APPENDIX E

SUBSURFACE EQUIPMENT DATA

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APPENDIX E
SUBSURFACE EQUIPMENT DATA

Equipment Data Sheets:

Transport Locomotive
Transfer Locomotive
Emplacement Locomotive
WP Transporter

Locomotive Selection Data:

Transport Locomotive
Transfer Locomotive
Emplacement Locomotive

Rail Size Selection Data:

Emplacement Drift Rail
Main Drift and Crosscut/Turnout Rail

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PRELIMINARY DATA SHEET NO. 1

Name: Transport Locomotive

Service: A single locomotive to move a WP transporter from the Waste Handling Building (at surface) to Emplacement Drifts (below surface). Tandem locomotives to move a loaded WP transporter from the Emplacement Drift to the Waste Handling Building.

Operating Conditions:

1.	Working Environment:	At surface and below surface in tunnels and drifts
2.	Temperature Range:	26°C to 50°C (79°F to 122°F)
3.	Elevation:	Approximately 1,000 m to 1,200 m (3,300 to 4,000 ft) above sea level
4.	Tunnel/Drift Dimensions:	
	a. Diameter:	5.0 m (16 ft) minimum
	b. Grade:	Tunnel +1.5% to -2.5%, Drifts ±0.75%
5.	Worst Case Load:	
	a. Type:	Waste package and WP transporter with two truck suspension
	b. Weight:	225 MT (250 tons) maximum
6.	Wheel Bearings:	Roller
7.	Locomotive Dimensions:	Approximately 6.7 m L x 1.8 m W x 2.4 m H
8.	Minimum Turning Radius:	25 m (82 ft) for both locomotive and WP transporter
9.	Track Gauge:	1.44 m (56½ in.)
10.	Rail:	57.05 kg/m (115 lb/yd) American Railroad Engineering Associates (AREA), on steel ties and concrete inverts
11.	Rail Condition:	Dry and in good condition
12.	Power Source:	Overhead trolley (250 volts D.C.) for travel in main drifts, and battery pack for limited travel in cross cuts or turnouts
13.	Battery Operation:	4 hours per day maximum
14.	Operation:	Two round trips per 8-hour day

15. Travel Distance: 4,000 m to 6,000 m one-way in main drifts, and 100 m (approx.) one-way in cross cuts or turnouts

Equipment Requirements:

1. Description: Two electric mine service type locomotives, for both trolley and battery operation with provisions, for single or tandem operations.

2. Maximum Design Grade: Single locomotive +2% to -3%
Tandem locomotives ±3%

3. Maximum Speed: 8 km/hr (5 mph)

4. Control: Manual and remote for operation in areas of high radioactivity

5. Coupler: Standard with remote operation

6. Approximately Dimensions and Weight:
   a. No. wheels: Four (4)
   b. Wheelbase: 2.54 m
   c. Coupler to coupler center: 7.7 m
   d. Overall length: 6.7 m
   e. Overall width: 1.83 m
   f. Overall height: 2.44 m above rail
   g. Coupler height: 0.79 m above rail
   h. Operating weight: 32 MT (35 tons)

Features:

1. Removable battery pack

2. Self-contained battery charger

3. Remote control operation (possibly wireless)

4. Closed circuit TV for remote operation

5. Remote control operation for coupler and air brake connections to WP transporter

Note: Above weights and dimensions are based on preliminary estimates and assumptions for approximate sizing of the mobile equipment for ACD. These weights and dimensions may change during subsequent design phases.

U.S. Suppliers:

1. Goodman Equipment Corporation
   (708) 496-1188 Fax: (708) 496-3939
   Contact: Scott Rife

2. Jeffery Division of Dresser Industries
   (614) 297-3123 Fax: (614) 297-3036
   Contact: Randy Morris

3. Balco, Inc.
   (412) 459-6814 Fax: (412) 459-0793
   Contact: Jess Bartholow

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PRELIMINARY DATA SHEET NO. 2

Name: Transfer Locomotive

Service: To move emplacement locomotive on locomotive carrier from main drift to emplacement drift.

Operating Conditions:

1.	Location:	Below surface in tunnels and drifts
2.	Temperature Range:	26°C to 50°C (79°F to 122°F)
3.	Elevation:	Approximately 1,000 m to 1,200 m (3,300 to 4,000 ft) above sea level
4.	Tunnel/Drift Dimensions:	
	a. Diameter:	5.0 m (16 ft) minimum
	b. Grade:	Tunnel +1.5% to -2.5% Drifts ±0.75%
5.	Worst Case Load:	
	a. Type:	Locomotive carrier with emplacement locomotive
	b. Weight:	30 MT (33 tons) maximum
6.	Wheel Bearings:	Roller
7.	Locomotive Dimensions:	Approximately 4.4 m L x 2.0 m W x 1.6 m H
8.	Minimum Turning Radius:	25 m (82 ft) for both locomotive carrier and locomotive
9.	Track Gauge:	1.44 m (56½ in.)
10.	Rail:	57.05 kg/m (115 lb/yd) AREA, on steel ties and concrete inverts
11.	Rail Condition:	Dry and in good condition
12.	Power Source:	Replaceable battery packs (one in locomotive, one on charger)
13.	Battery Operation:	8 hrs per day, maximum
14.	Operation:	Two round trips per 8-hour day
15.	Travel Distance:	4,000 m to 6,000 m one-way in main drifts, and 100 m (approx.) one-way in cross cuts or turnouts

Equipment Requirements:

1. Description: An electric mine service-type locomotive for battery operation

2. Maximum Design Grade: ±3%

3. Maximum Speed: 5 km/hr (3.1 mph)

4. Control: Manual and remote for operation in areas of high radioactivity

5. Coupling: Standard with remote operation

6. Approximately Dimensions and Weight:
   a. No. wheels: Four (4)
   b. Wheelbase: 1.5 m
   c. Coupler to coupler truck center: 4.8 m
   d. Overall length: 4.4 m
   e. Overall width: 2.0 m
   f. Overall height: 1.6 m above rail
   g. Coupler height: 0.79 m above rail
   h. Operating weight: 10 MT (11 tons)

Features:

1. Removable battery pack

2. Self-contained battery charger

3. Remote control operation (possibly wireless)

4. Closed circuit TV for remote operation

5. Remote control for coupler and air brake connectors to railcars

Note: Above weights and dimensions are based on preliminary estimates and assumptions for approximate sizing of the mobile equipment for ACD. These weights and dimensions may change during subsequent design phases.

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1. Goodman Equipment Corporation
   (708) 496-1188 Fax: (708) 496-3939
   Contact: Scott Rife

2. Jeffery Division of Dresser Industries
   (614) 297-3123 Fax: (614) 297-3036
   Contact: Randy Morris

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   (412) 459-6814 Fax: (412) 459-0793
   Contact: Jess Bartholow

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PRELIMINARY DATA SHEET NO. 3

Name: Emplacement Locomotive

Service: To move emplacement railcar loaded with waste package into emplacement drift.

Operating Conditions:

1.	Location:	Below surface in emplacement drifts
2.	Temperature Range:	26°C to 50°C (79°F to 122°F)
3.	Elevation:	Approximately 1,000 m to 1,200 m (3,300 to 4,000 ft) above sea level
4.	Drift Dimensions:	
	a. Diameter:	5.0 m (16 ft) minimum
	b. Grade:	±0.75%
5.	Worst Case Load:	
	a. Type:	Waste package and emplacement railcar
	b. Weight:	79 MT (87 ton) maximum
6.	Wheel bearing:	Sleeve
7.	Locomotive Dimensions:	4.4 m L x 2.0 m W x 1.6 m H
8.	Minimum Turning Radius:	25 m (82 ft)
9.	Track Gauge:	1.44 m (56½.)
10.	Rail:	44.64 kg/m (90 lb/yd), American Society of Civil Engineers (ASCE) on steel ties and compacted tuffaceous fill
11.	Rail Condition:	Dry and in good condition
12.	Power Source:	Replaceable battery packs (one in locomotive, one on charger)
13.	Battery Operation:	8 hrs per day, maximum
14.	Operation:	Two round trips per 8-hour day
15.	Travel Distance:	600 m maximum, one-way

Equipment:

1. Description: An electric mine service-type locomotive for battery operation

2. Maximum Design Grade: ±0.75%

3. Maximum Speed: 5 km/hr (3.1 mph)

4. Control: Manual and remote for operation in areas of high radioactivity

5. Coupling: Standard with remote operation

6. Approximately Dimensions and Weight:
   a. No. wheels: Four (4)
   b. Wheelbase: 1.5 m
   c. Coupler to coupler center: 4.8 m
   d. Overall length: 4.4 m
   e. Overall width: 2.0 m
   f. Overall height: 1.6 m above rail
   g. Coupler height: 0.38 m above rail
   h. Operating weight: 10 MT (11 tons)

Features:

1. Removable battery pack

2. Self-contained battery charger

3. Remote control operation (possibly wireless)

4. Closed circuit TV for remote operation

5. Remote control for coupler and air brake connectors to railcar

Note: Above weights and dimensions are based on preliminary estimates and assumptions for approximate sizing of the mobile equipment for ACD. These weights and dimensions may change during subsequent design phases.

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   Contact: Scott Rife

2. Jeffery Division of Dresser Industries
   (614) 297-3123 Fax: (614) 297-3036
   Contact: Randy Morris

3. Balco, Inc.
   (412) 459-6814 Fax: (412) 459-0793
   Contact: Jess Bartholow

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PRELIMINARY DATA SHEET NO. 4

Name: WP Transporter

Service: To provide for shielded transport of waste package from Waste Handling Building (at surface) to waste package emplacement drift (below surface).

Operating Conditions:

1.	Working Environment:	Above surface and below surface in tunnels and drifts
2.	Temperature Range:	26°C to 50°C (79°F to 122°F)
3.	Elevation:	Approximately 1,000 m to 1,200 m (3,300 to 4,000 ft) above sea level
4.	Tunnel/Drift Dimensions:	
	a. Diameter:	5.0 m (16 ft) minimum
	b. Grade:	Tunnel ±2.5% Drifts ±0.75%
5.	Load:	
	a. Type:	Waste package railcar
	b. Weight:	79 MT (87 tons) maximum
6.	Minimum Turning Radius:	25 m (82 ft) for both locomotive and WP transporter
7.	Track Gauge:	1.44 m (56½ in.)
8.	Rail:	57.05 kg/m (115 lb/yd) AREA, on steel ties and concrete inverts
9.	Rail Condition:	Dry and in good condition
10.	Operation:	Two round trips per 8-hour day
11.	Travel Distance:	4,000 m to 6,000 m one-way

Equipment:

1.	Description:	A rail-mounted shielded WP transporter for the transfer of high-level radioactive waste packages.
2.	Maximum Design Grade:	±3%
3.	Maximum Speed:	8 km/hr (5 mph)
4.	Suspension:	Two 4-wheel trucks with roller bearings
5.	Radiation Shielding:	165 mm thickness carbon steel gamma shield and 300 mm air gap between waste package and shielding
6.	Coupler:	Standard with remote operation controlled from transport locomotive
7.	Brakes:	Air-operated brakes on all wheels with air reservoir

8. Approximately Dimensions and Weight:

a.	No. trucks:	Two (2)
b.	No. wheels/truck:	Four (4)
c.	Truck center to center:	3.7 m
d.	Truck wheel base:	1.8 m
e.	Overall length:	8.4 m
f.	Overall width:	2.7 m
g.	Overall height:	3.9 m above rail
h.	Coupler height:	0.79 m above rail
i.	Operating weight:	225 MT (250 tons)

Special Features:

1. The air brake system of the WP transporter to operate in both modes, manually and automatically.

2. The WP transporter doors to be remotely controlled and operated.

3. The WP transporter loading system, for transfer of the emplacement railcar, to be remotely controlled and operated.

4. The mechanical parking brake to be remotely actuated and controlled from locomotive.

Note: Above weights and dimensions are based on preliminary estimates and assumptions for approximate sizing of the mobile equipment for ACD. These weights and dimensions may change during subsequent design phases.

Suppliers:

1. Transfab, Inc.
   (304) 736-5256 Fax: (304) 736-8135
   Attn: John Cardia

2. Robbins Co.
   (206) 872-4539 Fax: (206) 872-0199
   Attn: Bob Moffat

3. National Engineering
   (303) 295-3385 Fax: (303) 295-6057
   Attn: Marty Martin

4. TWI Industries, Inc.
   (412) 835-9400 Fax: (412) 835-6693
   Attn: Charles Schultz

5. Muhlhauser Tunneling Equip.
   (206) 813-0669 Fax: (206) 850-8315
   Attn: Kent Smith

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PRELIMINARY LOCOMOTIVE SELECTION

SELECTION PROCEDURE

Tentative sizing of locomotives is based on selection procedure from:

Goodman Equipment Corp.
Mining Machine Sales Manual
Trolley Locomotive Calculations, Section 4068

where locomotive capacity is determined by the following equation:

where:

$$L = \frac{W \times R_t}{2000\ (K + .01) - (G \times 20 + R_2)}$$

L = weight of locomotive (tons)
W = weight of trailing load (tons)
R_t = train resistance (lb/ton)
= $R_r + (G)(20)$
R_r = trailing load rolling resistance (lb/ton)
R_2 = locomotive rolling resistance (20 lb/ton)
G = grade (%)
K = Adhesion factor for driving wheels (0.25 for steel wheel on dry rail)

Rolling resistance is 20 lb/ton for trailing loads with roller bearings and 30 lb/ton for sleeve bearings.

Transport Locomotive

Description: Class D combination electric mine service locomotive for primary trolley operation and secondary storage battery operation, and equipped for tandem operation with an identical unit.

Selection Criteria:

Trailing load (W):	250 tons
Rolling resistance (R_r):	20 lb/ton
Grade (G):	±2% Condition 1; ±3% Condition 2
Speed:	5 mph

Selection for Condition 1 (Single Locomotive):

$$L = \frac{W \times R_t}{2000\ (K + .01) - (G \times 20 + R_2)}$$

$$R_t = R_r + (G)(20)$$
$$= 20 + (2)(20) = 60\ lb/ton$$

$$L = \frac{(250)\ (60)}{2000\ (0.25 + .01) - (2 \times 20 + 20)}$$

$$L = 32.6\ tons$$

Select a 35-ton locomotive (32 MT).

Selection for Condition 2 (Tandem Locomotives):

$$L = \frac{W \times R_t}{2000\ (K + .01) - (G \times 20 + R_2)}$$

$$R_t = R_r + (G)(20)$$
$$= 20 + (3)(20) = 80\ lb/ton$$

$$L = \frac{(250)\ (80)}{2000\ (0.25 + .01) - (3 \times 20 + 20)}$$

$$L = 45.5\ tons$$

Using two 35-ton (32 MT) locomotives in tandem will meet the requirements of this condition.

Note: Above weights and dimensions are based on preliminary estimates and assumptions for approximate sizing of the mobile equipment for ACD. These weights and dimensions may change during subsequent design phases.

EMPLACEMENT LOCOMOTIVE

Description: A Class A electric mine service locomotive for storage battery operation.

Selection Criteria:

Trailing load (W):	87 tons
Rolling resistance (R_r):	30 lb/ton
Grade (G):	±0.75%

Selection:

$$L = \frac{W \times R_t}{2000\ (K + .01) - (G \times 20 + R_2)}$$

$$R_t = R_r + (G)(20)$$
$$= 30 + (0.75)(20) = 45\ lb/ton$$

$$L = \frac{(87)\ (45)}{2000\ (.25 + .01) - (.75 \times 20 + 20)}$$

$$L = 8.1\ tons.$$

Select a 10-ton locomotive. The locomotive weight may be 10 MT or 10 tons, depending on availability; either will satisfy the load requirements.

Note: Above weights and dimensions are based on preliminary estimates and assumptions for approximate sizing of the mobile equipment for ACD. These weights and dimensions may change during subsequent design phases.

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TRANSFER LOCOMOTIVE

Description: A Class A electric mine service locomotive for storage battery operation.

Selection Criteria:

Trailing load (W):	33 tons
Rolling resistance (R_2):	20 lb/ton
Grade (G):	±3%

Selection:

$$L = \frac{W \times R_t}{2000\ (K + .01) - (G \times 20 + R_2)} \quad (tons)$$

$$R_t = R_r + (G)(20)$$
$$= 20 + (3)(20) = 80\ lb/ton$$

$$L = \frac{(33)\ (80)}{2000\ (.25 + .01) - (3 \times 20 + 20)}$$

$$L = 6.0\ tons$$

Based on this calculation, a six-ton locomotive will be adequate. However, for reasons of uniformity, a 10-ton locomotive is recommended. The locomotive weight may be 10 MT or 10 tons, depending on availability; either will satisfy the load requirements.

Note: Above weights and dimensions are based on preliminary estimates and assumptions for approximate sizing of the mobile equipment for ACD. These weights and dimensions may change during subsequent design phases.

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PRELIMINARY RAIL SIZE SELECTION

SELECTION PROCEDURE

Tentative rail sizing procedure is as follows:

1. Maximum wheel load is determined for the application.

2. Maximum wheel load is adjusted for the speed using a speed modification factor from Ref. 1.

3. Adjusted maximum wheel load and size is used with the appropriate table from Ref. 1 to determine minimum rail size and type required.

Ref. 1 Association of Iron and Steel Engineers (AISE) Technical Report No. 6. September 1991. *Specification for Electric Overhead Traveling Cranes for Steel Mill Service.*

EMPLACEMENT DRIFT RAIL

Service: Rail to provide for the placement of the WP/emplacement railcar by the emplacement locomotive in the emplacement drift and the support of the WP/emplacement railcar in the final placement position.

Selection Criteria:

The rail selection is based on the WP/emplacement railcar as the heaviest piece of equipment operating on the track with the criteria as follows:

Equipment:	
Emplacement railcar:	10 MT (22,000 lbs)
Waste Package Weight (max):	69 MT (151,800 lbs)
Total Weight:	79 MT (173,800 lbs)
Axles:	2
No. Wheels:	4
Diameter of Wheels:	0.46 m (18 in.)
Speed:	5 km/hr (3.1 mph) (275 fpm)
Safety Factor:	1.25
Rail Gauge:	1.44 m (56½ in.)
Rail Support:	Steel ties on compacted tuffaceous fill

Selection:

$$\textit{Design Wheel Load} = \frac{173{,}800}{4}\ (1.25) = 54{,}312\ \textit{lbs}$$

From Ref. 1 (Table 11) for a speed of 275 fpm and an 18-inch-diameter wheel:

$$\textit{Speed Modification Factor} = 1.098$$

Adjusting maximum design wheel load for travel speed:

$$\textit{Maximum Design Wheel Load} = (1.098)\ (54{,}312) = 59{,}635\ \textit{lbs.}$$

From Ref. 1 (Table 9) for 18-inch wheel and 60-pound rail:

$$\textit{Allowable Wheel Load} = 61{,}430\ \textit{lbs.}$$

Select the next larger rail size: 90 lb/yd (44.64 kg/m)ASCE rail

Note: Table 10 is based on wheels heat treated to 58 Rc minimum and rails heat treated to 320 Bhn minimum.

MAIN DRIFT AND CROSS CUT RAIL

Service: Rail to provide for transport of the loaded WP transporter from Waste Handling Building at surface to subsurface emplacement drifts and other rail-mounted support equipment.

Selection Criteria:

The rail selection is based on the WP transporter as the heaviest piece of equipment operating on the track, with the criteria as follows:

Mobile Equipment:	WP transporter
Total Weight (with Load):	225 MT (250 tons)
No. Axles:	4
No. Wheels:	8
Wheel Diameter:	0.61 m (24 in.)
Speed:	8 km/hr (5 mph) (440 fpm)
Rail Gauge:	1.44 m (56½ in.)
Safety Factor:	1.25
Rail Support:	Steel ties on concrete inverts

Selection:

$$\textit{Design Wheel Load} = \frac{(250)(2000)}{8}(1.25) = 78{,}125 \textit{ lbs.}$$

From Ref. 1 (Table 11) for a speed of 440 fpm and 24-inch-diameter wheel:

$$\textit{Speed Modification Factor} = 1.122$$

$$\textit{Maximum Design Load} = (1.122)(78{,}125) = 87{,}656 \textit{ lbs.}$$

From Ref. 1 (Table 10) for a 24-inch wheel and a 104- to 105-pound rail:

$$\textit{Allowable Wheel Load} = 87{,}750 \textit{ lbs.}$$

Select the next larger rail size: 115 lb/yd (57.05 kg/m), AREA rail.

Note: Table 10 is based on wheels heat treated to 58 Rc minimum and rails heat treated to 320 Bhn minimum.

Above weights and dimensions for the selection of rails are based on preliminary estimates and assumptions of the rolling stock for ACD. These weights and dimensions may change during subsequent design phases.

APPENDIX F1

RAIL CORRIDOR DESCRIPTION

USGS Quadrangle	Cuml. Miles *	Sec Twp Rng	Location Description	Land-Use Constraints	Archeological & Historical Sites	Road Crossings & Proximity to Population	Topographic Considerations	Bridges & Hydrologic Considerations	Operating Considerations
Roach Lake 15' References: Q-39 MTP-156 MTP-157 MTP-158 MTP-159 *Plate 17*: D1, D2	0.0	S3 T26S R59E	Borax Siding	Pipeline Right-of-Way N7100, (underground) 50 ft. Pipeline Right-of-Way NEV056213, (underground) 50 ft.					Connection with Union Pacific (in passing siding).
		S7,8,9,16,17,18 T26S R59E		Material Site NEV05336, S17 Material Site NEV04638, S17	Route passes through a very large unevaluated archeological site covering most of the area. If found to be a significant site, routing may still be possible if artifacts are diffused.				
	2.0	S16 T26S R59E	Interstate 15 (four lanes)	Highway Right-of-Way NEV046714, 400ft. Powerline Right-of-Way N2078, 20 ft. Telephone Right-of-Way N43923, (underground) 10 ft.		Grade Separation			
	5.0	S30 T26S R59E	Foot of Spring Mtns.						
							Extensive earthwork for 3 miles around southern tip of Spring Mtns. Cuts and fills range up to 80'.		2.2 % upgrade. Some sharp curves.
	6.5	S6 T27S R59E	Vicinity of State Line (casinos)			Probable track location within 2.0 miles of casinos.			
	8.0	S35 T26S R58E	Enter California						
	10.5	S28 T18N R14E	State Line Pass	Route parallels perimeter of Stateline Wilderness Area for approx. 4.0 mile. California Desert Conservation Act of 1994.			Deep cut through alluvial fan at summit.	Cut through alluvial fan will require considerable flood protection measures.	Top of grade.
							Extensive earthwork for 3 miles along face of Spring and Clark Mtns. Cuts and fills range up to 100' in hardrock; some tunneling may be necessary.	High run-off rates due to hard ground surface. Some canyon outflows will require major culvert installations.	2.2 % downgrade. Some sharp curves.
	14.0	S17 T26S R58E	Exit California						

* Cumulative Mileage figures are approximate and refer to this route section only; mileage between adjoining route sections is not contiguous.

USGS Quadrangle	Cuml. Miles *	Sec Twp Rng	Location Description	Land-Use Constraints	Archeological & Historical Sites	Road Crossings & Proximity to Population	Topographic Considerations	Bridges & Hydrologic Considerations	Operating Considerations
Clark Mtn. 15' References: Q-40 TTP-160 *16*: D5		S36 T25S R57E		Corral Community Pit N48722			Route crosses a series of alluvial fans at base of Spring Mtns.	Some major culvert installations just above.	
Shenandoah Peak 15' References: Q-41 MTP-161 MTP-162 MTP-163 MTP-164 MTP-165 MTP-166	21.5	S10,14,15,22,23, 24,25,26,27 T25S R57E	Enter vicinity of Sandy Valley	Community Pit N48722		Route is adjacent to southeast limit of populated area.			
						Probable track location parallels Cherokee St. and is less than 1.0 mile from homes.	Route crosses series of alluvial fans.		
	24.0	S3 T25S R57E	Sandy Valley Rd.	Community Pit N48722	Probable track location passes within 0.5 mile of Shenandoah Mill, an unevaluated historical site.	Grade Separation			
	25.5	S33 T24S R57E	Wilson Pass Rd.			Signaled Grade Crossing			
	27.0	S29 T24S R57E	Exit vicinity of Sandy Valley			Route is adjacent to northern limit of populated area. Within 1.0 mile of school.			
	33.0	S34 T23S R56E	Road from Sandy Valley to Hwy. 160			Signaled Grade Crossing			
Plate 16: B4, B5, C4, C5	39.5	S6 T23S R56E			Crossing of Old Spanish Trail, a significant historic site.				
Pahrump 15' References: Q-74 MTP-167 MTP-168 MTP-169 MTP-170 MTP-171 MTP-172		S18,19;20,28,27, 34,35 T22S R55E		Powerline Right-of-Way NEV066209, 20 ft. Powerline Right-of-Way NEV53100, 80 ft.					
		S14,15,16,17,18 T21S R55E		Powerline Right-of-Way N17151, 20 ft.					
		S3,4,5 T21S R55E		Pipeline Right-of-Way					
		S6,8,17,21,26,27, 35,36 T20S R54E		Powerline Right-of-Way NEV065524, 200 ft.					
		S27,34 T20S R54E		Water System N46682					
Plate 16: A2, A3	45.5	10 T22S R55E	Old Spanish Trail Hwy. *Match point for either North Pahrump Alternate or Stewart Valley Alternate.*			Grade Separation	If Stewart Valley Alternate adjoins, location is in S21 T22S R55E.		

* Cumulative Mileage figures are approximate and refer to this route section only; mileage between adjoining route sections is not contiguous.

USGS Quadrangle	Cumi. Miles *	Sec Twp Rng	Location Description	Land-Use Constraints	Archeological & Historical Sites	Road Crossings & Proximity to Population	Topographic Considerations	Bridges & Hydrologic Considerations	Operating Considerations
Goodsprings 15' References: Q-75 MTP-173 MTP-174 MTP-175 MTP-176 MTP-177 MTP-178 *Plate 17:* B1, C1, C2	0.0	S12 T25S R59E	Jean	Pipeline Right-of-Way N7100 (underground), 50 ft. Pipeline Right-of-Way NEV056213 (underground), 50 ft.		Connection trackage within 0.5 mile of casinos and industrial buildings, unless connection site moved to the north.			Connection with Union Pacific (to passing siding). Other potential connection sites within 3 miles to the north of Jean. 2.2 % upgrade begins within 0.5 mile of connection.
	0.7	S12 T25S R59E	Hwy. 604	Highway Right-of-Way CC0200954, 400 ft.		Grade Separation	As the slope of the valley floor is over 1.5 %, long fills will be required in advance of and between grade separations over Hwy. 604 and Interstate 15.		2.2 % upgrade, continuous for approx. 15 miles.
	1.0	S12 T25S R59E	Interstate 15 (four lanes)	Highway Right-of-Way NEV046714, 400 ft.		Grade Separation			
		S32 T24S R59E		Powerline Right-of-Way NEV015022, 100 ft.	One small unevaluated archeological site within corridor.				
	7.5	S24 T24S R58E	Goodsprings	Powerline Right-of-Way N37856, 20 ft. Enter proposed BLM utility corridor		Probable track location is within 1.0 mile of recently constructed homes on north side of Goodsprings.			
		S2 T24S R58E	Goodsprings Valley	Fence			Route loops around north end of valley, adding sufficient distance to maintain proper grade.		
	15.3	S17 T24S R58E	Wilson Pass Rd.			Signaled Grade Crossing			
	15.5	S17 T24S R58E	East Portal, Wilson Pass Tunnel			Above crossing of Wilson Pass Rd. may possibly be avoided by locating tunnel portal north of road.			Top of 2.2 % grade.
Goodsprings 15' Shenandoah Peak 15'			Wilson Pass Tunnel				Approx. 2.0 mile long tunnel through crest of Spring Mtns. at about 4600' elevation. Design may establish length as much as 0.4 mile shorter or longer.		Tunnel ventilation system may be required due to combined effects of tunnel length and 2.2 % approach grade.
Shenandoah Peak 15' *Plate 16:* B4, B5, C4, C5	17.5	S7 T24S R58E	West Portal, Wilson Pass Tunnel						
		S12 T24S R57E			Two small unevaluated archeological sites within corridor.				
		S6 T24S R58E	Wilson Pass Rd.			Signaled Grade Crossing. May be avoided depending upon site of tunnel portal (1500' road relocation would be necessary).			

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USGS Quadrangle	Cuml. Miles *	Sec Twp Rng	Location Description	Land-Use Constraints	Archeological & Historical Sites	Road Crossings & Proximity to Population	Topographic Considerations	Bridges & Hydrologic Considerations	Operating Considerations
							Extensive earthwork for approx. 3 miles between tunnels; cuts and fills range up to 60'. Earthwork may be reduced by lengthening both tunnels.		
Joshua Peak 15' *Plate 16:* B4, B5, C4, C5	20.5	S35 T23S R57E	Potosi Tunnel	Powerline Right-of-Way NEV066148, 20 ft.			Approx 0.5 mile long tunnel through branch of Spring Mtns. Design may lengthen as much as 0.4 mile.		Tunnel ventilation system probably not required. 2.2 % downgrade begins at west portal.
							Route crosses series of alluvial fans.	Many culverts required.	2.2 % downgrade, approx. 6 miles long.
	26.5	S6 T23S R57E	Road from Sandy Valley to Hwy. 160			Signaled Grade Crossing			Approx. foot of 2.2 % grade.
	28.5	S35 T22S R56E			Crossing of Old Spanish Trail, a significant historic site.				
	28.6	S35 T22S R56E	Lovell Wash					Bridge up to 300' long.	
Mountain Springs 15' References: Q-76 MTP-179 MTP-180 *Plate 16:* A4, A5									
Pahrump 15' *Plate 16:* A2, A3	37.5	S10 T22S R55E	Old Spanish Trail Hwy. *Match point for either North Pahrump Alternate or Stewart Valley Alternate.*			Grade Separation			

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USGS Quadrangle	Cuml. Miles *	Sec Twp Rng	Location Description	Land-Use Constraints	Archeological & Historical Sites	Road Crossings & Proximity to Population	Topographic Considerations	Bridges & Hydrologic Considerations	Operating Considerations
	0.0	S10 T22S R55E	Old Spanish Trail Hwy. *Match point for either Wilson Pass Alternate or State Line Pass Alternate.*			Grade Separation	Route crosses series of alluvial fans at base of Spring Mtns.		
	7.0	S13 T21S R54E	Hwy. 160			Grade Separation			
	8.0	S11 T21S R54E	Enter vicinity of built-up portion of Pahrump			Route is adjacent to eastern limit of populated area.		Numerous culverts required.	2.0 % downgrade.
	9.5	S2 T21S R54E	Carpenter Canyon Road			Signaled Grade Crossing			
Pahrump 15'	11.5	S27 T20S R54E					Route along southern tip of branch of Spring Mtns., using grades to avoid tunnel.		
Plate 16: A2, A3	12.0	S27 T20S R54E	Clark / Nye County Line						
	13.0	S21 T20S R54E	County road			Signaled Grade Crossing			
	14.5	S17 T20S R54E	Wheeler Wash					Bridge up to 100' long.	
	15.5	S8 T20S R54E	Wheeler Pass Rd.			Signaled Grade Crossing. Route is adjacent to central portion of Pahrump; nearest housing is approx. 1.5 miles from probable track location.			2.0 % upgrade.
Mt. Stirling 15'		S31 T19S R54E		Powerline Right-of-Way NEV065524, ft.			Route crosses series of alluvial fans at base of Spring Mtns.		
References: Q-77 MTP-181 MTP-182 MTP-183	22.0	S12 T19S R53E	Exit vicinity of built-up portion of Pahrump			Route is adjacent to northern limit of populated area, although private lands continue northward.	Optional routing to avoid private lands would be approx. 1.5 miles further east and to an elevation 600' higher on the slope of the Spring Mtns. The additional elevation gain would require approx. 3 miles additional construction involving heavy earthwork.	Numerous culverts required. Several of the larger washes will require major culvert installations.	
	23.0	S1 T19S R53E		Enter private lands.					
Plate 14: C1, D1	25.5	S26 T18S R53E		Exit private lands.					
Mt. Schader 7.5'	27.5	S15 T18S R53E		Enter private lands.					
References: Q-78 MTP-184 MTP-185 MTP-186	30.0	S8 T18S R53E		Northern limit of private lands in Pahrump area.					
	32.5	S36 T17S R52E	Johnnie Pass		One unevaluated site within corridor.				
Plate 13: C5		S25 T17S R52E			One unevaluated site within corridor.		Route through hills at base of Mt. Schader. Approx. 1800' tunneling required in addition to very heavy earthwork.		2.2 % downgrade, approx. 6.5 miles long.
	36.0	S14 T17S R52E	Foot of Mt. Schader						

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USGS Quadrangle	Cuml. Miles *	Sec Twp Rng	Location Description	Land-Use Constraints	Archeological & Historical Sites	Road Crossings & Proximity to Population	Topographic Considerations	Bridges & Hydrologic Considerations	Operating Considerations
-ter Range 15' nces: -84 MTP-194 MTP-195 MTP-196 MTP-197 MTP-198 *Plate 13:* A4, A5, B4, B5	42.0	S22 T16S R52E	Hwy. 160	Highway Right-of-Way NEV065993 Telephone Right-of-Way N47397 (underground), 20 ft. Within proposed BLM utility corridor		Grade Seperation			
	42.5	S21 T16S R52E	Wash					Bridge up to 200' long.	
	45.0	S19 T8S R52E	County Road			Signaled Grade Crossing			
	47.5	S22 T16S R51E	*Match point for Amargosa Desert Section.*						

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USGS Quadrangle	Cuml. Miles *	Sec Twp Rng	Location Description	Land-Use Constraints	Archeological & Historical Sites	Road Crossings & Proximity to Population	Topographic Considerations	Bridges & Hydrologic Considerations	Operating Considerations
Pahrump 15' *Plate 16:* A2, A3	0.0	S10 T22S R55E	Old Spanish Trail Hwy. *Match point for either Wilson Pass Alternate or State Line Pass Alternate.*			Grade Separation	If State Line Pass Alternate adjoins, location is in S21 T22S R55E.		
	3.0	S7 T22S R55E		Enter BLM proposed 2640' Utility/Trans. Corridor					
	6.5	S3 T22S R54E	Clark / Nye County Line	Powerline Right-of-Way NEV066289, 20 ft. Telephone Right-of-Way NEV065104, 20 ft.					
	10.0	S25 T21S R53E	Homestead Road			Grade Separation. At least 5 homes are within 0.2 mile of probable track location, numerous other homes are within 1.0 mile.			
Nopah Peak 7.5' References: Q-79 *Plate 16:* A1									
Sixmile Spring 7.5' References: Q-80 MTP-187 *Plate 13:* E5	19.5	S22 T24N R8E	Hwy. 372			Grade Separation	Extensive earthwork required through hills at southern tip of Last Chance Range.		2.0 % grades.
						Probable track location is within 0.5 mile of California state line, and within 0.6 mile of at least 10 homes (some new) and homes under construction in both Nevada and California.			
Stewart Valley 7.5' References: Q-81 MTP-188 MTP-189 MTP-190 MTP-191 *Plate 13:* E4	23.5	S5 T24N R8E		Exit BLM proposed 2640' Utility/Trans. Corridor					
Stewart Valley 7.5' High Peak 7.5' *Plate 13:* D4, E4			Stewart Valley			Probable track location within 0.1 mile of Ash Meadows Road for about 6 miles, and within 0.4 mile of 5 homes.	Route along base of High Peak, parallel to Ash Meadow Road.		

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USGS Quadrangle	Cuml. Miles *	Sec Twp Rng	Location Description	Land-Use Constraints	Archeological & Historical Sites	Road Crossings & Proximity to Population	Topographic Considerations	Bridges & Hydrologic Considerations	Operating Considerations
High Peak 7.5'	30.0	S13 T19S R51E	Amargosa Rd.			Grade Separation	Route through western hills of Last Chance Range.		2.0 % upgrade, approx. 7 miles long.
References: 92 P-192	34.5	S32 T18S R52E	Wash					Bridge up to 200' long.	
	35.5	S29 T18S R52E	Wash					Major culvert installation.	
Plate 13: D4	37.0	S19 T18S R52E	Summit						Top of grade.
Amargosa Flat 7.5'							Some heavy earthwork required.		2.0 % downgrade, approx. 6 miles long. Some sharp curves.
	39.0	S8 T18S R52E	Foot of Mt. Montgomery						
References: Q-83 MTP-193							Route crosses alluvial fans.	Many culverts required.	
Plate 13: C4	45.5	S9 T17S R52E	County road (to Crystal)	Powerline Right-of-Way NEV059100, 80 ft. Telephone Right-of-Way NEV064817, 10 ft. Powerline Right-of-Way NEV065524, 200ft.		Grade Separation			
	49.5	S30 T18S R52E	County road			Signaled Grade Crossing			
Specter Range 15' *Plate 13:* A4, A5, B4, B5	52.0	S22 T16S R51E	*Match point for Amargosa Desert Section.*						

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USGS Quadrangle	Cuml. Miles *	Sec Twp Rng	Location Description	Land-Use Constraints	Archeological & Historical Sites	Road Crossings & Proximity to Population	Topographic Considerations	Bridges & Hydrologic Considerations	Operating Considerations
Specter Range 15' *Plate 13:* A4, A5, B4, B5	0.0	S22 T16S R51E	*Match point for either North Pahrump Alternate or Stewart Valley Alternate.*						
	7.0	S3 T16S R50E	Rock Valley Wash					Bridge up to 200' long.	
							Route around south side of Skeleton Hills.		
Lathrop Wells 15' *Plate 13:* A2, A3, B2, B3	11.5	S20 T15S R50E	Hwy. 95	Highway Right-of-Way CCO18078, 400 ft. Powerline Right-of-Way NEV059100, 80 ft. Telephone Right-of-Way NEV065524, 100 ft. Powerline Right-of-way NEV058116, 100 ft.		Grade Separation			1.5 % upgrade.
	15.0	S4 T15S R50E	Enter Nevada Test Site	Nevada Test Site					
					One significant archeological site within corridor.		Probable route parallels power line.		
Topopah Spring 15' *Plate 12:* E3, E4	21.0		Topopah Wash					Bridge up to 200' long	
	21.3		NTS Road			Grade Separation	Probable route is straight across Jackass Flats, west of powerline. Lack of significant topography permits flexibility in routing to accommodate NTS requirements in this area.		
	21.5		NTS Road			Signaled Grade Crossing			
	24.0		NTS Road			Signaled Grade Crossing			
	25.0		NTS Road			Signaled Grade Crossing			
	27.0		Fortymile Wash		Numerous significant archeological sites, primarily on terraces along wash.			Bridge up to 600' long. Probable location at narrow point near BM 3403.	
							Route through gap in hills 1.0 mile east of North Portal.		2.0 % upgrade. Some sharp curves.
	29.0		Repository Site (North Portal)						

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USGS Quadrangle	Cuml. Miles *	Sec Twp Rng	Location Description	Land-Use Constraints	Archeological & Historical Sites	Road Crossings & Proximity to Population	Topographic Considerations	Bridges & Hydrologic Considerations	Operating Considerations
Dry Lake 15' References: Q-85 MTP-199 MTP-200 *Plate 15:* D4	0.0	S8 T19S R63E	Approx. midway between Dike and Apex near U.P. Milepost 349.	Clark County Development of Apex Heavy Industrial uses Park - Public Law 101-67 would affect corridor from Dike to Apex. Connection at Dike would shorten line by approx. 2 miles, but would move probable track location approx. 0.5 mile closer to 7500 acre proposed land exchange area. Enter BLM utility corridor N52787 Powerline Right-of-Way NEV061985, 100ft. Powerline Right-of-Way NEV067348, 100ft. Powerline Right-of-Way N39815			Connection at Apex would require 2 miles additional track construction with heavy earthwork and grade separation over Hwy. 604.		Connection with U.P., directly to mainline. One mile long 1.5 % upgrade begins within 0.5 mile of connection.
	1.0	S1 T19S R62E	Enter Nellis Small Arms Range	Nellis Wilderness Study Area A, B, C Nellis Small Arms Range, to be transferred to BLM.					
Gass Peak 15' References: Q-86 MTP-201 MTP-202 MTP-203 MTP-204 MTP-205 *Plate 15:* D2, D3		S11 T19S R62E			One small significant archeological site within corridor.				
		S3 T19S R62E			One small significant archeological site within corridor.				Approx. 3 miles of 1.5 % upgrade.
	4.0	S3 T19S R62E					Area of very large alluvial fan (4.5 miles across).	Primary route is above North Las Vegas flood control facilities. Many large culverts required.	
		S4 T19S R62E			One small significant archeological site within corridor.				

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USGS Quadrangle	Cuml. Miles *	Sec Twp Rng	Location Description	Land-Use Constraints	Archeological & Historical Sites	Road Crossings & Proximity to Population	Topographic Considerations	Bridges & Hydrologic Considerations	Operating Considerations
Gass Peak 15' References: Q-86 MTP-201 MTP-202 MTP-203 MTP-204 MTP-205 *Plate 15:* D2, D3	6.0	S5 T19S R62E		Closest point to 7500 proposed land exchange area. Probable track location is approx. 1.5 miles from northeast corner; elsewhere is 2.0 miles or more from northern property line.					
	6.5	S5 T19S R62E	Exit Nellis Small Arms Range						
	7.5	S1 T19S R61E	Enter Desert National Wildlife Range						
Gass Peak 15' *Plate 15:* D2, D3	8.5	S36 T18S R61E		Desert National Wildlife Range			Route crosses a series of alluvial fans at base of Las Vegas Range.	Some major culvert installations required.	
	14.5	S31 T18S R61E	Exit Desert National Wildlife Range				Route passes approx. 1.5 miles north of retention basin on Las Vegas Wash.		
	16.5	S26 T18S R60E	Re-enter Desert National Wildlife Range				Route crosses a series of alluvial fans at base of Las Vegas Range.	Some major culvert installations required.	
Corn Creek Springs 15' References: Q-87 MTP-206 MTP-207 MTP-208 MTP-209 *Plate 15:* C1, D1	18.0	S21 T18S R60E	Exit Desert National Wildlife Range	Desert National Wildlife Range					
	21.0	S24 T18S R59E		Quail Springs Wilderness Study Area Telephone Right-of-Way NEV055905, 20 ft.		Closest point to Las Vegas Paiute Indian Reservation. Probable track location is approx. 1.0 mile from northeast corner of Reservation.	Route crosses alluvial fans.	Many culverts required.	
	22.0	S13 T18S R59E	Las Vegas Wash		Two small unevaluated archeological sites, one on each side of Las Vegas Wash, near probable bridge site.			Bridge from north to south side of wash.	
	26.0	S9 T18S R59E				Closest point to private lands and homes in NW 1/4 S4 T18S R59E. Probable track location is approx. 0.5 mile from southwest corner of private land.			Approx. 4.5 miles of 1.5 % upgrade.

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USGS Quadrangle	Cuml. Miles *	Sec Twp Rng	Location Description	Land-Use Constraints	Archeological & Historical Sites	Road Crossings & Proximity to Population	Topographic Considerations	Bridges & Hydrologic Considerations	Operating Considerations
	27.5	S32 T17S R59E	Corn Creek Springs Rd.	Telephone Right-of-Way N50113 (underground), 100 ft.		Signaled Grade Crossing			
	31.0	S14 T17S R58E	First entry onto Nellis Air Force Range						
Creek Springs 15' *Plate 15:* C1, D1				Series of firing range facilities (including many small buildings) along approx. centerline of corridor for about 2.5 miles. Relocation of some of these facilities (further north) may be necessary to keep rail line an acceptable distance from Hwy. 95.					
Black Hills SW 7.5' References: Q-88 *Plate 14:* B5				Probable track location is close to irregular boundary of Nellis Air Force Range, crossing boundary multiple times in this area. Road Right-of-Way N1197, 100 ft., in S21.		Probable track location is parallel to and 0.3 to 0.8 miles north of Hwy. 95.			
Indian Springs SE 7.5' References: Q-89 MTP-210 MTP-211 *Plate 14: B4*	38.5	T16S R57E	*Match point for either Indian Hills Alternate or Cactus Springs Alternate.*						

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	0.0	T16S R57E	*Match point for Las Vegas Wash Section.*						
Indian Springs SE 7.5' *Plate 14*: B4	0.5	T16S R57E	Hwy. 95 (four lanes)	Highway Right-of-Way CC018191, 400 ft. Telephone Right-of-Way CC021488, 40 ft. Powerline Right-of-Way NEV043546, 100 ft.		Grade Separation			
		S28,29 T16S R57E		Withdrawal, Power Project N50954	One small significant archeological site in northern portion of corridor, south of Hwy. 95.		Route crosses series of alluvial fans along base of Spring Mtns.	Many culverts required.	Approx. 8.0 miles of 1.5 % upgrade.
Indian Springs 7.5' References: Q-90 MTP-212 MTP-213 *Plate 14*: B3	5.5	S22 T16S R56E	Eastern foot of hills	Within proposed BLM utility corridor		Probable track incision is approx. 1.5 miles south of (and is not visible from) populated area at Indian Springs.			
							Extensive earthwork needed for good alignment through eastern portion of hills. Some cuts up to 80' deep, but all are relatively short.		
	8.0	S20 T16S R56E	Summit						Top of grade.
							Route crosses alluvial fans.	Many culverts required.	Approx. 3.0 miles of 1.5 % downgrade.
	11.5	S24 T16S R55E	Willow Creek					Bridge up to 200' long.	
Mercury 15' References: Q-91 MTP-214 MTP-215 MTP-216 MTP-217 MTP-218 *Plate 14*: A1, B1, B2		T16S R55E		Route corridor closely follows 2640' wide utility corridor. Telephone Right-of-Way CC021488, 40 ft.					
	25.0	S36 T15S R53E	Hwy. 95 (four lanes)	Highway Right-of-Way CC018191, 400 ft.		Grade Separation			
	26.0	T15S R53E	Enter Nevada Test Site. *Match point for Mercury Section.*						

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Springs SE 7.5' *14:* B4	0.0	T16S R57E	*Match point for Las Vegas Wash Section.*						
	1.0	T16S R57E	Road into Air Force Range			Grade Separation			
	3.5	S13 T16S R56E	Exit Nellis Air Force Range			Probable track location is parallel to and 0.3 to 0.8 miles north of Hwy. 95.			
Indian Springs 7.5' *Plate 14:* B3	5.5-6.5	S10 T16S R56E	Re-enter Nellis Air Force Range	Indian Springs Air Force Auxiliary Field and adjacent military and civilian support facilities.		Routing north of the airfield may require a grade separation over the road into Nellis Air Force Range. Routing south of the airfield may require two signaled grade crossings in addition to the grade separation; housing on the opposite side of Hwy. 95 would be within 0.2 mile of track location.	Rail line could pass either in the open area north of the airfield (approx. 0.3 mile from end of runway) or in the narrow area between the airfield and Hwy. 95. The latter would require relocation of some Air Force and civilian facilities.		
			Indian Springs						
	9.5-10.5	S1 T16S R55½E	Exit Nellis Air Force Range						
Mercury 15' *Plate 14:* A1, B1, B2	12.5	S12 T16S R55E	Indian Springs Wash					Due to width of wash (approx. 1000'), crossing may involve several dispersed spans.	
			Indian Springs Valley				Routing in the lower hills on the north side of Indian Springs Valley would require some heavy earthwork over a 3 mile distance, while routing closer to the valley bottom would require heavy earthwork only in section 12.	Routing in the valley bottom north of the wash may require channel relocation in section 12.	Up to 3 miles of 1.5 % upgrade required for routing in the lower hills.
	19.0	S2 T16S R54E	Enter Nellis Air Force Range						
	20.5	S3 T16S R54E	Clark / Nye County Line						
	23.5	S31 T15S R54E	Summit between Indian Springs Valley and Mercury Valley			Probable track location is approx. 0.2 mile from Hwy. 95 due to summit.			
	25.5	T15S R53E	Enter Nevada Test Site. *Match point for Mercury Section.*						

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Mercury 15' *Plate 14:* A1, B1, B2	0.0	T15S R53E	Enter Nevada Test Site. *Match point for either Indian Hills Alternate or Cactus Springs Alternate.*	Nevada Test Site			Routing along upper slopes of Mercury Valley, between the site of Camp Desert Rock and Mercury, limits elevation changes and thereby permits moderate grades.		Short 1.5 % grades, mostly downgrades.
	1.0		Road to Tower Hill			Signaled Grade Crossing			
Specter Range 15' *Plate 13:* A4, A5, B4, B5	2.0		Mercury Highway			Grade Separation. Closest point to town of Mercury, approx. 1.0 mile from probable track location.			
	3.0		Jackass Flats Road			Grade Separation			
							Probable route would generally parallel power line. Some short stretches of heavy earthwork.		Short 1.5 % upgrades.
	10.5		Summit between Mercury Valley and Rock Valley		One small significant archeological site near summit.	Close proximity to Jackass Flats Road is likely in vicinity of summit.	Extensive earthwork in vicinity of summit.		
	11.5		Cane Spring Road		Very significant archeological site, approx. 0.5 mile in diameter, in upper portion of Rock Valley.	Signaled Grade Crossing	Probable route is along base of Skull Mtn., north of Jackass Flats Road.		Short 1.5 % downgrades.
					One small unevaluated archeological site within route corridor.				
	16.5		Jackass Flats Road		One small significant archeological site in vicinity of probable track location.	Grade Separation			
					One significant archeological site within corridor.		Some heavy earthwork along southwest side of Little Skull Mountain.		
Topopah Spring 15' *Plate 12:* B3, B4	25.5		Topopah Wash					Bridge up to 200' long.	
	25.8		NTS Road			Grade Separation	Probable route is straight across Jackass Flats, west of powerline. Lack of significant topography permits flexibility in routing to accommodate NTS requirements in this area.		1.5 % upgrade.
	26.0		NTS Road			Signaled Grade Crossing			
	28.5		NTS Road			Signaled Grade Crossing			
	29.5		NTS Road			Signaled Grade Crossing			
	31.5		Fortymile Wash		Numerous significant archeological sites, primarily on terraces along wash.			Bridge up to 600' long. Probable location at narrow point near BM 3403.	
							Route through gap in hills 1.0 mile east of North Portal.		2.0 % upgrade. Some sharp curves.
	33.5		Repository Site (North Portal)						

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we 15'** ace: -42 MTP-43 MTP-44 *Plate 1:* B5	0.0	S9 T31N R49E	Vicinity Beowawe			Connection is about 1.5 miles east of Beowawe and within 1.0 miles of a school.			Connection with Southern Pacific (directly to mainline). Connection with Union Pacific is via crossover(s) between S.P. and U.P.
Dunphy 15'** Reference: Q-43 MTP-45 MTP-46 *Plate 1:* B4	6.0	S1,2 T30N R48E			One significant archeological site within corridor.				
Crescent Valley 15'** Reference: Q-44 MTP-47 MTP-48 MTP-49 MTP-50 ** Every other section is private land in a checkerboard fashion. See Table 4.1 *Plate 1:* C4, D3, D4	12.8	S3 T29N R48E		Recreation and Public Purposes Lease N38444		Grade Separation			
	13.5	S4 T29N R48E		Material Pit N39953 Road Right-of-Way N55119		Corridor is about 1.0 mile east of the town of Crescent Valley.			
	17.6	S29,30 T29N R48E	Eureka/Lander county line.	Airport Lease N56882					
	17.7	S29 T29N R48E		Road Right-of-Way N55118 Telephone Right-of-Way N2616 (underground), 10 ft.		Signalized Grade Crossing			
	20.0	S6 T28N R48E		Road Right-of-Way N52826, 60 ft.		Grade Separation			
	21.2	S12 T28N R47E		Telephone Right-of-Way N55672 (underground), 10 ft.		Signalized Grade Crossing			
	21.8	S12 T28N R47E		Powerline		Signalized Grade Crossing			

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Cortez 15' Reference: Q-45 MTP-51 MTP-52 MTP-53 MTP-54 MTP-55 *Plate 2:* A4	27.0	T27N R47E	Corridor passes between Cortez and Gold Acres mining operations.						
	28.5	S8 T27N R47E		Telephone Right-of-Way N7808, 30 ft. Road Right-of-Way N43670, 50 ft.		Signalized Grade Crossing			
	28.8	S8 T27N R47E		Telephone Right-of-Way N30650, 10 ft.		Signalized Grade Crossing			
	31.0	S13 T27N R47E			One small unevaluated archeological site within corridor.				
Carico Lake 15' Reference: Q-46 MTP-56 *Plate 2:* A3	33.5	S26 T27N R46E	Vicinity Rocky Pass	Telephone Right-of-Way N30650, 10 ft.					
				Mining Patent					
	35.8	S3 T26N R46E				Signalized Grade Crossing			2% Upgrade
	46.0	S20 T25N R46E	Dry Canyon Summit						Top of Grade
									2% Downgrade
	49.0	S33 T25N R46E	Dry Canyon Spring						
Hall Creek 15' Reference: Q-47 *Plate 2:* B3, C3	56.0	S3 T23N R46E		Fence	Several Unevaluated archeological sites at various springs within corridor.		Route crosses a series of alluvial fans.		
Waitt Hot Springs 15' Reference: Q-48 *Plate 2:* B4, C4	64.0	T22N R46E		Withdrawal, N378, Desert Land Entry. Beginning of split corridor.	One large unevaluated archeological site at quarry within corridor.				

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USGS Quadrangle	Cuml. Miles *	Sec Twp Rng	Location Description	Land-Use Constraints	Archeological & Historical Sites	Road Crossings & Proximity to Population	Topographic Considerations	Bridges & Hydrologic Considerations	Operating Considerations
Ackerman Canyon nce: -49 *Plate 2:* D4	66.0	T22N R46E		Mining Patent, State Selection					
	69.0	S11 T21N R46E			Very significant Burial ground near ranch within corridor.				
Mount Callaghan 15' Reference: Q-50 MTP-57 MTP-58 MTP-59 MTP-60 MTP-61 MTP-62 *Plate 2:* D2, D3, E3, E4	70.0	S3 T21N R46E		Corridor is split for approximately 15 miles due to private lands.	Large unevaluated archeological site, 2.0 miles long, along creek extending into corridor.				
	72.0	S9,10,16 T21N R46E	Grass Valley Ranch			Corridor passes within 1.0 mile of ranch.			
	75.5	S29 T21N R46E				Signalized Grade Crossing			2% Upgrade
	79.0	S7 T20N R46E		End of split corridor					
	81.0	S18 T20N R45E	Rye Patch Canyon Summit						Top of Grade
	83.0	S25 T20N R45E		Powerline Right-of-Way N5253, 125 ft.	One significant archeological site within corridor 0.5 mile east of high point in section 25.				
Spencer Hot Springs 15' *Plate 3:* A2, A3, B2	88.0	S24 T19N R45E	*Match point for either Big Smoky Valley Alternate or Monitor Valley Alternate.*	Powerline Right-of-Way N25341, 140 ft. Telephone Row N51021, 15 ft. Comm Site N51021					

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USGS Quadrangle	Cuml. Miles *	Sec Twp Rng	Location Description	Land-Use Constraints	Archeological & Historical Sites	Road Crossings & Proximity to Population	Topographic Considerations	Bridges & Hydrologic Considerations	Operating Considerations
Spencer Hot Springs 15' References: Q-51 MTP-63 MTP-64 MTP-65 MTP-66 MTP-67 *Plate 3:* A2, A3, B2	0.0	S24 T19N R45E	*Match point for Crescent Valley Section.*	Road Row NEV042796, 200 ft.					
	0.5	S24 T19N R45E	Pony Express Trail		Pony Express Trail is a historical crossing.				
	4.0	S1,2 T18N R45E		Road Row N7219, 66 ft. Well N9525	One significant archeological site within corridor.		Route crosses a long series of alluvial fans.		
	7.4	S27 T18N R45E				Signalized Grade Crossing			
	10.4	S10 T17N R45E				Signalized Grade Crossing			
Wildcat Peak 15' Reference: Q-52 *Plate 3:* C2, D2	24.3	S17 T15N R45E	Lander/Nye county line	Fence					
Millett Ranch 15' References: Q-53 MTP-68 *Plate 3:* D1				Road Right-of-Way N6971, 70 ft.					
Carvers, NE 7.5' Reference: Q-54 *Plate 3:* E1	45.0	S18 T12N R44E		Withdrawal N37187, Desert Land Entry Withdrawal N37189, Desert Land Entry		Signalized Grade Crossing			

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Carvers SE 7.5' References: S5 MTP-69 MTP-70 MTP-71 MTP-72 *Plate 4:* A5	53.0	S24 T11N R43E		Withdrawal N37188, Desert Land Entry Powerline Right-of-Way N25341, 140 ft. Withdrawal R-0345 Road Right-of-Way N39967, 80 ft. Flume Right-of-Way N39891, 10 ft.					
Carvers 7.5' References: Q-56 MTP-73 MTP-74 *Plate 4:* A4	56.5	S3 T10N R43E				Grade Separation, Highway 376			

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USGS Quadrangle	Cuml. Miles *	Sec Twp Rng	Location Description	Land-Use Constraints	Archeological & Historical Sites	Road Crossings & Proximity to Population	Topographic Considerations	Bridges & Hydrologic Considerations	Operating Considerations
Pahin Canyon Ranch 7.5' Reference: Q-57 *Plate 4:* B4	59.0	S20 T10N R43E		Corridor is split for approximately 10 miles due to the town of Hadley, the Hadley Airport and private lands. West Leg: Powerline Right-of-Way NEV064717, 30 ft. Pipeline Right-of-Way CC09123, 100 ft. Powerline Right-of-Way N55147, 250 ft. Powerline Right-of-Way N11777, 25 ft. Pipeline Right-of-Way N46556, 50 ft. Road Right-of-Way N46508, 100 ft. Withdrawal N39765, Desert Land Entry Withdrawal N53593, Desert Land Entry East Leg: Right-of-Way N54310, 12 ft. Powerline Right-of-Way N55147, 250 ft Pipeline Right-of-Way N45089 (underground), 50 ft. Powerline Right-of-Way N11777, 25 ft. Telephone Right-of-Way N46314 (underground), 100 ft. Road Right-of-Way N46508, 100 ft.		Grade Separation			
	61.0	S28 T10N R43E				Corridor is within 1.0 mile of city of Hadley.			

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USGS Quadrangle	Cuml. Miles *	Sec Twp Rng	Location Description	Land-Use Constraints	Archeological & Historical Sites	Road Crossings & Proximity to Population	Topographic Considerations	Bridges & Hydrologic Considerations	Operating Considerations
Round Mountain 7.5' References: 58 MTP-75 *Plate 4:* B5	61.5	S29 T10N R43E		Powerline Right-of-Way N25341, 40 ft. Recreation and Public Purposes Lease, N34726 Road Right-of-Way N53177, 60 ft. Highway Right-of-Way CC020778 Telephone Right-of Way N33405, 20 ft. Road Right-of Way N54310, 12 ft. Flume Right-of-Way N54310, 15 ft. Pipeline Right-of-Way N45089 (underground), 50 ft. Powerline Right-of-Way N55247, 250 ft.	Jett Canyon Pipeline is a significant historical site across corridor.	Signalized Grade Crossing			
	63.0	S5 T9N R43E							
Seyler Peak 7.5' References: Q-59 MTP-76 MTP-77 MTP-78 *Plate 4:* C4	72.5	S24 T8N R42E				Signalized Grade Crossing			
San Antonio Ranch 15' References: Q-60 MTP-79 MTP-80 MTP-81 *Plate 4:* D3, E3	85.0	S11 T6N R41E	*Match point for Klondike Alternate.*						

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USGS Quadrangle	Cuml. Miles *	Sec Twp Rng	Location Description	Land-Use Constraints	Archeological & Historical Sites	Road Crossings & Proximity to Population	Topographic Considerations	Bridges & Hydrologic Considerations	Operating Considerations
San Antonio Ranch 15' *Plate 4:* D3, E3	0.0	S11 T6n R41E	*Match point for either Big Smoky Valley Alternate or Baxter Springs Alternate.*						
Baxter Spring 15' References: Q-61 MTP-82 MTP-88 *Plate 4:* D4, D5, E4, E5	2.0	S23 T6N R41E			One significant archeological site within corridor		Route crosses a long series of alluvial fans.		
Lone Mountain 15' References: Q-62 MTP-89 MTP-90 MTP-91 MTP-92 MTP-93 *Plate 6:* A2, B2	16.5	S35 T4N R41E				Grade Separation			
	16.7	S35T4N R41E	Nye/Esmeralda county line						
	18.3	S11 T3N R41E		Highway Right-of-Way CC018394, 400 ft. Telephone Right-of-Way CC021488, 40 ft. Powerline Right-of-Way NEV043264, 60 ft. Powerline Right-of-Way N33242, 75 ft.	One unevaluated archeological site within corridor.				
	20.6	S24 T3N R41E				Grade Separation			
	23.2	S1 T2N R41E			Old railroad grade is a significant historical site crossing corridor.				
Klondike 7.5' References: Q-63 MTP-94 MTP-95 *Plate 6:* C2	31.1	S10 T1N R42E		Powerline Right-of-Way NEV043264, 50 ft. Highway Right-of-Way N10914		Grade Separation			
	33.5	S24 T1N R42E	Vicinity Klondike						

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Mud Lake 15' ences: S4 P-96 P-97 MTP-123 MTP-124 MTP-125 MTP-126 MTP-127 *Plate 6:* C3, C4, D3, D4	35.0	S25 T1N R42E		Telephone Right-of-Way CC021489, 40 ft. Powerline Right-of-Way CC020795, 400 ft.	Significant archeological site within corridor in mining area.		Route passes through rugged area with high cuts and fills.		
	38.5	S4 T1S R42E	Esmeralda/Nye county line						
	39.5	S9 T1S R42E	*Match point for Goldfield Section.*						

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Spencer Hot Springs 15' *Plate 3:* A2, A3, B2	0.0	S26 T19N R45E	*Match point for Crescent Valley Section.*						
	6.0	S35 T19N R45E, S1,12,13,24 T18N R45E	Adjacent to Overland Express Route		One significant site in Rye Patch Canyon.				
	8.0	T18N R46E	South end of Cape Horn (Simpson Park Mountains)	Material Site NEV044851	Overland Stage Station near Cape Horn is eligible for National Register of Historic Places.				
	13.5	T18N R46E	Cross Highway 50	Highway Right-of Way NEV042796, 200 ft.		Route parallels Highway 50 from Cape Horn to grade separation at east edge of Spencer Hot Springs Quad.	Extensive earthwork and rock excavation required for 5.5 miles.	130 linear foot bridge.	
Hickison Summit 15' References: Q-65 MTP-98 MTP-99 MTP-100 MTP-101 MTP-102 MTP-103 *Plate 3:* A4, B4	18.0	T18N R46E	Summit of Toquima Range	Road Right-of-Way NEV042778, 400 ft.	Significant petroglyph site north of the highway near Hickison Summit must be avoided.		Extensive earthwork and rock excavation required for 8.5 miles over Toquima Range.		
	22.0	T17 N R47E	East foot of Toquima Range						
Dianas Punch Bowl 15' References: Q-66 MTP-104 MTP-105 MTP-106 *Plate 3:* C4, D4	39.5	S35 T15N R47E	Potts Ranch Vicinity		Monitor Ranch is eligible for National Register of Historic Places.	Signalled crossing of Highway 82.		Two major drainage structures	
	43.7	S21 T14N R47E	Dianas Punch Bowl Vicinity		Significant site at Dianas Punch Bowl hot springs.				
Box Spring 7.5' References: Q-67 MTP-107 MTP-108 MTP-109 MTP-110 *Plate 3:* E4	49.5	T13N R47E	West of Dry Lake		Two large "no-record" sites and several small "no-record" sites.	Two signalled crossings of Highway 82.		Two major drainage structures.	

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ito Creek 7.5' nces: -68 *Plate 5:* A3	60.0	S1 T11N R47E	Mosquito Creek secondary road crossing		Two unevaluated sites in Mosquito Creek area.				
Pine Creek Ranch 7.5' References: Q-69 *Plate 5:* A2	65.0	S26,35 T11N R46E	Pine Creek Ranch secondary road crossings						
Corcoran Canyon 7.5' References: Q-70 MTP-111 MTP-112 *Plate 5:* B2	70.0	T10N R46E	Stone House Ranch secondary road crossing	Application N27690, Desert Land Entry Road Right-of-Way N6926, 60 ft.					
Belmont East 7.5' References: Q-71 MTP-113 MTP-114 MTP-115 MTP-116 *Plate 5:* C2	74.0	S18 T9N R46E	East of Black Butte			Signalled crossing		Three major drainage structures.	
	80.0	S24 T8N R45E	*Match point for either Baxter Spring Alternate or Ralston Valley Alternate.*				Extensive earthwork required for 2.5 miles in the Horse Heaven Summit area.		

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Belmont East 7.5' *Plate 5:* C2	0.0	S24 T8N R45E	*Match point for Monitor Valley Alternate.*	Application N36381, Desert Land Entry Application N34295, Desert Land Entry Application N34294, Desert Land Entry Application N36210, Desert Land Entry Application N36211, Desert Land Entry					
	2.5	S14 T8N R45E	Monarch site vicinity		Town site of Monarch is an unevaluated site. Section 17 is an unevaluated site.				
Big Ten Peak West 7.5' References: Q-72 MTP-117 MTP-118 *Plate 5:* D1	13.0	T7N R45E	North of Big Ten Well	Application N30010, Desert Land Entry Application N30009, Desert Land Entry		Cross Highway 82-Signalled Grade Crossing		130 lineal foot bridge and five major drainage structures.	
	14.0	T7N R45E	West of Big Ten Well Vicinity						
Baxter Spring 15' *Plate 4:* D4, D5, E4, E5	25.0	S16 T6N R43E	Highway 8A			Cross Highway 8A-Signalled Grade Crossing	Route crosses a series of alluvial fans at south end of Toquima Range	Cut through alluvial fan will require culverts and erosion protection measures 130 lineal foot bridge and one major drainage structure.	
San Antonio Ranch 15' *Plate 4:* D3, E3	37.0	S27 T5N R41E	*Match point for Klondike Alternate.*	Powerline Right-of-Way N25341, 140 ft. Powerline Right-of-Way NEV043264, 100ft. Powerline Right-of-Way N33242, 75 ft.			Route crosses a series of alluvial fans at north end of San Antonio Mountains	Cut through alluvial fan will require culverts and erosion protection measures	

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Belmont East 7.5' *Plate 5:* C2	0.0	S24 T8N R45E	*Match point for Monitor Valley Alternate.*						
	2.5	S14 T8N R45E	Monarch site vicinity		Town site of Monarch is an unevaluated site. Section 17 is an unevaluated site.	One signalled road crossing			
								200 lineal foot bridge and one major drainage structure.	
Big Ten Peak West 7.5' *Plate 5:* D1	8.5	T7N R45E	Hunts Canyon						
	13.0	T7N R45E	East of Big Ten Well						
Baxter Spring 15' *Plate 4:* D4, D5, E4, E5	26.0	S28, T4N R44E	West of Thunder Mountain	Telephone Right-of-Way N4213, 20 ft. Pipeline Right-of-Way R-0240, 10 ft. Highway Right-of-Way CC020465, 400 ft.					
Tonopah 15' References: Q-73 MTP-119 MTP-120 MTP-121 MTP-122 *Plate 6:* A4, B4	38.0	S34, T3N R44E	Cross US 6	Powerline Right-of-Way NEV061459, 30 ft. Powerline Right-of-Way N32741 (underground), 10 ft. Powerline Right-of-Way NEV048554, 25 ft.		Grade separation at US 6		130 lineal foot bridge drainage structure.	
Mud Lake 15' *Plate 6:* C3, C4, D3, D4	55.0	S9, T1S R42E	*Match point for Goldfield Section.*		Significant sites north of Mud Lake, see discussion in Caliente description.				

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									Connection with Union Pacific (to passing siding).
Caliente 7.5'	0.0		Caliente			Route is within 0.1 mile of Nevada Girls Training Center.			
References: Q-1	0.5		Road to Nevada Girls Training Center			Signalled Grade Crossing. Route is within 0.1 mile of housing areas and within 0.2 mile of hospital.		Bridge up to 150' long. (Clover Creek)	
Plate 10: E4	0.8		1st crossing, Meadow Valley Wash				Use roadbed of abandoned U.P. Pioche Branch along bottom of canyon formed by Meadow Valley Wash.	Bridge up to 170' long.	
Chief Mountain 7.5' References: Q-2 *Plate 10:* D4	1.3	S5 T4S R67E	2nd crossing, Meadow Valley Wash		Abandoned U.P. roadbed is an unevaluated site.	Route is parallel to and approx. 100' from Hwy. 93.		Bridge up to 200' long.	
	3.2	S28 T3S R67E	3rd crossing, Meadow Valley Wash	Fence				Bridge up to 150' long.	Bridge on sharp curve.
	3.3	S28 T3S R67E	4th crossing, Meadow Valley Wash					Bridge up to 150' long.	
Indian Cove 7.5'	3.6	S28 T3S R67E	5th crossing, Meadow Valley Wash					Bridge up to 150' long.	
References: Q-3	7.0	S11 T3S R67E	Small wash	Fence				Bridge up to 75' long.	
MTP-1 MTP-2	8.2	S2 T3S R67E	Branch of Meadow Valley Wash		Significant site near west corridor boundary.	Route is roughly parallel to Hwy. 93, distance varies from 100' to 1500'.	Use roadbed of abandoned U.P. Pioche Branch across Meadow Valley.	Bridge up to 150' long.	
Plate 10: D5					Abandoned U.P. roadbed is an unevaluated site.				
	10.5	S25 T2S R67E	Branch of Meadow Valley Wash					Bridge up to 600' long.	
Panaca 7.5' References: Q-4 MTP-1	10.9	S25 T2S R67E	Hwy. 93	Telephone Right-of-Way N43923 (underground), 10 ft.		Grade Separation			
Plate 10: C5							Route ascends Chief Range generally along south side of Bennett Springs Wash, using a loop in upper hills to gain elevation.		2.2 % upgrade. Some sharp curves.
		S7 T2S R67E			Unevaluated site near Bennett Springs.				
Bennett Pass 7.5'		S36 T1S R66E			Unevaluated site near west corridor boundary.				
References: Q-5 MTP-3 *Plate 10:* C4	22.2		Bennett Pass	Telephone Right-of-Way N43923 (underground), 10 ft. Powerline Right-of-Way CC020073, 100 ft.			Route passes between Chief and Highland Ranges.		

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									2.0 % downgrade.
...nell Pass 7.5'	27.4	S13 T2S R65E	Black Canyon					Bridge up to 200' long.	
...e Bluffs 7.5' References: Q-7 MTP-3 MTP-5 MTP-12 *Plate 10:* C3									
Deadman Spring SE 7.5' References: Q-6 MTP-4 MTP-5 *Plate 10:* C2	35.1	S24 T1S R64E	Coyote Wash	Fence			Route is nearly straight across Dry Lake Valley.	Bridge up to 500' long.	
	35.6	S23 T1S R64E	Branch of Coyote Wash					Bridge up to 500' long.	
	37.3	S22 T1S R64E	Small wash					Bridge up to 300' long.	
Deadman Spring NE 7.5' References: Q-8 MTP-6 *Plate 10:* B2				Fence Fence Pipeline Right-of-Way 4070					2.3 % upgrade.
	47.1		Summit	Pipeline Right-of-Way 4070	Significant site near Black Rock Spring.		Pass through North Pahroc Range.		
Deadman Spring 7.5' References: Q-9 MTP-7 MTP-8 MTP-9 MTP-10 *Plate 10:* B1					Two large significant sites on the west side of the White River, approx. 3 to 6 miles south of probable bridge site.		Extensive earthwork; cuts and fills range up to 60'.		1.6 % downgrade. Shifting the proposed site of the White River bridge further south would increase grade to as much as 2.0 %.
Silver King Mtn. SW 7.5' References: Q-10 MTP-11 *Plate 10:* A1	54.0	S19 T2N R63E	Hwy. 318	Highway Right-of-Way N43923, 400 ft.		Grade Separation			
	54.4	S19 T2N R63E	White River	Road Right-of-Way N14148, 60 ft Material Site.				Bridge up to 400' long. Location up to 1.5 miles further south may offer better bridge site and improved route profile to west.	

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Timber Mtn. Pass East 7.5'	58.7	S34 T3N R62E	Lincoln / Nye County Line						
References: Q-11, MTP-13, MTP-14		S32 T3N R62E		Fence					2.3 % upgrade. Grade could be reduced to 2.0 % by shifting proposed site of the White River bridge further south.
Plate 9: D5		T3N R61E		Road Right-of-Way N53636, 40 ft.					
Timber Mtn. Pass West 7.5'	66.2		Timber Mtn. Pass	Road Right-of-Way N53636, 40 ft.			Pass through Seaman Range.		
References: Q-12, MTP-15				Fence			Coal Valley		2.4 % downgrade. Grade could be reduced to 2.0 % by adding distance through larger loops.
Plate 9: D4									
Water Gap East 7.5'	77.0		Small wash	Fence				Bridge up to 300' long.	
References: Q-13, MTP-16, MTP-17, MTP-18				Road Right-ofWay N53636, 40 ft.					2.2 % upgrade.
Plate 9: D3	81.9		Summit	Road Right-of-Way N57490, 60 ft. Fence			Pass through Golden Gate Range. Alternate route approx. 4 miles to the south through Water Gap would reduce grades.		

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'er Gap West 7.5'							Route nearly straight across Garden Valley.		2.2 % downgrade.
ences:	84.0		Small wash					Bridge up to 500' long.	
Q-14	87.6		Cherry Creek					Bridge up to 200' long.	
MTP-19	88.9		Sand Creek					Bridge up to 200' long.	
Plate 9: D2	89.3		Nye / Lincoln County Line	Pipeline Right-of-Way 4137					
Wadsworth Ranch 7.5'	90.4		Pine Creek	Pipeline Right-of-Way/Reservoir 4137			Route nearly straight across Garden Valley.	Bridge up to 400' long.	
References: Q-15 MTP-20	93.4		Cottonwood Creek	Pipeline Right-of-Way 4026				Bridge up to 300' long.	
Plate 9: D1									
Worthington Peak 7.5'	94.8	S32 T2N R57E	Barton Creek	Pipeline Right-of-Way 4026				Bridge up to 300' long.	
References: Q-16 MTP-16 MTP-17		S1, 12 T1N R56E		Oil/Gas Lease					1.5 % upgrade.
Plate 9: E1									
McCutchen Spring 7.5'	100.5	S11 T1N R56E	Summit	Oil/Gas Lease N52646 Oil/Gas Lease N52649 Oil/Gas Lease N52648 Oil/Gas Lease N52650 Oil/Gas Lease N52651			Route passes between Quinn Canyon Range and Worthington Mountains.		
References: Q-17 MTP-16 MTP-21 MTP-22									2.2 % downgrade.
Plate 8: B5	105.2	S19 T1N R56E	Davis Creek				Route nearly straight along northwest side of Sand Spring Valley.	Bridge up to 300' long.	
Quinn Canyon Springs 7.5'	109.0	S28 T1N R55E	Quinn Canyon Creek					Bridge up to 500' long.	
References: Q-18 MTP-22									
Plate 8: B4									

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Honest John Well 7.5' References: Q-19 MTP-23 *Plate 8:* C4									
Black Top 7.5' Q-20 MTP-24 *Plate 8:* C3	116.7		Lincoln / Nye County Line						
	119.0		Summit		Unevaluated site near southern corridor boundary.		Pass through Quinn Canyon Range.		
				Fence			Railroad Valley		1.4 % downgrade.
	124.3	S10 T2S R53E	Hwy. 375	Material Site	Two unevaluated sites near probable grade separation.	Grade Separation			
Reveille Peak 15' References: Q-21 MTP-25 MTP-26 MTP-27 MTP-28 MTP-29 MTP-30 MTP-31 *Plate 8:* B1, C1, C2				Probable track location is within 2.5 miles of Nellis Air Force Range boundary. Pipeline Right-of-Way 0541 Pipeline Right-of-Way 04976 Pipeline Right-of-Way 4717		Probable track location is parallel to and within 0.1 mile of secondary roads for a total of approx. 32 miles.			
	135.2	T2S R50E	Small wash					Bridge up to 400' long.	
		T1S R52E			Unevaluated site near BM 5926.				
Kawich Peak 15' References: Q-22 MTP-32 MTP-33 MTP-34 MTP-35 MTP-36 *Plate 7:* C4, C5, D4				Pipeline Right-of-Way 4976 Pipeline Right-of-Way 4717 Pipeline Right-of-Way 0659			Route is largely straight through Reveille Valley.		

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USGS Quadrangle	Cuml. Miles *	Sec Twp Rng	Location Description	Land-Use Constraints	Archeological & Historical Sites	Road Crossings & Proximity to Population	Topographic Considerations	Bridges & Hydrologic Considerations	Operating Considerations
Springs 15'		S22 T2N R50E			Reveille Mill is an unevaluated site.				
nces: Q-23 MTP-37 MTP-38 MTP-39 MTP-40 MTP-41 MTP-42	163.2	T3N R50E	Cow Canyon					Bridge up to 500' long.	
				Pipeline Right-of-Way 0668 Pipeline Right-of-Way 0139					2.3 % upgrade.
	169.2	T4N R49E	Summit			Probable track location is parallel to and within 0.1 mile of Hwy. 6 for approx. 1.0 mile.	Route passes between Kawich and Hot Creek Ranges.		
Plate 7: A4, A5, B4, B5					Clifford mine is an unevaluated site.				2.0 % downgrade.
Stone Cabin Ranch SE 7.5' References: Q-24 *Plate 7:* B3	178.0	S26 T3N R48E	Branch of Bellehelen Canyon Creek	Pipeline Right-of-Way R3523				Bridge up to 400' long.	
Stone Cabin Ranch SW 7.5' References: Q-25 *Plate 7:* B2	182.9	S8 T2N R48E	Haws Canyon Creek			Probable track location is parallel to and within 0.1 mile of secondary road for approx. 9.0 miles.	Route nearly straight across Stone Cabin Valley.	Bridge up to 600' long.	
Stinking Spring 15' References: Q-26 MTP-123 MTP-124 MTP-125 MTP-126 *Plate 7:* C2, C3		S30 T1N R47E		Flightline Right-of-Way NEV052668, 400 ft. Communications Site/Access Road Right-of-Way N26253 Pipeline Right-of-Way N26253 Powerline Right-of-Way N4436, 40 ft.	Unevaluated site within corridor.		Cactus Flat		

* Cumulative Mileage figures are approximate and refer to this route section only; mileage between adjoining route sections is not contiguous.

USGS Quadrangle	Cuml. Miles *	Sec Twp Rng	Location Description	Land-Use Constraints	Archeological & Historical Sites	Road Crossings & Proximity to Population	Topographic Considerations	Bridges & Hydrologic Considerations	Operating Considerations
Cactus Peak 15' References: Q-27 *Plate 6:* C5		S19 T1N R46E			Reeds Ranch is a significant site.		Route traverses Ralston Valley using flat curves and long tangents, passing north and west of Mud Lake.		
	199.1		Large unnamed wash from northern Cactus Flat					Bridge up to 1000' long.	
	199.8		Small wash					Bridge up to 400' long.	
				Probable track location is within 0.5 mile of Nellis Air Force Range boundary. Flightline Right-of-Way NEV052668, 400 ft. Powerline Right-of-Way N33242, 75 ft.					
Mud Lake 15' *Plate 6:* C3, C4, D3, D4	208.6		Large unnamed wash from northeastern Ralston Valley					Bridge up to 700' long.	
		T1N R44E T1N R43E			Several very significant sites within 2.0 miles of north end of Mud Lake.				
	219.6	S9 T1S R43E	*Match point for Goldfield Section.*						

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USGS Quadrangle	Cuml. Miles *	Sec Twp Rng	Location Description	Land-Use Constraints	Archeological & Historical Sites	Road Crossings & Proximity to Population	Topographic Considerations	Bridges & Hydrologic Considerations	Operating Considerations
	0.0	S9 T1S R43E	*Match point for either Revelle Section (Caliente Route) or Klondike / Ralston Valley Sections (Beowawe Route).*	Mining Patent (Irregular Shape), east edge of main route.			Alternate corridor 4 to 7 miles to the east would avoid high summit near Espina Hill, reducing grades to less than 1.5 %, but would penetrate Nellis Air Force Range up to 3.5 miles over a distance of approx. 14 miles.		2.3 % upgrade.
Mud Lake 15'		S28 T2S R43E			Significant site at Tagnani Springs.				
	9.9	S34 T2S R43E	Summit near Espina Hill			Probable track location is within 4.0 miles of Goldfield.			
Plate 6: C4, C5, D3, D4		S2 T3S R43E		Five Mining Patents (Irregular Shape)	Significant site at Willow Springs.				2.4 % downgrade. Some sharp curves.
		S5,8 T3S R44E			Six unevaluated sites within alternate corridor.				
							Sinnewall Flat	Bridge up to 200' long.	
	21.3	S22 T4S R43E	Small unnamed wash from Chispa Hills						
Gold Field 15' References: Q-28 MTP-127 MTP-128 MTP-129 MTP-130 MTP-131 *Plate 11:* A2, A3									
Sinnewall Pass 7.5' References: Q-29 MTP-132 *Plate 11:* B2					Old railroad grades are unevaluated sites. Significant site along lakebed near highway.		Lida Valley		
								Bridge up to 1200' long.	
Scotty's Junction NE	33.0	T6S R43E	Large unnamed wash from Lida Valley		Old railroad grades are unevaluated sites.				
References: *Plate 11:* B3	34.7	T6S R43E	Summit						

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USGS Quadrangle	Cuml. Miles *	Sec Twp Rng	Location Description	Land-Use Constraints	Archeological & Historical Sites	Road Crossings & Proximity to Population	Topographic Considerations	Bridges & Hydrologic Considerations	Operating Considerations
Scottys Junction 7.5' Reference: Q-31 MTP-133 MTP-134 MTP-135 *Plate 11:* C4		T7S R43E		Material Sites Telephone Right-of-Way CC021488, 40 ft. Powerline Right-of-Way NEV066116, 20 ft. Powerline Right-of-Way N1614, 20 ft.					2.0 % downgrade.
	40.9	S17 T7S R44E	Large unnamed wash from upper Sarcobatus Flat	Powerline Right-of-Way NEV0665524, 200 ft.		If routed west of Hwy. 95, probable track location is within 1.5 miles of both Hwy. 95 and occupied housing. If routed through Nellis Air Force Range, track location is within 1.0 mile of housing and 2.0 miles of Hwy. 95.	Route is nearly straight across Sarcobatus Flat. Two route corridors are possible, one on either side of Hwy. 95. These corridors avoid private lands and housing throughout the 4 milestretch south of Scottys Junction. The corridor west of the Hwy. 95 requires an *(continued on next page)*	Bridge up to 1300' long.	
		S32 T7S R44E			Small unevaluated site.				
Bonnie Claire 7.5' References: Q-32 *Plate 11:* D3		S34 T8S R44E			Small unevaluated site.				
Tolicha Peak 15' References: Q-32 MTP-136 MTP-137 *Plate 11:* C4									

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USGS Quadrangle	Cuml. Miles *	Sec Twp Rng	Location Description	Land-Use Constraints	Archeological & Historical Sites	Road Crossings & Proximity to Population	Topographic Considerations	Bridges & Hydrologic Considerations	Operating Considerations
Springdale 15' References: Q-33 MTP-138 MTP-139 MTP-140 MTP-141 MTP-142 *Plate 11:* D4, D5, E5	49.1	T8S R44E	Hwy. 95	Telephone Right-of-Way CC02148, 40 ft. Powerline Right-of-Way NEV 066116, 20 ft. Material Site Powerline Right-of-Way NEV065524, 200 ft.		Grade Separation	*(cont. from previous page)* additional grade separation (at mileage 43.1), over Hwy. 72. The corridor east of Hwy. 95 penetrates the Nellis Air Force Range a maximum of 3.0 miles over a distance of approx. 17 miles, and would potentially avoid the two grade separations over Hwy. 95 as well as over Hwy. 72.		
	50.6	T8S R45E	Tolicha Wash	Fence Numerous Material Sites				Bridge up to 500' long.	
	55.4	T9S R45E	Hwy. 95	Road Right-of-Way N47795, 60 ft. Telephone Right-of-Way N24739, 20 ft. Road Right-of-Way N47795, 30 ft. Powerline Right-of-Way NEV065524, 200 ft.	Small unevaluated site near probable grade separation.	Grade Separation			
Thirsty Canyon 15' References: Q-34 MTP-143 MTP-144 MTP-145 *Plate 12:* C1	70.2	S22 T10S R47E	Thirsty Canyon Wash	Powerline Right-of-Way NEV065524, 200 ft.				Bridge up to 1200' long.	
				Powerline Right-of-Way N57777, 20 ft. Road Right-of-Way N52809, 30 ft.		Probable track location is within 2.0 miles of housing along upper Amargosa River.			

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USGS Quadrangle	Cuml. Miles *	Sec Twp Rng	Location Description	Land-Use Constraints	Archeological & Historical Sites	Road Crossings & Proximity to Population	Topographic Considerations	Bridges & Hydrologic Considerations	Operating Considerations
	78.9	T11S R48E	Beatty Wash		Small unevaluated site along bottom of wash near west edge of corridor.			Bridge up to 300' long.	
Bare Mtn. 15' References: Q-35 MTP-146 MTP-147 MTP-148 MTP-149 MTP-150 MTP-151 MTP-152 *Plate 12:* D1, D2, E2							Route is very circuitous in ascent to summit, involving large loop to increase distance and reduce grade.		2.0 % upgrade. Many sharp curves.
	81.9	T11S R48E	Summit			Probable track location is within 7.0 miles of Beatty.			
							Route is very circuitous in northern portion of Crater Flat. Descent from summit involves several large loops to increase distance and reduce grade. Alternate corridor area, which clips corner of Nellis Air Force Range for approx 4 miles, would facilitate an alignment approx. 8.5 miles shorter.		1.8 % downgrade. Many sharp curves.
Big Dune 15' References: Q-36 MTP-153 MTP-154 *Plate 13:* A1	105.3	T14S R49E	Southern tip of Yucca Mtn.			Probable route is approx. 4.5 miles from Hwy. 95.	Route around southern tip of Yucca Mtn.		
Lathrop Wells 15' References: Q-37 MTP-219 MTP-220 MTP-221 MTP-222 *Plate 13:* A2, A3, B2, B3	109.2	T14S R49E	Easter Nevada Test Site.	Nevada Test Site.					Undulating profile with grades up to 2.2 %. Some sharp curves.

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USGS Quadrangle	Cuml. Miles *	Sec Twp Rng	Location Description	Land-Use Constraints	Archeological & Historical Sites	Road Crossings & Proximity to Population	Topographic Considerations	Bridges & Hydrologic Considerations	Operating Considerations
·opah Spring 15' :nces: -38 MTP-155 MTP-223 *Plate 12:* E3, E4					Numerous significant sites, primarily on terraces along Fortymile Wash.		Route along west side of Fortymile Wash, close to base of hills to avoid archeological sites.		2.2 % maximum upgrade. Some sharp curves.
	117.4		Road to Repository Site from Hwy. 95.			Signalled Grade Crossing	Route through gap in hills 1.0 mile east of North Portal.		
	118.5		Repository Site (North Portal)						

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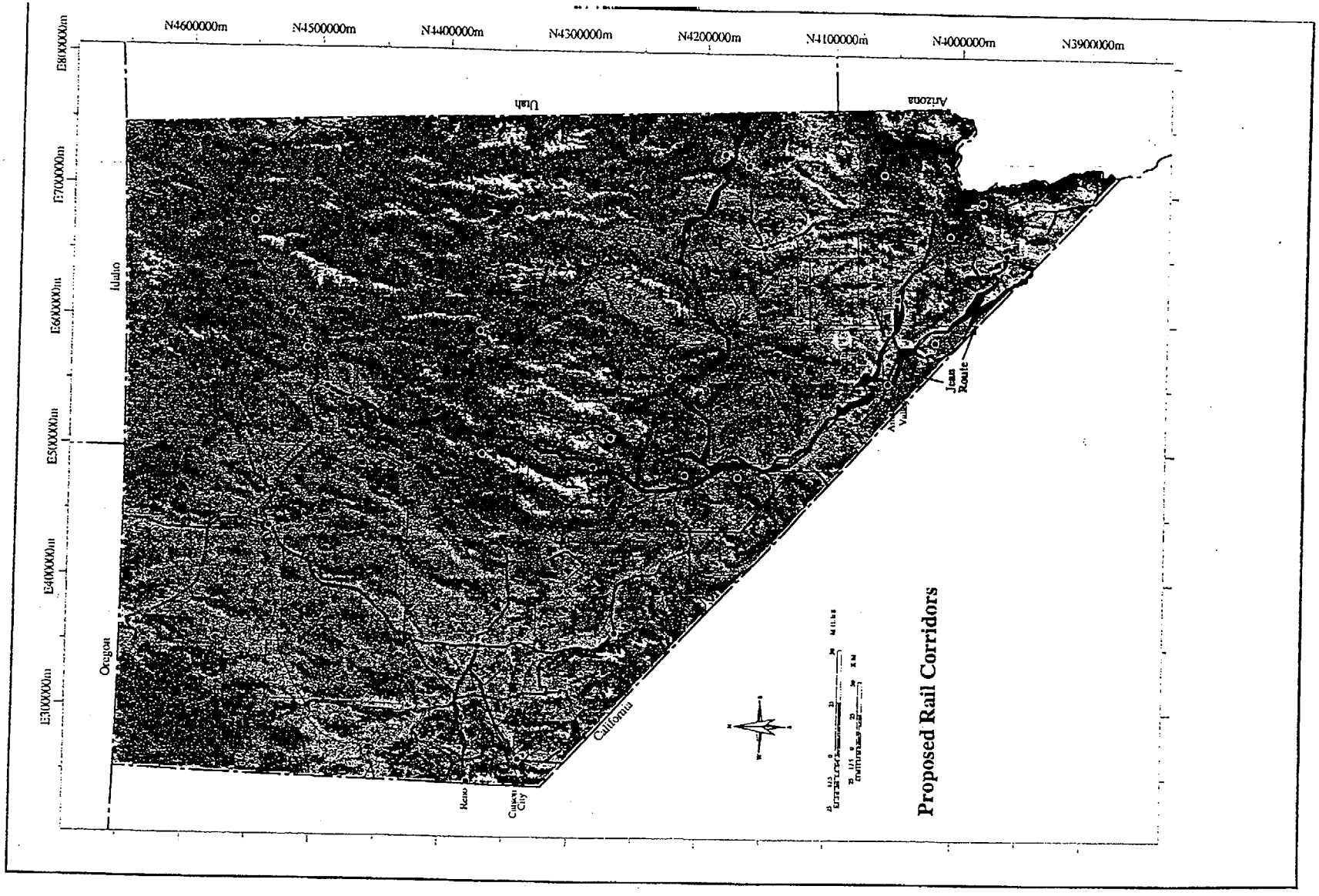
APPENDIX F2

RAIL CORRIDOR MAPS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N4400000m
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E400000m
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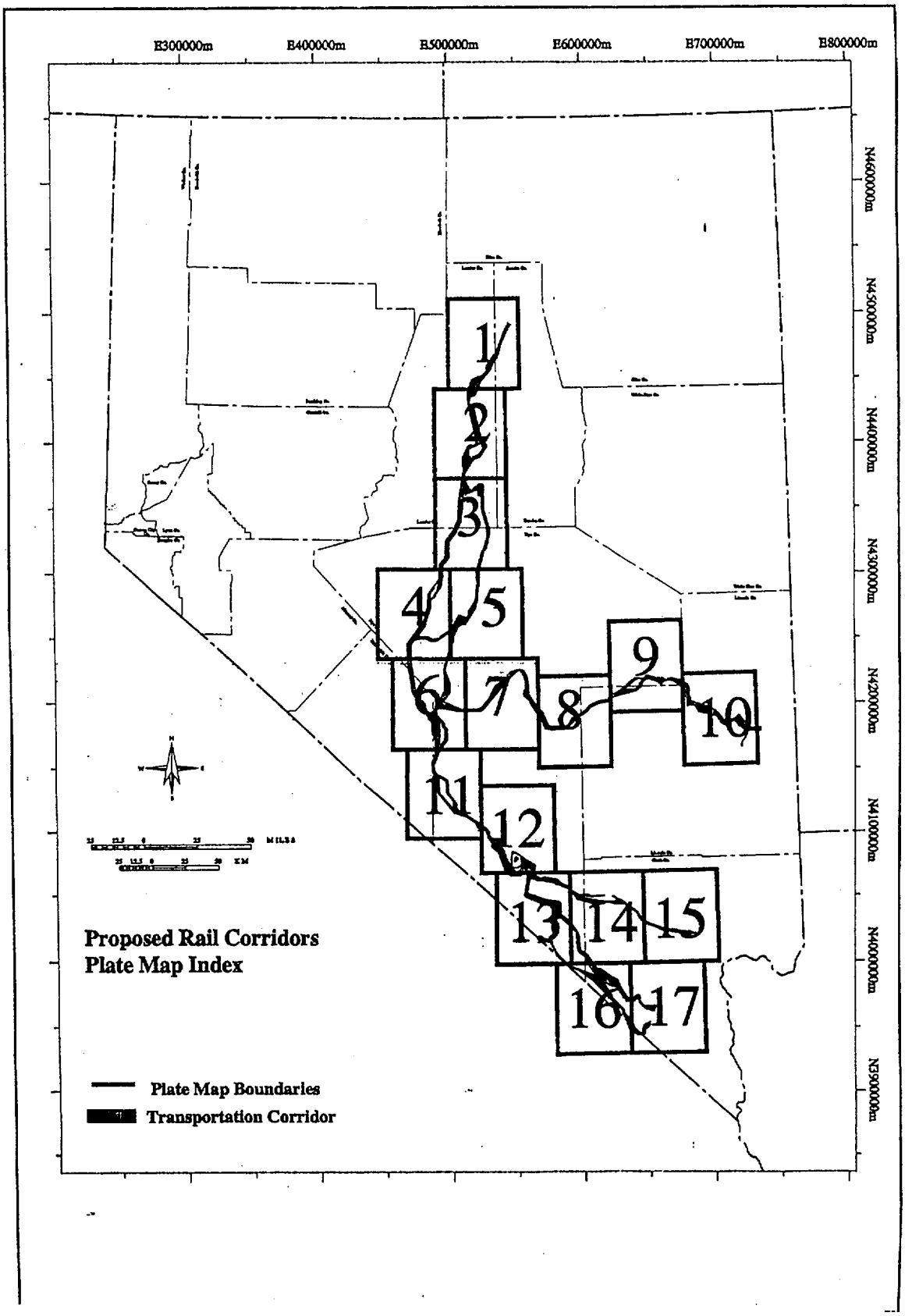
Oregon
Idaho
Utah
Arizona
California
Reno
Carson City
Las Vegas
Jean Route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MILES
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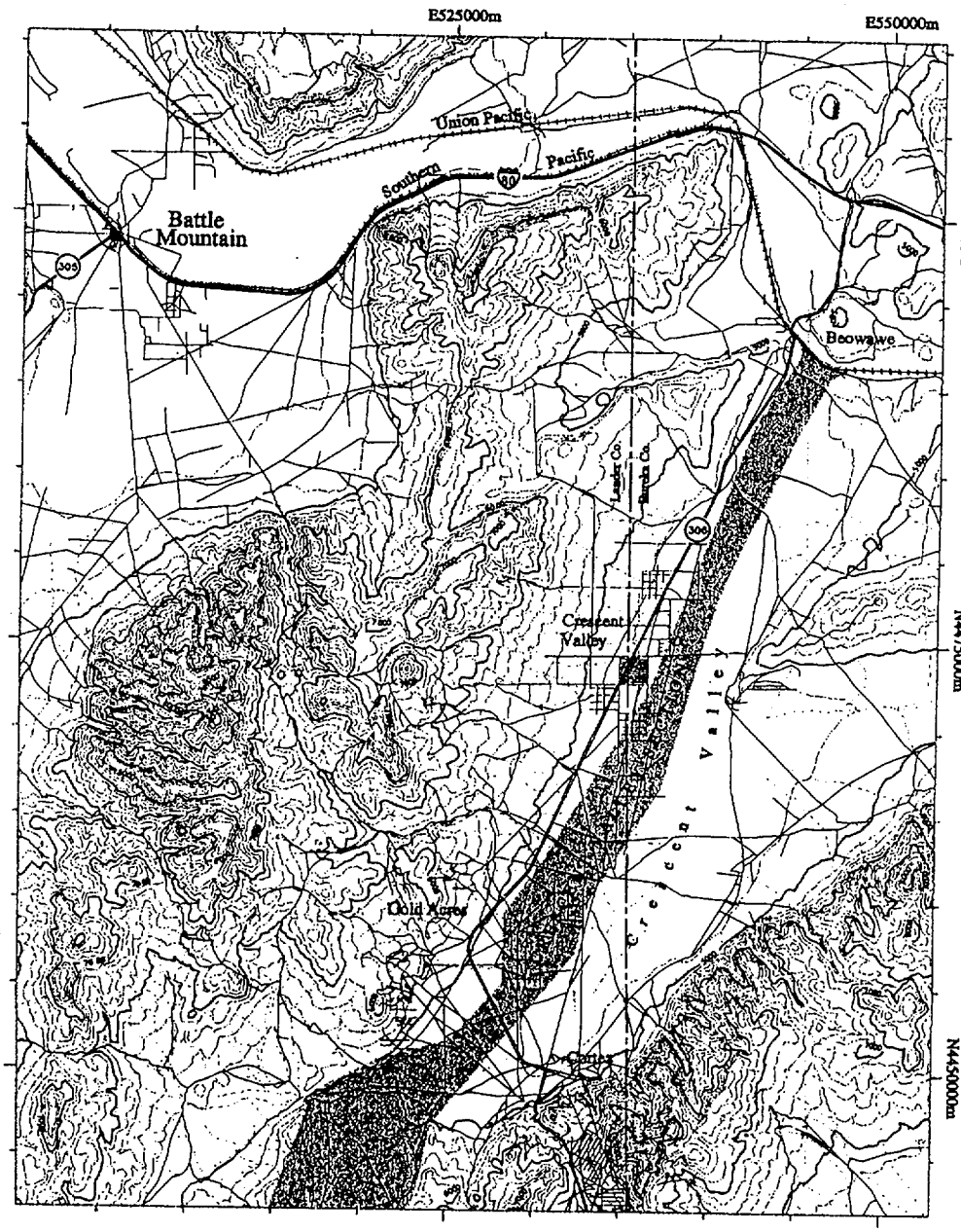
Proposed Rail Corridors
Plate Map Index
Plate Map Boundaries
Transportation Corridor



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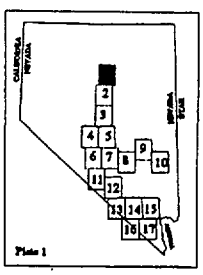
PROPOSED RAIL CORRIDORS

Carlin Route



TRANSPORTATION CORRIDOR

- Primary and Alternate Routes
- DOD/DOE Lands

PHYSIOGRAPHY

- Perennial Streams
- Intermittent Streams
- Intermediate Contour (200 ft. Interval)
- Index Contour (1000 ft. Interval)

INFRASTRUCTURE

- Primary Route, Class 1
- Secondary Route, Class 2
- Road or Street, Class 3 and 4
- Railroad
- Conceptual Controlled Area Boundary
- Proposed Repository Outline

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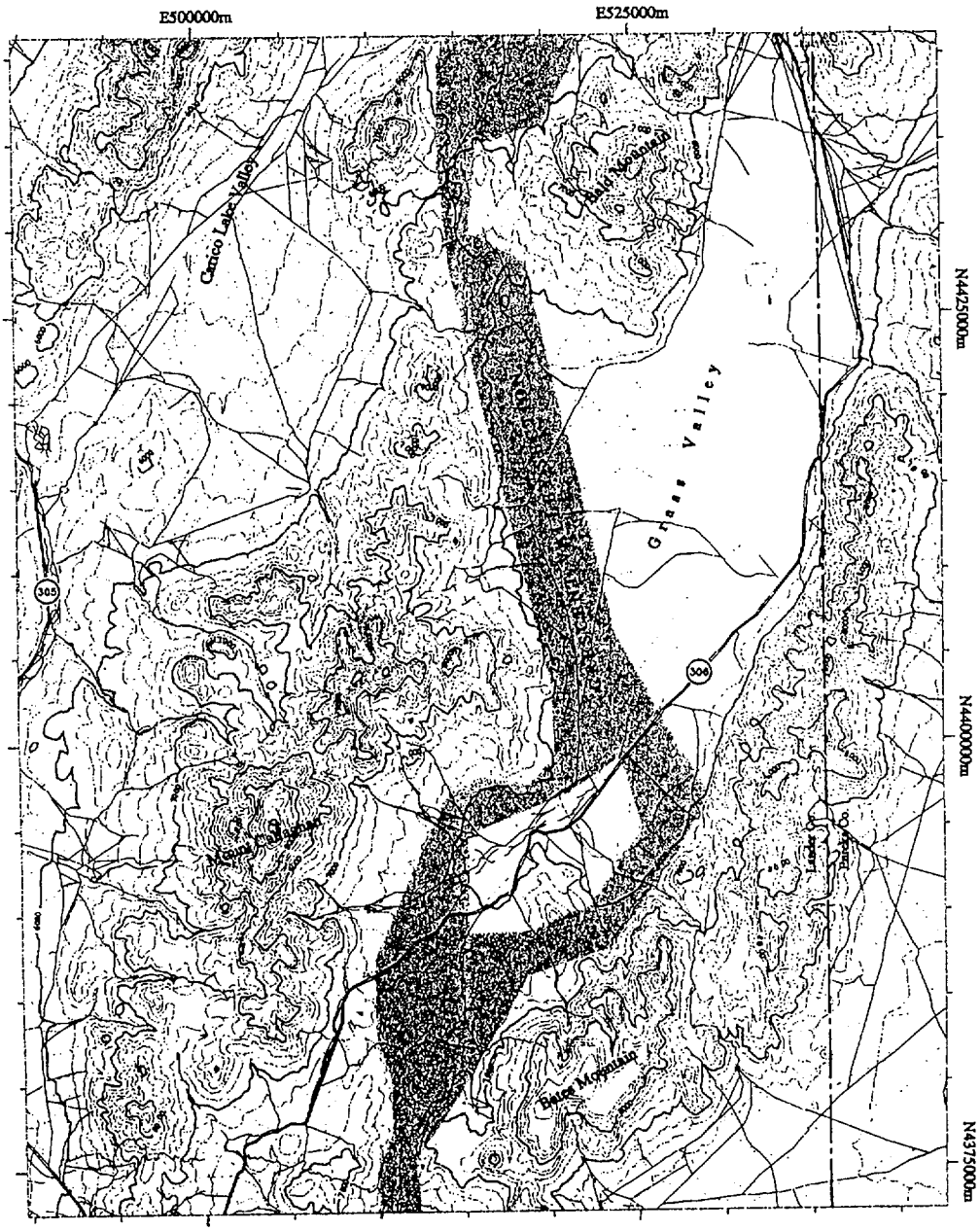

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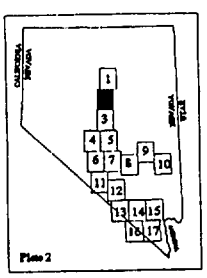
PROPOSED RAIL CORRIDORS

Carlin Route



TRANSPORTATION CORRIDOR

- Primary and Alternate Routes
- DOD/DOE Lands

PHYSIOGRAPHY

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- Intermediate Contour (200 ft. Interval)
- Index Contour (1000 ft. Interval)

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- Road or Street, Class 3 and 4
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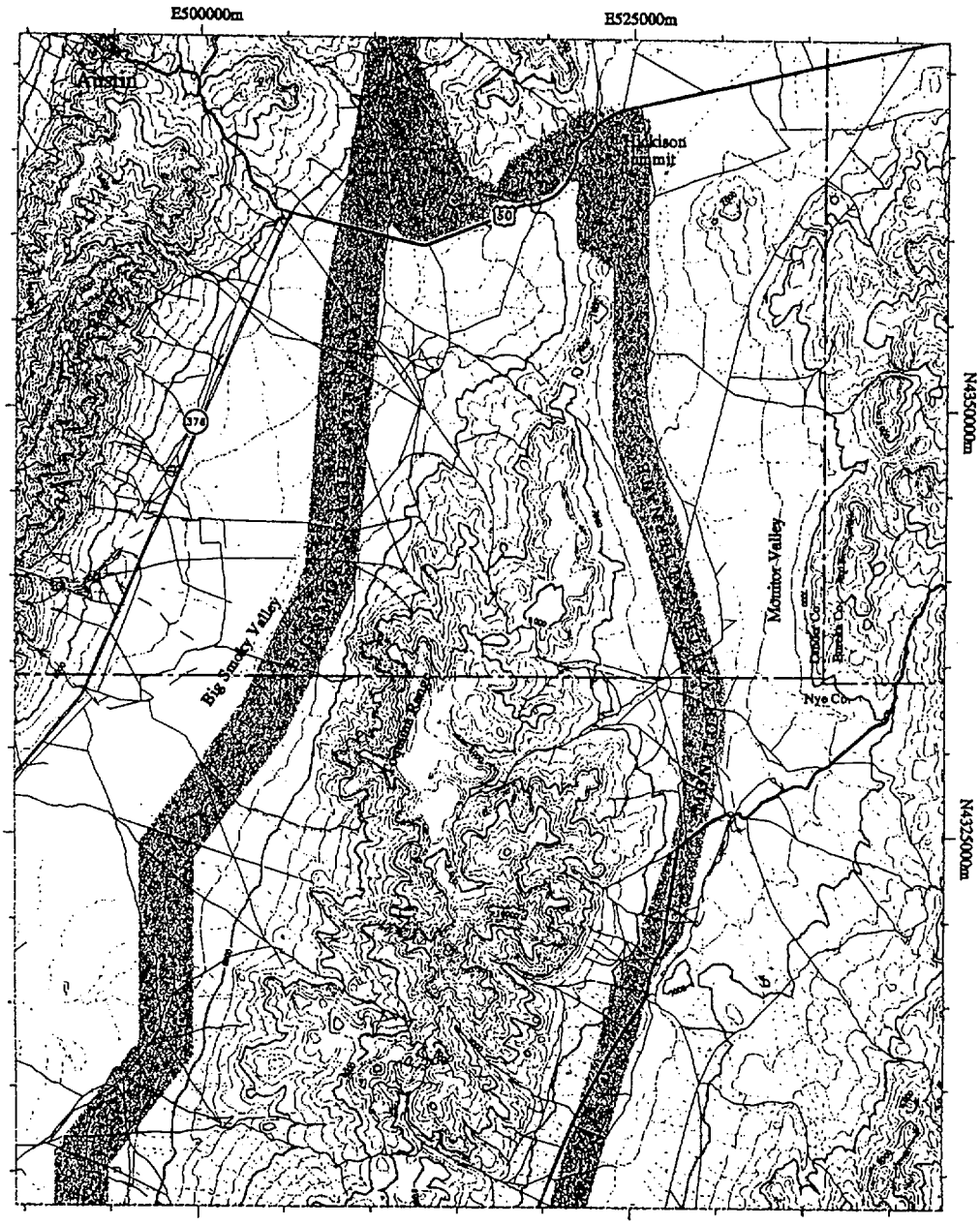
- Proposed Repository Outline



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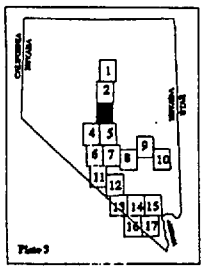
PROPOSED RAIL CORRIDORS

Carlin Route



TRANSPORTATION CORRIDOR

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- DOD/DOE Lands

PHYSIOGRAPHY

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- Intermittent Streams
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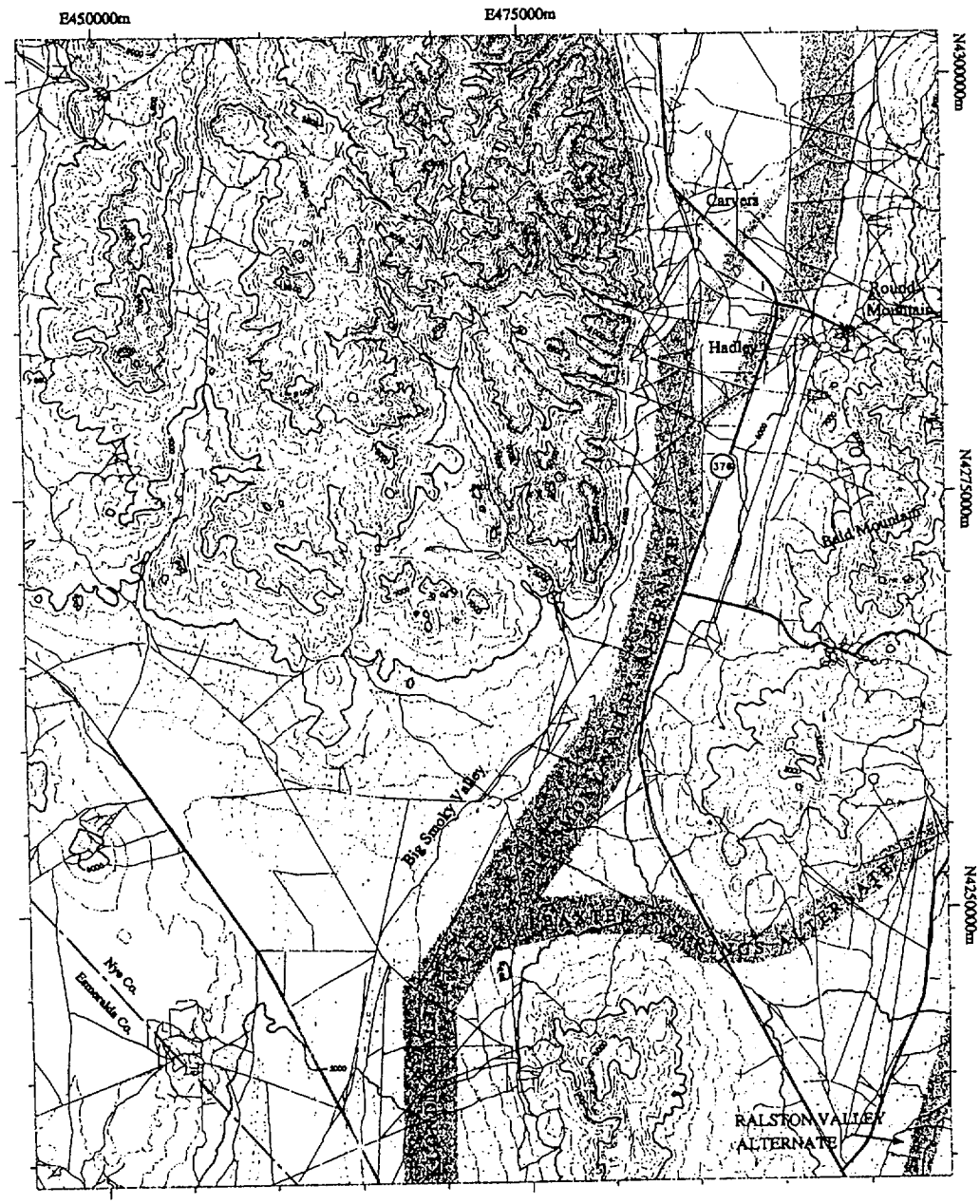
- Proposed Repository Outline



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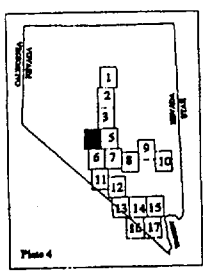
PROPOSED RAIL CORRIDORS

Carlin Route



TRANSPORTATION CORRIDOR

- Primary and Alternate Routes
- DOD/DOE Lands

PHYSIOGRAPHY

- Perennial Streams
- Intermittent Streams
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- Index Contour (1000 ft. Interval)

INFRASTRUCTURE

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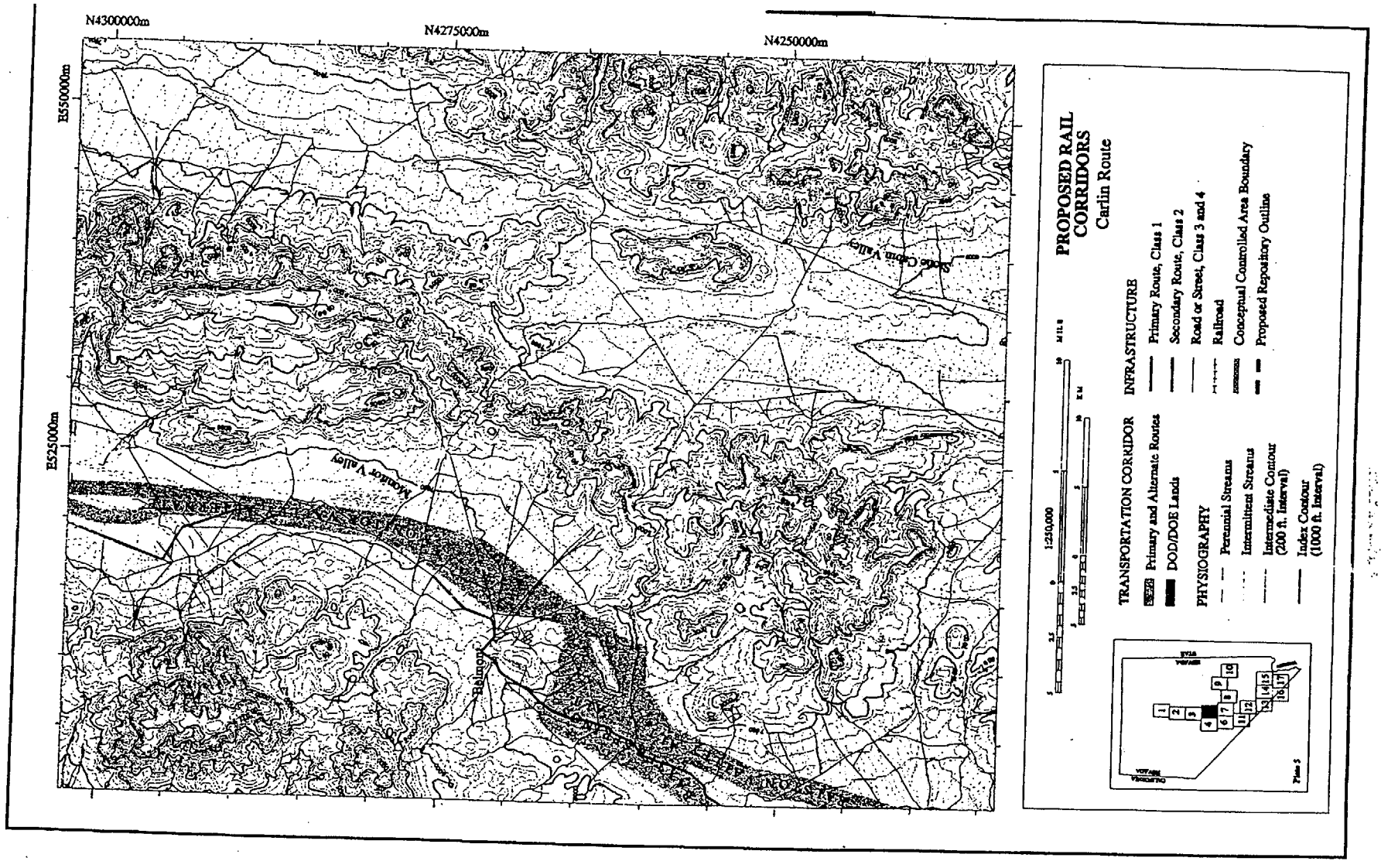
- Secondary Route, Class 2
- Road or Street, Class 3 and 4
- Railroad
- Conceptual Controlled Area Boundary
- Proposed Repository Outline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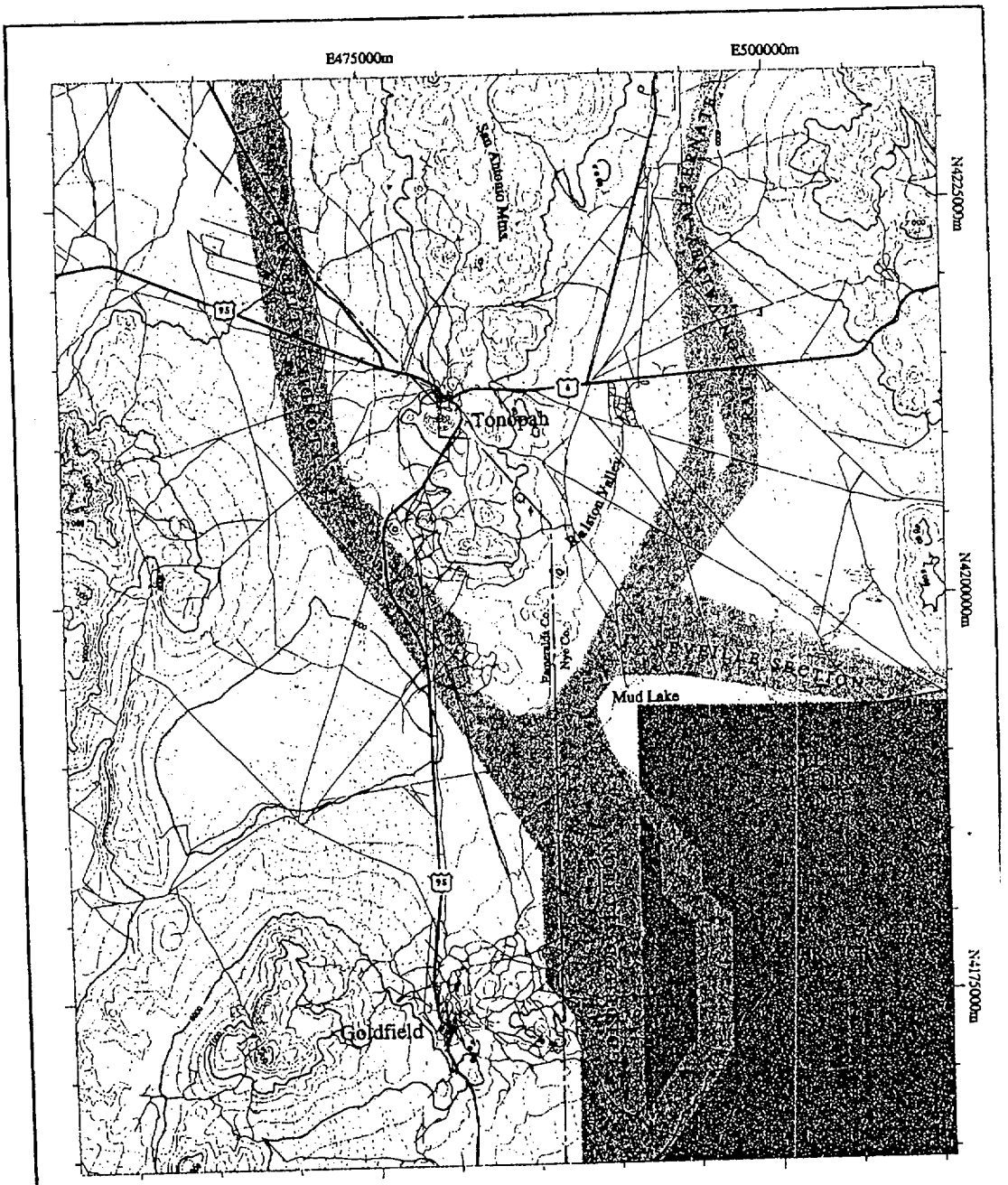
N4275000m
N4250000m
E550000m
E525000m
Monitor Valley
Belmont
Stone Cabin Valley
PROPOSED RAIL CORRIDORS
Carlin Route
1:250,000
MILES
KM
TRANSPORTATION CORRIDOR
Primary and Alternate Routes
DOD/DOE Lands
PHYSIOGRAPHY
Perennial Streams
Intermittent Streams
Intermediate Contour (200 ft. Interval)
Index Contour (1000 ft. Interval)
INFRASTRUCTURE
Primary Route, Class 1
Secondary Route, Class 2
Road or Street, Class 3 and 4
Railroad
Conceptual Controlled Area Boundary
Proposed Repository Outline



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MILES

KM

PROPOSED RAIL CORRIDORS

Carlin & Caliente Routes

TRANSPORTATION CORRIDOR

- Primary and Alternate Routes
- DOD/DOE Lands

PHYSIOGRAPHY

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INFRASTRUCTURE

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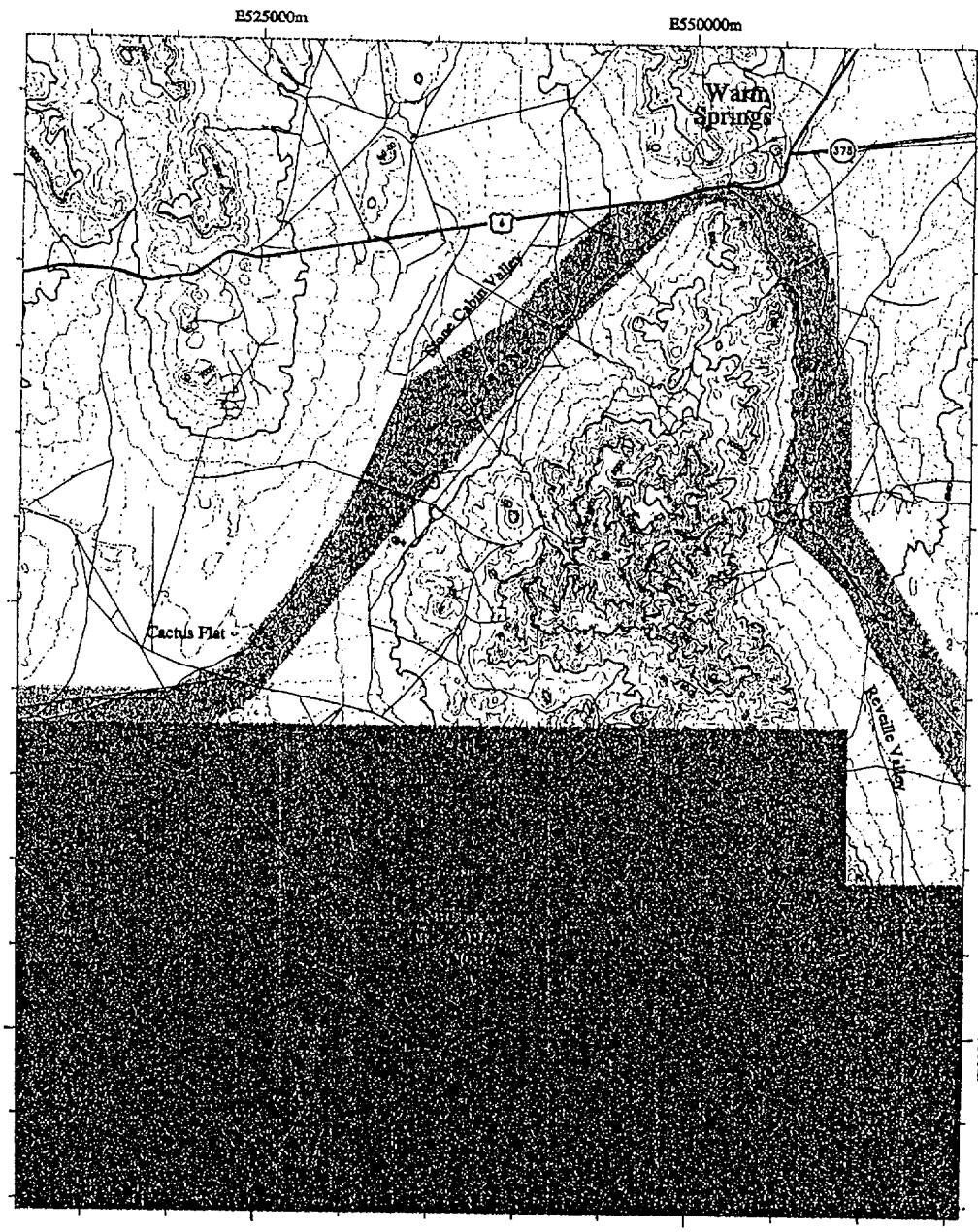
- Railroad
- Conceptual Controlled Area Boundary
- Proposed Repository Outline



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MILES

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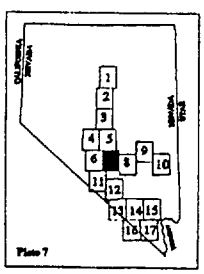
PROPOSED RAIL CORRIDORS

Caliente Route



TRANSPORTATION CORRIDOR

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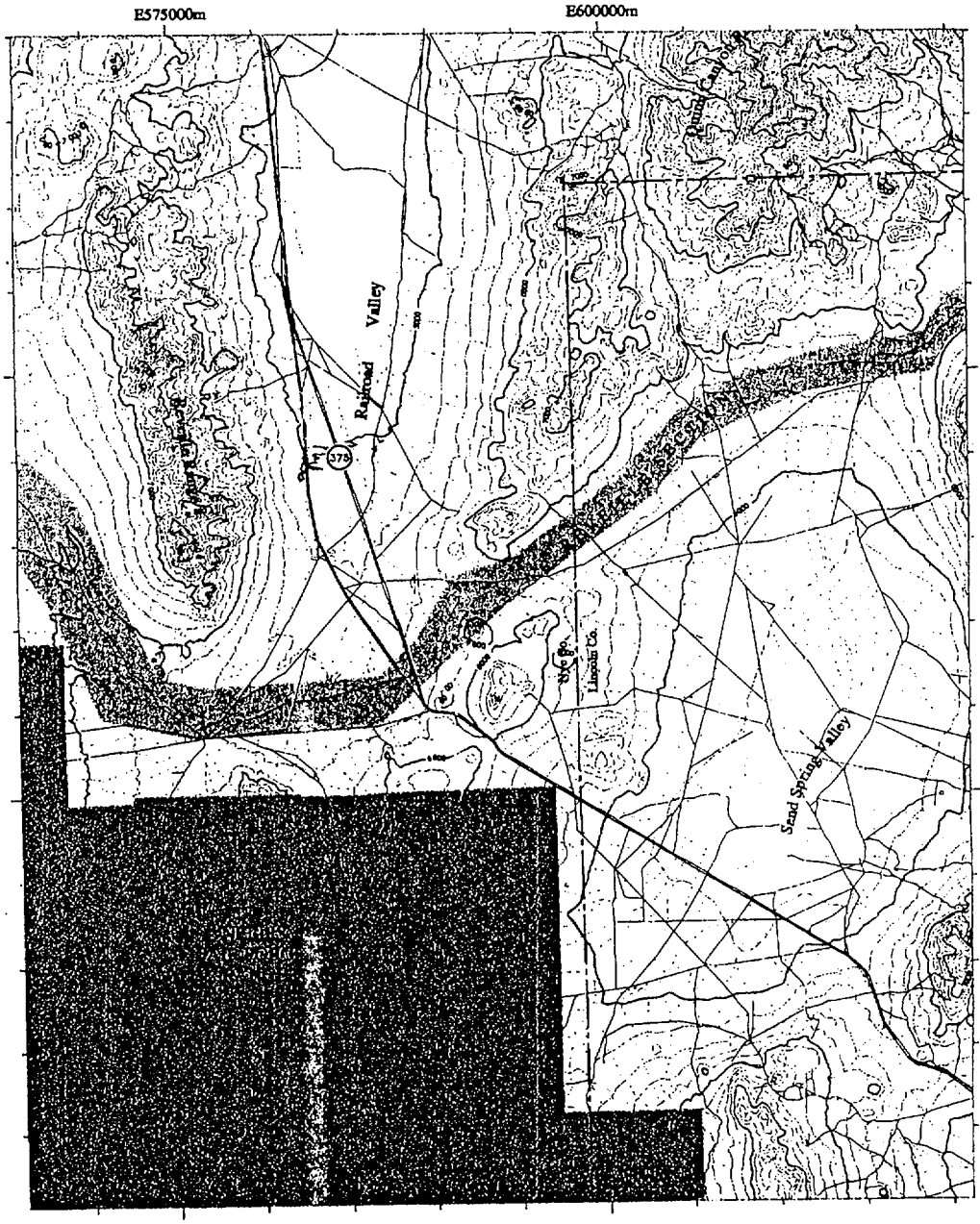

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MILES

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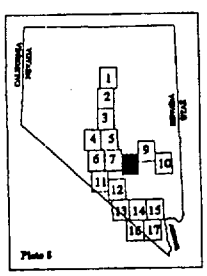
PROPOSED RAIL CORRIDORS

Caliente Route



TRANSPORTATION CORRIDOR

- Primary and Alternate Routes
- DOD/DOE Lands

PHYSIOGRAPHY

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- Intermittent Streams
- Intermediate Contour (200 ft. Interval)
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- Railroad
- Conceptual Controlled Area Boundary
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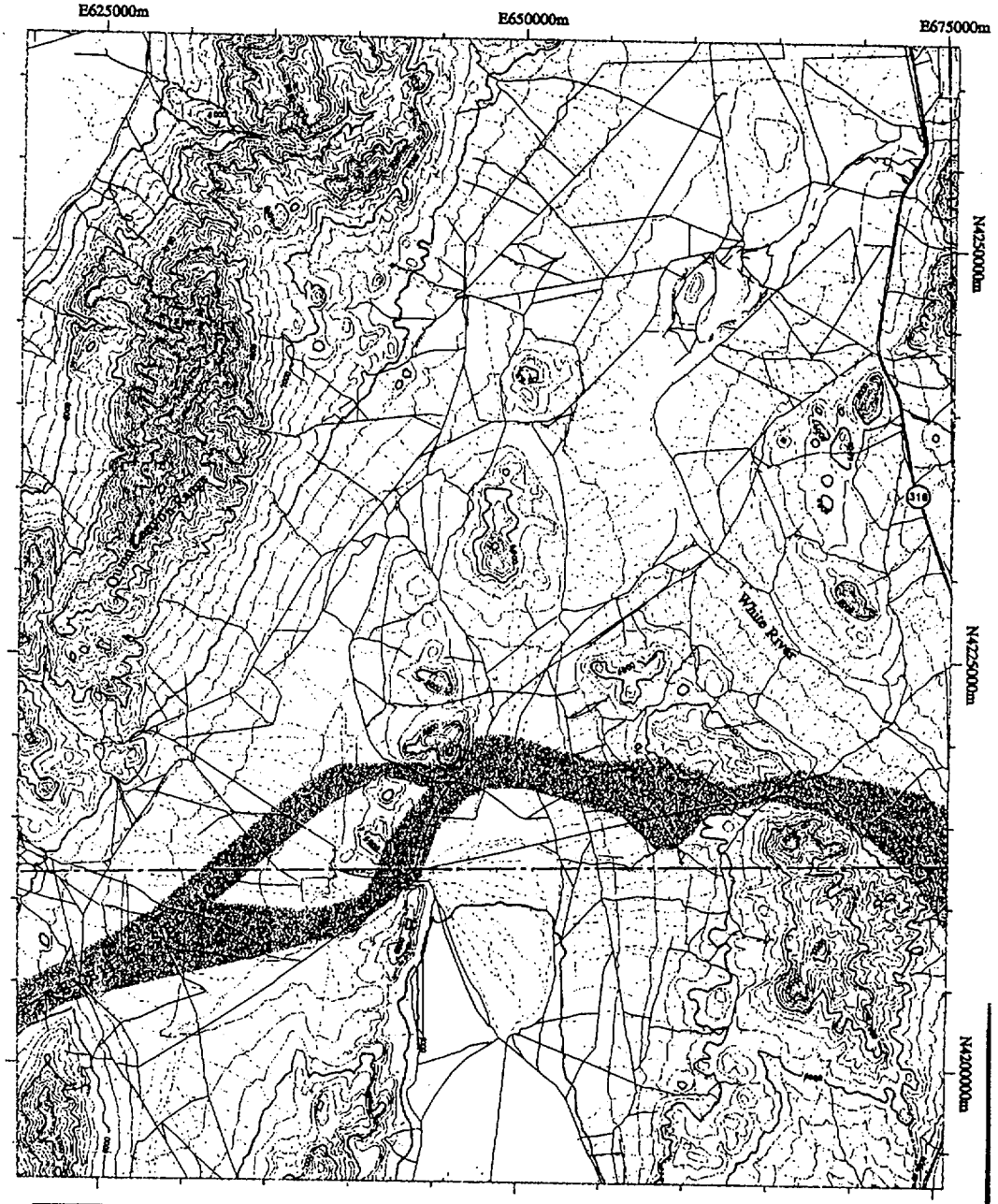

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MILES

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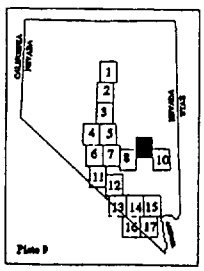
PROPOSED RAIL CORRIDORS

Caliente Route



TRANSPORTATION CORRIDOR

- Primary and Alternate Routes
- DOD/DOE Lands

PHYSIOGRAPHY

- Perennial Streams
- Intermittent Streams
- Intermediate Contour (200 ft. Interval)
- Index Contour (1000 ft. Interval)

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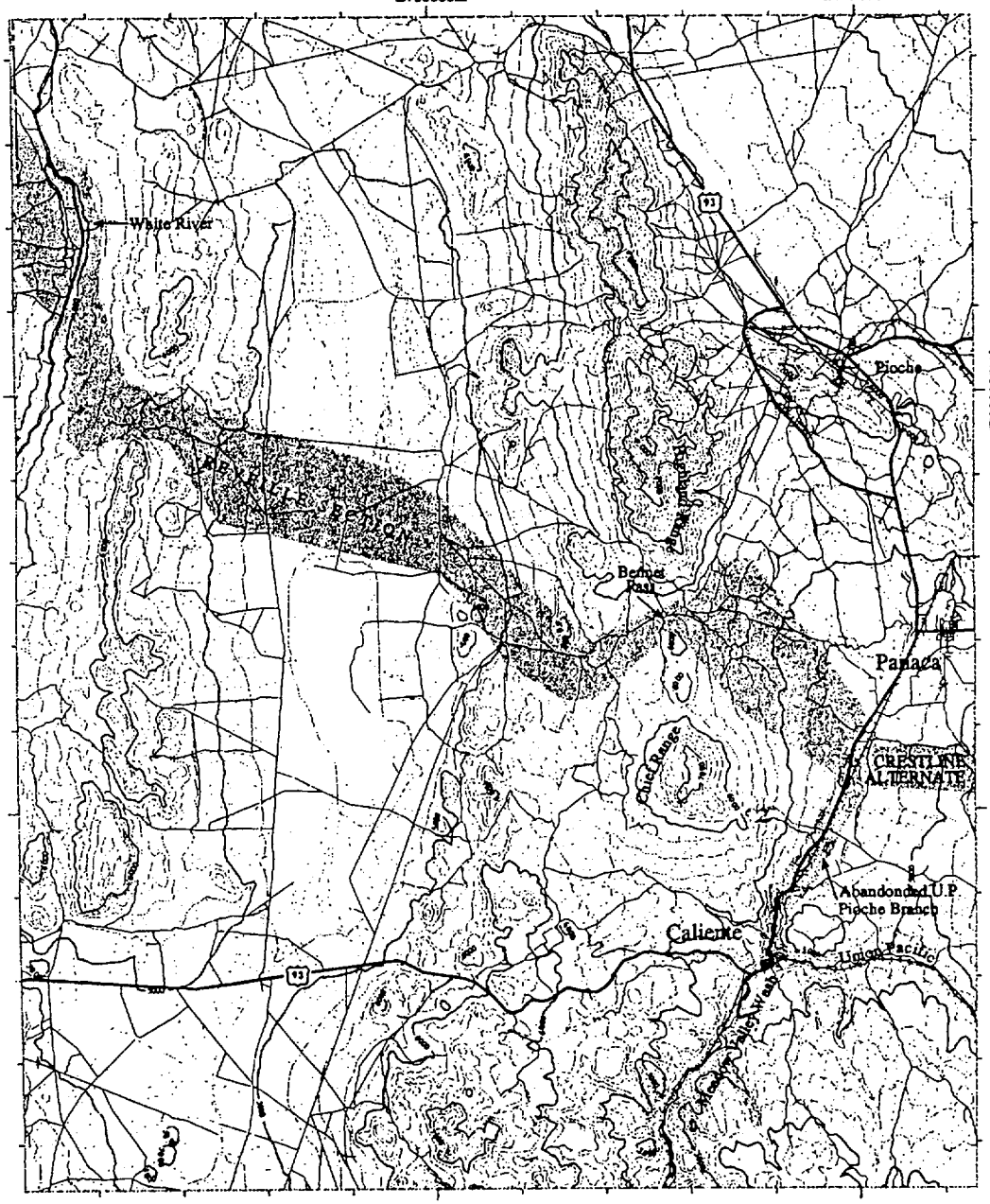

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MILES

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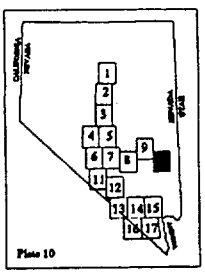
PROPOSED RAIL CORRIDORS

Caliente Route



TRANSPORTATION CORRIDOR

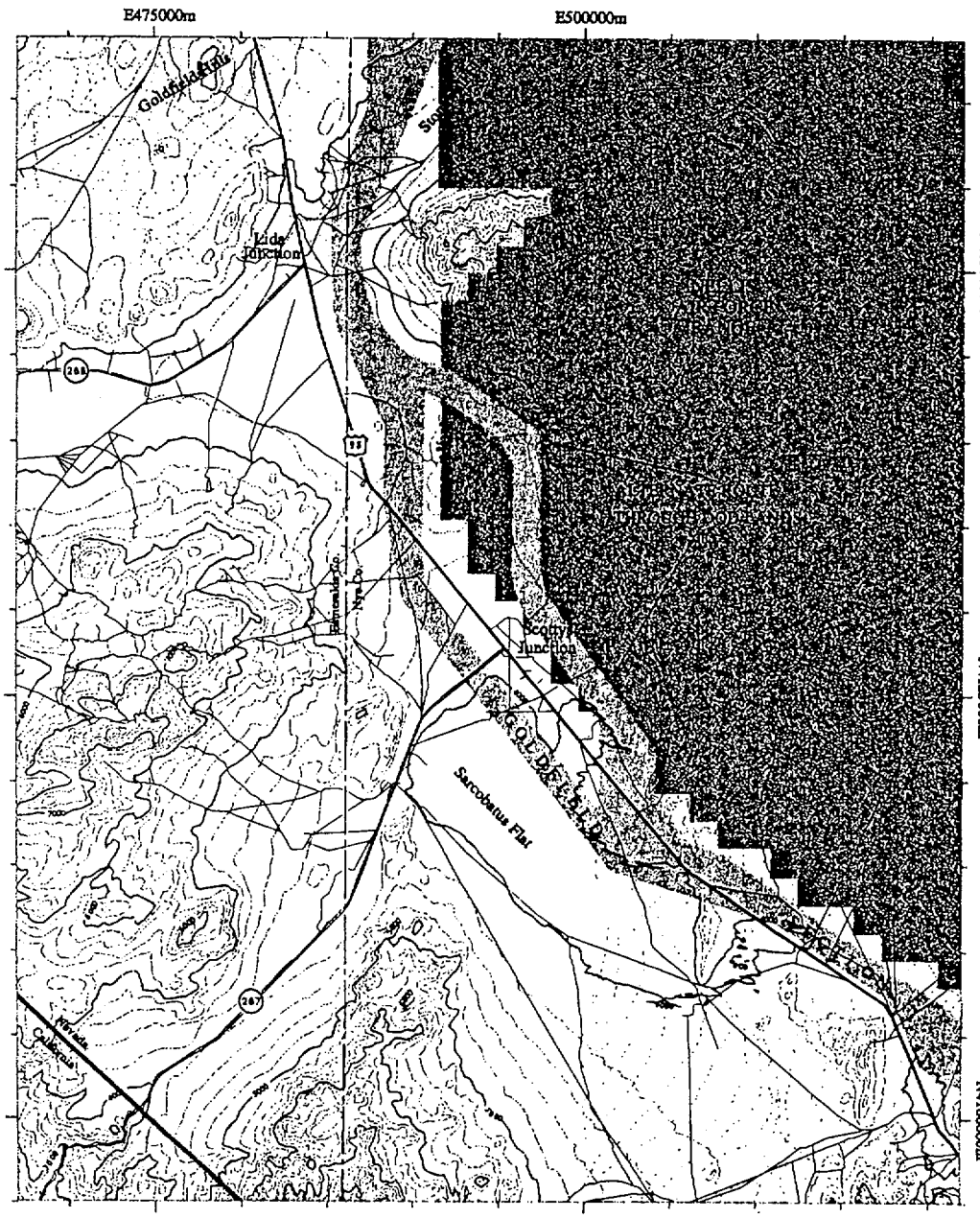
- Primary and Alternate Routes
- DOD/DOE Lands

PHYSIOGRAPHY

- Perennial Streams
- Intermittent Streams
- Intermediate Contour (200 ft. Interval)
- Index Contour (1000 ft. Interval)

INFRASTRUCTURE

- Primary Route, Class 1
- Secondary Route, Class 2
- Road or Street, Class 3 and 4
- Railroad
- Conceptual Controlled Area Boundary
- Proposed Repository Outline



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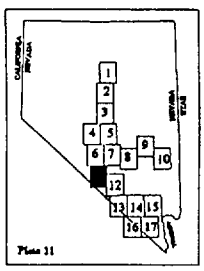
MILES

KM

PROPOSED RAIL CORRIDORS

Carlin & Caliente Routes



TRANSPORTATION CORRIDOR

- Primary and Alternate Routes
- DOD/DOE Lands

PHYSIOGRAPHY

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- Intermittent Streams
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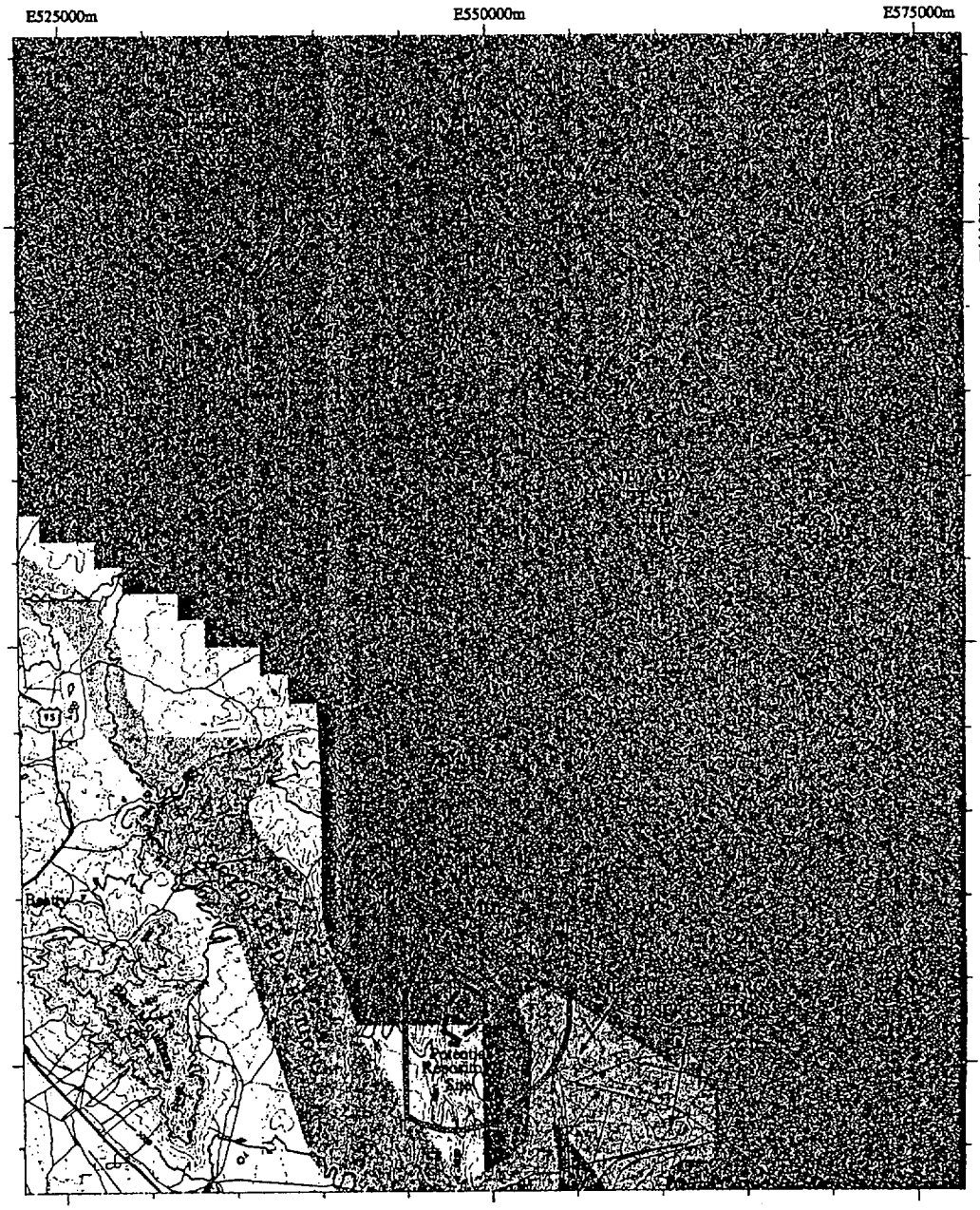
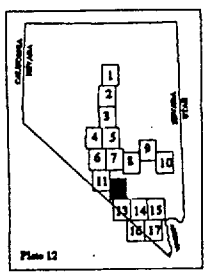


PROPOSED RAIL CORRIDORS

Carlin, Caliente, Valley Modified & Jean Routes



TRANSPORTATION CORRIDOR

- Primary and Alternate Routes
- DOD/DOE Lands

PHYSIOGRAPHY

- Perennial Streams
- Intermittent Streams
- Intermediate Contour (200 ft. Interval)
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- Railroad
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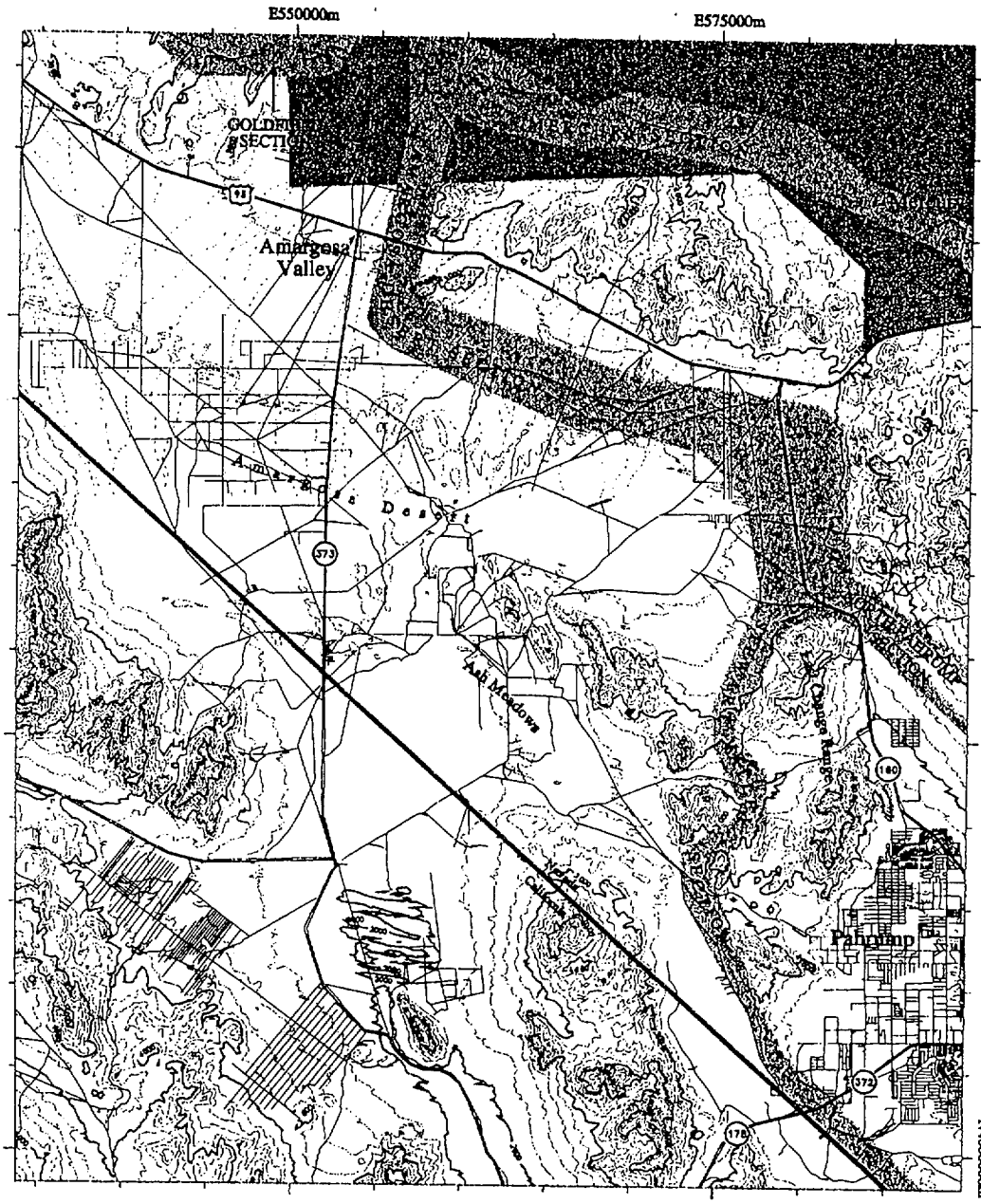
- Proposed Repository Outline



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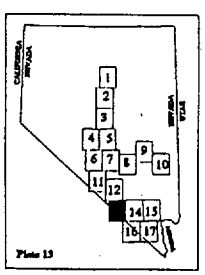
MILES

KM

PROPOSED RAIL CORRIDORS

Valley Modified & Jean Routes



TRANSPORTATION CORRIDOR

- Primary and Alternate Routes
- DOD/DOE Lands

PHYSIOGRAPHY

- Perennial Streams
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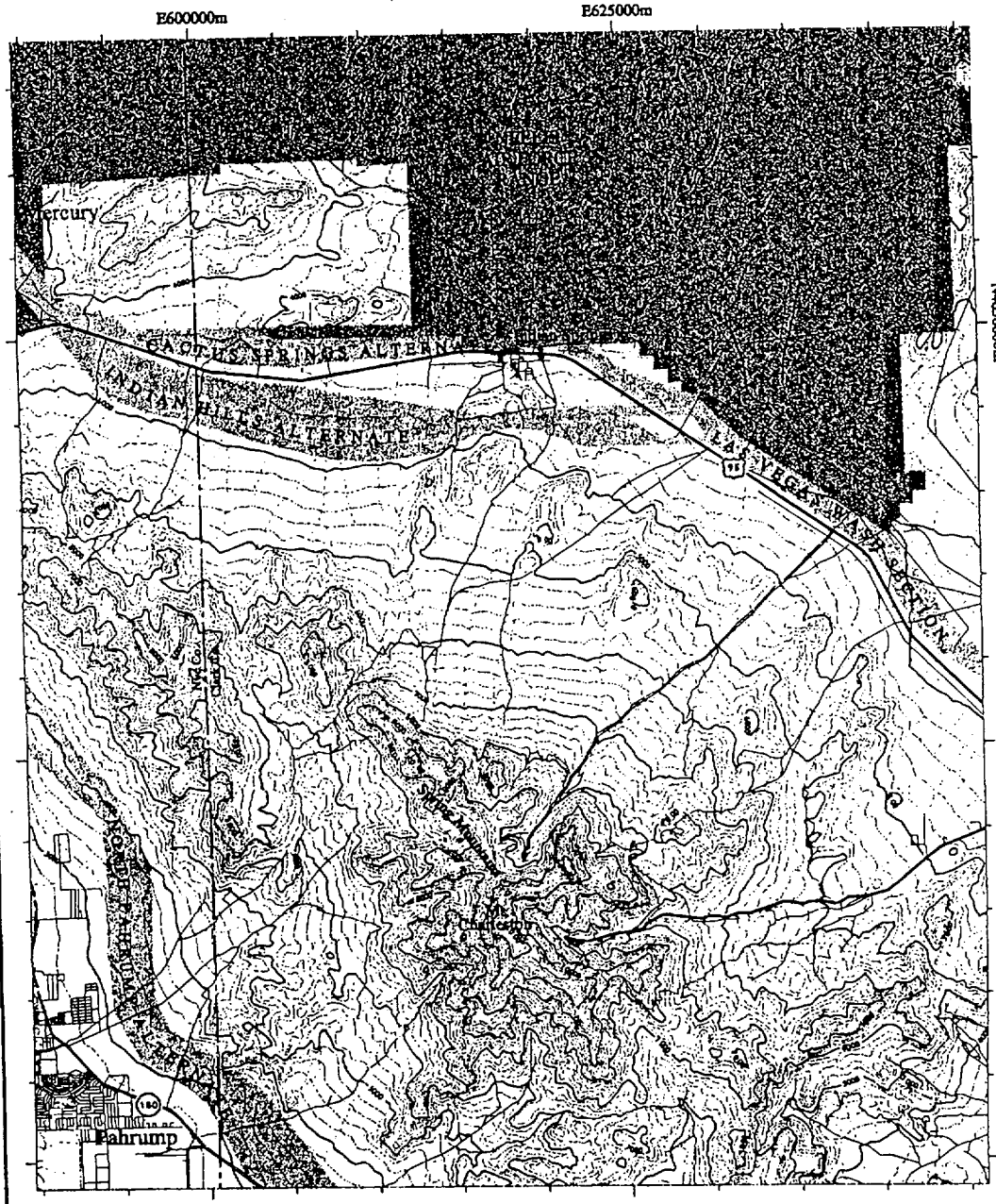
INFRASTRUCTURE

- Primary Route, Class 1
- Secondary Route, Class 2
- Road or Street, Class 3 and 4
- Railroad
- Conceptual Controlled Area Boundary
- Proposed Repository Outline



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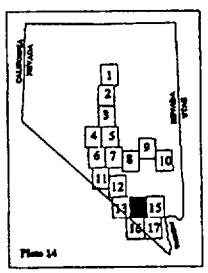
MILES

KM

PROPOSED RAIL CORRIDORS

Valley Modified & Jean Routes



TRANSPORTATION CORRIDOR

- Primary and Alternate Routes
- DOD/DOE Lands

PHYSIOGRAPHY

- Perennial Streams
- Intermittent Streams
- Intermediate Contour (200 ft. Interval)
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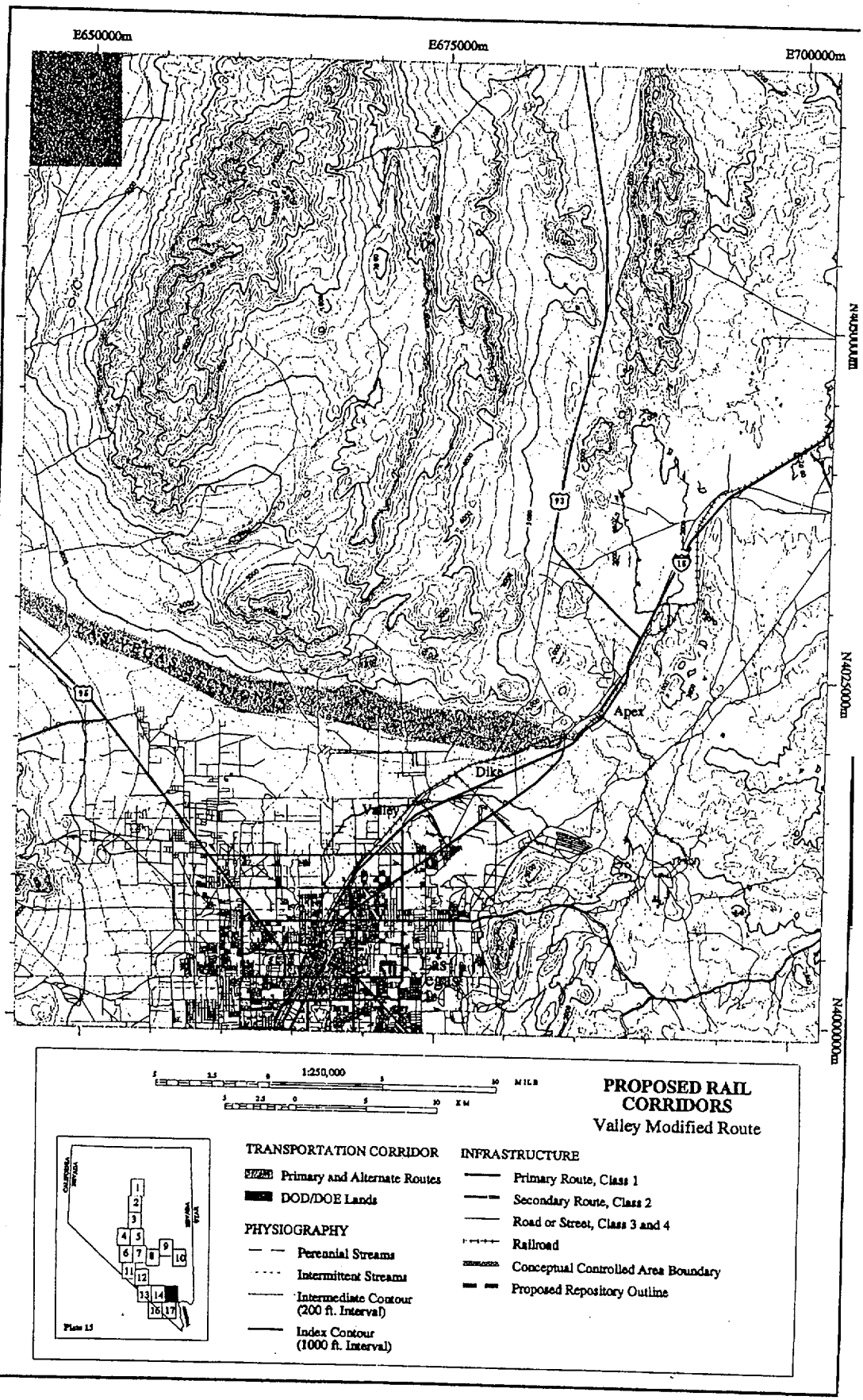
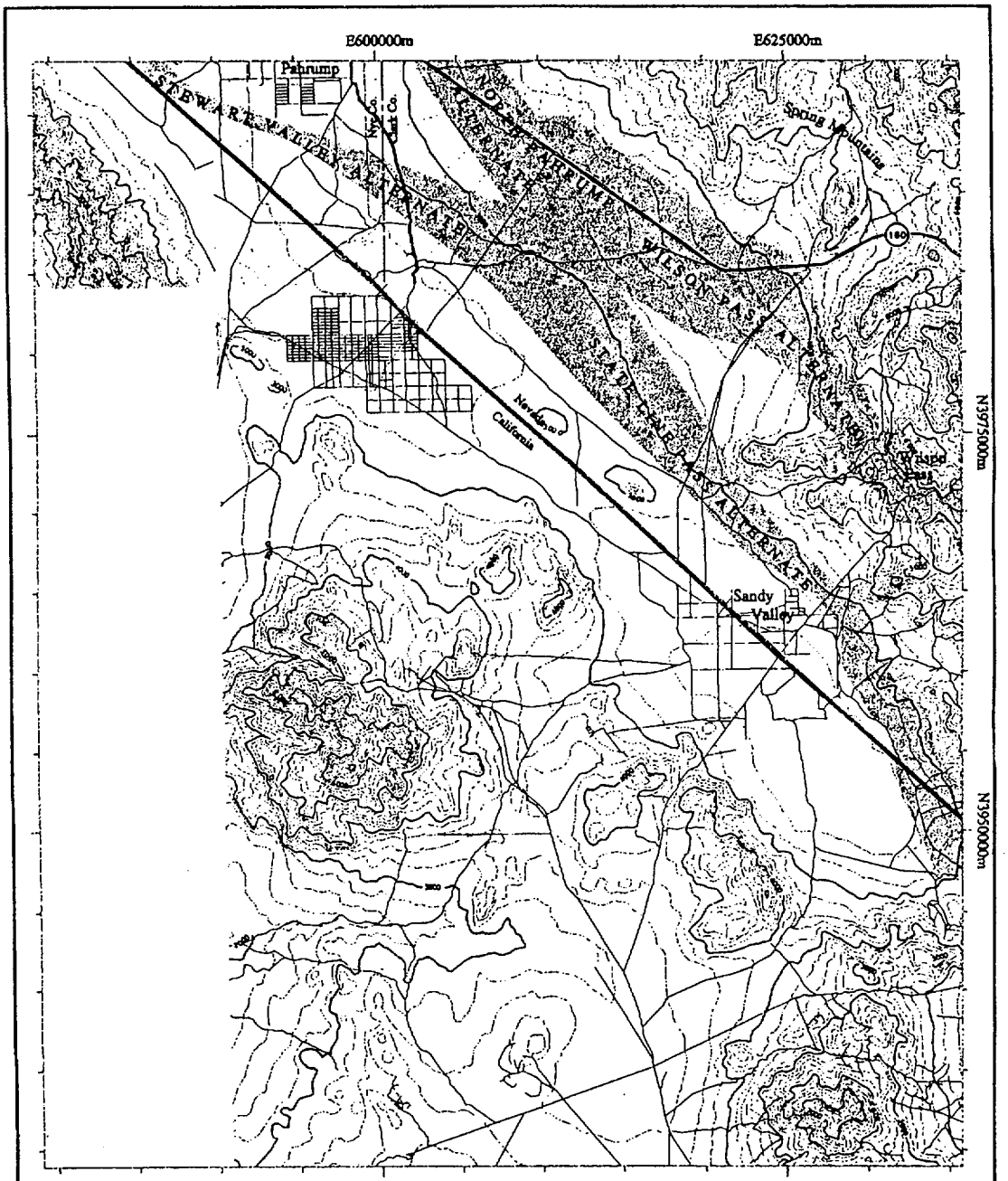
INFRASTRUCTURE

- Primary Route, Class 1
- Secondary Route, Class 2
- Road or Street, Class 3 and 4
- Railroad
- Conceptual Controlled Area Boundary
- Proposed Repository Outline


E650000m
E675000m
E700000m
N4050000m
N4040000m
N4030000m
Apex
Dike
Valley
Las Vegas
1:250,000
MILES
KM
PROPOSED RAIL CORRIDORS
Valley Modified Route
TRANSPORTATION CORRIDOR
Primary and Alternate Routes
DOD/DOE Lands
PHYSIOGRAPHY
Perennial Streams
Intermittent Streams
Intermediate Contour (200 ft. Interval)
Index Contour (1000 ft. Interval)
INFRASTRUCTURE
Primary Route, Class 1
Secondary Route, Class 2
Road or Street, Class 3 and 4
Railroad
Conceptual Controlled Area Boundary
Proposed Repository Outline
Plate 15



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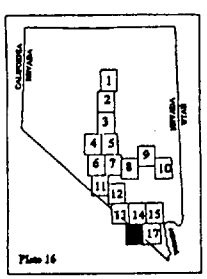
MILES

KM

PROPOSED RAIL CORRIDORS

Jean Route



TRANSPORTATION CORRIDOR

- Primary and Alternate Routes
- DOD/DOE Lands

PHYSIOGRAPHY

- Perennial Streams
- Intermittent Streams
- Intermediate Contour (200 ft. Interval)
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INFRASTRUCTURE

- Primary Route, Class 1
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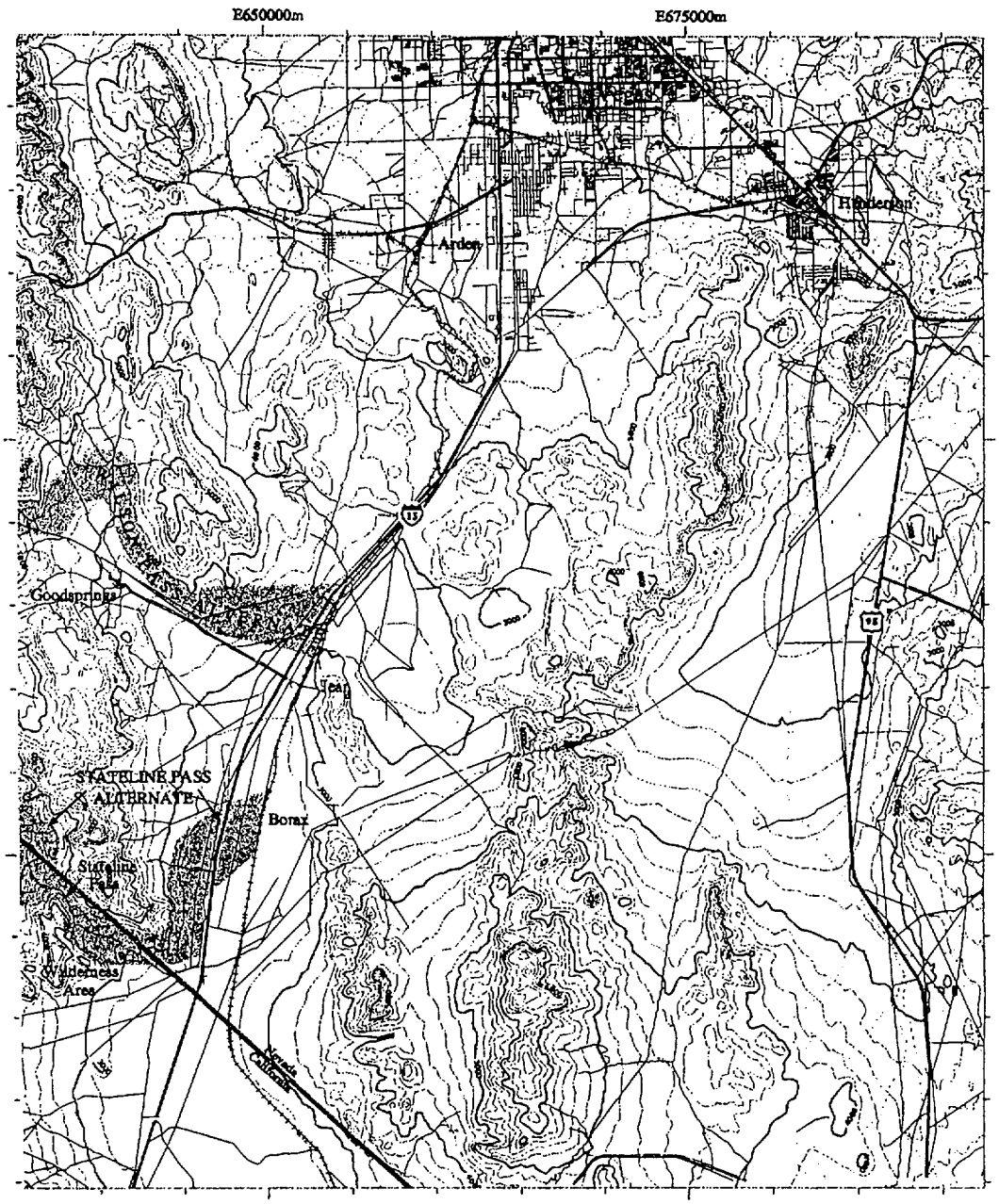
- Railroad
- Conceptual Controlled Area Boundary
- Proposed Repository Outline



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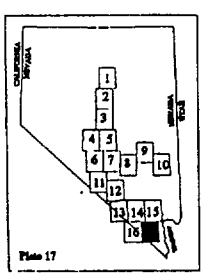
MILES

KM

PROPOSED RAIL CORRIDORS

Jean Route



TRANSPORTATION CORRIDOR

- Primary and Alternate Routes
- DOD/DOE Lands

PHYSIOGRAPHY

- Perennial Streams
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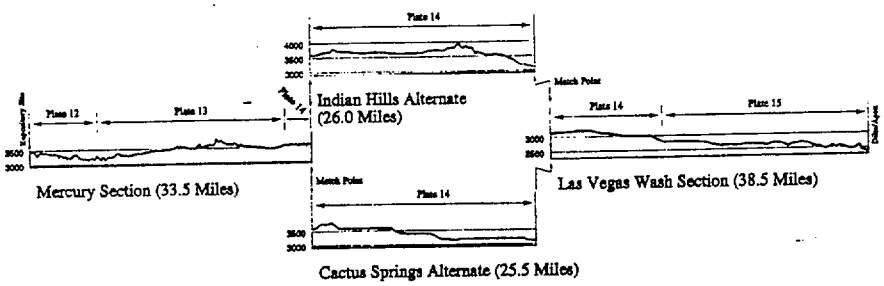
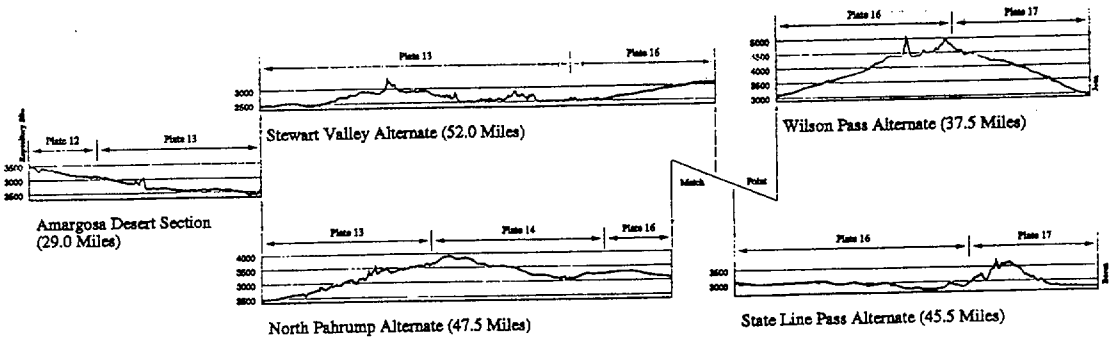
- Railroad
- Conceptual Controlled Area Boundary
- Proposed Repository Outline

VALLEY MODIFIED ROUTE
Existing Groundline Profiles

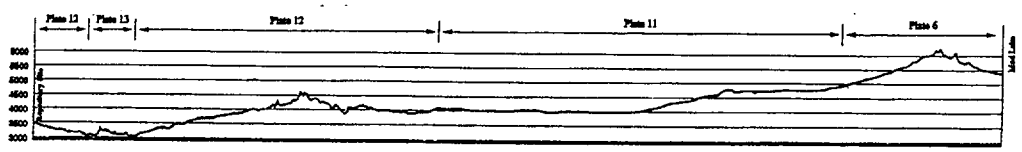


JEAN ROUTE
Existing Groundline Profiles

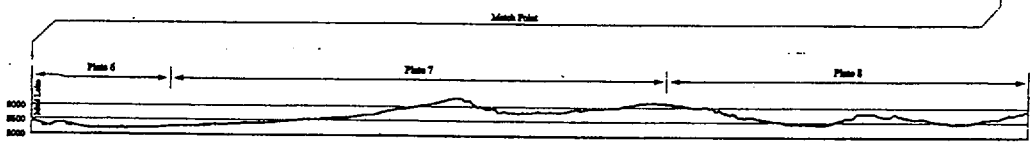


Vertical Scale: 1" = 3000 Feet
Horizontal Scale: 1" = 10 Miles (approx.)

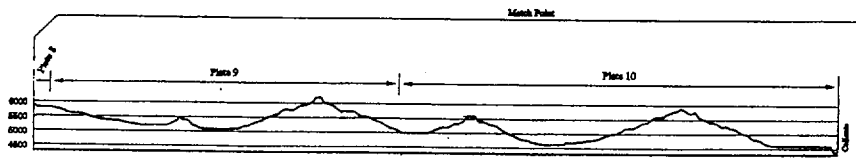
CALIENTE ROUTE
Existing Groundline Profiles



Goldfield Section (118.5 Miles)



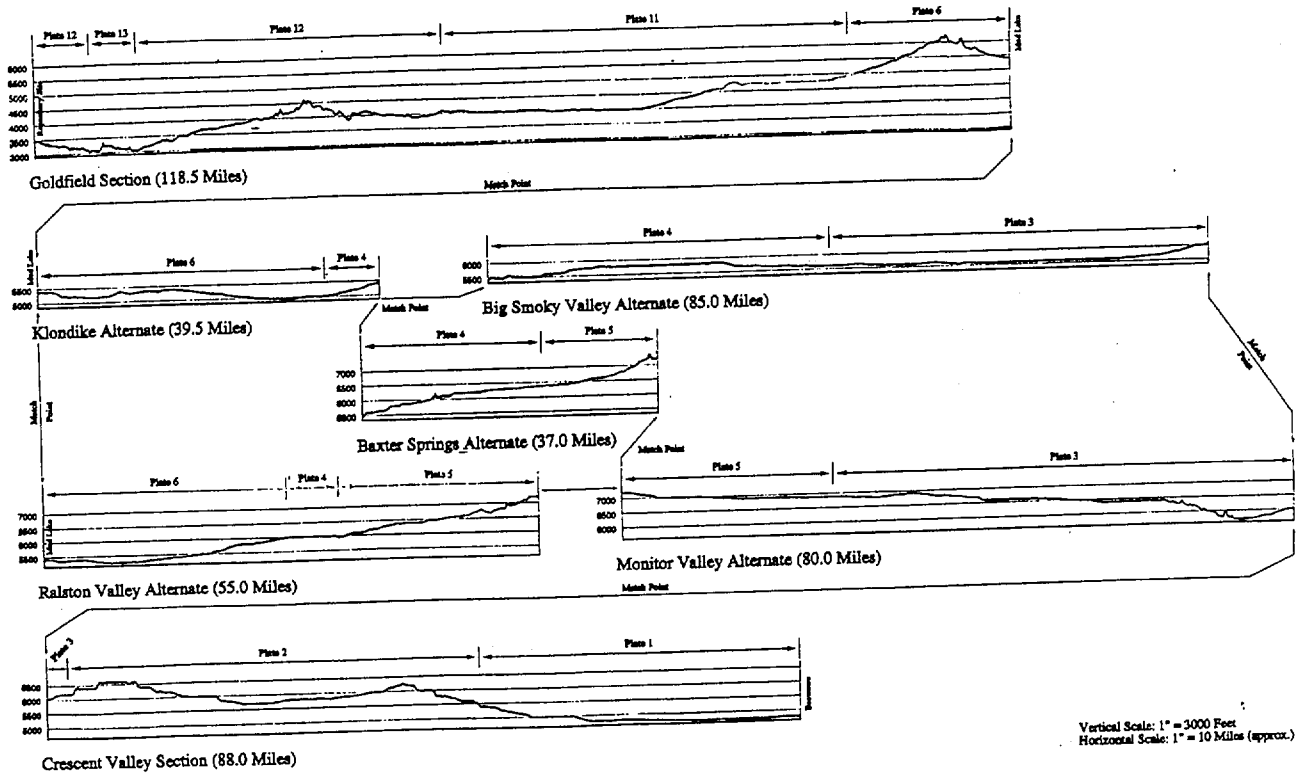
Reveille Section, West Half (119.1 Miles)



Reveille Section, East Half (100.5 Miles)

Vertical Scale: 1" = 3000 Feet
Horizontal Scale: 1" = 10 Miles (approx.)

CARLIN ROUTE
Existing Groundline Profiles



March 1996

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