximately 32 and 31 miles long, respectively, would tie in to the existing rail line northwest of Weber Reservoir, on property managed by the BLM. The first 1.1 miles of S1 and S2 cross BLM land (Appendix B, Map 2); the remainder of these alternatives are on the Reservation. These alternatives do not cross any private allotments on the Reservation.

The southern alternative alignment of the Schurz Bypass (S3) is approximately 31 miles long with 12 miles of DoD rail line and 19 miles of new construction, and is almost entirely within the Reservation (Appendix B, Map 2). The new construction of this alternative alignment comes within 300 feet of a private allotment along the Walker River, but the rest of the alignment is generally more than 1 or 2 miles from these private landholdings; S3 bypasses the town of Schurz to the east, and is approximately 0.4 to 1.2 miles east of the private allotments (Appendix B, Map 2). The allotments have no private residences, and are used for agriculture.

Before conducting any site-characterization activities, DOE must obtain permission to survey for a ROW and apply for a ROW reservation in accordance with the requirements in 25 CFR 169, "Rights-Of-Way over Indian Lands." This process is described in 25 CFR 169 (Bureau of Indian Affairs, Department of Interior, Part 169 Right of Way Over Indian Lands).

Although this may affect the design of the rail line, and may result in additional planning tasks, it does not affect the overall feasibility of the Mina corridor.

MCS1—Common segment MCS1 is 92 miles long with 21 miles of DoD rail line and approximately 71 miles of new construction. Roughly 87 percent of this approximately 71-mile-long new construction crosses land managed by the BLM; of the remaining portion, 10 percent is on the Hawthorne Army Depot, and 3 percent is across private property (Appendix B, Maps 3 through 6).

A ROW to construct the rail line on the Hawthorne Army Depot would have to be obtained from the U.S. Army Corps of Engineers. Prior to issuance of that ROW, the DoD would have to meet their requirements for compliance with the National Environmental Policy Act.

Due east of the Hawthorne Army Depot, the segment crosses approximately 2 miles of private property (Appendix B, Map 3).

The MCS 1 segment centerline is within 500 feet of three other parcels of private property. One private landholding located approximately 4 miles east of the Hawthorne Army Depot can be avoided by passing between that property and U.S. 95, although the construction ROW (the construction ROW differs from the operational ROW in that it is a temporary disturbance to facilitate rail line construction and, as such, represents a larger footprint than the long-term operational ROW) might encroach on that property (Appendix B, Map 3).

The common segment passes just to the east of private property in Soda Springs Valley, southeast of Luning, and at Sodaville (Appendix B, Map 4). The construction ROW may also encroach upon those properties, although it may be possible to avoid them by shifting the segment to the east, or restricting disturbances in those areas. Private property elsewhere in Soda Springs Valley (e.g., near the towns of Luning and Mina) can be avoided by more than 0.25 mile (Appendix B, Maps 4 and 5).

Parcels of property within 500 feet of the MCS1 segment centerline at Mina, Sodaville, Coaldale, and Blair Junction have been designated as suitable for disposal by the BLM. This means these federally managed lands could be traded for private or State land of equal value. While current land ownership status does not impact feasibility, should the ownership status of these lands change, access planning and design could be affected. A change in ownership of these lands could complicate the process of obtaining access to lands required to construct the rail line.

MN1—This 83-mile-long alternative alignment is almost entirely on land managed by the BLM. The only private property within 0.5 mile of this route is at Silver Peak. This alternative alignment is on an approximately 0.35-mile-wide strip of Federal property that passes through Silver Peak and has private property immediately to the east and west (Appendix B, Map 10). There are power lines and roads (and possibly other infrastructure) on or adjacent to the alignment at that location. The proximity of the alignment to the town and existing infrastructure would require close coordination with property owners and Esmeralda County.

From approximately 3.3 miles north to 3.0 miles south of Silver Peak, alternative alignment MN1 crosses land designated by the BLM as suitable for disposal, and passes near, and might cross (available map information does not provide adequate resolution for a conclusive assessment), BLM Visual Resource Management Class III areas east of NV-265 and NV-266, and a Class II area north of Railroad Pass in the Montezuma Range (BLM 1997). If the rail line alters the view from a "key observation point," or crosses these areas, mitigation may be required to ensure the visual impacts of the route are in accordance with BLM management criteria. There are no lands designated as suitable for disposal within 0.5 mile of MN1.

MN2—Ninety-eight percent of the land within 500 feet of the centerline of this 84-mile-long alternative alignment is managed by the BLM, and 2 percent is private property. MN2 crosses approximately 1 mile of private property at Millers (Appendix B, Map 7). There are active mineral processing facilities, power lines, and a sub-station on this property to the north of the alignment at Millers. There are also historic artifacts on and near this property. Because the private land extends from U.S. 95 south to the foothills of Lone Mountain, there probably is no alternative location for the alignment that would avoid crossing this private property. For approximately 0.3 mile along the alignment, lands to the west of the private property at Millers (and within 500 feet of the alignment) have been designated by the BLM as suitable for disposal. In the same area, for approximately 1.5 miles along the alignment, lands to the east of the private property (and within 500 feet of the alignment) have been designated by the BLM as suitable for disposal.

Near Goldfield, a total of approximately 0.5 mile of the alternative alignment crosses four parcels of private property (Appendix B, Map 11). The alignment also is within 500 feet of private property at four other locations in this area. Around Goldfield, approximately 9.2 miles of the alignment crosses lands that have been identified by the BLM as suitable for disposal.

MCS2—All of this 2.2 mile long common segment crosses land managed by BLM.

BC2, BC3, CS5, OV1, OV2, CS6—Ninety-one percent of the lands within 500 feet of this 75 to 77-mile-long section is managed by the BLM, 8.7 percent is on the DOE-managed Nevada Test

Site, and 0.3 percent is private property. Alternative alignment OV1 crosses one private land holding. Near Scottys Junction, the segment is within 500 feet of, but does not cross, two sections of land that have been identified by the BLM as suitable for disposal (Appendix B, Map 13).

2.2 HAZARDOUS MATERIALS AND WASTE DISPOSAL SITES

Enforcement of the Comprehensive Environmental Resource Conservation and Liability Act along the Mina corridor is within the jurisdiction of Region 9 of the U.S. Environmental Protection Agency. A search of documents prepared and managed by the Environmental Protection Agency revealed no Superfund sites that are within or near the Mina corridor. The same documents also indicated there are currently no sites within or near the corridor with the potential for listing as Superfund sites. In addition, there are no recorded Corrective Action sites, as regulated under the Resource Conservation and Recovery Act, within or near the corridor.

Management of hazardous materials and waste disposal in Nevada is regulated by the Nevada Division of Environmental Protection. A search of the Division's solid-waste management records indicated there are one open and four closed landfills near the Mina corridor. These landfills are far enough away from the corridor (approximately 0.5 mile) that they will not create direct land-use conflicts.

2.3 CULTURAL RESOURCES

In 2006, an archeological records search was conducted for the common segments and alignments located between Wabuska to just south of Lida Junction, where the Mina corridor becomes coincident with the Caliente corridor (*Class I Archeological Site Records Search for the Proposed Mina Rail Route* [DRI 2006]). This search included properties located within a 2-mile swath centered on segments and alignments S 1 , S2, S3, MCS1, MN1, and MN2. The total search length was approximately 400 miles encompassing a search area of about 850 square miles. In 2005, a records search was conducted for a 2-mile swath centered on the Caliente corridor, which is coincident with the Mina corridor common segment MCS2, CS5 and CS6, and preliminary alternative BC2, BC3, OV1, and OV3 (CRWMS M&O 1999). For both searches, records of cultural resources investigations and archaeological sites housed at Nevada's two archaeological information centers (University of Nevada Las Vegas Harry Reid Center and Nevada State Museum) and at appropriate Bureau of Land Management offices, were reported. For resource protection, the location of archeological sites is considered sensitive; hence this information is not included in Appendix A.

Results of the records search for common segments MCSO and MCS 1 and alternative alignments 51, S2, S3, MN1 and MN2 were based on approximately 180 on-the-ground archaeological investigations previously conducted within the 2-mile-wide search area. These investigations were completed for various reasons, such as transmission-line or highway-construction activities, and range from small surveys on limited parcels of land to extensive surveys of hundreds or thousands of acres. The field investigations cover less than 5 percent of the total records search area of about 850 square miles. The percent of area covered by archaeological investigations within a 2-mile swath of MCS2 and alternative alignments BC2, BC3, OV1 and OV3 and

common segments CS5 and CS6 is similar. Thus, future on-the-ground surveys of the entire corridor will likely identify a number of additional archeological sites within the 2-mile zone.

The records search for the Mina corridor identified approximately 500 properties recorded as archaeological sites (Table 2.3-1). The sites ranged in size from isolated artifacts and small scatters of artifacts to town sites and transportation networks (e.g., stage roads and railroad grades). Most sites are not considered eligible for inclusion in the National Register of Historic Properties (NRHP); however, a small number (about 10 percent) were deemed significant or eligible. A sizeable number of sites have not been evaluated for eligibility for inclusion in the NRHP, and the eligibility of these sites is considered "unknown."

The town of Goldfield and the surrounding area are particularly sensitive for historic resources. The 1000-foot construction ROW for alignment MN2 runs just west of the official boundary of the Goldfield Historic District; however, early photographs of Goldfield reflect a town boundary that extended west to the base of Malpais Mesa. To the north, the MN2 alignment construction zone lies just east of the Goldfield Cemetery boundary, but there is historic confusion over burial plot locations and therefore the boundary is questionable. MN2 also runs through the extensive NRHP-eligible Goldfield dump and crosses an eligible segment of the Tonopah & Goldfield Railroad north of town. In addition, there is the potential of buried prehistoric sites at nearby springs, as evidenced by local rock art.

Another area of interest lies along alternative alignment MN2, the Millers town site. The town site is less than one mile south of the centerline, and was considered significant when recorded in 1981. Millers was formerly a station on the Tonopah & Goldfield Railroad, and a mill site for Tonopah ores. Also nearby are a number of prehistoric sites, some of which are eligible or potentially eligible for inclusion in the NRHP. Although none of the known prehistoric sites are of immediate concern, there is a potential for early sites along this section of the rail corridor.

Alternative alignment MN1 runs adjacent to Cuprite, an unrecorded railroad station along the Bullfrog-Goldfield Railroad near Ralston. The station had a post office and served the gold camps of Lida, Hornsilver, Bonnie Clare, and Tule Canyon in the early 20th Century.

Common segment MCS2, CS5 and CS6, and alternative alignments BC2, BC3, OV1 and OV3 and lie within one mile of several cultural sites, including Steward's Western Shoshone Village at the south edge of Oasis Mountain, the Beatty Wash Petroglyphs, and Black Cone, which has been identified on visits by ethnographers and Native Americans as a place of religious significance or power.

In addition, the Mina corridor passes near known historic graves, including a Chinese grave and the historic cemetery at Millers town site. Furthermore, it is likely that numerous prehistoric sites not currently evaluated will, upon further examination, be considered eligible for inclusion in the NRHP.

Table 2.3-1. Number of Cultural Resource Properties Reported. by Class and NRHP Status

NRHP Status	Prehistoric	Historic	Prehistoric and Historic	Unknown	Total
Eligible	21	25	2	2	50
Not Eligible	233	53	28	4	318
Unknown	102	16	8	9	135
Total	356	94	38	15	503

Based on the results from the initial archaeological record searches, it is concluded that, along the Mina corridor, archeological resources will be encountered that will require mitigation through avoidance or treatment.

Historic Trash Dumps and Debris Scatters-Several historic trash dump and debris scatters sites were identified along the Mina corridor during the archaeological records search. Of note is the Goldfield dump, which covers a large area west of Goldfield and is eligible for the NRHP. based on its prospective ability to contribute important information to questions about mining camp housing and lifeways. Alternative alignment MN2 intersects the Goldfield dump.

Neither the EPA nor NDEP has declared the Goldfield dump a waste area for management purposes, nor has it been prioritized for cleanup by the Nevada Interagency Abandoned Mine Land Environmental Task Force (N1AMLETF 1999). Therefore, no additional data on the contents of the dump were obtained during the records searches. Future environmental and archaeological field investigations will likely identify additional historic dumps and mitigations such as avoidance or treatment, including any required remediation, will be completed as necessary.

2.4 BIOLOGICAL RESOURCES

Database searches, literature reviews, and field reconnaissance surveys were conducted to identify threatened and endangered species and other special-status plants and animal species that are afforded protection or special management under federal or state laws and regulations.

Threatened and Endangered Species—Four animal species classified as threatened under the Endangered Species Act, and one plant species classified as critically endangered by Nevada, occur on or near the Mina corridor (50 CFR 17.11 and 17.12; Nevada Administrative Code 527.010). Consultation with the U.S. Fish and Wildlife Service would be required for three of the threatened species. It is expected the presence of these species would not impact the feasibility of the corridor.

Lahontan cutthroat trout (*Oncorhynchus clarki henshaw* Oare 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. Re-establishment of a self-sustaining population of Lahontan cutthroat trout in the Walker River system is a prerequisite for recovery of this species (U.S. Fish and Wildlife Service 1995; Miller Ecological Consultants 2005), To construct a

bridge across the Walker River for a Schurz Bypass alternative alignment, impacts to water quality and flow would have to be minimized, and construction might be prohibited from April through July if the river bears sufficient water for fish migration.

Upstream and downstream of Weber Dam, portions of the Walker River are winter habitat for bald eagles (*Haliaeetus leucocephalus*) (URS Corporation 2006; Miller Ecological Consultants 2005, Section 3.5.4.1). Impacts to winter habitat along the Walker River would have to be minimized during construction of a bridge for a Schurz Bypass alignment, and restrictions might be placed on the time of year during which construction can occur.

Desert tortoise (*Gopherus agassizii*) occur from approximately Beatty Wash to Yucca Mountain. Along the route in that area, the abundance of this threatened species is low to very low (CRWMS M&O 1999a). Mitigation measures similar to those conducted at Yucca Mountain, such as surveys for tortoises prior to construction, reclamation of disturbed lands, and employee education, will be required for all construction activities within tortoise habitat.

Railroad Valley springfish (*Crenichthys nevadae*) have been introduced into a spring at Sodaville (U.S. Fish and Wildlife Service 1996, p. 14). The spring is more than 1 mile from the corridor, and this fish would not be affected by construction or operation of the rail line. Formal consultation with the U.S. Fish and Wildlife Service would not be required for this species.

The Sodaville milkvetch (*Astragalus lentiginosus Douglas var. sesquimetalis*) is found along the outflow of a spring at Sodaville. This plant species is classified as critically endangered by Nevada (Nevada Administrative Code 527.010). The spring and outflow are more than 1 mile from the corridor, and this plant would not be affected by construction or operation of the rail line.

Other Special Status Species—Other protected species, including those classified as sensitive by the BLM (BLM 2003), that may occur on or near the corridor were identified by examining BLM resource management plans (BLM 1994) and the Nevada Natural Heritage Database. Field surveys were conducted to evaluate potential habitat for special-status species along portions of the corridor. Those surveys are described in the *Biological Field Findings Report for Potential Rail Alignments along the Mina Route* (URS Corporation 2006).

More than 25 special-status species (exclusive of those classified as threatened or endangered and described above) that may be found along the Mina corridor were identified. Most of those species are bats that may roost in mines, and plants that are restricted to very sandy soils, alkaline or salty soils, rocky or gravelly areas, or riparian areas. *The Biological Field Findings Report for Potential Rail Alignments along the Mina Route* (URS Corporation 2006) and *Environmental Baseline File for Biological Resources* (CRWMS M&O 1999a) describe where those species may occur along the corridor. Additional surveys for these special-status species, and other special-status species identified by Federal land and natural resource management agencies, may be required prior to construction of the rail line. In addition, to minimize impacts to biological resources, those resource management agencies may require some modifications of the common segments or alternative alignments, and other mitigation measures.

In summary, threatened or endangered species, and other special-status biological resources, are known to occur at only a few locations along the corridor. In these areas, the design, construction, and operation of the rail line will have to include plans to mitigate impacts to these resources. The presence of these species should not prevent construction of the Mina corridor.

2.5 SURFACE WATERS

The only perennial surface water crossed by the Mina corridor is the Walker River either north (using S1 or S2) or south (using S3) of the Weber Reservoir; the corridor is also near a small number of wetlands, springs, and wells.

Wetlands—Information on the location of wetlands along the corridor was obtained from the National Wetlands Inventory (1:100,000-scale data), a database managed by the U.S. Fish and Wildlife Service.

The National Wetlands Inventory database indicates there are freshwater emergent wetlands along the Walker River where it would be crossed by Schurz Bypass alternatives S1 and S2 upstream of Weber Reservoir, and approximately 0.2 mile west of where these alternative alignments would reconnect with the existing DoD rail line. Based on observations made during surveys for sensitive species (URS Corporation 2006), it is likely there are also similar wetlands where the river would be crossed downstream of Weber Reservoir by Schurz Bypass alternative S3. These wetlands, other waters of the U.S. in the Walker River hydrographic basin crossed by the Schurz Bypass and MCS1, and some ephemeral washes crossed by OV1, OV3, and CS6 are regulated under Section 404 of the Clean Water Act. Thus, it would be necessary to obtain a permit from the U.S. Army Corps of Engineers before placing fill material in those waters. To obtain a permit, the Department would be required to evaluate alternative crossing locations and bridge designs that minimize impacts to wetlands and other waters. All other hydrographic basins crossed by the Mina corridor are intrastate basins, and it is likely Section 404 permits would not be needed to fill wetlands, ephemeral washes, and other waters in those basins.

The National Wetlands Inventory database shows ephemeral lakes (i.e., playas) within 0.25 mile of the corridor at the following locations:

- At the north end of the Garfield Hills (MCS 1),
- In Soda Springs Valley near Mina (MCS 1),
- In the Big Smokey Valley (MN1), and
- In Stonewall Valley (MN2).

These playas generally are devoid of vegetation, but some may have shrub wetland vegetation along their edges. The National Wetlands Inventory database also identified a water holding pond near Silver Peak (MN1) within 0.25 mile of the corridor.

Springs and Wells—Four springs, groups of springs, or wells were identified within 0.25 mile of the corridor by searching the U.S. Geological Survey 1:100,000-scale database of Nevada springs, wells, and other water bodies. There is an unnamed well approximately 800 feet north of common segment MCS1, at the west end of Sand Springs Valley. Rabbit Springs is approximately 700 feet from alternative alignment MN2, just south of Goldfield. OV1 is about

450 to 1,500 feet from a group of springs in Oasis Valley. Ov3 is about 500 feet from Colson Pond at from Colson Pond at the pond's feeding springs.

While none of the perennial waters, wetlands, and springs present an obstacle to the overall feasibility of the Mina corridor, specific permitting processes (Section 404) will need to be incorporated into any planning/design effort, and construction activities may have to be modified to avoid impacts to springs, wetlands, and affected biota.

2.6 MINING AND GROUND DISTURBANCE

Active and inactive mining claims along the Mina corridor were extracted from the BLM's LR2000 database (BLM 2006). The data utilized presents locations of these claims at a section level (one mile square). Further analysis will be needed to determine the exact extents of these claims and the subsequent determination of whether or not they could impact the development of the rail line and the associated construction ROW.

Based on the LR2000 data, six areas along the Mina corridor have elevated concentrations of unpatented mining claims. These areas include the eastern side of Soda Spring Valley (east of the town of Luning), several sections east of the town of Mina on the far side of Soda Spring Valley, the vicinity of Silver Peak, the summit region of the Montezuma Range, the southern portion of MN1 (Cuprite Hills area), and the Goldfield Area (south of the town of Goldfield) along MN2.

Mining claims of interest to the MRR, in the Mina and Luning areas, are lode claims (hardrock) located on surficial alluvial material. There are several mining engineering practices that can be implemented in these areas to allow claimants access to these lodes without affecting the rail line. The placer claims around Silver Peak are primarily affiliated with existing evaporate mining in the area. Preliminary field reconnaissance on the summit of the Montezuma Range revealed that the claims in this area are in hardrock slopes located topographically well above the corridor. The mining claims in the Cuprite and Goldfield areas may require either alignment relocation or the application of specific engineering practices depending upon the extent of subsurface workings and the exact locations of those claims.

3. DESIGN ANALYSIS

3.1 DESIGN CRITERIA

This section identifies key design criteria used to evaluate the feasibility of the Mina corridor. The design criteria used in the *Preliminary Rail Access Study* (OCRWM 1990) has since been updated to reflect changes in the cask car train, including longer and heavier cask cars than previously considered. The locomotives required to pull the trains are also larger, and have six axles. These changes result in flatter allowable maximum grades, and flatter allowable horizontal curvature. Engineers used these criteria to develop segment/alignment designs with USGS 1:24,000 scale maps. These maps defined existing infrastructure such as roads, washes, and private land. An engineering software tool, "Inroads," was used to calculate earthwork quantities and costs. S I, S2, S3, MCS1, MN1/MN2, MCS2, and the southern portion of MN2 south and west of Goldfield were engineered using photogrammetrically derived 5-foot topographical information for the Caliente rail corridor.

General. Railway and bridge design complies with the railroad-industry recommendations, as prescribed in the current edition of the American Railway Engineering and Maintenance-of-Way Association (AREMA) Manual, AAR standards, and the standards of the UPRR. Civil engineering elements will generally meet the requirements of the NDOT. The proposed railroad is designed for train speeds of 50 mph where grades and curves allow. The track and bridges are designed to carry the proposed cask cars, as well as all other general freight and locomotives.

Design requirements have been placed in the BSC requirements management system. These requirements were obtained from the *Nevada Transportation Requirements Document* (BSC 2005).

Grades. The maximum grade allowed for the track alignment is 2.0 percent. A dedicated cask-car train with six cars and two locomotives will be unable to maintain speeds of 50 mph on grades in excess of 1.5%.

Horizontal Alignment and Curvature. The desirable minimum radius curvature on main line track is 2,865 feet. The absolute minimum is 955 feet. Curves will be held to a minimum of 2,084 feet wherever possible. Curves shorter than 2,084 feet cause train speeds to be reduced below 50 mph.

Right-of-Way and Land-Use Conflicts. The ROW will be established within a 1,000-foot width on BLM lands, to allow for cut-and-fill slopes and track Sidings. ROW widths across Native American lands will be determined in accordance with 29 CFR 169.

Land research will indicate areas of proposed land-use changes on Federal, state, county, and local land.

Bridges. Short-span bridges will be constructed with pre-cast concrete sections. Long-span bridges, such as the one planned for Beatty Wash, will be designed for the heaviest car loading combination defined for the project. Heavily traveled paved highways will be grade separated from the railroad.

3.2 DESIGN EVALUATION OF MINA RAIL CORRIDOR ALTERNATIVES

Common segment and alternative alignment information is based on *Mina Route Plan and Profiles* (NRP 2006). The *Mina Route Alignment Development Evolution Report* (NRP 2006) details characteristics related with the Mina corridor. Characteristics are summarized in Table 3.2-1, *Rail Alignment Characteristics*. The following paragraphs summarize the design feasibility of new construction within the proposed Mina corridor.

Schurz Bypass Alternatives

Three alternative alignments have been investigated for the bypass around Schurz. These are:

1. 51: An alignment over Walker River, above Weber Reservoir, that is located further into the sandy hills northeast of Schurz.

2. S2: An alignment over Walker River, above Weber Reservoir, on the northeast of Schurz.
3. S3: An alignment over Walker River Gorge, below Weber Reservoir, that stays at least 3 miles from Schurz.

Alignment S3 requires a 3,000-foot bridge that would be 145 feet above the Walker River.

The design and construction of S1 and S2 will require resolution of the geotechnical issues (sandy soils) associated with this area.

There are no other particular engineering issues associated with the construction of these alternative alignments.

Hawthorne to Stonewall Pass (South of Lida Junction)

Between Hawthorne and Blair Junction (MCS1), the common segment generally follows the old Tonopah & Goldfield Railroad route. The original Tonopah & Goldfield Railroad route used some grades that exceed modern railroad standards, and the route went through the center of Luning, Mina, and Sodaville. The proposed common segment is across the valley from these towns, and has been designed to meet the current grade restrictions.

For alternative alignment MN2, the Tonopah & Goldfield line was also followed into the Goldfield area, using the flat grades through Montezuma Valley. Alternative alignment MN 1 follows the old Silver Peak Branch to Blair, and crosses Clayton Valley to the base of the Montezuma Range.

Alignment MN1 requires a climb to 1,700 feet, over a distance of 17 miles, to reach the pass of the Montezuma Range. Alignment MN2 climbs 1,235 feet, over a distance of 16 miles, to cross the Goldfield Hills. Engineering issues are:

- Alignment MN1 may require cuts through some areas of unpatented mining and abandoned claims known to be located on or near the alignment in the Montezuma Range. Preliminary field reconnaissance however, revealed that many of the mines in this area are in hardrock located on side slopes well above the alignment. This alternative alignment has few other engineering issues.
- Alternative alignment MN2 has few engineering issues.

Once south of the Montezuma Range, there are few engineering issues, and the alternative alignments connect to the common segment MCS2 in the Bonnie Claire area near Stonewall Pass.

Stonewall Pass to Yucca Mountain

Portions of the common segment from Stonewall Pass to Yucca Mountain (MCS2) are near or on the abandoned rail roadbed of the Las Vegas & Tonopah, which was abandoned in 1918. There

are also portions of the abandoned Bullfrog-Goldfield Railroad that are crossed by the Mina corridor from Stonewall Pass to Beatty (this line was abandoned in 1928).

Table 3.2-1. Rail Alignment Characteristics

	Length (Miles)	Major Bridges	Crossings	Curves	Terrain	Soils	Grade	Comments
Common								
MCSO	5	Existing DoD rail line						
Schurz Bypass								
S1	32	Walker River 500 feet long, 30 feet high	US-95 ¹	—	Flat	Sandy	—	—
S2	31	Walker River 500 feet long, 30 feet high	US-95 ¹	—	Flat	Sandy	—	—
S3	12	Existing DoD rail line						
	19	Walker River 3,000 feet long, 150 feet high	US-95 ¹	Sharp curve below dam	Flat	Sandy	—	Bridge maintenance
Common								
MCS1	21	Existing DoD rail line						
	71		SR 361 US-95 ¹	—	Mostly flat	Alluvial	11.8 miles > 1.5%	Avoids Luning, Mina, Sodaville, & Coaldale
Alternative Alignments								
MN1	73	—	At grade – Silver Peak Road US-95 ¹	1 at 2 degrees 30 min or greater	Mountainous for 28 miles (Montezuma Range) and 8 miles (Goldfield Valley)	Fine grained at playas in Clayton Valley	39.0 miles > 1.5%	Restricted train of < 35 mph for 40% of MN2
MN2	74	—	US-95 ¹ At grade – Silver Peak Road Tonopah At grade – Power Line Road	1 at 2 degrees 30 min or greater	Mountainous for 8 miles Deep cuts/fills of 100 ft	Sandy	15.0 miles > 1.5%	Follows abandoned rail roadbed for 40+ miles
Common								
MCS2	2	—	—	—	—	—	—	—
Caliente corridor alternative alignments and common segments shared with the Mina corridor								
BC2, BC3, CS5, OV1, OV3, & CS6	75	Beatty Wash	Tolicha Peak at grade	3 degrees at Beatty 6 deg. at EOL	Mountainous at Beatty and Busted Butte	Alluvial and rock	8.5 miles > 1.5%	—

NOTES: EOL = End of Line Facility.
Highway or road crosses over the railroad.

3.3 RAIL COST ESTIMATES

Cost estimates are based primarily on the length of the track to be constructed, and the earthwork required to construct the rail roadbed (Table 3.3-1). Additional design features, such as grade

separations or major bridges, have been considered, and incorporated as appropriate. Railroad features (e.g., signals, drainage, water requirements, construction camps, power distribution, etc.) have been included. This study used the *Order of Magnitude Cost Estimate for the Mina Route* (NRP 2006).

The estimates include an allowance for maintenance of existing DoD track during construction, to ensure the existing railroad is able to handle the projected construction-traffic volume. With the exception of the Schurz Bypass alignments, however, costs for any other upgrade, repair, or reconstruction of any existing DoD or UPRR railroad trackage are not included in these estimates.

Table 3.3-1. Mina Rail Corridor Alternative Alignments Cost Estimates to Build

Detail	Mina corridor via MN1 – Montezuma Pass and S1	Mina corridor via MN2 – Goldfield and S1
Cost [in 2005 dollars (U.S.)]	\$1,596,225,000	\$1,585,790,000
Length of New Construction	255 miles	256 miles

4. BRANCH LINE OPERATING PLAN

This section describes the existing operation of the Mina Branch, and two scenarios for operation once the extension to Yucca Mountain is constructed. The primary focus is on the potential interchange and staging yards in either Wabuska (Fort Churchill Power Plant) or Hawthorne. There is an assumption that the UPRR would deliver general freight and dedicated trains to one of these two destinations. The operations concept is more fully described in the *Mina Route Operations & Maintenance Options* (NRP 2006).

4.1 EXISTING OPERATIONS

The UPRR provides twice-weekly local service from its mainline connection at Hazen to industries between Hazen and the Wabuska area near the Fort Churchill Power Plant (a distance of approximately 43 miles). Occasionally (on average, once a month) the UPRR delivers a DoD train directly to the Thorne Siding. The UPRR has a trackage rights agreement with the DoD to operate trains from Wabuska to Thorne Siding on DoD track (a distance of approximately 54 miles). Due to slow-speed restrictions (maximum speed is 10 mph) on the DoD track, train crews must "overnight" in Hawthorne, thereby requiring 2 days for the UPRR to make the round trip (to Thorne Siding and back).

4.2 PROPOSED SCENARIOS

Figure 4.1-1 shows the mileage and travel times from Elko and Sparks to Wabuska, Hawthorne, and Yucca Mountain. The times in Figure 4.1-1 are based on improving track speeds to at least 25 mph on the DoD portion of the track, and assuming some lost time to passing trains. The trip to Yucca Mountain from either Wabuska or Hawthorne can be completed in a standard shift (8 hours), with little risk of a train crew running out of time. Based on these observations, Wabuska and Hawthorne appear to be feasible locations at which to stage the rail operations to Yucca Mountain. This section describes the potential operating scenarios.

Proposed rail operations of the Mina corridor conceivably could be handled under two operating scenarios. These scenarios have been identified based on the information provided and developed by BSC and Nevada Rail Partners. No formal discussions with the UPRR have been undertaken. Rail traffic volume is projected to be 20 trains per week (includes in-bound and out-bound traffic).

The possible scenarios are:

Scenario #1: Staging at Thorne Siding to change Train Crew and Locomotives

Assumption: The UPRR will deliver DOE/shared-use customer-generated rail traffic to Thorne Siding and separate from the UPRR locomotive power.

The DoD track on the Walker River Paiute Tribe Reservation, for the most part, would be relocated to newly constructed track east of the Weber Reservoir and the town of Schurz, a distance of 32 miles. The operating speed over this bypass would range from 50 mph to 60 mph using the design criteria implemented in the derivation of the CRC alignments. (Note: There are two other potential Schurz Bypass alternative alignments under consideration by DOE and the Walker River Paiute Tribe.) The balance of DoD track could be upgraded and maintained to support a maximum operating speed of 49 mph (unsignaled track with continuously welded rail).

At the Thorne Siding, a staging yard would be constructed to receive all rail traffic delivered by the UPRR, including dedicated cask trains. From the staging yard, the UPRR would pick up all rail traffic generated by DOE and/or shared-use customers and destined for transport over the national railroad network.

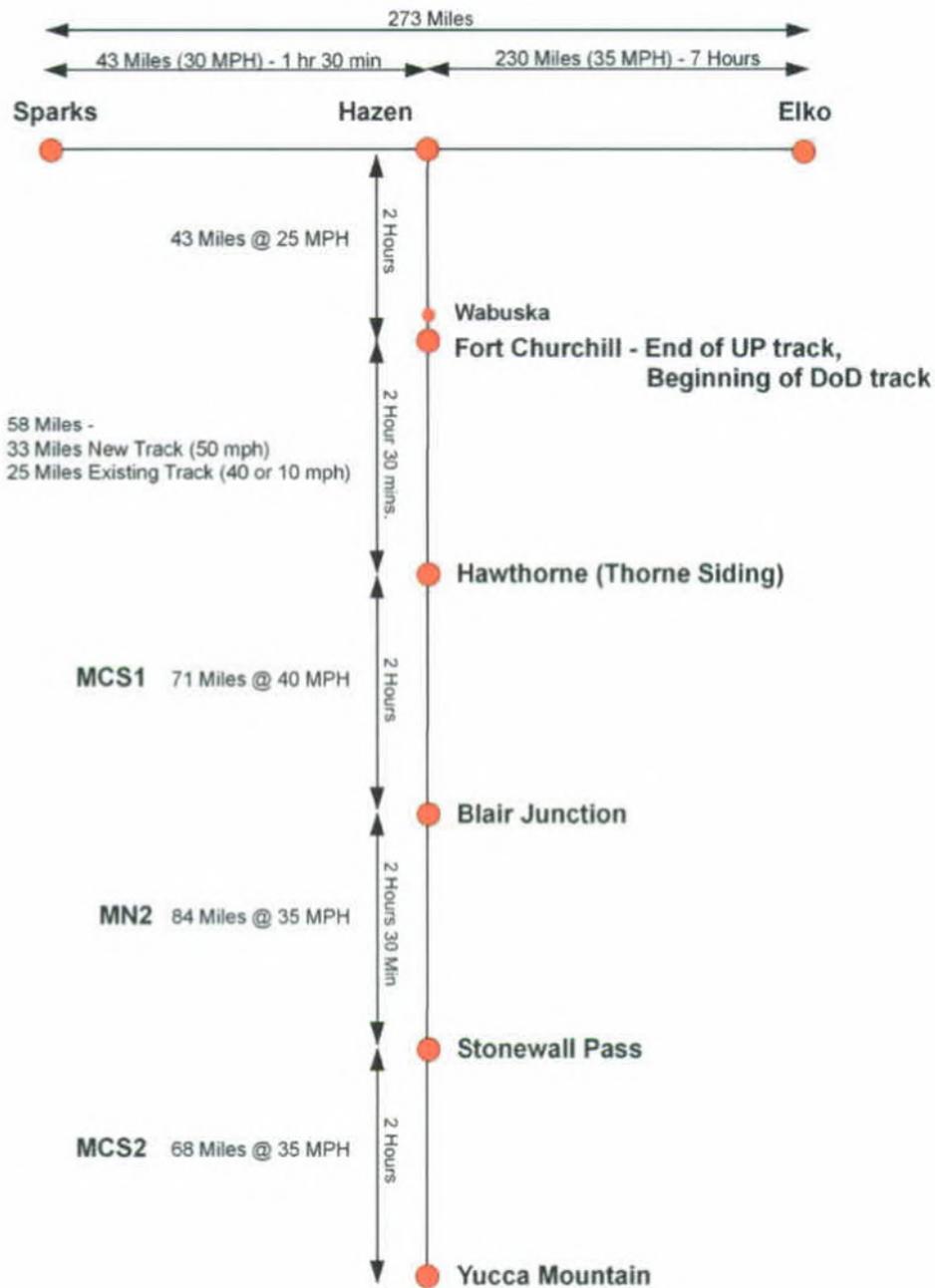


Figure 4.1-1. Mileage and travel times from Elko and Sparks to Wabuska, Hawthorne, and Yucca Mountain

Once trains arrive at the Thorne Siding, a DOE contract operator, or the UPRR, would transport the dedicated cask trains (and other traffic destined for delivery to the repository) over the newly constructed rail line to the End of Line Facility (EOL) at the proposed Yucca Mountain Repository. a distance of approximately 225 miles. The DOE contract operator, or the UPRR, would return all "out-bound" traffic to the staging yard at the Thorne Siding for UPRR pick up.

The distance of approximately 225 miles from the Thorne Siding to the EOL could be traversed in one crew shift (12-hour shift, maximum).

A Maintenance-of-Way Facility (MOW) would be located at the mid-point of the rail line, either at Silver Peak [for MN1] or at Klondike near U.S. 95 south of Tonopah [for the MN2 alternative alignment].

The MOW could also provide a crew change point for train operations, if required. The crew operating a train from the Thorne Siding to the MOW would return to the Thorne Siding with an "out-bound" train. The train arriving at the MOW would be taken to the EOL by a second crew, which would return to the MOW with an "out-bound" train. (This is the equivalent of a train crew per direction for the 225-mile alignment.)

Scenario #2: Staging at Fort Churchill/Wabuska to change Train Crew and Locomotives

Assumptions: The UPRR will deliver DOE/shared-use customer-generated rail traffic to the Fort Churchill Siding. The DOE will assume responsibility for the DoD track from the Fort Churchill Siding to the Thorne Siding.

At Fort Churchill, a staging yard would be constructed to receive all rail traffic delivered by the UPRR, including dedicated cask trains. From the staging yard, the UPRR would pick up all rail traffic generated by DOE and/or shared-use customers and destined for transport over the national railroad network. Once trains arrive at Fort Churchill, a DOE contract operator, or the UPRR, would transport the dedicated cask trains (and other traffic destined for delivery to the repository) over the existing DoD track to the Thorne Siding, where transport would continue over the newly constructed rail line to the EOL at the proposed Yucca Mountain Repository. The total distance is approximately 280 miles. The DOE contract operator, or the UPRR, would return all "out-bound" traffic to the staging yard at Fort Churchill for UPRR pick up.

The DoD track on the Walker River Paiute Tribe Reservation would, for the most part, be relocated to newly constructed track east of the Weber Reservoir and the town of Schurz, a distance of approximately 32 miles. This would allow the operating speed to be increased to a speed in line with project criteria operating speed (50 to 60 mph). The balance of the DoD track would be upgraded and maintained to support the project criteria operating speed. All DoD track would be signalized from Fort Churchill Siding to Thorne Siding.

The distance of roughly 280 miles from Fort Churchill to EOL could be traversed in one crew shift (8- to 12-hour shift, maximum).

A MOW would be located at the mid-point of the rail line at Blair Junction south of U.S. 95/ U.S. 6 west of Tonopah. This location would accommodate all alternative alignments south of that point.

The MOW could also provide a crew-change point for train operations. The crew operating a train from Fort Churchill to the MOW would return to Fort Churchill with an "out-bound" train. The train arriving at the MOW would be taken to the EOL by a second crew, which would return to the MOW with an "out-bound" train. (This is the equivalent of a train crew per direction for the 280-mile alignment.)

Operational Feasibility

Review of the operating scenarios described above indicates both scenarios satisfy the requirements of DOE. Both scenarios would provide railroad service in conformance with the general operating policies of the railroad industry.

5. RESULTS, CONCLUSIONS, AND RECOMMENDATIONS

Land Ownership and Management—Approximately 90% of the Mina corridor lies on Federal land managed by the BLM (based on a nominal 1000-foot construction ROW). The common segments and alternative alignments do not cross any wilderness areas, wilderness study areas, areas of critical environmental concern, or other special management areas.

The Mina corridor also cross approximately 7 miles of Federal land on the Hawthorne Army Depot.

Along the common segments and alternative alignments, there are four locations where private property cannot reasonably be avoided: just west of the Hawthorne Army Depot, for approximately 2 miles (MCS1); at Millers gold-processing operations, for approximately 1 mile (MN2); along the west side of Goldfield (MN2), and in the Oasis Valley area (along alternative alignment OV1). There are also three other locations along MCS1 where private property is located within the standard 1000 ft. ROW but may possibly be avoided with further engineering analysis and/or ROW width restrictions in these areas: 3.5 miles east of the Hawthorne Army Depot immediately north of U.S. 95, private property east of the towns of Luning and private property east of the town of Sodaville. In addition, alternative alignment MN1 passes adjacent to Silver Peak in an area that has power lines, roads, and other infrastructure, and it is adjacent to private property.

The Schurz Bypass alternative alignments lie almost entirely on the Walker River Paiute Tribe Reservation. All of the Schurz bypass alignments avoid private allotments. Obtaining ROWs (100 ft.) on the reservation however, is a complex process.

One key issue would be that DOE must obtain a decision from the Walker River Paiute Tribe that allows DOE shipments on the DoD track located on the Tribe's land. DOE will also need to reach an agreement with DoD to use their track for access to Thorne Siding

No hazardous materials or solid-waste disposal sites are known to exist along the corridor.

Cultural and Natural Resources—Few conflicts with cultural and natural resources were identified. More than 50 archeological sites eligible or potentially eligible for the NRHP have been recorded within a 2-mile swath of the segment/alignment centerlines. **Since the** cultural-resource inventories that located these sites encompass less than 5% of the area around the corridor, it is highly likely that other eligible sites will be found during surveys to be conducted prior to the beginning of construction. It is necessary to develop measures to mitigate impacts, including avoidance and treatment, before any construction begins.

Threatened or endangered species, and other special-status biological resources, are known to occur at only a few locations along the corridor, although others may be found during future

surveys. Locations at Walker River are the only places at which wetlands regulated by the Clean Water Act are likely to be found. If those wetlands could not be avoided, a permit would have to be obtained prior to construction of a bridge across that river.

While the corridor may cross mining claims, the exact locations of these claims need to be investigated in more detail. Few mines with subsurface workings appear to exist along the corridor with the exception of the area south of Goldfield. However, subsequent alignment engineering and other engineering approaches exist that may help to alleviate these potential conflicts.

Design Analysis—All of the common segments and alternative alignments presented in this study appear to be feasible to construct, operate, and maintain. MN1 and MN2 have engineering advantages and disadvantages relative to each other; these have been outlined in the discussions in Section 3.0. All operating scenarios will require DOE to establish an agreement with UPRR that addresses operational interfaces at either the Fort Churchill Siding or the Thorne Siding.

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APPENDIX A: DESIGN ANALYSIS TABLE

Focus Area Map	Station(s)	Location Description	Land-Use Constraints	Road Crossings, Bridges, and Hydrological Considerations	Design Issues	Environmental Issues	Operating Considerations
Map 1 Hazento Thorne	—	—	—	—	—	—	
Map 2 WRIR (S1/S2)	10090+00	Northern crossing of the Walker River	—	—	—	Habitat for threatened trout and bald eagle; jurisdictional wetlands	—
Map 2 WRIR (S1/ S2/ S3)	All	Walker River Indian Reservation	Specific ROW Regulations, see App. B	—	—	—	
Map 2 WRIR (S1/ S2/ S3)	100800	Crossings of the Walker River	—	—	—	Habitat for threatened trout and bald eagle; jurisdictional wetlands	—
Map 2 WRIR (S3)	10900 – 11400	Southern crossing of Walker River	Private landholdings/ allotments 0.4-mile of allotments crossed	—	—	—	—
Map 2 WRIR (S1/ S2/ S3)	10950	Crossing of US-95	NDOT ROW	—	—	—	
Map 2 WRIR (S3)	10000+00 10030+00	—		—	—	—	5° curves
Map WRIR (S3)	10080+00	—	—	Major bridge over Walker River 3,000 feet long 150 feet high	—	—	—
Map 2 WRIR (S3)	10004+00 10029+00	—	—	—	—	—	-1.80% grade
Map 2 WRIR (S3)	10780 1082	—	—	—	—	—	3° curves
Map WRIR (S2)	10080	—	—	500-foot-long, 30-foot-wide minor bridge over Walker River US-95 grade separate	—	—	3° curves
Map 2 WRIR (S2)	11575+00 11584+00	—	—	—	—	—	+1.57% grade
Map 3 Hawthorne Area (MCS1)	1000 – 1400	Hawthorne Army Depot	DoD lands	—	—	—	—

Focus Area Map	Station(s)	Location Description	Land-Use Constraints	Road Crossings, Bridges, and Hydrological Considerations	Design Issues	Environmental Issues	Operating Considerations
Map 3 Hawthorne Area (MCS1)	1400 – 1500	East of Hawthorne Depot	Private lands, fenced – ownership uncertain	—	—	—	—
Map 3 Hawthorne Area (MCS1)	1000+00 2050+00	—	—	—	Follow old rail roadbed	—	—
Map 3 Hawthorne Area (MCS1)	2200+00	—	NDOT ROW	At grade crossing of NV-361 (protection TBD)	—	—	
Map 4 Luning/ Mina/ Sodaville (MCS1)	TBD	—	—	—	—	—	—
Map 5 Rhodes Salt Marsh/ Redlich Pass (MCS1)	3450+00 3650+00	—	—	—	None	—	
Map 5 Rhodes Salt Marsh/ Redlich Pass (MCS1)	3500 – 3650	Redlich Pass	Power line ROW follows old rail grade	—	—	—	+1.76% grade
Map 5 Rhodes Salt Marsh/ Redlich Pass (MCS1)	3750+00 3870+00	—	—	—	—	—	-1.86% grade
Map 6 Blair Junction/ Columbus Salt Marsh/ Coaldale (MCS1)	4750	—	NDOT ROW	Crossing of US-95 / US-6 Graded separation	—	—	Grade of +1.76% -1.86% +1.63% -1.70%
Map 6 Blair Junction/ Columbus Salt Marsh/ Coaldale (MCS1)	4320+00 4560+00	—	—	—	—	—	+1.63% grade
Map 6 Blair Junction/ Columbus Salt Marsh/ Coaldale (MN2)	10270+0 10500+00	—	—	Follow old rail roadbed	—	—	—
Map 6 Blair Junction/ Columbus Salt Marsh/ Coaldale (MN2)	10220+00 10271 + 00	—	—	—	—	—	-1.70% grade

Focus Area Map	Station(s)	Location Description	Land-Use Constraints	Road Crossings, Bridges, and Hydrological Considerations	Design Issues	Environmental Issues	Operating Considerations
Map 7 US 95 / US-6 (MN2)	10500+00 11430+00	—	—	—	—	—	—
Map 7 US-95 / US-6 (MN2)	11225 – 11275	Millers	Private lands, transmission lines, substation	—	—	—	—
Map 8 Montezuma Valley (MN2)	11430+0 12350+00	—	—	Follow old rail roadbed	—	—	—
Map 9 NV-265 (MN1)	5259+00 5306	East side of NV-265	—	—	—	—	+1.69% grade
Map 9 NV-265 (MN1)	5335 – 5475	East side of NV-265	—	—	—	—	-1.91% grade
Map 9 NV-265 (MN1)	4750 – 5800	East side of NV-265	—	—	—	VRM Level III	—
Map 10 Clayton Valley (MN2)	4750 – 5800	East side of NV-265	Borders BLM preferred utility route	—	—	VRM Level III	—
Map 10 Clayton Valley (MN1)	5850	Town of Silver Peak	Private land/town within 1/4 mile	—	—	—	—
Map 10 Clayton Valley (MN1)	5850	Town of Silver Peak	Utilities crossed/ paralleled by alignment	—	—	—	—
Map 10 Clayton Valley (MN1)	6050	Clayton Valley Sand Dunes	BLM Restricted ROW area to the SW	—	—	—	—
Map 10 Clayton Valley (MN1)	7600	South end of Montezuma Range	—	—	—	VRM Level II avoided	—
Map 10 Clayton Valley (MN1)	6762 – 6800	—	—	—	—	—	3° curves
Map 10 Clayton Valley (MN1)	7606 – 7611	—	—	—	—	—	4° curves
Map 10 Clayton Valley (MN1)	5475 – 5610	—	—	—	—	—	-1.91% grade
Map 10 Clayton Valley (MN1)	5676 5738	—	—	—	—	—	-1.97% grade
Map 10 Clayton Valley (MN1)	6177 6854	—	—	—	—	—	+1.85% grade

Focus Area Map	Station(s)	Location Description	Land-Use Constraints	Road Crossings, Bridges, and Hydrological Considerations	Design Issues	Environmental Issues	Operating Considerations
Map 10 Clayton Valley (MN1)	7007 7208	—	—	—	—	—	+1.99% grade
Map 10 Clayton Valley (MN1)	7460 7599	—	—	—	—	—	+2.00% grade
Map 11 Goldfield/Montezuma (MN1 and MN2)	—	—	—	—	—	—	
Map 12 Bonnie Claire Interface	14328+00 14462+00	—	—	—	—	—	-1.92% grade
Map 12 Bonnie Claire Interface	14529 14582	—	—	—	—	—	-1.63% grade
Map 12 Bonnie Claire Interface)	14425	—	—	US-95 grade separation	—	—	—
Map 13 Lida Junction to Yucca Mountain	14500+00	North of Scottys Junction	Private landholdings within 1 mile – avoided	—	—	—	—
Map 13 Lida Junction to Yucca Mountain	1 51 50+00	SE of Scottys Junction	Private landholdings within 1/4 mile avoided	—	—	—	—
Map 13 Lida Junction to Yucca Mountain	15415+0 15464+00	—	—	NTTR Paved Road (Tolicha Peak)	—	—	1.50% grade
Map 13 Lida Junction to Yucca Mountain	16350+00	Oasis Valley	Private landholdings 1 mile of landholdings crossed	Section 404 permits needed 1,100-foot-long 150-foot-high bridge	—	Springs within 1/4 mile – avoided	Large cuts and fills
Map 13 Lida Junction to Yucca Mountain	16700+00	Beatty Wash	—	Section 404 permits needed	—	—	—
Map 13 Lida Junction to Yucca Mountain	16739+50 1 6796 +1 0	—	—	—	—	—	1.83% grade
Map 13 Lida Junction to Yucca Mountain	17085+70 17110+70	—	—	—	—	—	2.00% grade

Focus Area Map	Station(s)	Location Description	Land-Use Constraints	Road Crossings, Bridges, and Hydrological Considerations	Design Issues	Environmental Issues	Operating Considerations
Map 13 Lida Junction to Yucca Mountain	17206+00 17298+00		—	—	—	—	1.51% grade
Map 13 Lida Junction to Yucca Mountain	17863+00 17948+00	—	—	—	—	—	1.76% grade
Map 13 Lida Junction to Yucca Mountain	17952+00 18077 + 50	EOL	—	—	—	—	1.50% grade 6 degree harp curves at EOL. Heavy earthwork.

Notes: "—" = no known pertinent information to report for that station location at this time; EOL = End of Line Facility

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APPENDIX B: MAPS OF MINA ROUTE ALTERNATIVES

Mina Rail Corridor

Hazen to Thorne

Legend

Rail Study Related Features

Existing Rail

- Department of Defense Rail Line
- National Rail System
- Existing Rail that is part of the Mina Rail Corridor

Potential Alignments that would require new construction

- Mina Corridor Potential Alignments
- Mina Corridor Potential Alignments (also addressed as part of the Caliente Rail Corridor)

- MCS2 Alignment Designator

Jurisdiction

- BLM District Boundary
- U.S. Bureau of Land Management
- U.S. Bureau of Reclamation
- City and County Parks
- U.S. Department of Defense
- U.S. Department of Energy
- Fish and Wildlife Service
- Native American Reservation
- Nevada State Lands
- Private Lands
- U.S. Forest Service
- Wilderness Study Areas

EPA Hazard Sites

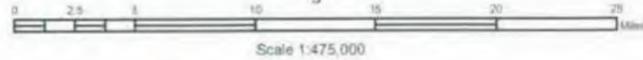
- Air Emissions
- Hazardous Waste
- Toxic Release
- Water Discharges
- Multiple

Landfills

- Active
- Closed

Sources

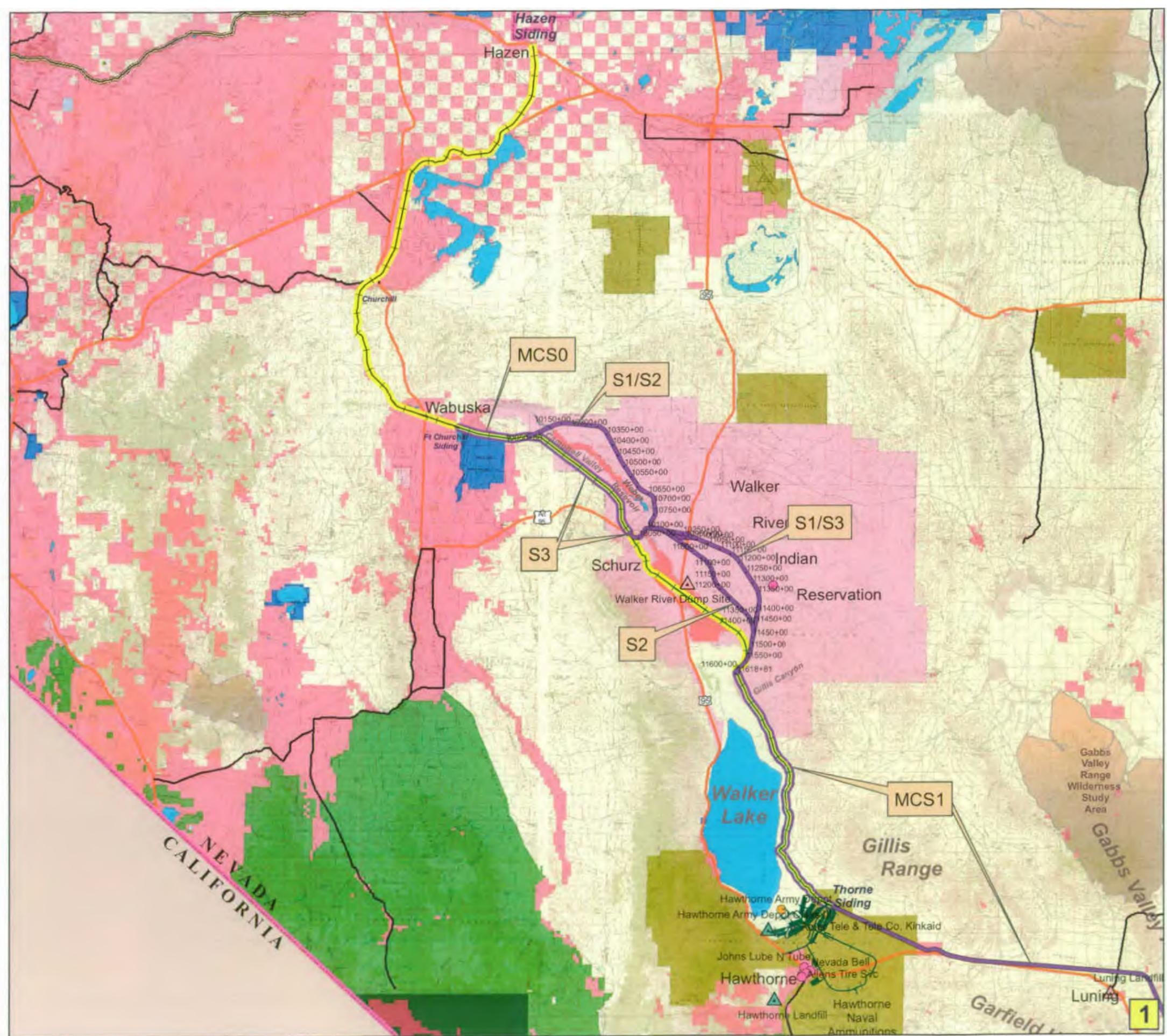
USGS 1:250,000 scale Digital Raster Graphs
 Jurisdictional GIS data layer information from BLM
 Wilderness Study Area data from BLM
 Alternatives and alignments presented on this map reflect the most current alignment engineering concepts and are subject to change.



Yucca Mountain Project

Map created by BSC, Nevada Transportation, 10/12/2006

T06-00242 rev11 #01 - Hazen



Mina Rail Corridor

Walker River Indian Reservation

Legend

Rail Study Related Features

Existing Rail

- Department of Defense Rail Line
- National Rail System
- Existing Rail that is part of the Mina Rail Corridor

Potential Alignments that would require new construction

- Mina Corridor Potential Alignments
- Mina Corridor Potential Alignments (also addressed as part of the Caliente Rail Corridor)

MCS2 Alignment Designator

Jurisdiction

- BLM District Boundary
- U.S. Bureau of Land Management
- U.S. Bureau of Reclamation
- City and County Parks
- U.S. Department of Defense
- U.S. Department of Energy
- Fish and Wildlife Service
- Native American Reservation
- Nevada State Lands
- Private Lands
- U.S. Forest Service
- Wilderness Study Areas

EPA Hazard Sites

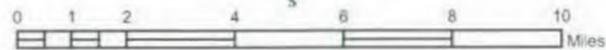
- Air Emissions
- Hazardous Waste
- Toxic Release
- Water Discharges
- Multiple

Landfills

- Active
- Closed

Sources

USGS 1:250,000 scale Digital Raster Graphs
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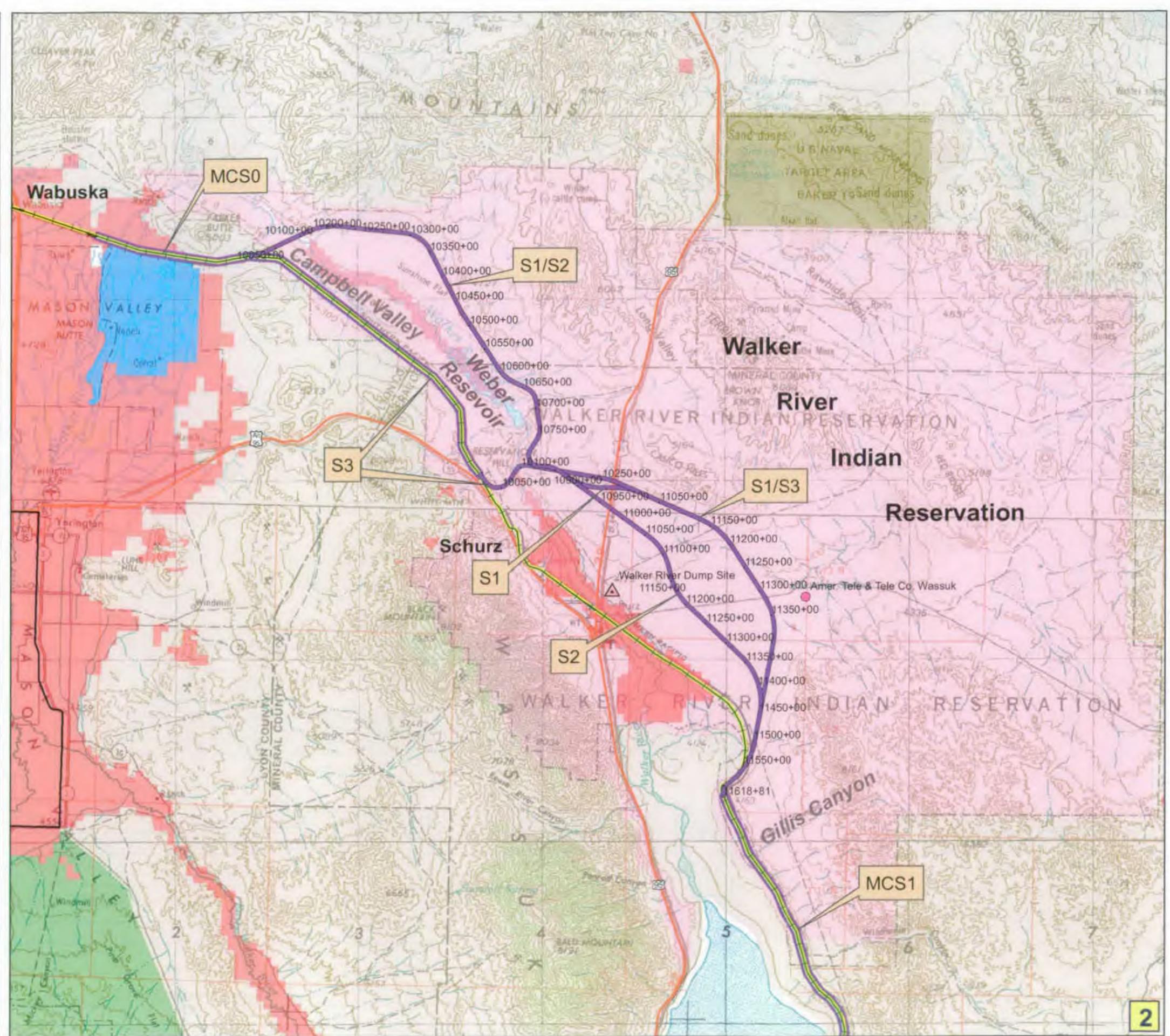


Scale 1:210,000



Yucca Mountain Project

Map created by BSC, Nevada Transportation, 10/12/2006 T06-00242 rev11 #02 - Walker River Indian Res



Mina Rail Corridor Hawthorne Area

Legend

Rail Study Related Features

Existing Rail

- Department of Defense Rail Line
- National Rail System
- Existing Rail that is part of the Mina Rail Corridor

Potential Alignments that would require new construction

- Mina Corridor Potential Alignments
- Mina Corridor Potential Alignments (also addressed as part of the Caliente Rail Corridor)

MCS2 Alignment Designator

Jurisdiction

- BLM District Boundary
- U.S. Bureau of Land Management
- U.S. Bureau of Reclamation
- City and County Parks
- U.S. Department of Defense
- U.S. Department of Energy
- Fish and Wildlife Service
- Native American Reservation
- Nevada State Lands
- Private Lands
- U.S. Forest Service
- Wilderness Study Areas

EPA Hazard Sites

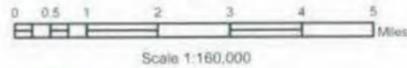
- Air Emissions
- Hazardous Waste
- Toxic Release
- Water Discharges
- Multiple

Landfills

- Active
- Closed

Sources

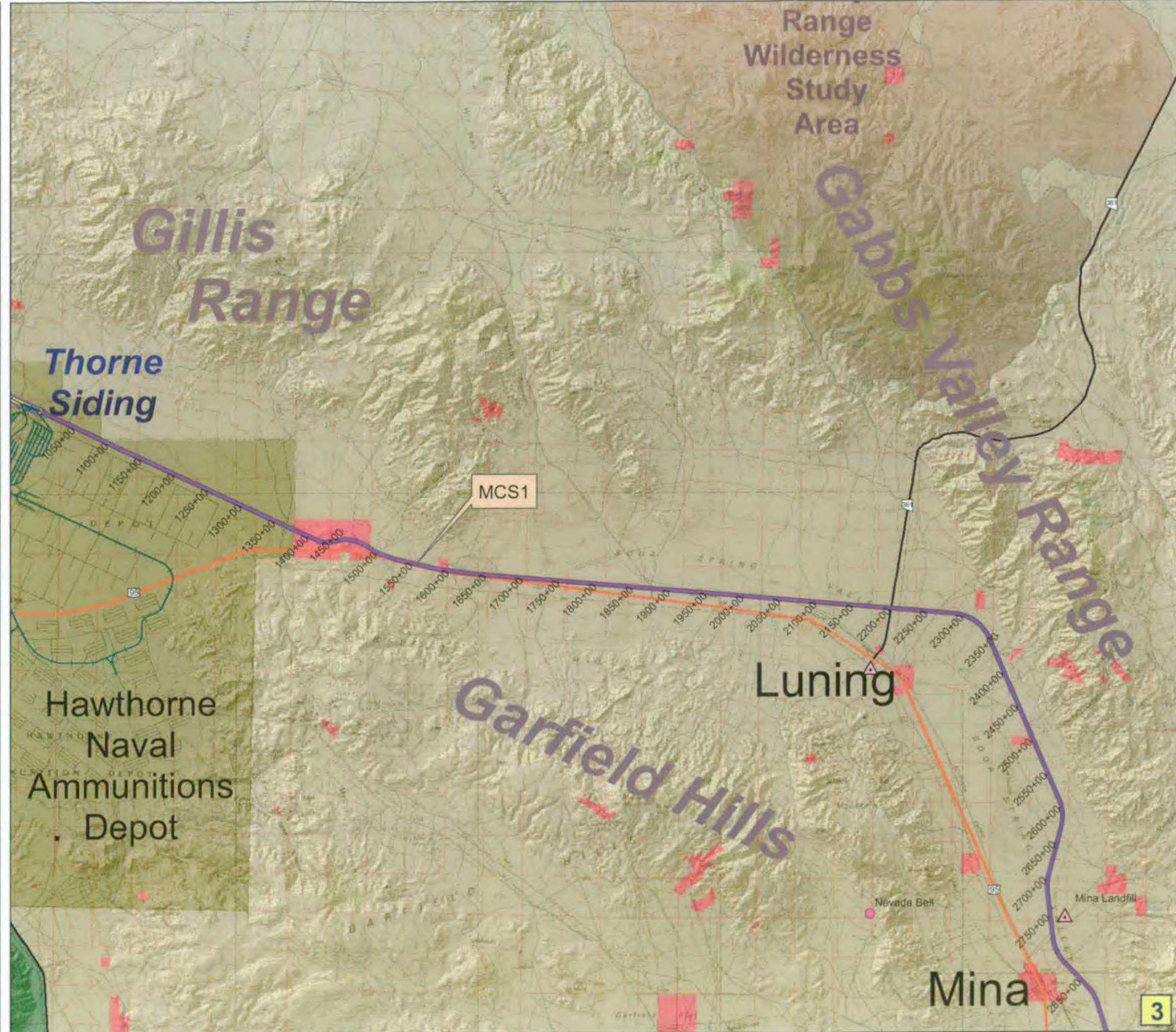
USGS 1:100,000 scale Digital Raster Graphs
Jurisdictional GIS data layer information from BLM
Wilderness Study Area data from BLM
Alternatives and alignments presented on this map reflect the most current alignment engineering concepts and are subject to change.



Yucca Mountain Project

Map created by BSC, Nevada Transportation, 10/12/2006

T06-00242 rev11 #03 - Hawthorne



Mina Rail Corridor

Luning/Mina/Sodaville Area

Legend

Rail Study Related Features

- Existing Rail**
- Department of Defense Rail Line
 - National Rail System
 - Existing Rail that is part of the Mina Rail Corridor

Potential Alignments that would require new construction

- Mina Corridor Potential Alignments
- Mina Corridor Potential Alignments (also addressed as part of the Caliente Rail Corridor)

- Alignment Designator

Jurisdiction

- BLM District Boundary
- U.S. Bureau of Land Management
- U.S. Bureau of Reclamation
- City and County Parks
- U.S. Department of Defense
- U.S. Department of Energy
- Fish and Wildlife Service
- Native American Reservation
- Nevada State Lands
- Private Lands
- U.S. Forest Service
- Wilderness Study Areas

EPA Hazard Sites

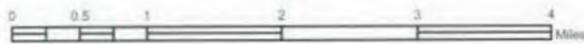
- Air Emissions
- Hazardous Waste
- Toxic Release
- Water Discharges
- Multiple

Landfills

- Active
- Closed

Sources

USGS 1:100,000 scale Digital Raster Graphs
 Jurisdictional GIS data layer information from BLM
 Wilderness Study Area data from BLM
 Alternatives and alignments presented on this map reflect the most current alignment engineering concepts and are subject to change.



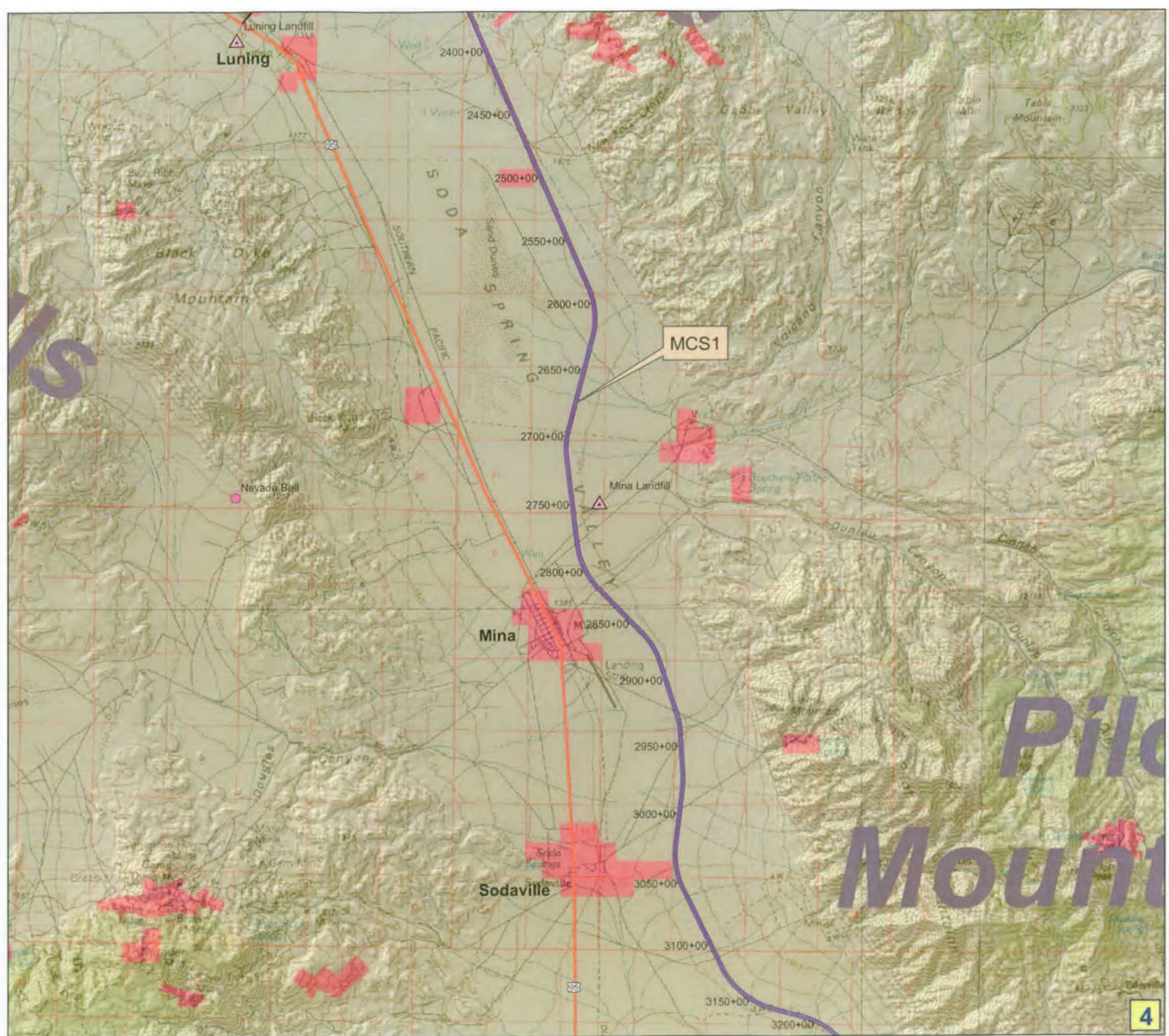
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Yucca Mountain Project

Map created by BSC, Nevada Transportation, 10/12/2006

T06-00242 rev11 #04 - Luning



Mina Rail Corridor

Rhodes Salt Marsh/Redlich Pass

Legend

Rail Study Related Features

Existing Rail

- Department of Defense Rail Line
- National Rail System
- Existing Rail that is part of the Mina Rail Corridor

Potential Alignments that would require new construction

- Mina Corridor Potential Alignments
- Mina Corridor Potential Alignments (also addressed as part of the Caliente Rail Corridor)

MCS2 Alignment Designator

Jurisdiction

- BLM District Boundary
- U.S. Bureau of Land Management
- U.S. Bureau of Reclamation
- City and County Parks
- U.S. Department of Defense
- U.S. Department of Energy
- Fish and Wildlife Service
- Native American Reservation
- Nevada State Lands
- Private Lands
- U.S. Forest Service
- Wilderness Study Areas

EPA Hazard Sites

- Air Emissions
- Hazardous Waste
- Toxic Release
- Water Discharges
- Multiple

Landfills

- Active
- Closed

Sources

USGS 1:100,000 scale Digital Raster Graphs
 Jurisdictional GIS data layer information from BLM
 Wilderness Study Area data from BLM
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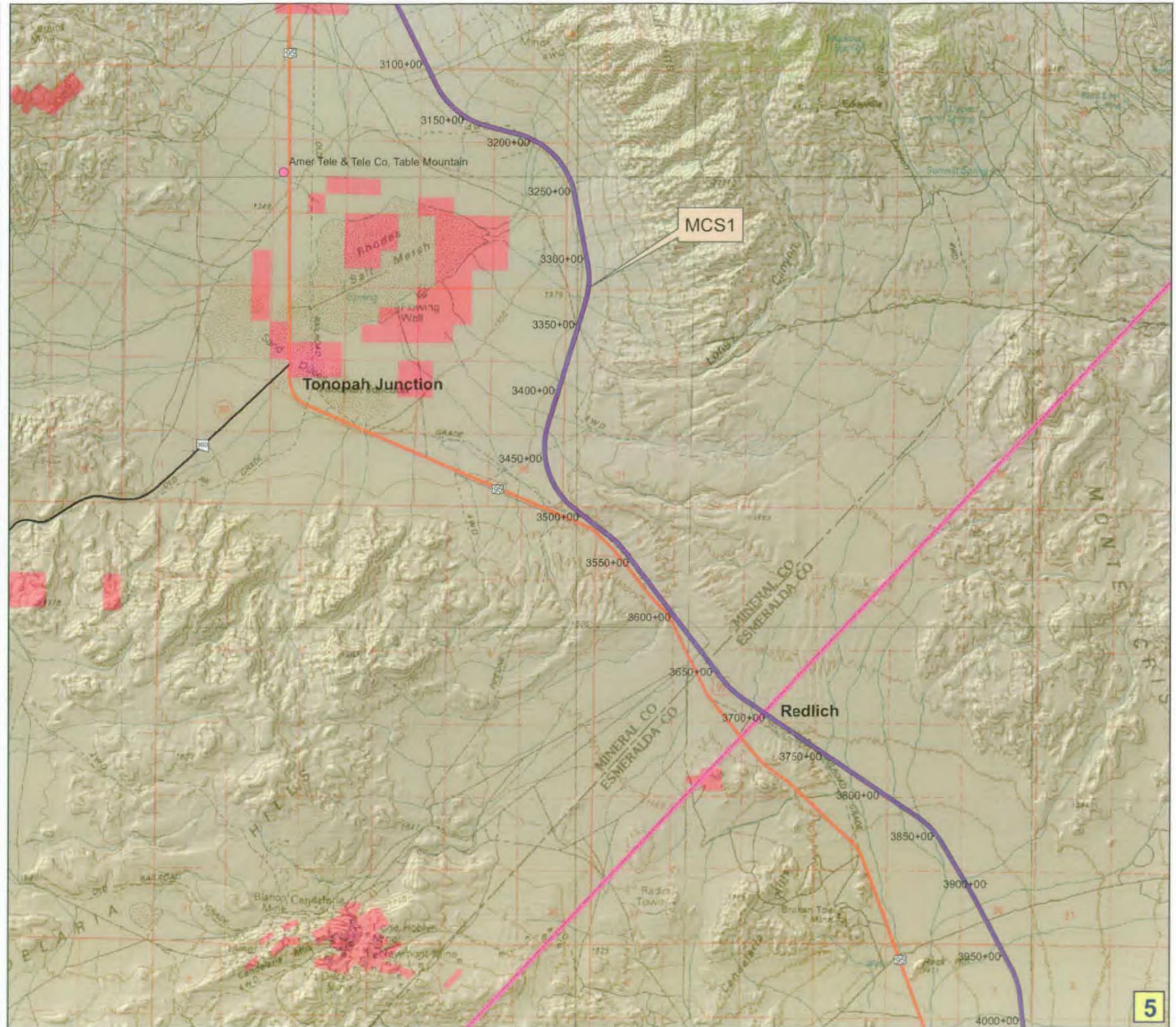
Scale 1:85,000



Yucca Mountain Project

Map created by BSC, Nevada Transportation, 10/12/2006

T06-00242 rev11 #05 - Rhodes



Mina Rail Corridor

Blair Junction/Columbus Salt Marsh/Coaldale

Legend

Rail Study Related Features

Existing Rail

- Department of Defense Rail Line
- National Rail System
- Existing Rail that is part of the Mina Rail Corridor

Potential Alignments that would require new construction

- Mina Corridor Potential Alignments
- Mina Corridor Potential Alignments (also addressed as part of the Caliente Rail Corridor)

MCS2 Alignment Designator

Jurisdiction

- BLM District Boundary
- U.S. Bureau of Land Management
- U.S. Bureau of Reclamation
- City and County Parks
- U.S. Department of Defense
- U.S. Department of Energy
- Fish and Wildlife Service
- Native American Reservation
- Nevada State Lands
- Private Lands
- U.S. Forest Service
- Wilderness Study Areas

EPA Hazard Sites

- Air Emissions
- Hazardous Waste
- Toxic Release
- Water Discharges
- Multiple

Landfills

- Active
- Closed

Sources

USGS 1:100,000 scale Digital Raster Graphs
 Jurisdictional GIS data layer information from BLM
 Wilderness Study Area data from BLM
 Alternatives and alignments presented on this map reflect the most current alignment engineering concepts and are subject to change.



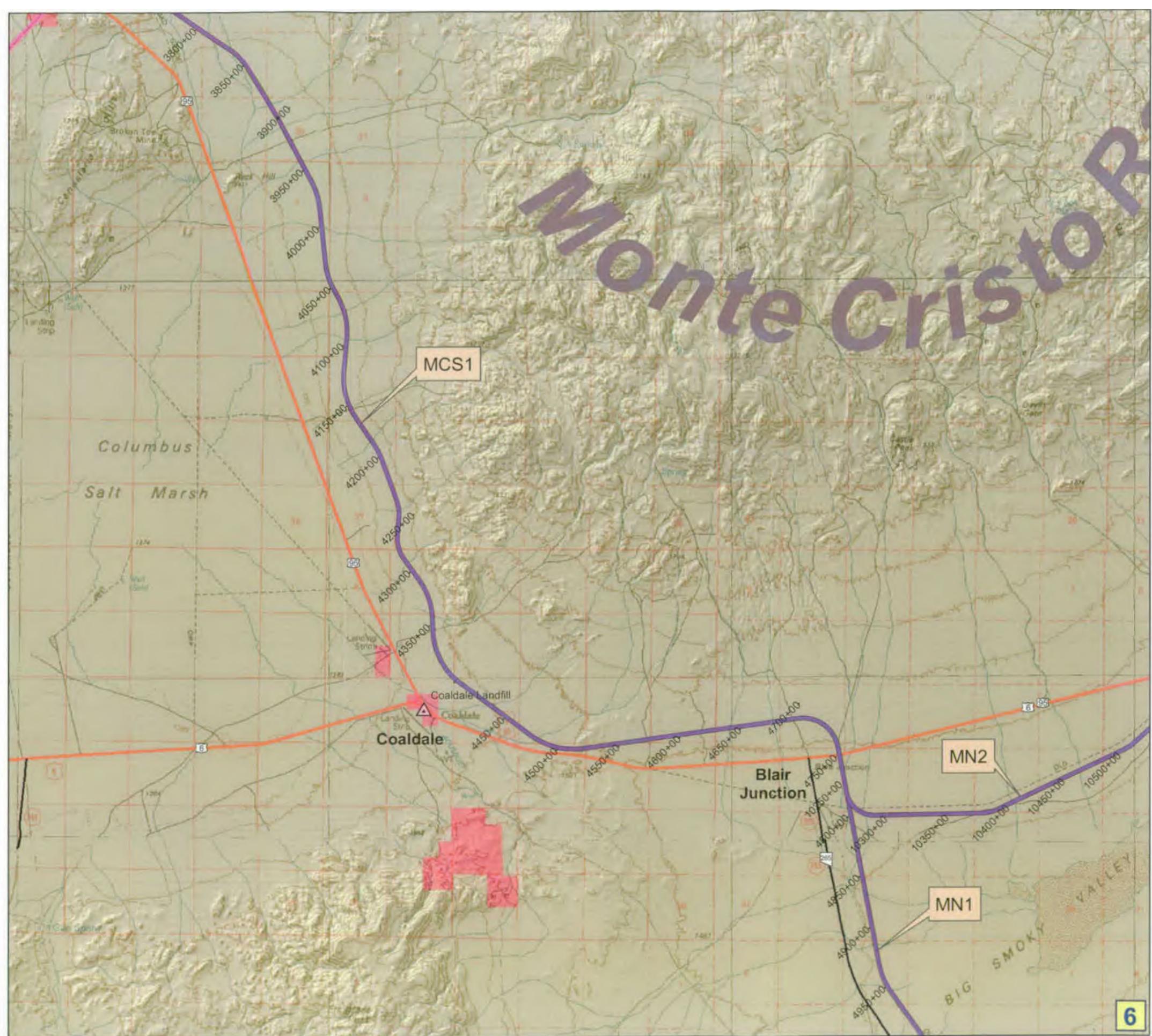
Scale 1:95,000



Yucca Mountain Project

Map created by BSC, Nevada Transportation, 10/12/2006

T06-00242 rev11 #06 - Blair



Mina Rail Corridor

US 95/US 6

Legend

Rail Study Related Features

Existing Rail

- Department of Defense Rail Line
- National Rail System
- Existing Rail that is part of the Mina Rail Corridor

Potential Alignments that would require new construction

- Mina Corridor Potential Alignments
- Mina Corridor Potential Alignments (also addressed as part of the Caliente Rail Corridor)

Alignment Designator

Jurisdiction

- BLM District Boundary
- U.S. Bureau of Land Management
- U.S. Bureau of Reclamation
- City and County Parks
- U.S. Department of Defense
- U.S. Department of Energy
- Fish and Wildlife Service
- Native American Reservation
- Nevada State Lands
- Private Lands
- U.S. Forest Service
- Wilderness Study Areas

EPA Hazard Sites

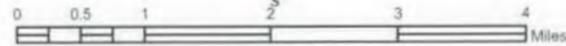
- Air Emissions
- Hazardous Waste
- Toxic Release
- Water Discharges
- Multiple

Landfills

- Active
- Closed

Sources

USGS 1:100,000 scale Digital Raster Graphs
 Jurisdictional GIS data layer information from BLM
 Wilderness Study Area data from BLM
 Alternatives and alignments presented on this map reflect the most current alignment engineering concepts and are subject to change.



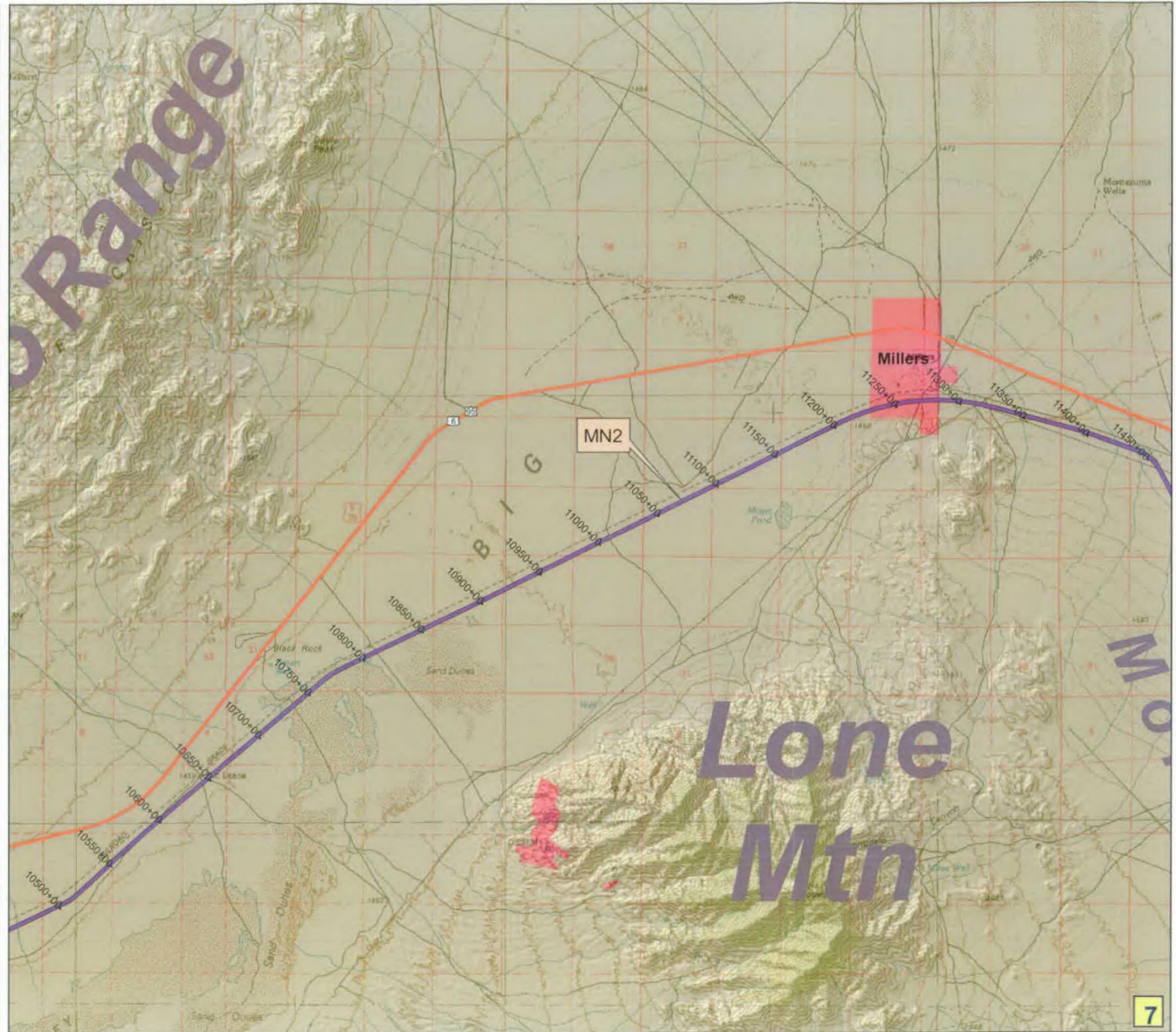
Scale 1:90,000



Yucca Mountain Project

Map created by BSC, Nevada Transportation, 10/12/2006

T06-00242 rev011 #07 - US95



Mina Rail Corridor Montezuma Valley

Legend

Rail Study Related Features

Existing Rail

- Department of Defense Rail Line
- National Rail System
- Existing Rail that is part of the Mina Rail Corridor

Potential Alignments that would require new construction

- Mina Corridor Potential Alignments
- Mina Corridor Potential Alignments (also addressed as part of the Caliente Rail Corridor)

Alignment Designator

Jurisdiction

- BLM District Boundary
- U.S. Bureau of Land Management
- U.S. Bureau of Reclamation
- City and County Parks
- U.S. Department of Defense
- U.S. Department of Energy
- Fish and Wildlife Service
- Native American Reservation
- Nevada State Lands
- Private Lands
- U.S. Forest Service
- Wilderness Study Areas

EPA Hazard Sites

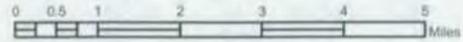
- Air Emissions
- Hazardous Waste
- Toxic Release
- Water Discharges
- Multiple

Landfills

- Active
- Closed

Sources

USGS 1:100,000 scale Digital Raster Graphs
Jurisdictional GIS data layer information from BLM
Wilderness Study Area data from BLM
Alternatives and alignments presented on this map reflect the most current alignment engineering concepts and are subject to change.

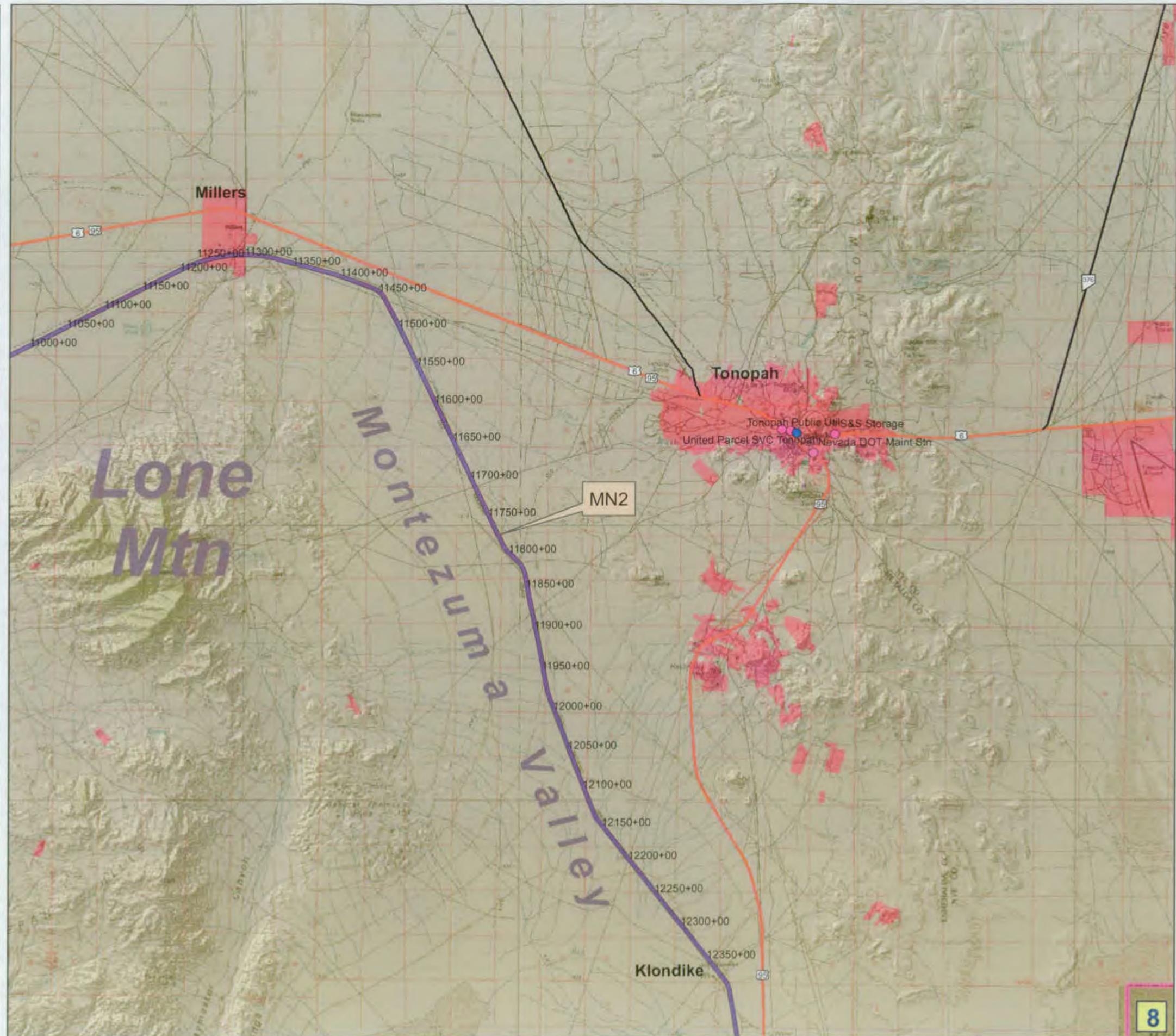


Scale 1:140,000



Yucca Mountain Project

Map created by BSC, Nevada Transportation, 10/12/2006 T06-00242 rev11 #08 - Montezuma Valley



Mina Rail Corridor

NV 265

Legend

Rail Study Related Features

Existing Rail

-  Department of Defense Rail Line
-  National Rail System
-  Existing Rail that is part of the Mina Rail Corridor

Potential Alignments that would require new construction

-  Mina Corridor Potential Alignments
-  Mina Corridor Potential Alignments (also addressed as part of the Caliente Rail Corridor)

-  Alignment Designator

Jurisdiction

-  BLM District Boundary
-  U.S. Bureau of Land Management
-  U.S. Bureau of Reclamation
-  City and County Parks
-  U.S. Department of Defense
-  U.S. Department of Energy
-  Fish and Wildlife Service
-  Native American Reservation
-  Nevada State Lands
-  Private Lands
-  U.S. Forest Service
-  Wilderness Study Areas

EPA Hazard Sites

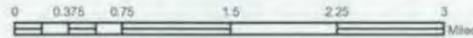
-  Air Emissions
-  Hazardous Waste
-  Toxic Release
-  Water Discharges
-  Multiple

Landfills

-  Active
-  Closed

Sources

USGS 1:100,000 scale Digital Raster Graphs
 Jurisdictional GIS data layer information from BLM
 Wilderness Study Area data from BLM
 Alternatives and alignments presented on this map reflect the most current alignment engineering concepts and are subject to change.



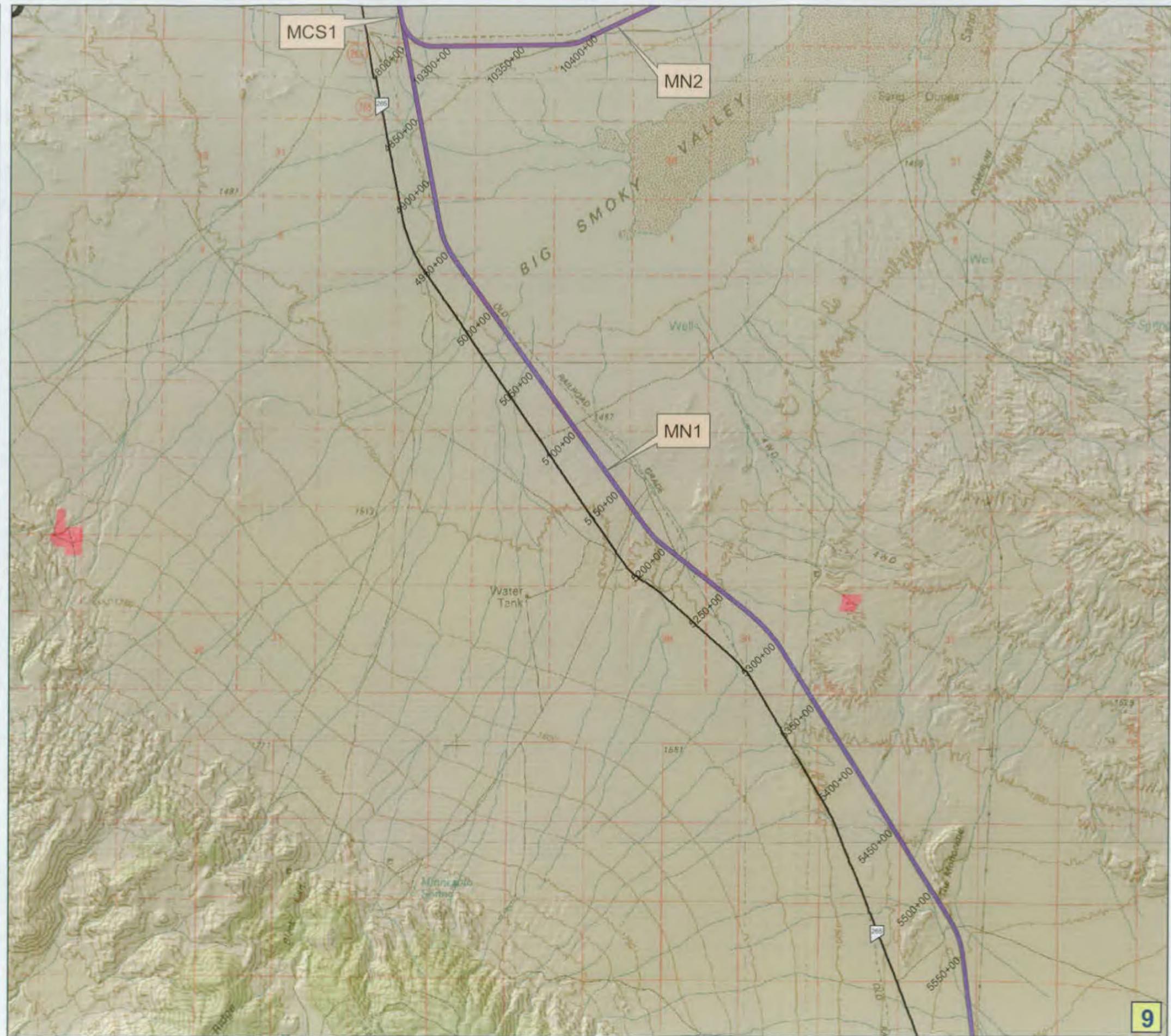
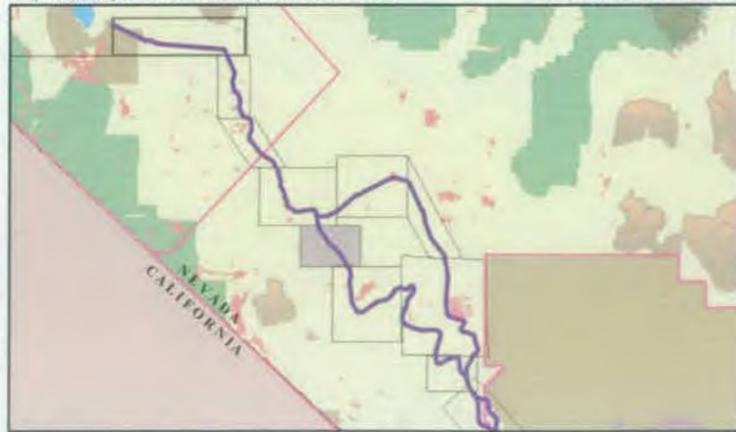
Scale 1:80,000



Yucca Mountain Project

Map created by BSC, Nevada Transportation, 10/12/2006

T06-00242 rev11 #09 - NV 265



Mina Rail Corridor

Clayton Valley

Legend

Rail Study Related Features

Existing Rail

- Department of Defense Rail Line
- National Rail System
- Existing Rail that is part of the Mina Rail Corridor

Potential Alignments that would require new construction

- Mina Corridor Potential Alignments
- Mina Corridor Potential Alignments (also addressed as part of the Caliente Rail Corridor)

Alignment Designator

Jurisdiction

- BLM District Boundary
- U.S. Bureau of Land Management
- U.S. Bureau of Reclamation
- City and County Parks
- U.S. Department of Defense
- U.S. Department of Energy
- Fish and Wildlife Service
- Native American Reservation
- Nevada State Lands
- Private Lands
- U.S. Forest Service
- Wilderness Study Areas

EPA Hazard Sites

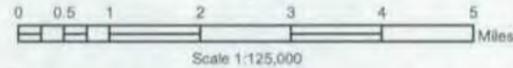
- Air Emissions
- Hazardous Waste
- Toxic Release
- Water Discharges
- Multiple

Landfills

- Active
- Closed

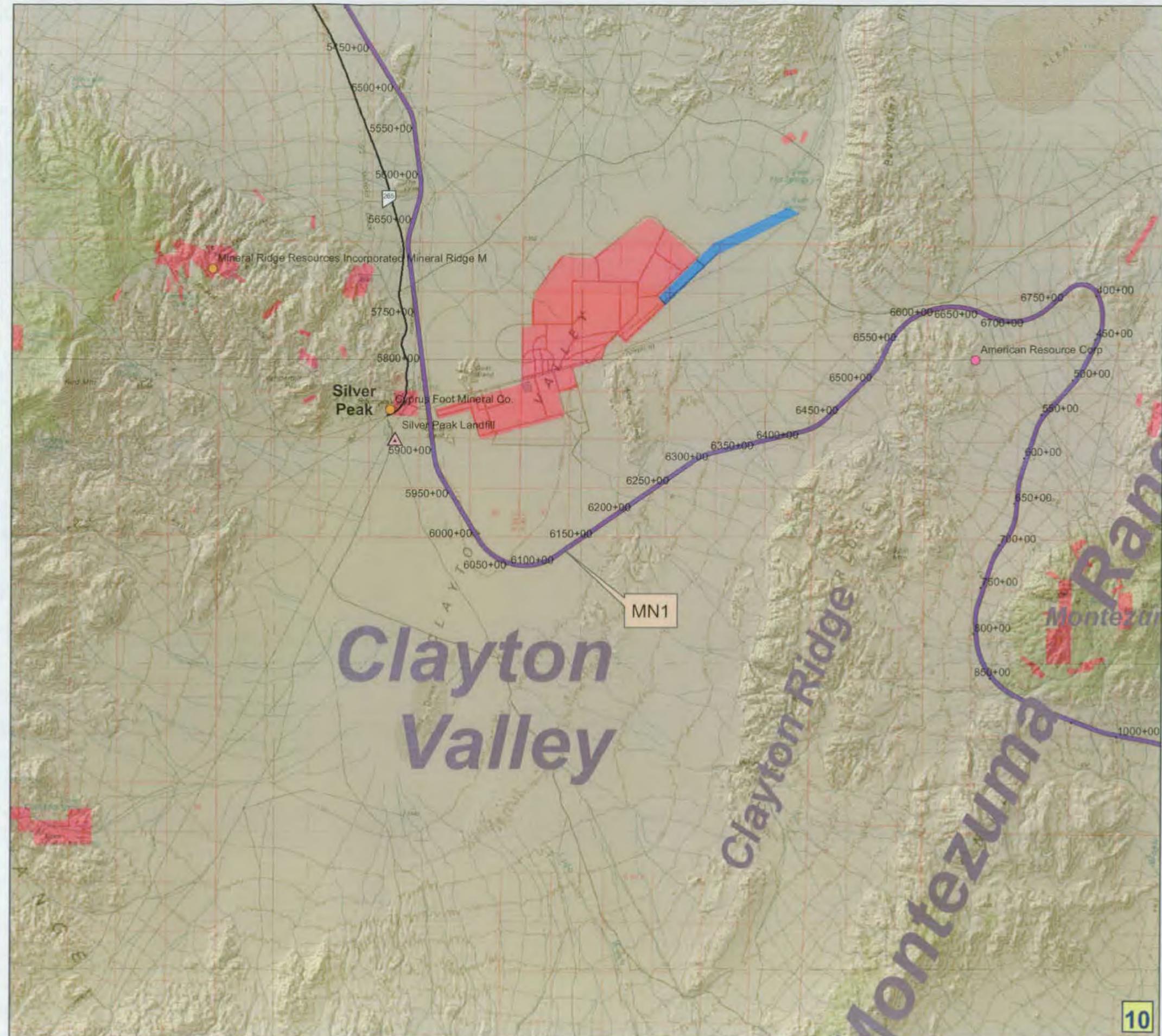
Sources

USGS 1:100,000 scale Digital Raster Graphs
 Jurisdictional GIS data layer information from BLM
 Wilderness Study Area data from BLM
 Alternatives and alignments presented on this map reflect the most current alignment engineering concepts and are subject to change.



Yucca Mountain Project

Map created by BSC, Nevada Transportation, 10/12/2006 T06-00242 rev11 #10 - Clayton Valley



Mina Rail Corridor

Goldfield/Montezuma

Legend

Rail Study Related Features

Existing Rail

- Department of Defense Rail Line
- National Rail System
- Existing Rail that is part of the Mina Rail Corridor

Potential Alignments that would require new construction

- Mina Corridor Potential Alignments
- Mina Corridor Potential Alignments (also addressed as part of the Caliente Rail Corridor)

Alignment Designator

Jurisdiction

- BLM District Boundary
- U.S. Bureau of Land Management
- U.S. Bureau of Reclamation
- City and County Parks
- U.S. Department of Defense
- U.S. Department of Energy
- Fish and Wildlife Service
- Native American Reservation
- Nevada State Lands
- Private Lands
- U.S. Forest Service
- Wilderness Study Areas

EPA Hazard Sites

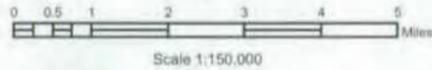
- Air Emissions
- Hazardous Waste
- Toxic Release
- Water Discharges
- Multiple

Landfills

- Active
- Closed

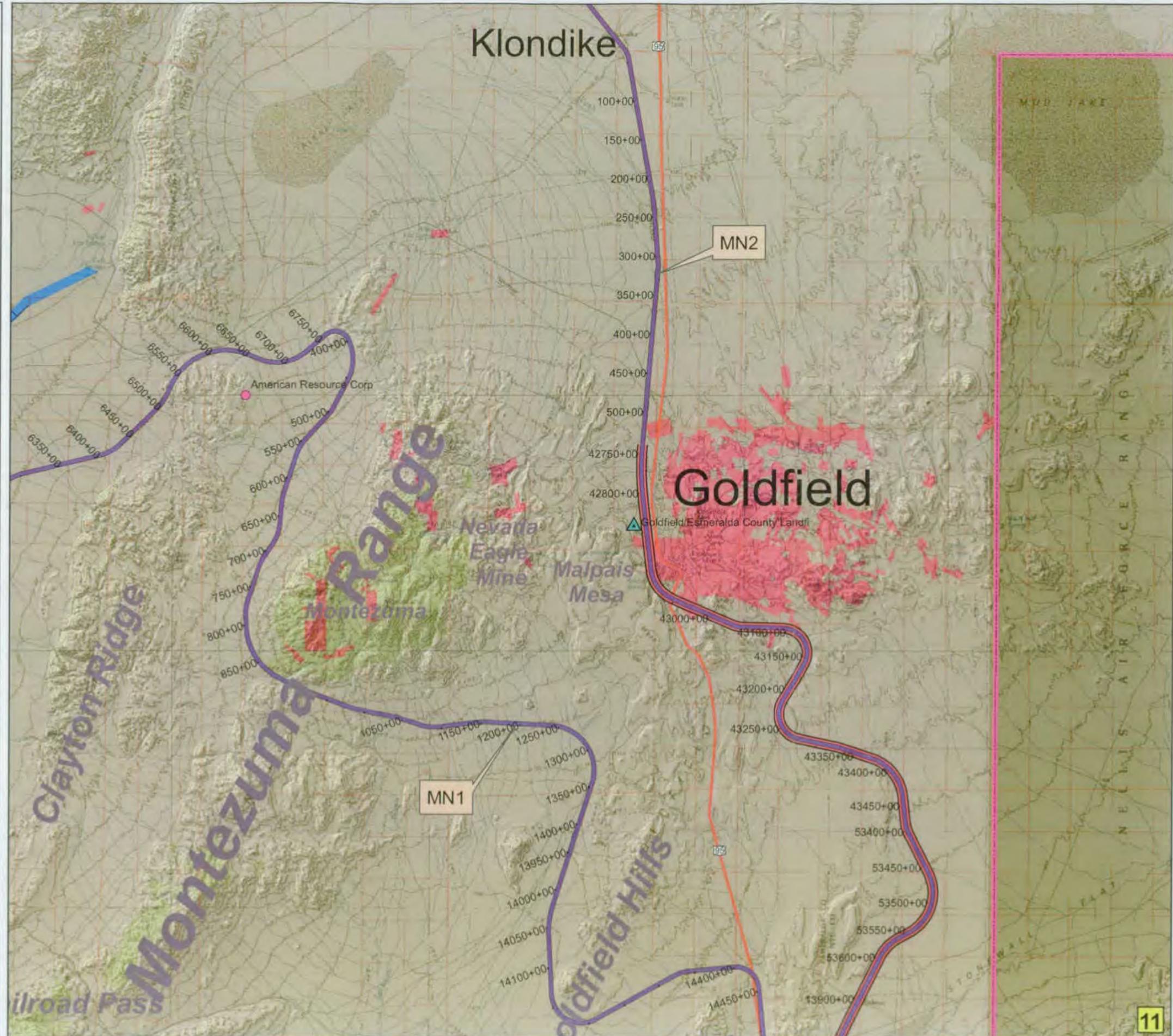
Sources

USGS 1:100,000 scale Digital Raster Graphs
 Jurisdictional GIS data layer information from BLM
 Wilderness Study Area data from BLM
 Alternatives and alignments presented on this map reflect the most current alignment engineering concepts and are subject to change.



Yucca Mountain Project

Map created by BSC, Nevada Transportation, 10/12/2006 T06-00242 rev 11 #11 - Goldfield/Montezuma



Mina Rail Corridor

Bonnie Claire Interface

Legend

Rail Study Related Features

Existing Rail

- Department of Defense Rail Line
- National Rail System
- Existing Rail that is part of the Mina Rail Corridor

Potential Alignments that would require new construction

- Mina Corridor Potential Alignments
- Mina Corridor Potential Alignments (also addressed as part of the Caliente Rail Corridor)

- Alignment Designator

Jurisdiction

- BLM District Boundary
- U.S. Bureau of Land Management
- U.S. Bureau of Reclamation
- City and County Parks
- U.S. Department of Defense
- U.S. Department of Energy
- Fish and Wildlife Service
- Native American Reservation
- Nevada State Lands
- Private Lands
- U.S. Forest Service
- Wilderness Study Areas

EPA Hazard Sites

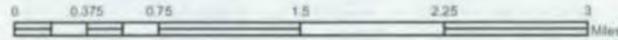
- Air Emissions
- Hazardous Waste
- Toxic Release
- Water Discharges
- Multiple

Landfills

- Active
- Closed

Sources

USGS 1:100,000 scale Digital Raster Graphs
 Jurisdictional GIS data layer information from BLM
 Wilderness Study Area data from BLM
 Alternatives and alignments presented on this map reflect the most current alignment engineering concepts and are subject to change.



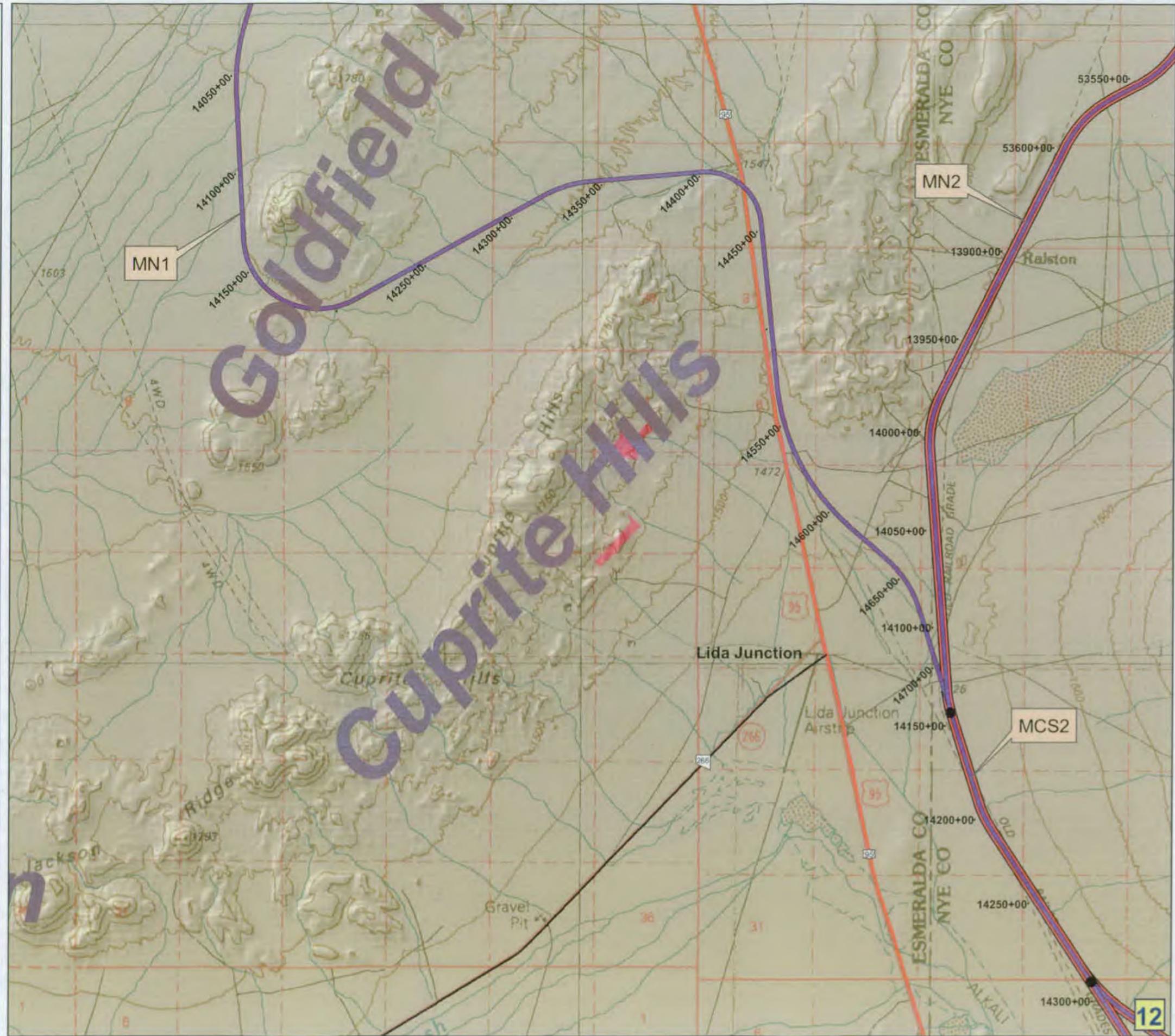
Scale 1:60,000



Yucca Mountain Project

Map created by BSC, Nevada Transportation, 10/12/2006

T06-00242 rev11 #12 - Bonnie



Mina Rail Corridor

Lida Junction to Yucca Mountain

Legend

Rail Study Related Features

Existing Rail

- Department of Defense Rail Line
- National Rail System
- Existing Rail that is part of the Mina Rail Corridor

Potential Alignments that would require new construction

- Mina Corridor Potential Alignments
- Mina Corridor Potential Alignments (also addressed as part of the Caliente Rail Corridor)

Alignment Designator

Jurisdiction

- BLM District Boundary
- U.S. Bureau of Land Management
- U.S. Bureau of Reclamation
- City and County Parks
- U.S. Department of Defense
- U.S. Department of Energy
- Fish and Wildlife Service
- Native American Reservation
- Nevada State Lands
- Private Lands
- U.S. Forest Service
- Wilderness Study Areas

EPA Hazard Sites

- Air Emissions
- Hazardous Waste
- Toxic Release
- Water Discharges
- Multiple

Landfills

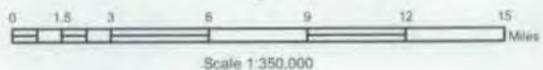
- Active
- Closed

Other Features

- Yucca Mountain Site
- Proposed Repository Land Withdrawal

Sources

USGS 1:250,000 scale Digital Raster Graphs
 Jurisdictional GIS data layer information from BLM
 Wilderness Study Area data from BLM
 Alternatives and alignments presented on this map reflect the most current alignment engineering concepts and are subject to change.



Yucca Mountain Project

Map created by BSC, Nevada Transportation, 10/12/2006 T06-00242 rev11 #13 - Lida Junction to Yucca

