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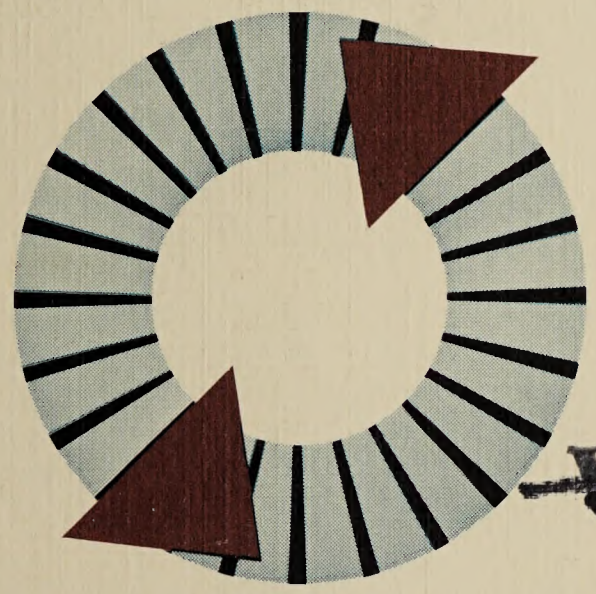

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A COMPREHENSIVE RECYCLING AND WASTE MANAGEMENT SYSTEM

Santa Fe ATSF A JOINT VENTURE WMNA

Prepared For:

COUNTY OF SAN BERNARDINO
and
UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

November 1992

ENVIRONMENTAL SOLUTIONS, INC.

PLANNING DEPARTMENT

385 North Arrowhead Avenue • San Bernardino, CA 92415-0180 • (714) 387-4091
Fax No. • (714) 387-3223

COUNTY OF SAN BERNARDINO
ENVIRONMENTAL MANAGEMENT GROUP

SHARON W. HIGHTOWER
Director of Planning

November 25, 1992

RESPONSIBLE AND TRUSTEE AGENCIES
INTERESTED ORGANIZATIONS AND INDIVIDUALS

RE: NOTICE OF AVAILABILITY FOR THE DRAFT EIR/EIS ON THE RAIL-CYCLE BOLO STATION LANDFILL

Dear Reader/Reviewer:

Enclosed for your review and comment is the Draft Environmental Impact Report/Environmental Impact Statement (DEIR/DEIS) for the Bolo Station Landfill proposed by the Rail-Cycle Corporation. The purpose of the document is to identify and describe the probable environmental impacts that would result from the proposed siting of a Class III municipal waste landfill on 4,800 acres, located adjacent to Bristol Dry Lake, approximately 3 miles southeast of the community of Amboy.

This document has been prepared to meet the State requirements of the California Environmental Quality Act and the Federal requirements of the National Environmental Policy Act. The DEIR/DEIS has been prepared by Environmental Solutions, Inc., an independent environmental consultant, under the supervision of the County of San Bernardino and the Bureau of Land Management.

The Bureau of Land Management will hold public hearings as required by Federal regulations, at the locations shown below to allow oral comments to be made relating to the adequacy and completeness of the DEIR/DEIS.

DATE	LOCATION
February 8, 1993 7:00 - 9:00 p.m.	Holiday Inn 1511 East Main Barstow CA 92311
February 10, 1993 7:00 - 9:00 p.m.	Twentynine Palms High School 72750 Wildcat Way Multi-Purpose Room Twentynine Palms CA 92277
February 11, 1993 7:00 - 9:00 p.m.	San Bernardino County Government Center, Hearing Chambers 385 N. Arrowhead Avenue San Bernardino, CA 92415

HARRY M. MAYS
County Administrative Officer

ALBERT R. REID
Assistant Administrative Officer
Environmental Management Group

Board of Supervisors

MARSHA TUROCI ..... First District
JON D. MIKELS ..... Second District
BARBARA CRAM RIORDAN ..... Third District
LARRY WALKER ..... Fourth District
ROBERT L. HAMMOCK ..... Fifth District

The public comment period will end on March 3, 1993. Written comments should be addressed to:

County of San Bernardino, Planning Department
385 N. Arrowhead Avenue, Third Floor
San Bernardino, CA 92415-0182
Attn: Mr. Randy Scott

909-387-4099
Issuing a Supplement

Sincerely,

Randy Scott

RANDY SCOTT, Senior Planner
Environmental Team
San Bernardino County

John Rivers-Bisson

Henri R. Bisson
District Manager
Bureau of Land Management

RS:jl

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COVER SHEET

DRAFT ENVIRONMENTAL IMPACT REPORT/ENVIRONMENTAL IMPACT STATEMENT
RAIL•CYCLE - BOLO STATION LANDFILL
SAN BERNARDINO COUNTY, CALIFORNIA

LEAD AGENCIES:

- San Bernardino County Planning Department
  San Bernardino, California
- U.S. Department of the Interior
  Bureau of Land Management
  Riverside, California

PROPOSED ACTION:

Construction and operation of the Rail•Cycle - Bolo Station Landfill and the issuance of associated right-of-way grants and land exchange.

Comments should be submitted to the County of San Bernardino at the address given below. For further information, contact the County or Bureau of Land Management at:

County of San Bernardino
Planning Department
385 North Arrowhead Avenue, 3rd Floor
San Bernardino, California 92415-0180
(714) 387-4099
Attention: Mr. Randy Scott

Bureau of Land Management
California Desert District
6221 Box Springs Boulevard
Riverside, California 92507-0714
(714) 697-5230
Attention: Mr. Doug Romoli

DESIGNATION:

Draft Environmental Impact Report/Environmental Impact Statement

ABSTRACT:

In August 1991, the County of San Bernardino (County) issued a Notice of Preparation of an Environmental Impact Report (EIR) in response to an application submitted by Rail•Cycle for construction of a Class III municipal solid waste facility near Amboy, California, in the eastern Mojave Desert region of San Bernardino County. The U.S. Bureau of Land Management (BLM) determined that an Environmental Impact Statement (EIS) would be required as the proposed action includes the exchange of federal lands managed by the BLM, an amendment of the California Desert Conservation Area Plan, and right-of-ways across federal lands. The BLM issued a Notice of Intent to prepare an EIS for the proposed action in August 1991. In accordance with the California Environmental Quality Act and National Environmental Policy Act, the County and BLM are preparing a joint EIR/EIS.

The proposed action is a private venture between Atchison, Topeka, and Santa Fe Railway Company, Inc. (ATSF) and Waste Management of North America, Inc. involving construction and operation of a Class III nonhazardous waste landfill that would accommodate up to 21,000 tons of waste per day. Waste would be transported by rail from various counties and cities in southern California in sealed 40- to 45-foot containers (using existing rail lines) to the proposed Bolo Station Landfill.

Alternatives to the proposed Bolo Station Landfill include:

- Cadiz Valley Alternative
- Reduced Action Alternative
- No Action Alternative

Additional alternative sites for the proposed landfill were considered, but eliminated from further analysis, as they were determined not to be feasible for one or more of the following reasons:

- Not located on an ATSF rail line or located on ATSF rail line with steep grades.
- Located too far from Los Angeles County.
- Currently being considered for other proposed projects.
- Located in desert tortoise habitat.
- Site was considered too small to accommodate a 21,000-ton per day operation.
- Close proximity to populated areas.
- Topographical or geologic features which made siting of a landfill inappropriate.
- Jurisdictional boundaries (i.e., Department of Defense lands).

Issues identified through the scoping process and evaluated in this Draft EIR/EIS include geology and soils, mineral resources, surface hydrology and ground water, vegetation, wildlife, air quality, public health and safety, visual resources, cultural and paleontological resources, transportation, noise, land use, and socioeconomics. However, with implementation of the mitigation measures identified in the document, most impacts would be reduced to a level of nonsignificance. Impacts on the following would remain significant and unavoidable even after mitigation:

- Ground water supply
- Air quality
- Visual resources
- Land use
- Socioeconomics

Various technical reports have been prepared by Rail•Cycle which have been used in the preparation of the Draft EIR/EIS. These reports are available for review on request at the County and BLM offices listed above.

This Draft EIR/EIS is being distributed for a 90-day public review and comment period. This review and comment period will end on March 3, 1993. The BLM will hold three public hearings during the 90-day public review and comment period to receive verbal comments on the Draft EIR/EIS. Written comments on the Draft EIR/EIS should be submitted to the County at the above address and should be received by March 3, 1993.

RAIL•CYCLE - BOLO STATION LANDFILL

DRAFT ENVIRONMENTAL IMPACT REPORT/ENVIRONMENTAL IMPACT STATEMENT

This document has been approved for public review.

Ed Hastey — 11/18/92

Ed Hastey
State Director
Bureau of Land Management

Date

Valery Pilmer — 11/19/92

Name: Valery Pilmer
Planning Director
County of San Bernardino

Date

RAIL•CYCLE - BOLO STATION LANDFILL

DRAFT
ENVIRONMENTAL IMPACT REPORT/ ENVIRONMENTAL IMPACT STATEMENT

State Clearinghouse No. 91092020

November 1992

Prepared For:

County of San Bernardino
and
United States Department of the Interior
Bureau of Land Management

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CHAPTER 1.0
SUMMARY

1.0 SUMMARY

1. This Draft Environmental Impact Report/ Environmental Impact Statement (EIR/EIS) has been prepared in accordance with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) for use by the County of San Bernardino (County), the U.S. Bureau of Land Management (BLM), other responsible and reviewing agencies, and the public in consideration of the proposed construction and operation of the Rail•Cycle-Bolo Station Landfill project. The proposed action includes rail transport of nonhazardous municipal solid waste from material recovery facilities (MRFs) to be located in various southern California cities and counties, and establishment of a large capacity (2,100 acre), long-term (60 to 100 years), Class III landfill facility. The MRFs are not part of the proposed action and will be evaluated separately. The landfill is proposed to be situated at a site known as Bolo Station in a rural area of the Mojave Desert near the community of Amboy in San Bernardino County, California, as shown in Figure 1.1.

2. The following sections provide a brief summary of the proposed action and the major conclusions of issues analyzed. Detailed discussions of the information summarized in this chapter are presented in other parts of this document as follows:

   - Chapter 2.0 - Introduction
   - Chapter 3.0 - Description of Proposed Action and Alternatives
   - Chapter 4.0 - Affected Environment
   - Chapter 5.0 - Potential Environmental Impacts
   - Chapter 6.0 - Cumulative Impacts

3. This summary has been prepared to provide an overview of the proposed action, its potential environmental effects, and feasible alternatives, including the No Action Alternative. It also summarizes feasible mitigation measures that would eliminate or minimize significant impacts of the proposed action. The environmental issues evaluated in this Draft EIR/EIS are as follows:

   - Geology and Soils
   - Mineral Resources
   - Surface Hydrology and Ground Water
   - Vegetation
   - Wildlife
   - Air Quality
   - Public Health and Safety
   - Visual Resources
   - Cultural Resources
   - Paleontological Resources
   - Transportation
   - Noise
   - Land Use
   - Socioeconomics

   For purposes of convenience, this summary presents major conclusions of the environmental impact analysis. For a complete understanding of the proposed action and environmental issues evaluated, the reader is encouraged to review the text of this Draft EIR/EIS in its entirety.

1.1 SUMMARY OF PROPOSED ACTION

1. The proposed action is a private venture by Rail•Cycle: a limited partnership between the Atchison, Topeka, and Santa Fe Railway Company, Inc. (ATSF) and Waste Management of North America, Inc. (WMNA). To meet a portion of the solid waste disposal requirements for various southern California cities and counties, Rail•Cycle proposes to construct and operate a Class III nonhazardous solid waste landfill, as defined by California Code of Regulations (CCR) Title 23, that would accommodate up to 21,000 tons of waste per day. Initial operation would begin with 3,000 tons of waste per day increasing to a maximum of 21,000 tons per day within five to seven years. Waste would be transported by rail from various areas of southern California in sealed 40- to 45-foot containers using existing rail lines to an onsite container offloading facility. From the offloading facility, the containers would be transported a short distance to the landfill and emptied.

2. The proposed Bolo Station site consists of seven and one-half sections (a section is 640 acres) of land (4,800 acres) near Bristol Dry Lake, south of the Bristol and Marble mountains. It is located midway between Cadiz and Amboy, along the ATSF rail line, as shown in Figure 1.2. Specifically, the Bolo Station Landfill is proposed to be located in Sections 5, 8, 9, 15, 16, 17, 21, and the western one-half of Section 22 in Township 5 North, Range 13 East, San

91-109 EIR / EIS REV. 7/8/92

LEGEND

ATSF ATCHISON, TOPEKA, AND SANTA FE RAILROAD

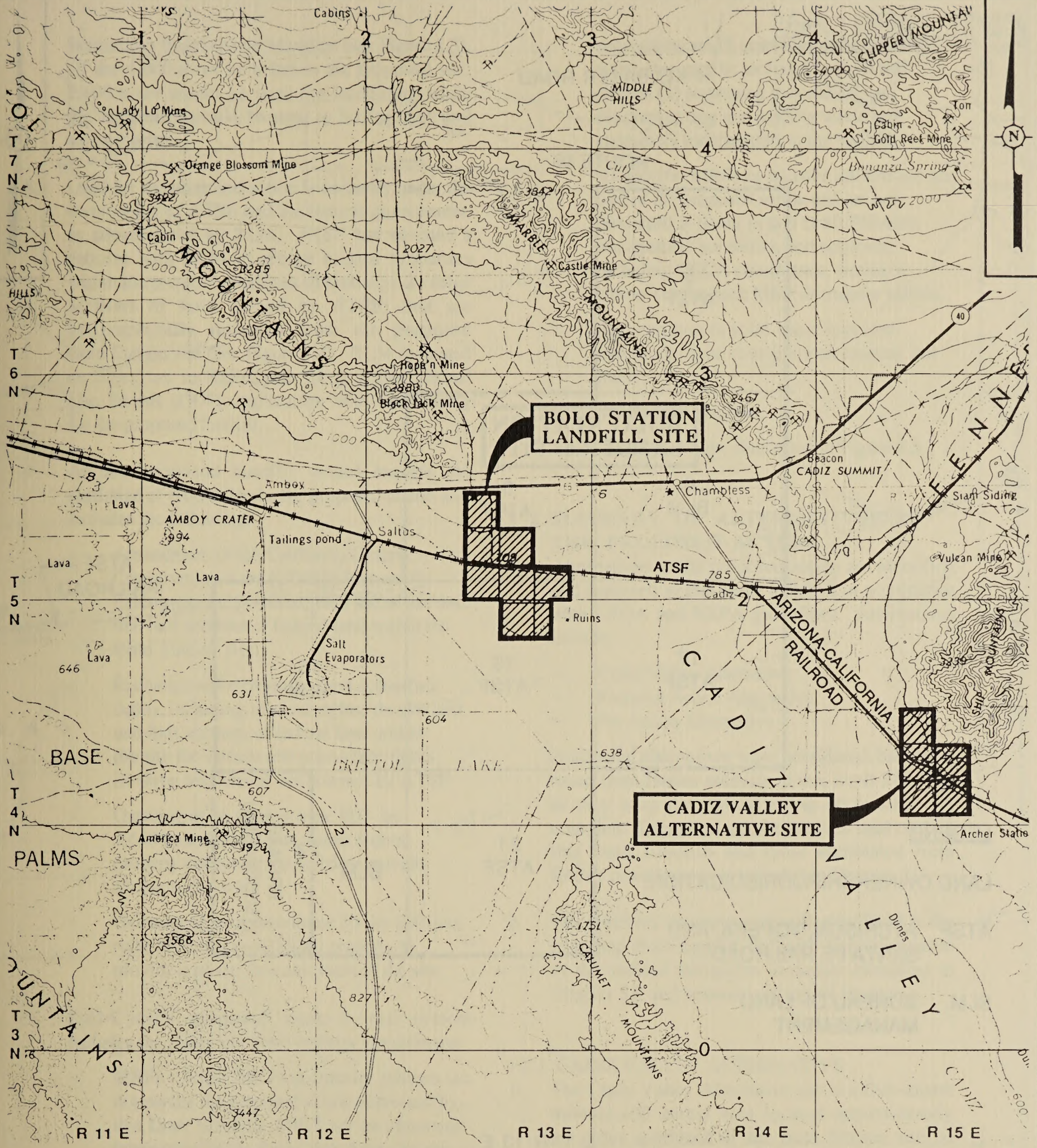
SP SOUTHERN PACIFIC TRANSPORTATION COMPANY

FIGURE 1.1

REGIONAL LOCATION MAP

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.



0 4 8 MILES

SCALE

CONTOUR INTERVAL: 200 FEET

LEGEND

ATSF ATCHISON, TOPEKA, AND SANTA FE RAILROAD

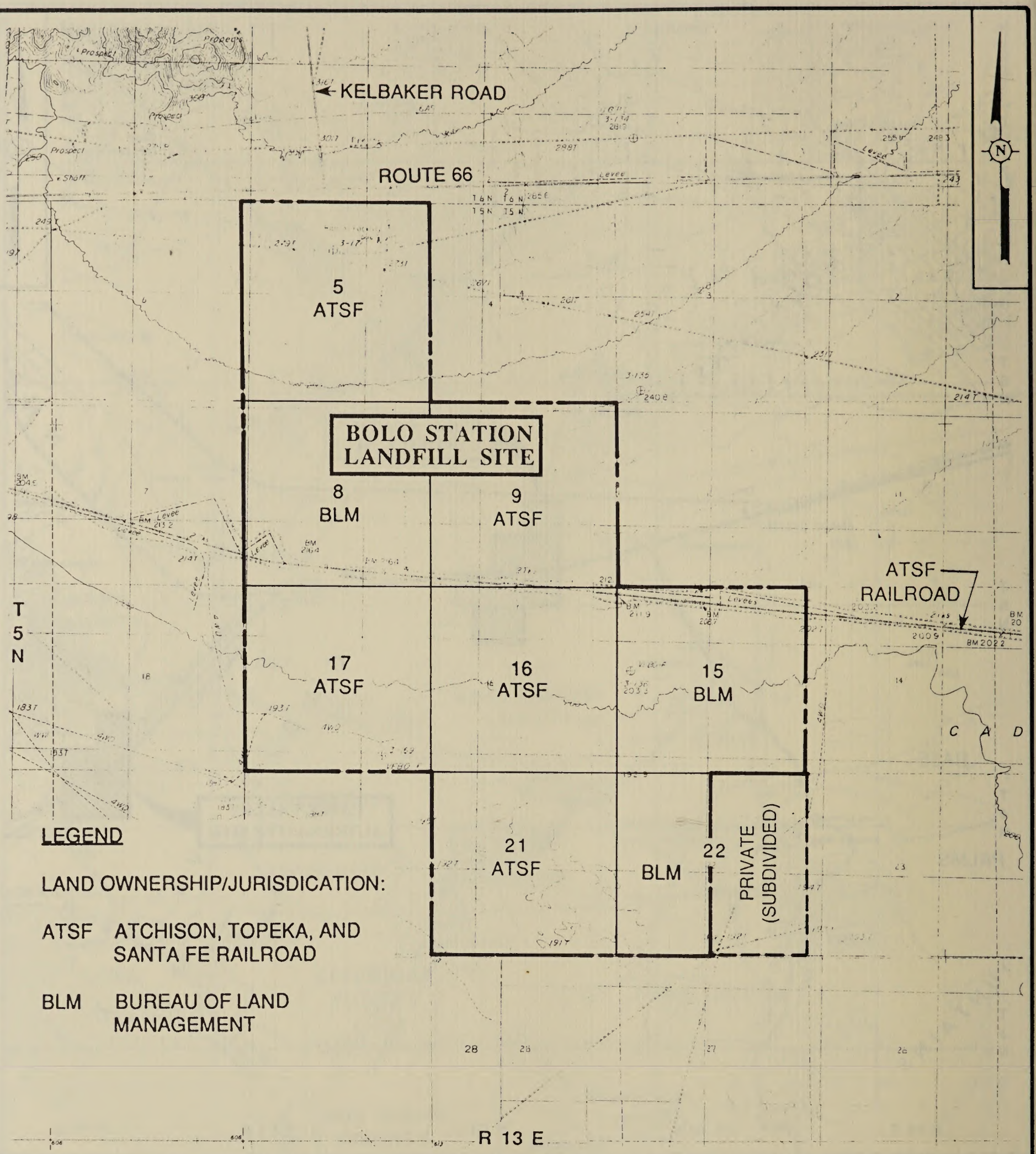
REFERENCE: U.S.G.S. 1 X 2 DEGREE TOPOGRAPHIC QUADRANGLE MAP OF NEEDLES, SAN BERNARDINO COUNTY, CALIFORNIA. DATED 1956 AND REVISED IN 1969.

FIGURE 1.2

SITE VICINITY MAP

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.



REFERENCE: U.S.G.S. 7.5 MINUTE TOPOGRAPHIC QUADRANGLE MAPS OF AMBOY, BRISTOL LAKE NW, CADIZ, AND CALUMET MINE, SAN BERNARDINO COUNTY , CALIFORNIA. AMBOY, CADIZ, AND CALUMET MINE ARE PROVISIONAL EDITION MAPS AND ARE DATED 1985. BRISTOL LAKE NW IS DATED 1954 AND PHOTOREVISED IN 1984.

NOTE: PROVISIONAL EDITION MAPS SHOW CONTOUR INTERVALS, SPOT ELEVATIONS AND U.T.M. COORDINATES IN METERS. BRISTOL LAKE NW IS ON THE DATUM FOR 1927. CONTOUR INTERVALS AND SPOT ELEVATIONS ARE MEASURED IN FEET.

FIGURE 1.3

SITE LOCATION MAP

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

Bernardino Baseline and Meridian (see Figure 1.3). Of the 4,800 acres included in the proposed site, 2,100 acres would be used for landfilling while the remainder would be used as buffer zone and support areas.

3. Land for the proposed action is currently under the ownerships of ATSF and the federal government, as administered by BLM. ATSF has initiated a process with BLM to secure needed properties within the project boundaries in exchange for other sections of land owned by ATSF, that are geographically removed from the proposed Bolo Station site (see Figure 1.4). BLM indicated no objection to Rail•Cycle filing a Conditional Use Permit (CUP) application with the County for the proposed landfill.

4. As the proposed landfill would require the exchange of federal lands, the proposed action also includes the following:

   - Amendment of the California Desert Conservation Area (CDCA) Plan to redesignate the permitted land use of one and one-half sections of federal land within the Bolo Station site.
   - Exchange in fee of surface and subsurface rights, including mineral rights, on two and one-half sections of federal land within the site for surface and subsurface rights on three sections of land owned by ATSF.
   - Granting of an approximate 800- by 2,640-foot right-of-way across federal property bordering Route 66 to provide access to the site.
   - Granting of an approximate 20- by 800-foot right-of-way across federal property to provide a power line easement to the site.

5. Rail•Cycle's proposed waste-by-rail system includes the following three primary components:

   - MRFs - While MRFs or transfer stations are not part of the proposed action addressed by this Draft EIR/EIS, MRFs are an important component of the Rail•Cycle waste-by-rail system. Up to seven MRFs may be constructed in urban areas of southern California to support the Rail•Cycle system by: (1) receiving non-separated and source-separated nonhazardous municipal solid waste, (2) identifying, separating, and segregating small quantities of hazardous waste that may be included in the waste stream, (3) separating recyclables, and (4) compacting and loading waste into containers for transport to the landfill.

     As specific MRFs or transfer stations are not part of the proposed action and are not discussed in detail in this Draft EIR/EIS, site-specific permitting and approval, including CEQA compliance, would be conducted for each MRF or transfer station.
   - Rail transport of solid waste in sealed intermodal-type containers on existing rail lines.
   - Solid waste disposal.

   These components are illustrated in Figure 1.5.

1.2 SUMMARY OF ALTERNATIVES TO THE PROPOSED ACTION

1. Alternatives to the proposed action are identified and analyzed in this Draft EIR/EIS in accordance with CEQA and NEPA guidelines. Alternatives include:

   - Cadiz Valley Alternative
   - Reduced Action Alternative
   - No Action Alternative

   Additional alternatives were considered, but eliminated from further analysis in this Draft EIR/EIS, as they were determined not to be feasible. A complete discussion of alternatives analyzed in this Draft EIR/EIS and those eliminated from further consideration is included in Chapter 3.0.

2. The preferred alternative identified by BLM is the proposed Bolo Station site with implementation of the various mitigation measures identified in Chapter 5.0 and summarized in this chapter.

1.2.1 CADIZ VALLEY ALTERNATIVE

1. The Cadiz Valley Alternative site is a five-square mile (3,200 acres) area located approximately ten miles southeast of the Bolo Station site, at the southern toe of the Ship Mountains (see Figure 1.2). The alternative site is situated in Township 4 North, Range 15 East, Sections 5, 8, 9, 16, and 17, San Bernardino Baseline and Meridian. Sections 5 and 9 are owned by Southern Pacific Land Company, a subsidiary of the Santa Fe Southern Pacific Corporation,

PIUTE VALLEY
OFFERED LANDS SITE
(SECTION 29
TOWNSHIP 13 NORTH
RANGE 19 EAST)

FENNER VALLEY
OFFERED LANDS SITE
(SECTION 13
TOWNSHIP 9 NORTH
RANGE 17 EAST)

CADIZ VALLEY
OFFERED LANDS SITE
(SECTION 33
TOWNSHIP 4 NORTH
RANGE 15 EAST)

PROJECT SITE

LEGEND

SELECTED LAND (BLM)

PRIVATE LAND

OFFERED LAND

0 8 16 MILES

SCALE

REFERENCE: U.S.G.S. STATE OF CALIFORNIA (SOUTH HALF)
COMPILED 1981, REVISED 1986.

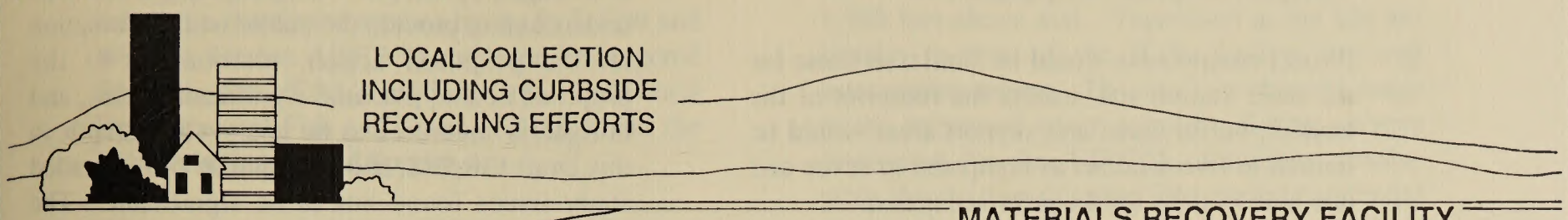
FIGURE 1.4

LOCATION OF LANDS OFFERED FOR EXCHANGE FOR ONSITE BLM LANDS

RAIL•CYCLE
BOLO STATION LANDFILL

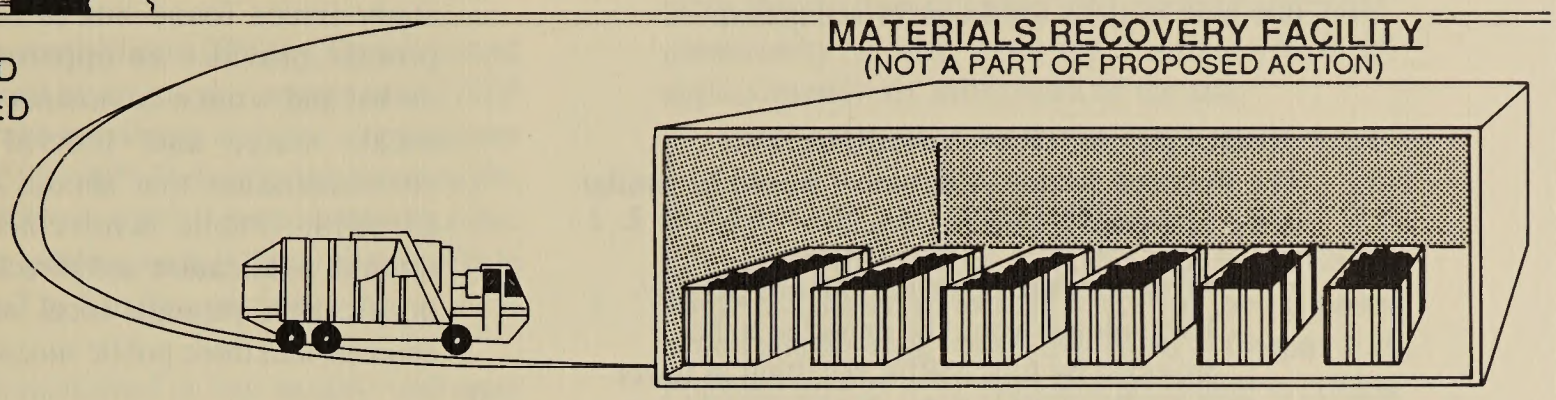
ENVIRONMENTAL SOLUTIONS, INC.

WASTE GENERATION
(NOT A PART OF PROPOSED ACTION)

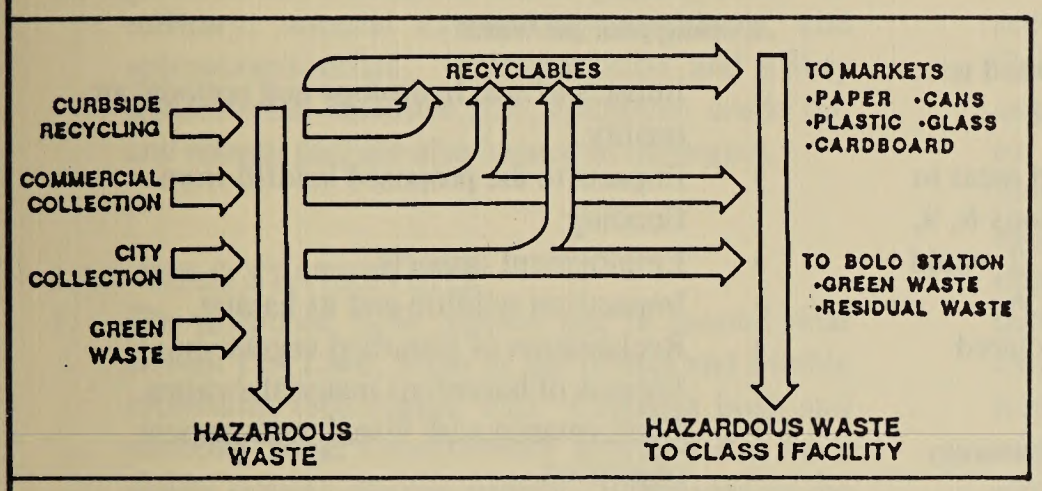


SEGREGATED AND UNDIFFERENTIATED WASTE STREAM TRUCKED TO MATERIAL RECOVERY FACILITY

MATERIALS RECOVERY FACILITY
(NOT A PART OF PROPOSED ACTION)



WASTE STREAM SUBDIVIDED



RECYCLABLES TO MARKETS

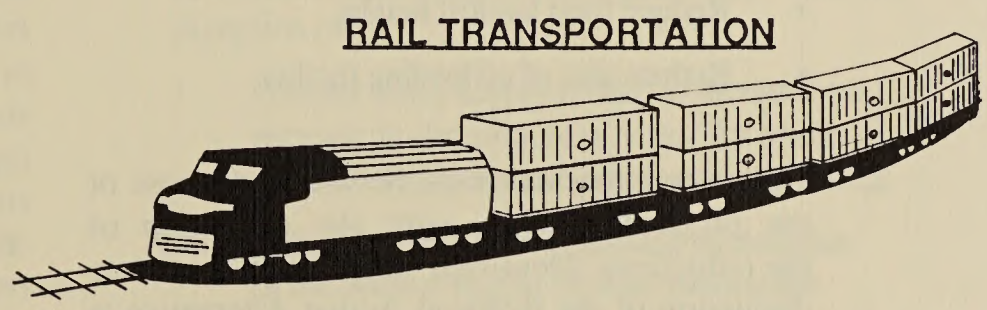
LOCAL MARKETS

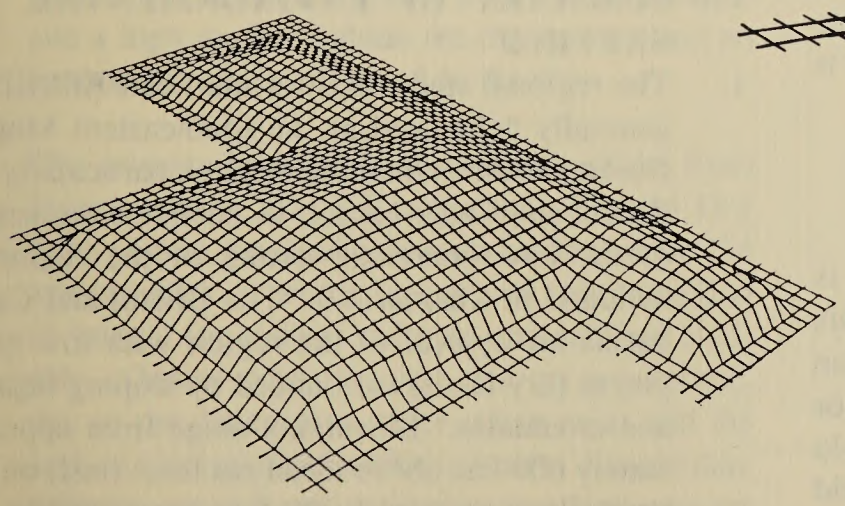
RESIDUAL WASTE

GREEN WASTE

RAILCAR LOADING

RAIL TRANSPORTATION





BOLO STATION LANDFILL
RESIDUAL WASTE DISPOSAL

FIGURE 1.5

WASTE-BY-RAIL SYSTEM SCHEMATIC

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

which is the parent company of ATSF. Section 8 is federal land managed by BLM, Section 16 is state land, and Section 17 is owned by Cadiz Valley Development Corporation.

2. Project components would be similar as those for the Bolo Station site, except the footprint of the landfill, buffer zone, and support areas would be limited to five sections as compared to seven and one-half sections for the proposed action.

1.2.2 REDUCED ACTION ALTERNATIVE

1. The Reduced Action Alternative would be similar to the proposed action but would:

   - Accommodate up to 12,000 tons per day. This volume would be expected to be provided by four MRFs, resulting in fewer trains (four waste laden trains per day versus seven from the proposed action).
   - Maximum landfill life would be limited to 40 years versus 60 to 100 years.
   - Reduce landfill footprint and support areas to a maximum of five sections. Sections 8, 9, and the western one-half of Section 22 would be eliminated from the project site. A right-of-way from BLM would be required for access across Section 8.
   - Reduce subsurface excavation in preparation for landfilling.
   - Reduce final landfill height.
   - Reduce size of offloading facility.

2. Project components would be similar to those of the proposed action, with the exception of the reductions identified above. A complete discussion of the Reduced Action Alternative is included in Chapter 3.0.

1.2.3 NO ACTION ALTERNATIVE

1. Consideration of the No Action Alternative is required by both NEPA and CEQA. If this alternative were implemented, the proposed action would not be developed and no potential for environmental impacts would occur at the Bolo Station or Cadiz Valley Alternative sites. Solid waste proposed to be landfilled at Bolo Station would still require disposal at other sites.

1.3 PUBLIC SCOPING PROCESS

1. A public scoping process for the proposed action was initiated by BLM, as required by NEPA and as encouraged by CEQA. This scoping process was undertaken to provide the public with information on the proposed action, alternatives to the proposed action, potential significant effects, and mitigation measures to be analyzed in depth in this Draft EIR/EIS, and to eliminate from detailed study issues found not to be significant. The process provides an opportunity for receipt of verbal and written comments from the public and local, state, and federal agencies as to concerns/issues that should be included in the EIR/EIS. Public involvement was encouraged through publication and direct mailing of notices, notification through local and regional media sources, and three public meetings.

2. The primary issues of concern raised through the scoping process were:

   - Impacts to area hydrology and regional air quality.
   - Impacts to the proposed landfill from flooding.
   - Employment impacts.
   - Impacts on wildlife and its habitat.
   - Reclamation of disturbed vegetation.
   - Impacts of hazardous materials/wastes.
   - Conformance with visual management objectives.
   - Land use designation and compatibility with adjacent properties.
   - Impacts to accessibility of mineral resources on or adjacent to the proposed landfill.

1.4 SUMMARY OF ENVIRONMENTAL SETTING

1. The regional study area for the Draft EIR/EIS is generally delineated as the southeastern Mojave Desert in San Bernardino County, particularly the Bristol and Cadiz basins. A complete discussion of the environmental setting of the region is included in Chapter 4.0. The Bristol and Cadiz basins are typical of the region with low-lying playas (dry lakes) surrounded by sloping bajadas and mountains. Elevations range from approximately 600 feet above mean sea level (msl) on the basin floor, to over 5,000 feet above msl in the surrounding mountains.

2. Vegetation and wildlife species in this region are generally wide-ranging and commonly found throughout the Mojave Desert. The region is within the range of the desert tortoise which is listed as a threatened species by the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act (ESA), and by the California Department of Fish and Game (CDFG) under the California Endangered Species Act.

3. Climate in the southeastern Mojave Desert is arid and characterized by warm, dry summers and mild winters. Average maximum daytime temperatures range from 45° to 60° F during winter months, and between 90° to 110° F in summer months. Rainfall in the project area is low, ranging from approximately 2 to 5 inches per year.

4. Land use is characterized as low density, and open space prevails. Activities in the region include the military, mineral extraction, agriculture, and recreation/tourism. Transportation and utility transmission facilities (i.e., electrical, crude oil, and natural gas) are also located in the region.

1.4.1 BOLO STATION SITE

1. The proposed Bolo Station site is located near Bristol Dry Lake, south of the Bristol and Marble mountains (see Figure 1.2). ·Creosote bush and saltbush scrub communities exist on the site's gently sloping alluvial surface. Elevations on the site range from 610 feet to approximately 935 feet above msl. This site is characteristic of a desert environment, with sandy soils and sparse vegetation. Wildlife observed or expected to occur are typical of the surrounding region. Although the site is within the range of the threatened desert tortoise, the BLM and USFWS do not consider the site a high quality habitat for the species and no tortoise have been observed on the site.

2. The primary land use in the vicinity of the Bolo Station site is mineral extraction. Bristol Dry Lake adjoins the southwestern boundary of the site and provides an active mining area (via extraction of brines) for sodium chloride and calcium chloride. Onsite recreation and tourism are limited, due to the distance to major urban areas and the lack of recreational facilities or uses. Residential, military, agricultural, and wilderness land uses are located five or more miles away.

1.4.2 CADIZ VALLEY ALTERNATIVE SITE

1. The Cadiz Valley Alternative site is located immediately south of the Ship Mountains, with elevations ranging from approximately 660 feet to 1,580 feet above msl. Vegetation at the site are similar to that of the Bolo Station site and surrounding region. The site is within the range of the threatened desert tortoise. During surveys conducted for this EIR/EIS, numerous tortoise were observed on this site. The closest residential community is the town of Cadiz, which is approximately six miles west of the site.

1.5 SUMMARY OF POTENTIAL ENVIRONMENTAL CONSEQUENCES

1. Anticipated environmental effects of the proposed action and alternatives are evaluated in Chapter 5.0. Potential effects were evaluated according to criteria for significance established in the beginning of each section and based on Appendix G of the CEQA Guidelines and other appropriate criteria established as part of this Draft EIR/EIS. Mitigation measures to reduce or eliminate the impacts are also identified. These potential impacts, mitigation measures, and significant unavoidable adverse impacts are summarized in Table 1.1. This table outlines the major findings and conclusions of the evaluations for significant impacts. Based on the potential impacts identified and mitigation measures incorporated, it was found that potential environmental effects of the proposed action could be reduced below a level of significance with the exception of:

   - Ground water supply related to incremental increase in the amount of water for onsite use withdrawn from an aquifer in overdraft.
   - Air quality related to continued exceedance in the project region of state particulate matter less than 10 microns in aerodynamic diameter (PM_{10}) standards, and the production of oxides of nitrogen (NO_x) and reactive organic gases (ROG) emissions in a nonattainment area for ozone.
   - Visual quality as a result of permanent alteration of the basin floor's natural topography, and in the development of a long-term industrial activity in the project area, which changes the passive character of the site. Incompatibility with the Open Space Element (scenic resources) of the County General Plan.

TABLE 1.1

SUMMARY OF IMPACTS, MITIGATION MEASURES, AND UNAVOIDABLE ADVERSE IMPACTS

ENVIRONMENTAL ISSUE	IMPACTS[1]			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS[2]
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
GEOLOGY AND SOILS					
• Seismic Hazard	• Maximum probable earthquake at the site may result in accelerations up to 0.09g due to movement on the Ludlow Fault. No known faults trend through or toward the site.	• Maximum probable earthquake at the site may result in accelerations up to 0.05g due to movement on the Ludlow Fault. No known or mapped faults or lineaments trend through or towards the site. Potential for seismic settlement, differential compaction, or liquefaction is very low. Some rock fall may occur from steep slopes.	• Same as proposed action.	• Structures onsite will be engineered and constructed per the Uniform Building Code to withstand the maximum probable acceleration with little or no damage. • A post-earthquake inspection plan will be developed. Damage incurred during a seismic event will be mitigated as soon as practical after the event.	• None.
• Subsidence	• Total ground settlement of up to 14 feet may occur in underlying soils. Additional ground settlement may occur from ground water withdrawal. Settlement may result in disruption of the liner system and leachate collection system. • Landfill settlement within the waste prism is anticipated to occur at a rate of 10 percent by height and 6 percent by volume, and could result in disruption of the landfill gas collection system and integrity of the final cover.	• Unknown, no subsurface studies conducted. Expected to be less than Bolo Station site due to placement of site on coarse, dense, cohesionless soil where depth to ground water is greater than 50 feet.	• Similar, but less than the proposed action, as less waste loading will be applied.	• Excavation prior to landfilling will be based on the natural ground water elevations and will be designed to offset the expected ground settlement while maintaining a minimum separation of 5 feet between waste and ground water. • A monitoring plan will be developed to evaluate whether the leachate and landfill gas collection systems are operating efficiently.	
• Collapsible/Expansive Soils	• Collapsible or expansive soils may exist within the upper 20 feet of soil.	• Unknown, no subsurface studies conducted.	• Same as proposed action.	• No mitigation required regarding collapsible/expansive soils. The upper 20 feet will be removed in preparation for landfilling and no significant impact is expected, therefore no mitigation required.	
• Volcanic Hazard	• Site is located seven miles west of Amboy Crater, an area of potential volcanic activity that could impact the proposed site.	• Site is located ten miles from Amboy Crater. Potential hazard would be less than for the Bolo Station site.	• Same as proposed action.	• The probability for renewed activity of the volcano is very low, and should not impact the site, therefore no mitigation is required.	

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TABLE 1.1

SUMMARY OF IMPACTS, MITIGATION MEASURES, AND UNAVOIDABLE ADVERSE IMPACTS
(Continued)

ENVIRONMENTAL ISSUE	IMPACTS[1]			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS[2]
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
MINERAL RESOURCES					
• Brines	• In the event ground water contamination occurred, it could impact the Leslie Salt operations. • Dust and other airborne contaminants generated by the project may contribute to impurities in the salt evaporation tanks.	• In the event ground water contamination occurred, it is unlikely that the brines would be impacted, as the distance and ground water gradient provide adequate time to implement a corrective action program. • Similar impacts from dust and airborne contaminants may occur to salt evaporators on Cadiz Lake.	• Same as proposed action.	• The composite liner system, leachate collection system, landfill gas collection system, and final cover are designed to prevent contamination to underlying ground water. In the event that contamination occurs, ground water and landfill gas monitoring systems will be designed to detect contamination, as soon as practical. If water quality protection standards are exceeded, Rail•Cycle is required to implement a corrective action program to remediate the affected ground water. • In the event that ground water contamination occurred that rendered the brine useless or unprofitable, the following mitigation measures would be implemented: - A corrective action program. - A financial assurance program, funded by Rail•Cycle, to pay entities involved, including the federal government for increased purification costs or loss of a mineral resource. • Dust and other airborne contaminants which could potentially impact the salt evaporators will be controlled by frequent watering of unpaved roads and working areas, and operation of a landfill gas collection system.	• None
• Other Potential Minerals	• No rare, unique, or regionally significant mineral resources exist onsite. Access to sand and gravel deposits existing onsite will be eliminated, although these materials will be used for daily cover to the degree possible.	• Portions of Sections 5, 8, and 17 are included in an area considered to have potential uranium and/or thorium deposits. However, no field studies have been done to verify that economic deposits exist.	• Similar to proposed action, although slightly reduced due to smaller landfill footprint.		

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SUMMARY OF IMPACTS, MITIGATION MEASURES, AND UNAVOIDABLE ADVERSE IMPACTS
(Continued)

ENVIRONMENTAL ISSUE	IMPACTS(1)			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS(2)
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
HYDROLOGY					
• Drainage	• Existing surface drainage patterns result in surface flow across the site. If the surface flow is not controlled and diverted, landfill facilities and operations would be impacted. • Alteration of the existing drainage patterns onsite and downgradient of the site will occur. This will result in concentration and channelization of the surface flows, and increased erosion in the flow pathway.	• Similar to proposed action.	• Same as proposed action.	• An earthen drainage channel will be constructed to intercept and divert the stormwater to the 150-foot wide perimeter drainage channel system along the east and west boundaries of the proposed landfill. This channel will collect water flowing south of the railbed, redirect it around the perimeter of the landfill, and discharge it from the south side of the site. This channel will also intercept sheet flow runoff from the unloading area and railyard, and other nonlandfill areas adjacent to the channels. Each channel will be designed to carry the flow expected during the 100-year, 24-hour storm event. • A sedimentation basin and energy dissipators will be installed at the discharging end of the drainage channels to reduce flow velocity and resulting erosion. • Drainage structures will be inspected and maintained on a regular basis. • Surface runoff from the active working area will be collected via temporary diversion ditches which will be constructed around each module or cell during the period it remains open for landfilling. Stormwater runoff will be diverted to an unlined collection sump and reused for dust control within the active work area only. The sump will be designed to hold runoff from the 100-year, 24-hour storm event. If overfilling or erosion damage occurred, the sump would immediately be restored and enlarged as required.	• Extraction of an additional annual average of 75 acre-feet of water will be a significant unavoidable adverse impact if the aquifer is currently overdrafted.
• Surface Water Contamination	• Surface water contamination may occur from discharge of stormwater which has become contaminated onsite.	• Similar to proposed action.	• Same as proposed action.		
• 100-Year Floodplain	• A small portion of the southwest corner of the landfill is located in the 100-year floodplain. Final design of the landfill will exclude landfilling in areas potentially affected by the 100-year floodplain.	• No impact; not located in the 100-year floodplain.	• Same as proposed action.		
• Ground Water Supply	• Approximately 75 acre-feet of water will be extracted from an aquifer which may already be in overdraft.	• No impact, aquifer is not expected to be in overdraft.	• Same as proposed action.		
• Ground Water Impairment	• Ground water impairment may result from a leak in the liner (leachate) or landfill gas migration through the liner.	• Similar to proposed action.	• Same as proposed action.		

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(Continued)

ENVIRONMENTAL ISSUE	IMPACTS[1]			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS[2]
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
HYDROLOGY (Continued)				• Stormwater discharges will require an NPDES permit. This permit will require regular testing of the perimeter drainage channels and retention ponds to insure stormwater discharged to the playa does not contain contaminants. Mitigation measures required by the NPDES permit will be implemented. • Drainage structures will be inspected and maintained on a regular basis. • The collection basin for surface runoff from the active working area shall be lined. • To reduce the quantity of water required by the proposed action: - Low-flow plumbing fixtures will be installed in all onsite facilities. - Washwater from cleaning waste containers will be collected, treated, and reused for container washing. - Surface runoff collected from the landfill will be retained in the sedimentation basin, and if necessary, treated and used for dust control. • If further analyses indicate that withdrawal of ground water is significantly affecting either the quantity of water available to the Leslie Salt wells, or the concentration of the brines at those wells, Rail•Cycle shall either reduce the pumping rate of its well until the impact is reduced to a less than significant level, or relocate its well to a location which shall not impact the Leslie Salt wells.	

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(Continued)

ENVIRONMENTAL ISSUE	IMPACTS[1]			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS[2]
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
HYDROLOGY (Continued)				• The single-liner system will be upgraded to a double-liner system. This double-liner system will include two leachate collection systems. • If leachate or landfill gas generated by the proposed action is determined to be contaminating ground water, a corrective action program will be developed and implemented.	
VEGETATION	• 2,700 acres of vegetation will be lost or disturbed.	• Similar to proposed action.	• Similar to proposed action, but would reduce acreage disturbed to 2,380 acres.	• Landfill cells will be revegetated during the final closure of each cell. Approximately 2,400 acres will be revegetated over the 60- to 100-year life of the project. • A native plant seed mixture will be used for revegetation. • Areas on which no project related facilities are to be located will be protected and avoided during construction and operations. • Construction and operational vehicles will be restricted, to the degree possible, to paved roads or designated unpaved roads. • Construction support yards will be restricted, to the degree possible, to areas disturbed by previous construction activities.	• None.

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(Continued)

ENVIRONMENTAL ISSUE	IMPACTS(1)			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS(2)
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
WILDLIFE	• The landfill may attract ravens, which prey on desert tortoises. • Kit fox, a species of concern to state biologists, may be impacted. • Project will result in 2,700 acres of lost native habitat, causing wildlife to relocate. • Noise, light, and increased traffic are not expected to impact wildlife. • Potential illegal collection of desert tortoise by landfill employees or visitors.	• The protected desert tortoise species has been identified onsite. Approximately 80 tortoises may be affected by implementation of the project. • Kit fox natal dens are also known for the site. The level of impact to these species would not be expected to be significant. • Bighorn sheep in the Ship Mountains may be impacted by operation of a landfill at the alternative site. • Project will result in 2,700 acres of lost native habitat, causing wildlife to relocate.	• Similar to proposed action, but acreage decreased to 2,380 acres of disturbed land.	• Construction Phase: - An education program regarding the desert tortoise will be developed for construction employees. - A regional raven study and monitoring program will be initiated and baseline data on raven concentrations, densities, feeding patterns, and nesting areas will be recorded. - Vehicle speeds will be restricted to under 20 mph (15 mph for trucks) during tortoise activity periods. - The working area of the site will be fenced prior to construction to preclude offsite tortoises from moving onto the site. Fences should be designed to discourage perching by ravens. - Kit foxes found onsite would be relocated to similar offsite environments. - As a precaution, initial land clearance prior to construction along the access road will be monitored by a qualified desert tortoise biologist or person trained by a qualified biologist. - If necessary, relocation of tortoises will proceed using state-of-the-art techniques, under the supervision of a qualified desert tortoise biologist. Tortoises will be relocated adjacent to the site boundary (north and east) with more favorable habitats during appropriate weather conditions. - Tortoises sighted by construction workers will be relocated appropriately.	• None.

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ENVIRONMENTAL ISSUE	IMPACTS[1]			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS[2]
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
WILDLIFE (Continued)				• Operations Phase: - An education program regarding the desert tortoise will be developed for landfill employees. - The regional raven study and monitoring program will continue with periodic monitoring to establish if changes are occurring. Changes that would adversely affect protected wildlife species will be remedied with mitigation measures developed in consultation with BLM and USFWS. - During the life of the facility, tortoises found onsite will be removed from danger and relocated under the supervision of a qualified desert tortoise biologist. - Fencing and facility operations will be designed such that waste does not blow out of the facility. Exposed waste or surface impoundments will have nylon lines or other approved methods to deter avian predators. - Vehicle speeds on access roads will be restricted to under 20 mph (15 mph for trucks) during tortoise activity periods. - Landfill cells will be revegetated during the final closure of each cell, minimizing the impact of onsite habitat loss.	

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ENVIRONMENTAL ISSUE	IMPACTS[1]			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS[2]
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
AIR QUALITY	• PM_{10} emissions would contribute to 24-hour and annual standard exceedances, as SEDAB is currently nonattainment for PM_{10}. • The project would emit NO_x and ROG, which are precursors to O_3 and therefore contribute to the existing O_3 exceedances. SEDAB is already a nonattainment area for O_3.	• Similar to proposed action.	• Same as proposed action.	• Permanent onsite roadways will be paved to minimize fugitive dust emissions. • A miscellaneous crushed base will cover unpaved roadways to minimize fugitive dust emissions. • Unpaved roadways will be sprayed regularly with water and chemical dust suppressants to minimize fugitive dust emissions. • Chemical binding agents will be applied to cover stockpiles to minimize wind erosion emissions. • Completed landfill cells will be revegetated to minimize wind erosion emissions. • Construction sequence will be designed to minimize double handling of cover soils. • Low-sulfur diesel fuel of 0.05 percent will be used to minimize SO_2, a (PM_{10} precursor) emissions. • Operation of a landfill gas collection system and associated landfill gas flare to minimize ROC/toxic air contaminant emissions. • Use of locomotives to transport waste as opposed to trucks. • Daily cover or an alternative daily cover, as permitted, will be placed over the compacted in-place waste during the day and over the working face at the end of each day to control odors. • Heavy-duty diesel operational equipment, which meets or exceeds state and federal emission standards applicable at the time of equipment acquisition, will be used (based on equipment availability).	• PM_{10} emissions, although reduced by mitigation measures, cannot be entirely mitigated. As the SEDAB is currently nonattainment for PM_{10}, any additional contribution to existing PM_{10} emissions will be a significant unavoidable adverse impact. • NO_x and ROG emissions, although reduced by mitigation measures, cannot be entirely mitigated. As the SEDAB is currently nonattainment for O_3, any additional contribution to existing O_3 precursors will be a significant unavoidable adverse impact.

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	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
AIR QUALITY (Continued)				• Ridesharing and vanpool programs will be implemented where feasible. • High combustion efficiency/ low-NO_x flare will be used to minimize O_3 precursor emissions. The flare would be replaced as the project matures by a gas turbine and then a steam boiler, both capable of producing electricity. • Emission offsets may be required for future site activities such as installation of a gas control flare or energy recovery facility.	
PUBLIC HEALTH AND SAFETY • Fire	• In the event a surface fire occurred (which is considered very unlikely) the following impacts could result: - Burn injuries and smoke exposure. - Loss of life. - Release of toxic emissions. - Structural and machinery damage. • In the event a subsurface fire occurred (which is considered very unlikely), the following impacts could result: - Accelerated or sudden settling of the landfill surface in the vicinity of the fire. - Venting of smoke through the cover material, which may emit various volatile and toxic compounds.	• Same as proposed action.	• Same as proposed action.	• Rail•Cycle will comply with state and federal procedures to provide prevention of and response in the event of potential fires. • Rail•Cycle will include provision of facilities for fire, and paramedic including trained response personnel and equipment including reserve water supply for firefighting. • MRFs (including potential transfer stations) will provide primary inspection to screen for hazardous and other unacceptable wastes. Receipt of wastes from facilities which do not provide prescreening for hazardous wastes will be restricted. Procedures and training for screening local inbound waste will be implemented to preclude landfill disposal of hazardous wastes, and minimize accidental exposure to workers and other persons.	• None.

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ENVIRONMENTAL ISSUE	IMPACTS[1]			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS[2]
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
PUBLIC HEALTH AND SAFETY (Continued)					
• Hazardous Waste	• Small quantities of hazardous waste may be deposited in the landfill. • The handling, storage, and use of diesel fuels, lubricating oils, hydraulic fluids, and waste oils for recycling present a potential hazard.	• Same as proposed action.	• Same as proposed action.	• The small percentage of hazardous waste that would potentially be included in the waste stream is not expected to create a significant health or safety risks. • A temporary hazardous waste storage area will be sited, designed, and constructed pursuant to CCR Title 22.	
• Nuisance Vectors, Litter and Odors	• No significant impacts due to nuisance vectors, litter, and/or odors are expected from the proposed action.	• Same as proposed action.	• Same as proposed action.	• Compliance with state and federal material/waste exposure or disposal will reduce potential impacts to less than significant levels. • Compliance with the requirements of 40 CFR 112, and the California Health and Safety Code Chapter 6.67 of Division 20, including preparation of implementation of a SPCC plan and design, construction, and operation of facilities in accordance with the Oil Pollution Action of 1990, NFPA guidelines, Uniform Fire Code and API guidelines, will be implemented during design, construction and operation of the proposed action.	

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ENVIRONMENTAL ISSUE	IMPACTS[1]			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS[2]
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
PUBLIC HEALTH AND SAFETY (Continued)				• Preparation of site-specific community and employee right-to-know programs. • Design features shall be implemented to minimize operational spills and drips, and to collect spills and drips that occur for recovery and recycling. Fuel unloading equipment and onsite storage tanks that unload from the top to prevent spills will be used/installed. Track collection pans shall be installed to contain smaller spills and leaks. • SPCC plans shall include prevention and response for small spills and leaks that can occur during mobile equipment fueling. • Areas or locations for storage of various lubricating oils, hydraulic fluids, and waste oils for recycling shall be designed and operated in accordance with an SPCC plan. Areas shall be properly signed, fenced, and constructed on a concrete pad with proper containment. • Controls including, but not limited to, litter and security fencing, litter policing and inspection, and response to vector problems will be implemented to minimize nuisance vectors, litter, and odors.	
VISUAL RESOURCES	• During the 60- to 100-year operational life of the landfill, the visual qualities of the site will be impacted resulting in the proposed action not being compatible with the Open Space Element of the County General Plan.	• Similar to proposed action. Viewshed from the Cadiz Dunes would also be degraded.	• Same as proposed action, but of reduced areal extent and operating life.	• The final surface will be contoured in an undulating pattern so as to blend with surrounding topography. • The final surface will be revegetated for runoff control and to enhance visual blending with the surrounding area.	• The proposed action will not be compatible with the goals and policies of the Open Space Element (scenic resources) of the County General Plan.

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	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
VISUAL RESOURCES (Continued)	• The presence of the landfill and associated facilities and operations would substantially change the visual character of the site. • The construction and operation of the landfill will contribute to degradation of the Bristol Basin viewshed by changing the character of the site from passive to active use, with notable vehicle/rail movement and dust emissions. This impact would be reduced when the landfill closes. • Illumination of the night sky from nighttime landfill operations.			• Procedures to prevent illegal dumping will be established and enforced. • Procedures to minimize the presence of litter on the operating landfill will be established and enforced. • Onsite lighting will be directed inward and downward to minimize offsite illumination. • Onsite lighting will be shielded. • Dust control measures will be rigorously maintained to minimize emission of fugitive dust.	• The presence of the landfill will permanently change the visual character of the site, due to the establishment of an artificial mound on the flat desert floor and long-term, industrial activity in a rural portion of the desert. The illumination of the night sky will also change the visual character of the desert locale. These are considered significant unavoidable adverse impacts.
CULTURAL RESOURCES	• One of the 22 onsite cultural resources has been determined to meet the criteria for eligibility to the NRHP. This site, SBr-2910H, is a segment of the National Old Trails Road (1914-1943). This site will be affected by the proposed access road but a no adverse effect determination has been recommended by an "adaptive reuse" of the road. The BLM will consult with the SHPO and the ACHP as required by Section 106 of the National Historic Preservation Act.	• Unknown - The siting and operation of a landfill and associated facilities has the potential to adversely impact significant cultural resources which are as yet unknown.	• Same as proposed project.	• Construction and operations personnel will be briefed on the no collection policy for cultural resources situated both onsite and offsite. • Information on prehistoric and historic land use of the project area will be included in interpretive displays at the visitor's center. • An archaeological monitor will be present during grading and construction of the access road. • If necessary, a BLM-approved treatment plan will be developed and implemented.	• None.

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	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
PALEONTOLOGICAL RESOURCES	• Land-altering activities, both surface and subsurface, have the potential to disturb or destroy significant paleontological resources, if present. • Increased human presence, through establishment of a large onsite work force, could facilitate the recreational collection of significant fossils, which would destroy their scientific value. • Improved access to the site vicinity, through establishment of the access road from Route 66, could facilitate the recreational activities by the public, including fossil collection, in the near vicinity of the site and elsewhere in the basin accessible by the network of dirt roads.	• Impacts would be similar to the proposed action, based on archival data and a literature review.	• Impacts would be similar to the proposed action, but on a lesser scale.	• Resource evaluation will be conducted that includes known onsite resource localities and prioritizing significant sites. • Field salvage which consists of: - Intense inspection and removal of fossil sources at the most significant localities observed during previous field assessment. - Excavation monitoring to identify areas likely to contain significant paleontological resources. • Compliance will include identifying, curating, and permanently housing recovered fossils, and providing a report that indicates a paleontological resource mitigation program has been completed. • Construction and operations personnel will be briefed as to the proper procedures when working with a paleontological monitor and when fossils are discovered in an unmonitored situation. They will also be briefed on the no collection policy for paleontological resources. • Management will have adequate work-around plans, so work can be continued unimpeded away from a paleontological discovery site.	• None.

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PALEONTOLOGICAL RESOURCES (Continued)				• Information on paleontology of the site and region will be included in interpretive displays at the visitor's center as part of a Public Information Program. This display will also include signs advising of the provisions of the Antiquities Act of 1906 and FLPMA.	
TRANSPORTATION					
• Highways	• Additional traffic on roads.	• Similar to the proposed action, but Cadiz Road would have to be surfaced in unpaved areas before project construction could begin.	• Similar to the proposed action, but with a smaller increase in traffic volumes.	• Turning lanes will be developed on Route 66 at entrance to site. • Maintenance and repair, as necessary, to Kelbaker Road and Route 66 from Kelbaker Road to the landfill entrance.	• None.
• Railways	• At full capacity (21,000 tons per day of waste), 14 one-way train trips per day, six days a week would be added to existing rail traffic. This would result in a 24 percent increase in the hazard index over non-project related values. It would also result in an additional 554-vehicle hours of delay (37 percent increase) over delays without the project.	• Similar to proposed action.	• Similar to the proposed action but with smaller increases in the hazard index and delays. Only eight one-way trains would be utilized, rather than 14. The hazard index would increase 16 percent over nonproject-related values and a 28 percent increase in delay time would occur.	• A Rail•Cycle sponsored ride sharing or busing program from areas where large numbers of employees reside will be implemented. • Trains will be scheduled to operate in urban areas during late night or early morning hours. • Coordination with the PUC will continue to evaluate and coordinate grade crossing improvements.	
NOISE					
• Railroad Corridors	• Noise levels along railroad corridors will increase. Average increases in Ldn are below or very near 3 dB, which is identified as the significant threshold.	• Similar to proposed action.	• Similar to proposed action, but slightly less.	• None identified. The recommended Ldn for residential development is not exceeded at distances of 800 feet.	• None.

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NOISE (Continued)					
• Landfill Operations	• Noise levels will increase due to landfill, offloading, and related operations. • Equipment operators onsite may experience excessive noise levels during working hours.	• Similar to proposed action.	• Similar to proposed action, but slightly less.	• Onsite structures with noise contours exceeding 65 dBA (400 to 500 feet from landfill and 100 to 200 feet from offloading facility) will be designed for appropriate noise attenuation. • An employee hearing protection program will be established which will specifically address equipment operators and other personnel working on or near heavy equipment.	
LAND USE					
• Consistency with Plans and Policies	• The County General Plan will have to be amended to assign appropriate land use designation for the proposed landfill. • The proposed action will not be compatible with the Open Space Element (mineral resource production and scenic resources) of the County General Plan. • The proposed action will result in a change in the land use of the site from limited use (Resource Conservation District) to intensive use for a period of 60 to 100 years.	• Same as proposed action.	• Same as proposed action.	• As the site of the proposed action is not addressed in the adopted CoSWMP, its approval would be based on compliance with AB 2296. If approved, the 1994 CoIWMP would reflect the selected site. • The County General Plan will be amended to reflect the proposed action. • The project will be subject to a CUP. • Construction activities will be subject to development requirements and review by the County Building and Safety Department.	• The proposed action represents a major modification of rural "limited use" to a intensive land use that is not compatible with the land use classification of Resource Conservation. • The proposed action will not be compatible with the Open Space Element (mineral resource production and scenic resources) of the County General Plan.
• Compatibility with Existing and Future Land Uses	• The proposed action will result in a significant change in the land use of the sites from limited to intensive.	• Same as proposed action.	• Same as proposed action.	• Solid waste disposal activities will be monitored by the SBCDEHS.	
• Land Exchange	• No significant impact.	• No significant impact.	• No significant impact.	• A land exchange in fee will occur consistent with BLM regulations and policies.	

(1) The No Action Alternative was not included in this table, as there will not be any impacts associated with this alternative.
(2) For purposes of CEQA, a statement of overriding considerations is required for any significant unavoidable adverse impacts. While NEPA does not have a similar requirement, this information will be useful to the decision makers during preparation of the Record of Decision for the EIS.

TABLE 1.1

SUMMARY OF IMPACTS, MITIGATION MEASURES, AND UNAVOIDABLE ADVERSE IMPACTS
(Continued)

ENVIRONMENTAL ISSUE	IMPACTS[1]			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS[2]
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
SOCIOECONOMICS					
• Employment	• Employment demand would increase. The project would employ up to 262 personnel for construction and 267 for operation of the landfill. An additional 167 indirect jobs would be associated with the proposed action.	• Similar to proposed action.	• Similar to proposed action, but at a lesser scale during operations due to reduced daily waste delivery and shortened life span of facility.	• Rail•Cycle will hire from the local labor force to the extent possible so that personnel requirements would have a positive effect on local employment. • To the extent practicable, Rail•Cycle will retain the temporary construction personnel for permanent landfill employment positions. • Rail•Cycle shall implement an ongoing training program so that persons initially hired for basic positions would be able to improve their skills and their employment status.	• Increased employment and population would accelerate consumption of local land and water resources and is a significant unavoidable adverse impact.
• Population	• Population of the area is expected to increase by up to 668 people, due to direct employment opportunities, and an additional 250 people due to indirect employment.	• Same as proposed action.	• Similar to proposed action, but at a lesser scale during operations due to reduced employment or shortened life span of the facility.	• Rail•Cycle will hire construction workers from the local labor force to the extent possible to minimize the effect that temporary project construction requirements would have on local population fluctuations. • Rail•Cycle will hire landfill and train operations personnel from the local labor force to the extent possible to minimize the effect of the proposed action on local population growth. • To the extent practicable, Rail•Cycle will hire permanent operations personnel from the construction work force to minimize the number of workers and their families who move to the area.	

(1) The No Action Alternative was not included in this table, as there will not be any impacts associated with this alternative.
(2) For purposes of CEQA, a statement of overriding considerations is required for any significant unavoidable adverse impacts. While NEPA does not have a similar requirement, this information will be useful to the decision makers during preparation of the Record of Decision for the EIS.

TABLE 1.1

SUMMARY OF IMPACTS, MITIGATION MEASURES, AND UNAVOIDABLE ADVERSE IMPACTS
(Continued)

ENVIRONMENTAL ISSUE	IMPACTS[1]			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS[2]
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
SOCIOECONOMICS (Continued)					
• Housing	• It is expected that approximately 76 housing units will be required in the Morongo Basin area, and 76 housing units will be required in the Barstow vicinity. The virtual lack of available housing in the Morongo Basin communities will require new housing to be built or locations made available for RVs and trailers. Barstow housing stock is expected to be sufficient to meet project needs. Additional housing units will be needed for indirect employee housing - up to 38 in the Morongo Basin and 46 in the Barstow vicinity.	• Same as proposed action.	• Similar to proposed action, but at a lesser scale during operations due to reduced employment or shortened life span of the facility.	• A condition of construction and operations contracts will be that contractor personnel live in approved housing only.	• The establishment of additional housing in the project area would introduce a concentration of population that currently does not exist and is a significant unavoidable adverse impact.
• Public Services					
- Schools	• An additional three to four classrooms and three to four more personnel would be required at the elementary school.	• Same as proposed action.	• Similar to proposed action.	• Impacts to schools will be mitigated through school districts constructing additional classroom space.	• None.
- Health Services	• No health services are currently available in the immediate project area.	• Same as proposed action.	• Similar to proposed action	• None identified.	• None.
- Police and Firefighting	• Additional population would significantly increase the demands on police and firefighting services of the area.	• Same as proposed action.	• Similar to proposed action	• A fire/paramedic station will be established in the vicinity of the project area and Rail•Cycle will contribute to a fund for its construction, equipment, and staffing.	• None.

(1) The No Action Alternative was not included in this table, as there will not be any impacts associated with this alternative.
(2) For purposes of CEQA, a statement of overriding considerations is required for any significant unavoidable adverse impacts. While NEPA does not have a similar requirement, this information will be useful to the decision makers during preparation of the Record of Decision for the EIS.

TABLE 1.1

SUMMARY OF IMPACTS, MITIGATION MEASURES, AND UNAVOIDABLE ADVERSE IMPACTS
(Continued)

ENVIRONMENTAL ISSUE	IMPACTS[1]			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS[2]
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
SOCIOECONOMICS (Continued)				• In compliance with the County Fire Code, 180,000 gallons of water will be reserved for firefighting purposes. • Fire extinguishers will be located throughout the project site. • Fire hydrants and hoses will be located to service facilities. • Stored materials will be identified as to their risk of fire, and adequate and proper containment will be used. • Water trucks and tankers utilized in the landfill operation will be available to support the dedicated fire engine, if needed. • Buildings and structures will be designed to meet fire prevention standards required by the County Fire Marshall.	
- Solid Waste Disposal	• Increased populations may require a more formalized disposal program than currently exists.	• Same as proposed action.	• Same as proposed action.	• A solid waste disposal system will be established at the project site to assure appropriate disposal.	• None.
- Utilities	• Requirements for utilities service are expected to exceed existing capacity of facilities. This includes telephone, natural gas, and electric power.	• Same as proposed action.	• Same as proposed action.	• Telephone service will be established at the project site to serve the landfill. • Low sodium lighting shall be used onsite where possible. • A potable water supply and distribution system will be established at the project site to serve the needs of landfill personnel, contractors, and visitors.	• None.

(1) The No Action Alternative was not included in this table, as there will not be any impacts associated with this alternative.
(2) For purposes of CEQA, a statement of overriding considerations is required for any significant unavoidable adverse impacts. While NEPA does not have a similar requirement, this information will be useful to the decision makers during preparation of the Record of Decision for the EIS.

- Incompatability with land use goals and policies of the County General Plan.
- Socioeconomic character of the area in that increased employment opportunities will draw population to the region, which would establish or reinforce the concentration of population in the area and accelerate consumption of local land and water resources.

1.6 COMPARATIVE IMPACTS OF THE PROPOSED ACTION AND ALTERNATIVES

1. Potential impacts and mitigation measures for the proposed action at the Bolo Station site and alternatives are evaluated and compared in Chapter 5.0, and summarized on Table 1.1. Based on the analysis included in Chapter 5.0, the following findings are made regarding the alternatives.

2. **Cadiz Valley Alternative**: Implementation of this alternative would incur impacts similar to those at Bolo Station. Regional impacts to air quality would be similar, but would be marginally increased as the rail distance to the Cadiz Valley Alternative site is approximately 10 to 15 miles further through Bolo Station. Impacts associated with the overall size of the proposed landfill would be reduced. A maximum of five sections of land (3,200 acres) would be included, compared to the seven and one-half sections of land (4,800 acres) at Bolo Station. However, access to the site by both rail and roadways is limited. Rail service to the Cadiz Valley Alternative site consists of a single line currently owned by the Arizona-California Railroad. This single line may require improvements to ensure safe and efficient operation of rail transport of waste. The site is served only by a secondary dirt road, which would require major improvements to support landfill construction and operation vehicles. Improving access to the site would impact additional lands offsite. The Cadiz Valley Alternative site provides better habitat for the threatened desert tortoise. Tortoise were observed on the site during the survey conducted for this EIR/EIS.

3. **Reduced Action Alternative**: As this alternative would be located at Bolo Station, the impacts, while reduced due to fewer acres being utilized (3,200 acres as compared to 4,800 acres), would be similar to those of the proposed action. Potential impacts directly associated with the amount of waste landfilled on a daily basis and over the life of the project would be reduced. Daily waste would be reduced to 12,000 tons per day from 21,000 tons per day. This alternative would also reduce the total landfill capacity and the height of the landfill. Regional impacts to air quality from hauling waste by rail to the site would be reduced by approximately 40 percent as the number of trains traveling to the site on a daily basis would be limited to four. While the Reduced Action Alternative would reduce certain impacts as compared to the proposed action, it would not result in a reduction of all impacts below a level of significance.

4. **No Action Alternative**: Under this alternative, no impacts from the proposed action would occur at Bolo Station or in the region. Solid waste would continue to be landfilled at existing landfills. As the capacity of these landfills are met, new landfills would either be developed or existing landfills would require expansion. Construction and operation of Class III landfills in southern California would result in similar impacts independent of their locations. Therefore, while this alternative would eliminate site specific impacts at Bolo Station, it is expected that similar types of impacts would occur at other locations in southern California as existing landfills continue operations, or new landfills are constructed and operated.

1.7 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

1. CEQA requires that the environmentally superior alternative be identified. If the environmentally superior alternative is the No Action Alternative, CEQA stipulates that the environmentally superior alternative among the remaining alternatives be identified. NEPA does not expressly require identification of the environmentally superior alternative. However, it does require that the least environmentally impacting alternative be identified in the Record of Decision at the end of the EIS process.

2. Based on the evaluation of the proposed action, alternatives, and mitigation measures included in Chapter 5.0, the environmentally superior alternative would be the No Action Alternative. Of the remaining alternatives, the environmental superior alternative is the proposed action at the Bolo Station site, with the implementation of the

mitigation measures identified in Chapter 5.0 and summarized on Table 1.1.

1.8 DRAFT EIR/EIS FORMAT

1. The contents of the Draft EIR/EIS are arranged to provide a clear and accurate description of the proposed action, the Bolo Station site, and alternatives. The Draft EIR/EIS identified and analyzes the potential environmental consequences of implementation of the proposed action.

2. The remainder of the Draft EIR/EIS is organized under the following primary chapter headings:

   - **2.0 - Introduction** - This chapter introduces the proposed action, explains the EIR/EIS process, including public scoping, and provides a framework for understanding the complexity of regulatory compliance requirements associated with the proposed action.
   - **3.0 - Description of Proposed Action and Alternatives** - Provides a detailed description of the proposed Rail•Cycle waste-by-rail system and the proposed Bolo Station Landfill. Alternatives to the proposed action that were considered are also discussed, as are alternatives deemed not to be feasible.
   - **4.0 - Affected Environment** - This chapter provides a baseline description of the natural and man-made environment that could be affected by the proposed action or its alternatives.
   - **5.0 - Potential Environmental Impacts** - This chapter discusses the potential impacts resulting from implementation of the proposed action or its alternatives, and evaluates their significance. Mitigation measures that would reduce or avoid environmental effects are identified. Significant unavoidable adverse impacts that will require a statement of overriding consideration in accordance with CEQA are also identified.
   - **6.0 - Cumulative Impacts** - This chapter evaluates the cumulative impacts from the proposed action and other projects in the region.
   - **7.0 - Other Required Considerations** - Short-term versus long-term uses of the environment and commitments of resources required for implementation of the proposed action are discussed.
   - **8.0 - Terms and Abbreviations** - Terms are described as they are used in this document, and a list of abbreviations is provided.
   - **9.0 - List and Qualifications of Preparers** - This chapter identifies individuals who contributed to preparation of the EIR/EIS.
   - **10.0 - Organizations and Persons Consulted** - This chapter provides a list of individuals and organizations that have contributed data used or concerns to be addressed in the EIR/EIS.
   - **11.0 - Draft EIR/EIS Distribution List**
   - **12.0 - References and Resources**
   - **13.0 - Index**
   - **Appendices:**

     A - Copy of the County Initial Study and Notice of Preparation for the proposed Rail•Cycle-Bolo Station Landfill that was prepared as the initial step in complying with CEQA. A copy of the BLM Notice of Intent is also provided.

     B - A list of permits and approvals necessary before full implementation of the action could be achieved is provided.

     C - Fault and seismic data.

     D - Calculation of Sodium Chloride Quantities in Ground Water.

     E - Hydrology letter from U.S. Army Corps of Engineers.

     F - Ground Water Constituents of Concern.

     G - Lists of vegetation and wildlife known to occur or expected to occur on or in the vicinity of the Bolo Station site.

     H - Air quality emission tables.

     I - Transportation calculations.

     J - Noise calculations.

     K - Corrective Action Insurance Policy.

CHAPTER 2.0
INTRODUCTION

2.0 INTRODUCTION

1. The purpose of this EIR/EIS is to inform the public, responsible and reviewing agencies, and decision makers of the:

   - Purpose and need for the proposed action.
   - Potential effects of the proposed action on the environment.
   - Potential cumulative effects associated with the proposed action and other projects in the area.
   - Potential for effects to result in significant impacts, and if so, the manner in which the identified impacts could be avoided or mitigated to below a level of significance.
   - Significant unavoidable adverse impacts from the proposed action.
   - Alternatives to the project, including the No Action Alternative, and identification of the environmentally superior alternative.

2. The proposed Rail•Cycle waste-by-rail landfill would be located at a site known as Bolo Station near Amboy in the Mojave Desert in San Bernardino County, California. The proposed action involves the transport of nonhazardous municipal solid wastes from MRFs, which are not a part of the proposed action, by rail using existing rail lines, and disposal of the waste at the proposed Class III Bolo Station Landfill.

2.1 PURPOSE AND NEED FOR THE PROPOSED ACTION

1. The purpose and need for the proposed action are to:

   - Develop a new Class III solid waste disposal facility to meet part of the projected demand for landfill space necessary to support various cities and counties in southern California.
   - Provide long-term landfill capacity in a rural desert setting, so as to minimize issues related to land use compatibility often faced by landfills sited near residential or other urban areas.

2. Various studies have cited the need for additional Class III landfill capacity to serve counties in southern California, including Los Angeles, San Bernardino, Riverside, and Orange counties (Los Angeles County, 1988; SCAG, 1988; Los Angeles County, 1990; Riverside County, 1989). As existing landfills in close proximity to the urban areas of southern California reach their capacity (some within the next five to ten years) additional landfill capacity will be required. Options available to provide additional landfill capacity include:

   - Source reduction, recycling, composting, and other measures to reduce the volume of solid waste.
   - Transformation of waste (i.e., incineration or waste-to-energy).
   - Expansion of existing landfills.
   - Development of new landfills in the urban southern California region.
   - Development of new landfills in rural areas accessible to the southern California region.

3. The pending need for additional landfill space is not restricted to southern California. It is an issue facing solid waste management agencies throughout the state, as well as the remainder of the country. In recognition of the importance of long-term management of landfill capacity and to reduce the volume of solid waste requiring disposal, the California legislature passed State Assembly Bill 939 (AB 939), also known as the California Integrated Solid Waste Management Act, in 1989. AB 939 requires counties to prepare integrated county-wide solid waste management plans and mandatory reductions in the volume of solid waste being landfilled. Specifically, AB 939 requires a 25 percent reduction by 1995 and a 50 percent reduction by 2000, in solid waste being disposed of at landfills through source reduction, recycling, and composting.

4. While implementation of AB 939 will serve to reduce the rate of decline in landfill disposal capacity in southern California and the rest of the state, it does not eliminate the need for new long-term landfill capacity. Similarly, expansion of existing landfills and siting of new landfills in urban areas of southern California may alleviate short-term requirements for landfill capacity, but may not provide a long-term solution to waste disposal requirements of the region. Land for

expansion of existing landfills and siting of new landfills in urban southern California is limited. As recognized by the Southern California Association of Governments (SCAG), a waste-by-rail system to a large capacity landfill in the desert region of southern California may provide a portion of the long-term landfill capacity required by the region (SCAG, 1988).

5. Based on the above, Rail•Cycle is proposing to develop a waste-by-rail system and the proposed Bolo Station Landfill to meet a portion of the long-term landfill capacity for southern California. This Draft EIR/EIS addresses the potential environmental consequences of this proposed action.

6. In addition to Rail•Cycle, there are currently two other waste-by-rail municipal solid waste landfill projects that propose to transport waste from urban southern California to new large Class III landfills proposed for construction in rural areas of the southern California desert region. The other proposed projects are:

   - Eagle Mountain Landfill in northeastern Riverside County. This project is proposed by Mine Reclamation Corporation and involves conversion of an abandoned open pit iron ore mine previously operated by Kaiser Steel Corporation into a Class III landfill. The proposed landfill would be located on approximately 2,300 acres (additional area would be required for support facilities and buffer zone) and would have a capacity of 700-million tons of waste over an estimated 115-year operational life. At full operations, the landfill would be designed to accept up to 20,000 tons of solid waste per day from throughout southern California. A Draft and Final EIR/EIS have been prepared and distributed by Riverside County and the BLM for this project. The Riverside County Board of Supervisors certified the Eagle Mountain Landfill EIR/EIS in October 1992. The BLM has not yet issued a Record of Decision on the EIR/EIS.

   - Mesquite Landfill in southeastern Imperial County. This project is proposed by California InterRail Corporation and involves construction of an area type Class III landfill (similar to the proposed Bolo Station Landfill) near an active open pit gold mine. The proposed landfill would be located on approximately 2,500 acres (additional area would be required for support facilities and buffer zone) and would have a capacity of 600-million tons of waste over an estimated 100-year operational life. At full operations, the landfill would be designed to accept up to 20,000 tons of solid waste per day from throughout southern California. A Draft EIR/EIS is currently being prepared by Imperial County and the BLM for this project.

7. In addition to the proposed Bolo Station, Eagle Mountain and Mesquite landfills, there is potentially a fourth waste-by-rail landfill being considered in the desert region of southern California. Chambers Development Company has begun the initial evaluation process for a landfill near Niland in central Imperial County. As this proposal is just in its earliest conceptual phase, no specific public information is currently available.

8. Considering only the three known proposed waste-by-rail landfills (Bolo Station, Eagle Mountain, and Mesquite), if all three landfills are approved and constructed, they would have a combined daily capacity of 61,000 tons of solid waste and a combined operational capacity of approximately 2-billion tons of waste over the next 100 to 115 years. This compares to the 1990 combined daily solid waste disposal rate of approximately 70,000 tons for Los Angeles, Orange, Riverside and San Bernardino counties.

2.2 PROJECT BACKGROUND

1. This document has been prepared as a joint EIR/EIS in accordance with provisions of NEPA (40 Code of Federal Regulations [CFR] Part 1506.2) and CEQA (Section 15226 of the Guidelines for Implementation of CEQA). The County Planning Department is the lead agency for the EIR, and BLM Needles Resource Area is the lead agency for the EIS.

2. In compliance with County Guidelines under Ordinance 3040 and CEQA (California Public Resources Code §21000 *et seq.*) and its implementing guidelines (CCR Title 14 §1500 et *seq.*), an Initial Study was prepared and issued by the County for the proposed Rail•Cycle waste-by-rail project and Bolo Station Landfill in November 1990. The Initial Study identified the project as a proposed privately operated landfill that would require an amendment to the County General Plan.

The Initial Study also provided:

- A detailed description of the proposed action.
- An overview of the existing environment and site conditions.
- Identification of the potential environmental effects of the proposed action.
- Discussion of potential mitigation measures for the identified impacts.

3. The Initial Study was prepared to meet requirements of CEQA and is included in Appendix A. Based on the Initial Study, the County determined that an EIR would be required for the proposed action.

4. In addition, BLM is required to consider the potential environmental impacts from a proposed action involving federal land. The proposed action includes an exchange in fee of two and one-half sections of federal land (1,600 acres) located within the boundaries of the proposed Bolo Station site, in exchange in fee for three sections of ATSF land (1,920 acres). This federal land exchange would require the following:

   - Amendment of the CDCA Plan to redesignate the permitted land use on one and one-half sections of federal land within the Bolo Station site.
   - Exchange in fee of surface and subsurface rights, including mineral rights, on two and one-half sections of federal land within the site for surface and subsurface rights on three sections of land owned by ATSF.
   - Granting of an approximate 800 by 2,640 foot right-of-way across federal property bordering Route 66 to provide access to the site.
   - Granting of an approximate 20 by 800 foot right-of-way across federal property to provide a powerline easement to the site.

5. Prior to making a decision concerning the above, the BLM, as the federal managing agency, is required to evaluate the potential environmental effects the proposed action could have in accordance with NEPA, as implemented by Executive Order 11514, 42 United States Code (USC) 4321, and the President's Council on Environmental Quality (CEQ) Regulations, 40 CFR, Part 1500 *et seq.* The BLM determined that an EIS would be required to consider the environmental consequences of the proposed action.

6. In addition to considering the environmental consequences of the proposed action in accordance with NEPA, BLM must consider potential mineral resources management and policy issues associated with the proposed exchange of federal lands. In this regard, the BLM must consider various regulations and policies including the:

   - Mining and Minerals Policy Act of 1970 (PL 91-631; 84 Stat. 1566).
   - National Materials and Minerals Policy, Research and Development Act of 1980 (PL 96-479; 30 USC 1601-1605).
   - BLM Mineral Resources Policy (BLM Manual Section 3000, Appendix 1).

2.3 ENVIRONMENTAL ANALYSIS PROCESS

1. NEPA was enacted as law on January 1, 1970, as a national policy to maintain conditions under which man and nature can exist in productive harmony and fulfill the social, economic, and other requirements of present and future generations of Americans. Under NEPA, federal actions or actions that require federal approval, which could have significant impact on the environment, are subject to review by federal, state, and local agencies, and public. CEQ regulations (40 CFR Parts 1500-1508) established the implementing regulations for compliance with NEPA.

2. CEQA (as amended) is state legislation that was developed subsequent to NEPA and applies to state and local agencies or local governments that regulate activities of private individuals, corporations, and public agencies which are found to have a potential to affect the quality of the environment. CEQA Guidelines (Sections 15000 to 15387) established the procedures for implementation of CEQA.

2.4 INTENDED USES OF THE EIR/EIS

1. The EIR/EIS will be used by various local, state, and federal agencies in their consideration of discretionary actions required to: (1) approve, (2) approve with conditions or modifications, or (3) deny the proposed action. The EIR/EIS is intended to provide the public, lead agencies,

responsible and reviewing agencies, and decision makers with a comprehensive analysis of the potential environmental consequences of the proposed action, potential mitigation measures to avoid or reduce impacts, and identify feasible alternatives to the proposed action. The level of technical detail, evaluation, and analysis included in the EIR/EIS is consistent with CEQA and NEPA and is sufficient to provide an understanding of the potential environmental impacts.

2. The EIR/EIS is the initial phase of the process for issuance of various permits or approvals by agencies and governing boards for the proposed action. The second phase, portions of which may occur concurrently with the EIR/EIS, is the preparation and submission of appropriate application packages for specific permits or approvals. These applications will include technical reports, studies, and engineering data, as necessary, to describe in detail landfilling operations to the satisfaction of permitting and/or reviewing agencies. The third and final phase is public and agency review of permit applications, development of specific permit conditions, and issuance of permits by the agencies. This phase may result in modifications to the proposed action to meet various regulatory requirements or permit conditions.

3. The following sections identify the primary local, state, and federal agencies which will have discretionary actions associated with the Bolo Station Landfill. The EIR/EIS will be used by these agencies along with other technical, economic, and social data during the environmental review process.

2.4.1 COUNTY OF SAN BERNARDINO

1. The EIR/EIS will be used by the County Planning Department, as the CEQA lead agency, and the County Planning Commission and County Board of Supervisors during review of the proposed action. In addition, the EIR/EIS will be used by various other County agencies and departments, defined by CEQA as responsible agencies, during their regulatory review and permitting process. The primary County discretionary actions associated with the proposed action include:

   - Amendment of the County General Plan to redesignate the land use as a Class III solid waste landfill. The County Planning Department is the lead agency for the County General Plan and Development Code. The County Planning Commission must review, and the County Board of Supervisors must approve the amendment.
   - Issuance of a CUP, with appropriate conditions, to permit use of the proposed site as a Class III landfill. A CUP application has been submitted to the County by Rail•Cycle. The County Planning Commission must review and the County Board of Supervisors must approve the CUP as the proposed action requires an amendment of the County General Plan.
   - Determination of consistency with or inclusion of the proposed action in the County Solid Waste Management Plan (CoSWMP) or, if it is in effect, the County Integrated Waste Management Plan (CoIWMP). The County Solid Waste Management Department and Solid Waste Advisory Task Force are the responsible agencies.
   - Issuance of a Solid Waste Facilities Permit (SWFP) for the proposed action in accordance with CCR Title 14. This permit would be issued by the County Department of Environmental Health Services (SBCDEHS) as the responsible department. The SBCDEHS is the designated local enforcement agency (LEA) for the County.
   - Issuance of an Authority to Construct (ATC) permit and Permit to Operate (PTO) for the proposed action by the County Air Pollution Control District (SBCAPCD) as the responsible agency for air quality management.

2.4.2 BUREAU OF LAND MANAGEMENT

1. The BLM will use this EIR/EIS, along with other information, in its consideration of the following:

   - Amendment of the CDCA Plan to redesignate 960 acres (one and one-half sections) of federal land within the proposed Bolo Station site from a land use designation of Class L (limited or low intensity use, with uses such as new solid waste disposal facilities not allowed), to Class M (moderate use, which would allow the property to be exchanged for use as a new Class III landfill).
   - Approval of exchange in fee of surface and subsurface rights, including mineral rights, on 1,600 acres (two and one-half sections)

of federal land (selected lands) within the Bolo Station site to Rail•Cycle for surface and subsurface rights on 1,920 non-contiguous acres (three sections) of land (offered lands) owned by ATSF.

- Granting of an approximate 800 by 2,640 foot right-of-way across federal property bordering Route 66, to provide access to the Bolo Station site.
- Granting of an approximate 20 by 800 foot right-of-way across federal property to provide a powerline easement to the site.

2.4.3 OTHER AGENCIES

1. The proposed action would also require major permits or approvals from the following regional or state agencies, acting as responsible agencies, as defined by CEQA:
   - California Regional Water Quality Control Board (RWQCB): Issuance of Waste Discharge Requirements (WDRs) for operation of the proposed action in accordance with CCR Title 23.
   - California Integrated Waste Management Board (CIWMB): Concurrence with the issuance of the SWFP for the proposed action by the LEA in accordance with CCR Title 14.

2.5 IMPLEMENTATION OF EIR/EIS PROCESS

1. The following briefly summarizes the EIR/EIS process as it relates to the proposed action:
   - **Notice of Preparation and Notice of Intent** - Public notification to prepare an EIR/EIS. The Notice of Preparation was distributed by the County to state agencies, local organizations, and individuals on August 16, 1991. The Notice of Intent prepared by BLM was published in the Federal Register on August 9, 1991. Copies of these documents are included in Appendix A.
   - **Public Scoping Meetings** - Public scoping meetings were held by BLM in Twentynine Palms, Barstow, and San Bernardino to solicit input of issues which should be addressed in the EIR/EIS from interested individuals, groups, agencies, and elected officials. These meetings were announced by a BLM news release on July 14, 1991, and published in the Federal Register on August 9, 1991.
   - **Preparation of the Draft EIR/EIS** - This Draft EIR/EIS was prepared to identify, describe, and analyze the environmental issues of the proposed action and alternatives.
   - **Notice of Completion and Federal Register Publication** - The availability of this completed Draft EIR/EIS was announced by the County with a Notice of Completion and by BLM through the U.S. Environmental Protection Agency (EPA) in the Federal Register.
   - **Public Release of the Draft EIR/EIS for Review and Comment** - This Draft EIR/EIS has been released for a 90-day review and comment period to the public, including interested individuals, groups, government representatives, and agencies.
   - **Public Hearing** - Three public hearings are scheduled to be held by the BLM during the 90-day Draft EIR/EIS review period, to provide the public with an opportunity to verbally comment on this document.
   - **County Environmental Review Committee Meeting** - During the public review and comment period on the Draft EIR/EIS, the County's Environmental Review Committee will hold a meeting, open to the public, to consider the adequacy of the Draft EIR/EIS and written public comments. The committee will make a recommendation to the County Planning Commission as to whether the document meets the requirements of CEQA and whether it should be certified as complete.
   - **Preparation of the Final EIR/EIS** - A Final EIR/EIS will be prepared and will incorporate and respond to all public comments received as a result of public review of this Draft EIR/EIS.
   - **Record of Decision** - After publication and circulation of the Final EIR/EIS, the County will hold a public hearing to certify the adequacy of the Final EIR/EIS, make its decision regarding the proposed action, and prepare and file a Notice of Determination.

The BLM will make its decision regarding the proposed action after a 60-day waiting period, prepare a Record of Decision on its findings, and publish the decision in the Federal Register.

2.6 REGULATORY COMPLIANCE

1. This section summarizes the legislative and regulatory framework which, in addition to NEPA and CEQA guidelines, would be addressed as part of the proposed action. Various aspects of the proposed action, as discussed below, must be in compliance with appropriate federal and state regulations before implementation is permitted. These additional regulations apply to those aspects of the proposed action which could involve solid waste management, air quality, water quality, land use, endangered species, and cultural resources. For the proposed action, numerous acts, codes, resolutions, and agencies rules and regulations have been identified.

2. A list of permits and/or approvals required for the proposed action is provided in Appendix B. Agencies listed in the appendix would use the EIR/EIS in their considerations of these permits and/or approvals.

2.6.1 SOLID WASTE MANAGEMENT

1. The 1972 Nejedly-Z'Berg-Dills legislation (Solid Waste Management and Resources Recovery Act) required each county in the state to prepare a comprehensive and coordinated CoSWMP. These plans were intended to guide the counties' efforts to effectively manage and plan for the storage, collection, transportation, processing and reuse, conversion or disposal, of solid waste in a safe, sanitary, aesthetically acceptable, environmentally sound, and economic manner. New or expanded solid waste management facilities were required to be consistent with the local CoSWMP.

2. AB 939 repealed the requirements of the 1972 Nejedly-Z'Berg-Dills legislation. The major provisions of AB 939 include:

   - The preparation of a CoIWMP to replace the existing CoSWMP. The CoIWMP is to include a source reduction and recycling element, and a household hazardous waste element. The County is scheduled to submit its CoIWMP by January 1, 1994.
   - The CoIWMP is required to include an implementation schedule identifying how jurisdictions will divert 25 percent of their solid waste from landfills or incinerator disposal by January 1, 1995, through source reduction, recycling, and composting. By January 1, 2000, diversion is to reach 50 percent. Agricultural wastes, inert solids, or other wastes not normally disposed of at landfills are excluded from the above requirements.
   - Establishes an integrated waste management framework to guide the CIWMB and local agencies in implementing the provisions of the bill.

3. In October 1990, AB 2296 was approved as an urgency statute to resolve conflicts between AB 939 and the previous CoSWMP requirements. AB 2296 allows new or expanded solid waste facilities, which were included in the most recently approved CoSWMP, to be approved by local jurisdictions. Rail•Cycle's proposed Bolo Station landfill is included in the County's draft revised 1989 CoSWMP; however, this revised CoSWMP was not adopted due to the passage of AB 939.

4. In addition to the previous Nejedly-Z'Berg-Dills legislation and AB 939, counties include provisions for siting and zoning of solid waste disposal facilities in their General Plans, and land use and zoning regulations.

2.6.2 AIR QUALITY

1. Construction and operation of the proposed Rail•Cycle-Bolo Station Landfill would be subject to federal, state, and local rules and regulations, as implemented through provisions of the Clean Air Act, as amended in 1990, and the California Clean Air Act of 1988, pertaining to the control of air emissions to the atmosphere. Region IX of the EPA in San Francisco, California, has federal jurisdiction over the area, and the California Air Resources Board (CARB) is responsible at the state level. At the local level, the SBCAPCD has review and permitting authority over air emission sources in the area.

2. CARB serves as a technical review and advisory agency, providing technical advice to SBCAPCD when necessary, and offering guidance when SBCAPCD regulations are not sufficiently detailed

to address a particular situation. Under the provisions of the federal Clean Air Act, SBCAPCD fulfills federal requirements that allow a local agency to administer federal Clean Air Act policies. Thus, SBCAPCD will have primary regulatory review authority over potential sources of air emissions associated with the proposed action.

2.6.3 WATER QUALITY

2.6.3.1 Clean Water Act

1. The federal Clean Water Act is administered by the EPA, which delegates authority to the State Water Resources Control Board and, ultimately, the RWQCBs. The act defines the primary and secondary standards for the maximum contamination levels of such contaminants as metals and solvents in drinking water. Treated water discharged to surface water would be subject to the requirements of a National Pollution Discharge Elimination System (NPDES) permit, which, in effect, ensures that the water meets drinking water quality standards at the point of discharge. Recent changes to the regulations also require that NPDES permits are obtained for the release of stormwater from industrial facilities.

2.6.3.2 California Code of Regulations, Title 23

1. CCR Title 23, Chapter 15, includes but is not limited to the state's regulation for the disposal and/or management of various types of waste, as it relates to the protection of surface and ground water. Of specific interest for the proposed action are those sections of CCR Title 23, Chapter 15, that address Class III solid waste landfills. The regulation includes specific requirements for the design and construction of landfills that are intended to reduce the risk of surface water and ground water contamination. The regulation includes requirements or specifications for, but not limited to, the following:

   - Protection from the 100-year flood.
   - Seismic design to withstand maximum probable earthquake.
   - Liner systems.
   - Leachate collection and removal systems.
   - Drainage control.
   - Ground water monitoring.
   - Landfill closure and final cover.
   - Landfill postclosure maintenance.

2. CCR Title 23, Chapter 15, also provides RWQCB with its authority for adoption of WDRs to protect waters of the state from contamination. Under this regulation, RWQCB will regulate systems or activities of the proposed action that have the potential to discharge waste or waste constituents to surface or ground waters. When adopting WDRs, RWQCB follows requirements of CCR Title 23, Chapter 15, and the California Porter-Cologne Water Quality Act of 1985. The RWQCB establishes limits on discharges and specific monitoring requirements as conditions of approval for the WDRs. The limitations are intended to ensure that discharges will not adversely affect the beneficial uses of waters of the state.

3. CCR Title 23, Chapter 15, Article 5, was recently established to require that holders of WDRs provide financial assurance of their ability to fund potential corrective action programs in the event that contamination of waters of the state occur from their actions. Article 5 requires that the permittee estimate the potential corrective action program costs and demonstrate the ability to pay for the corrective action required.

2.6.3.3 California Code of Regulations, Title 14

1. CCR Title 14, Division 7, provides the state's minimum standard for the management of facilities that handle and/or dispose of solid waste. CCR Title 14, Division 7, is administered by the CIWMB and the designated LEAs. Unlike CCR Title 23, Chapter 15, which establishes requirements and specifications, CCR Title 14, Division 7, establishes general standards to provide required levels of performance for facilities that handle and/or dispose of solid waste. This regulation covers various solid waste facilities including, but not limited to:

   - Landfills
   - MRFs and transfer stations
   - Composting facilities

2. For landfills, CCR Title 14, Division 7, requires specific closure plans, and postclosure monitoring and maintenance plans. The regulation includes specific requirements for owners/operators of landfills to provide financial assurance of their ability to pay the full cost associated with closure and postclosure.

2.6.3.4 Resource Conservation and Recovery Act

1. In October 1991, the EPA issued federal regulations governing the design, operation, and closure of nonhazardous, municipal landfills under the Resource Conservation and Recovery Act (RCRA). These regulations are included in 40 CFR, Part 258, Subtitle D, and establish federal requirements for the design of landfills, ground water monitoring, and potential corrective actions associated with the operation of landfills. The regulations include requirements or specifications for, but not limited to, the following:

   - Protection from the 100-year flood.
   - Seismic design to withstand the maximum probable earthquake.
   - Liner systems, specifically composite liners.
   - Leachate collection and removal systems.
   - Drainage control.
   - Landfill gas collection, control, and monitoring for landfill operations, closure, and postclosure.
   - Ground water monitoring.
   - Landfill closure and final cover.
   - Landfill postclosure maintenance.

2. While issued in October 1991, Part 258, Subtitle D allows the states to develop specific regulations to implement the requirements of Subtitle D by October 1993. While CCR Titles 14 and 23 meet or exceed most of the requirements of Part 258, Subtitle D, in the case of composite liner systems Part 258, Subtitle D may be more restrictive. It is anticipated that California will amend or modify CCR Titles 14 and 23 to meet the requirements of Part 258, Subtitle D. As the proposed action is not expected to be operational by October 1993, the design, construction, operation, and closure/postclosure of the Bolo Station Landfill will take into account these requirements.

2.6.4 LAND USE

2.6.4.1 Bureau of Land Management

2.6.4.1.1 Federal Land Policy Management Act

1. The Federal Land Policy Management Act (FLPMA) was passed in 1976 to direct the management of public lands. It defines specific procedural measures and environmental standards that public projects on federal land must comply with to prevent "unnecessary or undue degradation" of federal lands. In areas where specific statutory authority requires that a stated level of environmental protection or reclamation be attained, such as within the CDCA, that level of protection must be met. FLPMA includes provisions for application of regulations to "protect the scenic, scientific, and environmental values of the public lands of the California Desert Conservation Area against undue impairment..." (Title VI, Section 601 [f]).

2.6.4.1.2 California Desert Conservation Area Plan

1. Section 601 of FLPMA requires that BLM develop a plan to "provide for the immediate and future protection and administration of the public lands in the California desert within the framework of a program of multiple use and sustained yield, and the maintenance of environmental quality." In accordance with FLPMA, the CDCA Plan was developed for management of the public lands of the California desert under BLM jurisdiction.

2. The CDCA Plan includes several elements that pertain to the Rail•Cycle project. These include cultural resources, wildlife, vegetation, wilderness, geology, energy, mineral resources, energy production, utility corridors, and land-tenure adjustment.

3. The CDCA Plan recognizes that the mix of ownership of desert lands creates problems for effective management of public lands. To address this concern, BLM encourages land exchange opportunities that improve the protection and effective management of desert lands. The CDCA Plan specifies that a proposed action must include protection of surrounding lands from incompatible uses. The goal of the Land Tenure Adjustment Element is to:

   > "Acquire lands which are needed to provide for effective BLM management of existing public lands and resources in the California desert."

   In requesting the land exchange, Rail•Cycle must show that the BLM will receive land of equal or greater value. The CDCA Plan emphasizes the need to acquire lands containing sensitive resources. A beneficial exchange would need to exhibit improved resource protection or management qualities.

2.6.4.2 County of San Bernardino

1. The County has regulatory authority over unincorporated land not directly regulated by state and federal government agencies, municipalities, or Native American Indian tribes. The County regulates land use through implementation of state planning and zoning laws.

2.6.5 ENDANGERED SPECIES

2.6.5.1 Federal Endangered Species Act

1. The ESA, as amended, extends legal protection to plants and animals listed as endangered or threatened by the USFWS. The ESA authorizes the USFWS to review proposed federal actions to assess potential impacts to listed species.

2. Listed species are those which are *threatened* or *endangered* (in danger of extinction throughout all or a significant portion of their range) and have been the subject of final regulation and listing in the Federal Register. Also represented are those species officially proposed for listing in a Federal Register notice.

3. Through Section 7 of the ESA, federal agencies, in consultation with the USFWS, are required to ensure "that any action authorized, funded or carried out by such agency... is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of [critical] habitat."

4. In addition to listed species, a second group of species are identified under the ESA. This group, known as candidate species, have not yet been the subject of a proposed or final ruling to become listed. While not provided protection under the ESA, federal agencies are required to consider candidate species in their planning process. Two categories of candidate species and one category of non-candidate species are recognized:

   - **Category 1** - Candidate species for which there is adequate information to support listing as threatened or endangered, but for which USFWS has not completed the listing procedure.
   - **Category 2** - Candidate species for which there is information that indicates that proposing to list as threatened or endangered is possibly appropriate, but substantial data on vulnerability and threat are not currently known.
   - **Category 3** - Species no longer under consideration for listing.

2.6.5.2 California Endangered Species Act and Native Plant Protection Act

1. The California Endangered Species Act (CESA) of 1984 and the California Native Plant Protection Act (NPPA) of 1977 are administered by the CDFG. In addition to rare and endangered species, the state of California includes candidate species for plants and wildlife. Candidate species are those that have been accepted by the state for review and potential inclusion to the list of rare, threatened, or endangered species. The rare designation applies to plants only and includes those plants that are not threatened or endangered, but that could become eligible due to decreasing numbers or further restrictions to habitat. Lists of vegetation and wildlife known or expected to occur on or in the vicinity of Bolo Station are included in Appendix G.

2.6.5.3 BLM Sensitive Species List

1. "Sensitive" plant and wildlife species are designated by BLM's California State Director if they meet one or more of the following criteria:

   - Species identified as candidates for listing as endangered or threatened by the USFWS in a Federal Register Notice of Review.
   - Species that have been officially proposed for listing as endangered or threatened by the USFWS in a Federal Register Notice.
   - Species that do not meet either of the above criteria, but have been designated as sensitive by the State Director, based in part on information from the California Natural Diversity Database and private groups, such as the California Native Plant Society.

   The purpose of the designation is to provide increased management attention to prevent population and habitat declines that might result in federal or state listing as endangered or threatened.

2.6.6 CULTURAL RESOURCES

1. The National Historic Preservation Act (NHPA) of 1964, as amended, established the following:

   - National Register of Historic Places (NRHP) to be maintained by the Secretary of the Interior.

- Position of State Historic Preservation Officer (SHPO).
- Advisory Council on Historic Preservation (ACHP).

Section 106 of the NHPA requires federal agencies to provide the SHPO and ACHP an opportunity to comment on any project on federal lands, or projects that are federally funded or permitted, that have the potential to affect properties included in or eligible for inclusion in the NRHP.

2. ACHP regulations, "Protection of Historic Properties" (36 CFR Part 800), outline procedures to be followed by federal agencies. Federal agencies are required to consult with the SHPO to determine if a proposed action encompasses any property included in, or eligible for inclusion in, the NRHP. For each eligible property identified, the federal agency must determine if the proposed action would have an effect. If there could be an effect, the Criteria of Adverse Effect are applied to determine if the effect would be adverse. Treatment measures are developed for resources that would be adversely affected. The ACHP regulations encourage participation by local governments, Native American tribes, and the public (36 CFR Part 800.1 [c] [2]).

2.7 PUBLIC SCOPING PROCESS

1. A public scoping process was initiated, as required by NEPA and CEQ regulations and as encouraged by CEQA and its guidelines. Public scoping was undertaken to identify the environmental issues and potential significant effects to be addressed in depth in the EIR/EIS, to consider the potential environmental impacts resulting from the proposed action, and to eliminate from detailed analysis issues found not to be significant. The process provides an opportunity for receipt of verbal and written comments from the public, and local, state, and federal agencies. Notifications included:

   - Publication of the Notice of Intent in the Federal Register by BLM.
   - Direct mailing of a Notice of Preparation to potentially interested agencies and individuals by the County.
   - Public notice by BLM to regional and local media sources (newspapers, radio, television), indicating the nature of the project, and the date, time, and location of public scoping meetings.
   - Direct mailing of an announcement by BLM to individuals and organizations, indicating the nature of the project and the date, time, and location of public scoping meetings.

2. The scoping process included three public meetings, held on August 27, 1991, in Twentynine Palms; August 28, 1991, in Barstow; and August 29, 1991, in San Bernardino. The meetings were conducted to provide an opportunity for the public and governmental agencies to submit verbal statements on issues to be addressed in response to a presentation on the proposed action. Those not able to attend a public meeting were invited through the published notifications to submit written comments.

3. As a result of the scoping process, the primary issues of public concern were identified. These issues are summarized in Table 2.1.

TABLE 2.1

RAIL•CYCLE PROJECT
PUBLIC SCOPING PROCESS
SUMMARY OF ISSUES

ISSUES

Hydrology

- Capacity of local and regional aquifer to support ground water withdrawals.
- Relationship of ground water aquifer to surrounding water sources.
- Availability of alternative water sources.
- Potential contamination of water resources from operations.

Wildlife

- Impact of project on wildlife habitat.
- Effectiveness of reclamation activities on wildlife habitat.
- Impact on desert tortoise.

Land Use

- Short- and long-term relationships between project and current/future land uses.
- Relationship of project to East Mojave National Scenic Area and wilderness study areas.

Vegetation/Reclamation

- Vegetation removal due to project operations.
- Effectiveness of reclamation activities.
- Impact on sensitive species.
- Potential establishment of exotic species.

Hazardous Materials/Wastes

- Impact of transporting, storing, and potential inadvertent disposal of hazardous materials/wastes.

Visual/Scenic

- Conformance with Visual Resource Management objectives.

Air Quality

- Impact of dust from project traffic.
- Impact of pollutant emissions from onsite equipment and landfilling operations.
- Impact of air toxic emissions.

Cultural/Historical

- Potential impact to cultural and historic resources.
- Measures taken to protect cultural and historic resources.

Wilderness

- Compatibility of landfilling operations with adjacent wilderness areas.
- Potential for impairment of wilderness values by project.

Geology

- Seismicity and local/regional faulting.
- Subsidence due to ground water use and landfilling operations.

Mineral Resources

- Accessibility to mineral resources at or beneath the proposed site or from areas adjacent to the proposed site.
- Potential degradation of mineral resource quality by landfill operations.

CHAPTER 3.0
DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

3.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

3.1 INTRODUCTION

1. A comprehensive description of the proposed action and its alternatives is presented in this chapter. The proposed action is the Rail•Cycle waste-by-rail project which includes the rail transport of nonhazardous municipal solid waste in sealed containers over existing rail lines. The proposed action also includes a large capacity, long-term Class III landfill facility at Bolo Station located in a rural area of the Mojave Desert, near Amboy in San Bernardino County, California. The preferred BLM alternative is the proposed Bolo Station site with implementation of the various mitigation measures identified in Chapter 5.0 of this Draft EIR/EIS.

2. The proposed construction of the landfill facilities would begin in 1993, with initial operations beginning in late 1993 or early 1994.

3. Potential alternatives to the Bolo Station site are identified in this chapter and are evaluated for feasibility. Three feasible project alternatives have been identified and are evaluated throughout this document. The three feasible alternatives are:

   - Cadiz Valley Alternative
   - Reduced Action Alternative
   - No Action Alternative

4. The description of the proposed action and feasible alternatives provides the basis against which the existing environment (Chapter 4.0) is evaluated for potential impacts (Chapter 5.0). The remainder of this chapter provides a description of major project elements, construction and operational considerations, and alternatives.

3.2 PROPOSED ACTION

1. The proposed Rail•Cycle waste-by-rail project is a private venture by Rail•Cycle, a limited partnership between ATSF and WMNA. The proposed Class III landfill would accommodate up to 21,000 tons of waste per day at maximum operation. Initial operations would begin with approximately 3,000 tons of waste per day and increase to the anticipated maximum operation, as shown in Table 3.1. Waste would be transported over existing rail lines to a railyard and onsite offloading facility that would be constructed as an element of the proposed action.

2. As the proposed landfill would require the exchange of federal lands, the proposed action also includes the following:

   - Amendment of the CDCA Plan to redesignate the permitted land use of one and one-half sections of federal lands within the Bolo Station site.
   - Exchange in fee of surface and subsurface rights, including mineral rights, on two and one-half sections of federal land within the site for surface and subsurface rights on three sections of land owned by ATSF.
   - Granting of an approximate 800 by 2,640 foot right-of-way across federal property bordering Route 66 to provide access to the site.
   - Granting of an approximate 20 by 800-foot right-of-way across federal property to provide a power line easement to the site.

3. The BLM has selected three noncontiguous sections of land owned by ATSF for exchange: one located at the northeast corner of the Cadiz Dunes; one in Piute Valley; and one in the Fenner Valley/Providence Mountains, as shown in Figure 1.4. The locations of the three proposed exchange sections were selected by BLM from a list of ATSF owned sections. BLM's preliminary evaluation of potential public value of the sections was based on the following:

   - Under the CDCA Plan (BLM, 1980a), the Cadiz Dunes area is identified as a Planned Management Area for Fish and Wildlife. The proposed exchange section in the northern portion of the Cadiz Dunes provides a buffer and access to the Planned Management Area. The Cadiz Dunes are designated as a Special Area by BLM, due to the presence of a sparse but highly

TABLE 3.1

OPERATIONS
PHASED SCHEDULE[1]

YEAR	TONS/DAY	TONS/YEAR[2] (millions)	VOLUME/YEAR[2] (million cubic yards)	CUMULATIVE TOTAL VOLUME[2] (million cubic yards)
1	3,000	0.936	1.56	1.56
2	6,000	1.872	3.12	4.68
3	9,000	2.808	4.68	9.36
4	15,000	4.680	7.81	17.16
5	21,000	6.552	10.94	28.08

91-109 (7/12/92/dh)

(1) The phased schedule presented here is for planning purposes only. Expansion by 3,000-ton increments to the optimum 21,000 tons per day may be accomplished earlier or later than Year 5.

(2) A ton of waste is expected to have a volume of 1.67 cubic yards after compaction in the landfill. Alternately, each cubic yard of waste deposited in the landfill is expected to weigh 0.6 tons.

specialized plant community associated with the dune environment.

- The proposed exchange section in Piute Valley is beneficial to BLM management goals, as it is composed of Category 1 desert tortoise (*Gopherus agassizii*) habitat.
- The proposed exchange section in the Fenner Valley/Providence Mountains area is located approximately 20 miles east/ southeast of the Providence Mountains State Recreation Area. The area in which this section is located has been identified as a Category 1 habitat for desert tortoise.

3.2.1 PROJECT LOCATION

1. The landfill is proposed to be located at an area known as Bolo Station adjacent to an ATSF rail line between the towns of Amboy and Cadiz, in San Bernardino County, California. As shown in Figure 1.3, the Bolo Station site encompasses approximately 4,800 acres. Of this total, 2,100 acres would be allocated to the actual landfill. The remaining acres would be for support facilities and provide buffer area to the landfill. Of the 4,800 acres, 3,200 acres are owned by ATSF (Sections 5, 9, 16, 17, and 21), and 1,600 acres are federal lands managed by BLM (Sections 8, 15, and the western one-half of 22).

3.2.2 OVERVIEW OF RAIL•CYCLE WASTE-BY-RAIL SYSTEM

1. The proposed action is comprised of two components: the rail transport of waste in sealed containers using existing rail lines; and disposal of solid waste at the proposed Bolo Station Landfill. The proposed Bolo Station Landfill consists of two phases, construction and operations.

2. Rail•Cycle's waste-by-rail system would obtain waste from approved MRFs. The MRFs are not part of this proposed action and are not discussed in detail in this Draft EIR/EIS. Site-specific permitting and approval, including CEQA compliance, would be conducted for each MRF.

3. While not part of the proposed action, a description of a typical Rail•Cycle MRF is provided below to facilitate an understanding of the Rail•Cycle waste-by-rail system. Up to seven MRFs may be constructed in southern California to support Rail•Cycle. These MRFs will assist the waste-generating communities in meeting AB 939's waste reduction requirements.

4. For purposes of evaluating the potential impacts of the proposed action, a point of origin for rail haul of municipal wastes has been identified as a MRF located in the Los Angeles basin. This approach provides a means of assessing the secondary impacts from as many as seven MRFs located in the urbanized portion of southern California. The effects of municipal solid waste transported by rail are assessed in this document, and include potential impacts to air quality, transportation/circulation, noise, public health and safety, and land use.

5. Each MRF will function as an intermodal waste transfer facility that will accomplish a number of tasks preparatory to waste being processed for rail transport to the landfill. The term intermodal refers to modes of transportation. Intermodal facilities are locations where trucking and rail modes come together for the transport or delivery of materials or freight. Processing tasks that will be accomplished at the MRFs include:

   - Inspection of incoming waste for hazardous or nonpermitted waste.
   - Separation of recyclable commodities and, potentially, green waste from the waste stream.
   - Storage and transport of recyclable commodities (including aluminum, plastic, cans, paper, cardboard, and glass) to markets.
   - Compaction of nonrecyclable (residual) waste and green waste.
   - Weighing of waste and recyclables.
   - Loading of containers of residual waste onto rail cars for transport to the landfill.

6. MRFs to support the Rail•Cycle system are anticipated to be strategically located adjacent to existing rail lines. Each MRF will require approximately 20 acres of land in a suitably zoned industrial area. MRFs would be designed and operated to assist local jurisdictions in meeting their AB 939 requirements. Site-specific permitting and CEQA compliance

would be implemented as agreements are reached with local jurisdictions. Rail•Cycle has tentatively secured markets for recyclable commodities, including plastic, glass, aluminum and other cans, cardboard, and paper, as follows:

- Plastics - Du Pont Corporation
- Aluminum, other cans, and glass - All American National Can Company
- Paper and cardboard - Stone Container Company

7. A separate proposal is underway to establish a MRF in the City of Commerce. A Final EIR for construction and operation of the Commerce MRF (David Evans and Associates, 1992) was certified as complete by the City of Commerce Planning Commission on August 26, 1992 (City of Commerce, 1992). The Rail•Cycle waste-by-rail system would be expanded beyond the Commerce MRF as needed, with additional MRFs proposed for development along existing rail lines. Other areas tentatively being considered for siting of MRFs that could be supported by Rail•Cycle include Santa Clarita Valley, Pomona Valley, San Gabriel Valley, San Bernardino Valley, and the high desert area of San Bernardino County. Other areas in southern California may also be considered for siting of MRFs.

8. Each Rail•Cycle MRF will be designed to handle an inbound waste volume of between 3,300 and 4,500 tons per day and an approximate outbound residual waste volume of 3,000 tons per day with complete recycling, processing, and loading capability. Rail•Cycle has established policies and procedures for handling incoming waste at MRFs. Waste inspection, verification, and long-term recordkeeping are involved. Personnel at the MRFs will screen and remove hazardous or nonpermitted materials from the incoming waste stream. These materials would be temporarily stored in appropriate storage facilities at the MRFs and transported for disposal/recycling at appropriately permitted facilities.

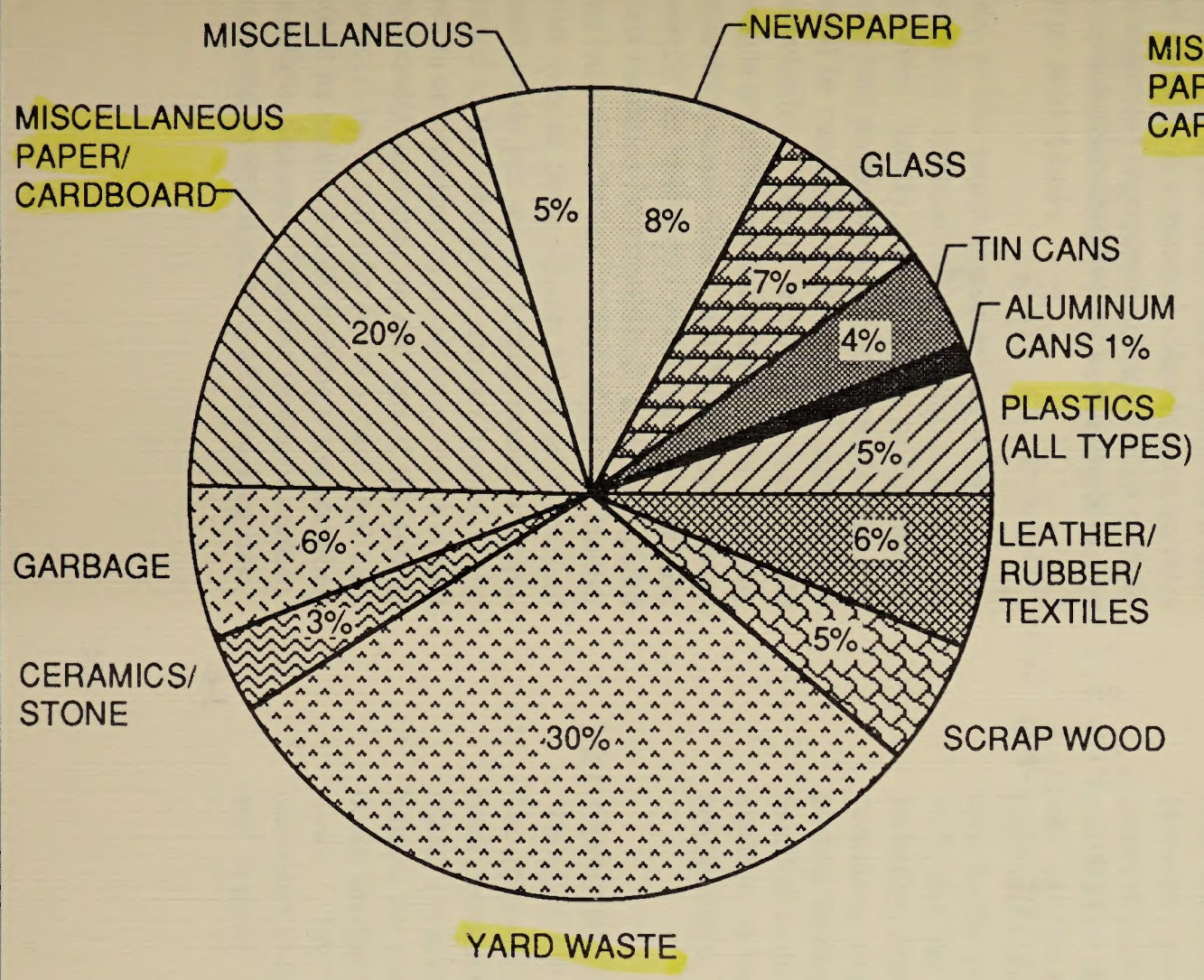
9. The Rail•Cycle waste-by-rail system is being proposed in part to meet a portion of the long-term solid waste disposal requirements of Los Angeles County. The waste stream composition of Los Angeles County is considered generally representative of waste streams from other urban areas in southern California which could be supported by Rail•Cycle. The percent by volume of various waste categories that make up the residential and commercial/industrial waste stream for Los Angeles County is shown in Figure 3.1. Residential and commercial/industrial solid waste represents two-thirds of Los Angeles County's total nonhazardous municipal waste stream. The remaining one-third of the nonhazardous municipal waste stream in Los Angeles County consists of construction/demolition wastes.

10. To assist local jurisdictions in meeting their AB 939 goals, diversion of recyclables from the waste stream entering MRFs is an integral element of Rail•Cycle. Typical anticipated waste stream diversions at Rail•Cycle's MRFs from recycling are shown in Table 3.2. The quantity of recyclable materials recovered at each MRF will be dependent on the composition of the waste stream, which is expected to vary by source and over time.

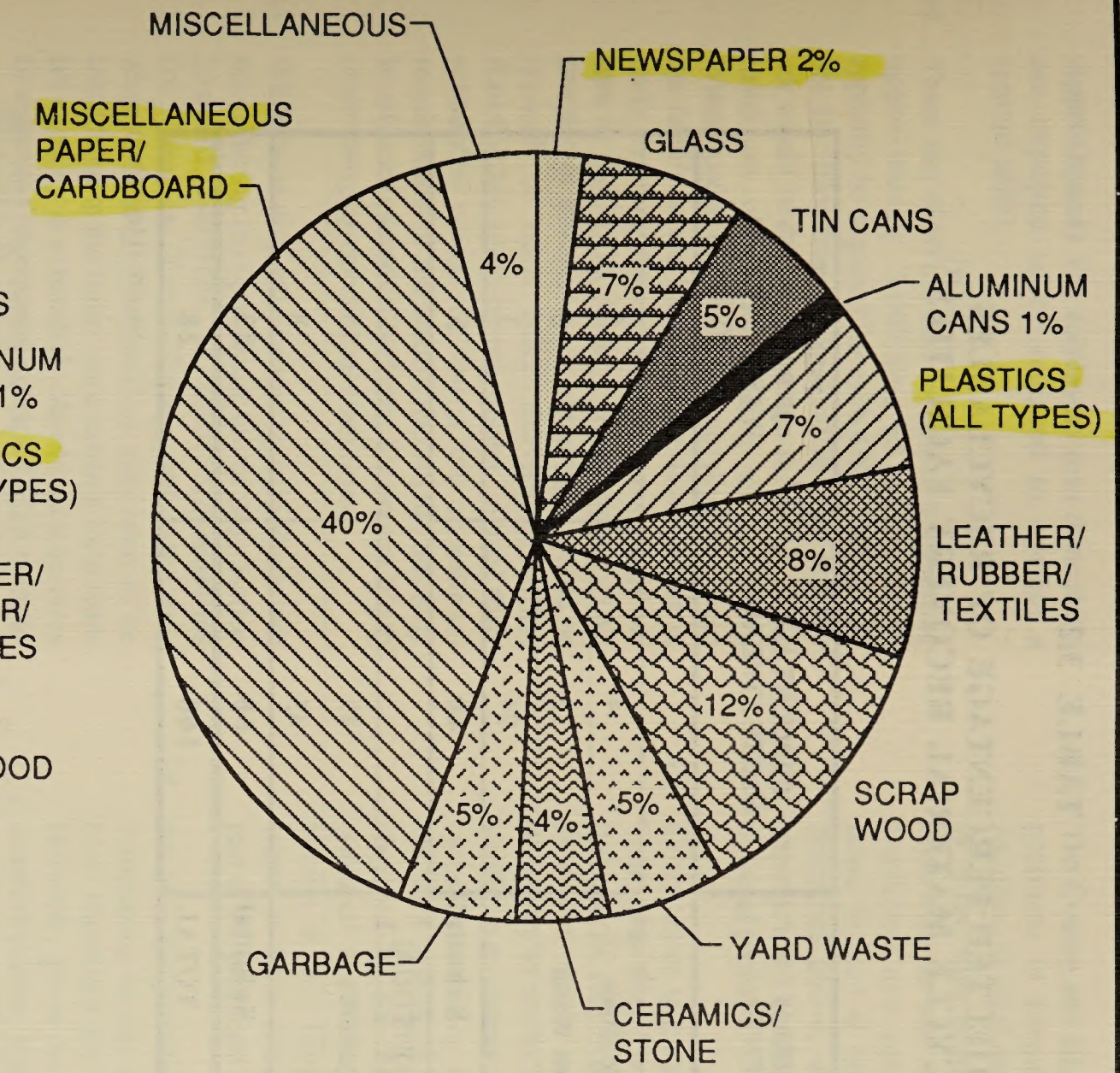
11. After removal of recyclables, residual waste will be compacted and placed into intermodal-type containers, and loaded on a train for transport to Bolo Station. Intermodal containers are specially designed 8-foot by 8-foot by 40- to 45-foot leakproof, steel or reinforced aluminum containers which can be transported by truck or rail. Dedicated, conventional double-stack unit trains, utilizing existing rail lines, will transport the residual municipal solid waste to Bolo Station.

12. Commercial waste collection truck traffic to and from existing landfills is expected to be reduced due to the locations of MRFs in close proximity to collection areas. It is anticipated that MRFs would be centrally located within the area to be served and that truck distances to MRFs will be less than distances traveled to existing and proposed landfills.

13. MRFs, which would be sited in industrial areas, may remain open 24-hours per day, 7 days a week, but the majority of waste would be received during a 12-hour day period (6:00 a.m. to 6:00 p.m.), six days per week (Monday through Saturday). Two hours each day will be scheduled to accommodate cleaning and maintenance.



RESIDENTIAL WASTE



COMMERCIAL/INDUSTRIAL WASTE

FIGURE 3.1

WASTE STREAM COMPOSITION
LOS ANGELES COUNTY

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

REFERENCE: LOS ANGELES COUNTY, 1990.

TABLE 3.2

PROJECTED PERCENTAGE OF RECYCLABLES RAIL•CYCLE MATERIAL RECOVERY FACILITIES[1]

WASTE STREAM COMPONENT	PERCENT OF WASTE STREAM	PERCENT OF PROJECTED WASTE STREAM RECYCLED
RESIDENTIAL		
• Separated Recyclables	4	4
• Separated Green Waste	12	0
• Mixed Waste	24	1
Subtotal	**40**	**5**
COMMERCIAL/INDUSTRIAL		
• Separated Recyclables	15	15
• Mixed Waste	45	8
Subtotal	**60**	**23**
TOTAL	**100**	**28**

91-109 (11/4/92/mg)

(1) Rail•Cycle, 1991.

Vol % of recyclables from fig 3.1 – excluding yard waste
Residential 45% — amt of this salvaged = 11%
Comm. 62% = 37%

Approximately 135 employees over three shifts are expected to be required to operate a typical MRF.

14. Three sets of 60 rail cars capable of transporting approximately 3,000 tons of waste would typically be required for each MRF. While one set is offloading at the landfill site, another set would be in transit back to the MRF, and a third set would be loading at the MRF. Waste-loaded trains would typically travel from the MRFs to the landfill in the late evening to early morning hours. Empty trains would return to the MRFs during evening hours. This practice of transporting waste at night would be typical of each MRF developed within Rail•Cycle's waste-by-rail system. Actual daily schedules would be based on operational requirements of the landfill and ATSF, and may be adjusted periodically during the project life to meet changing operational conditions.

15. While local drop-off of waste by individuals will occur during the operational life of Bolo Station Landfill, services to local communities (i.e., Needles, Yucca Valley, and other east Mojave Desert communities) may need to be considered in the future once existing local landfill capacity is exhausted. Should such services be requested or required, specific CEQA compliance and permitting would be accomplished on an as-needed basis.

16. Due to low population densities in these communities, centralized recycling may not be feasible. Rather, various types of community recycling programs and waste transfer stations could be employed to standardize separation of recyclables. Waste transfer stations would include a scalehouse and a method for screening hazardous waste which may have inadvertently entered the municipal waste stream. Should such facilities be established, it is anticipated that each transfer station may supply the landfill with two to three 25-ton loads of municipal solid waste per week. Loads would be transported to the landfill by transfer trucks, if the area is not serviced by a rail line, or in a sealed intermodal container on rail cars if the area is serviced by a rail line (in this case, rail cars would be included with existing trains traveling past Bolo Station). Transfer trucks or containers would be tipped at the landfill working face.

17. The County and BLM are currently faced with problems of illegal solid waste disposal by residents of rural desert communities. Cleanup of these sites requires a long-term solution, otherwise, as one site is cleaned up, residents establish a new site. Local waste transfer stations, located at rural desert communities, as described above, would provide an alternate approach and viable solution to this desert waste disposal problem.

18. Green waste (e.g., yard trimmings, agricultural waste, and others) is an additional form of waste that may be recycled by the project in the future. However, further processing of green waste is necessary to render it marketable as compost or usable as an alternative cover for operations and closure of existing landfills. Markets have not yet been developed for green waste potentially received by the Rail•Cycle system. As the potential for markets for green waste are not known at this time, transportation of green waste to Bolo Station for composting is not part of the proposed action.

19. An area for potential future development of a composting facility at Bolo Station Landfill has been identified for future planning purposes. However, given the current uncertainty of the compost market, Rail•Cycle is not proposing to construct or operate the compost facility at this time and the compost facility is not part of the proposed action. If, in the future, markets or uses for the compost are developed, Rail•Cycle will take the appropriate regulatory actions, including compliance with CEQA and various permitting requirements applicable for a composting facility. Until then, green waste will be handled at the MRFs and be diverted to local markets, or handled as other disposable wastes and landfilled.

3.2.3 CONSTRUCTION AND OPERATIONS PHASES OF THE PROPOSED ACTION

1. The proposed action at Bolo Station consists of both construction and operations phases. An initial construction phase would develop Bolo Station for receipt of solid waste, and provide onsite facilities required to begin landfill operations. The initial construction phase is estimated to be six to nine months in duration, and require approximately 170 personnel.

During the initial construction phase, the following onsite project facilities or features will be completed:

- Initial landfill cell.
- Portions of the railyard and offloading facility to support a minimum of two trains.
- Hazardous waste temporary storage area.
- Leachate collection/evaporation pond.
- Water supply and storage facilities.
- Fencing.
- Utilities network.
- Public waste drop-off facility.
- Entrance facility.
- Administration/equipment maintenance facility.
- Onsite service roads.
- Visitor's center.
- Fire/paramedic/sheriff station (may be provided at an offsite location either by Rail•Cycle or the County).
- Fuel storage.
- Helipad.

A landfill gas recovery facility initially consisting of a flare system would be constructed within two to three years of project initiation and is addressed as part of the proposed action.

2. Approximately 360 acres of land will be disturbed during the initial six- to nine-month construction phase. On a monthly basis, an average of 100 acres could be disturbed, with a range of 50 to 200 acres. These estimates include locations where excavated soils or imported borrow materials (i.e., clay and gravel) are stockpiled.

3. The number and type of equipment expected to be required to complete the initial construction phase is listed in Section 3.5. Construction for the landfill is expected to be accomplished on a ten hours per day, six days per week schedule. Double or triple shift construction crews may be necessary for short periods during the six- to nine-month construction phase, if the schedule requires acceleration. An average of approximately 110 pieces of equipment will be used at any one time. The peak construction period is expected to occur during the third through seventh months when up to 140 pieces of construction equipment may be in operation concurrently and 200 acres of land could be disturbed.

4. At the completion of the six- to nine-month initial construction phase, Bolo Station Landfill will be ready for operation. Follow-on construction activities will continue throughout the service life of the landfill. These follow-on activities would include additions to the offloading facility and tracks, as required by addition of MRFs to the waste-by-rail system. However, most continuing construction activities will be associated with expansion of the landfill. Landfill development will occur on a 45- to 60-acre cell-by-cell basis throughout its service life. Landfill cells are the basic units used for waste disposal and are developed on a sequential basis. Environmental protection and monitoring features will be completed during landfill cell construction. Because construction and operation associated with the landfill will be concurrent activities after the initial construction phase, they are treated and discussed in detail in the description of project elements that follows.

3.3 BOLO STATION LANDFILL PROJECT ELEMENTS

1. Bolo Station Landfill includes a number of elements, which are detailed in Sections 3.3.1 through 3.3.4. Project elements include the following:

   - **Waste Transport Element:** Transport of waste within the County is discussed under this element, including container and train types, schedule, and personnel requirements.
   - **Landfill Element:** The landfill element of the proposed action is the most comprehensive. This element is subdivided into landfill facility, offloading facility and railyard, entrance/ administration and equipment maintenance facilities, hazardous waste temporary storage area, public waste drop-off facility, and landfill gas recovery facility.

Description of the landfill facility includes landfill phasing schedule, grading, soil cover requirements, and onsite environmental control systems, such as leachate control and surface water management.

- **Support Elements:** A wide range of environmental monitoring elements are detailed, together with additional landfill support features such as the fire/paramedic/sheriff station and sanitary facilities.
- **Ancillary Elements and Utilities:** These elements include the visitor's center, power, communications and water requirements, and additional ancillary elements of the proposed action.

3.3.1 WASTE TRANSPORT ELEMENT

1. Compacted residual waste (i.e., municipal solid waste from which recyclables have been removed at the MRF) will be transported from MRFs to Bolo Station over existing rail lines. Each train will carry approximately 3,000 tons of compacted solid waste in intermodal-type containers. Typically, 100 to 120 containers, each carrying approximately 25 to 30 tons of waste, will be loaded on a conventional double-stack, approximately 4,000-foot long train.

2. At the maximum disposal rate, up to seven inbound trains may be required to service the landfill. The schedule for adding trains is directly correlated with additions of new MRFs to the waste-by-rail system. Each MRF is expected to supply the landfill with approximately 3,000 tons of waste per day, which will be transported to the landfill by a single train. The maximum disposal rate of 21,000 tons per day is expected when seven MRFs are included within the system, each requiring a single train to the landfill daily.

3. Rail transport to the landfill is scheduled to occur primarily at night on a six day basis (between the hours of approximately 8:00 p.m. to 6:00 a.m.). Typical landfill operations would require that waste be ready for offloading at the start of the first daytime shift of employees. Empty trains would typically leave the landfill in the early morning (between the hours of approximately 4:00 a.m. to 9:00 a.m.), lay over for a variable time at Barstow, and return to the MRFs in the early to late evening (between the hours of approximately 8:00 p.m. to 11:00 p.m.). Train schedules will be finalized as each MRF is brought on line.

4 Each MRF in the proposed waste-by-rail system will require three sets of containers and rail cars. One set will be at the MRF for loading, one set at the landfill for unloading, and one set in transit between the MRF and the landfill. Each set of rail cars will complete six round trips per week to support one MRF. Rail crews for the trains will be drawn from the ATSF train crew pools and consist of three persons. However, train crew size may be reduced to two-person train crews in the future. Crews are not assigned to specific projects but are drawn as needed from available personnel.

5. Initially, MRFs will be established in communities in Los Angeles County, where available landfill disposal space is declining. Future MRFs are tentatively being considered for other southern California communities, including San Bernardino County.

6. Depending on eventual locations of MRFs supporting Rail•Cycle, three rail haul routes will be used to transport waste from the MRFs to Bolo Station. These routes are shown in Figure 3.2 and consist of:

- ATSF's San Bernardino Subdivision that extends from east Los Angeles through Fullerton, Corona, and Riverside to San Bernardino. From San Bernardino the route follows ATSF's main line through the Cajon Pass, Victorville and Barstow to Bolo Station.
- A portion of the recently established Southern California Regional Rail Authority (SCRRA) rail system that extends from east Los Angeles through Pasadena, Glendora, Upland and Rialto to San Bernardino. From San Bernardino the route again follows ATSF's main line through Barstow to Bolo Station.
- A portion of ATSF's Mojave Subdivision that extends from Mojave to Barstow and connects with a Southern Pacific Railroad that serves the Santa Clarita Valley. From Barstow this route follows ATSF's main line to Bolo Station.

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KERN COUNTY
SAN BERNARDINO COUNTY
VENTURA COUNTY
LOS ANGELES COUNTY
ORANGE COUNTY
RIVERSIDE COUNTY
SAN DIEGO COUNTY
IMPERIAL COUNTY
PACIFIC OCEAN
BAKERSFIELD
MOJAVE
BARSTOW
VICTORVILLE
SAN BERNARDINO
RIVERSIDE
SANTA ANA
VENTURA
LOS ANGELES
SAN DIEGO
EL CENTRO
BLYTHE
NEEDLES
AMBOY
SALTON SEA
BOLO STATION LANDFILL
ARIZONA-CALIFORNIA RAILROAD (FORMERLY ATSF)
ATSF
SP
SP/ATSF
UP
SCRRA
PRIVATE
NEVADA
CALIFORNIA
ARIZONA
NEVADA
ARIZONA
CALIFORNIA
CALIFORNIA
MEXICO
ARIZONA
MEXICO
99
395
14
58
5
15
40
138
101
10
177
62
405
86
78
8

N

LEGEND

- RAIL•CYCLE WASTE-BY-RAIL HAUL ROUTES
- INTERNATIONAL BOUNDARY
- STATE BOUNDARY
- COUNTY BOUNDARY
- MAJOR HIGHWAY
- MAJOR RAILROAD LINE
- ATSF — ATCHISON, TOPEKA, AND SANTA FE RAILROAD
- SP — SOUTHERN PACIFIC RAILROAD
- UP — UNION PACIFIC RAILROAD
- SCRRA — SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY

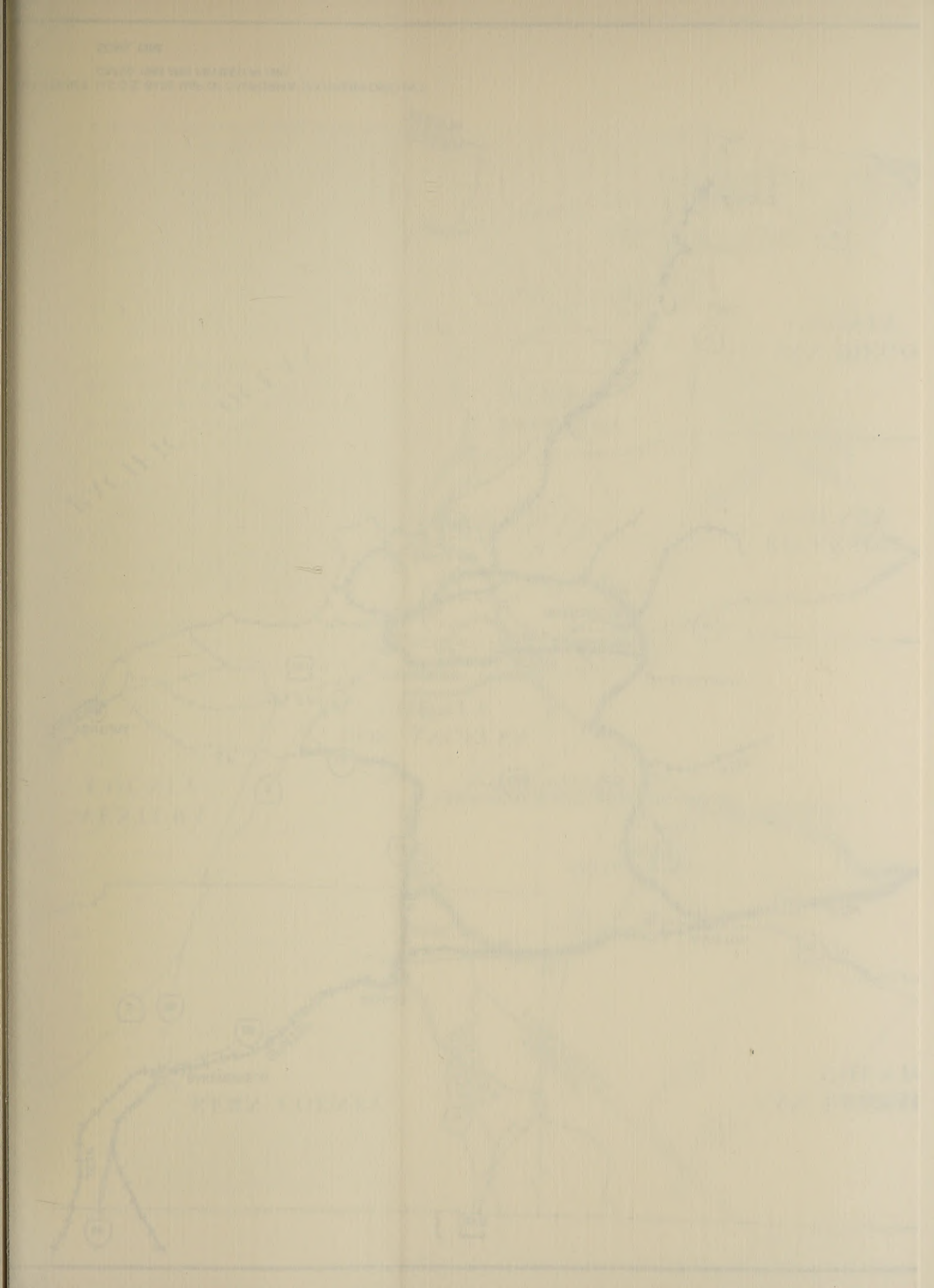
0 25 50 MILES
SCALE

REFERENCE: U.S.G.S. BASE MAP OF CALIFORNIA, SOUTHERN ONE-HALF. DATED 1968 AND REVISED IN 1981

SCAG, 1988.

FIGURE 3.2
SYSTEM WIDE WASTE-BY-RAIL HAUL ROUTES
RAIL·CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.



The portions of the Rail•Cycle waste-by-rail track routes that are located in urban southern California (ATSF's San Bernardino Subdivision and a portion of SCRRA's rail line) lie predominantly between east Los Angeles and San Bernardino and are depicted in greater detail in Figure 3.3.

7. ATSF has a major railyard at Barstow that will function as the refueling, inspection, and maintenance area for unit trains in the waste-by-rail system. Barstow serves these same functions for current ATSF operations. These activities will not be conducted at the landfill site. For each MRF, there will be one outbound waste-laden rail trip and one inbound rail trip per 24-hour day.

3.3.2 LANDFILL ELEMENT

1. The landfill element includes the landfill facility, railyard and offloading facility, entrance facility, administration/equipment maintenance facility, hazardous waste temporary storage area, public waste drop-off facility, and landfill gas recovery facility. The locations of these facilities, and other onsite project elements and features, are shown in Figure 3.4.

2. An emergency response plan will be developed for each phase of the Bolo Station facilities operations. The plan will have subsections addressing:

   - Offloading operations
   - Landfilling operations
   - Equipment/maintenance operations
   - Administrative operations
   - Offsite assistance (e.g., firefighting, paramedical, and police/security)

3.3.2.1 Landfill Facility

1. The landfill will be designed as a Class III non-hazardous municipal solid waste disposal facility that includes a composite liner system, leachate collection and control system, landfill gas collection system, and litter control. The landfill design will meet or exceed regulatory requirements for the construction, operation, and closure of landfills included in CCR Titles 14 and 23, and 40 CFR Part 258, Subtitle D. Its estimated capacity is approximately 717 million cubic yards or 430 million tons of municipal solid waste, with a service life ranging from approximately 60 to 100 years dependent on the annual volume of waste which is landfilled.

2. The waste stream will be preprocessed at MRFs before being compacted and loaded for transport to the landfill. The majority of recycling activities will be completed prior to transport of the residual waste. Recycling at the landfill would be for wastes brought into the public drop off facility located near the visitor's center, or wastes from potential waste transfer stations at remote desert communities. Should markets or uses for compost be developed, composting of green waste may be conducted at the landfill facility. Composting and recycling of potential wastes from remote desert community transfer stations are not part of the proposed action.

3. The landfill "footprint" design includes division of the 3.3-square mile surface area (2,100 acres) into 46 landfill cells along a north-south grid, as shown in Figure 3.5. These cells are the basic units for landfill development. Each cell will be sequentially prepared and filled with its optimum volume of waste and cover. As landfilling operations advance, portions of the landfill will reach their maximum height while other sections remain unaltered, as graphically illustrated in Figure 3.6. Completed cells will be managed according to a closure plan in accordance with CCR Title 14. Surfaces and slopes that will not interface with a future landfill cell will be closed, including revegetation as specified in the approved closure plan. Slopes that will interface with a future landfill cell will be temporarily covered with soil. Landfilling operations will be initiated in the northwestern corner of the landfill as shown in Figure 3.5.

4. At completion, 60 or more years in the future, the landfill will have a general T-shape, as shown in Figure 3.7. The central portion of the landfill will be elevated from approximately 370 to 380 feet above the surrounding natural terrain. The landfill slopes and surface will be undulating so as to simulate natural foothill features, while maintaining top and side slope drainage. Figure 3.8 depicts typical cross sections of the landfill at completion.

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LEGEND

- ATSF (ATCHISON, TOPEKA AND SANTA FE RAILWAY COMPANY)
- SCRRA (SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY)

NOTE: SCRRA RECENTLY PURCHASED THIS RAIL LINE FROM ATSF, ATSF HAS RETAINED RAIL RIGHTS ON THIS LINE.

0 4 8 MILES
SCALE

REFERENCE: USGS 1 X 2 DEGREE TOPOGRAPHIC MAPS OF LOS ANGELES AND SAN BERNARDINO, CALIFORNIA, BOTH DATED 1975 AND 1969 RESPECTIVELY.

FIGURE 3.3

URBAN SOUTHERN CALIFORNIA WASTE-BY-RAIL HAUL ROUTES

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

91-1094/rsk-08 REV 11/05/92

ROUTE 66 (NATIONAL TRAILS HIGHWAY)

ACCESS ROAD INTERSECTION

1400'

ABOVEGROUND WATER STORAGE TANK (600,000 GALLONS)

VISITOR'S CENTER AND PUBLIC DROPOFF AREA (SEE DETAIL "A")

400'

50' LANDFILL ACCESS ROAD (24' PAVEMENT)

POTENTIAL FUTURE COMPOSTING FACILITY (LOCATED FOR INFORMATION PURPOSES ONLY)

NEW WATER WELL

PAVED AREA

HAZARDOUS WASTE TEMPORARY STORAGE AREA (200' MIN. BUFFER ZONE TO OTHER STRUCTURES)

CONTAINER MAINTENANCE SHOP

INITIAL RAILYARD/ OFFLOADING FACILITY (SEE FIGURE 3.15)

FUTURE RAILYARD/ OFFLOADING FACILITIES (SEE FIGURE 3.15)

ATSF (NORTH MAIN TRACK)

ATSF (SOUTH MAIN TRACK)

NMT

SMT

LEVEE

PROPOSED BOLO STATION RAILROAD SIDING

RAILWAY OVERPASS

OPERATIONS AND MAINTENANCE FACILITY

HELIPAD

ADMINISTRATION BUILDING

GAS RECOVERY FACILITY

ELECTRICAL POWER LINE

LANDFILL

POTENTIAL LINED LEACHATE EVAPORATION PONDS (LOCATED FOR INFORMATIONAL PURPOSES ONLY)

POWER LINE CONNECTION TO SCE

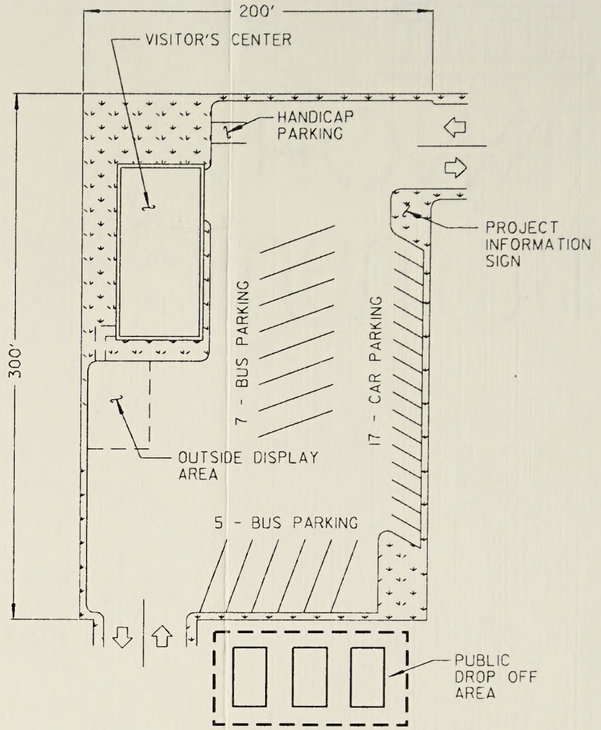
APPROXIMATE LOCATION OF 100-YEAR FLOODPLAIN

LANDFILL RUNOFF SEDIMENTATION BASIN

SEE DETAIL "B"

NOTE: FINAL DESIGN WILL EXCLUDE LANDFILLING IN AREAS POTENTIALLY AFFECTED BY THE 100-YEAR FLOODPLAIN.

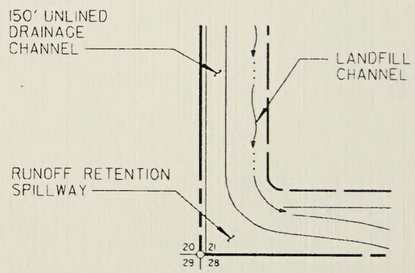
REFERENCE: WMNA, 1991a, FACILITIES, SHEET NO. 8.



DETAIL A

VISITOR'S CENTER AND PUBLIC DROP OFF AREA

NOT TO SCALE



DETAIL B

PERIMETER STRUCTURES (TYPICAL)

NOT TO SCALE

LEGEND

- PROJECT AREA BOUNDARY
- ATSF RAILROAD
- EXISTING RAILROAD LEVEE
- LANDFILL LINED RUNOFF CHANNEL
- 150' WIDE UNLINED DRAINAGE CHANNEL
- PROPOSED LIMIT OF FILL
- EXISTING DIRT ACCESS ROAD
- ELECTRICAL POWER LINE
- APPROXIMATE LOCATION OF 100-YEAR FLOODPLAIN (CORRESPONDS TO THE 620' CONTOUR)
- SECTION CORNER
- LANDSCAPING
- NMT ATSF NORTH MAIN TRACK
- SMT ATSF SOUTH MAIN TRACK

0 2,500 5,000 FEET

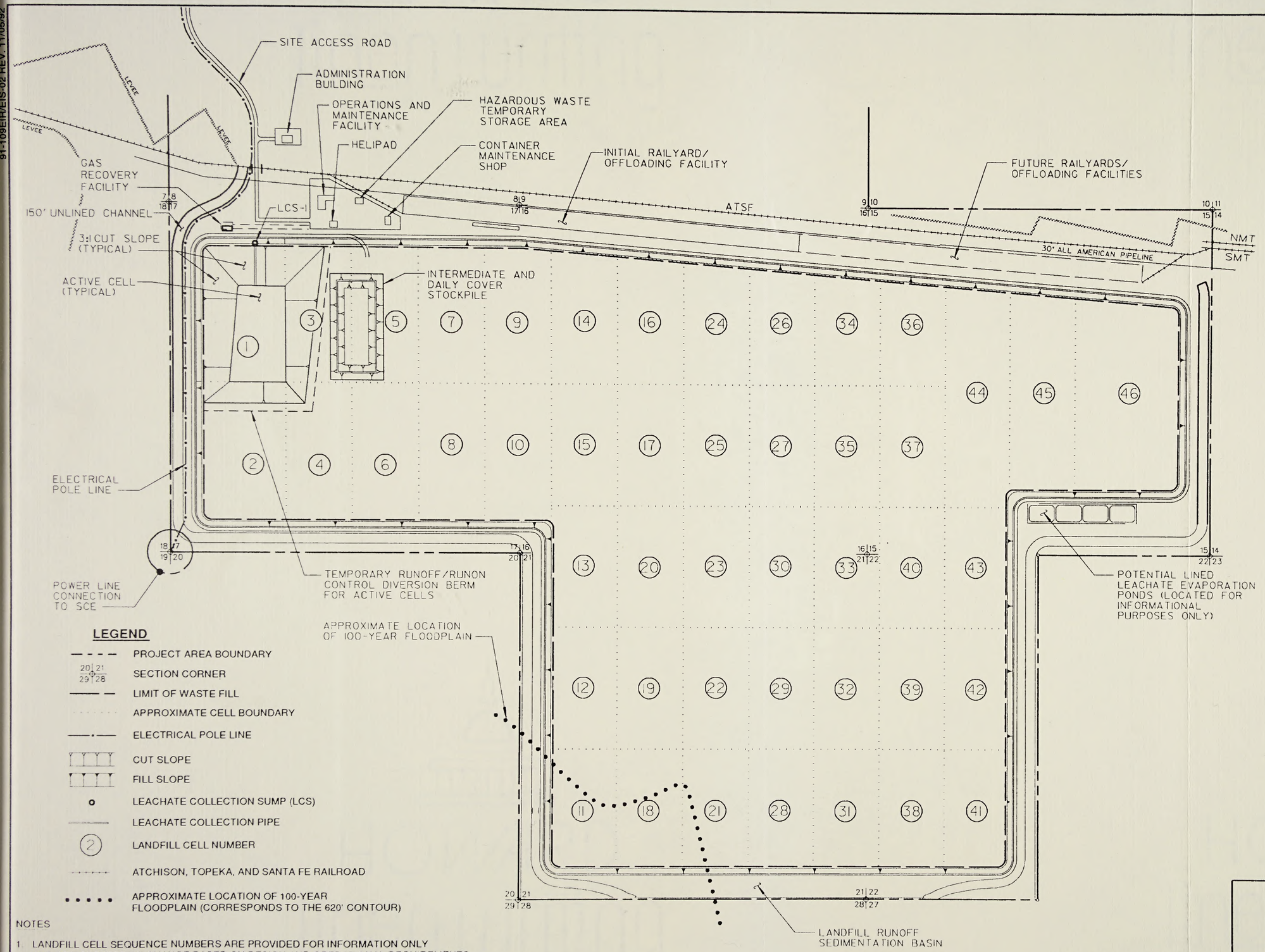
SCALE

FIGURE 3.4

PLAN VIEW OF THE BOLO STATION LANDFILL SITE

RAIL·CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.



CELL NUMBER	WASTE LOADING (MILLIONS OF CUBIC YARDS)
1	10.3
2	11.6
3	13.1
4	11.2
5	13.1
6	11.7
7	13.1
8	11.7
9	13.1
10	11.7
11	7.5
12	8.6
13	8.5
14	12.4
15	12.9
16	11.8
17	14.5
18	10.6
19	15.2
20	14.9
21	10.5
22	18.6
23	19.0
24	11.3
25	18.6
26	10.5
27	21.9
28	10.4
29	20.4
30	24.0
31	10.5
32	18.5
33	18.9
34	10.3
35	18.2
36	9.7
37	13.4
38	10.5
39	14.8
40	14.8
41	7.4
42	7.6
43	7.9
44	14.1
45	12.3
46	15.7

LEGEND

- PROJECT AREA BOUNDARY
- SECTION CORNER (20|21 / 29|28)
- LIMIT OF WASTE FILL
- APPROXIMATE CELL BOUNDARY
- ELECTRICAL POLE LINE
- CUT SLOPE
- FILL SLOPE
- LEACHATE COLLECTION SUMP (LCS)
- LEACHATE COLLECTION PIPE
- (2) LANDFILL CELL NUMBER
- ATCHISON, TOPEKA, AND SANTA FE RAILROAD
- APPROXIMATE LOCATION OF 100-YEAR FLOODPLAIN (CORRESPONDS TO THE 620' CONTOUR)

NOTES

1. LANDFILL CELL SEQUENCE NUMBERS ARE PROVIDED FOR INFORMATION ONLY AND ARE SUBJECT TO CHANGE BASED ON DESIGN AND OPERATIONAL REQUIREMENTS.
2. FINAL DESIGN WILL EXCLUDE LANDFILLING IN AREAS POTENTIALLY AFFECTED BY THE 100-YEAR FLOODPLAIN. CELLS 11, 18 AND 21 WILL BE RECONFIGURED TO STAY ABOVE THE 620' CONTOUR.

REFERENCE: WMNA, 1991a.
PHASING PLAN-CELL LAYOUT, SHEET NO. 7.

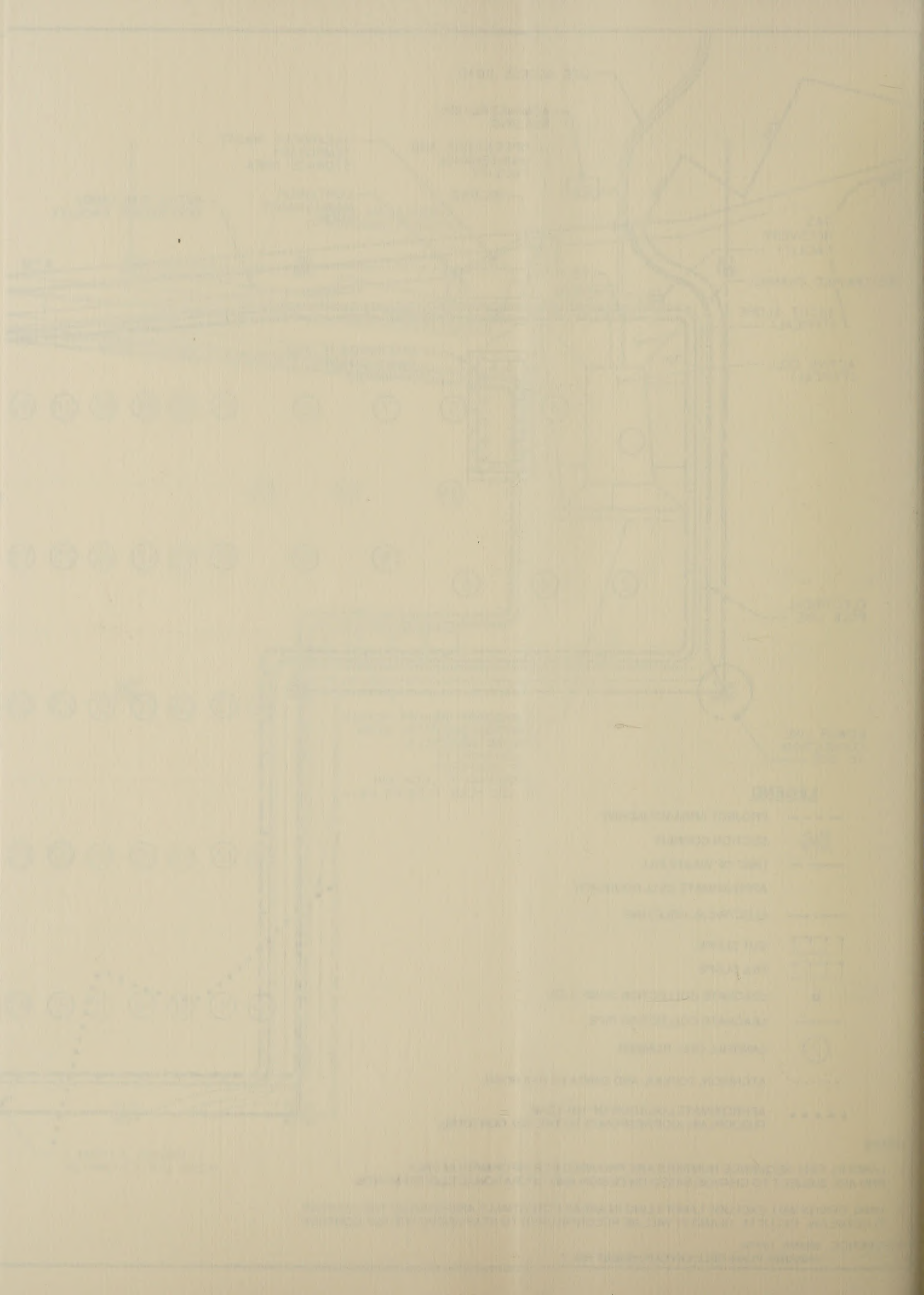
0 1,500 3,000 FEET
SCALE

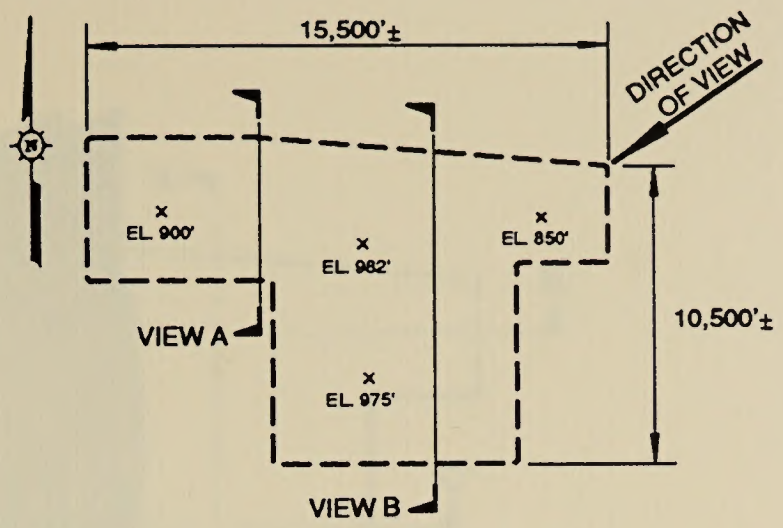
FIGURE 3.5

LANDFILL CELL LAYOUT

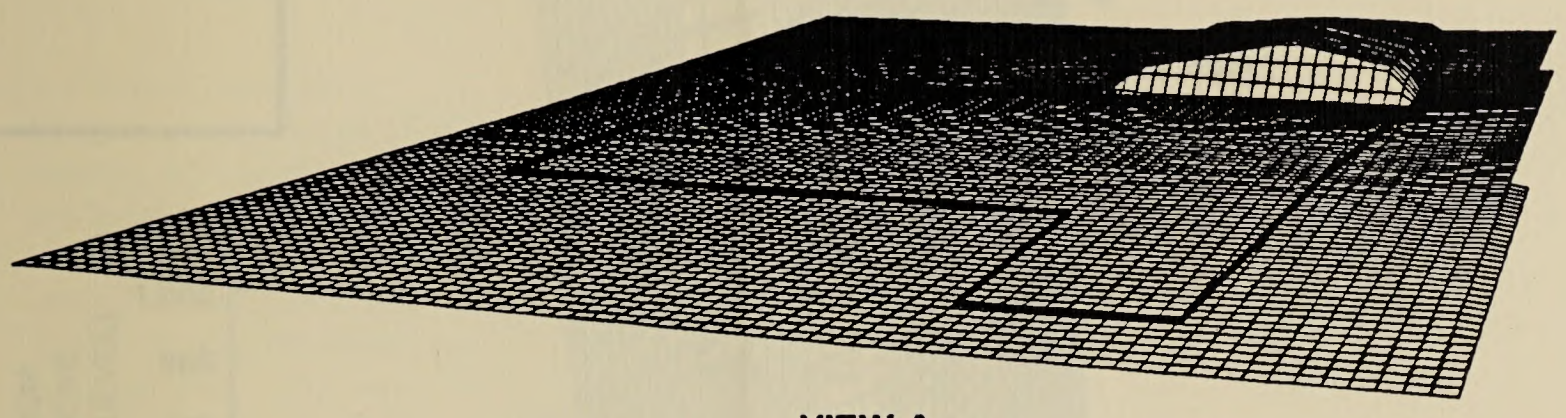
RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.



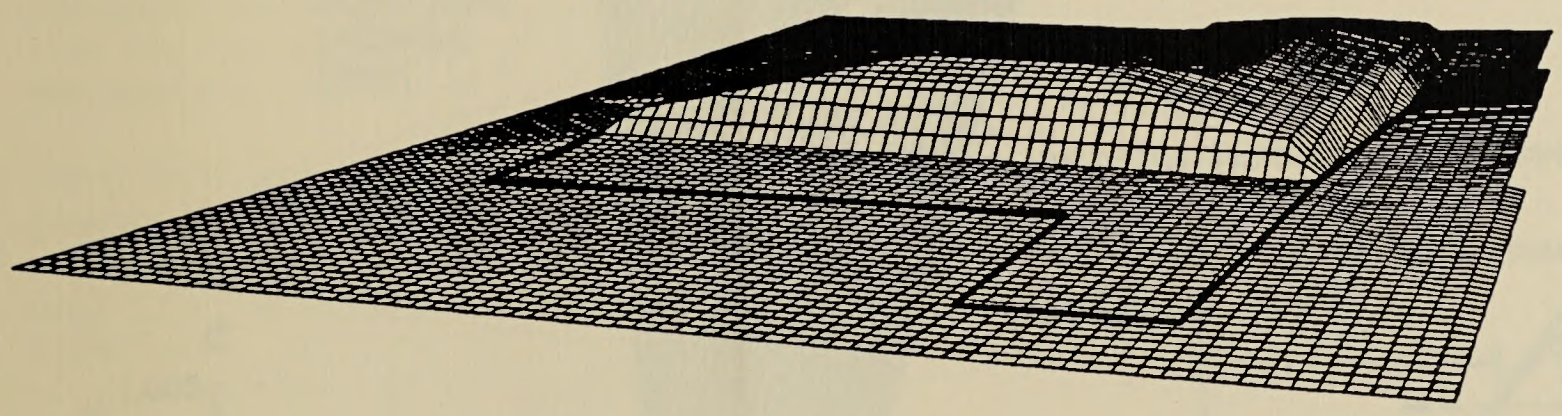


KEY PLAN



VIEW A

VIEW OF LANDFILL AT 20% FILL COMPLETION
(APPROXIMATELY YEAR 14)



VIEW B

VIEW OF LANDFILL AT 70% FILL COMPLETION
(APPROXIMATELY YEAR 40)

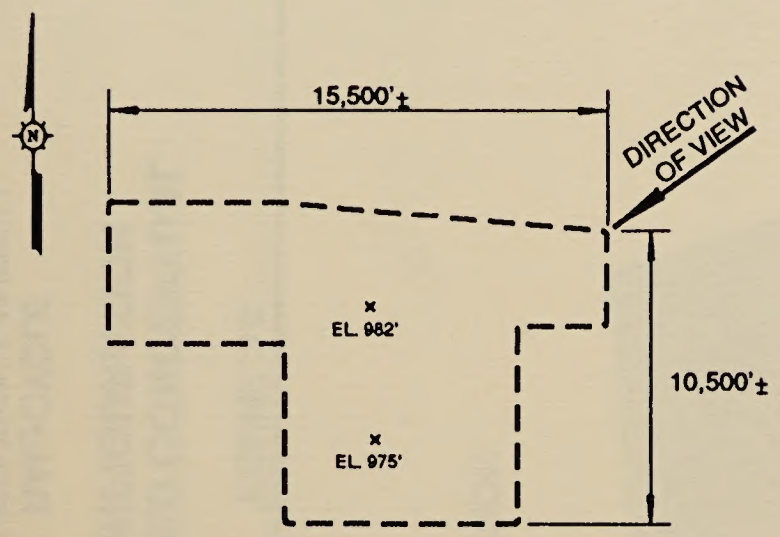
NOTE
BASED ON 21,000 TONS PER DAY
BY THE FIFTH YEAR OF OPERATION.

FIGURE 3.6

PHASED CONCEPTUAL CONFIGURATION

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.



KEY PLAN

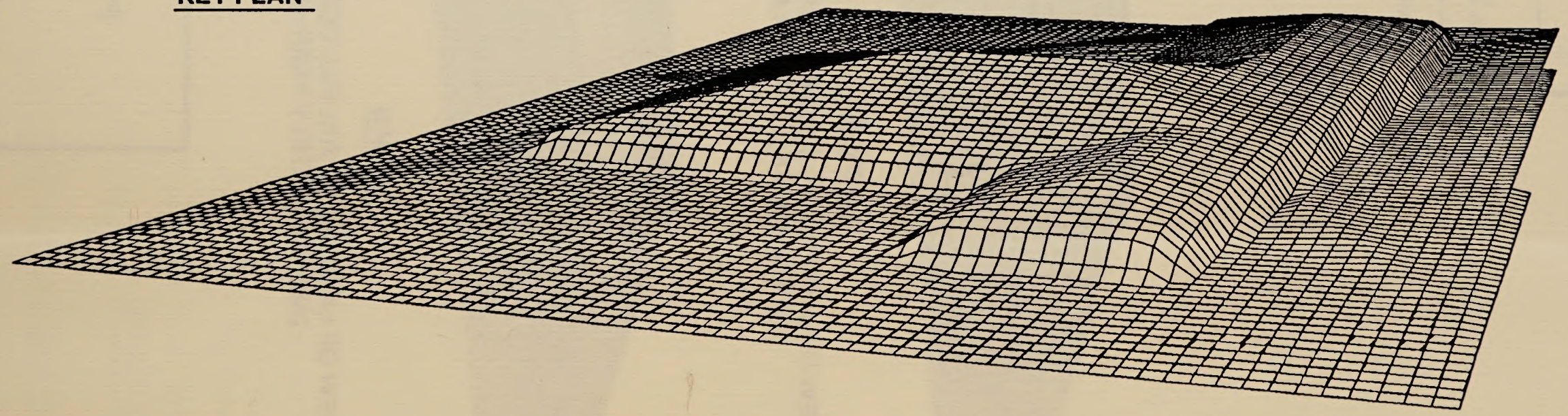
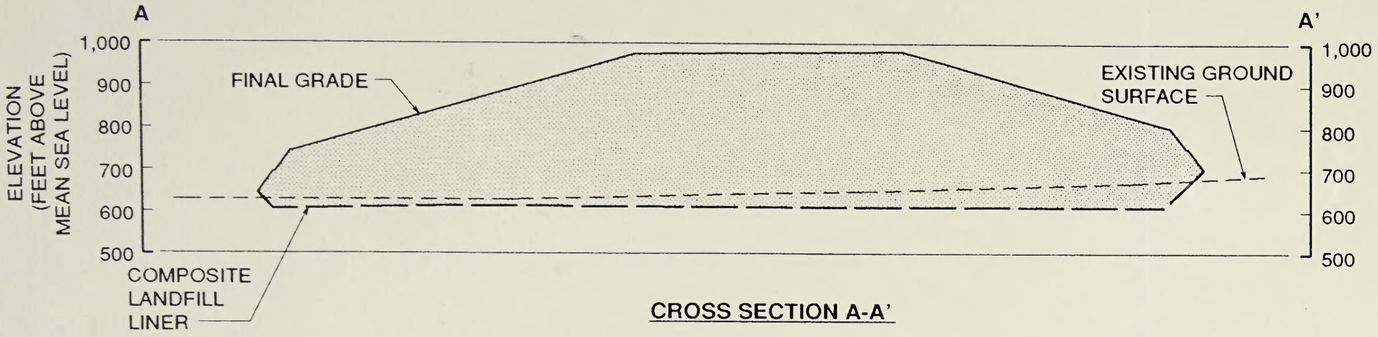


FIGURE 3.7

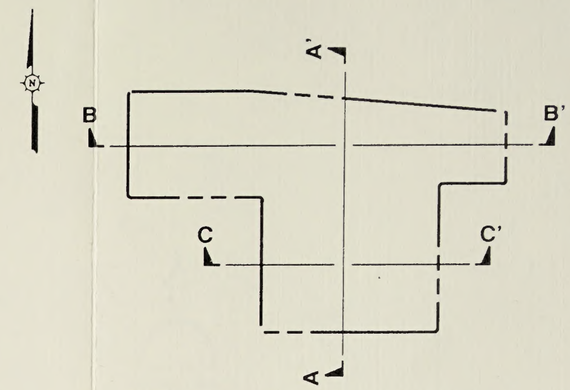
FINAL CONCEPTUAL CONFIGURATION

RAIL•CYCLE
BOLO STATION LANDFILL

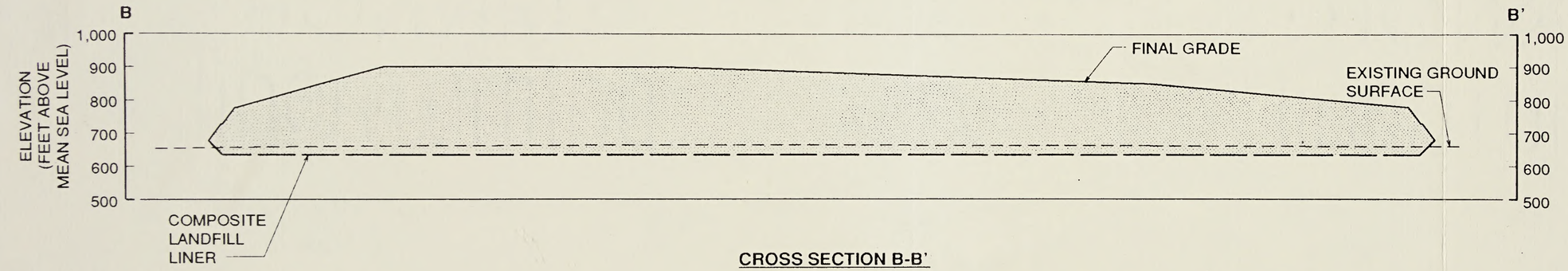
ENVIRONMENTAL SOLUTIONS, INC.



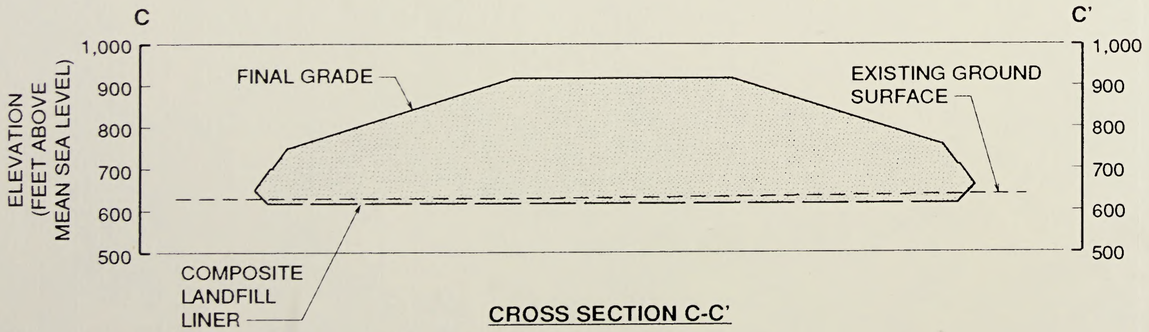
CROSS SECTION A-A'



PLAN VIEW



CROSS SECTION B-B'



CROSS SECTION C-C'

LEGEND

- EXISTING GROUND SURFACE (APPROXIMATE)
- COMPOSITE LANDFILL LINER
- LANDFILL FINAL COVER (APPROXIMATE)
- LANDFILLED WASTE

0 1,500 3,000 FEET
HORIZONTAL SCALE

0 375 750 FEET
VERTICAL SCALE

NOTES

1. SEE FIGURE 3.9 FOR LOCATIONS OF CROSS SECTIONS.
2. BASE GRADES SHOWN ARE CONCEPTUAL. FINAL BASE GRADES WILL VARY ACCORDING TO DETAILED DESIGN AND ANALYSIS OF GROUND WATER LEVELS, CAPILLARY ZONE, SETTLEMENT AND LINER CONSTRUCTION MATERIAL.

REFERENCE: WMNA, 1991a.
CROSS SECTIONS, SHEET NO. 9.

FIGURE 3.8

TYPICAL CROSS SECTIONS OF BOLO STATION LANDFILL

RAIL·CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

5. Elevation of the landfill will range from approximately 800 feet to 980 feet above msl. The elevation of natural terrain surrounding the landfill ranges from approximately 610 feet above msl at the southwestern perimeter of the landfill to approximately 690 feet above msl along the northern perimeter of the landfill.

6. The final grade of the landfill surface will be sloped at approximately 7 percent when the final cover for each landfill cell is applied as shown in Figure 3.9. The maximum side slope at the landfill edges will be 3 to 1. The final landform of the closed landfill is graphically illustrated in Figure 3.7.

3.3.2.1.1 Phased Schedule

1. Following construction of the landfill support facilities and preparation of the first landfill cell, the landfill will continue to be developed for waste disposal on a phased schedule. Limited areas (i.e., about 60 to 180 acres) of the approximately 2,100 acre landfill area will be open at any one time. The upper limit of this range would include an active cell, a cell under construction, a daily cover stockpile, and a cell that has been completed but is being capped, graded, and revegetated as part of cell closure. Remaining areas will either be unaltered or completed, except for interfaces between completed and working or subsequent working cells that will be utilized as the landfill progresses to its final build-out.

2. During the initial five operational years of the proposed action, it is expected that residual waste transferred to the landfill will increase from 3,000 tons per day (one MRF) to 21,000 tons per day (seven MRFs), as shown in Table 3.1. The schedule presented in Table 3.1 is for planning purposes only. The actual schedule for reaching 21,000 tons per day is dependent on approval and development of MRFs, which may be accomplished in either a more abbreviated or more extended time frame. Once achieved, the 21,000 tons per day input is expected to remain relatively constant throughout the remaining service life of the landfill. Landfill development and use during the initial three to four years will be accomplished at a slower rate than succeeding service years due to lower levels of daily waste input.

3. Table 3.3 summarizes conceptual landfill capacity and projected service life. The conceptual landfill capacity is 821 million cubic yards. Of this total, the waste volume is projected to be 717 million cubic yards, with the remaining 104 million cubic yards comprising various soil cover materials, including daily, intermediate, and final cover to meet the landfill cover requirements of CCR Titles 14 and 23 and 40 CFR Part 258, Subtitle D. At an average landfill waste volume of 5,000 cubic yards per 3,000-ton daily train load, and with seven trains per day projected by the fifth year of operation (21,000 tons per day), the service life of the landfill is projected to be approximately 60 years. Lower daily volumes would extend the life of the landfill.

4. To accommodate varying rates of anticipated project utilization, the landfill will be developed cell by cell. A cell will range from 45 to 60 acres in area. A total of 46 cells is planned for the landfill, as shown in Figure 3.5. The use of cells will limit areal disturbance as well as dimensions of the landfill working face to only that area needed to satisfy waste disposal demands at the time.

5. In the initial three to five years of the project, only one landfill cell is expected to be completed. This early cell will contain approximately 10 million cubic yards of waste (see Figure 3.5). Once the landfill achieves its maximum disposal rate of 21,000 tons per day, a typical landfill cell would be filled in one to two years. However, there are several high volume cells with capacities from 20 to 24 million cubic yards that would remain active for three years or more even at the 21,000 tons per day disposal rate. Across the site, projected waste volume per cell will range from 7.4 to 24 million cubic yards.

3.3.2.1.2 Landfill Grading

1. The landfill will be constructed by excavating, lining, and then filling cells oriented along a north-to-south grid, as shown in Figure 3.5. Cell limits and construction sequence are designed to balance soil excavation and soil cover use to reduce import and double handling of soil materials. As shown in Table 3.4, the only import material is low permeability clay

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SITE ACCESS ROAD
ADMINISTRATION BUILDING
OPERATIONS AND MAINTENANCE FACILITY
HELIPAD
HAZARDOUS WASTE TEMPORARY STORAGE AREA
CONTAINER MAINTENANCE SHOP
INITIAL RAILYARD/ OFFLOADING FACILITY
FUTURE RAILYARDS/ OFFLOADING FACILITIES
LEVEE
LEVEE
GAS RECOVERY FACILITY
150' UNLINED CHANNEL
ATSF
NMT
SMT
30" ALL AMERICAN PIPELINE
LCS-1 LCS-2 LCS-3 LCS-4 LCS-5 LCS-6 LCS-7 LCS-8 LCS-9 LCS-10 LCS-11 LCS-12 LCS-13 LCS-14
LCS-15 LCS-16 LCS-17 LCS-18 LCS-19 LCS-20 LCS-21
7% MIN
850
900
950
x982
x975
A
A'
B
B'
C
C'
POTENTIAL LINED LEACHATE EVAPORATION PONDS (LOCATED FOR INFORMATION PURPOSES ONLY)
APPROXIMATE LOCATION OF 100-YEAR FLOODPLAIN
LANDFILL RUNOFF SEDIMENTATION BASIN

LEGEND

- PROJECT AREA BOUNDARY
- SECTION CORNER
- PROPOSED LIMIT OF FILL
- FILL SLOPE (TOP / TOE)
- FINAL GRADE
- LEACHATE COLLECTION SUMP (LCS-21)
- RUNOFF DIVERSION DITCH AND FLOW DIRECTION
- RUNOFF INLET AND DOWNSPOUT
- APPROXIMATE LOCATION OF 100-YEAR FLOODPLAIN (CORRESPONDS TO THE 620' CONTOUR)

NOTES

1. ELEVATIONS SHOWN ARE AT SURFACE OF 4' FINAL COVER.
2. MAXIMUM SLOPES ARE 3 TO 1.
3. SEE FIGURE 3.8 FOR CROSS SECTIONS A-A', B-B', AND C-C'.
4. APPROXIMATE LOCATION OF 100-YEAR FLOODPLAIN (CORRESPONDS TO THE 620' CONTOUR)

0 1,500 3,000 FEET
SCALE

REFERENCE: WMNA, 1991a. PROPOSED FINAL GRADES, SHEET NO. 4.

FIGURE 3.9

FINAL GRADE AND SURFACE WATER CONTROL OF COMPLETED LANDFILL

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

TABLE 3.3

LANDFILL CAPACITY AND APPROXIMATE SERVICE LIFE

SURFACE AREA	2,100 ACRES	PROPOSED OPERATING YEARS[1]					
		1	2	3	4	5	6-60
Capacity: • Total Landfill Volume • Less Daily, Intermediate and Final Cover (reference Table 3.4) • Volume for Waste • Total Weight of Waste	821 million cubic yards 104 million cubic yards --- 717 million cubic yards 430 million tons	3,000 tons/day	6,000 tons/day	9,000 tons/day	15,000 tons/day	21,000 tons/day	21,000 tons/day
Total Volume of Waste Per Year (million cubic yards)[2]		1.56	3.12	4.68	7.8	10.92	~10.92
Cumulative Volume of Waste (million cubic yards)[2]		1.56	4.68	9.36	19.16	28.08	717
Total Weight of Waste Per Year (million tons)[2]		0.94	1.88	2.81	4.68	6.55	~6.55
Cumulative Weight of Waste (million tons)[2]		0.94	2.82	5.63	10.31	16.86	430

91-109 (11/4/92/mg))

(1) Service life of approximately 60 years based on maximum waste disposal of approximately 21,000 tons per day according to phased operation schedule shown.

(2) A ton of waste is expected to have a volume of 1.67 cubic yards after compaction in the landfill. Alternately each cubic yard of waste deposited in the landfill is expected to weight 0.6 tons.

TABLE 3.4

EXCAVATION, EARTHWORK, AND POTENTIAL MATERIAL IMPORT REQUIREMENTS(1)

DESCRIPTION	VOLUME (million cubic yards)
EXCAVATION	104
EARTHWORK	
• Daily/Intermediate Cover	90
• Final Cover	14
TOTAL EARTHWORK	**104**
POTENTIAL MATERIAL IMPORT REQUIREMENTS	
• Clay Barrier Material ($1x10^{-7}$ cm/sec)	13.5
• Gravel (Leachate Drainage Layer)	3.4

where from?

91-109 (11/4/92/mg)

(1) WMNA, 1992b.

NOTE: Daily/intermediate cover volumes assume limited use of soil for daily cover based on expected approval from the LEA and CIWMB for the use of synthetic or other alternative daily cover. It also assumes that 24-hour operations are integrated once sufficient volumes of wastes are received on a daily basis that will further limit the need for daily cover.

for the landfill liner and final cover, and gravel for the drainage layer. Landfill units will be excavated to depths of 0 to 60 feet. Excavation depth will vary across the landfill site in order to achieve and maintain a minimum separation of 5 feet between the base of the landfill liner and the highest anticipated zone of capillary rise above ground water level. This capillary zone varies across the site (i.e., height at which soil water is held by cohesion in capillary spaces).

2. Each landfill cell will be excavated at a 3 to 1 (horizontal to vertical ratio) cut slope. The base will be sloped at a minimum of 1 percent to provide proper drainage to 1 of 21 leachate collection sumps located along the north and south perimeter of the landfill. Excavated materials will be stockpiled in a nearby location for use as daily and intermediate cover material during landfill operation. Top soil will be stockpiled separately for final closure of each cell.

3. Landfill slope faces will be constructed at a 3 to 1 ratio with 20-foot wide benches at 50-foot high intervals to minimize erosion. The landfill top surface will have a minimum slope of about 7 percent to provide surface water runoff without resulting in erosion potential. The final landfill surface will rise to a maximum elevation of approximately 380 feet above the natural terrain in the central portion of the site, but will have a generally less elevated surface elsewhere.

3.3.2.1.3 Daily, Intermediate, and Final Landfill Cover

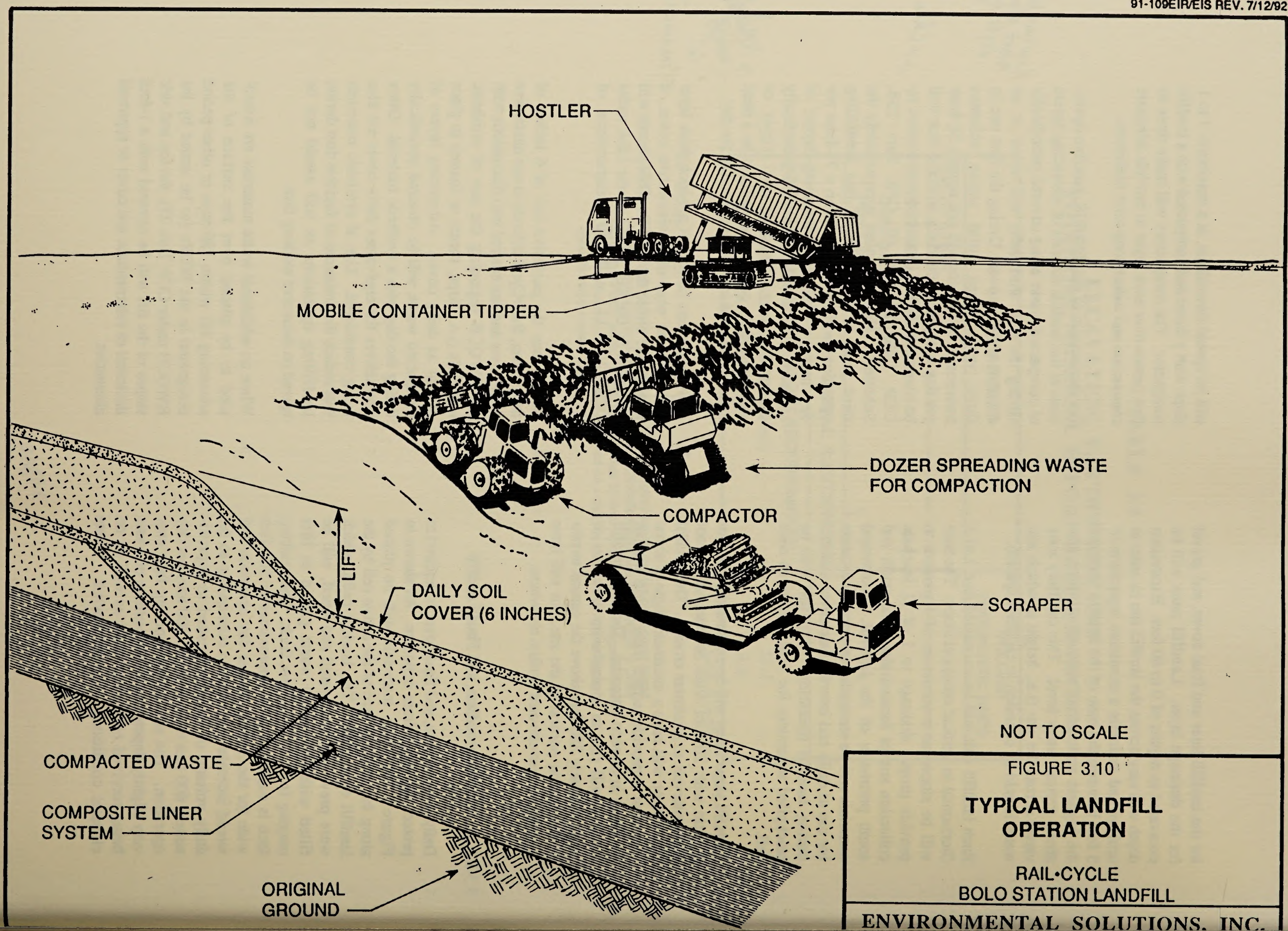
1. Daily, intermediate, and final cover is required to protect the waste from exposure. As shown in Figure 3.10, waste materials will be placed along the working face of the active cell by the landfill equipment. The landfill cells, which were previously excavated and lined, will be filled with compacted waste placed in lifts ranging from 15 to 20 feet thick. The working face is expected to be approximately 300 feet wide for the 3,000 tons per day operation and would increase over time in relationship to the daily volume of waste deposited to approximately 600 feet wide at the 21,000 tons per day operation. The size of the working face may vary slightly depending on the volume of waste being received on a daily basis as well as on climatic conditions, especially wind. Waste will be spread downslope, at a maximum 3 to 1 slope with a dozer and compacted with a landfill compactor. The compactors will make three to five passes over each layer to provide adequate compaction and reduce long-term settlement.

2. For the purpose of this EIR/EIS, baseline operations at the landfill consists of advancing layers of compacted waste being covered periodically during the day with daily soil cover or an alternative daily cover. During the first one to three years when solid waste volumes transported to the site will not require 24-hour per day operations, the daily working face will be covered at the end of each day as required by CCR Title 14 and 40 CFR Part 258, Subtitle D. However, after approximately the third year, it is anticipated that landfilling operations will be conducted on a 24-hour per day basis. While the advancing layers of compacted waste will be covered periodically during the day with daily soil cover or alternative daily cover, there will not be a need to cover the working face at the end of the day.

3. Daily cover may consist of a 6-inch thick layer of soil or an equivalent alternative cover, if permissible under the SWFP. This permit will be issued by the SBCDEHS as the LEA under CCR Title 14, with the concurrence of CIWMB.

4. Rather than the exclusive use of 6 inches of daily cover, Rail•Cycle intends to use alternative daily cover and has entered into discussions with the RWQCB regarding the use of synthetic materials (i.e., tarps, sheets or foams) in place of soil as daily cover. Advancing layers of compacted waste will be covered periodically during the day with a synthetic material. Other alternatives for equivalent daily cover are also being considered. Use of synthetic materials will reduce the emissions of fugitive dust during landfilling operations as soil would not be spread on the active working face.

5. When no additional waste materials are scheduled to be placed over the surface of the advancing lift within 180 days or other period designated in the WDRs (to be issued by the RWQCB under CCR Title 23), the top and side slopes of the lift will be covered with a 1-foot thickness of intermediate soil cover or approved alternative.



NOT TO SCALE

FIGURE 3.10

TYPICAL LANDFILL OPERATION

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

6. As cells are completed to final grade, a minimum of 4 feet of cover will be placed on the slopes and over the upper surface as follows: a 2-foot thick foundation layer will be capped with 1 foot of clay or equivalent alternative having a permeability of $1x10^{-7}$ centimeter per second (cm/sec) or less, which will be covered with a 1-foot thickness of topsoil. Stockpiled topsoil will be used for the uppermost layer, which will be suitable for vegetative growth. The surface will be landscaped with drought-tolerant native vegetation. Requirements for final cover are included in CCR Title 23 and 40 CFR Part 258 Subtitle D.

7. Rail•Cycle is considering the use of a 40-mil (a mil is 1/1,000 of an inch) thick high density polyethylene (HDPE) flexible membrane in place of the 1-foot of clay in the final cover. Use of the HDPE membrane in the final cover would eliminate the water required to establish the optimum moisture content for the clay layer. Its use would also eliminate importation of the clay to the site and the emissions of fugitive dust associated with the spreading and compacting of the clay liner.

8. The use of a HDPE membrane in the final cover is a permitting issue that will involve RWQCB, LEA, and CIWMB. As the permitting process has not been completed to allow the use of a HDPE membrane in the final cover at Bolo Station, the use of the 1-foot layer of clay as part of final cover represents not only the "standard" regulatory method but also the "worst-case" in terms of associated environmental impacts. Therefore, the use of clay as part of final cover is considered baseline for the purpose of the EIR/EIS. However, if Rail•Cycle receives the appropriate permits and approvals for the use of an HDPE membrane as part of final cover at Bolo Station, it will replace the use of clay at the site.

3.3.2.1.4 Onsite Landfill Control Systems

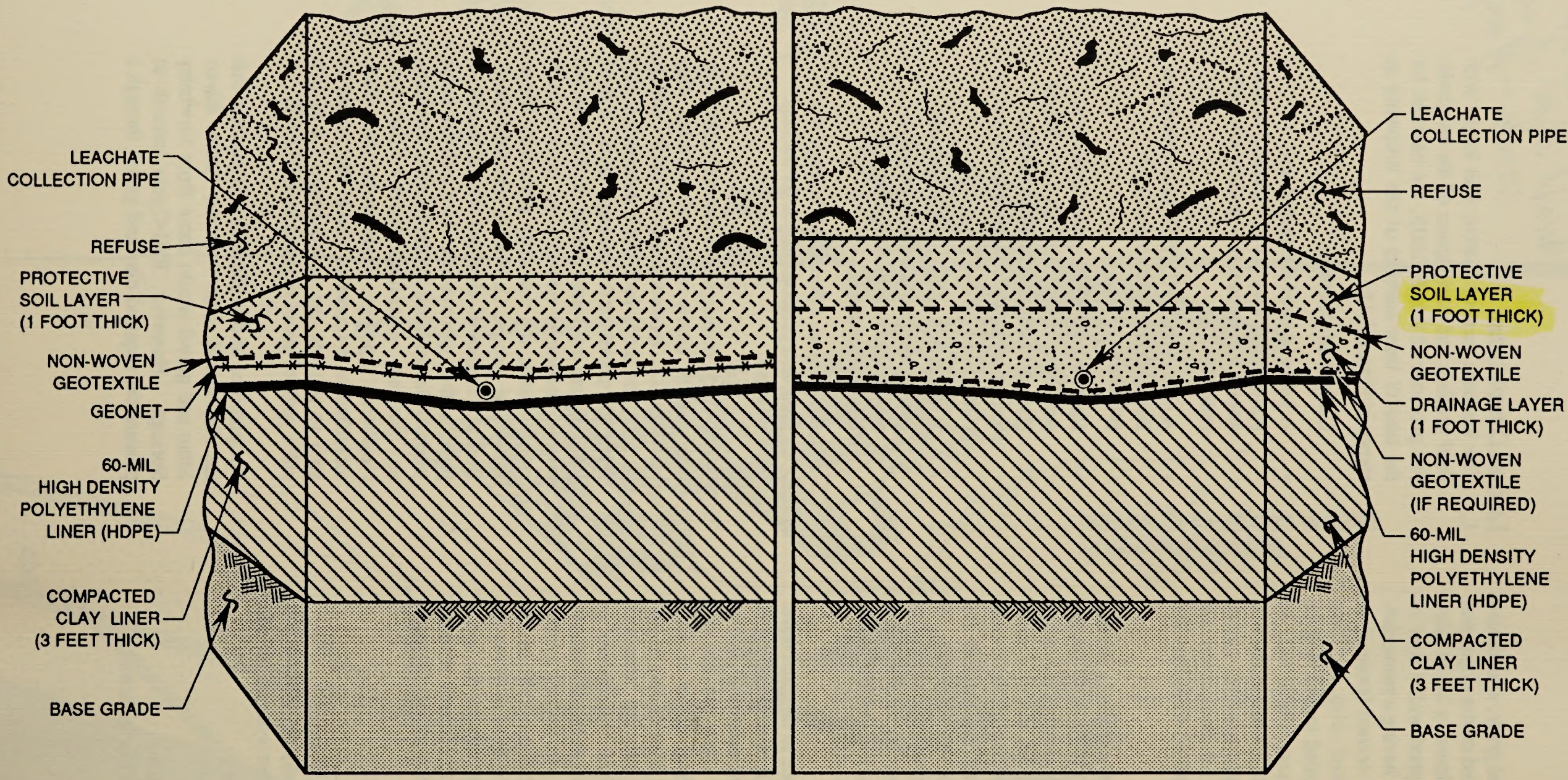
1. Onsite landfill control systems are discussed in the following paragraphs. These systems include:
   - Leachate control system
   - Surface water run-on controls
   - Landfill runoff controls
   - Landfill gas control system
   - Control of nuisance and health factors

Leachate Control System

1. The leachate control system will begin with final grading and compaction of the subgrade. For purposes of this EIR/EIS, the baseline for the landfill liner consists of the following as shown in Figure 3.11:
   - Compacted subgrade.
   - A 3-foot layer of compacted low permeability clay ($1x10^{-7}$ cm/sec) or less sloped at 2 percent in a shallow sawtooth pattern.
   - A 60-mil thick HDPE flexible membrane liner overlayed with a protective geotextile.
   - Either a 1-foot thick gravel layer or a thin layer of geonet to serve as a lateral drainage medium to conduct leachate toward a leachate collection trench and pipe.
   - A nonwoven geotextile material will overlay the gravel layer or geonet to prevent infiltration of soil into the drainage medium.
   - A minimum 1-foot thick layer of soil to serve as a protection layer for the liner system.

2. Geotechnical investigations currently underway may locate onsite areas of suitable clay materials (i.e., a permeability of $1x10^{-7}$ cm/sec or less) for the 3-foot thick compacted clay layer, and gravel for the drainage layer. If these materials are not found onsite, or, if found, but not in sufficient quantity to meet project requirements, the currently permitted Rheox Mine near Hector, California, has been identified as a source of clay that would be able to provide the approximate 13.5 million cubic yards of clay required for the landfill. Similarly, an existing, permitted borrow site near Newberry Springs, California, has been identified as a source of gravel that would be able to provide the approximate 3.4 million cubic yards of gravel required for the landfill.

3. For purposes of this EIR/EIS it is assumed that the clay would come from the Hector Rheox Mine and gravel would come from Newberry Springs. However, Rail•Cycle intends to procure the required clay and gravel through a



LINER SYSTEM WITH GEONET DRAINAGE MEDIUM

LINER SYSTEM WITH GRAVEL DRAINAGE MEDIUM

NOT TO SCALE

FIGURE 3.11

CROSS SECTION OF COMPOSITE LINER SYSTEM

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

competitive contract and other sources may be utilized. To be awarded a contract, the source will be required to be an approved mining/borrow area with appropriate permits and licenses. As Rail•Cycle will use existing permitted and licensed sources, the mining of clay and gravel for use at the site is not addressed in this EIR/EIS. However, the EIR/EIS does address the impacts associated with transporting these materials from the source to Bolo Station.

4. The leachate collection system consists of a 1-foot thick gravel drainage layer or a geonet layer and piping, as depicted in Figure 3.11. Leachate collection piping consists of 6-inch diameter, perforated pipe installed in rows. These perforated pipes will collect and transport leachate from the drainage layer to leachate sumps.

5. Collection piping will be installed in gravel trenches between the leachate drainage layer and the HDPE liner. The piping will be sloped at a 1 percent minimum grade providing gravity flow to a leachate collection sump. An 18-inch diameter, nonperforated riser pipe installed in the sump will be used to withdraw leachate periodically by pumping. The leachate collection system is designed such that leachate will be contained in its general area of production, as shown in Figure 3.12. Landfill base contours at the top of the composite liner system will slope downward to the north and south from a centrally placed east-west topographic high point in the landfill bore contour. Each leachate collection source area will encompass about 100 acres, and the landfill design includes 21 such areas.

6. It is the intent of Rail•Cycle to reintroduce collected leachate into the solid waste compacted at the active working face. The reintroduction of leachate has been approved at other landfills by the RWQCB and various LEAs. The reintroduction of collected leachate will eliminate the need for Rail•Cycle to construct and operate leachate evaporation ponds at Bolo Station.

7. If reintroduction of collected leachate is not approved for Bolo Station, Rail•Cycle would construct double-lined leachate evaporation ponds at the east-central perimeter of the landfill, as shown in Figure 3.12. Up to four ponds could potentially be developed for the landfill facility. Each pond would measure approximately 300 feet wide by 400 feet long with a capacity of approximately 4 million gallons. If required, the ponds would be constructed in phases, with one pond being constructed during the initial construction period and the other three being constructed on an as-needed basis.

8. The leachate evaporation ponds would be lined to prevent leachate from migrating from the ponds into ground water. The composite liner system for the ponds is shown in Figure 3.13, and would consist of the following:

   - A 12-inch base course consisting of consolidated gravel and sand.
   - A 12-inch layer of compacted low permeability clay ($1x10^{-7}$ cm/sec or less).
   - A secondary 60-mil thick HDPE flexible membrane liner overlaid with a protective geotextile.
   - A 6-inch secondary gravel ($1x10^{-2}$) gravel layer which will include a leachate collection system. Geotextile will overlay the gravel layer.
   - A second 12-inch layer of compacted low permeability clay ($1x10^{-7}$ cm/sec or less).
   - A primary 60-mil thick HDPE flexible membrane liner overlaid with geotextile and a 12-inch layer of protective soil.

9. The leachate collection system between the primary and secondary HDPE flexible membrane liner acts as a monitor in the event the primary liner is damaged. In the event of damage, the primary liner would be repaired.

10. The above information on the potential leachate evaporation ponds is provided in the event reintroduction of collected leachate into the waste at the active working face is not approved. Rail•Cycle has not received any indication from the RWQCB that reintroduction of leachate will not be approved, therefore, the potential construction and operational impacts associated with the leachate evaporation ponds are not addressed in this EIR/EIS. If leachate evaporation ponds become necessary at Bolo Station,

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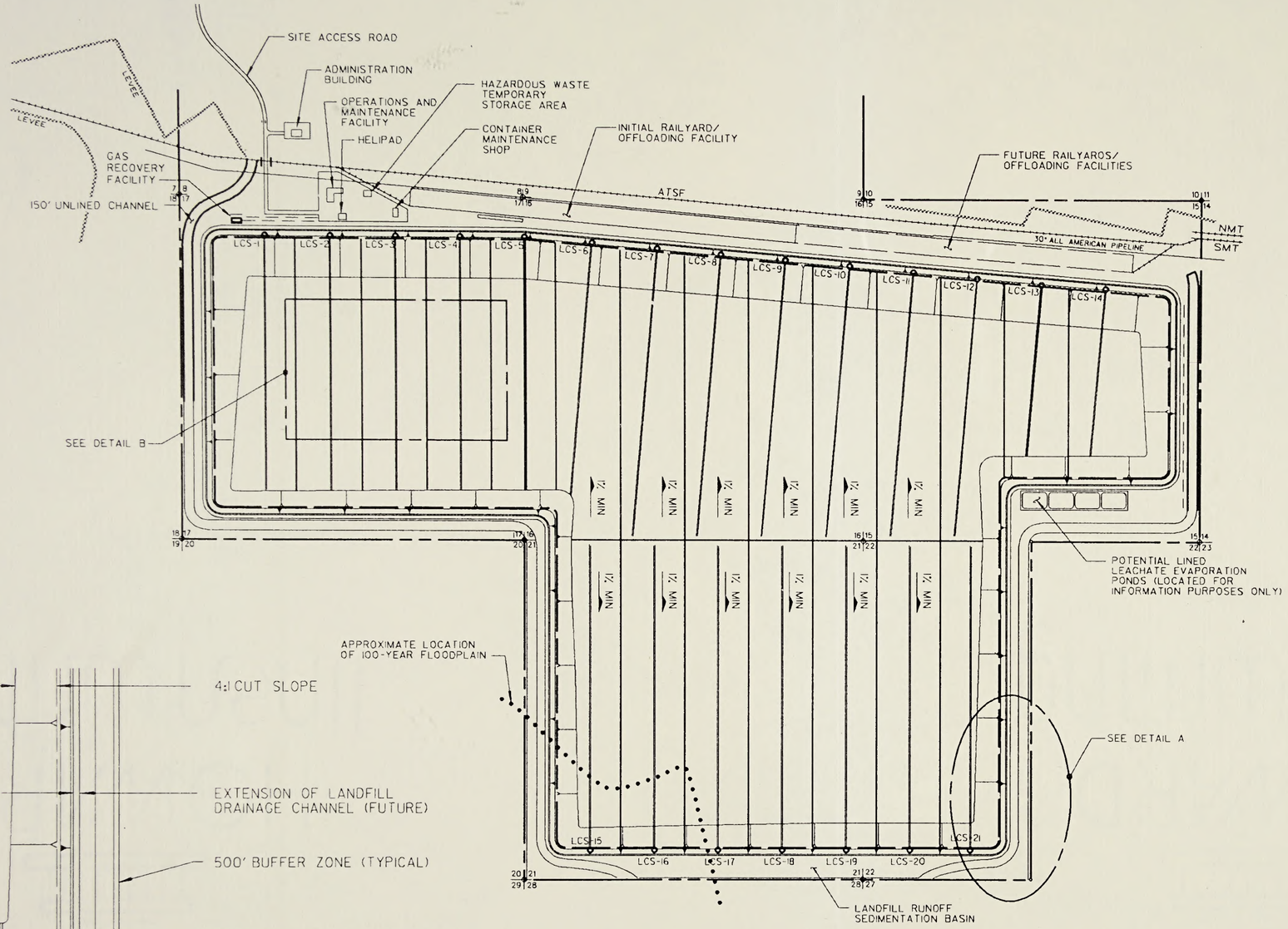
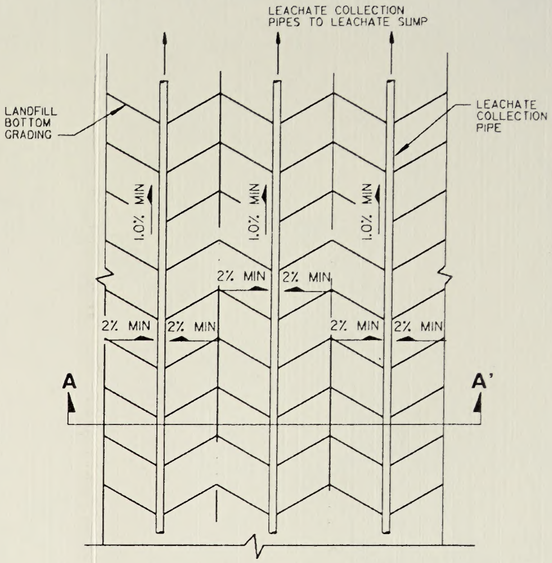
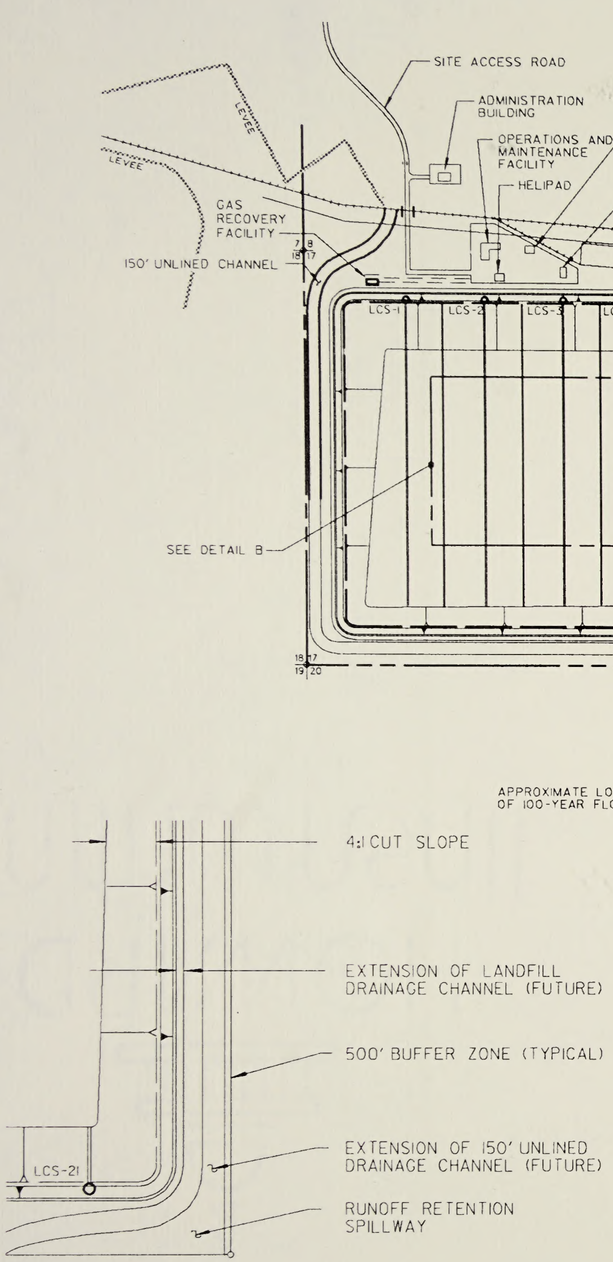




DETAIL B
NOT TO SCALE



DETAIL A
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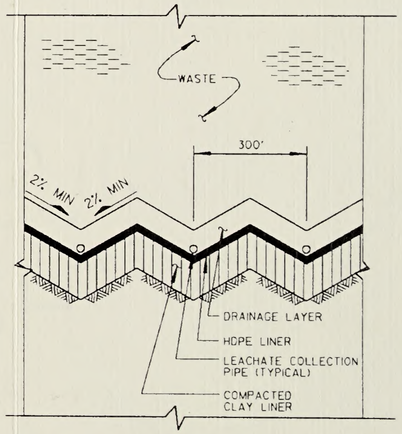

CROSS SECTION A-A'
NOT TO SCALE

LEGEND

----	PROJECT AREA BOUNDARY
20|21 / 29|28	SECTION CORNER
——	PROPOSED LIMIT OF FILL
LCS-21	LEACHATE COLLECTION SUMP (LCS)
——	LEACHATE COLLECTION PIPE
ATSF	ATCHISON, TOPEKA AND SANTA FE RAILROAD
------	TRACKS
• • •	APPROXIMATE LOCATION OF 100-YEAR FLOODPLAIN (CORRESPONDS TO THE 620' CONTOUR)

NOTE: FINAL DESIGN WILL EXCLUDE LANDFILLING IN AREAS POTENTIALLY AFFECTED BY THE 100-YEAR FLOODPLAIN.

REFERENCE: WMNA, 1991a.

0 2,000 4,000 FEET
SCALE

FIGURE 3.12

CONCEPTUAL LEACHATE COLLECTION SYSTEM

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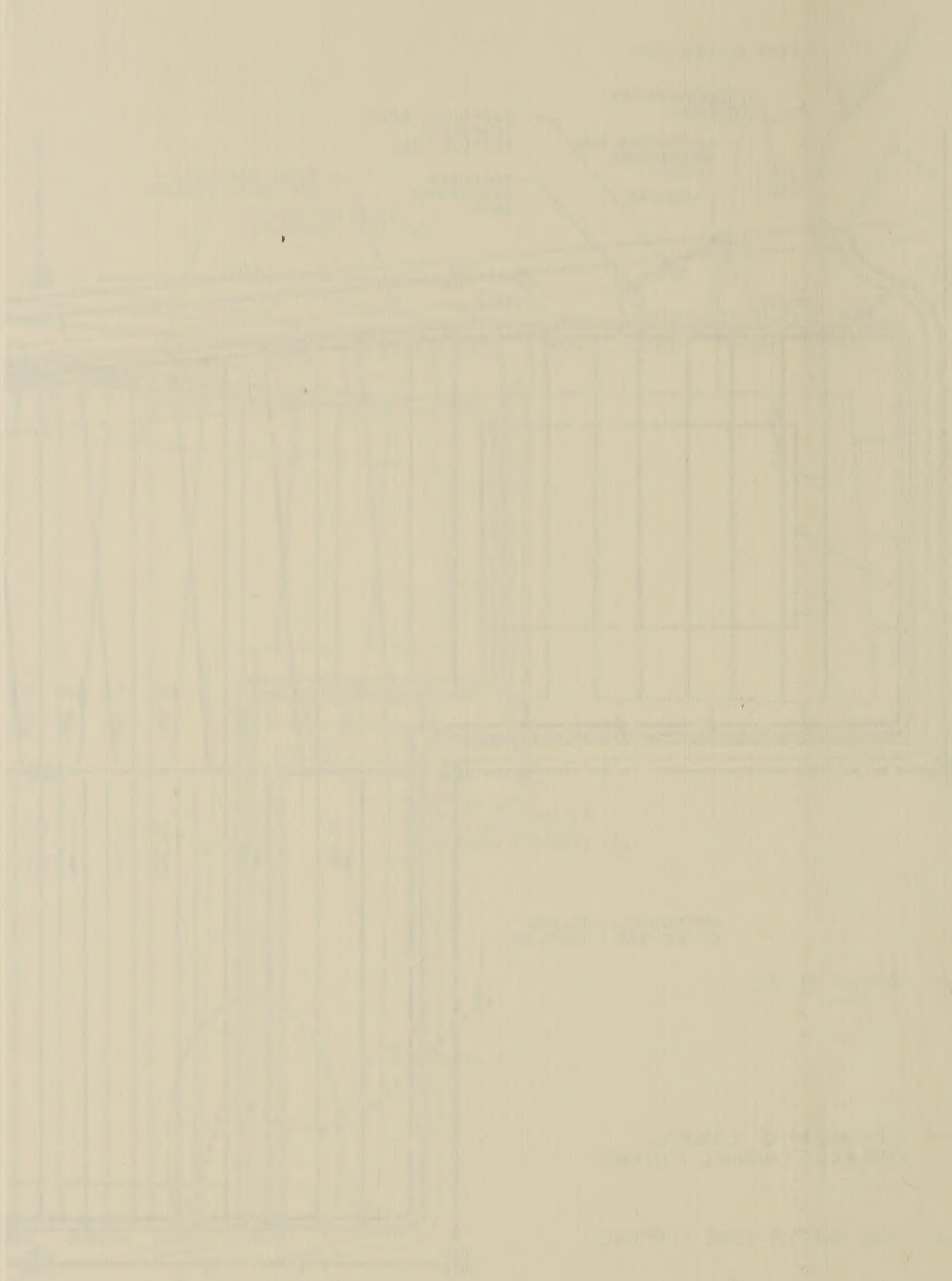
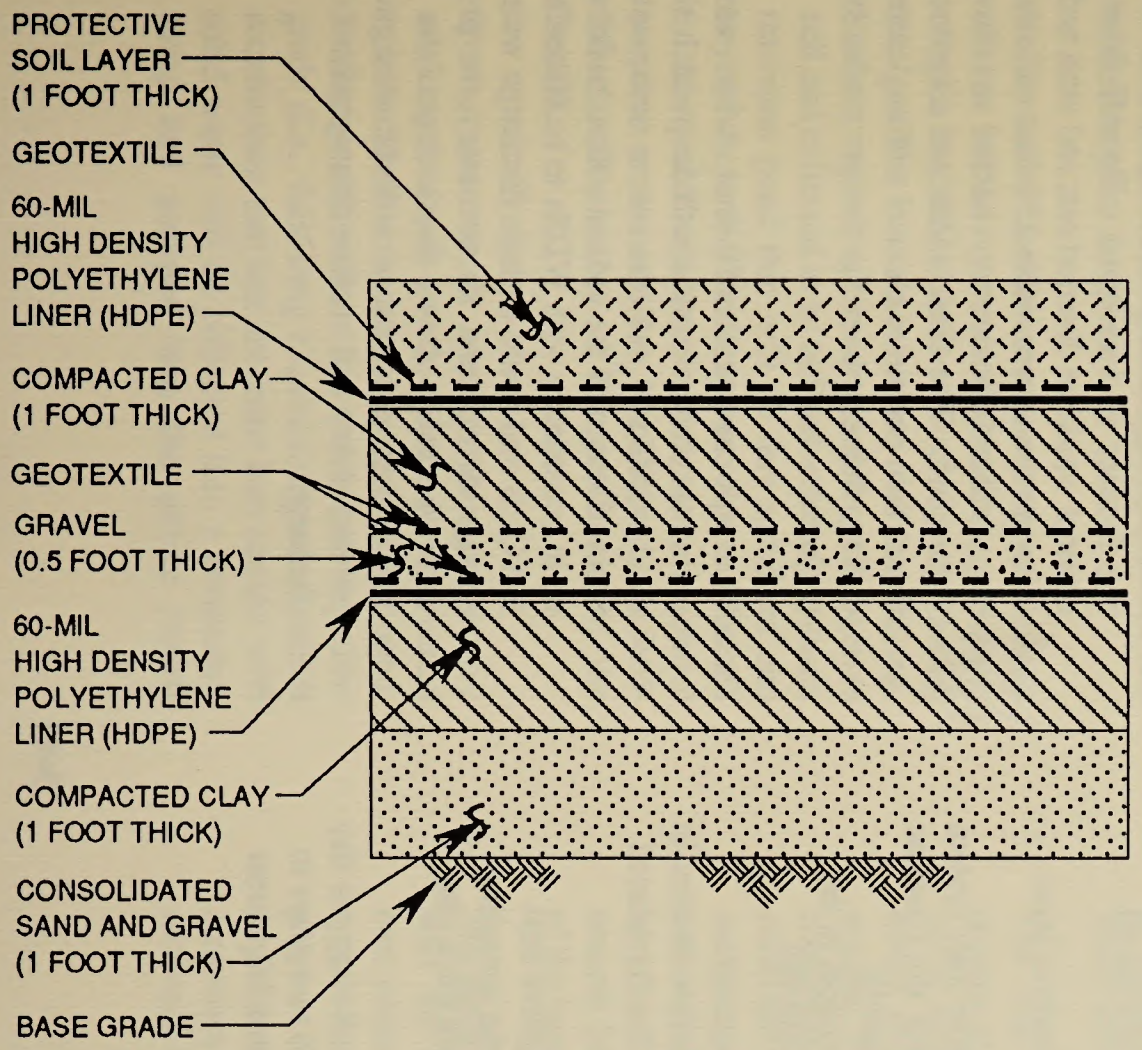
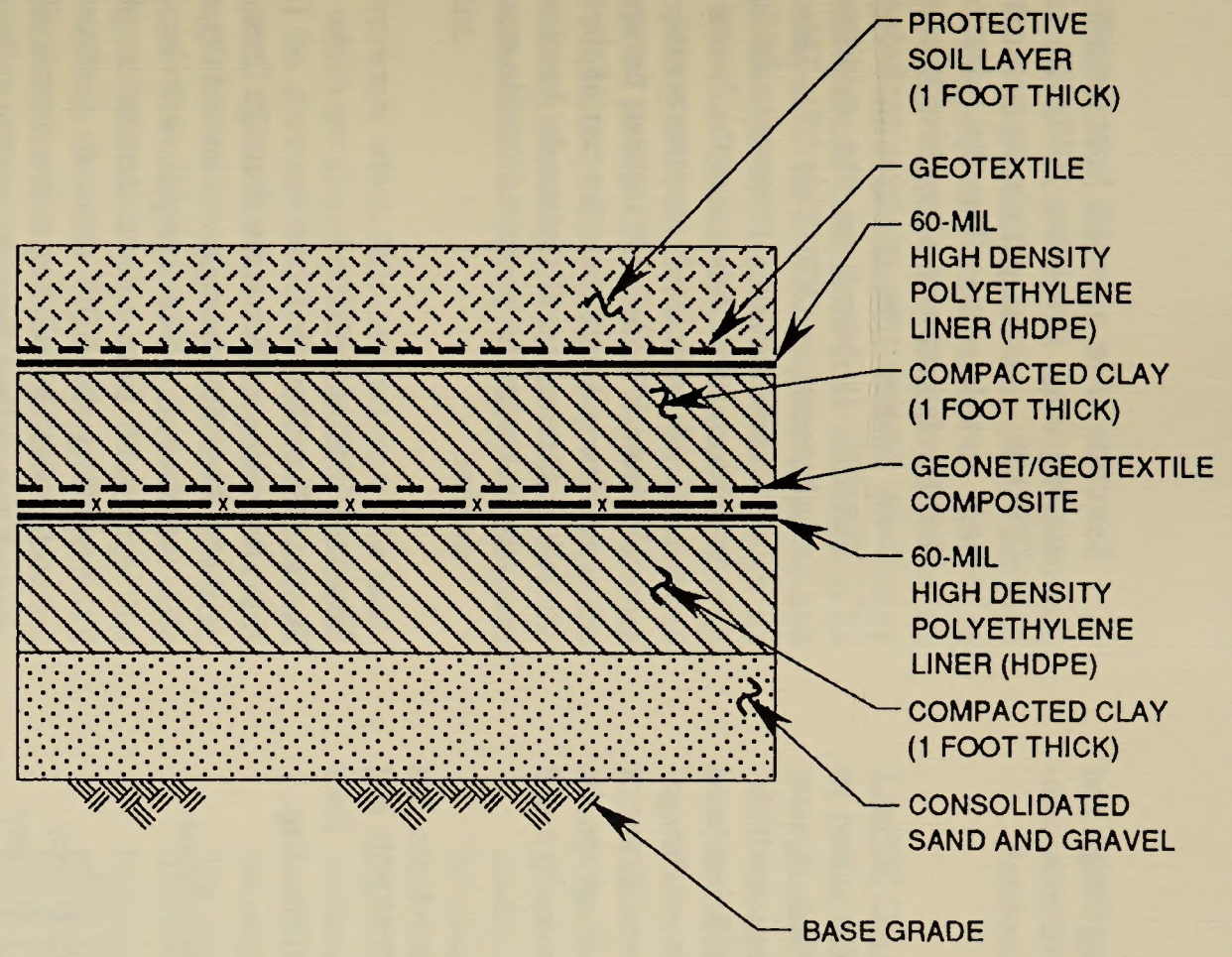




LINER SYSTEM FOR BASE



LINER SYSTEM FOR SLOPE

NOT TO SCALE

FIGURE 3.13
CROSS SECTIONS
COMPOSITE LINER SYSTEM
POTENTIAL LEACHATE
EVAPORATION PONDS
RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

NOTE: AS THE LEACHATE EVAPORATION PONDS MAY NOT BE REQUIRED AND ARE NOT A PART OF THE PROJECT AT THIS TIME, THIS FIGURE IS PROVIDED FOR INFORMATION PURPOSES ONLY.

the appropriate permitting, including CEQA and if necessary NEPA compliance, will be accomplished prior to construction of the ponds.

Alternate Landfill Liner System

1. In the spring of 1992, the RWQCB raised an issue regarding the minimum liner system required by CCR Title 23 at "mega-landfills" such as Bolo Station. The RWQCB indicated that due to the long-term nature of "mega-landfills," an alternate liner system consisting of a double containment system and composite clay liner, and vadose zone gas monitoring could be required as part of the WDRs.

2. To respond to this concern, Rail•Cycle has entered into discussion with the RWQCB and has proposed its preferred alternative liner system which would consist of the following:

   - Prepared sub-base.
   - 60-mil thick HDPE flexible membrane liner (secondary liner).
   - Geonet synthetic drainage layer and collection sump (secondary collection).
   - Geosynthetic clay liner (GCL) (primary liner).
   - 60-mil thick HDPE flexible membrane liner (primary liner).
   - Geonet synthetic drainage layer and collection sump (primary collection).
   - Geotextile silt filter layer.
   - 2-foot thick native soil protective layer.

3. The Rail•Cycle preferred alternative liner system has a number of advantages over the baseline CCR Title 23 liner system, including:

   - A secondary containment system in the event the primary liner should fail.
   - Elimination of the water required to establish the optimum moisture content in the 3-foot thick clay layer that is replaced by the GCL.
   - Significant reduction in fugitive dust emissions associated with the spreading and compaction of the 3-foot thick clay layer.
   - Elimination of up to 80 truck trips per day for six months every one to two years to transport clay from the Rheox Mine near Hector, California.

4. Selection of an alternate liner system is a permitting issue involving RWQCB, LEA, and CIWMB. As the permitting process has not been completed to allow the selection of the Rail•Cycle preferred alternative liner system at Bolo Station, the analysis included in this EIR/EIS is based on the minimum liner requirements in CCR Title 23. This baseline liner system not only represents the "standard" regulatory method but also the "worst case" in terms of associated environmental impacts. However, if Rail•Cycle receives the appropriate permits and approvals for use of the alternate liner system, it will replace the baseline liner at the site with the preferred double containment system.

Drainage Control System

Surface Water Run-On Controls

1. Prevailing surface water drainage from storms in the Bolo Station region is toward the south and southwest. The landfill will be partially protected from run-on inundation of surface water by the ATSF railroad. Surface water is channeled by existing storm control dikes north of the railbed through existing railway bridge structures. This runoff would in turn be intercepted by an unlined earthen diversion channel to be constructed parallel and south of the rail line, running the length of the proposed offloading facility and railyard. Runoff from this channel would be diverted east and west and then intercept the approximate 150-foot wide earthen (i.e., unlined) perimeter channel as shown in Figure 3.4. The final width and alignment of the earthen perimeter channel will be determined during the engineering design phase of the project.

   how deep?

2. The approximate 150-foot wide earthen perimeter channel runs south down each side of the landfill and collects into a sedimentation basin. Design of the sedimentation basin would be in accordance with WDRs to be issued by the RWQCB and could include discharge weirs and energy dissipators, as necessary, to provide uniform sheet flow south from the site. The energy dissipators will be designed to prevent slurry and erosion downgradient of the discharge.

Surface Water Runoff Control

1. Concurrent with landfill cell development, surface water runoff controls for stormwater will be designed and constructed as shown in Figure 3.5. Stormwater control will focus on areas within the landfill limits for active working areas, completed cells and areas to be developed. The controls will be adjusted and expanded as the landfill evolves through its service life. Stormwater will be managed with temporary and permanent diversion ditches and retention ponds. The size of diversion ditches and retention ponds will be designed during the permitting phase of the project. Sizing of the systems will be for a 25-year, 24-hour storm event.

2. Stormwater which falls on portions of the landfill which are closed or have not been developed will be diverted to the lined landfill runoff channel. This lined runoff channel is located along the inside perimeter of the landfill, adjacent to but separated from the 150-foot wide earthen perimeter channel. Water in this channel, as shown in Figure 3.5, collects into a sedimentation basin. Design of the basin, including dissipators and weirs as necessary, would be in accordance with WDRs to be issued by the RWQCB. Since this discharge is from within the landfill area, it is anticipated that the WDRs would include discharge requirements and treatment prior to release.

3. In the active landfill area, temporary diversion ditches will be constructed around the perimeter of each individual cell or working area during the period it remains open for landfilling. Surface run-on will be diverted from the active cell and collected in an unlined temporary run-on retention pond that will be downgradient and beyond the active working area. Water collected in this pond would be used for dust control purposes or, as necessary, discharged to the landfill runoff channel at the perimeter of the landfill.

4. Stormwater runoff from within the active working area will also be collected and diverted to an unlined temporary runoff retention pond. During periods when the active cell is below grade (i.e., following excavation), water which accumulates that has not come into contact with solid waste will be collected into a temporary sump and pumped into the above runoff retention pond. The water collected in the unlined temporary runoff retention pond will be held and reused for dust control.

Landfill Gas Collection System

1. The landfill gas collection system for Bolo Station will be designed as an active gas collection system. It will utilize mechanical blowers to create a pressure gradient to maximize the extraction of landfill gas. The landfill gas collection system will be designed to limit the migration of gas so that it does not travel laterally, or vent into either the atmosphere or nearby engineered structures. In addition, it will be designed to ensure that atmospheric oxygen is not pulled into the covered waste, so as to prevent potential subsurface fires at the landfills.

2. Landfill gas is produced by the biological decomposition of waste contained in a landfill. The gas consists primarily of methane, carbon dioxide, and organic compounds. The final biological phase of landfill gas production in municipal solid waste landfills is a steady state condition that may last approximately 60 years from the time at which the waste is landfilled. Gas generated during this phase contains approximately 25 to 60 percent methane and 40 to 75 percent carbon dioxide, with trace amounts of gases from organic compounds, some of which are ozone precursors.

3. The Bolo Station gas collection system will consist of a network of vertical gas extraction wells, collection header piping, and gas monitoring probes, as shown in Figure 3.14. This system will be installed on a phased basis consistent with landfill expansion. If horizontal collection pipes are used, they will be installed at approximate 150-foot intervals about 20 feet below final cover. Gas monitoring probes will be placed at a maximum interval of 1,000 feet around the perimeter of the landfill to the depth of the base of landfilled waste.

4. The landfill gas collection and recovery system will be constructed approximately one to two years after initial landfilling or when approximately 1 million tons of waste are in place. The time frame for construction is dependent on the generation of sufficient quantities of gas to warrant collection. The gas recovery facility would be constructed during

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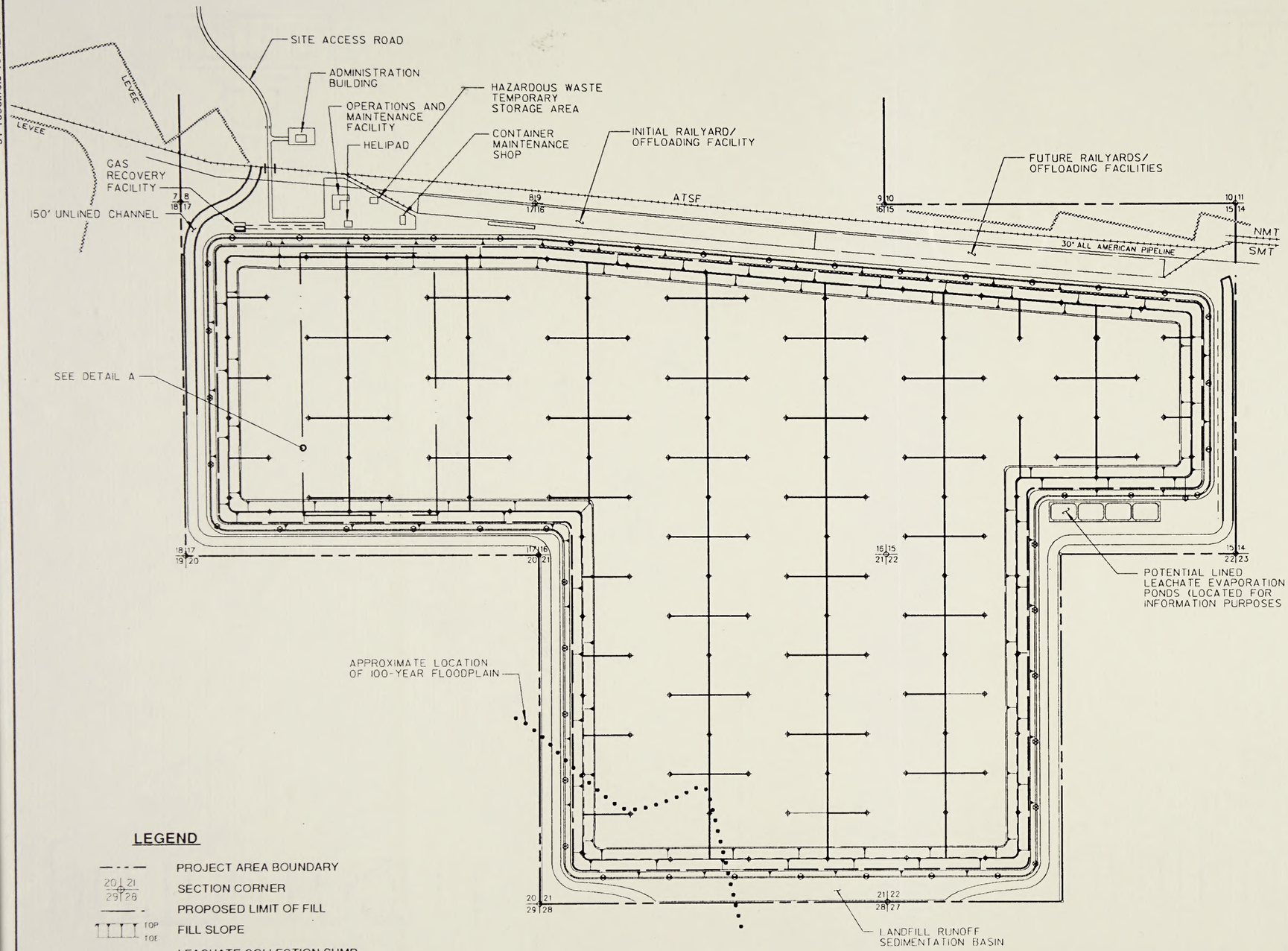
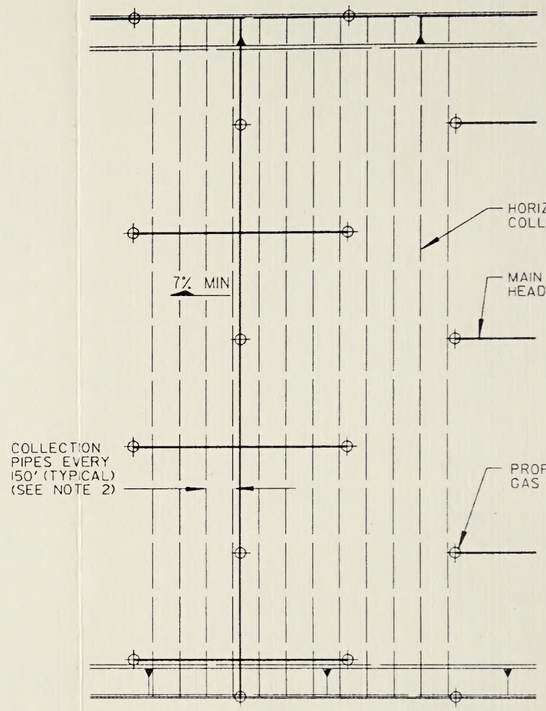




DETAIL A

NOT TO SCALE

LEGEND

- PROJECT AREA BOUNDARY
- SECTION CORNER (20 21 / 29 28)
- PROPOSED LIMIT OF FILL
- FILL SLOPE (TOP / TOE)
- LEACHATE COLLECTION SUMP
- HORIZONTAL COLLECTION PIPE
- MAIN COLLECTION HEADER PIPE
- PROPOSED VERTICAL GAS WELL
- PROPOSED PERIMETER GAS MONITORING PROBE
- APPROXIMATE LOCATION OF 100-YEAR FLOODPLAIN (CORRESPONDS TO THE 620' CONTOUR)

REFERENCE: WMNA, 1991a.
GAS MANAGEMENT PLAN, SHEET NO. 7.

NOTES

1. GAS MONITORING PROBES PLACED AT MAXIMUM 1000' INTERVALS. BOTTOM OF PROBE IS AT DEPTH OF REFUSE.
2. HORIZONTAL COLLECTION PIPES ARE INSTALLED APPROXIMATELY 20' BELOW FINAL COVER.
3. VERTICAL WELLS AND MAIN COLLECTION HEADER PIPE ARE INSTALLED AS LANDFILLING PROGRESSES.

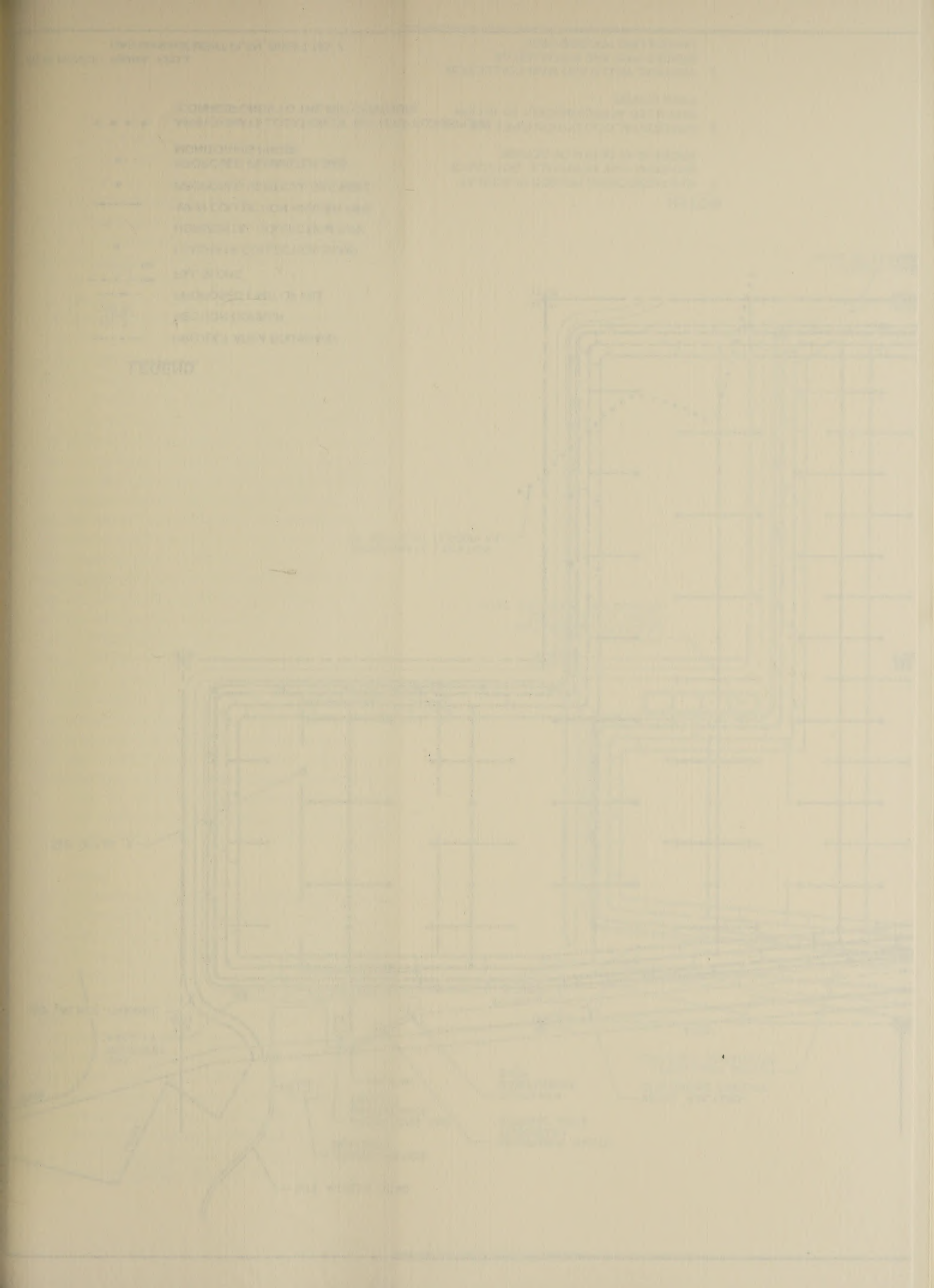
0 1,750 3,500 FEET
SCALE

FIGURE 3.14

LANDFILL GAS COLLECTION SYSTEM

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.



this same time frame. The system will be expanded as the landfill waste volume and gas generation rates increase. Initially, collected gas will be combusted in a flare (see Section 3.3.2.6). As economical volumes of landfill gas are produced, the flare could be replaced with gas turbines and later a steam boiler, and it could potentially be used to generate electricity for landfill requirements or could be sold directly to an offsite industrial gas user. The generation of electricity or the sale of gas for offsite uses is not part of the proposed action. If, in the future, landfill gas is to be used to generate electricity or is to be sold for offsite uses, specific approaches and permitting actions, including CEQA, will be accomplished.

5. Moisture (condensate) collected in the header pipe or generated by compression of the gas prior to flaring will be collected, treated, and disposed of with landfill leachate in accordance with WDRs to be issued by the RWQCB.

Control of Nuisance and Health Factors

1. Unsightliness, dust, and odor will be controlled by limiting exposed waste to a small working face (which will range from approximately 300 feet across the working face during the early stages of landfill operation to about 600 feet across the working face at full operation) by watering of access roads, and by watering and revegetating of completed slopes.

2. Cover practices and regular maintenance are expected to keep vector problems to a minimum. Buildings, grounds, and perimeter areas will be inspected for signs of vectors on a weekly basis by a trained safety employee assigned to the task. If a problem is encountered, appropriate measures, such as use of a licensed exterminator, will be adopted if necessary.

3. Litter and other foreign material at the facility will be kept to a minimum. A litter control team will be assigned the task of routine maintenance on a full-time basis. Litter will be controlled at the active working face by the use of soil cover or an approved alternative, use of portable litter fences, reduction of the working face in high winds, and policing of surrounding areas, including adjoining properties. Litter control will limit the attraction of ravens to the project site and is intended as a method of raven control. Windblown debris will be collected at regular intervals during daytime hours. A 6-foot high "wind fence" will be placed around the active landfill cell to secure the active cell and act as a litter control barrier. A three-strand barbed wire and mesh wire tortoise fence will be erected around the perimeter of the entire Bolo Station facility.

4. Noise will be attenuated by appropriate mufflers on heavy equipment. Workers in high noise areas will be required to wear ear protection devices.

5. Birds (particularly ravens) will be controlled by limiting the size of the working face, litter control, use of soil or synthetic daily cover, and use of automatic noise devices, as appropriate. Installation of overhead wire grids to disrupt landing patterns will also be utilized, if necessary. Regional raven baseline monitoring will be conducted to determine short- and long-term changes in the raven population.

3.3.2.2 Offloading Facility and Railyard

1. Rail•Cycle will design, construct, and operate an approximately 130 acre offloading facility and railyard adjacent to the landfill site, as shown in Figure 3.15. Separate yard tracks will be constructed to accommodate offloading of each 3,000 tons per day double-stack container unit train. At startup, one unit train per day, on a six-day per week basis, will be utilized for waste transport, increasing over a five-year period to seven trains per day, as MRFs are added to the system. Initially, sufficient tracks to support two trains will be constructed and additional tracks will be constructed as MRFs are added to the system.

2. A rail siding off the ATSF mainline and two rail unloading yards will be constructed to handle the landfill unit trains as shown in Figure 3.15. The siding and Yard No. 1 would be constructed initially. Yard No. 2 would be constructed to provide additional capacity as required.

3. Inbound unit trains will depart the ATSF mainline and enter the siding. From the siding, the inbound unit trains will be assigned to one of the yard tracks. Locomotive units will be

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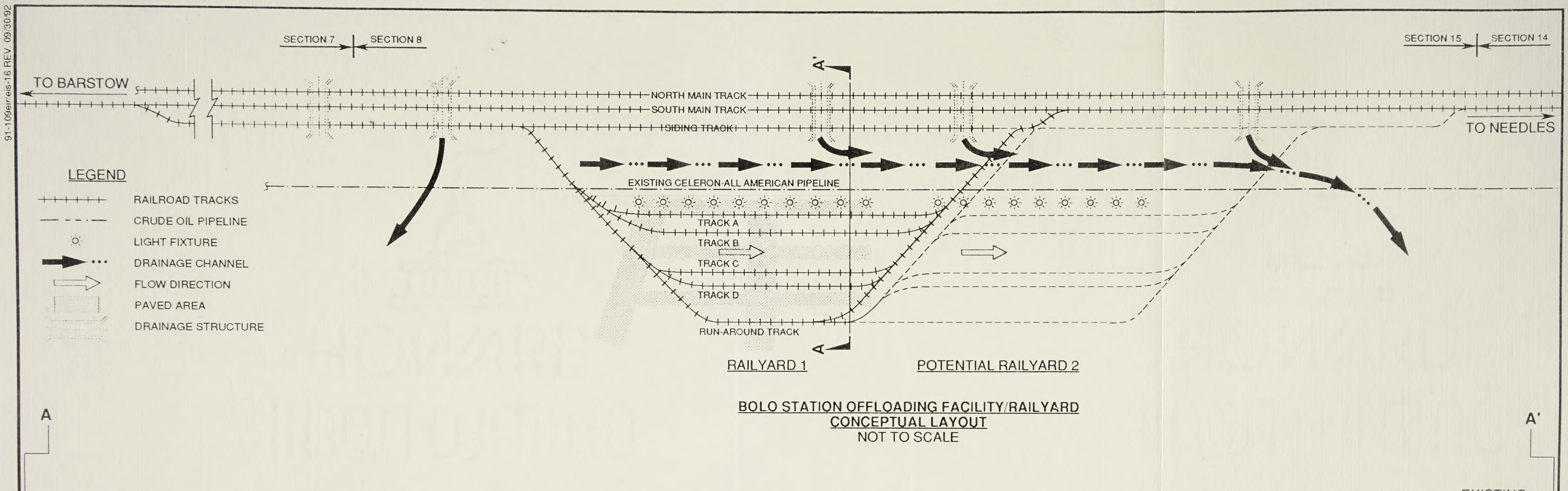
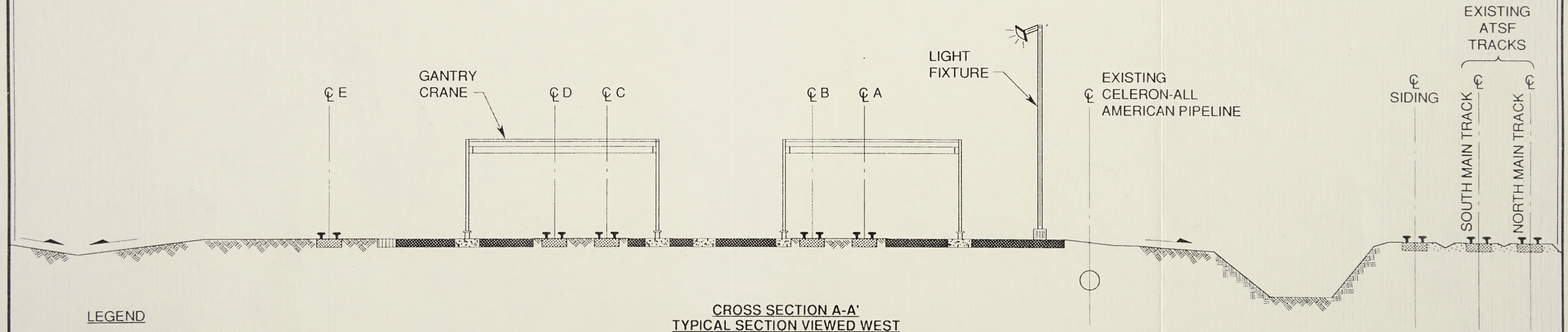


BOLO STATION OFFLOADING FACILITY/RAILYARD
CONCEPTUAL LAYOUT
NOT TO SCALE



CROSS SECTION A-A'
TYPICAL SECTION VIEWED WEST
OFFLOADING FACILITY/RAILYARD
NOT TO SCALE

FIGURE 3.15
BOLO STATION
TYPICAL OFFLOADING
FACILITY/RAILYARD
RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

of the yard tracks. Locomotive units will be uncoupled from the unit train and coupled to a previously unloaded train for return to one of the MRFs. A "run-around" track is provided in the yard design to allow locomotives to reverse direction in the yard. Departing trains will enter the siding prior to entering the main track. Operations on the siding and those entering or departing the mainline will be signal controlled.

4. Computer equipment will be used to automatically log in each container and record its source, contents, and destination in the landfill. This procedure will be similar to current methods used by ATSF to manage containers within its intermodal system.

5. A schematic illustration of the typical offloading operation is provided in Figure 3.16. Each unit train will be left in a single string for offloading. Straddle-type gantry cranes (mobile overhead cranes) will be used to unload full containers and reload empties from hostlers (truck chassis) located next to the train. Sufficient gantry cranes will be available in the event that regular units require maintenance or repair. Gantry cranes will be rubber-tired and will travel on a reinforced concrete pad to accommodate the loads.

6. A semi-truck and chassis for carrying containers (hostlers) will travel a short distance on a two-lane asphalt roadway to the landfill entrance and then on an unpaved gravel surface to a track-mounted tipper at the working face of the landfill. The average one-way haul distance will be approximately one mile. Hostlers will back trailers with waste containers onto a tipper. Containers will be tipped, emptied, and then coupled back to hostlers for transport to the train for reloading. The entire offloading-tipping-reloading cycle is expected to take approximately 25 minutes per waste container. Each unit train carrying 100 to 120 containers will require approximately nine hours to process using approximately eight hostlers per train. At some point after project startup, modified hostlers may be employed. These modified hostlers would be capable of carrying two containers and would have built-in tippers to discharge the waste at the working face. Should a composting facility be established in the future, a similar offloading process will be used for the containers of green waste except that hostlers or modified hostlers would haul green waste to the composting facility.

7. The offloading facility and railyard will have provisions for periodic scouring and cleansing of containers. Approximately 5 percent or 35 containers passing through the offloading facility will be washed daily. At a minimum, each container will be cleaned approximately once every six months. Records will be maintained onsite to monitor the cleaning schedule for each container. Washwater generated by container washing operations will be collected in an aboveground, sealed clarifier and passed through a "packaged" treatment unit. The treated water will be recycled and reused for container washing.

8. The offloading facility will also contain maintenance facilities for containers and gantry cranes. In addition to normal maintenance on containers and gantry cranes, repairs requiring welding, metal forming and structural repairs would be performed. These facilities would be constructed within the landfill maintenance area, as shown in Figure 3.4. A steel building to support these operations would be approximately 3,500 square feet in size and constructed on a concrete pad. A concrete pad would be constructed for repair and maintenance of the gantry cranes.

3.3.2.3 Entrance/Administration and Equipment Maintenance Facilities

1. The proposed landfill entrance facilities, including an approximate 5,000 square foot visitor's center, public waste drop-off area and parking, will be located on approximately one and one-half acres of land near the Route 66 entrance, as shown in Figure 3.4. The area will be graded and paved. An entrance sign to identify the facility will be designed and constructed in a style compatible with the natural surroundings. The visitor's center is discussed in more detail in Section 3.3.4.1. The public waste drop-off area is more fully discussed in Section 3.3.2.5.

2. The landfill maintenance area will be located south of the railroad and north of the landfill at the west end of the offloading facility.

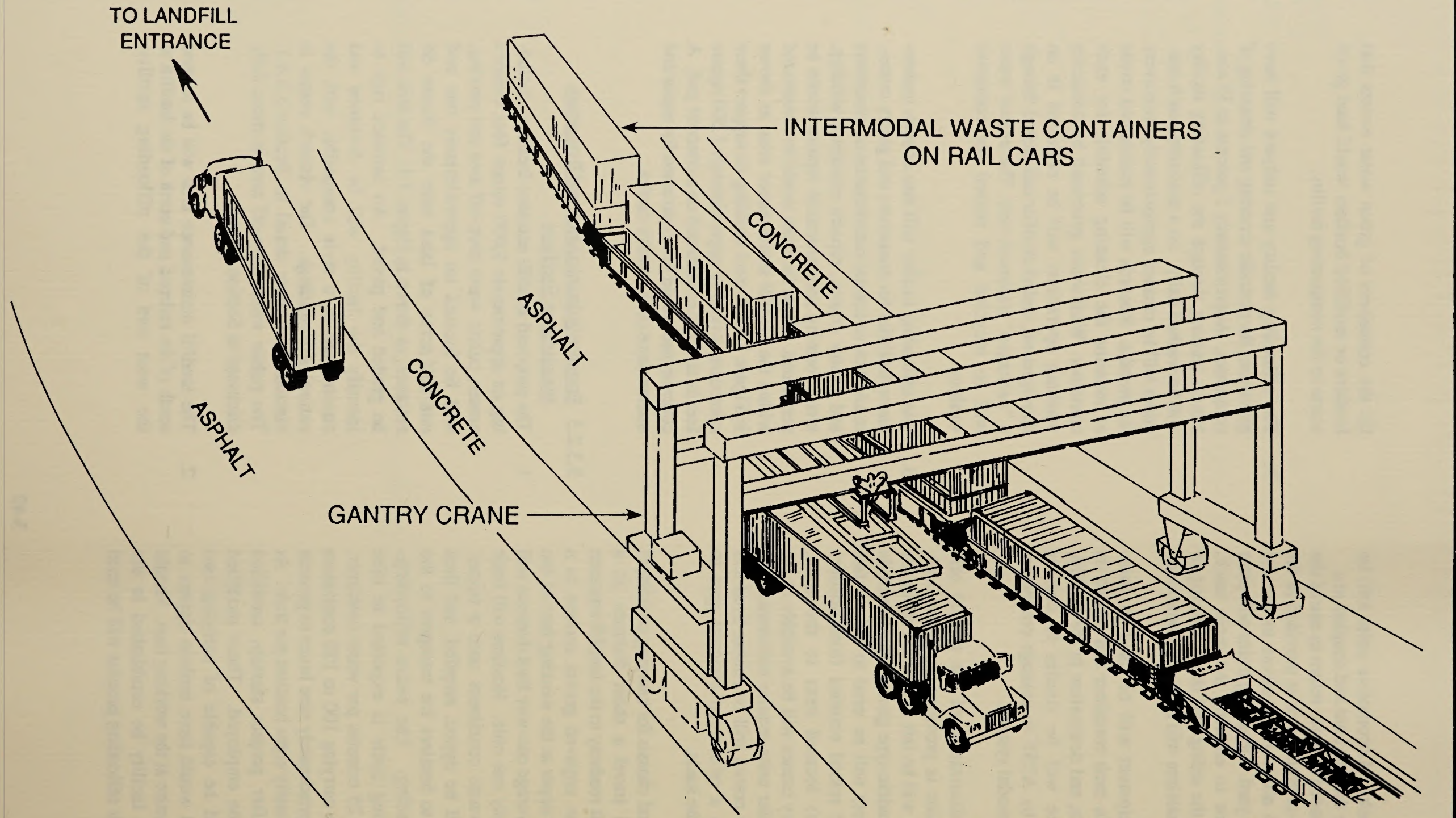


FIGURE 3.16

TYPICAL OFFLOADING OPERATION

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

Facilities in this area will include an approximate 20,000-square foot maintenance building for light and heavy equipment, an equipment wash area, equipment parking, a fueling area, and additional employee parking.

3. The administrative building will be a single-story, 15,000-square-foot structure located just north of the railroad on the west side of the facility near the railroad overpass and entrance to the landfill. This structure will also be designed for the projected life of the landfill complex.

4. Diesel fuel for landfill equipment will be stored at the maintenance facility in an aboveground tank that meets County Fire Marshall requirements. The fuel storage area will include an impermeable pad and concrete dike with sufficient capacity to contain the contents of the tank plus a freeboard allowance for storm events. Fuel will be supplied by rail tank car or truck. Fuel unloading facilities will be designed to minimize spills and in the event of a spill to retain and collect lost product.

3.3.2.4 Hazardous Waste Temporary Storage Area

1. Hazardous waste, as defined by CCR Title 22, that may inadvertently enter the municipal waste stream will be excluded, to the maximum extent practical, from the landfill site. A personnel training and waste inspection program will be conducted at the MRFs and at the landfill facility. Should hazardous waste or other unauthorized waste be discovered during the offloading process at the landfill, these wastes will be taken to a designated temporary (less than 90 days) storage area. The temporary storage area will be a 30-foot long by 20-foot wide concrete slab with a 6-inch high containment curb surrounded by a chain link fence, and will be clearly posted as a hazardous waste temporary storage area. It will be located in the vicinity of the maintenance building at a minimum distance of 200 feet from other structures, as shown in Figure 3.4. A record will be made of the date and time the waste was discovered, and of the waste type, quantity and source. This material will then be removed from the site and receive proper disposal. The SBCDEHS, as the LEA, will be furnished with copies of pertinent site records.

2. Waste oil from equipment maintenance will be stored in a 2,000-gallon aboveground tank. The waste oil will be collected by a licensed recycler on an as-needed basis. This tank will be placed with a concrete or equivalent contaminant area able to retain the volume of the tank plus a freeboard allowance for storm events. The tank will be labeled "Hazardous Waste/Waste Oil," and the accumulation start date will be marked on the side. A list of safety procedures, in case of emergency, will be attached to the tank and kept at the equipment maintenance facility.

3.3.2.5 Public Waste Drop-off Facility

1. A public waste drop-off facility to serve the surrounding communities will be constructed at Bolo Station, as shown in Figure 3.4. As previously noted, this facility will be located near the visitor's center to keep the public away from active landfill activities. This facility will consist of an asphalt pad and roll-off containers into which members of the public may deposit their household waste. Separate smaller containers will be provided for the public to deposit various recyclables (glass, cans, paper, and plastic). Public use of this facility will be supervised by trained personnel who will inspect and screen unauthorized waste from being left at the facility. Periodically, the roll-off containers will be transported to the landfill working face for disposal and the recyclables transported to appropriate recycling companies. Access to the public waste drop-off facility will be controlled to prevent unauthorized waste from being left at the facility and to prevent scavenging of wastes or recyclables.

2. Commercial waste hauling vehicles or transfer trucks will not be allowed to use the public waste drop-off facility, but will be accepted at the landfill. In the event such vehicles transport waste to Bolo Station, they will be directed to the active working face of the landfill. A scale to weigh such vehicles and for random weighing of containers from MRFs will be installed near the operations and maintenance facility. Load checking for hazardous or other unacceptable wastes in commercial waste hauling vehicles and transfer trucks will be conducted at the scales prior to the load being accepted for disposal.

3.3.2.6 Landfill Gas Recovery Facility

1. A landfill gas recovery facility will be constructed west of the landfill maintenance facility at Bolo Station, as shown in Figure 3.4. This facility will consist of a flare system and associated control systems to combust landfill gas. This facility will be constructed and in operation approximately three years after initial landfilling or when approximately 1 million tons of waste are in place. It is not expected that landfill gas will be generated in years one through three. The timeframe for construction is dependent on the generation of sufficient quantities of landfill gas to warrant collection.

2. The flare system will operate until sufficient landfill gas is generated to allow the gas to be used for the economic generation of electricity for either onsite or offsite use. It is estimated that economic recovery of gas would not occur until year five. Therefore, gas collected during this period will be flared using specifically designed flares.

3. If sufficient quantities of landfill gas are generated and collected (i.e., five years after landfilling commences), this gas could be used to generate electricity for onsite or offsite use on a 24-hour per day basis. At that time, gas turbines could be constructed at the landfill to generate electricity. A steam boiler could replace the gas turbine at approximately year 25 and would also generate electricity. The boiler could continue to operate over the life of the facility until closure is completed. The electricity generated from either the gas turbine or steam boiler could be in excess of the requirement for landfill operations and could be available for sale into the Southern California Edison (SCE) grid. After three years, the flare system would only be used to combust landfill gas in excess of the capacity or during maintenance of the gas turbine or steam boiler.

4. There is the potential that an industrial user could be available at a future date which could use the landfill gas. Should such a user be located, the use of gas turbines or steam boilers with excess electrical generation capabilities may be reconsidered. Such use is not presently considered and is not included as part of the proposed action.

3.3.3 SUPPORT ELEMENTS

3.3.3.1 Leachate Monitoring

1. Leachate levels in the leachate collection system's sumps will be monitored by WMNA Environmental Management Department (EMD) staff technicians on a monthly or more frequent basis to determine if withdrawal is necessary. A nonperforated riser pipe will be used to withdraw leachate periodically by pumping. As required, leachate will be withdrawn by the submersible pump and piped to a tank truck. Leachate will then be transported and disposed of in the leachate evaporation ponds. Design features and operational procedures will be established to prevent more than 30 centimeters (or approximately 12 inches) of leachate from accumulating on the liner.

2. Preliminary studies (EPA's HELP Model) indicate that significant quantities of leachate will not be generated for up to 30 years following closure, due to the moisture content of the waste received at the landfill and the arid climate that characterizes the region. However, the potential for leachate will be monitored and leachate monitoring results will be recorded and reviewed monthly. Leachate, if detected, will be analyzed at the WMNA environmental laboratory.

3.3.3.2 Landfill Gas Monitoring

1. A perimeter and interior landfill gas monitoring plan will be implemented to evaluate landfill gas generation and the performance of the landfill gas collection system. Permanent perimeter gas monitoring probes will be used to obtain and evaluate pressure measurements and concentrations of methane and oxygen. The probes will be monitored on a quarterly or more frequent basis by Rail•Cycle staff during landfill construction and operation and after landfill closure. It is expected that the low moisture content of the waste and the low annual rainfall will greatly reduce the amount of gas generation at this site.

3.3.3.3 Ground Water Monitoring

1. A hydrogeological model, based on findings of the ground water site characterization, will be used to develop the ground water monitoring network of background and detection monitoring

points in consultation with the RWQCB. A series of ground water monitoring wells will be placed in upgradient and downgradient locations to facilitate detection of possible pollutant concerns. This will satisfy CCR Title 23 requirements, as specified by the WDRs that will be issued by the RWQCB. To assure sample integrity, each onsite well will be equipped with a dedicated sample pump and collection system. During the active life of the landfill and during the postclosure monitoring and maintenance period, quarterly sampling and annual reporting procedures will be used, and quarterly reports will be provided to regulatory agencies.

3.3.3.4 Surface Water Monitoring

1. Run-on to the landfill will be diverted to the approximate 150-foot wide earthen perimeter channel and released onto the playa. Runoff from closed or completed portions of the landfill will be collected in a diversion channel that flows to a sedimentation basin prior to release onto the playa. Monitoring will be in accordance with WDRs. Treatment prior to release is not expected, since this stormwater will not be affected by landfill operation.

3.3.3.5 Sanitary Facilities

1. Buildings will be equipped with low-flow toilets and showers. Rest room facilities for visitors and travelers will be available at the visitor's center. Landfill employees will generally use rest room facilities located at the maintenance building. Portable toilets will be provided for employees working at some distance from the maintenance buildings. Septic tank and leachline systems will be used for disposal of wastewater from the sanitary systems.

3.3.3.6 Fire/Paramedic/Sheriff Station

1. A fire/paramedic/sheriff station will be established within or near the Bolo Station facility by either Rail•Cycle or the County. It will be staffed on a full-time basis with support from trained staff. Provision of facilities and staff will be in coordination with the County Fire Marshall. A minimum of two trained personnel will be available 24 hours per day and will be supported by dedicated emergency equipment.

2. Fire extinguishers will be located throughout the site. Fire hydrants and hoses will be designed to service the facilities. Storage materials will be identified as to their risk of fire, and adequate and proper storage will be used. Water trucks and tankers utilized in the landfill operation will also be available for fire fighting use to support the dedicated equipment, if needed.

3. Buildings and structures will be designed to meet fire prevention standards required by the County Fire Marshall. Due to the rural location of the facilities, it is planned to have the necessary fire fighting equipment nearby or onsite and available for use by trained designated personnel on the operations staff.

4. Fire fighting equipment located at the station may include a fire engine, water tender, and rescue equipment based on requirements of the County Fire Marshall. In compliance with the County Fire Code, 180,000 gallons of water will be reserved onsite (in the 600,000-gallon capacity aboveground storage tank near the visitor's center) for fire fighting purposes.

5. Paramedic equipment located at the station will include an ambulance, first aid equipment, and miscellaneous supplies.

3.3.3.7 Helipad

1. A helipad will be located in the landfill maintenance area, as shown in Figure 3.4. The helipad will be used primarily for transport during medical and police emergencies. Anticipated usage would be five flights per year. The helipad will be 30 feet in diameter and will consist of a steel-reinforced concrete slab or asphalt. The helipad will be designed, marked, and lit in accordance with Federal Aviation Administration (FAA) regulations, and may require a California Department of Transportation permit prior to operation. The helipad will be illuminated by floodlights at night if an emergency exists that requires helicopter support. Fueling and maintenance activities will not be performed at the helipad.

3.3.4 ANCILLARY ELEMENTS AND UTILITIES

3.3.4.1 Visitor's Center

1. A 5,000-square foot visitor's center will be constructed near Route 66, as shown in Figure 3.4. In addition to the building, the center will include a paved parking lot, rest rooms, and picnic facilities for travelers and those interested in the landfill operation. The visitor's center will have various visual and audio-visual demonstrations of the Rail•Cycle operation as well as information on the local area. The center will provide "creature comfort" for travelers and those persons interested in the landfill operation. The center will be open from 8:00 a.m. to 5:00 p.m., Monday through Saturday. Educational tours of the various Bolo Station facilities will include an overview of the project site using a tour bus.

3.3.4.2 Road Right-of-Way and Access Road Interchange

1. The access road into Bolo Station extends from Route 66 southward, as shown in Figure 3.4. It enters the project area near the visitor's center. A portion of the access road lies north of the project boundary in Section 32 of Township 6 North, Range 13 East. A right-of-way will be required from the BLM for use of this road segment. The required right-of-way is part of the proposed action and is addressed by this EIR/EIS.

2. The offsite road segment is approximately 500 feet long. The existing dirt road in this location will be widened to 50 feet, graded, surfaced, and paved. The paved portion of the road will be 24 feet wide.

3. An access road interchange will be developed on Route 66 where it intersects the access road. The interchange will be approximately 1,500 feet long (east-west) and 75 feet wide, including road shoulders. To prevent traffic slowdown at the intersection, the interchange will be designed with dedicated turn lanes and acceleration lanes separated by medians. A dedicated right turn lane will be developed for eastward flowing traffic, and a dedicated left turn lane will be developed for westward flowing traffic. The Bolo Station access road will include a dedicated turn lane for traffic exiting westward onto Route 66.

3.3.4.3 Onsite Service Roads

1. The landfill access road will be the primary onsite road. This two-lane road will extend from Route 66 southward, provide access to the visitor's center and then proceed southward paralleling the western boundary of the project site, as shown in Figure 3.4. The access road corridor will be 50 feet wide through the project site and paved (24 feet wide) with asphalt.

2. A railroad overpass will be constructed at the intersection of the access road and railroad. This steel and concrete structure will be an initial construction activity requiring approximately four months to complete. The overpass will eliminate the requirement of a railroad grade crossing for equipment, material deliveries, and workers during remaining construction activities and active operation of the facility. The length of the overpass would be approximately 150 feet wide with 500- to 600-foot long approaches having a maximum grade of 6 percent. The roadway width would be approximately 36 feet and clearance above the rails would be approximately 23 feet.

3. A second two-lane roadway will extend from the offloading facility westward to the landfill entrance area and then southward into the landfill. The primary purpose of this road is to support hostler traffic from the offloading facility to the daily landfill working face. It will be paved from the offloading facility to the landfill entrance area and will be unpaved beyond that point to the active working face.

4. A landfill perimeter patrol road will be developed in phases as the landfill expands. This roadway will be developed on the bermed ground between the landfill runoff channel and the unlined drainage channel that will divert run-on water. It will be 30 feet wide and unpaved, and will serve to provide access to the landfill during operations and postclosure.

3.3.4.4 Access Control and Security

1. Unauthorized access to active portions of the site will be controlled by a three-strand barbed wire fence in the remote areas and a 6-foot chain link fence with barbed wire eye tops in areas under current operation. The entire site will be fenced. Access roads will have lockable gates.

Closed circuit television monitoring/video camera surveillance will be used in selected areas. Monitored areas will include, but will not be limited to, the visitor's center, fire/paramedic/sheriff station (if onsite), administration building, landfill gas recovery facility, and maintenance building. Security guards will be employed at the landfill for 24-hour per day site security.

3.3.4.5 Utilities

1. Utilities required for the proposed action include power, communications, and water, which are discussed in the following sections.

3.3.4.5.1 Power Requirements and Supply

1. Power for the Bolo Station Landfill will be needed primarily for lighting purposes and for support of the entrance/administration building, maintenance facility, visitor's center, and onsite lighting requirements. Power will be supplied by SCE and is currently available at the southwest corner of the site. SCE has indicated that their Amboy Substation has a capacity of 1,200 kVA. Bolo Station facilities require 750 to 800 kVA, which is within the excess capacity of the Amboy Substation. A connection would be made at the Leslie Salt Wells as shown in Figure 3.4 and brought overhead into the facility. The power line connection to the site will require a right-of-way from BLM and is part of the proposed action addressed by this EIR/EIS. Onsite electrical power will be provided to the maintenance area, visitor's center and water well via overhead lines, as shown in Figure 3.4.

2. Portions of the landfill site will be illuminated 24 hours per day. The entrance, offloading facility and railyard, and maintenance areas will be supplied with permanent lighting. Mobile lighting will be used at active work areas of the landfill, including the working face, when 24-hour landfilling operations begin once daily volumes reach 15,000 tons per day.

3.3.4.5.2 Communications

1. Telephone communication will be provided by microwave over a cellular network.

3.3.4.5.3 Water Requirements and Supply

1. Anticipated water demands for Bolo Station facilities are listed in Table 3.5. Water will be required during the initial six- to nine-month construction period for drinking and personal hygiene, and to support site operations.

2. During early stages of the initial six- to nine-month construction period, water will be delivered to the site by truck or railcar. One well will be constructed onsite. Upon completion of the well, remaining water requirements for construction and operation will be from onsite well. Bottled drinking water will be provided from an offsite commercial source and will not be provided by the onsite well.

3. With the exception of bottled drinking water, water would be supplied for remaining onsite activities from a well to be located in the northeast corner of Section 9 north of the railroad tracks, as shown in Figure 3.4. Water would be drawn from a screened interval at sufficient depth to allow production of potable water.

4. Water will be pumped from the well to a 600,000 gallon aboveground storage tank located near the entrance and visitor's center. This tank will store water for normal construction and operations as well as the required reserve capacity of 180,000 gallons required by the County for fire fighting purposes. Standby emergency generators will be available to run water pumps in the event of a general power outage.

5. Total water usage including reserves for fire fighting is estimated at 25,770 to 54,270 gallons per day or 5 to 20 gallons per minute. Of this water usage, dust control is estimated to require approximately 17,000 to 27,000 gallons per day.

6. A combined average daily water demand of approximately 54,270 gallons per day, or 16.52 million gallons per year (50.7 acre-feet), will be required at Bolo Station for the 21,000 tons per day operation. Up to approximately 19,000 gallons per day, or 5.8 million gallons per year, of this water may be recycled as part of the vehicle and container washing operation. This recycling of wash water would result in a reduced average daily water demand at

TABLE 3.5

ANTICIPATED WATER DEMAND

WATER USE	INITIAL CONSTRUCTION(1)			OPERATIONS					
				3,000 Tons Per Day(2)			21,000 Tons Per Day(2)		
	Average Daily Demand (gallons per day)	Initial Construction Demand (million gallons)	Initial Construction Demand (acre-feet)	Average Daily Demand (gallons per day)	Average Annual Demand (million gallons)	Average Annual Demand (acre-feet)	Average Daily Demand (gallons per day)	Average Annual Demand (million gallons)	Average Annual Demand (acre-feet)
• Employee Facilities(2)	1,000	0.23	0.72	1,500	0.46	1.41	3,000	0.92	2.82
• Visitor's Center	--	--	--	800	0.29	0.89	800	0.29	0.89
• Firefighting(4)	--	--	--	1,970	0.36	1.10	1,970	0.36	1.10
• Landscaping(3)	1,000	0.27	0.83	1,000	0.37	1.14	2,400	0.88	2.70
• Vehicle Wash(5)	1,500	0.35	1.08	1,500	0.46	1.41	5,100	1.56	4.79
• Container Wash(5)	--	--	--	2,000	0.61	1.87	14,000	4.27	13.11
• Dust Control/Roads/Working Face	20,000	4.68	14.36	17,000	5.19	15.91	27,000	8.24	25.29
AVERAGE TOTAL	23,500	5.53	16.99	25,770	7.74	23.73	54,270	16.52	50.70
CLAY LINER(6)	130,700	11.76	36.09	130,700	2.94 - 5.88	9.02 - 18.04	130,700	3.92 - 7.84	12.03 - 24.06
CLAY CAP(7)	--	--	--	43,600	0.98 - 1.96	3.01 - 6.01	43,600	1.31 - 2.61	4.02 - 8.01
MAXIMUM ANNUAL TOTAL(8)	--	17.29	53.08	--	11.66 - 15.58	35.76 - 47.78	--	21.75 - 26.97	66.75 - 82.77

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(1) The anticipated water demand for the initial six- to nine-month construction phase is delineated in these columns and based on 26 working days per month, as appropriate, for a maximum of nine months. Water demands for construction activities that continue beyond the initial nine-month construction period are included in the operations phase estimates.

(2) Based on 305 work days per year or 365 calendar days as appropriate.

(3) Based on 365 days per year; 270 days during initial construction.

(4) County Fire Code requires 1,500 gallons per minute for two hours = 180,000 gallons for fire reserve storage. The fire storage reserve will be replenished at a rate of 1,970 gallons per day, as shown. Two events per year are projected.

(5) Vehicle wash and container wash water may be recycled, thereby reducing water demand.

(6) The clay liner for an average cell is estimated to require 130,700 gallons per day for 90 days, yielding an average water demand per cell of 11.76 million gallons. After construction, new cells will be developed every two to four years for the 3,000 tons per day operation and every 1-1/2 to 3 years for the 21,000 tons per day operation, depending on disposal demand and optimal landfill cell volume. The 3,000 tons per day operation is expected to be less than one to five years in duration.

(7) The clay cap for an average cell is estimated to require 43,600 gallons per day for 90 days, yielding an average water demand of 3.92 million gallons per cell. Cell caps are estimated to be required every two to four years for the 3,000 tons per day operation, and every 1-1/2 to 3 years for the 21,000 tons per day operation. The 3,000 tons per day operation is expected to be less than one to five years in duration.

(8) The maximum annual total water demand is based on the average total water demand for normal daily activities plus the installation of clay liner and clay cap. However, the maximum annual total water demand will not occur each year of operation, as clay liners and clay caps will only be installed every 1-1/2 to 3 years once the 21,000 tons per day level is achieved.

Bolo Station of 35,270 gallons per day, or 11.08 million gallons per year.

7. In addition to the average daily and average annual water demand, additional water will be periodically required during construction of landfill cell clay liners and clay caps. The moisture content of clay used for landfill liners and caps is critical and requires daily application of water during construction. Based on waste disposal rates at Bolo Station, subsequent landfill cells will be constructed every one and one-half to three years and final cover will be placed on closed landfill cells also every one and one-half to three years.

8. The periodic construction of landfill cell clay liners requires approximately 131,000 gallons per day of water during the projected 90-day construction period for the liner, for a total demand of 11.76 million gallons per landfill cell liner. Similarly, the construction of landfill cell clay caps requires approximately 44,000 gallons per day of water during the projected 90-day construction period for the cap, for a total demand of 3.92 million gallons per landfill cell clay cap. These water demands will not occur simultaneously with each other, but will be in addition to the average daily and average annual water demand for site operations during periods when landfill liners or caps are being constructed.

3.4 HOURS OF OPERATION

1. The landfill will be open 24 hours per day, seven days per week. Initially, most of the landfill activities will occur in daylight hours over a six-day week when the MRFs are operating and the unit trains are being offloaded. The seventh work day at the landfill will be used primarily for equipment maintenance and limited operations. A single work shift will be employed for 3,000 to 6,000 tons per day operations. Two work shifts will be initiated at 9,000 tons per day operations, and three work shifts will be employed for 15,000 to 21,000 tons per day operations. The site will not be open on the following holidays: New Years Day, Easter Sunday, Memorial Day, July 4th, Labor Day, Thanksgiving, and Christmas Day. During the holidays, a minimal crew consisting of two site security guards will remain onsite on a 24-hour per day basis.

3.5 PERSONNEL AND EQUIPMENT

1. Staffing requirements will vary during the early years of the project, but are expected to stabilize during the fifth operational year when seven MRFs are included in the waste-by-rail system. When the landfill opens, one eight-hour work shift will be required to handle the 3,000 tons per day operation. This will increase to three eight-hour work shifts for the 15,000 to 21,000 tons per day operations. Table 3.6 identifies the personnel requirements during the construction period and the various operations scenarios up to 21,000 tons per day.

3.5.1 CONSTRUCTION PERSONNEL

1. The initial construction period is expected to last six to nine months. During this time, the initial cell will be excavated and prepared for the receipt of waste. Concurrently, additional onsite support facilities, systems, and features will be constructed. A maximum work force of approximately 150 construction personnel is projected for this initial landfill construction period. Subsequent landfill construction activities are shown as operations. These employees are expected to find temporary housing in Twentynine Palms if they are not hired locally or if they do not commute from areas near Barstow or Needles, California.

2. Construction of the offloading facility and railyard will occur in two phases. The first phase includes extension of mainline bridges to accommodate the siding, construction of the storm diversion ditch, site grading, construction of the siding, and tracks for Yard No. 1. The construction will occur during the initial six- to nine-month construction phase and will require approximately an additional 85 construction personnel. The second phase of the offloading facility and railyard will be constructed as waste volumes dictate but is assumed to occur within the first four years of operation and includes tracks, utilities, and paving for Yard No. 2. This second phase of construction would require approximately 65 construction personnel. Construction personnel for the offloading and railyard are summarized in Table 3.6.

TABLE 3.6

CONSTRUCTION AND OPERATIONS PERSONNEL REQUIREMENTS

TASK	INITIAL CONSTRUCTION PERSONNEL(1)	OPERATIONS PERSONNEL						
		Year 1	Year 2	Year 1 & 3		Year 4		Year 5 to 60
		3,000 Tons Per Day	6,000 Tons Per Day	9,000 Tons Per Day(2)	12,000 Tons Per Day	15,000 Tons Per Day(3)	18,000 Tons Per Day	21,000 Tons Per Day
LANDFILL SITE								
• Construction - Landfill	75	N/A	N/A	N/A	N/A	N/A	N/A	N/A
• Construction - Offloading Facility	85	N/A	N/A	N/A	N/A	N/A	N/A	N/A
• Liner System Installation(4)	72	--	--	72	--	72	--	72
• Environmental Control Systems Installation(5)	4	4	4	5	6	8	8	8
• Environmental Systems Monitoring	2	2	2	2	2	2	2	2
• Offloading/Railyard	--	16	26	26	29	38	40	46
• Landfill	--	25	30	35	40	45	50	55
• Hazardous Waste Spotter	--	2	2	2	3	3	3	3
• Equipment Maintenance	--	6	6	6	8	8	10	10
• Dust Control	2	2	2	2	3	3	4	4
• Litter Control	--	2	2	2	2	2	2	2
• Administration	5	6	6	7	8	8	8	8
• Visitor's Center	--	1	1	1	1	1	1	1
• Security	6	6	6	6	6	6	6	6
• Paramedic/Firefighter	6	6	6	6	6	6	6	6
Site Subtotal(6)	257	78	93	172	114	202	140	223
RAIL OPERATIONS(7)								
• Train Crew Member(8)	--	9	21	30	39	48	54	63
• Car Inspectors(9)	--	--	--	1	1	2	2	2
Rail Subtotal	--	9	21	31	40	50	56	65
TOTAL	**257**	**87**	**114**	**203**	**154**	**252**	**196**	**288**

91-109 (7/12/92/cm)

(1) The initial phase is a six- to nine-month construction effort. Further construction is represented as a task assignment throughout the operations phase.
(2) Two work shifts will be instituted at 9,000 tons per day operations.
(3) Three work shifts will be instituted at 15,000 tons per day operations.
(4) This construction phase of the liner system is estimated to be 120-days per cell; installation will be by contractors. Liner installation for estimating purposes will be every 1-1/2 to 4 years based on landfill cell life. Personnel requirements includes drivers for approximately 80 truck loads of clay per day during the 120-day construction period.
(5) Environmental control systems construction includes ground water monitoring wells; leachate monitoring system; and landfill gas, collection system and landfill gas recovery system.
(6) Employees whose primary workplace will be the Bolo Station Landfill.
(7) Rail operations include train crews on the unit trains traveling between the MRFs and Bolo Station Landfill and inspectors located at ATSF's Barstow Yard.
(8) Train crew members are assumed to be based in either Los Angeles, San Bernardino, or Barstow.
(9) Each unit train will be inspected at Barstow as part of ATSF routine car inspection program. The unit trains from the first two MRFs (reflected on this table as 3,000 and 6,000 tons per day) will be inspected by current ATSF car inspectors at Barstow. Additional car inspectors may be required at Barstow as subsequent MRFs are added to the system.

Construction of the offloading facility would be accomplished by a combination of rail crews and outside contractors.

3.5.2 OPERATIONAL PERSONNEL

1. During the first year of landfill operation, with a single unit train delivering waste to the landfill from a single MRF, 16 people are expected to be needed for the rail offloading process and 25 people for landfill operation. Additional personnel will be required for administration, support, and environmental installation monitoring functions, with a total of 78 people comprising the baseline staffing requirement for operation, excluding the rail crew.

2. During succeeding years, one to six additional trains per day will haul waste to the landfill. For each additional train, additional employees will be required for rail offloading landfilling and other tasks. By the end of the fifth year, seven trains are expected to haul 21,000 tons per day of waste to the landfill. A total of 151 employees (excluding rail crew) will be required to operate the landfill, 223 employees during construction of new cells and liner installation, with 46 people performing rail offloading tasks and 55 people performing landfilling tasks. By the end of the fifth year and thereafter, the fill rate is expected to remain constant at 21,000 tons per day and the number of employees will remain constant.

3. Train crews are assigned daily from Los Angeles, San Bernardino, and Barstow crew pools. At ATSF's 1991 volume of train traffic, the initial Commerce MRF would require expansion of the available crew pool by approximately six persons. Future requirements could require additional expansion of the crew pool from 42 to 63 persons at maximum capacity to support seven MRFs. Twenty-one of these crew positions are expected to be filled by persons living in San Bernardino County.

3.5.3 CONSTRUCTION AND OPERATIONS EQUIPMENT

1. Equipment needs for construction and operation are defined below and summarized in Table 3.7. Equipment required is anticipated to increase from the initial 3,000 tons per day operation when the landfill begins to receive 9,000 tons per day and again when it begins to receive 15,000 tons per day.

3.6 CLOSURE/POSTCLOSURE PLAN

3.6.1 CLOSURE PLAN

1. Each of the landfill cells will be closed in accordance with the landfill closure requirements included in CCR Titles 14 and 23. To meet the requirements of CCR Title 14, closure and postclosure monitoring and maintenance plans will be prepared for each cell. The plans will be prepared to meet the requirements of CCR Title 23, Chapter 15 and the uniform standards for closure/postclosure plans established by the CIWMB. These plans will be approved by the LEA and CIWMB.

2. Implementation of requirements of an approved closure plan will begin within 30 days of receipt of the last waste completing a module or cell. Currently, CCR Title 23 requires that landfills be closed with a minimum of 4 feet of final cover material over the side slopes and top surface. This 4 feet of final cover consists of:

   - A 2-foot thick foundation layer.
   - A 1-foot thick layer of clay with a maximum permeability of $1x10^{-6}$ cm/sec or less.
   - A 1-foot thick layer of topsoil suitable for revegetation.

3. In October 1991, EPA issued 40 CFR, Part 258, Subtitle D that require states to develop minimum standards for the design, operation, and closure of municipal solid waste landfills. These regulations include cover requirements that may be more restrictive than CCR Title 23. Rather than a 1-foot layer of $1x10^{-6}$ cm/sec clay, Subtitle D requires a minimum 18-inch layer of earthen material with a permeability equal to or less than the permeability of the bottom liner (in the case of Bolo Station the bottom liner has a permeability of $1x10^{-7}$ cm/sec) or not less than $1x10^{-5}$ cm/sec, whichever is less. The CIWMB has until October 1993 to develop new state standards that may modify closure requirements. Rail•Cycle will develop closure plans for each cell to meet the effective requirements at the time of closure of each cell.

TABLE 3.7

CONSTRUCTION AND OPERATIONS EQUIPMENT REQUIREMENTS

EQUIPMENT	INITIAL CONSTRUCTION(1)	OPERATIONS						
		3,000 Tons Per Day	6,000 Tons Per Day	9,000 Tons Per Day(2)	12,000 Tons Per Day	15,000 Tons Per Day(2)	18,000 Tons Per Day	21,000 Tons Per Day(2)
LANDFILL CONSTRUCTION								
Asphalt Laydown Machine	1	--	--	--	--	--	--	--
Bulldozer	3	--	--	2	--	2	--	2
Cement Truck	4	--	--	--	--	--	--	--
Dump Truck	6	--	--	4	--	4	--	4
Forklift	3	--	--	--	--	--	--	--
Grader	2	--	--	2	--	2	--	2
Mixer/Water Injector	2	--	--	2	--	2	--	2
Scraper (medium)	3	--	--	4	--	4	--	4
Scraper (large)	3	--	--	--	--	--	--	--
Sheepsfoot Roller	2	--	--	2	--	2	--	2
Smooth Drum Roller	2	--	--	2	--	2	--	2
Subtotal	**31**	--	--	**18**	--	**18**	--	**18**
OFFLOADING FACILITY CONSTRUCTION								
Light Trucks	10	--	--	--	10	--	--	--
Heavy Trucks	17	--	--	--	11	--	--	--
Work Train (Two Locomotives)	2	--	--	--	2	--	--	--
Pile Driver	1	--	--	--	--	--	--	--
Front End Loader	2	--	--	--	1	--	--	--
Dozer	5	--	--	--	0	--	--	--
Scraper (Large)	9	--	--	--	0	--	--	--
Compactor	4	--	--	--	2	--	--	--
Aggregate Spreader	3	--	--	--	2	--	--	--
Motor Grader	3	--	--	--	2	--	--	--
Backhoe	1	--	--	--	1	--	--	--
Asphalt Laydown Machine	1	--	--	--	1	--	--	--
Asphalt Batch Plant	1	--	--	--	1	--	--	--
Speedswing	2	--	--	--	3	--	--	--
Compressor	2	--	--	--	2	--	--	--
Liner	1	--	--	--	1	--	--	--
Tamper	1	--	--	--	1	--	--	--
Ballast Regulator	1	--	--	--	1	--	--	--
Anchor Applicator	1	--	--	--	1	--	--	--
Spiking Machine	1	--	--	--	1	--	--	--
Subtotal	**68**	--	--	--	**43**	--	--	--
WASTE TRANSPORT								
Trains(3)	--	**2**	**4**	**6**	**8**	**10**	**12**	**14**
LANDFILL OPERATIONS								
Backhoe	--	1	1	1	1	1	1	1
Bulldozer	--	2	2	2	2	3	3	3
Compactor	--	4	4	4	5	5	6	6
Forklift (diesel)	--	1	1	1	2	2	2	2
Forklift (propane)	--	1	1	1	1	1	1	1
Grader	--	1	1	1	2	2	2	2
Scraper (medium)	--	2	2	3	3	4	4	4
Scraper (large)	--	2	2	2	3	3	4	4
Tank Truck (leachate)		1	1	1	1	1	1	1
Subtotal	--	**15**	**15**	**16**	**20**	**22**	**24**	**24**

(1) The initial construction phase is a six- to nine-month effort. During this initial phase, the average number of onsite construction equipment is anticipated to be 31. During certain peak periods during this initial construction phase, approximately 70 pieces of construction equipment may be required.

(2) As additional landfill cells are constructed and support facilities are expanded (i.e., stormwater collection system, wind berms, and environmental control systems) additional construction activities will occur. The subsequent construction permits are combined with ongoing operations.

(3) One waste-laden unit train (120 rail cars) per MRF will arrive at Bolo Station six days per week. One empty unit train (120 rail cars) will return to each MRF per work day. One train, without an engine, will be in the process of loading at a MRF while the other trains are in transit or being offloaded.

(4) Clay will be transported to the site by existing trains in support of landfill cell construction. An average of 20 rail cars per day of clay will be required. These rail cars will be included with existing trains traveling between Barstow and Needles.

TABLE 3.7

CONSTRUCTION AND OPERATIONS EQUIPMENT REQUIREMENTS (Continued)

EQUIPMENT	INITIAL CONSTRUCTION(1)	OPERATIONS						
		3,000 Tons Per Day	6,000 Tons Per Day	9,000 Tons Per Day(2)	12,000 Tons Per Day	15,000 Tons Per Day(2)	18,000 Tons Per Day	21,000 Tons Per Day(2)
OFFLOADING OPERATIONS								
Gantry Crane	--	1	2	3	4	5	6	7
Hostler (waste)	--	8	15	--	--	--	--	--
Modified Hostler (waste)	--	--	6	8	10	11	11	11
Tipper (waste)	--	1	--	--	--	--	--	--
Subtotal	--	**10**	**23**	**11**	**14**	**16**	**17**	**18**
DUST CONTROL								
Water Truck (water pull)	**2**	**1**	**1**	**2**	**2**	**2**	**2**	**2**
FIRE/PARAMEDIC/SHERIFF STATION								
Fire Engine	--	1	1	1	1	1	1	1
Ambulance	1	1	1	1	1	1	1	1
Security/Patrol Van (4x4)	1	1	1	1	1	2	2	2
Subtotal	**2**	**3**	**3**	**3**	**3**	**4**	**4**	**4**
MISCELLANEOUS								
Maintenance Truck	--	1	1	1	2	2	2	2
Pickup Truck (1/4-ton)	--	1	1	1	2	2	2	2
Pickup Truck (1/2-ton)	--	1	1	1	2	2	2	2
Visitor Touring Bus	--	1	1	1	1	1	1	1
Subtotal	--	**4**	**4**	**4**	**7**	**7**	**7**	**7**
TOTAL	**103**	**35**	**50**	**60**	**97**	**79**	**66**	**87**

(1) The initial construction phase is a six- to nine-month effort. During this initial phase, the average number of onsite construction equipment is anticipated to be 31. During certain peak periods during this initial construction phase, approximately 70 pieces of construction equipment may be required.

(2) As additional landfill cells are constructed and support facilities are expanded (i.e., stormwater collection system, wind berms, and environmental control systems) additional construction activities will occur. The subsequent construction permits are combined with ongoing operations.

(3) One waste-laden unit train (120 rail cars) per MRF will arrive at Bolo Station six days per week. One empty unit train (120 rail cars) will return to each MRF per work day. One train, without an engine, will be in the process of loading at a MRF while the other trains are in transit or being offloaded.

(4) Clay will be transported to the site by existing trains in support of landfill cell construction. An average of 20 rail cars per day of clay will be required. These rail cars will be included with existing trains traveling between Barstow and Needles.

4. To meet the current requirements of CCR Title 23, Rail•Cycle will use onsite material excavated during the construction of landfill cells for the 2-foot thick foundation layer. In addition, Rail•Cycle will stockpile topsoil from its excavation for use as the 1-foot thick topsoil layer.

5. To provide a source of low permeability clay, Rail•Cycle is conducting onsite geotechnical investigations to determine if onsite materials may meet this requirement. If onsite materials are not suitable, the existing Rheox Mine site near Hector, California, has been identified as a source of clay that meets the permeability requirement. Clay from this site would be trucked to the landfill.

6. As discussed in Section 3.3.2.1.3, Rail•Cycle is considering the use of a 40-mil thick HDPE flexible membrane in place of clay for final cover. As this is a closure issue that has not been resolved with the RWQCB, LEA, and CIWMB, the 1 foot of clay is used as the basis for this EIR/EIS. However, if Rail•Cycle receives the appropriate permits and approvals for the use of the HDPE flexible membrane, it will be used in place of clay for final cover of the site.

7. The closure plan for each cell will be in accordance with requirements of CCR Title 14 for:

   - Side slopes and top slope
   - Drainage control
   - Stormwater protection
   - Leachate collection
   - Landfill gas collection

8. Figure 3.9 shows the final grades to be obtained on completion of closure of Bolo Station. The final configuration of the site will be a function of the final grade and slopes, slope stability considerations, and minimum gradients to provide adequate drainage of the landfill after anticipated waste settlement.

9. As each landfill cell is closed and brought to final grade, final cover will be placed, final cell drainage features installed, and the cell will be revegetated under provisions for partial or phased closure of landfills included in CCR Titles 14 and 23. Detailed construction specifications will be developed for placing final cover and would include necessary construction control requirements to ensure that the final cover is placed in accordance with the closure plan. Each fall, before winter rains, the new portions of the landfill which have been closed will be seeded with a native plant seed mixture approved by the CDFG and County. The native seed mixture will include shallow-root, erosion resistant vegetation. Plant species that have root systems that could extend beyond the 1-foot thick top soil layer should be avoided to ensure that plant roots do not damage the 1-foot thick compacted clay cap.

10. As required by CCR Title 14, Rail•Cycle will establish the appropriate funding mechanisms to ensure that sufficient funds for closure of each cell and for final closure of Bolo Station are collected from tipping fees.

3.6.2 POSTCLOSURE MONITORING AND MAINTENANCE PLANS

1. CCR Title 14 requires that landfills establish and fund a postclosure plan that will provide proper monitoring and maintenance for a minimum of 30 years after closure. Rail•Cycle will prepare postclosure monitoring and maintenance plans for each cell and for the entire landfill to meet the requirements of CCR Title 14. The plan will verify that containment and monitoring facilities retain their integrity and make repairs as necessary. These plans will be submitted for approval to the LEA and CIWMB. The postclosure monitoring and maintenance requirement of CCR Title 14 may be modified by the state to meet the requirements of 40 CFR, Part 258, Subtitle D. Specific postclosure monitoring and maintenance plans for Bolo Station will meet the regulatory requirements in force at the time of postclosure activities.

2. The plans will include monitoring and maintenance of the following:

   - Side slopes and top slope
   - Final cover
   - Vegetation
   - Drainage structure
   - Stormwater protection structures
   - Leachate collection and monitoring system

- Landfill gas collection and monitoring system
- Ground water monitoring system

Corrections of identified deficiencies will be made within 30 days. Should additional time be required, a written report of the circumstances requiring additional time will be submitted to the LEA.

3. As required by CCR Title 14, Division 7, Chapter 13, Article 8 and State Assembly Bill (AB) 2448 (Eastin) Rail•Cycle will establish the appropriate funding mechanisms to ensure that sufficient funds are collected from tipping fees for a minimum of 30 years of postclosure monitoring and maintenance.

4. As required by CCR Title 23, Chapter 15, Article 5, Rail•Cycle will establish the appropriate funding mechanisms to ensure corrective action financial assurance through a site specific corrective action insurance policy. An example of such a policy is included in Appendix K.

3.7 PROJECT ALTERNATIVES

1. This EIR/EIS not only analyzes the environmental consequences of the proposed action, but also the consequences of the reasonable and feasible alternatives to the proposed action. The level of analysis in this EIR/EIS is sufficient to allow the public, responsible and reviewing agencies, and decision makers to make informed decisions on the environmental consequences of the proposed action and its alternatives.

2. The approach used to evaluate the potential alternatives to the proposed action and identification of reasonable and feasible alternatives analyzed in this EIR/EIS is as follows:

   - Review and verification of project-specific siting, design, and operational criteria developed by Rail•Cycle for siting of a rural landfill. These criteria are based on:
     - Various regulatory requirements included in CCR Titles 14 and 23, and 40 CFR, Part 258, Subtitle D, for siting, design, operation, and closure of Class III solid waste landfills.
     - Specific siting, design, and operations requirements developed by Rail•Cycle.
   - Review and evaluation of potential Class III landfill sites identified in the SCAG 1988 report entitled *The Feasibility of Hauling Solid Waste by Railroad from the San Gabriel Valley to Remote Disposal Sites* (SCAG, 1988).
   - Review and evaluation of alternative sites in the Amboy/Cadiz area identified by Rail•Cycle in a May 1991 report entitled *Alternative Rail•Cycle Landfill Sites - Preliminary Analysis* (Jacobs, 1991a).

3. The following operational siting criteria were identified by Rail•Cycle for selection of potential landfill sites based on its concept for the waste-by-rail system:

   - Direct access to a main rail line and minimization of interline transfer of waste (i.e., use of rail lines owned by other railway companies).
   - Maximum turnaround time of approximately 24 hours, equivalent to approximately 230 rail miles, from the majority of Los Angeles County. Based on current federal regulations governing train crew hours of service, and crew turnaround/layover time, the maximum desirable one-way distance is approximately 230 miles.
   - Sufficient area and configuration to provide a minimum of 50 years of solid waste disposal capacity, with an appropriate buffer zone, based on an initial startup volume of 3,000 tons per day and increasing to 21,000 tons per day. Depending on specific site conditions, a minimum of 1,500 to 2,000 acres will be dedicated to landfilling operations would be required to accommodate projected waste volumes over a 50-year site life. Additional acreage will be required for support facilities.
   - Direct highway access to support initial site construction, long-term continual landfill development phasing, and operations requirements, including employee access.
   - A portion of the land within the proposed landfill site boundaries owned by ATSF and adequate additional land available for acquisition.

- A location remote from urban areas to minimize impacts to population centers.
- Compatibility with surrounding land uses and future land use designations for the vicinity.
- Arid climate to minimize potential for precipitation to infiltrate into the landfill.

4. In addition to the above Rail•Cycle siting criteria for potential landfill sites, an initial screening was performed for the following initial siting and design criteria associated with federal, state, and local regulatory requirements:
   - Surface and ground water resources.
   - Seismic, geologic, and topographic characteristics.
   - Biological, cultural, and paleontological resources.
   - Regional and local air quality, including proximity to Class I prevention of significant deterioration (PSD) areas and sensitive receptors for toxic and nontoxic emersions.

3.7.1 ALTERNATIVES TO THE PROPOSED ACTION CONSIDERED IN DETAIL

3.7.1.1 Cadiz Valley Alternative Site

1. The Cadiz Valley Alternative site (preliminarily evaluated as Alternative Site C) is situated approximately ten miles southeast of the proposed project site, at the southern toe of the Ship Mountains, as shown in Figure 3.17. The alternative site is a five-square mile area that is roughly bisected (from northwest to southeast) by Cadiz Road and the Arizona-California Railroad, which was formerly owned by ATSF.

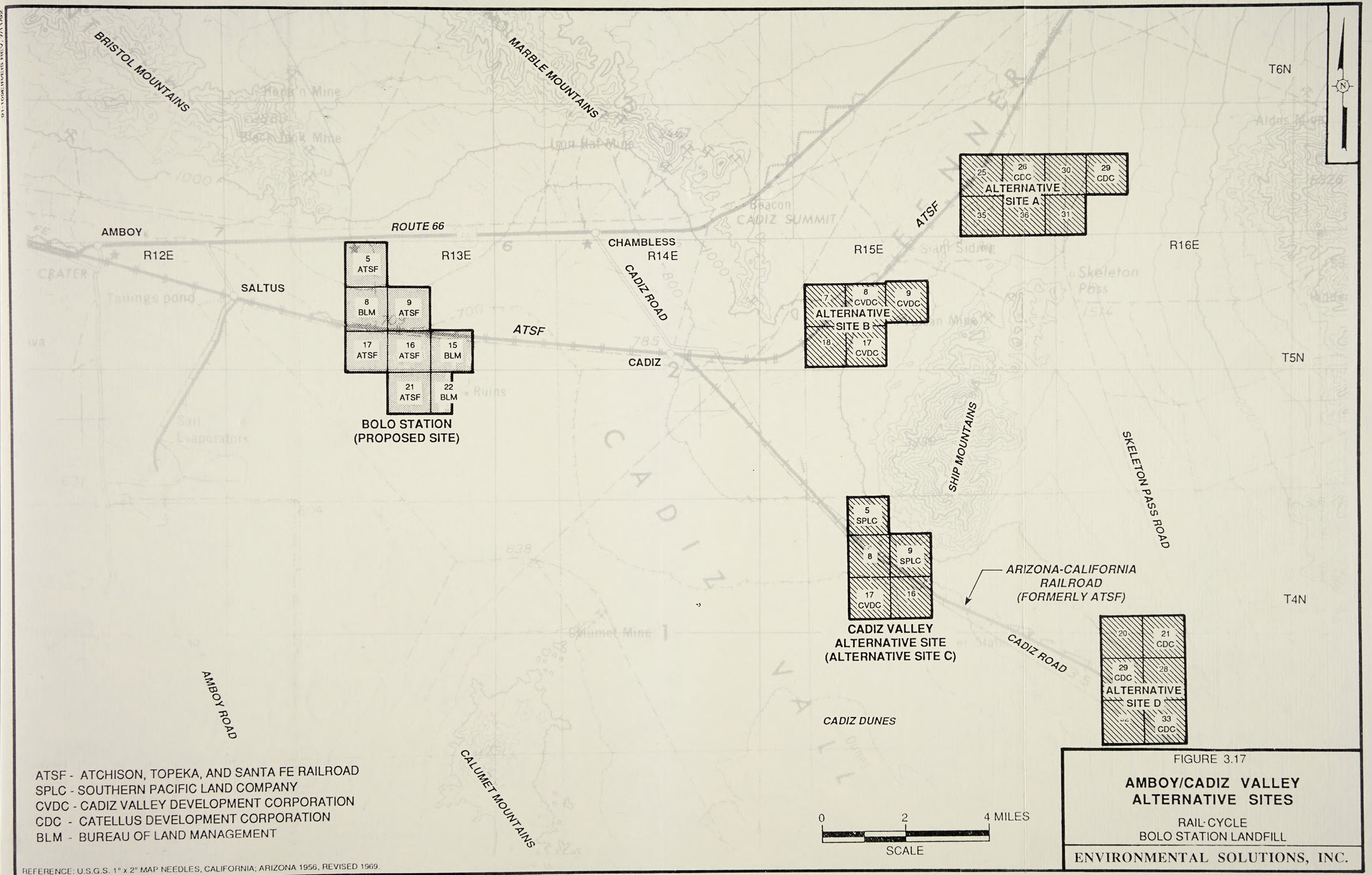
2. The alternative site is situated in Township 4 North, Range 15 East, Sections 5, 8, 9, 16, and 17. Sections 5 and 9 (1,280 acres) are owned by Southern Pacific Land Company, a wholly-owned subsidiary of the Santa Fe Realty Company, which is a wholly-owned subsidiary of the Santa Fe Southern Pacific Corporation, the parent company of ATSF. Section 8 (640 acres) is federal land managed by the BLM as multiple use Class M, Section 16 (640 acres) is state land, and Section 17 (640 acres) is owned by Cadiz Valley Development Corporation.

3. One section of BLM land (Section 8) within the Cadiz Valley Alternative site would be exchanged with Rail•Cycle for land of equal or greater value. Two exchange sections are considered for the Cadiz Valley Alternative site due to the smaller involvement of BLM land in comparison to the Bolo Station site. The exchange sections considered are the same as those proposed for the Bolo Station site with the exception of the Cadiz Dunes area. This proposed section was eliminated from consideration for exchange due to its close proximity to the Cadiz Valley Alternative site.

4. Similar to the Bolo Station site, the Cadiz Valley Alternative site is situated within the creosote bush scrub biotic community in a sparsely populated rural setting. The town of Cadiz lies six miles northwest of the site, and Route 66 is an additional three miles to the northwest. Archer Station lies one and one-half miles southeast of the alternative site boundary.

5. Onsite elevations range from approximately 650 to 1,000 feet above msl. Bedrock outcrops occur in Sections 5 and 9, which are nearest to the Ship Mountains.

6. Landfill design, construction, and operations at the Cadiz Valley Alternative site would be similar to those for the proposed action. Municipal solid waste would be received and processed at MRFs situated in Commerce and a maximum of six other MRFs in southern California. Recyclables would be removed from the waste stream and transported to markets. Residual waste, approximately 3,000 tons per day per MRF, would be compacted, loaded into intermodal containers, and transported by rail to the site on a daily basis. Containers would be offloaded, transferred to hostlers, transported to the working face, and discharged by a tipper or modified hostler. Leachate and landfill gas would be collected, monitored, and treated as necessary. Ground water would also be monitored. This alternative would observe all relevant requirements for a Class III landfill, including closure and postclosure procedures.



ATSF - ATCHISON, TOPEKA, AND SANTA FE RAILROAD
SPLC - SOUTHERN PACIFIC LAND COMPANY
CVDC - CADIZ VALLEY DEVELOPMENT CORPORATION
CDC - CATELLUS DEVELOPMENT CORPORATION
BLM - BUREAU OF LAND MANAGEMENT

REFERENCE: U.S.G.S. 1° x 2° MAP NEEDLES, CALIFORNIA; ARIZONA 1956, REVISED 1969.

FIGURE 3.17

AMBOY/CADIZ VALLEY ALTERNATIVE SITES

RAIL·CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

3.7.1.2 Reduced Action Alternative

1. The Reduced Action Alternative at the proposed Bolo Station site includes the following basic elements:

   - Inbound solid waste from MRFs would be reduced from a maximum of 21,000 tons per day to 12,000 tons per day.
   - Reduced daily solid waste volumes would result in fewer trains on a daily basis.
   - Maximum landfill life limited to 40 years.
   - Reduced landfill and support area footprint.
   - Reduced subsurface excavation in preparation for landfilling and reduced final landfill height.

2. The Reduced Action Alternative would entail reduced landfill operations at Bolo Station as compared to the proposed action. Four MRFs instead of seven would transport 3,000 tons per day each of waste to the landfill facility. In addition, the maximum life of the landfill would be limited to 40 years. With these reductions, the capacity of the landfill would be 230 million cubic yards of waste, a reduction of 487 million cubic yards (or approximately 65 percent) relative to the proposed 717 million cubic yards (Table 3.3).

3. This alternative would also limit the footprint for the landfill and for the project area as a whole. The western one-half of Section 22 would be eliminated from the landfill footprint, and Sections 8 and 9 would be removed from the project area. A right-of-way for the landfill access road across Section 8 would be required from the BLM. The potential for establishing a future composting facility in Section 8 would not exist under the Reduced Action Alternative. Altogether, the Reduced Action Alternative would incorporate five sections of land: four owned by ATSF (Sections 5, 16, 17, and 21), and one comprising public land managed by the BLM (Section 15).

4. The final difference considered in this alternative would be the reduction of subsurface excavation in support of landfill cell construction and reduced landfill height. Given the reduced volume of waste to be landfilled at Bolo Station, a decrease in landfill depth and height over the smaller landfill footprint is achievable. Landfill depth would be reduced by as much as 20 feet.

5. Landfill height would be reduced by 45 feet but the configuration of the final landfill surface would remain generally the same. The maximum height of the landfill under the Reduced Action Alternative would be approximately 940 feet above msl, a rise of approximately 285 feet above the existing terrain in the area. The majority of the landfill surface, however, would range from 750 feet to 800 feet above msl.

6. Landfill construction and operations would be similar to those described for the proposed action. The phasing plan as related to the construction of landfill cells, the liner system, drainage controls, leachate and landfill gas control systems, haul roads, and other elements of the landfill design would be consistent with that of the proposed project.

3.7.1.3 No Action Alternative

1. Consideration of the No Action Alternative is required by CEQA and NEPA. Implementation of this alternative would mean that the Rail•Cycle-Bolo Station Landfill project would not be developed under this proposal. The landfill, offloading facility, and other site features, including a potential future composting facility, would not be constructed, and no additional project-related rail traffic associated with Rail•Cycle waste transport would occur in the County.

2. The Bolo Station site would remain in its present state, and no potential for increased environmental impacts from the proposed action would occur. The site would be available for future development, as permitted by BLM policy and County land use designations.

3. Because Bolo Station Landfill is a primary component of the Rail•Cycle waste-by-rail system, the No Action Alternative would primarily impact areas outside the County. Specifically, communities in Los Angeles County and others where MRFs could be sited would be affected. These communities could experience inadequate landfill long-term capacity to meet future waste disposal requirements. Additionally, other southern California communities, including

some in the County, where MRFs are tentatively planned to be sited, may experience waste disposal limitations in the future.

3.7.2 ALTERNATIVES ELIMINATED FROM DETAILED CONSIDERATION

1. The southern California region was evaluated for potential alternative sites for a Class III solid waste landfill that would meet operational criteria established by Rail•Cycle and siting, design, and critical operational criteria established by federal, state, and local regulatory requirements. The purpose of this evaluation was to identify reasonable and feasible alternatives to the proposed Rail•Cycle-Bolo Station site that would support a waste-by-rail system.

3.7.2.1 Regional Alternatives

1. In 1988, SCAG evaluated the feasibility of a waste-by-rail system to meet the waste disposal requirements of the San Gabriel Valley (SCAG, 1988). This study was used as the basis for examining appropriate locations potentially available for siting of a large, long-term landfill. As part of its 1988 evaluation of the feasibility of waste-by-rail solid waste systems, SCAG identified nine sites with rail access in the four county area that, in 1988, were being considered by various proponents as potential landfill sites. These sites, shown in Figure 3.18, are:

   - Niland in Imperial County.
   - Blythe, Eagle Mountain, and the Morongo Indian Reservation in Riverside County.
   - Amboy, Dunn, Hector, and Oro Grande in San Bernardino County.
   - Tehachapi in Kern County.

2. Based on the approximate 24-hour turnaround (230-mile one-way rail distance) criteria determined by Rail•Cycle to define its effective radius, Rail•Cycle focused on the desert areas of Kern, San Bernardino, Riverside, and Imperial counties, as originally delineated in the SCAG siting study report for a waste-by-rail landfill. As shown in Figure 3.18, when the existing rail lines operated by ATSF, Southern Pacific Railroad, and Union Pacific Railroad are taken into account, the regional alternatives for potential waste-by-rail landfill sites are defined by narrow corridors.

3. Based on the Rail•Cycle siting criteria of access to an ATSF rail line, an approximate 24-hour turnaround, and sufficient available acreage, two additional potential sites were identified as part of the EIR/EIS evaluation of regional alternatives. These sites, also shown in Figure 3.18, are:

   - Ward Valley in San Bernardino County.
   - Boron in Kern County.

4. Rail•Cycle evaluated each of the nine sites included in the 1988 SCAG rail haul feasibility study based on its operational criteria and the general regulatory criteria. Table 3.8 includes general information regarding each site, Rail•Cycle's evaluation of the suitability of each site, and Rail•Cycle's rationale for selection of Amboy as the regional area best suited to its waste-by-rail landfill concept.

5. As part of this EIR/EIS, a separate evaluation of the nine sites included in the 1988 SCAG feasibility study and the two other sites located in the four county region was accomplished with the following findings:

   - Four of the sites (Niland in Imperial County, Eagle Mountain and Morongo Indian Reservation in Riverside County, and Dunn in San Bernardino County), while located on a rail line, are not located on an ATSF rail line, as shown in Figure 3.18. In addition, Eagle Mountain is currently being proposed by others for a similar rail-haul landfill, and Dunn is limited to approximately 285 acres, which would not provide for a long-term disposal site at the projected Rail•Cycle volumes of 21,000 tons per day. Therefore, for the purpose of this EIR/EIS, these sites were eliminated from further consideration, as they do not meet the basic siting and operational criteria of the proposed action.
   - Blythe in Riverside County is located 300 rail miles from Los Angeles County and it does not meet the 24-hour turnaround criteria. Therefore, for the purpose of this EIR/EIS, this site was eliminated from further consideration as it does not meet the basic siting and operational criteria of the proposed action.

KERN COUNTY
SAN BERNARDINO COUNTY
VENTURA COUNTY
LOS ANGELES COUNTY
ORANGE COUNTY
RIVERSIDE COUNTY
SAN DIEGO COUNTY
IMPERIAL COUNTY
PACIFIC OCEAN
BAKERSFIELD
TEHACHAPI
MOJAVE
BORON
BARSTOW
DUNN
HECTOR
ORO GRANDE
VICTORVILLE
AMBOY
WARD VALLEY
NEEDLES
VENTURA
LOS ANGELES
SAN BERNARDINO
RIVERSIDE
SANTA ANA
SAN JACINTO
MORONGO INDIAN RESERVATION
EAGLE MOUNTAIN
BLYTHE
NILAND
SALTON SEA
MESQUITE MINE
EL CENTRO
SAN DIEGO
ATSF
SP
UP
SP/ATSF
PRIVATE
NEVADA
CALIFORNIA
ARIZONA
ARIZONA-CALIFORNIA RAILROAD (FORMERLY ATSF)
CALIFORNIA
MEXICO
ARIZONA
MEXICO

LEGEND

- INTERNATIONAL BOUNDARY
- STATE BOUNDARY
- COUNTY BOUNDARY
- MAJOR HIGHWAY
- MAJOR RAILROAD LINE
- ATSF — ATCHISON, TOPEKA, AND SANTA FE RAILROAD
- SP — SOUTHERN PACIFIC RAILROAD
- UP — UNION PACIFIC RAILROAD

0 25 50 MILES
SCALE

REFERENCE: U.S.G.S. BASE MAP OF CALIFORNIA, SOUTHERN ONE-HALF. DATED 1968 AND REVISED IN 1981.

SCAG, 1988.

FIGURE 3.18

SOUTHERN CALIFORNIA DESERT REGIONAL PROJECT ALTERNATIVES

RAIL-CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

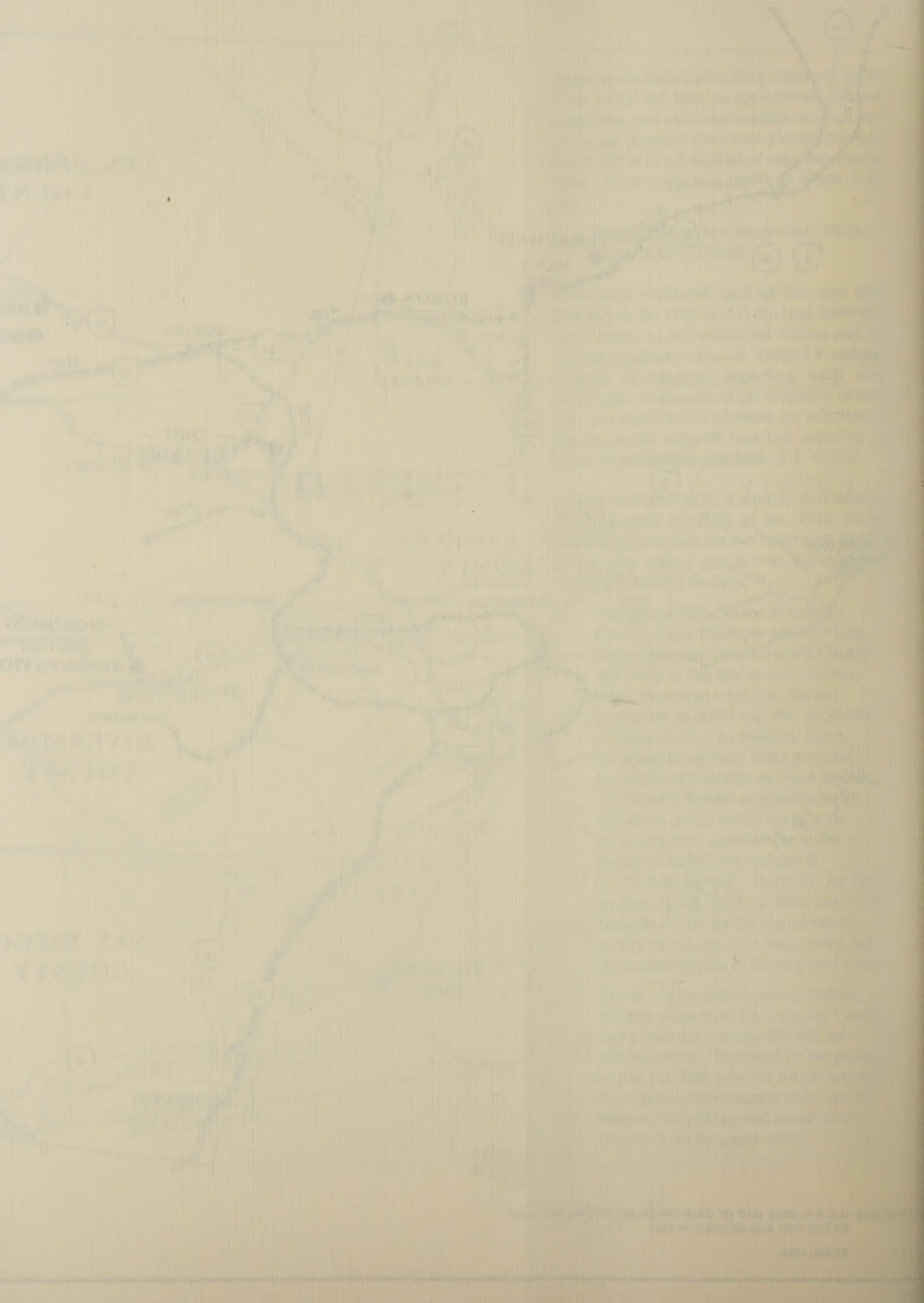


TABLE 3.8

WASTE-BY-RAIL
POTENTIAL REMOTE LANDFILL SITES

SITE	RAIL LINE	DISTANCE (miles from San Gabriel Valley)	SITE AREA(1)	SCAG REMARKS	RAIL•CYCLE SITE EVALUATION
IMPERIAL COUNTY					
Niland	Southern Pacific	173	60 square miles	--	Site eliminated when Southern Pacific rejected consideration of investment in a major sanitary landfill.
KERN COUNTY					
Tehachapi	Southern Pacific	146	1,050 acres	• Proposed for Kern County waste.	Limited available acreage and resulting short potential site life. Surrounding residential land use resulted in elimination of this site from consideration. Also, Southern Pacific rejected consideration of investment in a major sanitary landfill.
RIVERSIDE COUNTY					
Blythe	ATSF	300	N/A	• Gasification plant proposed. • ATSF is not interested in hauling waste to Blythe due to economics and need to upgrade line.	Distance factor eliminated this site from further consideration as the 24-hour turnaround, a key criterion, could not be achieved.
Eagle Mountain	Southern Pacific	185	N/A	• Former Kaiser Steel Iron Mine	Numerous potential environmental factors resulted in Rail•Cycle eliminating it from further consideration, including: the potential presence of fault zones plus potential cracking from mine blasting operations; the presence of special interest species (desert tortoise and desert bighorn sheep); and potential air quality conflict with the Joshua Tree National Monument. This site is being proposed by others for a similar waste-by-rail remote landfill.
Morongo Indian Reservation	Southern Pacific	68	N/A	• 36,000-acre reservation, only 1,000 acres inhabited.	Timeframe required to complete negotiations for land use with the Morongo Indian Tribe was estimated by WMNA to require ten years and determined to be prohibitive. Also, Southern Pacific rejected consideration of investment in a major sanitary landfill.

Note - Boron not listed in this table

TABLE 3.8

WASTE-BY-RAIL
POTENTIAL REMOTE LANDFILL SITES
(Continued)

SITE	RAIL LINE	DISTANCE (miles from San Gabriel Valley)	SITE AREA[1]	SCAG REMARKS	RAIL•CYCLE SITE EVALUATION
SAN BERNARDINO COUNTY					
Amboy	ATSF	200	N/A	--	Amboy area met siting criteria, and appeared to be a favorable locale.
Dunn	Union Pacific	163	285 acres	• Proposed as possible preferred alternative to Oro Grande waste separation solid waste gasification plant.	Site was eliminated due to the probable presence of the threatened desert tortoise and limited available acreage.
Hector	ATSF or Union Pacific	165	12,000 acres (some BLM land)	• Hazardous waste repository being considered. • Need spur line of 5 to 15 miles. • This area may be involved in or border proposed Desert National Park.	Site was eliminated due to the probable presence of the threatened desert tortoise. In addition, this site would require either laying of new trackage or truck haul from the railhead to the landfill site.
Oro Grande	ATSF or Union Pacific	92	75 acres	• Waste separation plant and solid waste gasification plant proposed.	Site was eliminated due to the probable presence of the threatened desert tortoise and limited available acreage.

91-109 (11/4/92/mg)

(1) N/A = Not available. The 1988 SCAG rail haul feasibility study did not provide consistent information for each site.

- Hector and Ward Valley in San Bernardino County are not located directly on an ATSF rail line. These sites would require 5 to 15 miles of spur lines. The requirement for a spur line was determined insufficient on its own to eliminate the site from further consideration. Both Hector and Ward Valley are also currently being considered as possible sites for other waste disposal requirements. The site known as Hidden Valley, located approximately five miles north of Hector, is being evaluated as a potential Class I hazardous waste disposal site, and Ward Valley is being considered for a low-level radioactive disposal site for waste from research and medical facilities. In addition, Ward Valley is approximately 280 rail miles from Los Angeles County and would not meet the 24-hour turnaround criteria. Based on these factors, for the purpose of this EIR/EIS, both Hector and Ward Valley were eliminated from further consideration.

- Oro Grande in San Bernardino County and Boron in Kern County have been determined to be potential habitat for the threatened desert tortoise. In addition, Oro Grande is in an area of high ground water and is limited to 75 acres, which would not provide for a long-term disposal site at the projected Rail•Cycle volumes of 21,000 tons per day. Also, Oro Grande is becoming a much more urbanized community. Based on these factors, Oro Grande and Boron were eliminated from further consideration for the purpose of this EIR/EIS.

- Tehachapi in Kern County is limited to approximately 1,000 acres, which would not provide for a long-term disposal site at the proposed Rail•Cycle volumes of 21,000 tons per day. In addition, the most direct rail route would require the use of a Southern Pacific rail line. Based on these factors, for the purpose of this EIR/EIS, Tehachapi was eliminated from further consideration.

- Amboy in San Bernardino County meets the Rail•Cycle siting and operational criteria and, depending on the specific site of the landfill, the Amboy/Cadiz Valley area appears to meet federal, state, and local regulatory criteria for the siting and operation of a Class III landfill.

6. Two additional sites for a potential waste-by-rail landfill were identified by private ventures in Imperial County in 1991 and 1992. The sites, known as the Mesquite Mine and Niland, are located in southeast Imperial County, as shown in Figure 3.18. However, as these sites are being considered by other private ventures and access to the site would not be available to Rail•Cycle, they are not considered to represent reasonable feasible alternatives to Rail•Cycle for its proposed Bolo Station Landfill and have not been evaluated as part of this EIR/EIS.

3.7.2.2 San Bernardino County Regional Alternatives

1. Potential alternatives in the San Bernardino County desert region were evaluated based on siting, design, and operational criteria established by Rail•Cycle. As shown in Figure 3.19, four alternative locales were identified for evaluation. (For purposes of this discussion, locale refers to a general vicinity, while site refers to specific boundaries.) These four locales represent areas along the ATSF rail line between Barstow and Amboy with sufficient acreage for a landfill of the size being proposed by Rail•Cycle (minimum of 1,500 to 2,000 acres of dedicated landfill operations plus additional acreage for support facilities), which are not limited by one or more of the following:

   - Proximity to the populated areas from Barstow to Newberry Springs.
   - Topographical or geologic features such as steep slopes and lava flows.
   - Steep grades on the ATSF rail line.
   - High ground water or dry lake beds.
   - Jurisdictional boundaries (e.g., Twentynine Palms Marine Corps Base).

2. Specific factors that limit the use of intermediate areas between the four potential alternative locales are as follows:

   - Alternative Locale I West to Barstow: Alternative Locale I is located immediately north of Interstate 40 (I-40), with the ATSF rail line situated north of the interstate. The northern, western, and eastern boundaries of Alternative Locale I are

ALTERNATIVE LOCALE I

ALTERNATIVE LOCALE H

ALTERNATIVE LOCALE G

ALTERNATIVE LOCALE F

ALTERNATIVE SITE A

ALTERNATIVE SITE B

BOLO STATION PROPOSED SITE (SITE E)

ALTERNATIVE SITE C (CADIZ VALLEY ALTERNATIVE SITE)

ALTERNATIVE SITE D

0 8 16 MILES

SCALE

REFERENCE: USGS STATE OF CALIFORNIA (SOUTH HALF) COMPILED 1968, REVISED 1981.

FIGURE 3.19

SAN BERNARDINO COUNTY DESERT REGIONAL ALTERNATIVES

RAIL·CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

dominated by steep slopes. Troy Dry Lake, with its high water table and seasonal flooding, is located approximately two miles west of the slopes that border Alternative Locale I. Approximately six miles west of Troy Dry Lake is the populated area that stretches from Newberry Springs westward to Barstow. The combination of steep slopes, high water table, and proximity to the populated area from Newberry Springs to Barstow makes the area west of Alternative Locale I not suitable for a landfill to support Rail•Cycle's waste-by-rail system.

- Alternative Locale I East to Alternative Locale H: Approximately two miles east of Alternative Locale I, the ATSF rail line crosses under I-40. To meet the criteria of access to the ATSF rail line, the area potentially available for a Rail•Cycle landfill would be located south of I-40. The area between Alternative Locale I and Alternative Locale H south of I-40 along the ATSF rail line is dominated by lava flows that severely limit access to the subsurface and make the area unsuitable for a landfill. At Lavic, the Twentynine Palms Marine Corps Base boundary encompasses the ATSF rail line and extends southward, making this area unavailable for development of a landfill.

- Alternative Locales H and G to Alternative Locale F: These locales are situated in the Ludlow vicinity. Alternative Locale H is located north of Ludlow and I-40 with the highway situated between the ATSF rail line and this locale. The eastern boundary of Alternative Locale H is dominated by steep slopes. Alternative Locale G is located east of Ludlow and south of the ATSF rail line. The southern, eastern, and western boundaries of Alternative Locale G is dominated by lava flows that severely limit access to the subsurface making the area unsuitable for a landfill. East of these locales and extending to Alternative Locale F, the railroad grade is steep due to the local terrain. The grade is not suitable for the development of rail sidings necessary to support an offloading facility. Approximately four miles west of Bagdad, the boundary of Twentynine Palms Marine Corps Base again encompasses the ATSF rail line and extends south of the rail line; therefore, this area is not available for development of a landfill.

- Alternative Locale F to Amboy: Alternative Locale F is north and east of Bagdad and north of the ATSF rail line. South of Bagdad is the boundary of Twentynine Palms Marine Corps Base. The northern, western, and eastern boundaries of Alternative Locale F are dominated by steep slopes, which extend to Amboy. The area from the boundary of Twentynine Palms Marine Corps Base eastward to Amboy is dominated by lava flows and Amboy Crater, which severely limit access to the subsurface and make the area unsuitable for a landfill.

3. To determine if one or more of the four alternative locales represents a reasonable and feasible alternative to the proposed Bolo Station site, the basic siting criteria for Rail•Cycle was applied to each locale. The results of this siting evaluation are as follows:

- Alternative Locale I: This locale is located on the ATSF rail line and includes sufficient acreage for a Rail•Cycle landfill. However, ATSF does not own sections within the boundaries of the locale. In addition, while there is secondary highway access to Hector, there is no direct highway access to the majority of the locale. Based on the above, it was determined that the locale does not meet two of the basic landfill siting criteria and, therefore, it does not represent a reasonable and feasible alternative. Additional evaluation of remaining siting, design, and operational criteria was not warranted based on the failure of the locale to meet two of the basic siting criteria.

- Alternative Locale H: This locale is not located directly on the ATSF rail line, but rather, is separated from the rail line by I-40. While the locale includes sufficient acreage for a Rail•Cycle landfill, ATSF does not own property within the boundaries of the locale. Based on the above, it was determined that the locale does not meet two of the basic landfill siting criteria and, therefore, it does not

represent a reasonable and feasible alternative. Additional evaluation of the remaining siting, design, and operational criteria was not warranted based on the failure of the locale to meet two of the basic siting criteria.

- Alternative Locale G: This locale is located on the ATSF rail line and has direct highway access. While the locale includes sufficient acreage for a Rail•Cycle landfill, ATSF does not own sections within the boundaries of the locale. In addition, the locale offers limited configurations for the landfill and its supporting facilities. Based on the above, it was determined that the locale does not meet one of the basic siting criteria and only marginally meets the landfill configuration criterion; therefore, it does not represent a reasonable and feasible alternative. Additional evaluation of the remaining siting, design, and operational criteria was not warranted based on the failure of the locale to meet one of the basic siting criteria.

- Alternative Locale F: This locale is located on the ATSF rail line and has direct highway access. While the locale includes sufficient acreage for a Rail•Cycle landfill, ATSF does not own sections within the boundaries of the locale. Based on the above, it was determined that the locale does not meet one of the basic landfill siting criteria and, therefore, it does not represent a reasonable and feasible alternative. Additional evaluation of the remaining siting, design, and operational criteria was not warranted based on the failure of the locale to meet one of the basic siting criteria.

3.7.2.3 Amboy/Cadiz Valley Alternatives

1. Within the Amboy/Cadiz Valley area, Rail•Cycle identified the Bolo Station site and four potential alternative sites for the landfill, as shown in Figure 3.17. Using existing federal, state, and local documents, Rail•Cycle conducted a preliminary evaluation of the four potential alternative sites to determine if one or more of the sites could be considered a feasible alternative based on the Rail•Cycle siting and operational criteria, and various regulatory requirements for the siting and operation of a Class III landfill. The following documents were evaluated as part of this process:

- BLM maps of the Amboy and Sheephole Mountain quadrants to identify potential desert tortoise habitat.
- BLM CDCA Plan to identify the current classifications and significant resources included in the plan for the five sites. The plan includes various information and data including:
  - Native American Reservation Element: areas of reservations removed from the public domain.
  - Wildlife Element: areas of known habitat for state and federal protected wildlife species.
  - Vegetation Element: distribution of protected plant species.
  - Wilderness Areas Element: areas inventoried and evaluated for potential wilderness designation.
  - Livestock Grazing Allotments: areas leased for cattle and sheep grazing.
  - Motorized Vehicle Access: Routes approved for travel.
  - Multiple-Use Class Status:
    Class C - areas recommended for wilderness designation.
    Class L - limited or low intensity use (uses such as solid waste landfills are not allowed).
    Class M - moderate use.
    Class I - intensive use.
  - Mineral Resources: areas with potential for locatable, leasable, and saleable minerals.
  - Utility Corridors: includes existing rail lines, pipe line corridors, power and communication lines and sites.
  - Areas of Critical Environmental Concern (ACEC): areas with unique geological, cultural, or biological resources.
- County maps and records to identify land use, zoning, and improvement classifications or restrictions for the five sites. The County General Plan was reviewed to identify documented environmental resources within the vicinity of the five sites.

2. Based on the review of available documents, the following preliminary findings were made regarding the proposed site and the four potential alternative sites:

- **Bolo Station Site:** This site was determined to be environmentally and operationally superior to the other four potential sites in the Amboy/Cadiz area, as site topography is flat and does not overlay an active or potentially active seismic fault. The site has good surface water drainage and, due to its flat topography, design and construction of the landfill will be able to manage stormwater flow for the 100-year storm/flood. The site has direct access to ATSF's double mainline and Route 66. Due to its flat topography, project related rail spurs, offloading facility, and railyard can be designed and constructed in accordance with current ATSF engineering and safety requirements. The site does not provide high quality habitat for rare, threatened, or endangered species, and has been designated as a Category 3 habitat by BLM for the threatened desert tortoise. This designation indicates that while the site is within the historic range of the species, the population has declined and may no longer be present in the area.

- **Alternative Site A:** This site was eliminated from further consideration as it is within an area that is designated by BLM as a Category 1 habitat for the threatened desert tortoise. This designation indicates that the site is within the historic range of the desert tortoise and provides high quality habitat for the species. While this site is located on the ATSF double mainline, the rail line location on the alternative site cuts across the northwest corner of the site and would require extensive area for the project related rail spur, and offloading and railyard.

- **Alternative Site B:** This site was also eliminated from further consideration as it is within an area that is designated by BLM as a Category 1 habitat for the threatened desert tortoise. This site also has limited configuration for the design and construction of the project related rail spur, offloading facility, and railyard. In addition, the site is affected by a desert wash that cuts through the center of the site and therefore has stormwater drainage issues that would require extensive design and construction effort to control.

- **Alternative Site C (Cadiz Valley Alternative Site):** This site consists of only five sections and is not located on the ATSF double mainline. The rail line to this site was recently sold by ATSF to the Arizona-California Railroad. The northwest corner of the site trends into the Ship Mountains and would not be usable for the landfill. However, the usable area could still provide capacity for 821 million cubic yards of solid waste and various landfill cover materials. While the site has limitations, none of them were considered significant enough to eliminate it from consideration. Therefore, this site has been identified as a feasible alternative to Bolo Station.

- **Alternative Site D:** This site is also located on the Arizona-California Railroad single line. This site was eliminated from further consideration due to its close proximity to the Cadiz Dunes a BLM special interest area. In addition, due to its relatively steep terrain, this site would require substantial earthwork to develop a landfill.

Not relevant for Broadwell

3. Based on the above findings, Amboy/Cadiz area Alternative Sites A, B, and D were eliminated from further consideration in this EIR/EIS. Alternative Site C (Cadiz Valley Alternative site) was determined to represent a feasible alternative to Bolo Station and is discussed in Section 3.7.1. Throughout this EIR/EIS this site is referred to as the Cadiz Valley Alternative site.

CHAPTER 4.0
AFFECTED ENVIRONMENT

4.0 AFFECTED ENVIRONMENT

4.1 INTRODUCTION

1. For the purposes of this Draft EIR/EIS, regional and site-specific project study areas were defined. The regional study area was delineated as the southeastern Mojave Desert, particularly the Bristol and Cadiz basins. Bristol Basin covers approximately 710 square miles and is physically bounded by the Bullion Mountains on the west and the Bristol and Marble mountains on the north. To the east the Calumet Mountains partially separate the Bristol and Cadiz basins. The approximately 430-square mile Cadiz Basin is bordered by the Iron Mountains on the east and the Ship Mountains to the north. For certain topics, such as air quality, transportation, and socioeconomics, areas beyond Bristol and Cadiz basins are also considered. The 4,800-acre Bolo Station site and 3,200-acre Cadiz Valley Alternative site were inventoried either by site survey and/or literature review for resources such as minerals, vegetation, wildlife, and cultural resources. A general overview of the regional and local environment is provided below in Sections 4.1.1, 4.1.2 and 4.1.3.

2. Sections 4.2 through 4.15 provide descriptions of the existing environment in the vicinities of the Bolo Station and Cadiz Valley Alternative sites. The sites are described for each environmental issue from regional and local perspectives, as appropriate. At the direction of the BLM, descriptions of the natural resources of the Offered Lands sites in Piute Valley and near Cadiz Dunes were limited to mineral resources, vegetation (with regard to desert tortoise habitat), and wildlife (desert tortoise). For other topical areas, the Offered Lands are not described as the proposed exchange will not result in potential environmental impacts.

4.1.1 REGIONAL STUDY AREA

1. The Bristol and Cadiz basins lie within an elongate, northwest-trending valley known as the Bristol-Cadiz-Danby Trough. This trough is subdivided into three distinct basins, which (from north to south) are the Bristol Basin, Cadiz Basin, and Danby Basin. These basins are typical of the region with low-lying playas surrounded by sloping bajadas and mountains. Elevations range from approximately 600 feet above msl on the basin floors to over 5,000 feet above msl in the surrounding mountains.

2. Vegetation and wildlife species in this region are generally wide-ranging and commonly found throughout the Mojave Desert. Representative plant communities include the creosote bush scrub, which occurs on valley floors and lower slopes of alluvial fans, generally below elevations of 4,000 feet above msl, and juniper woodlands above the 4,000-foot elevation. Saltbush communities are found at playa margins. Wildlife in the region include:

   - Reptiles, including desert iguana, desert horned lizard, and Mojave rattlesnake.
   - Various resident and migratory birds, including turkey vulture, red-tailed hawk, greater roadrunner, and common raven.
   - Mammals, including coyote, jackrabbit, desert woodrat, mouse, and others.

   Species of special interest include raptors such as the golden eagle and prairie falcon. In addition, the desert tortoise is known to exist in the region, and is listed as a threatened species by the USFWS and CDFG.

3. Climate in the regional study area is arid and characterized by warm, dry summers and mild winters. Average maximum daytime temperatures range from to 60° F in winter, and from 90° to 110° F in summer. Rainfall in the project area is low, approximately 2 to 5 inches per year.

4. Land use in the region is characterized as low density, in which open space prevails. Activities include the military, mineral extraction, agriculture, and recreation/tourism. Transportation and transmission facilities are also located throughout the region.

4.1.2 BOLO STATION SITE STUDY AREA

1. The proposed Bolo Station site consists of 4,800 acres near Bristol Dry Lake, south of the Bristol and Marble mountains (see Figure 1.2).

The ATSF main rail line between Barstow and Needles passes through the site. Creosote bush and saltbush scrub communities exist on the site's gently sloping alluvial surface. The site slopes from an elevation of 935 feet above msl at the northern boundary to about 610 feet at the southern boundary along Bristol Dry Lake.

2. Bolo Station is situated in a characteristic desert environment, with sandy soils and sparse vegetation. Onsite floral communities are depauperate (poorly developed), possibly due to: (1) minor increases in salinity, and (2) the drought experienced from 1986 to the present. Vegetation consists of five plant communities: creosote brush scrub, creosote bush-allscale scrub, desert dune scrub, desert wash scrub, and desert saltbush scrub. Wildlife observed or expected to occur on the site are typical of the surrounding region, including the reptiles, birds, and mammals identified in Section 4.1.1. While the site is within the range of the threatened desert tortoise, the area in which the site is located has been classified by the BLM as a Category III tortoise habitat, which indicates that it is not considered to provide high quality habitat for this species. During biological surveys for the proposed action, only one tortoise sign was observed on the site.

3. Mineral extraction is the primary current land use in the vicinity of Bolo Station. Bristol Dry Lake borders the site to the southwest and is classified as a Known Sodium Leasing Area (KSLA) by BLM. It provides an active brine extraction and mining area for sodium chloride and calcium chloride. Recreation and tourism are limited due to the distance from major urban population centers and the lack of recreational facilities. Residential, military, agricultural, and wilderness land uses are located five or more miles away.

4.1.3 CADIZ VALLEY ALTERNATIVE SITE STUDY AREA

1. The Cadiz Valley Alternative study area consists of 3,200 acres located approximately ten miles southeast of the Bolo Station site, along the Arizona-California Railroad (see Figure 1.2). The site is immediately south of the Ship Mountains, and encompasses the southwest tip of this range of mountains. Elevations at the alternative site range from 1,580 feet above msl at the mountainous outcroppings in the northeast, to 660 feet above msl on the southern portions of the site. A rail line (Arizona-California Railroad) crosses the site diagonally from the northwest corner of Section 8 to the eastern side of Section 16.

2. The site is characteristic of a desert environment, with creosote bush and saltbush scrub communities dominating the alluvial plain. Wildlife observed or expected to occur on the site are typical of the surrounding region. Numerous desert tortoise signs were observed onsite during the biological survey; however, the site has been classified by BLM as a Category 3 tortoise habitat, which indicates that the site is not considered to provide high quality habitat for this species.

3. Land use surrounding the Cadiz Valley Alternative site is limited. The nearest residential community is the town of Cadiz, approximately six miles northwest of the site. Recreational uses and tourism are limited due to the distance from major urban population centers and the lack of recreational facilities.

4.2 GEOLOGY AND SOILS

4.2.1 REGIONAL GEOLOGY AND SOILS

1. For projects covering large land areas such as the proposed Bolo Station site, a review of the regional physiographic setting and geologic processes combined with site specific investigations provide a more thorough understanding of surface and subsurface conditions potentially affecting design, construction, and operation of the proposed action. This section summarizes the physical features and geologic processes contributing to development of existing topographic, geologic, soil, surface and ground water conditions at the Bolo Station and Cadiz Valley Alternative sites, and the Offered Lands sites. This information was applied to interpretations (e.g., subsurface cross sections) made regarding geology, soils, and ground water conditions at sites discussed in Section 4.2.2.

4.2.1.1 Physiography

1. The Bolo Station and Cadiz Valley Alternative sites are located in the southeastern portion of the Mojave Desert Geomorphic Province, a region characterized by north to northwest trending mountain ranges separated by broad alluvial valleys or basins, as shown in Figure 4.2.1. The Bolo Station site is situated in the Bristol Basin on predominantly gently sloping alluvial fan deposits bordering the Bristol Mountains. On the southwest is Bristol Dry Lake, a broad, flat desert playa of about 80 square miles. The Cadiz Valley Alternative site is situated immediately south of the Ship Mountains and several miles north of Cadiz Dry Lake and is approximately 12 miles southeast of the Bolo Station site. This alternative site is largely situated on predominantly gently sloping alluvial fan deposits emanating from the Ship Mountains. Figure 4.2.2 depicts site boundaries and local topography.

2. Elevations range from 610 to 935 feet above msl at the Bolo Station site and from 660 to 1,580 feet above msl at the Cadiz Valley Alternative site. The Bolo Station site contains minimal topographic relief, with the only contrast provided by a low rock outcropping in Section 5. Mountain foothills in Sections 5 and 9 at the alternative site provide topographic contrast between northeastern and southwestern site areas, which are separated by the Arizona-California Railroad, as shown in Figure 4.2.2.

3. A prominent geomorphic feature in the project vicinity is Amboy Crater, a relatively young (less than 6,000 years old) volcanic cinder cone surrounded by numerous hummocky lava flows. Amboy Crater is located approximately seven miles west of the Bolo Station site, rising approximately 250 feet above the surrounding valley floor, as shown in Figure 4.2.1.

4. Cadiz Valley is a broad, low-relief, northwest-trending desert intermountain basin. The valley is up to 15 miles wide and 60 miles long, occupying an area of 430 square miles (DWR, 1975). Topographic closure (i.e., watershed separation between adjacent valleys) for the valley is at approximately 1,000 feet above msl. Ancient shoreline features are absent along the valley side slopes, although they may be buried by a thick mantle of more recently deposited alluvium.

4.2.1.2 Bedrock, Geomorphology, and Soils

1. Bedrock of the Mojave region primarily consists of Precambrian crystalline rocks and a variety of Paleozoic to mid-Mesozoic metasedimentary and volcanic rocks. These rocks were subsequently deformed and intruded by granitic rocks of late Mesozoic to early Cenozoic age (Jacobs, 1990c, as in Garfunkel, 1974; and Howard and John, 1984). Overlying these rocks in the basin areas are alluvial and playa sediments, and various volcanic rocks of Tertiary and Quaternary age.

2. Uplifting activity that formed local mountains surrounding the project vicinity is interpreted to have occurred between six and ten million years ago (Jacobs, 1991b, as in Rosen, 1989). Subsequent geomorphic or erosional processes (primarily alluvial), acting on the exposed bedrock surface comprised of various types of bedrock of variable resistance to erosion, contributed to the current patterns (e.g., topographic and stratigraphic) of basin formation. The relatively old geologic age of mountain uplifting in the basins results in thick alluvial deposits and relatively low surface gradients. A generalized geologic map of the project vicinity is presented in Figure 4.2.1.

3. Unconsolidated alluvial sediments surrounding Bristol and Cadiz Dry lakes are Quaternary in age (0 to 2 million years old) (Jacobs, 1991b, as in Koehler, 1983). These deposits consist of varying amounts of gravel, sand, silt, and clay derived

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EXPLANATION

SEDIMENTARY AND METASEDIMENTARY ROCKS

QUATERNARY

Recent

- Qs — Dune sand
- Qal — Alluvium
- Qsc — Stream channel deposits
- Qf — Fan deposits
- Qb — Basin deposits

GREAT VALLEY

- Qst — Salt deposits
- Ql — Quaternary lake deposits
- Qg — Glacial deposits

Pleistocene

- Qt — Quaternary nonmarine terrace deposits
- Qm — Pleistocene marine and marine terrace deposits
- Qc — Pleistocene nonmarine
- QP — Plio-Pleistocene nonmarine

IGNEOUS AND META-IGNEOUS ROCKS

- Qrv — Recent volcanic: Qrv^r —rhyolite; Qrv^a —andesite; Qrv^b —basalt; Qrv^p —pyroclastic rocks
- Qpv — Pleistocene volcanic: Qpv^r —rhyolite; Qpv^a —andesite; Qpv^b —basalt; Qpv^p —pyroclastic rocks
- Quaternary and/or Pliocene cinder cones

BOLO STATION SITE

CADIZ VALLEY ALTERNATIVE SITE

0 4 8 MILES

SCALE

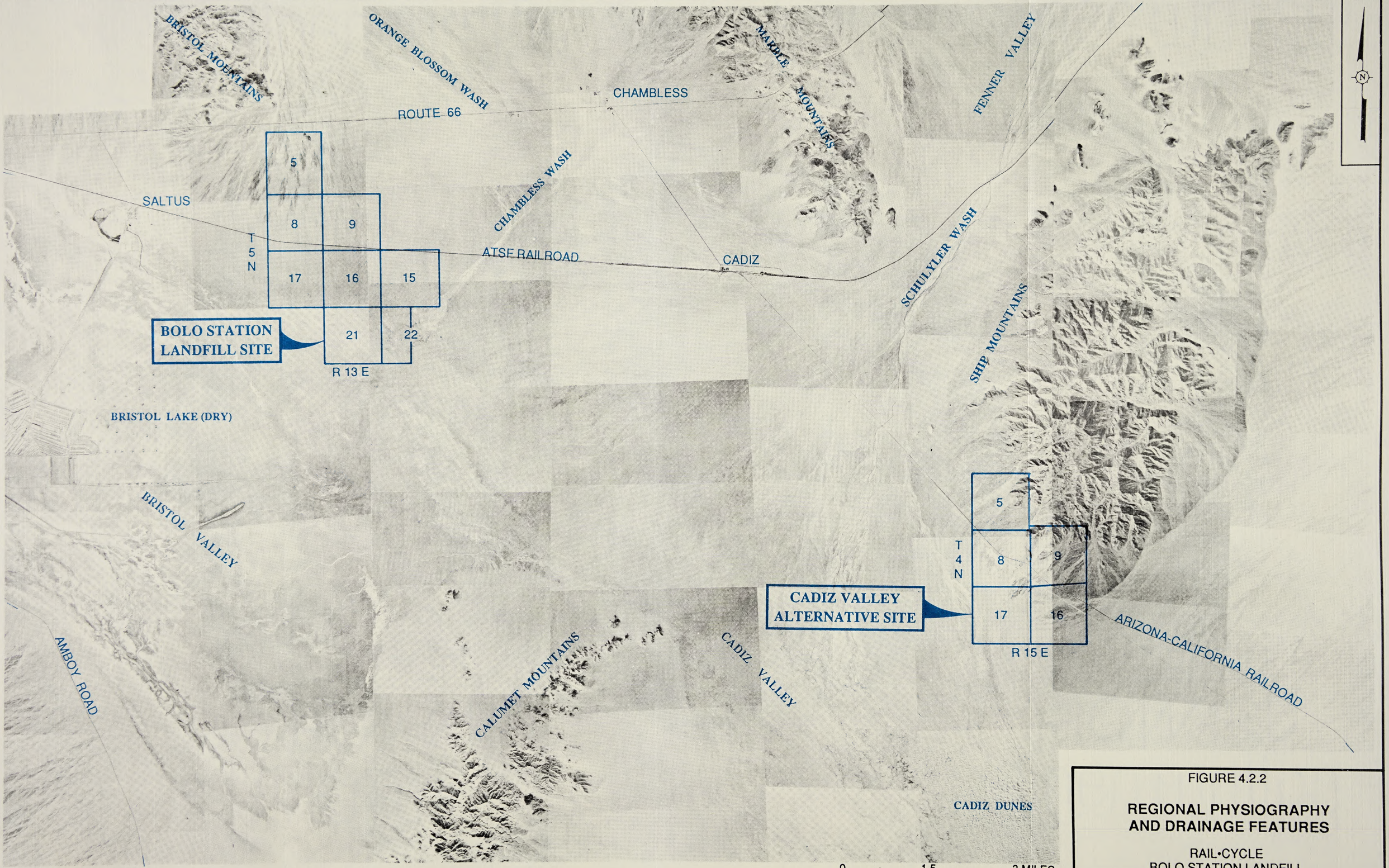
REFERENCE: U.S.G.S. 1: 250,000 GEOLOGIC MAP OF CALIFORNIA, NEEDLES SHEET, DATED 1963.

FIGURE 4.2.1

SURFACE GEOLOGY OF THE PROJECT REGION

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.



SOURCE: COMPOSITE AERIAL PHOTO FROM BLM, DATED 10/13/77

FIGURE 4.2.2

REGIONAL PHYSIOGRAPHY AND DRAINAGE FEATURES

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

from the surrounding mountains and deposited in coalescing alluvial fans. The greater the distance from the mountain source of the alluvial deposits, the finer the sediments become. The lower, more distant portion of the fans are dominated by sheet-flow deposits of sand and finer sediments. The Bolo Station site is primarily located on this portion of the alluvial fan. Calcite, gypsum, and small amounts of halite form in these porous deposits. The alluvial fans surrounding both lake basins have a relatively low topographic gradient, typically 0.02 to 0.03 feet per foot or less (about a 2 to 3 percent slope).

4. Geophysical data from a gravity and magnetic survey suggest that sedimentary fill may be as thick as 5,000 to 7,000 feet in the center of the basins (Howard and John, 1984; Jacobs, 1991b as in Biehler, 1991). Wells drilled to depths of approximately 1,000 feet in Bristol Basin have generally failed to reach bedrock (Jacobs, 1990c, as in Moyle, 1967; and Bassett, et al., 1959). However, in 1984 bedrock was reportedly encountered at a depth of 1,525 feet in a well located near Amboy on the perimeter of the basin, about five miles north of the center of the Bristol Dry Lake (Moyle, 1967). This agrees with the apparent depth to bedrock suggested by the gravity and magnetic survey data for this perimeter portion of the basin. A well drilled in the Cadiz playa did not encounter basement rock to a depth of 500 feet (Bassett, et al., 1959).

5. Bristol and Cadiz playa sediments are Quaternary-age deposits of fine to very fine grained clastic material and evaporite minerals that were formed by the evolution of the playa through time. Playa deposits can be subdivided into three subfacies based on grain size, surface features, and geochemistry: the playa margin, saline mud flat, and salt pan.

6. Playa margin sediments vary from silty sands to sandy clays (Jacobs, 1990c). Sheet flow is the dominant depositional mechanism in this environment. The southwestern margin of the Bolo Station site is located in the current Bristol Lake playa margin depositional zone. However, sediments probably become coarser with depth below this portion of the site reflecting the detrital infilling of the basin.

7. The saline mud flat environment is dominated by detrital mud (silt and clay) with minor amounts of sand. These deposits are generally homogeneous and barren of flora. The saline mud flats vary in areal extent over time. In the past, these deposits may have extended across the entire basin (Jacobs, 1991b). The surface of the mud flats are hummocky, and in many places, saturated. It is unlikely that these types of sediments directly underlie either of the sites, although it is possible that they could exist at depth (Jacobs, 1990c).

8. The salt pan environment is currently found in isolated areas within the saline mud flat environment. Two salt pans presently exist on the surface of Bristol Dry Lake, with halite layers reported to reach a maximum thickness of about 1.3 feet in both pans. Cadiz Lake has a similar salt pan near the center of the playa (Bassett, et al., 1959). Surface features associated with the salt pans include large halite teepee structures (salt-thrust polygons), knobs of salt-encrusted organic matter, and halite reefs. Based on available evidence, neither of the sites are located within the modern salt pan.

4.2.1.3 Structure

1. The project region is situated within a large, wedge-shaped structural block roughly coincident in area with the Mojave Desert Geomorphic Province. Known as the Mojave block, this structural feature is bounded on the north by Garlock Fault, on the southwest by San Andreas Fault, and on the south by the eastern Transverse Ranges. The eastern boundary of the Mojave block is not clearly defined, although recent publications speculate where the boundary is located (Dowrhenwend et al., 1991; Howard and Miller, 1992). The main structural influence in this area is the relative fault motion between the Garlock and San Andreas faults. The locations of the Bolo Station and Cadiz Valley Alternative sites relative to these faults are shown in Figure 4.2.3.

2. The prevailing structural influence within the Mojave block is the series of subparallel, northwest-striking faults that transect the region, interpreted to range in age from early Tertiary (about 60 million years ago) through to the present. As shown in Figure 4.2.3, neither the Bolo Station or Cadiz Valley Alternative sites are located on a known fault. Displacements along many faults are not known with certainty, but both dip-slip and right lateral components of displacement are documented.

BOLO STATION SITE

CADIZ VALLEY ALTERNATIVE SITE

FAULT ALONG WHICH HISTORIC (LAST 200 YEARS) DISPLACEMENT HAS OCCURRED, AND IS ASSOCIATED WITH ONE OR MORE OF THE FOLLOWING:

- A RECORDED EARTHQUAKE WITH SURFACE RUPTURE.
- FAULT CREEP SLIPPAGE (SLOW GROUND DISPLACEMENT USUALLY WITHOUT ACCOMPANYING EARTHQUAKES).
- DISPLACED SURVEY LINES.

WIDTH OF BAND HAS NO PARTICULAR SIGNIFICANCE AND IS NOT INTENDED TO INDICATE THE ZONES OF THE ALQUIST-PRIOLO SPECIAL STUDIES ZONES ACT OF 1972.

QUATERNARY FAULT DISPLACEMENT (DURING PAST TWO MILLION YEARS), WITHOUT HISTORIC (LAST 200 YEARS) RECORDED ACTIVITY.

WIDTH OF BAND HAS NO PARTICULAR SIGNIFICANCE AND IS NOT INTENDED TO INDICATE THE ZONES OF THE ALQUIST-PRIOLO SPECIAL STUDIES ZONES ACT OF 1972.

PRE-QUATERNARY FAULT (OLDER THAN TWO MILLION YEARS) OR FAULT WITHOUT RECOGNIZED QUATERNARY DISPLACEMENT. FAULTS IN THIS CATEGORY SHOULD NOT NECESSARILY BE CONSIDERED "DEAD."

0 20 40 MILES

APPROXIMATE SCALE

REFERENCE: JENNINGS, 1975.

FIGURE 4.2.3

FAULTS WITHIN THE PROJECT REGION

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

3. Hewett (1955) indicates that the entire Mojave region was at one time elevated 15,000 feet or more relative to areas to the south and north. He interprets the steeply dipping, northwest-striking faults as being primarily dip-slip features along which the present basin areas have dropped relative to adjacent mountain ranges. Gardner (1985) suggests that components of both dip-slip and strike-slip motion best explain observed displacements. Regional folding of strata within the Mojave block is relatively minor and largely associated with faulting (Bassett, et al., 1964).

4.2.1.4 Faulting and Seismicity

1. Earthquakes are thought to result from sudden movement along interfaces of bedrock faults. During initial formation of mountain ranges, earthquakes were frequent, as large bedrock masses were uplifted causing fracture and displacement in the bedrock materials (i.e., thrust faults). Although not as dramatic as in early geologic time, the earth's crust is still moving today, causing stresses to build up on fault surfaces or zones. When these stresses reach certain limits (dependent upon material properties, fault orientation, etc.), a sudden slippage may occur, resulting in tremendous energy release (earthquake). The energy release may cause some or all of the following:

   - Ground rupture
   - Severe ground shaking
   - Ground subsidence
   - Liquefaction of soil deposits
   - Lurching
   - Landslides
   - Slope failure
   - Tidal waves

   Depending on the magnitude of earthquake and proximity to the earthquake focus, the energy release can cause damage to man-made structures and injury or loss of life. (Note: general terminology for seismicity is included in Appendix C.)

2. Evaluation of the potential for impacts of earthquakes is typically divided into two separate but interrelated studies:

   - Assessment of whether or not active or potentially active faults are located within the project site.
   - Assessment of the extent of past seismic activity in the site vicinity, and the probability that damage-producing earthquakes will occur in proximity to the site in the future.

3. CCR Title 23, Chapter 15 prohibits siting of landfills over an active or potentially active fault. Also, the California Alquist-Priolo Special Studies Zone Act of 1973 requires the State Geologist to delineate "special studies" zones along known active fault zones in California, with the intent of prohibiting human occupancy across traces of active faults. According to the California Public Resources Code, an "active fault" is one that has had surface displacement within Holocene time (approximately the last 10,000 years). A "potentially active fault" is defined as one that has shown evidence of surface displacement during the Quaternary period (the last two million years). Inactive faults are those which have not shown surface displacement within the Quaternary period.

4. Intensity of ground shaking during an earthquake depends in large part on geologic foundation conditions (i.e., thickness and physical properties of materials comprising the upper several hundred feet of the affected area). The potential for impacts due to ground shaking is related to the stratigraphy, grain size, density, and degree of saturation of subsurface soils, as well as the intensity of ground shaking. The potential for lurching, landslides and slope failures depends on topography (height, configuration, and slope angles of embankments or natural deposits), material strength properties, drainage conditions, and static and dynamic loadings among others.

4.2.1.4.1 Capable Faults in the Region

1. Several fault systems transect the eastern Mojave Desert region, primarily from northwest to southeast. Major active and potentially active faults within 100 miles of the Bolo Station and Cadiz Valley Alternative sites, as identified by California Division of Mines and Geology (DMG) are listed in Table 4.2.1, and shown in Figure 4.2.3. As shown in this table, the closest active fault is the Pisgah-Bullion Fault, approximately 29 miles southwest of the Bolo Station site and 35 miles southwest of the Cadiz Valley Alternative site.

TABLE 4.2.1

MAJOR ACTIVE AND POTENTIALLY ACTIVE FAULTS WITHIN 100 MILES OF THE PROPOSED PROJECT OR ALTERNATIVE SITE[1]

FAULT	DISTANCE FROM BOLO STATION SITE[2] (miles)	DISTANCE FROM CADIZ VALLEY ALTERNATIVE SITE (miles)	DMG ACTIVITY STATUS[3]
Bicycle Lake	68	80	P
Blackwater	93	--[4]	P
Blue Cut	41	34	P
Borrego Mountain (San Jacinto)	97	96	A
Calico-Newberry	36	46	A
Camp Rock - Emerson	41	50	P
Casa Loma - Clark (San Jacinto)	87	89	A
Cleghorn	94	--[4]	P
Coyote Creek (San Jacinto)	90	93	A
Death Valley (West)	83	94	A
Drinkwater Lake	72	84	P
Garlock (East)	84	96	A
Glen Helen - Lytle Creek - Claremont	90	97	P
Harper	79	93	P
Helendale	65	75	A
Hot Springs - Buck Ridge (San Jacinto)	84	86	A
Lenwood	60	71	A
Lockhart	87	--[4]	P
Ludlow	15	26	P
Manix	52	65	A
Mojave River (Ord Mountain)	59	70	P
Old Woman Springs	53	64	P
Pinto Mountain - Morongo	32	35	A
Pisgah-Bullion	29	35	A
San Andreas (Southern)	61	65	A
Sand Hills	81	76	P
San Gorgonio - Banning	62	66	P

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(1) Petra Geotechnical, 1992.
(2) Distance determined by the deterministic method.
(3) A = Active, P = Potentially Active.
(4) Over 100 miles from the site.

The nearest potentially active fault is the Ludlow Fault, approximately 15 miles northwest of the Bolo Station site and 26 miles northwest of the Cadiz Valley Alternative site.

2. Historic earthquake activity was evaluated by reviewing a map of selected earthquake epicenters in California between June 1808 and December 1987 (Jacobs, 1990c, as in Goter, 1988). The map indicates epicenters of earthquakes of magnitude (M) 3.0 and greater. A portion of that map is presented in Figure 4.2.4, which indicates that the project vicinity (i.e., within a 20-mile radius of the sites) is relatively inactive. The majority of documented seismicity has been recorded in the Transverse and Peninsular ranges, located 40 miles and 80 miles southwest of the site, respectively. A computer program (Blake, 1989b) was utilized to estimate what the ground acceleration from these historic earthquakes would have been at the Bolo Station site. The database utilized by this computer program has been recently updated to include all historic earthquakes through July 1992 (which includes the recent Landers and Big Bear earthquakes). Ground accelerations are a measure of the potential for damage to structures or slopes. Estimated accelerations at the site were calculated by the computer program using Joyner and Boore's random mean attenuation relationship (Blake, 1989b).

3. A summary of recorded seismic activity (greater than M4.0) within a 20-mile radius of the Bolo Station and Cadiz Valley Alternative sites is provided in Table 4.2.2.

4.2.1.4.2 Historical and Recent Earthquake Impacts

1. There is no reported evidence of significant ground rupture, subsidence, liquefaction, lurching, landslides, or slope failure due to earthquakes in the project vicinity (i.e., within a 20-mile radius) during this century.

2. The recent earthquakes that occurred on June 28, 1992, with their epicenters at Landers (4:58 a.m.) and Big Bear, California (8:04 a.m.), which measured M7.5 and M6.6 respectively on the Richter scale (and the series of aftershocks following these events) caused no reported damage in the project area (Rail•Cycle, 1992a). An inspection of the site and personal interviews with residents of Amboy, Chambless, and Saltus indicated the only impact to the Amboy/Cadiz area due to these events was an electrical power outage that lasted approximately 12 hours. No damage was reported to the power grid in the Amboy/Cadiz area, but the main power supply in Twentynine Palms had to be restored before power was received in the Amboy/Cadiz area (Rail•Cycle, 1992a).

3. Ground water monitoring wells and piezometers installed at Bolo Station by Rail•Cycle have been monitored since these earthquakes. Results of this recent monitoring determined that the monitoring wells and piezometers were undamaged and intact, indicating no earth movements at depth occurred, down to a depth of 200 feet (Rail•Cycle, 1992a).

4. No significant damage to structures, roads, bridges, railroad lines, or power lines has been reported in the project vicinity during earthquakes presented in this discussion. ATSF employs a policy of immediate inspection of all bridges for damage on their rail line route within 50 miles of the epicenter of each M3.5 or greater earthquake. ATSF reports that no such damage has occurred along the rail lines in the vicinity of the Bolo Station and Cadiz Valley Alternative sites during the 1900s.

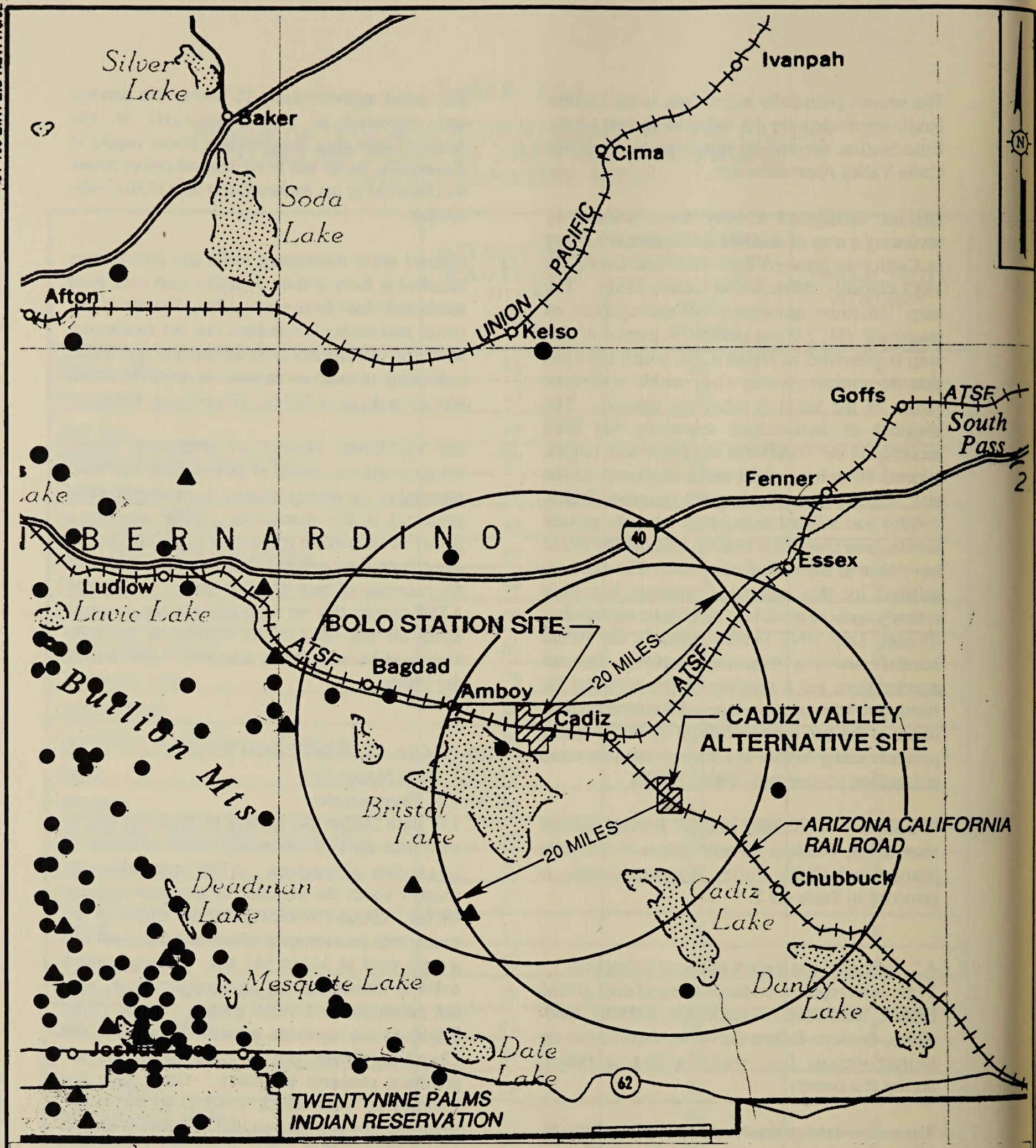
4.2.2 LOCAL GEOLOGY AND SOILS

4.2.2.1 <u>Bolo Station Site</u>

4.2.2.1.1 Physiography

1. The Bolo Station site is three miles across east to west and four miles across north to south at its greatest dimensions. ATSF railroad tracks roughly bisect the site into northern and southern halves. Ground surface generally slopes to the south, with an average gradient of 1.6 percent and a total relief of 340 to 345 feet. The site surface exhibits limited natural topographic relief, with the exception of a small granite outcrop (Bolo Rock) in the northern portion of the site, the Chambless Wash, and the sand dunes near the southern property boundary. Other than the Chambless Wash which is 40 to 45 feet wide, there are no significant natural channels or slopes. Local topographic relief along the Chambless Wash is only about 5 to 10 feet above natural ground level.

2. The site is primarily (i.e., approximately 90 percent) located on a large, continuous, south facing alluvial fan formed along the Bristol and Marble mountain range fronts. Surface soils are alluvial in nature and, as a result of the natural sorting process that occurs as flows move down



LEGEND

EARTHQUAKE MAGNITUDES

- ● 3.0 - 4.4
- ▲ 4.5 - 6.4

0 12 24 MILES

SCALE

REFERENCES: 1. U.S.G.S. 1:2,000,000 SCALE MAP OF SOUTHERN CALIFORNIA, DATED 1973.
2. JACOBS, 1990c: AS IN GOTER, 1988.

FIGURE 4.2.4

REGIONAL EARTHQUAKE EPICENTERS

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

TABLE 4.2.2

EARTHQUAKE EPICENTERS WITHIN A 20-MILE RADIUS[1]

DATE OCCURRING	RICHTER MAGNITUDE	DISTANCE TO BOLO STATION SITE (miles)	ESTIMATED ACCELERATION AT BOLO[2] (g)	DISTANCE TO CADIZ VALLEY ALTERNATIVE (miles)	ESTIMATED ACCELERATION AT CADIZ[2] (g)
12/22/43	5.5	17	0.063	23	0.043
7/18/46	5.6	20	0.054	33	0.030
12/14/70	4.0	16	0.030	20	0.023

92-109 (11/9/92/mg)

(1) Petra Geotechnical, Inc., 1992.

(2) Estimated using Joyner and Boore's Random Mean Attenuation Relationship (1982). Other earthquake epicenters within the 20-mile radius of the site (as shown in Figure 4.2.4) represent earthquakes of magnitude 3.0 to 3.9.

What about debris flows?

the alluvial fan, grain size decreases relative to distance from the mountains. Near the southern project boundary the alluvial material intergrades into fine grained playa deposits of Bristol Dry Lake; sheet flow is the primary depositional mechanism of these fine to very fine grained materials (Jacobs, 1990c).

3. The surface is typically sparsely vegetated with predominantly creosote and bursage. There is no visual evidence of serious wind or runoff erosion, landslides, or local subsidence.

4. The approximate limits of alluvial, playa, sand dune and debris flow deposits within and immediately surrounding the Bolo Station site are shown in Figure 4.2.5. The investigation of surface geology in the immediate vicinity of Bolo Station has identified what has been interpreted to be a barrier bar-spit system (Jacobs, 1991b). Three of these barrier bar-spit complexes were observed on aerial photographs and confirmed in the field (Jacobs, 1991b). They are elevated 6 to 10 feet above the present playa, with low (3- to 6-foot high) sand dunes, and cover about 130 acres of the southern portion of the site. Additional barrier systems may exist north of the site, but many have been subsequently buried in alluvial fan deposits.

5. A fan-delta-debris flow system which was fed by the Chambless Wash was also identified during the investigation (Jacobs, 1991b). This debris flow system periodically entered Bristol Lake through the channel between the barrier systems. These deposits, which include mud and debris flows, cross the southeastern corner of the site, as shown in Figure 4.2.5.

6. Project-specific geophysical surveys were conducted in the site vicinity to define the bedrock surface and subsurface geologic structure (Biehler, 1991). Both gravity and magnetic stations were established for data collection. The results indicate a subsurface bedrock ridge underlies the Bolo Station site, trending northwest-southeast from the bedrock outcropping in Section 5 to the northern outcroppings of the Calumet Mountains. This ridge may have originally been a surface feature, such as a low ridge bridging the Bristol and Calumet mountains, but has been subsequently buried by more recently deposited alluvium. A subsurface bedrock trough exists to the northeast of the ridge, and roughly correlates to the location of the Orange Blossom Wash (Biehler, 1991). To the southwest of the ridge, bedrock elevations slope downward into Bristol Lake basin (Biehler, 1991).

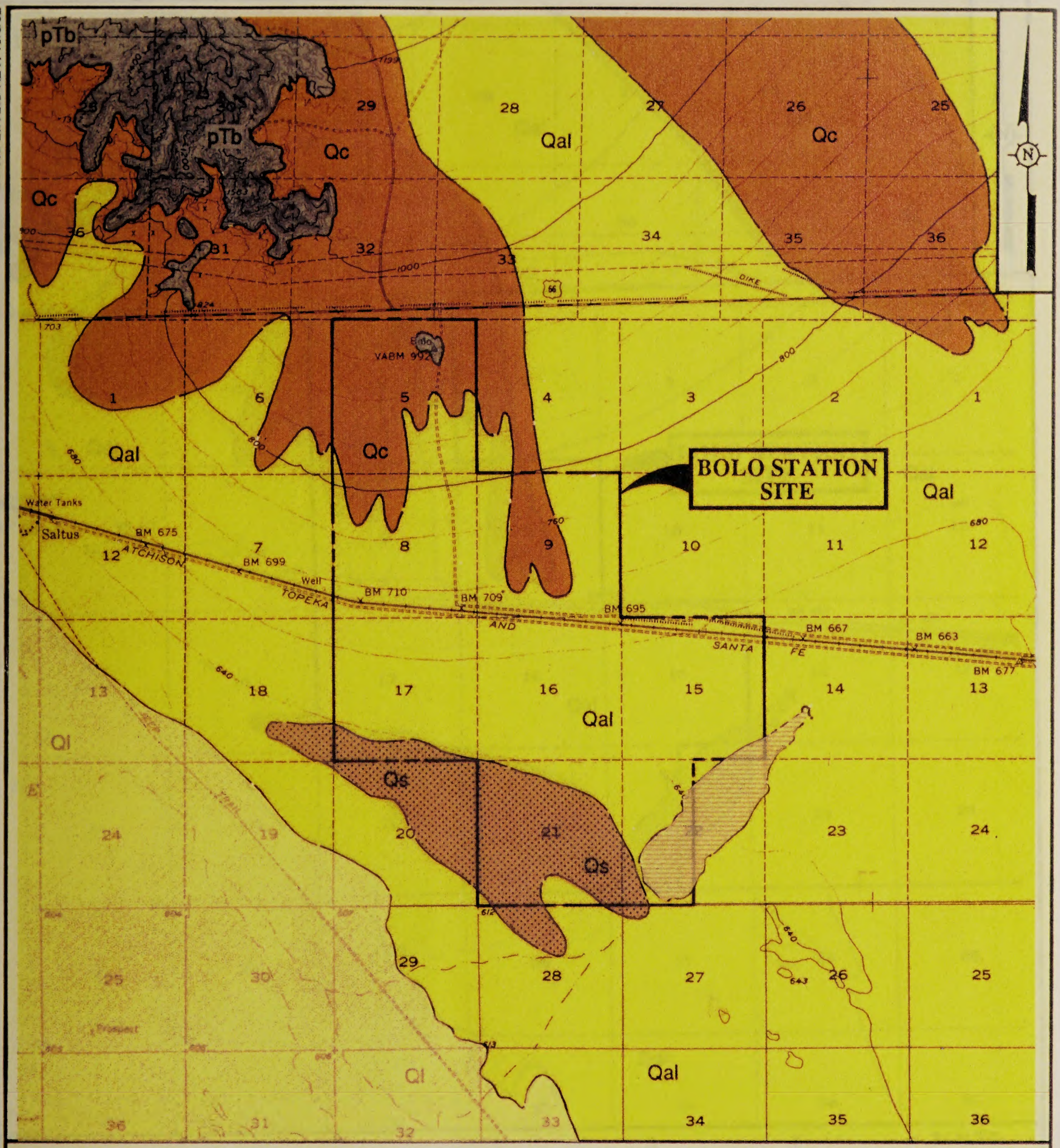
7. Geomorphology of the site does not indicate the likelihood for vertical channeling (i.e., coarser grained vertical or nonvertical deposits) which could influence infiltration. Additional geophysical study is being performed for the proposed action in consultation with the RWQCB in support of the permitting requirements of CCR Title 23 to verify these results.

4.2.2.1.2 Soils and Stratigraphy

1. Soils analysis was conducted on samples obtained during drilling operations for monitoring wells. The analyses included tests to determine engineering and geotechnical parameters pertinent to the design and construction of the landfill. Additional soil samples will be taken during a site verification program. Additional geochemical analysis will contribute to a better understanding of the soil substrate and will assist in designing landfill reclamation techniques. Additionally, the age of the soils will be evaluated to document relative ages of geologic units in the site area, including surface features and lineaments found in the area.

2. Stratigraphy of the Bolo Station site has been evaluated from subsurface borings and regional geomorphology (Jacobs, 1991b). Nineteen well borings to a maximum depth of 280 feet were used to develop cross sectional soil profiles. The locations of the well borings and four cross sections are shown in Figure 4.2.6. Soil profiles A-A', B-B', and C-C' represent extrapolated soil profiles in a north-south orientation, and soil profile D-D' represents that in an east-west orientation. Details of these cross sections reflect typical soil deposits occurring in an alluvial environment immediately upslope of Bristol Dry Lake. Although not noted in the boring logs, lacustrine deposits may exist at depth below the site, based on the proximity of Bristol Lake.

3. Predominantly cohesionless (i.e., shear strength results from interparticle friction only) gravel, sand, and silty sand exist in the northern project site near Wells MW-1, MW-2, P-8, P-9, P-10, and P-11 as shown in Figure 4.2.6. In general, the area north of the ATSF rail line is estimated to comprise primarily cohesionless soils with a



LEGEND

- Qal — QUATERNARY ALLUVIUM
- Qc — PLEISTOCENE NONMARINE DEPOSITS
- pTb — MESOZOIC AND PRE-MESOZOIC INGNEOUS AND METAMORPHIC BEDROCK (UNDIFFERENTIATED)
- Qs — DUNE SAND
- Ql — QUATERNARY LAKE DEPOSITS
- DEBRIS FLOW DEPOSITS

REFERENCES:
1. SURFACE GEOLOGY ADAPTED FROM PLATE 4-1 (JACOBS, 1991b) AND THE GEOLOGIC MAP OF CALIFORNIA, NEEDLES SHEET (USGS, 1963).
2. USGS 15 MINUTE TOPOGRAPHIC QUADRANGLE MAPS OF BRISTOL LAKE AND CADIZ, SAN BERNARDINO COUNTY, CALIFORNIA, BOTH DATED 1956.

0 1 2 MILES

SCALE

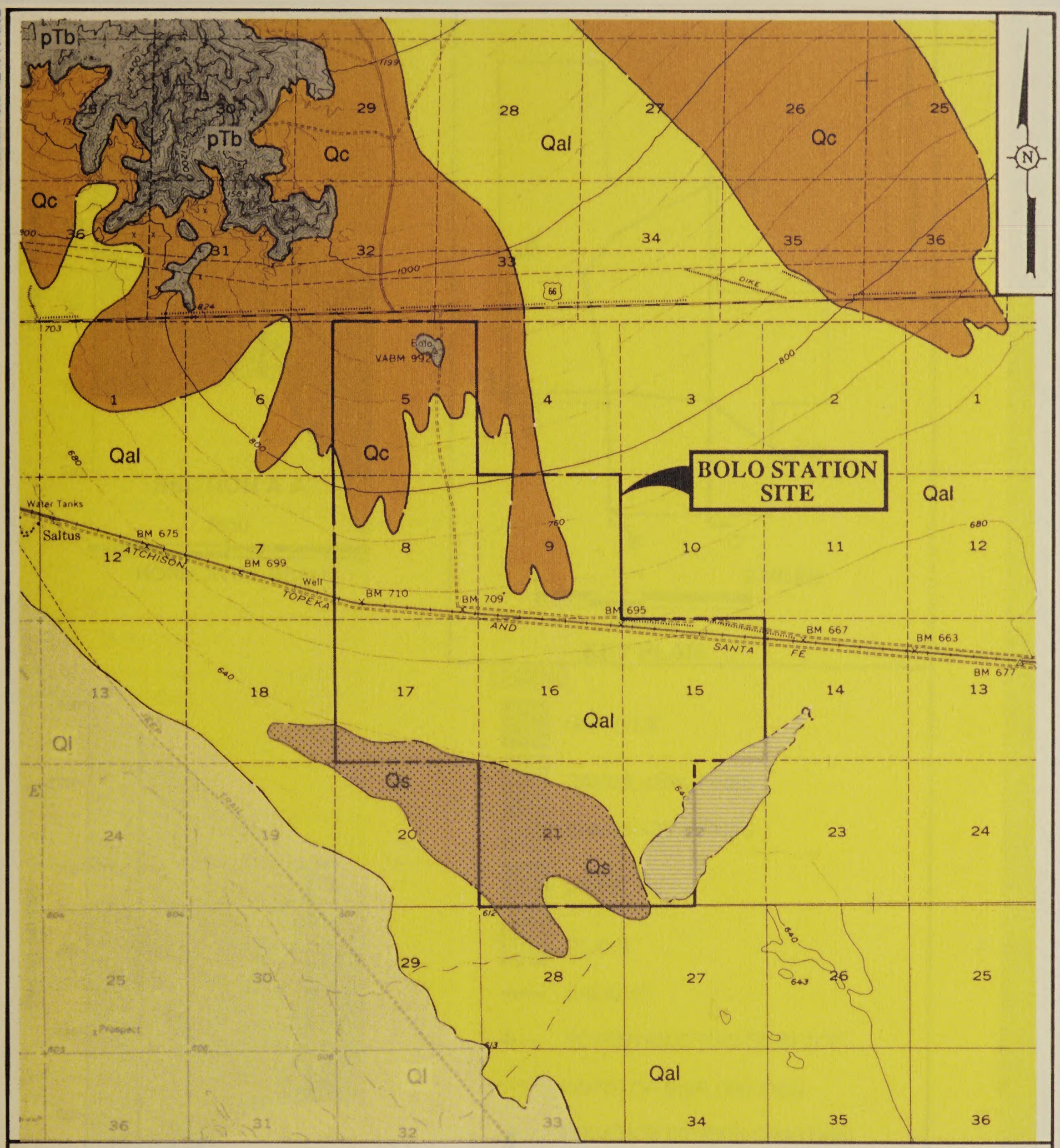
CONTOUR INTERVAL: 40 FEET

FIGURE 4.2.5

SURFACE GEOLOGY
BOLO STATION SITE

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.



LEGEND

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0 1 2 MILES

SCALE

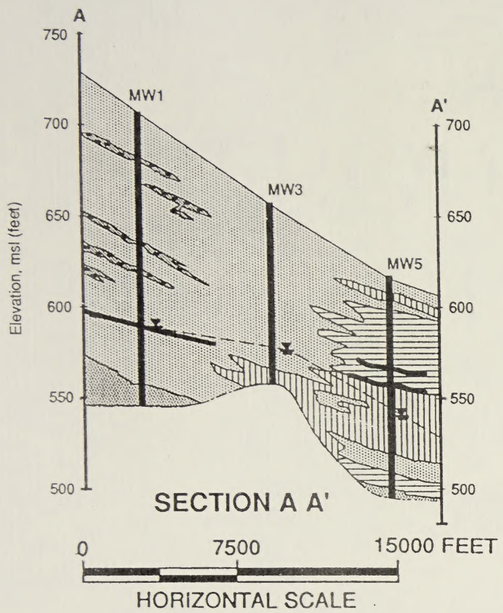
CONTOUR INTERVAL: 40 FEET

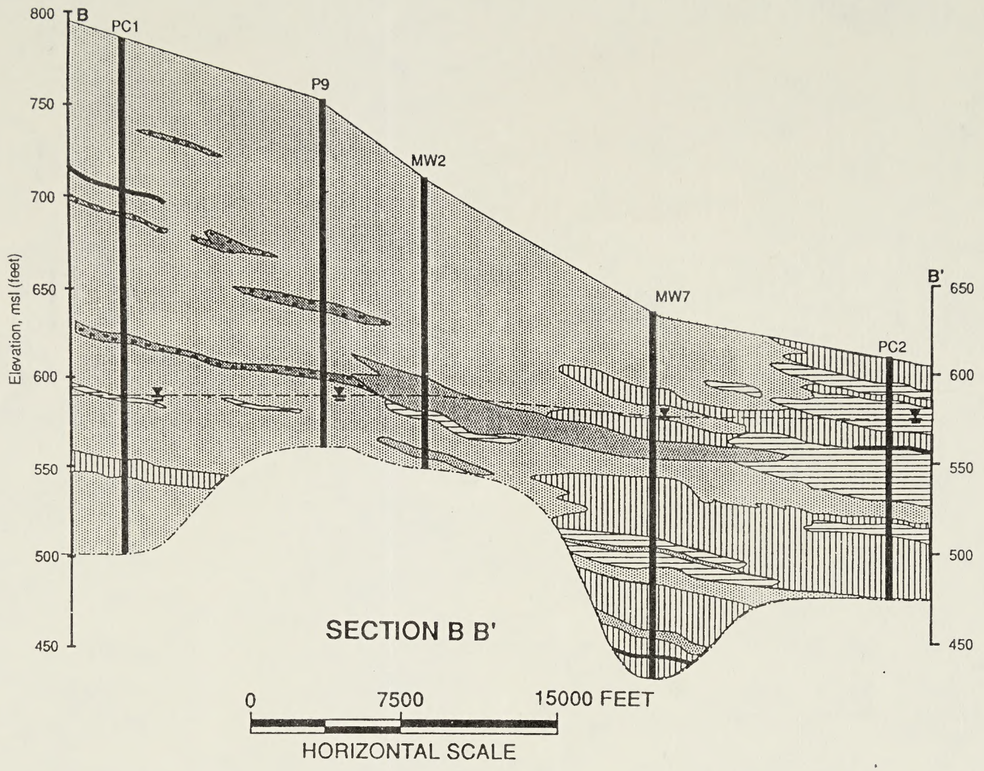
FIGURE 4.2.5

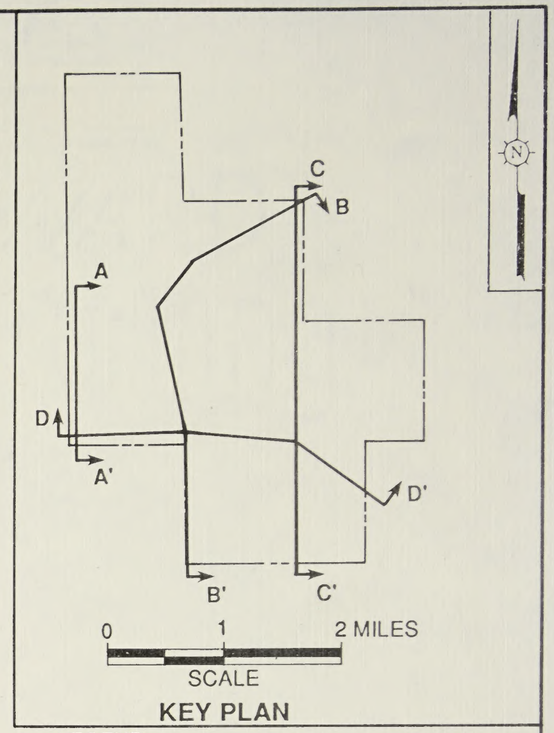
SURFACE GEOLOGY
BOLO STATION SITE

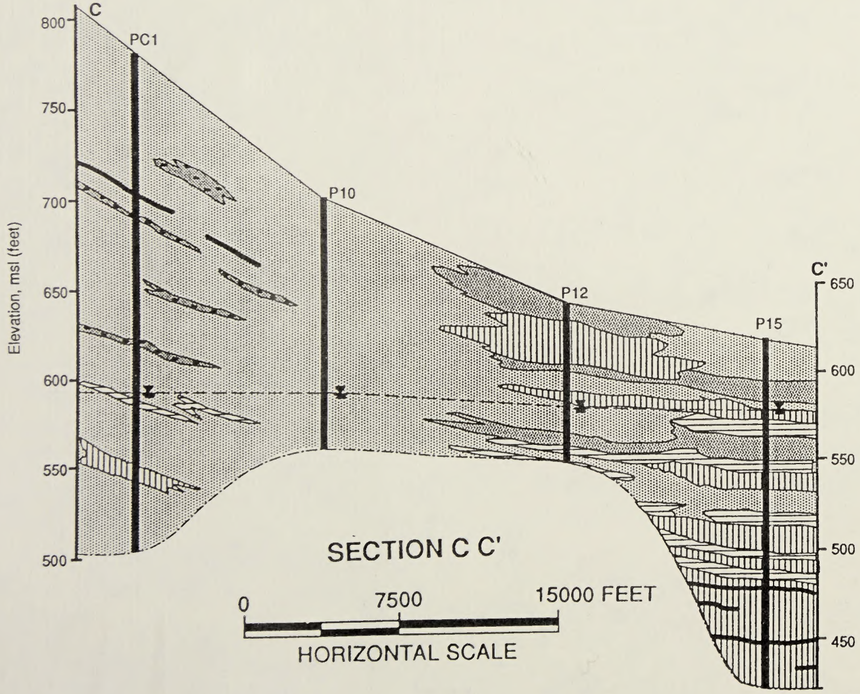
RAIL•CYCLE
BOLO STATION LANDFILL

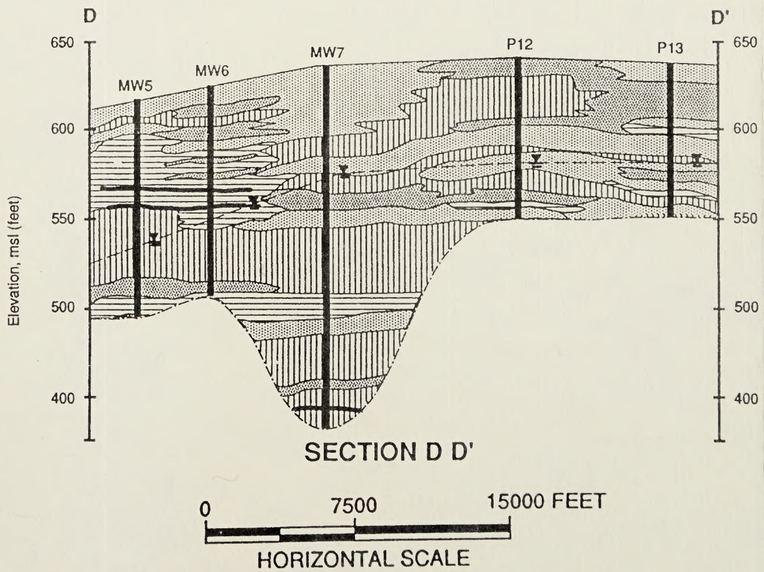
ENVIRONMENTAL SOLUTIONS, INC.











LEGEND

- GRAVELS
- SANDS <25% FINES
- SANDS >25% FINES
- SILTS
- CLAYS
- CALICHE
- POTENTIOMETRIC SURFACE
- LIMITS OF EXPLORATION
- LOCATION OF EXPLORATORY WELL/ BORING/ PIEZOMETER
- MW2 MONITORING WELL
- P12 PIEZOMETER

FIGURE 4.2.6

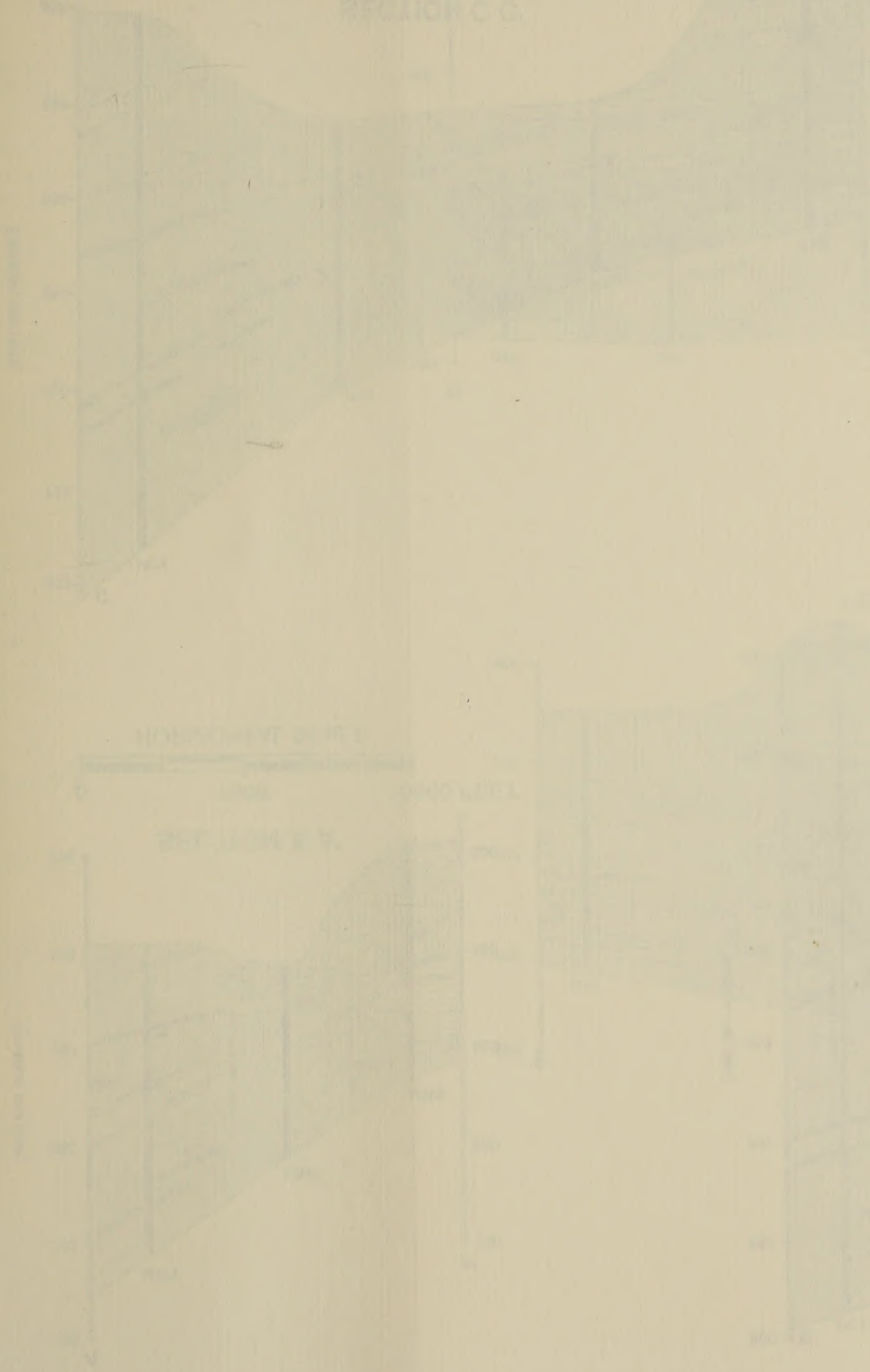
BOLO STATION SITE SOIL STRATIGRAPHY

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

SOURCE: JACOBS, 1991b, FIGURES 4-8, 4-9, 4-10, AND 4-12.

NOTE: WELL LOCATIONS ARE SHOWN ON FIGURE 4.4.12.



do they analyze subsidence, desiccation fracturing? — any surface signs now? — listed by Neal et al as not showing desicc. features

near-absence of cohesive soils (i.e., shear strength results from combination of adhesion and interparticle friction). Deposits underlying the southern portion of the site and the most southerly end of the landfill footprint are predominantly cohesive silts, sandy silts, clayey silts and clays, with occasional cohesionless layers (Jacobs, 1991b). The transition from sandy soils in the northern portion of the site to predominantly silty soils in the southern portion of the site apparently occurs as a smooth, gradual change, with no decisively distinct zones.

4. Geotechnical parameters of the subsurface materials underlying the Bolo Station site were estimated based on in situ standard penetration tests, aquifer tests, and geotechnical soil testing results (Jacobs, 1991b). The soils were grouped into two main categories:

   - Cohesive soils, with a fines content greater than 25 percent.
   - Cohesionless soils, with a fines content of less than 25 percent.

   The amount of fines content was obtained from laboratory grain-size analysis and visual classification of the soils.

Cohesionless Soils

1. The cohesionless soils consist of dense to very dense gravelly sand and silty sand. The soils were found to have slight cementation. Typical blow counts vary from about 40 blows per foot to refusal (more than 50 blows per 6 inches of penetration). For depths down to 200 feet, the average blow count was approximately 50; for depths between 200 and 280 feet, the average blow count was about 100. Medium dense layers of silty sand occasionally occur, with blow counts between 25 and 40. Laboratory test data indicate an average dry density of 115 pounds per cubic foot and a natural water content of about 10 percent above the water table and 15 percent below the water table (Jacobs, 1991b).

2. Laboratory permeability tests and aquifer tests, including slug tests, constant head drawdown pump tests, and step drawdown pump tests, were used to estimate the permeability of the cohesionless soils. The vertical permeability is estimated to be in the range of 10^{-3} to 10^{-5} cm/sec, based primarily on the laboratory testing. Based on the aquifer tests and a single laboratory test, the horizontal permeability is estimated to range from 10^{-2} to 10^{-5} cm/sec (Jacobs, 1991b).

Cohesive Soils

1. The cohesive soils are found primarily beneath the southern portion of the proposed landfill footprint south of the ATSF rail line. The soils consist of medium dense to very dense silty sand, clayey sand, medium stiff to very stiff clay, sandy or silty clay, and sandy silt and clayey silt. Average natural water content is approximately 25 percent for soils above the water table and 35 percent for soils below the water table. These soils exhibit a low to medium plasticity, with a liquid limit varying between 22 and 62 percent, and plasticity index ranging between 2 and 24 percent. Standard penetration test blow counts were typically 20 to 30 blows per 1-foot interval.

2. The calculated vertical permeability values for cohesive soils, based on the consolidation test results, range from 1.6×10^{-7} to 3.1×10^{-6} cm/sec, with a mean value of 8.0×10^{-7} cm/sec. The results of a laboratory permeability test generally agreed with results based on the consolidation test (Jacobs, 1991b).

4.2.2.1.3 Structure/Faults

1. Geologic structure within the site and Bristol Basin is influenced by the forces that created the Bristol-Cadiz-Danby Structural Trough. Photolineaments, tonal contrasts, or geomorphic features that would indicate the presence of shallow faults in the alluvium or playa deposits are not apparent on the aerial photographs. However, alluvial deposits tend to obscure fault traces over time, making them difficult to see on aerial photographs. Bedding in the alluvial units essentially mimics the ground surface profile.

   which are active, tho aseismic

2. Previous geologic mapping (Bishop, 1963; Moyle, 1967), and more recent mapping performed for the project evaluation (Jacobs, 1991b), have not revealed any structural faults within the site boundaries. No active or potentially active faults have been mapped within 20 miles of the site, and none project toward or through the landfill site. Although not suspected to be a fault trace, a north-south trending photolineament located about one mile southwest of the site was identified on

aerial photographs. Further investigation to verify the lack of active or potentially active faults beneath the Bolo Station site is being conducted in consultation with the RWQCB to support the permitting requirements of CCR Title 23.

4.2.2.2 Cadiz Valley Alternative Site

4.2.2.2.1 Physiography

1. The Cadiz Valley Alternative site is located at the northeast end of Cadiz Valley and encompasses the southwest tip of the Ship Mountains. The playa of Cadiz Valley lies approximately five miles south of the site, and a northwest-trending band of active sand dunes are approximately two miles south of the site. Three basic landforms were identified in the Cadiz Valley Alternative site area:

   - The upland bedrock foothills of the Ship Mountains.
   - Older, well-developed alluvial fans reaching southward from the mountains.
   - Vast alluvial outwash plains projecting from Fenner Valley into Cadiz Valley around both sides of the Ship Mountains.

2. Figure 4.2.2 shows the location of these various physiographic features which are described below:

   - **Foothills:** The southwest tip of the Ship Mountains is characterized as irregular bedrock slopes which abruptly rise above older alluvial fan surfaces. These foothills cover approximately 10 percent of the site. Streams have eroded deep, narrow canyons into the range, producing bare, rocky slopes approaching 1.5:1 (horizontal to vertical) slope ratios. Longitudinal ridges and canyons are generally narrow. Thick accumulations of talus (rocky fragments) mantle the lower slopes and mouths of the main canyons. Within the boundaries of the site, the foothills rise up to 765 feet above the adjacent alluvial aprons.
   - **Older Alluvial Fans:** Surrounding the perimeter of the bedrock foothills is a continuous belt of well-developed alluvial fan surfaces. These deposits cover approximately 65 percent of the site. The gently inclined detrital surfaces extend from the base of the mountain front southward into the inland basin, and have been formed by the lateral coalescence of a series of separate, but confluent fans (bajadas). The fan surfaces are convex and slightly undulatory. Many of the surfaces appear plainated and covered with a well-developed varnished desert pavement (patina). The distal edges of the fans have been buried by the deposition of younger alluvial outwash debris transported southward from Fenner Valley. Active drainages have incised the fan surfaces and extend well past the fan apex and into the narrow canyons.
   - **Alluvial Outwash Plains:** The southern portion (about 25 percent) of the site lies in the recently deposited alluvial outwash plain. The plains are broad surfaces of low relief, cut by numerous braided active stream channels. Surfaces are rocky and uneven due to stream erosion and deposition, combined with deflation by wind processes. Gradients are mild (i.e., 55 feet per mile) and project southward, eventually merging with the playa in the center of the valley. The plains are produced by the continual detrital outwash from Fenner Valley down both sides of the Ship Mountains.

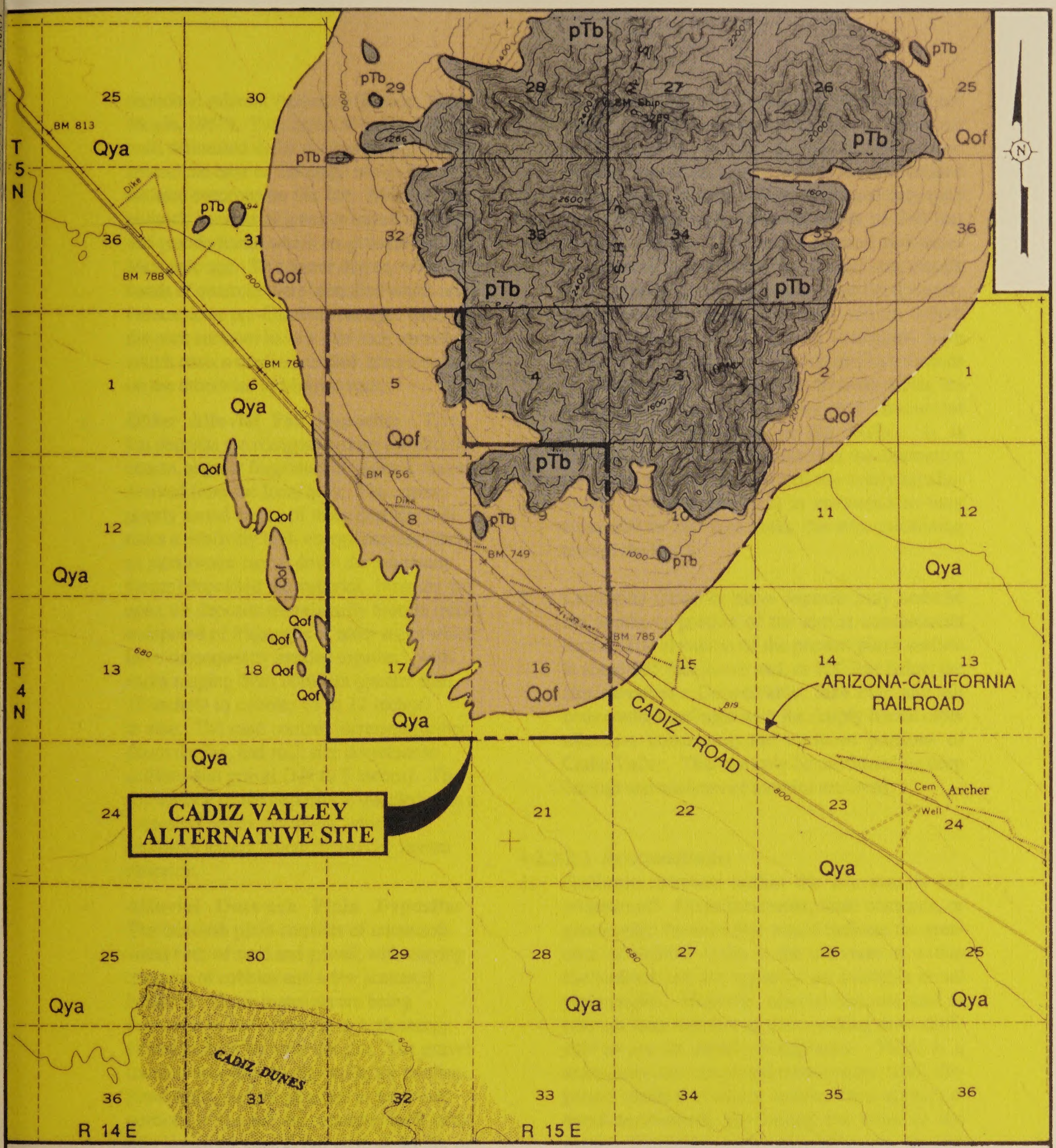
3. Topography varies considerably across the site from relatively steep slopes (up to 20 percent) in the northeast portion near the Ship Mountains to the gentle slopes of less than 2 percent in the alluvial outwash plains near the southwest perimeter of the proposed site. In addition to numerous natural drainage channels, site relief is provided by berms for the Arizona-California Railroad roadbed, which ranges from 5 to 15 feet high and 10 to 20 feet wide. The site land surface generally slopes from northeast to northwest.

4. The surface is typically sparsely vegetated with creosote and bursage. There is no visible evidence of major landslides, local subsidence, or significant wind erosion. There are numerous runoff erosional channels extending out of the foothills and dissecting the alluvial fan.

4.2.2.2.2 Soils and Stratigraphy

1. Based on review of available geologic literature and maps and site reconnaissance, stratigraphic units exposed at the surface correspond to the three major landforms defined above. Figure 4.2.7 shows the approximate lateral extent of each of these units, which are briefly described below:

   - **Bedrock:** The Ship Mountains have only been mapped regionally, as they are presently believed to contain limited or no



LEGEND

- Qya — HOLOCENE ALLUVIUM
- Qof — PLEISTOCENE OLDER FANGLOMERATES
- pTb — MESOZOIC AND PRE-MESOZOIC IGNEOUS AND METAMORPHIC BEDROCK (UNDIFFERENTIATED)

NOTE: NO FAULTS HAVE BEEN MAPPED IN AREA SHOWN.

REFERENCES: MODIFIED AFTER MOYLE, 1967; BISHOP, 1963.

SOURCE: U.S.G.S. 15 MINUTE TOPOGRAPHIC MAP OF CADIZ LAKE, SAN BERNARDINO COUNTY, CALIFORNIA. DATED 1956.

FIGURE 4.2.7

SURFACE GEOLOGY
CADIZ VALLEY
ALTERNATIVE SITE

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

economic mineral resources (Bishop, 1963; Moyle, 1967). Two types of bedrock have been delineated in the detritus (rocky rubble) around the base of the range and in the isolated outcrops on the site. Most of the bedrock consists of igneous intrusive granite and grandodiorite which are probably of late Mesozoic age. To a lesser degree, wide bands of quartzite were identified which are Paleozoic or pre-Cambrian in age. Most of the rock surfaces have a thin rock varnish which casts a medium to dark brown color on the otherwise red-brown rock.

- **Older Alluvial Fan Deposits:** The fan deposits are composed of unconsolidated, coarse, angular fragments of bedrock material derived from the local hills. The coarse, poorly sorted nature of these deposits indicates a relatively high energy process (such as stormwater runoff down the mountain slopes) deposited the material. Near the fan apex the deposits are primarily breccia (rocks composed of fragments of older rocks which have subsequently melded together), with rocks ranging from boulders (greater than 12 inches) to cobbles (3 to 12 inches) in size. The sand content increases further down the fan, and rock size decreases to cobbles and gravel (1/4 to 3 inches). The top surface of the deposits is mantled with a varnished desert pavement, which is extensive except where incised by stream channels.

- **Alluvial Outwash Plain Deposits:** The outwash plain consists of unconsolidated beds of sand and gravel, with varying amounts of cobbles and a few scattered boulders. These materials are being deposited by the moderate to high energy streams which traverse the site. The gravel fraction decreases southward as the gradient diminishes, and the deposits at the lower portions of the site are primarily sand with thin lenses of gravel, but little or no silt or clay. Low scattered brush has helped stabilize the surface.

2. Surface soils (i.e., residual silts, clays or silty sands) have not yet developed onsite as most of the surface is being eroded by both active streams and wind. The only exceptions are the areas covered with desert pavement (a layer of wind polished rock covering the desert surface as a result of the removal of silt and sand by wind process), which provides some protection from erosional forces for the underlying deposits. The exact thickness of the alluvial deposits is not known. Boring logs for the nearest well to the site, located at the Archer railroad siding, indicated only sand and gravel through the total depth of 340 feet (Moyle, 1967). This well is located two miles southeast of the site along the railroad and, though now abandoned, was originally used for domestic water supply. Most mountain ranges which bound a basin, such as the Ship Mountains, have a buried bedrock pediment (or ledge) which extends in toward the basin. Pediments develop during the recession of the range front and concurrent deposition of alluvium in the basin. It is expected that a pediment underlies the alternative site and limits the thickness of the overlying alluvium. Alluvial thickness is estimated to vary from 100 to 500 feet under the site, thickening toward the basin.

3. Lacustrian (lake) or playa deposits may underlie the southerly portion of the site at considerable depth. The elevation of the present playa surface is about 545 feet above msl, or 200 feet below the site elevation. Conceivably, lake clay and silt beds could interfinger with the deeply buried older alluvium underlying the northern portions of Cadiz Valley. This can only be confirmed by deep borings and analyses of samples retrieved.

4.2.2.2.3 Structure/Faults

1. Geologic structure within the site area is not pronounced. Photolineaments, tonal contrasts, or geomorphic features that would indicate the presence of shallow faults in the alluvium or within the bedrock are not apparent on available aerial photographs. However, alluvial deposits tend to obscure fault traces over time, making them difficult to see on aerial photographs. There is a moderately well-developed metamorphic fabric displayed within the bedrock terrain, which appears to trend north-south, paralleling the trend of the range. Similarly, systematic joint sets are not apparent, but the bedrock is generally slight to moderately well fractured. Bedding in the alluvial units essentially mimics the ground surface profile.

2. Previous regional geologic mapping (Bishop, 1963; Moyle, 1967) does not indicate major structures (such as faults) that project toward or through the site area. No active or potentially active faults have been mapped within 15 miles of

the site. Inactive bedrock faults have been mapped in the northern portion of the Ship Mountains, about five miles north of the site. Similar inactive faults may exist in the southern part of the range but have not been mapped to date. Additional information regarding regional faulting along capable faults and regional seismicity are discussed in Section 5.2.2.1.

4.2.2.3 Offered Lands Sites

4.2.2.3.1 Piute Valley

1. The Piute Valley site (see Figure 1.4) is located on a broad alluviated outwash plain approximately two miles east of the Piute Range and one mile northwest of several large granite outliers. The alluvium covering the site consists of unconsolidated volcanic detritus derived from the Piute Range. The depth of this alluvium is unknown at this time. Soil types are typically coarse grained sandy gravel, silty sands, and sands. Discontinuous exposures of Quaternary-age lake deposits lie immediately east of the property. No active or potentially active faults have been identified in the region, although several inactive faults have been mapped in the Piute Range and Piute Valley.

4.2.2.3.2 Cadiz Valley

1. The Cadiz Valley site is located primarily on an alluviated plain of very low relief. The alluvium consists of detritus derived from Fenner Valley to the northeast of the site. The southwest quarter of the property is covered with active sand dune deposits. These deposits are part of an extensive sand dune belt that trends northwest along the eastern side of Cadiz Lake playa. The depth of the underlying alluvial deposits is estimated to be 1,000 to 2,000 feet. Soil types are typically coarse grained silty sands and sands in the alluvium, and uniform fine to medium in the dune areas. No known faults have been mapped in the immediate area surrounding the site.

4.2.2.3.3 Fenner Valley

1. The Fenner Valley site is located on a broad alluvial outwash plain, one mile east of Fenner Hills. The unconsolidated Quaternary alluvium covering the site is probably derived from the Hackleberry Mountains located approximately 12 miles north. The land surface offers very little topographic relief as it slopes at a 3 percent grade from north to south, but a bedrock outcropping immediately southwest of the section rises approximately 60 feet above the surrounding terrain. No active or potentially active faults have been identified in the region, although two short inactive faults are identified one to two miles southwest of the site (Jennings, 1975).

4.3 MINERAL RESOURCES

4.3.1 MINERAL MANAGEMENT POLICIES

1. California is ranked second in the nation in value of nonfuel mineral production, with an estimated value of $2.8 billion or 10 percent of the total domestic mineral production in 1989 (BLM, 1991). Many of the mineral resources of the state are located in the CDCA, in which the project region is included. Excluding oil and gas, the CDCA produces 50 percent of the state's revenue from mineral resources (BLM, 1980a). For some resources, such as borates, the CDCA contains the only known source of the mineral within the state.

2. The importance of the mineral industry to the County is increasing with demand. In addition, rising transportation and energy costs have increased the value of the County's mineral resources due to its proximity to the southern California consumption region. While most land uses have options as to the location for site development, mineral extraction is limited to sites where minerals occur. Therefore, it is important for mineral resources to be protected and managed, so as not to be lost due to encroachment of incompatible land uses. This issue is considered in land use decisions made by the County, and is one of the goals of the 1989 County General Plan. Additionally, the California Surface Mining and Reclamation Act of 1975 (SMARA) encourages the principals, with respect to mineral deposits and assessment of mineral potential, of land use planning, land use plan changes, and economics.

3. A goal of the 1989 County General Plan is the conservation of mineral resources and preservation of access to them for recovery. Specifically, the General Plan states that:

   > "Mineral resources must be conserved for future beneficial uses, and the ability to recover them must be preserved and protected, to assure that adequate supplies of such resources are available to meet the future needs of the County, the consumption region and the nation. Mineral resources that are designated or classified by the State Mining and Geology Board or the State Geologists are considered regionally significant. Regionally significant mineral resources must be preserved, protected and used for consumption by the County, the region and the nation" (County, 1989).

4. Federal mineral management policy for the project region, as stated in the CDCA Plan (BLM, 1980a, as amended) and in the Bureau Mineral Policy, is administered by the BLM. Federal mineral management policy is mandated in various legislation, including the Mining and Minerals Policy Act of 1970, FLPMA, and the National Materials and Minerals Policy, Research and Development Act of 1980.

5. The Mineral Resource Element of the CDCA Plan includes an assessment of potential mineral resources in the Bristol Basin vicinity, as shown in Figure 4.3.1. The figure reflects the federal classification scheme of locatable, leasable, and saleable minerals, as defined in various regulations, including the Mining Law of 1872, the Mineral Lands Leasing Act of 1920, and the Materials Act of 1947. Technically, these classifications are meaningful only for federal lands, and have no bearing on privately owned land. However, for ease of discussion, the federal classification scheme is applied to the lands involved in the proposed action, regardless of ownership.

6. "Locatable minerals" generally refers to metallic minerals, but also includes many rare or uncommon varieties of nonmetallic minerals. "Leasable minerals" are those listed as available for lease under the Mineral Leasing Act of 1920, as amended. "Saleable minerals" are those specified as available by sale under the Materials Act of 1947 and amendments to that act. Specific resources included in these three categories are:

Classification	Resource
Locatable	Gold, silver, iron, copper, lead, manganese, tungsten, limestone, dolomite, quartzite, calcium chloride, lithium, and others.
Leasable	Oil and gas, oil shale, coal, tar sands, phosphate, geothermal, sodium, potassium, uranium.
Saleable	Gravel, sand, limestone, pumice, clay, cinder, dimension stone, rock roofing granules, and others.

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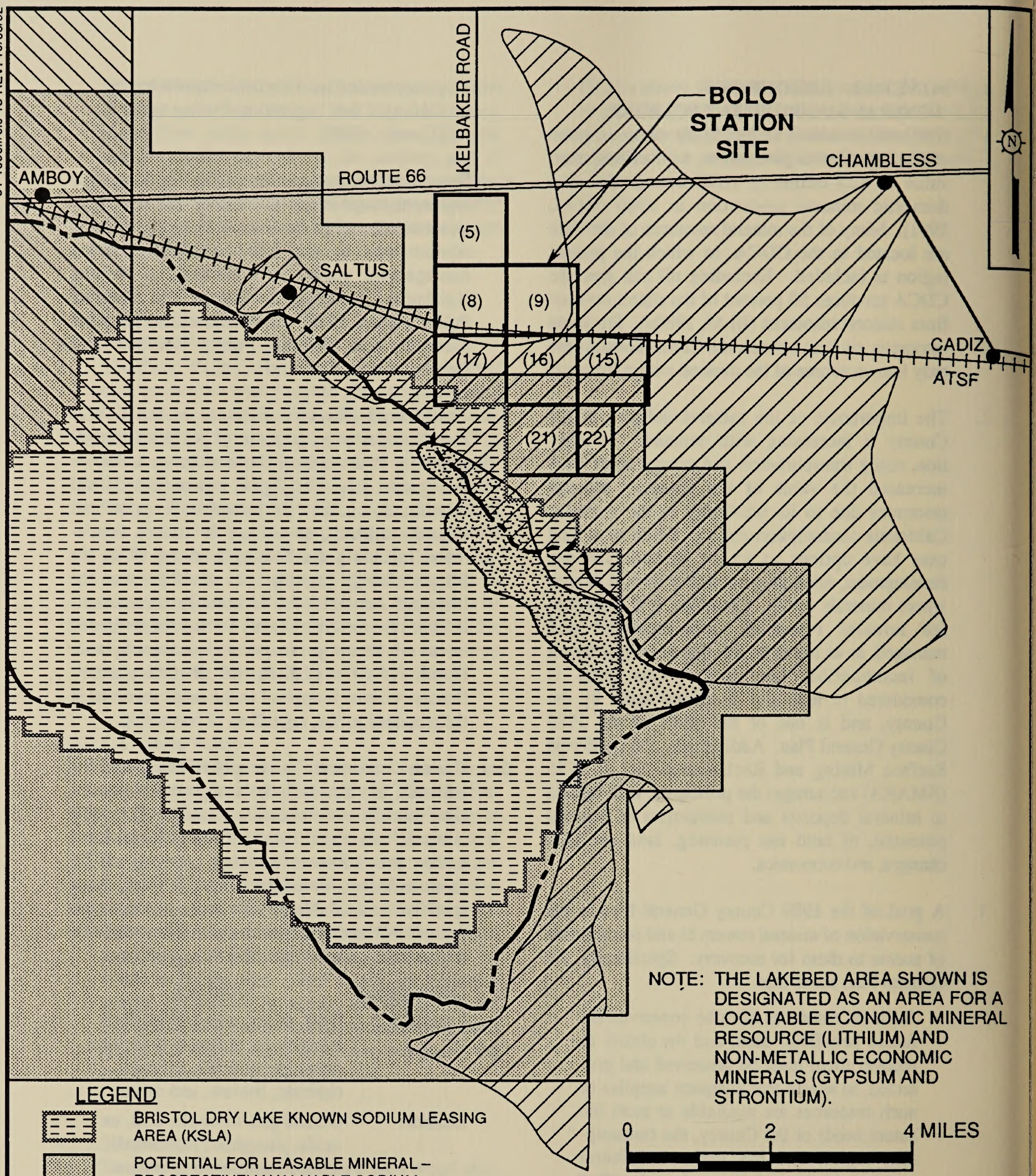

FIGURE 4.3.1

MINERAL RESOURCE POTENTIAL BOLO STATION SITE AND VICINITY

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

4.3.2 REGIONAL MINERAL RESOURCES

1. Information reviewed for this section includes literature and maps available from BLM such as the CDCA Plan, U.S. Geological Survey (USGS) mineral resource publications and maps, and other related literature assessing the mineral resources of the Mojave Desert region. A special report addressing mineral resources of the CDCA management region, issued by the U.S. Bureau of Mines, has also been reviewed in draft form, and includes estimates of mineral resource production rates for several minerals and a comparison of the quantity of land which contains mineral resources versus the portion of that land still available for mineral exploitation (Crandell, et al., 1989). The final draft of the above referenced report has not yet been released.

2. Numerous mining claims and prospects have been identified in the project region, and are primarily found in either the mountainous terrain surrounding the valleys or playa lakes. Specific resources historically mined in the region are as follows (Jacobs, 1991b, as in Chapman and Rietman, 1978; Smith, et al., 1974):

Location	Resource
Bullion Mountains	Gold, silver, iron
Bristol Mountains	Gold, copper, silver, iron, uranium, perlite, limestone
Calumet Mountains	Gold, silver
Kilbeck Hills	Gold, silver, copper, mica
Marble Mountains	Gold, silver, copper, bentonite, iron, limestone
Old Woman Mountains	Tungsten, gold, lead, silver
Sheephole Mountains	Gold, tungsten
Ship Mountains	Gold, limestone
Bristol Lake	Gypsum, calcium chloride, sodium chloride
Cadiz Lake	Calcium chloride, sodium chloride
Danby Lake	Gypsum, sodium chloride, sodium sulfate

4.3.2.1 Locatable Resources

1. Locatable resources occurring in the project region include the minerals listed above for the mountain ranges surrounding the area. Two mine shafts were noted during the Bolo Station site reconnaissance in the southern and southeastern Bristol Mountains, approximately five miles from the northern boundary of the site. Production data for these mines were not found during a records and file search (Jacobs, 1991b). The America Mine, an abandoned heap leach gold mine located 9.5 miles southwest of Amboy in the Bullion Mountains, is proposed to be reopened. The Vulcan Mine, an abandoned open pit iron mine located 30 miles north of Cadiz, was operated between 1943 and 1947 by Kaiser Steel Company. White Creek Enterprises is currently proposing to use the Vulcan Mine as a waste tire repository (White Creek Enterprises, 1991).

2. The project region contains areas of interior drainage with various playas (dry lakes) and other areas where soluble mineral elements have become naturally concentrated through the evaporation process. Deposits of saline minerals and brines occur in Bristol, Cadiz, and Danby dry lakes.

3. Calcium chloride has been produced from both Bristol and Cadiz lakes, which (as of 1985) were the only sources of calcium chloride in production in California (Majmundar, 1985a). Total production of calcium chloride in 1985 from both lakes was estimated to be 35,000 short tons per year. Total U.S. production of calcium chloride was 708,000 metric tons, valued at an average of $154 per metric ton (U.S. Bureau of Mines, 1991). Current production rates, or estimates thereof, are not available, nor are exact estimates of the mineral reserves contained within the brines of Bristol and Cadiz lakes (Gundry, 1992).

4. Calcium chloride is also found in the oil field brines of Ventura County and in certain springs and geothermal wells in the Salton Sea area, but these sources are not currently being developed. Calcium chloride is primarily used for deicing roads and other surfaces. It is also used for dust control processes due to its ability to retard the evaporation of water, which is important in arid climates (Majmundar, 1985a). The principal producer is Leslie Salt Company (a subsidiary of Cargill Salt Company), using brines obtained from Bristol Lake. It is also produced by National Chloride and Lee Chemical from brines extracted from Bristol Lake and Cadiz Lake, respectively (Jacobs, 1991b, as in DMG, 1990).

5. Gypsum occurs in irregular bodies or layers within the sediments of Bristol Dry Lake. It is found primarily at the northwest playa perimeter, and is

associated with the Amboy Crater basaltic lava flow, where the gypsum is thought to have blown into small drifts across the tongues of lava (Jacobs, 1991b, as in Gale, 1951). Gypsum is currently being produced from these deposits by the C.V. Organic Fertilizer Company (Jacobs, 1991b, as in DMG, 1990). Gypsum has also been produced from the brines underlying Bristol Lake, and although not currently produced from brines, the potential exists for future production (Gundry, 1992).

4.3.2.2 Leasable Resources

1. Leasable mineral resources in the region include primarily soluble minerals, such as sodium chloride, with lesser quantities of sodium sulfate. There is a low potential for oil and gas, oil shale, coal, tar sands, and phosphate in the region, but the potential for geothermal resources is somewhat higher (Jacobs, 1991b). Each of these resources are described below.

2. Bristol and Danby lakes are both classified by BLM as known leasing areas (KLAs) for sodium, and Cadiz is classified as prospectively valuable for sodium (Gundry, 1992). All three lakes are classified by the CDCA Geology-Energy-Minerals (GEM) Resource Area Assessment as having high potential for sodium mineral resources (Gundry, 1992 as in BLM, 1980a). Beds of sodium chloride have been mined from below the surface of Bristol Lake, and produced from brines extracted from both Bristol and Danby lakes. However, the production rate and volume sold from Bristol and Danby lakes is not known at this time. Mineral resource reserves of sodium compounds at Bristol and Cadiz lakes has been estimated by USGS, but exact mineral reserves is not known (Gundry, 1992). The mineable (crystalline) sodium deposits underlying Bristol Lake has been estimated to ranges between 83.6 to 522.7 million tons of salt, and 31 million tons underlying Cadiz Lake (Calzia, et al., 1979). The extent of the reserves of the brine water ore body have not been estimated. A sodium lease application has been filed with BLM for Bristol Lake, although no such application has been filed or sodium lease issued on Cadiz Lake (Gundry, 1992).

3. Lease applications were filed in 1980 for petroleum exploration throughout the entire Cadiz Valley (Marsh, et al., 1982). Reportedly, the target was petroleum products in the Cenozoic-age sediments of the basin, or products that might exist beneath possible overthrust zones. The USGS concluded that the region did not warrant classification as a potential petroleum resource (Marsh, et al., 1982). The area is not located within a known geologic structure (KGS) for oil and gas, nor are the lands classified as valuable for oil and gas resources (BLM, 1987).

4. Geothermal resources are often associated with young, active areas of concurrent faulting and volcanism. A large area adjacent to the Amboy Crater and its associated lava beds (primarily west of Amboy Road) has been classified as having potentially valuable geothermal resources (BLM, 1980a). Cadiz Valley lies in a north-northwest trending region of moderate to high heat flow, which may also indicate possible geothermal resources (Marsh, et al., 1982). However, geothermal resources have not been located in the valley. In 1981, geothermal lease applications were filed for lands along the southwest side of Cadiz Valley. By 1982, the industrial activities had ceased and drilling data was held as confidential (Marsh, et al., 1982).

5. Although Bristol Lake is located in an area classified as favorable for the discovery of thermal water (at shallow depths) of sufficient temperature for direct heat geothermal applicators, it is not known or inferred to be underlain by such water (Majmundar, 1983). Cadiz and Danby lakes are not classified as favorable for thermal waters (Majmundar, 1983). The area is not classified as a known geothermal resource area (KGRA) by the CDCA Plan (BLM, 1980a).

4.3.2.3 Saleable Resources

1. Saleable resources refers to deposits which are commonly found in many places, such as sand and gravel, clay, pumice, cinders, and decorative stone. Vast quantities of saleable resources exist in the project region, such as common borrow material, sand and gravel deposits (including quartz dune sand at the Cadiz Dunes), and igneous/metamorphic rock that could be quarried for rock products. However, due to low bulk value of these deposits and high transportation costs associated with shipping to distant market areas, there is no apparent potential for development of these deposits in the near future other than for limited, local uses.

2. ATSF utilized pumice from the Bagdad Volcano region as supplemental base under the railroad tracks. ATSF also used local deposits in the construction of the surface water diversion levees along the northern side of the railroad line.

4.3.3 LOCAL MINERAL RESOURCES

4.3.3.1 Bolo Station Site

4.3.3.1.1 Locatable Resources

1. The Bolo Station site is classified by BLM in the CDCA Plan as having a low (but existing) potential for the occurrence of the following locatable minerals: gold, silver, iron, copper, manganese, tungsten, limestone, dolomite, quartzite, calcium chloride, and lithium. No mineral production is currently undertaken at the site. According to BLM files, evidence of significant or long-term mineral resource exploitation or exploration activities near the site is not present, particularly for the watersheds of the Bristol and Marble mountains, which provide most of the alluvial material underlying the Bolo Station site (Jacobs, 1991c). Therefore, the probability for placer type deposits in the site vicinity is probably negligible.

2. The Bolo Station site was evaluated for mineral potential through a literature search, field reconnaissance, and a ground water sampling program conducted according to BLM procedures (Jacobs, 1991b). BLM has reviewed the results of these investigations and has determined that the area is valuable for prospecting for locatable calcium chloride (Waiwood, 1992).

4.3.3.1.2 Leasable Resources

1. Leslie Salt brine production wells are located near the southwestern boundary of the Bolo Station site. Field exploration and ground water sampling were conducted to determine the potential for deriving minerals from brines underlying the site. The investigation encountered brackish water at two onsite wells (P-15 and MW-7) that supports a classification of the sections as being prospectively valuable for sodium chloride (Jacobs, 1991b). A detailed explanation of the calculations to determine mineral concentrations is included in Appendix D.

2. The extent of the ore brine body under the Bolo Station site is not presently defined. Therefore, portions of the project site has been classified by the BLM as being "prospectively valuable" for sodium chloride resources, and valuable for prospecting for calcium chloride resources.

3. The Bolo Station site, and specifically Sections 15 and 22 (BLM managed lands being considered for exchange in fee as part of the proposed action), lie within an area where brines are extracted to produce calcium chloride. Sodium chloride is also produced from these brines as a by-product of the calcium chloride production. While production currently appears to focus on calcium chloride, sodium chloride has historically been produced from the area (Waiwood, 1992).

4. Based on a hypothetical analysis of the maximum foreseeable development scenario, BLM has determined that if the brines located in Sections 15 and 22 are found to be of economic quality and quantity, an estimated 5,000 to 10,000 tons of calcium chloride could potentially be produced on an annual basis from Sections 15 and 22 (Waiwood, 1992). If these quantities of calcium chloride could be produced, it would represent 1 to 2 percent of total annual U.S. production rate, and would have an estimated market value of between $800,000 and $1.5 million per year (Waiwood, 1992). Based on similar production rates in the area by Leslie Salt, estimated economic values to the local economy would include (Waiwood, 1992):

   - An increase in the work force from five to seven individuals.
   - An increase in annual local payroll of approximately $250,000.
   - Annual tax outlays ranging from $15,000 to $165,000.
   - Annual material and supplies estimated at $65,000.

5. The site is classified as not having potential for oil and gas, oil shale, coal, tar sands, or phosphate (Jacobs, 1991b). As shown in Figure 4.3.1, the potential for leasable minerals occurs in Sections 21 and 22, and in portions of Sections 15, 16, and 17.

4.3.3.1.3 Saleable Resources

1. The potential for saleable mineral resources at the Bolo Station site occurs in Sections 8, 9, 15, 16, 17, 21, and 22. With the exception of Section 8, these areas were identified in the CDCA Plan as potential sources of sand and gravel, as shown in Figure 4.3.1. Proximity to markets and/or transportation means was not considered in the CDCA Plan (BLM, 1980a). Potential areas of sand and gravel deposits were also identified in the northern

portion of the Bolo Station site, including Section 8 (Jacobs, 1991b). Characteristics of the granular soils underlying the site reduce its potential for economic use:

- Sand deposits in this area contain a relatively high percentage of fines, (approximately 15 to 20 percent), which are undesirable and would require extensive processing to separate the fines out.
- Soils in the area have variable amounts of cementation as a result of salt deposits, requiring extensive material processing to separate the sand and gravel.
- Within the cementation agents, high chloride and sulfate contents are expected, which would degrade the quality of the sand and gravel due to their corrosiveness and their chemical reaction with cement. This reduces the marketability of the aggregate.
- The site is located a relatively great distance from most potential markets (Jacobs, 1991b).

2. Due to these factors, the soils underlying the Bolo Station site are not recognized as an economic sand and gravel resource.

4.3.3.2 Cadiz Valley Alternative Site

4.3.3.2.1 Locatable Resources

1. No known claims are located in the southern portion of the Ship Mountains in the vicinity of the Cadiz Valley Alternative site, although several gold claims were noted in the vicinity of the Vulcan Mine (unrelated to the Vulcan Mine discussed earlier) at the northern end of these mountains, along with some limestone prospects (Smith, et al., 1974). One unidentified prospect was noted during the field reconnaissance within the alternative site area (in the northeast quarter of Section 9), in an outcrop of quartzite. This prospect appeared very old and was presumably worked for a quartz resource.

2. The alternative site is not located in an area of economic mineral resources, and it has been classified as having an "unqualified or unknown potential" for locatable minerals (BLM, 1980a).

4.3.3.2.2 Leasable Resources

1. The alternative site is not located in a region identified as being a known valuable or prospectively valuable geothermal, oil and gas, sodium or potassium resource area. Portions of Sections 5, 8, and 17 are included in a small area considered to have potential uranium and/or thorium deposits, as interpreted from airborne survey data (BLM, 1980a).

4.3.3.2.3 Saleable Resources

1. The alternative site contains abundant amounts of alluvial deposits which could be used for sand and gravel, as well as igneous and metamorphic rock that could be quarried to produce rock products. The ground surface of several acres in the northwest quarter of Section 8, along the access road, was previously scalped, presumably to provide road base or railroad track base, or used to construct surface water diversion levees along the rail line.

2. Portions of Sections 8 and 17 were identified in the CDCA Plan as potential sources of sand and gravel. However, due to the low bulk value and high transportation cost for shipping to distant markets, there is little economic potential for development of these resources other than for small local uses.

4.3.3.3 Offered Lands Sites

1. A review of available documentation was conducted to determine the potential for mineral resources on the offered lands (Jacobs, 1992b). The following agencies were contacted for information during this review:
   - County
   - BLM
   - U.S. Bureau of Mines
   - DMG
   - USGS, Minerals Information Office
   - Santa Fe Pacific Minerals
   - ATSF
   - Catellus Development Corporation

4.3.3.3.1 Piute Valley

1. The CDCA Plan does not identify the Piute Valley Offered Land Site as falling within CDCA designations for georesources, prospectively valuable mineral resources, or potential for saleable, leasable, or locatable minerals (BLM, 1980a). Therefore, the offered lands are not

considered to include known mineral resources. However, extensive locations for potential locatable minerals are in the immediate vicinity of the site. This offered land site is less than one mile from an area containing known reserves of Category II minerals, defined as strategic or nationally important, but are not in current demand or are in insignificant quantity locally (BLM, 1980a). Additionally, northwest and southeast of the site are large areas considered favorable for the future discovery of locatable minerals.

2. No known mineral claims have been filed on this land, although several mines have been located in the surrounding mountains (Jacobs, 1992b). Tungsten, gold, copper, silver, and lead have been mined from the south end of the Piute Range, as well as in the Homer Mountain area (except tungsten).

4.3.3.3.2 Cadiz Valley

1. The CDCA Plan identifies the Cadiz Valley Offered Lands Site as occurring within or near a range of classifications for mineral and economic resources (BLM, 1980a). The site is at the periphery of lands, associated with Cadiz Lake, designated as an economic resource for locatable lithium.

2. This offered land site is also classified in the CDCA Plan as having a "prospectively valuable" sodium resource, due to the proximity to and similar geologic deposits as Cadiz Lake (BLM, 1980a). It was also classified as being a potential sand and gravel resource, particularly sand, as it is located on the edge of the Cadiz Dunes. No known georesources exist on this site (BLM, 1980a; Jacobs, 1992b).

4.3.3.3.3 Fenner Valley

1. The Fenner Valley Offered Lands site is classified in the CDCA Plan as an area thought to be favorable for future discovery of locatable mineral deposits that could potentially be extracted through mining claims (BLM, 1980a). However, to date, this assessment has not been confirmed and remains speculative (Jacobs, 1992b). No known potential for leasable resources, saleable resources, or georesources exists on this section (BLM, 1980a). No site are listed with DMG as being located on these mining claims (Jacobs, 1992b).

4.4 SURFACE HYDROLOGY AND GROUND WATER

1. The proposed Bolo Station and Cadiz Valley Alternative sites are located in the Bristol and Cadiz ground water basins, which are two of the 45 basins which comprise the Colorado River Basin Region. The Bristol Basin covers an area of 710 square miles, while the Cadiz Basin occupies 430 square miles. These basins, along with others in the region, are shown in Figure 4.4.1. Local climate in the Bristol and Cadiz basins is typical of the Mojave Desert region, with low annual precipitation and humidity, high summer temperatures, and strong winter winds. Water is a critical resource in desert regions, and the availability of usable water often dictates the degree of development.

4.4.1 SURFACE WATER AND DRAINAGE

4.4.1.1 Regional Surface Water and Drainage

4.4.1.1.1 Precipitation

1. The east Mojave Desert region receives an average of 3.9 inches of precipitation annually (as measured at Twentynine Palms and averaged between 1951 and 1980), with no season receiving substantially more rainfall than another (CARB, 1989). Data recorded at Amboy reflect an average rainfall of 2.3 inches during the summer months, and 2.2 inches during the winter months, as measured between 1982 and 1987 (Jacobs, 1990c, as in Rosen, 1989). Although of short duration, rainfall during thunderstorms can be intense, resulting in flash floods and high velocity surface flow through desert washes which can rapidly modify the terrain that is exposed to the erosive surface runoff. Due to the arid climate, most of the precipitation evaporates, leaving very little to infiltrate as it flows toward the center of the basins. No permanent water bodies or perennial streams occur in either the Bristol or Cadiz basins (LSA, 1992; Jacobs, 1990c).

2. A 100-year, 24-hour storm event would produce between 2 and 2.5 inches of rain in the valleys and up to 4.5 inches in the mountains (Jacobs, 1990c, as in Miller et al., 1973). Class III landfills are required by CCR Title 23 and 40 CFR Part 258, Subtitle D to be designed and constructed to accommodate the peak flows from surface runoff resulting from a 100-year, 24-hour storm event.

4.4.1.1.2 Regional Drainage Characteristics

1. Geologic experts disagree as to whether the Bristol, Cadiz, and Danby Lakes were perennial lakes during periods of greater effective moisture (Shafer, 1964; Rosen, 1992; Thompson, 1929; Jachens and Howard, 1992). Presently, these lakes are ephemeral in nature, and have become dry lakes or playas of greatly reduced size compared with previous times. Water remains on the surface of the playas for only short periods following infrequent heavy precipitation (Shafer, 1964; LSA, 1992).

2. The occurrence of heavy rainfall during storms of short duration commonly results in runoff that flows down the mountain valleys via a network of incised valleys, gullies, braided channels and sheet flows into the basins. Both Bristol and Cadiz basins are hydrologically closed units, i.e., surface water flowing into the basins cannot flow out. If flow is sufficient, surface water can briefly pool in the lowest topographic areas (i.e., the playas), where it infiltrates or evaporates.

3. The main drainages in the region consist of a series of braided channels spread laterally over the surface, rather than single channels. Toward the more distal portions of the alluvial fans, the reduced surface gradient causes the stream courses to slowly diminish or terminate, and stream flow spreads into sheet flow (LSA, 1992).

4. Major washes and drainage patterns in the region are shown in Figure 4.2.2. The most prominent wash depicted is the Schulyler Wash, which carries runoff from Fenner Valley into Cadiz Valley via the pass between the Marble and Ship mountains. The main channel of this wash flows towards Cadiz Lake. The Orange Blossom Wash carries runoff from the valley between the Bristol and Marble mountains. Only the lower terminus of this wash appears on Figure 4.4.2, where it is intercepted by the Chambless Wash. As shown in Figure 4.4.2, Chambless Wash flows southwest towards Bristol Lake, near the southeast corner of the Bolo Station site. Runoff from the Chambless Wash then sheet flows across the corner of the site toward the Bristol Lake Playa (LSA, 1992).

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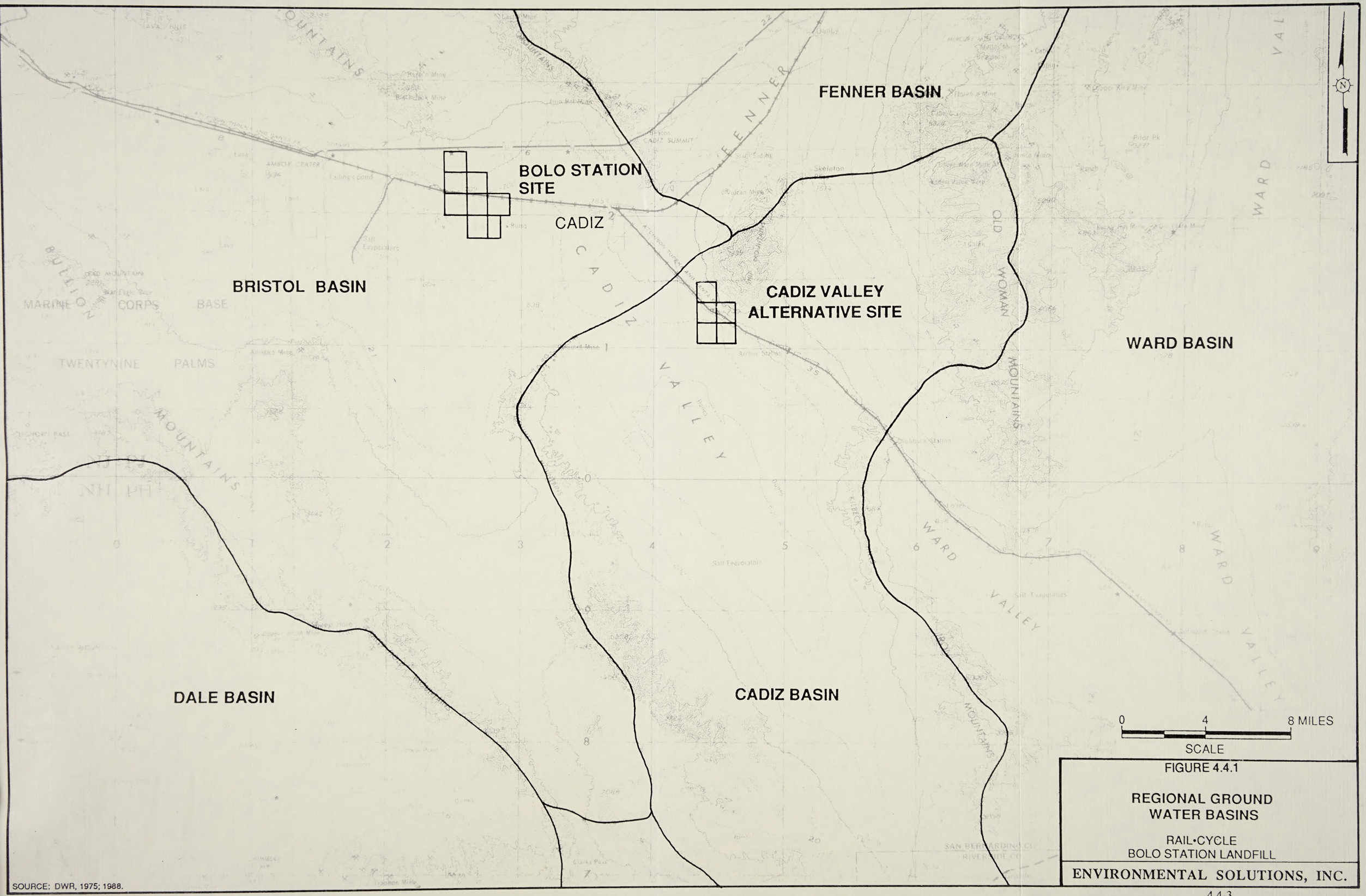

SOURCE: DWR, 1975; 1988.

FIGURE 4.4.1

REGIONAL GROUND WATER BASINS

RAIL•CYCLE
BOLO STATION LANDFILL

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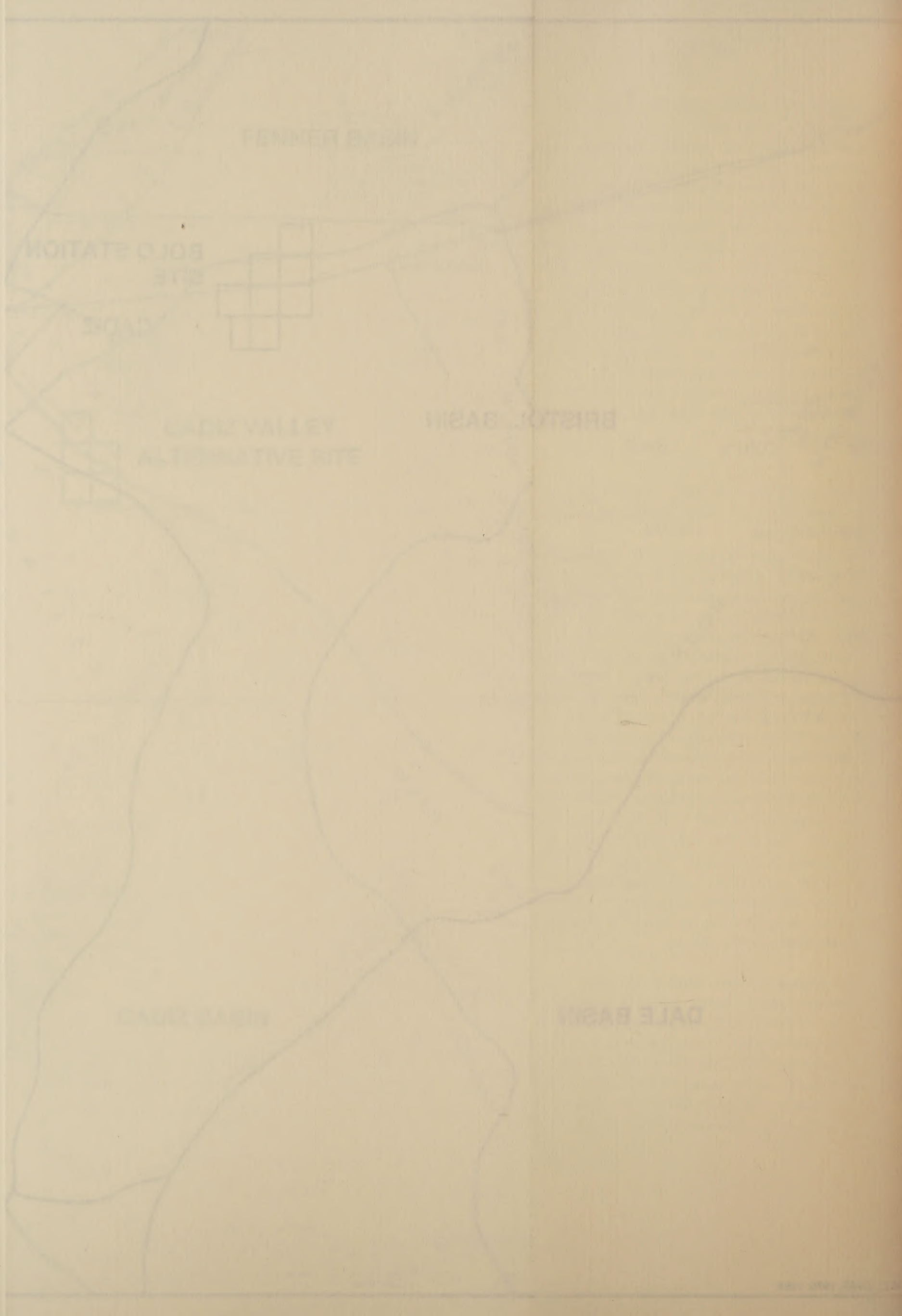

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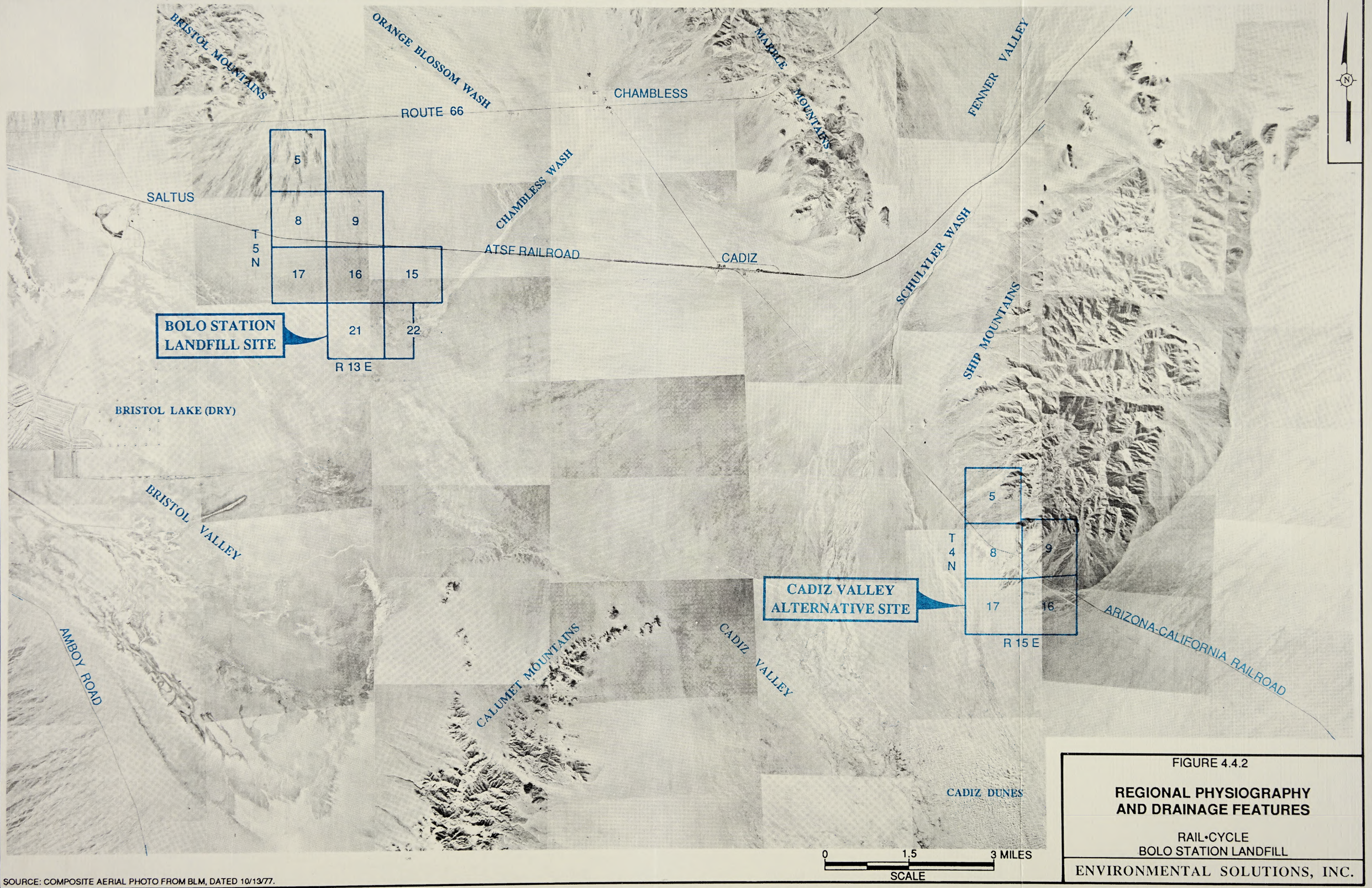

SOURCE: COMPOSITE AERIAL PHOTO FROM BLM, DATED 10/13/77.

FIGURE 4.4.2

REGIONAL PHYSIOGRAPHY AND DRAINAGE FEATURES

RAIL•CYCLE
BOLO STATION LANDFILL

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4.4.1.1.3 Flooding

1. CCR Title 23 and 40 CFR, Part 258, Subtitle D requires new Class III landfills to be protected from inundation or washout due to floods with a 100-year return period. According to the County Flood Control District, the potential flood plain associated with a 100-year storm event has not been mapped or established for Bristol Lake (Jacobs, 1990c, as in Mashburn, 1990). Also, quantitative data are generally lacking for determining the frequency and duration of inundation at Bristol Lake (LSA, 1992). Qualitative observations by persons familiar with the area consistently reported that surface water is present in Bristol Lake after significant rainfall, the area of inundation is uncertain but extensive, and the water dries up rapidly (i.e., usually within two to three days). In addition, there is no ordinary high water mark associated with Bristol Lake and no evidence of ordinary high water marks associated with drainage channels on the Bolo Station site (LSA, 1992). However, based on available precipitation and topographic data and an estimated surface runoff coefficient, an estimate of the water level rise in Bristol Lake resulting from the 100-year, 24-hour storm event using the Rational Method was prepared for the Bolo Station site (Jacobs, 1990c).

2. According to National Oceanic Atmospheric Administration (NOAA) data, the 100-year, 24-hour storm event would result in 2.5 inches of rainfall on the basin floor, 3 inches along the surrounding range fronts, and 3.5 to 4.5 inches in the mountains (Jacobs, 1990c, as in Hershfield, 1973). Assuming a runoff coefficient of 0.85, and 4.5 inches of rainfall, the 100-year, 24-hour storm event could potentially result in a water level of 16 feet in Bristol Lake (Jacobs, 1990c). The area of the Bolo Station site potentially impacted by the 100-year floodplain estimated by the Rational Method is shown in Figure 4.4.3, and essentially follows the 620 foot contour. This estimate may be conservative for the following reasons:

   - The Rational Method is generally applied only to smaller areas (640 acres or less) where rainfall intensity can be assumed to be uniformly distributed over the drainage area. In larger areas, rainfall distribution varies considerably and the Rational Method may be inappropriate (County, 1986).
   - For larger areas, the estimate of the runoff coefficient may be subject to error, due to the variability of the drainage basin characteristics (such as vegetation type, vegetation cover density, infiltration capacity of the ground surface, and slope of the drainage area).
   - The use of 4.5 inches of rainfall over the entire drainage basin, rather than a weighted average over each of the different areas, may be overly conservative. The portion of the drainage basin receiving 4.5 inches of rainfall is limited to mountain peaks, which are probably less than 10 percent of the area.

   The above methodology and results will be used for purposes of this EIR/EIS. For project design and permitting purposes, the 100-year floodplain limits will be more accurately defined using the Soil Conservation Service (SCS) Method presented in the County Hydrology Manual. The SCS method involves detailed mapping of the watershed, surface soil types, vegetative cover types, etc., and uses estimates of rainfall losses to infiltration and storage. This will result in a more accurate estimate of the 100-year floodplain boundary, and will determine whether this floodplain crosses the Bolo Station site.

4.4.1.2 Local Surface Water and Drainage

4.4.1.2.1 Bolo Station Site

Drainage Features

1. The main surface flows originating in the mountains to the north of the proposed Bolo Station site tend to bypass the site, which is slightly elevated above the surrounding topography (LSA, 1992). Orange Blossom Wash is oriented in such a way that it would divert the majority of runoff from the north, away from the proposed landfill site. Only minor, unnamed drainages enter the site from the north. However, during storms, some surface water flow would be expected to enter the site from the north (Jacobs, 1990c).

2. Surface water flow across the Bolo Station site is primarily from north to south, via incised gullies and braided washes, which diminish as they flow south and become primarily low flow washes and sheet flow by the time they reach the ATSF rail line. The exception is the Chambless Wash, which trends southwest and cuts across the corner of Section 15, ending in the embankment area in the west half of Section 22. Surface channels are

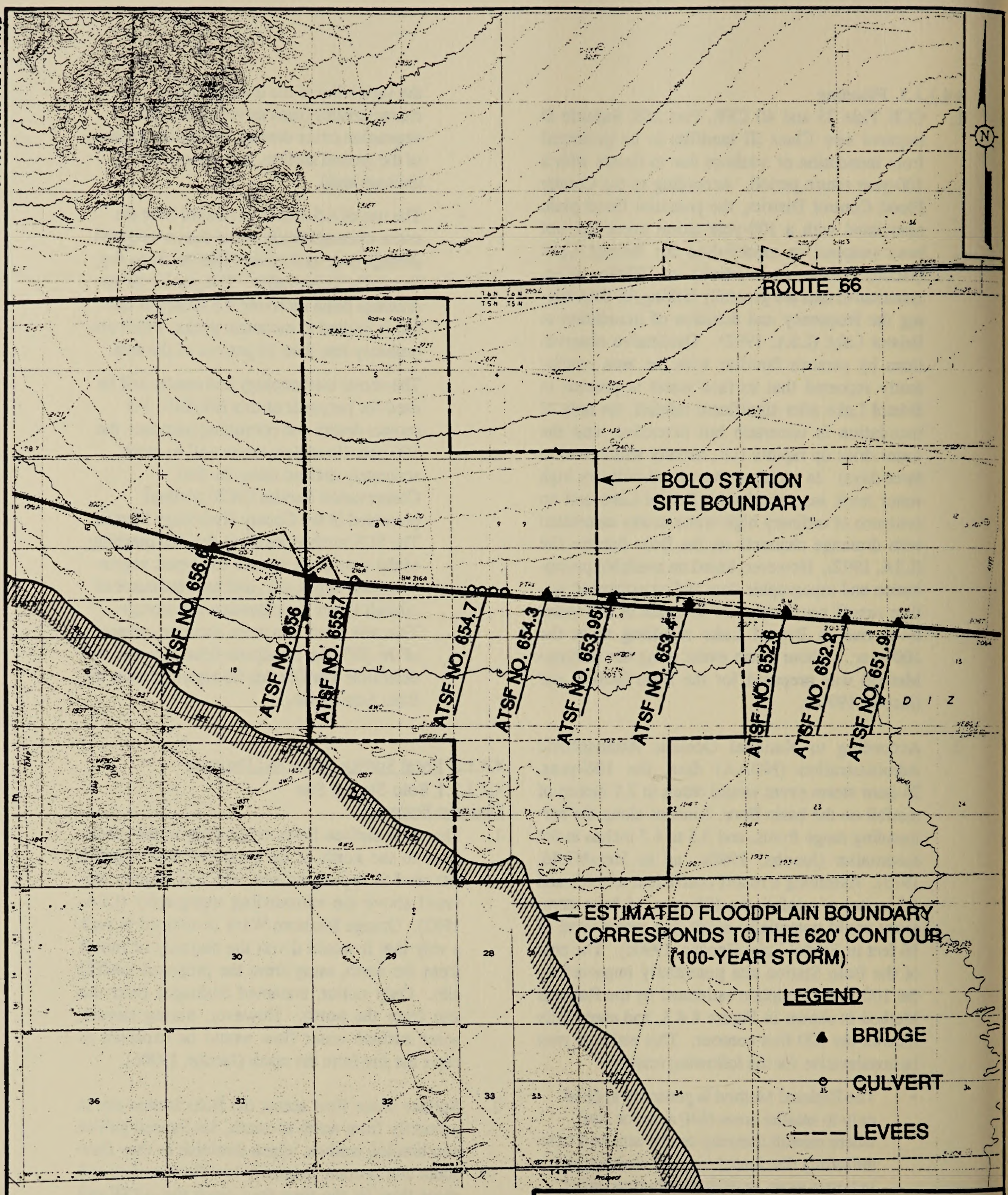

FIGURE 4.4.3
EXISTING DRAINAGE STRUCTURES AND ESTIMATED FLOODPLAIN BOUNDARY (100-YEAR STORM)
RAIL•CYCLE
BOLO STATION LANDFILL

REFERENCE: DRAINAGE STRUCTURES - ATSF,1990
FLOODPLAIN BOUNDARY - JACOBS, 1990c.

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normally dry, with surface flows occurring only during infrequent storms. During such occasions, the drainage system may direct substantial amounts of water from the north across the site. Figure 4.4.4 depicts the physiographic and drainage features of the Bolo Station site. As shown on this figure, there is general lack of drainage features on the southern half of the site where the landfill itself would be located.

3. On the southern portions of Sections 21 and 22, the surface gradient is very flat (approximately 10 feet per mile or a 0.2 percent gradient) and results in some localized ponding after heavy storms. This has been attributed to the vegetation "anchoring" soil mounds which are otherwise washed away by sheet flow or blown by the wind. This causes localized mounding around vegetation and dips in the void space between vegetation.

4. Site drainage in the area of the Bolo Station site is modified by man-made surface features, as shown in Figure 4.4.3. These include Route 66, which parallels the northern boundary of the site, the ATSF rail bed, which is elevated about 5 to 15 feet above the ground surface and traverses the central portion of the site in an east-west direction, and levees and drainage structures that have been constructed along the railroad and Route 66. The highway intercepts surface flow from the north and directs it under the roadway through two drainage structures. The western structure is about 10 feet high and 20 feet wide, and the eastern structure is about 5 feet high and 40 feet wide (Jacobs, 1990c). These drainage structures are designed to channel flows from a 50-year storm event. Flows that exit the southern side of the highway flow onto the Bolo Station site.

5. The ATSF rail line is protected by levees constructed of native soil material, ranging in height from 5 to 15 feet. These levees, shown in Figure 4.4.3, intercept runoff from the north and direct it to six drainage channels under the tracks. The six drainage structures have a combined flow capacity of over 1,425 cubic feet per second, as shown in Table 4.4.1. The table also shows individual capacities for each structure. The capacity of these structures is sufficient to divert flows from the 100-year storm to the southern side of the railroad tracks. Water that flows under the railroad continues its southerly direction for about one mile, where it gradually shifts to the southwest toward Bristol Lake. The flows generally alternate between braided channel and overland sheet flow, continuing south to the sand dune complex. Except for one small area near the southwest property boundary, there was no evidence that storm flows breach the dunes. Even at this breach area, downstream flows do not continue towards Bristol Lake except as overland flow (LSA, 1992).

6. Surface hydrology of the Bolo Station site can best be described as overland flow, i.e., sheetflow (LSA, 1992). Detailed examination of the surface hydrology characteristics of the site failed to disclose any collecting tributaries, and none of the onsite drainage courses are continuous across the site (LSA, 1992). Certain drainages do cross portions of the site, but are not continuously confined to a channel. Chambless Wash, for example, crosses the southeast corner of the site but shows no evidence of an ordinary high water mark in this area. Based on this finding it has been concluded that the drainage channels on the Bolo Station site are not part of a tributary system to waters of the United States, therefore, no permit from the U.S. Army Corps of Engineers is required pursuant to Section 404 of the Clean Water Act (LSA, 1992). A letter of concurrence with this finding for the proposed Bolo Station site was received by Rail•Cycle from the U.S. Army Corps of Engineers, and is included in Appendix E.

Flood Protection

1. During a 100-year, 24-hour storm, runoff from the entire Bristol Basin region drain into Bristol Lake, causing the water to rise an estimated 16 feet above the basin floor based on a preliminary estimate prepared for the proposed action. As shown in Figure 4.4.3, this rise in water levels could flood a small portion (i.e., less than about 2 percent) of the extreme southwest corner of the Bolo Station site.

2. The major wash to the north (the Orange Blossom Wash) would be able to carry a large portion of the runoff during the 100-year, 24-hour storm. Other washes would overflow and drain toward the Bolo Station site. Overflow north of the site would be intercepted by Route 66, which has underlying drainage structures with the capacity to divert the flow from a 50-year, 24-hour storm. The remainder of the water would flow over the highway and onto the northern site area. This portion of site does not contain proposed landfill cells or critical operations elements. However, the site would be

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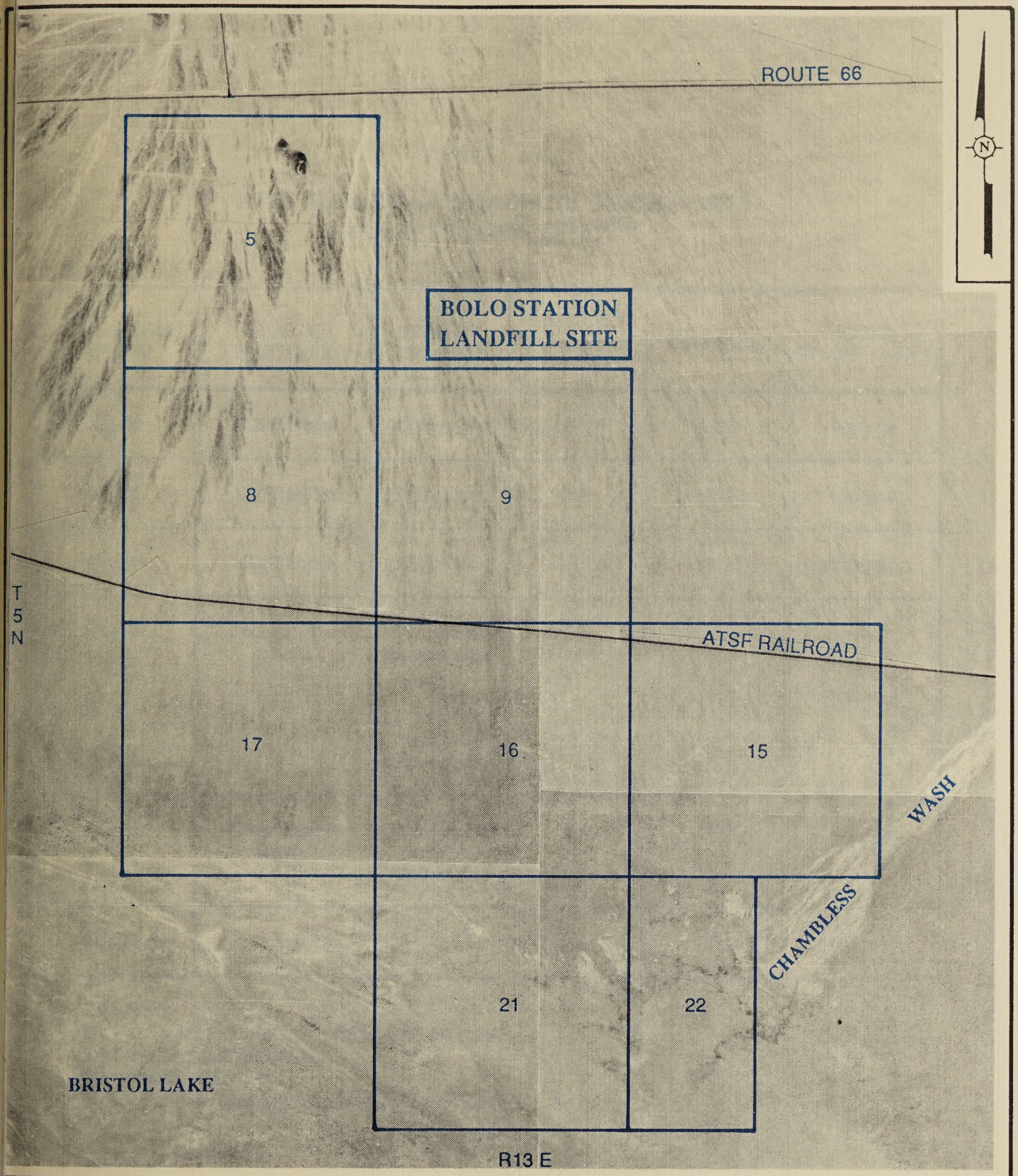

0 3,000 6,000 FEET

APPROXIMATE SCALE

SOURCE: COMPOSITE AERIAL PHOTO FROM BLM, DATED 10/13/77.

FIGURE 4.4.4

PHYSIOGRAPHIC AND DRAINAGE FEATURES

BOLO STATION SITE

RAIL•CYCLE

BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

TABLE 4.4.1

ATSF RAILROAD DRAINAGE STRUCTURES
BOLO STATION SITE[1][2]

STRUCTURE NUMBER	TYPE OF STRUCTURE[3]	SPAN OR DIAMETER	CAPACITY (cubic feet per second)	YEAR BUILT	DESIGN STORM EVENT
653.40	BDPT bridge	42 foot span	370	1910	100-year
653.95	BDTR bridge	31 foot span	852	1938	100-year
654.30	BDPT bridge	30 foot span	[4]	1918	100-year
654.70	Concrete pipe culverts	Two 36-inch diameter pipes Two 42-inch diameter pipes	70 100	1917	100-year
655.70	Concrete pipe culverts	One 36-inch diameter concrete pipe	35	1975	100-year
656.00	Concrete bridge	28 foot span	Unknown	1975	100-year

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(1) ATSF, 1990.
(2) See Figure 4.4.3 for location of structures on the project site.
(3) BDPT = ballast deck pile trestle.
BDTR = ballast deck T-rail.
(4) Capacity included in calculations for structure No. 653.95.

required to provide protection from run-on of flows resulting from the 100-year, 24-hour storm event.

3. Levees and drainage structures under the portion of the ATSF rail line that crosses the site have the collective capacity to accommodate flow from a 100-year, 24-hour storm. The channeled water would drain toward Bristol Lake in braided channels or as overland sheetflow.

4.4.1.2.2 Cadiz Valley Alternative Site

1. Surface water flow across the alternative site trends to the southwest, away from the foothills in the northern portion of the site. This flow meets with the easternmost branch of Schulyler Wash in the southwest quarter of Section 17, as shown in Figure 4.4.5. Several deeply incised streambeds exist in Sections 5 and 9, eroded by high energy desert washes carrying runoff from the steep slopes of the Ship Mountains. The surface of the alluvial fans are cut by numerous braided channels, which are caught by a series of levees immediately north of the Arizona-California Railroad. The levees redirect the storm runoff to culverts and underpasses constructed to protect the rail line from washout during storms.

2. On the southern side of the rail line, the surface gradients are relatively flat (i.e., 55 feet per mile or 1 percent) and surface water flow slows down and diminishes as it moves across Section 17. A southeast branch of the Schulyler Wash cuts across the southwest corner of Section 17 and flows south toward the Cadiz Dunes. Surface channels are normally dry, with surface flows occurring only during infrequent storms. During such occasions, the drainages may carry substantial quantities of water across the site.

3. Flow resulting from a 100-year, 24-hour storm event has not been calculated for the major washes in the region of the Cadiz Valley Alternate site. Flow down the eastern branch of Schulyler Wash spreads out into alternating braided channel and overland sheet flow near the southwest corner of the site, and would therefore not be susceptible to flooding. However, the site would be required to provide protection from run-on of flows resulting from the 100-year, 24-hour storm.

4. The potential rise in the level of water in Cadiz Lake resulting from the 100-year, 24-hour storm event has not been calculated, nor has the 100-year floodplain been defined. However, due to its proximity of the Bristol Basin, it is assumed that conditions would be similar in both basins during storm events. Although the drainage area of Cadiz basin is only slightly more than half the surface drainage area of Bristol basin, Cadiz basin receives additional surface flow from Fenner Valley. It is assumed that the rise in water levels in Cadiz Basin would be on the same order of magnitude as the predicted rise in water levels in Bristol Basin, which is 16 feet. The lowest part of the alternate site is about 100 feet higher than the level of Cadiz Lake. It is therefore considered very unlikely that the alternative site is located in the 100-year floodplain from the Cadiz Lake.

4.4.2 GROUND WATER

4.4.2.1 Regional Ground Water

4.4.2.1.1 Ground Water Occurrence and Interbasin Flow

1. Bristol and Cadiz basins are both hydrologically closed, or internally drained basins, in which evaporation is the primary means of ground water discharge rather than subsurface flow into another basin (Jacobs, 1991b). Such evaporation from successive lake and playa surfaces since late Pleistocene time has resulted in the concentration of the mineral and salt brines which exist today (Jacobs, 1991b, as in Shafer, 1964). The surrounding mountain ranges and underlying basement complex, due to their relative impermeability, define the boundaries of Bristol and Cadiz basins (Jacobs, 1990c, as in Moyle, 1967; and Rosen, 1989). A geophysical study was conducted within the region surrounding the Bolo Station site which indicated the depth to bedrock in the center of Bristol Lake is approximately 6,000 to 7,000 feet (Jacobs, 1991b, as in Biehler, 1991).

2. Regional ground water contours and flow directions are shown in Figure 4.4.6. In the project region, ground water flows southward from Fenner Valley into Cadiz Valley on either side of the Ship Mountains (DWR, 1965). Basin outflow from Fenner Valley is estimated at 270 acre-feet per year based on a calculated transmissivity of 310 square feet per day (Freiwald, 1984). Most of this subsurface flow is directed along the west side of the range. The flow splits at the southern end of Fenner Valley, and a portion of the ground water recharges Bristol Basin, while the remainder recharges Cadiz Basin. Other than this shared recharge from Fenner Valley, there appears to be

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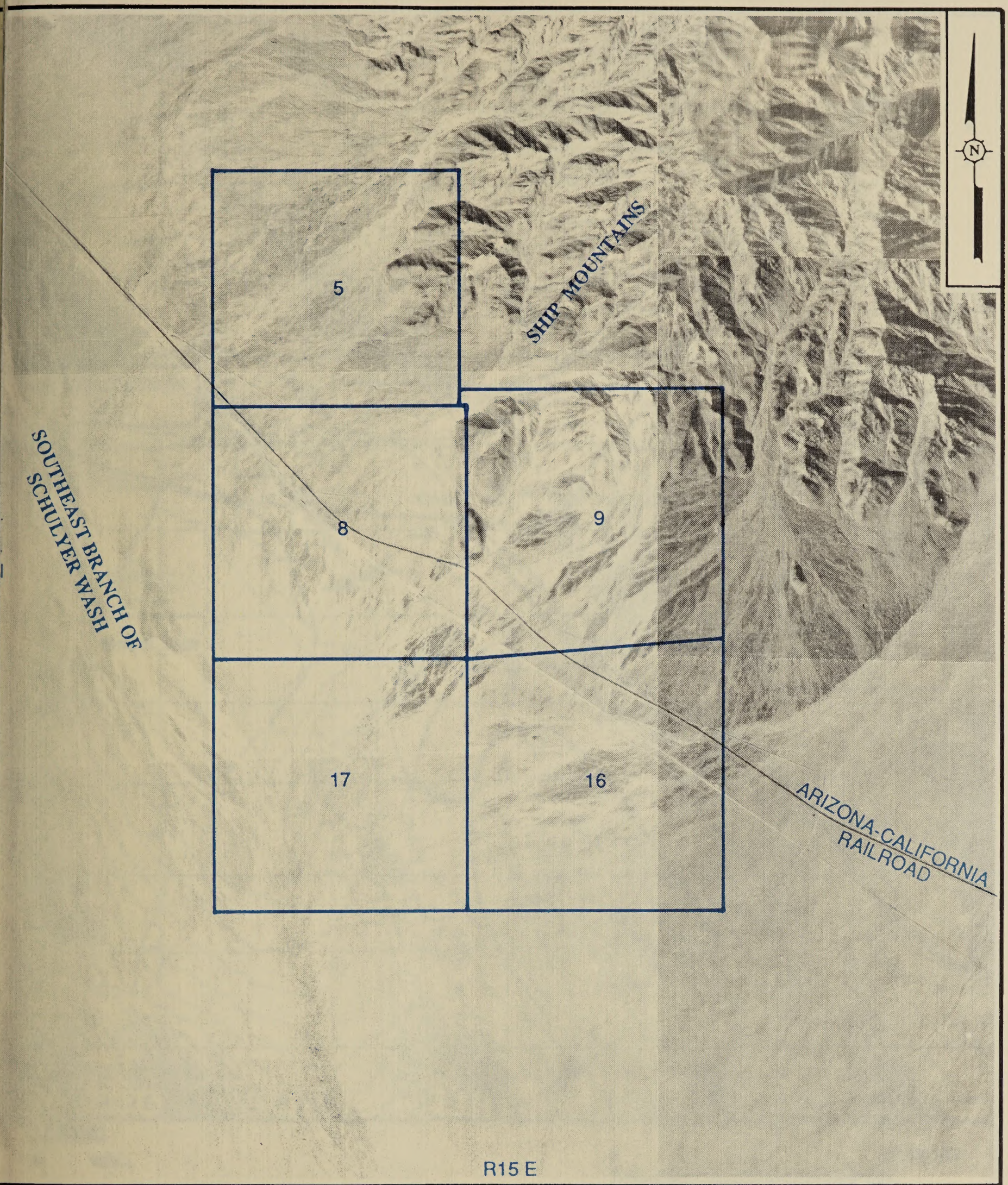


0 3,000 6,000 FEET

APPROXIMATE SCALE

SOURCE: COMPOSITE AERIAL PHOTO FROM BLM, DATED 10/13/77.

FIGURE 4.4.5

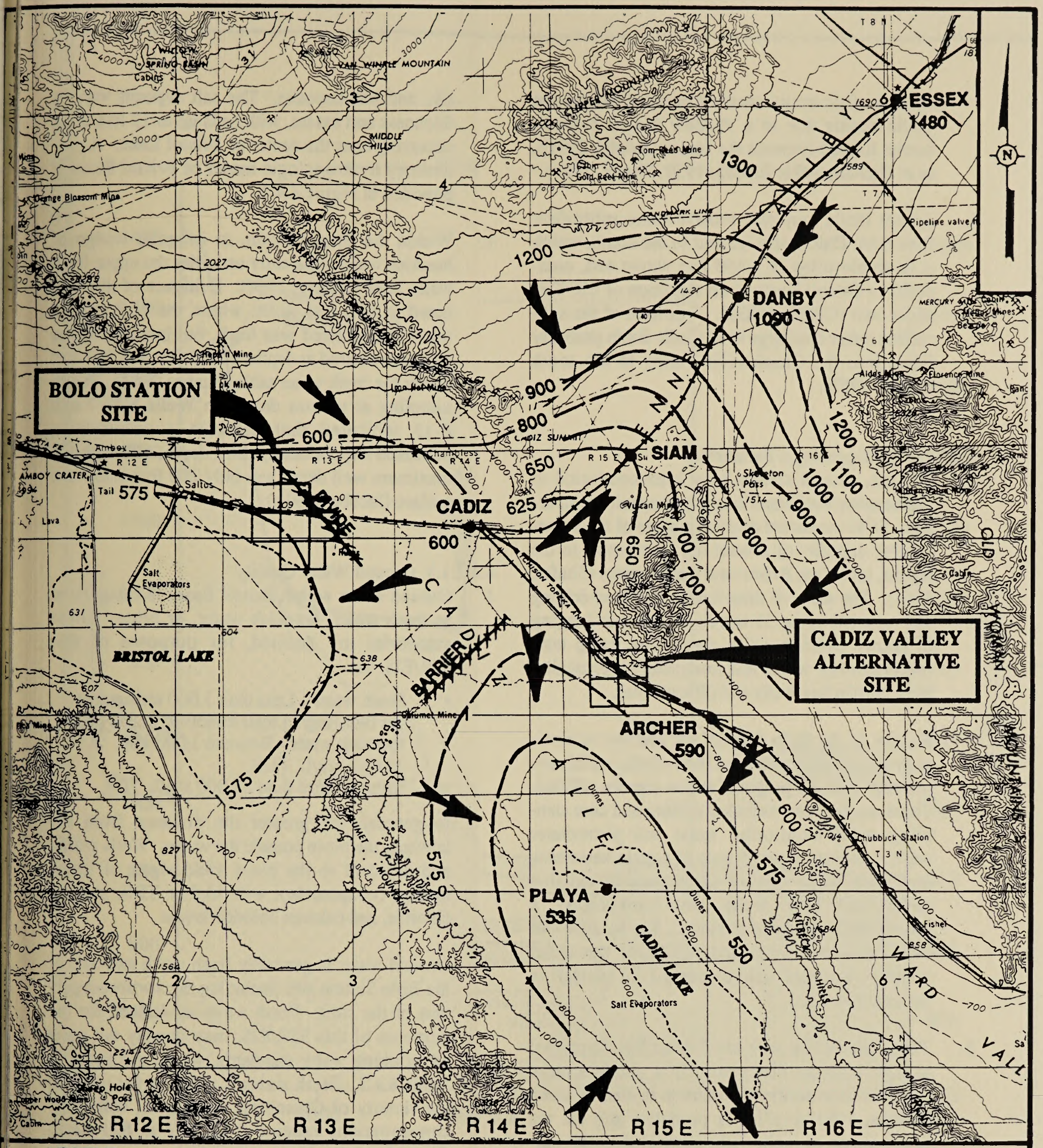
PHYSIOGRAPHIC AND DRAINAGE FEATURES

CADIZ VALLEY ALTERNATIVE SITE

RAIL•CYCLE

BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.


BOLO STATION SITE
CADIZ VALLEY ALTERNATIVE SITE
ESSEX
1480
DANBY
1090
SIAM
CADIZ
PLAYA
535
ARCHER
590
BRISTOL LAKE
CADIZ LAKE
1300
1200
900
800
600
650
625
575
550
700
1100
1000
R 12 E
R 13 E
R 14 E
R 15 E
R 16 E
Amboy
Salt Evaporators
Cadiz Summit
Chubbuck Station
Fisher
Pipeline valve
Skeleton Pass
Vulcan Mine
Calumet Mine
Tom Reed Mine
Gold Reef Mine
Orange Blossom Mine
Castle Mine
Florence Mine
Aldas Mine
Lava Hot Mine
Champless
Saltus
Tail
Lava
Cabin
Dunes
Salt Evaporators
MIDDLE HILLS
CHIPPER MOUNTAINS
VAN WINKLE MOUNTAIN
MOUNTAIN
DIVIDE
BARRIER
ALLEY
WARD VALLEY
OLD WOMAN MOUNTAINS
SANTA FE
ATCHISON TOPEKA
Wilson Spring Ranch
Zero Hole Pass
Copper World Mine
Mercury Gulch
Aldas Mine
Florence Mine
Pipeline valve
Skeleton Pass
Vulcan Mine
Calumet Mine
Tom Reed Mine
Gold Reef Mine
Orange Blossom Mine
Castle

no subsurface interconnection between Bristol and Cadiz basins due to a shallow buried bedrock barrier located between the basins (Jacobs, 1991b, as in Biehler, 1991; Bassett, 1959; Shafer, 1964).

3. Bristol Basin may also receive some subsurface flow from Dale Basin located to the south, which is at an elevation of 1,160 feet above msl, compared to Bristol Basin at an elevation of 610 feet above msl (USGS, 1983a). A portion of the subsurface water discharge from Cadiz Basin probably flows into the Chuckwalla Valley to the south (DWR, 1952).

4.4.2.1.2 Hydrogeologic Parameters

1. To date, several studies have been conducted to characterize the Bristol Basin hydrogeologic structure. SCE conducted detailed studies of the water-bearing capacity of several dry lake basins in the region, including Bristol and Cadiz basins (Shafer, 1964). The study of these basins involved drilling and core sampling 21 test holes, electric logging of known existing wells, conducting pump tests on certain key wells, and analyzing water quality from certain key wells and all test holes.

2. Studies of the Bolo Station site and the immediately surrounding area have been conducted in conjunction with the proposed action (Jacobs, 1991b). These studies have included drilling and core sampling of 19 monitoring wells and piezometer wells, conducting pump tests of certain key wells, analyzing water quality parameters in existing wells and new wells, and completing a geophysical survey of the area. The locations of the monitoring wells and results of the water quality analyses are discussed in detail in Section 4.4.2.2.1.

3. The available literature and field studies completed to date indicate that generally a single aquifer exists in an unconfined condition in Bristol Basin (Jacobs, 1991b). This is probably true for the Cadiz Basin as well. The alluvial deposits surrounding the basin floors are generally permeable and, where saturated, yield water freely to wells. In the transitional zone between the alluvial fan and the playa, the interlayering of playa and alluvial deposits may result in some confining layers, leading to localized semiperched or semiconfined hydrologic conditions. The portion of the aquifer underlying the center of Bristol Lake is composed of thin layers of sandy materials within thick clay, silt, and salt deposits. The salt deposits vary in thickness and extent, with beds up to 12 feet thick occurring near the center of Bristol Lake. A preliminary hydrogeologic model of Bristol Basin is provided in Figure 4.4.7.

4. Within the Bristol Basin, an irregular wedge of brackish water apparently underlies the upper fresh water zone (Shafer, 1964). Evidence of this was noted in two test wells, where the first ground water encountered was fresh, but brackish water was encountered at depths of 133 feet and 201 feet below the fresh water table (Shafer, 1964). Water sampling at various depths in Wells MW-7 and P-15 indicated that brackish concentrations increased exponentially with depth, although the maximum well depth was only 200 feet below the surface (Jacobs, 1991b).

4.4.2.1.3 Ground Water Quality

1. Ground water within Bristol Basin is categorized as fresh water, brackish water, or brine. These categories are defined, for purposes of this EIR/EIS, as:

   - Fresh water - Less than 1,000 milligrams per liter (mg/L) total dissolved solids (TDS).
   - Brackish water - Between 1,000 and 35,000 mg/L TDS.
   - Brine - More than 35,000 mg/L TDS.

   In general, the greater the distance from the lakebed, the more potable the water. Wells within and adjacent to the playa yield water of lower quality (nonpotable), with higher TDS, sodium chloride, and calcium chloride levels.

2. Ground water is generally fresh north and east of the Bolo Station site (including the northwest portion of the site). Fresh water as defined for the purposes of this EIR/EIS, may or may not meet all drinking water standards, which are listed in Table 4.4.2. Fresh water is reported for wells in the vicinity of Chambless and Cadiz, with TDS concentrations ranging from 279 to 823 mg/L. Chloride and sulfate concentrations range from 43 to 267 mg/L and 36 to 186 mg/L, respectively (Jacobs, 1991b, as in Moyle, 1967; Rosen, 1989).

3. Brackish water occurs in a zone between the relatively fresh water of the basin margin and the brine solutions underlying the dry lake. The chemical parameters of brackish waters generally

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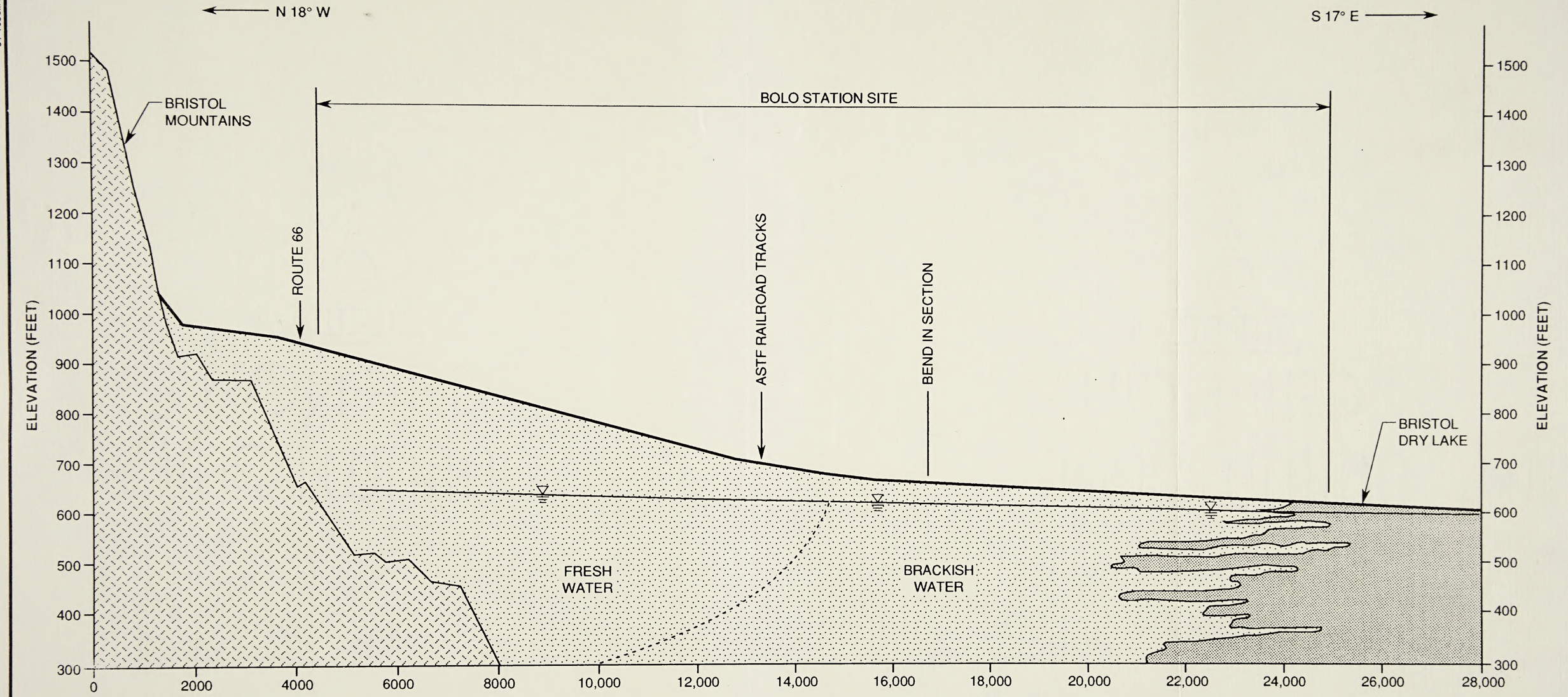

LEGEND

- BEDROCK - BASEMENT COMPLEX
- ALLUVIUM AND FAN DEPOSITS - MOSTLY SAND AND GRAVEL
- PLAYA DEPOSITS - MOSTLY SILT AND CLAY WITH SALT BEDS
- GROUND WATER SURFACE (EXTRAPOLATED)

0 2000 4000 FEET
HORIZONTAL SCALE

0 200 400 FEET
VERTICAL SCALE

REFERENCE: JACOBS, 1990c.

FIGURE 4.4.7

BRISTOL BASIN HYDROGEOLOGIC STRUCTURE CROSS SECTION

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

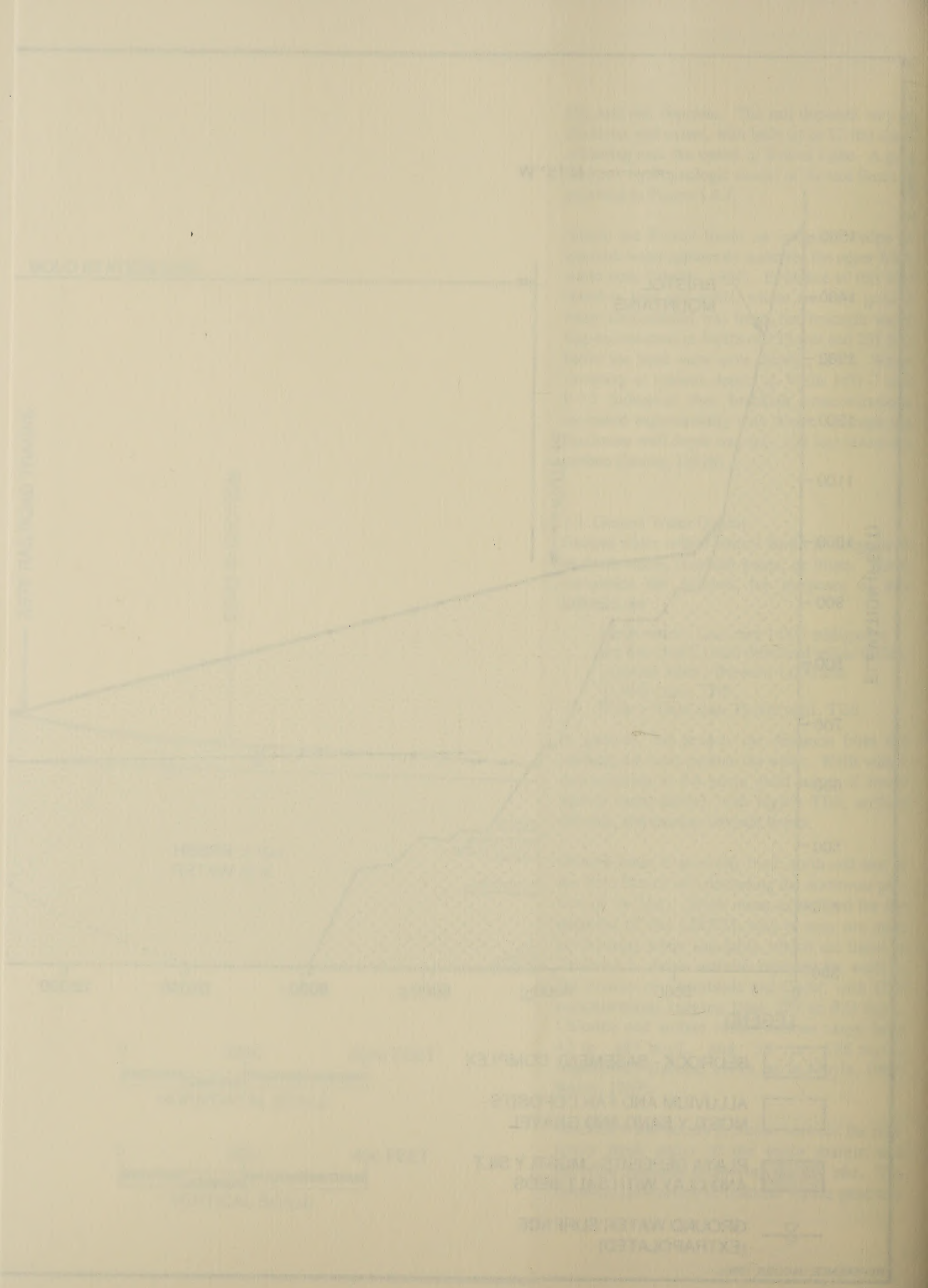

TABLE 4.4.2

PRIMARY DRINKING WATER STANDARDS

CONSTITUENT	MAXIMUM CONTAMINANT LEVEL (mg/L)
INORGANIC CONSTITUENTS(1)	
Aluminum	1.00
Arsenic	0.05
Barium	1.00
Cadmium	0.01
Chromium	0.05
Lead	0.05
Mercury	0.002
Nitrate (as NO_3)	45.00
Selenium	0.01
Silver	0.05
ORGANIC CONSTITUENTS(2)	
Chlorophenoxys	
2,4-D	0.1
2,4,5-TP Silvex	0.01
Chlorinated Hydrocarbons	
Endrin	0.0002
Lindane	0.004
Methoxychlor	0.1
Toxaphene	0.005
Synthetics	
Atrazine	0.003
Bentazone	0.018
Benzene	0.001
Carbon Tetrachloride	0.0005
Carbofuran	0.018
Chlordane	0.0001
1,2-Dibromo-3-chloropropane	0.0002
1,4-Dichlorobenzene	0.005
1,1-Dichloroethane	0.005
1,2-Dichloroethane	0.0005
cis-1,2-Dichloroethylene	0.006
trans-1,2-Dichloroethylene	0.02
1,1-Dichloropropane	0.005
1,3-Dichloropropene	0.0005
Di(2-ethylhexyl) phthalate	0.004
Ethylbenzene	0.680
Ethylene Dibromide	0.00002
Glyphosate	0.7
Heptachlor	0.00001
Heptachlor epoxide	0.00001
Molinate	0.02
Monochlorobenzene	0.030
Simazine	0.010
1,1,2,2-Tetrachloroethane	0.001
Thiobencarb	0.07
1,1,1-Trichloroethane	0.200
1,1,2-Trichloroethane	0.032
Trichloroethylene	0.005
Trichlorofluorometahne	0.15
1,1,2-Trichloro-1,2,2-Trifluoroethane	1.2
Vinyl Chloride	0.0005
Xylenes	1.750

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(1) CCR, Title 22, Division 4, Chapter 15, Article 4, Part 64435.
(2) CCR, Title 22, Division 4, Chapter 15, Article 5.5, Part 64444.5

exceed drinking water standards for TDS and chlorides. Without treatment, this water is not suitable for human consumption, but is suitable for other purposes, such as fire protection, dust control, or industrial processes. Wells in this zone exhibit TDS concentrations ranging from 2,542 to 17,476 mg/L, and chloride and sulfate levels of 493 to 9,751 mg/L and 374 to 17,565 mg/L, respectively (Jacobs, 1990c, as in Moyle, 1967). The presence of dissolved solids in the brackish water is probably be the result of mixing the fresher water occurring along the basin margin with the brines of the playa deposits.

4. Brine occurs within and adjacent to the playa deposits. Brine is a highly mineralized solution containing exceptionally high concentrations of sodium and calcium chloride. Economic quantities of salts are extracted from these brines in the vicinity of Bolo Station. Available data indicate that TDS concentrations range from about 35,000 to 300,000 mg/L in these solutions. Chloride and sulfate concentrations range from 6,000 to 220,000 mg/L and 3.1 to 1,700 mg/L, respectively (Jacobs, 1991b).

4.4.2.1.4 Ground Water Usage

1. Ground water from Bristol Basin is used for brine extraction, irrigation, and domestic supply. An inventory of 25 wells and test borings within a seven-mile radius of Bolo Station site was conducted in conjunction with the proposed action (Jacobs, 1990c). Water is supplied by private wells located throughout the area. Water from upgradient wells is used for public and private domestic consumption and irrigation. Water wells downgradient of the Bolo Station are used for brine extraction. Table 4.4.3 lists these 25 wells, indicating their locations, uses, capacities, and other pertinent characteristics. The California Department of Water Resources (DWR) was contacted and reported that annual water use data has been provided to their agency for only the two ATSF wells in Cadiz. Therefore, the values of annual water use included on the table have been estimated from other published data (e.g., irrigation application guides by SCS). Potable ground water nearest the site is being extracted from wells in the communities of Chambless and Cadiz, and at the Pacific Agriculture grape/citrus farm approximately six miles east of Bolo Station (Jacobs, 1990a), as shown in Figure 4.4.8. Pacific Agriculture is currently extracting approximately 7,500 acre-feet per year to irrigate 1,440 acres of grape and citrus crops.

2. Since 1981, brine has been extracted by the Leslie Salt Company (a subsidiary of Cargill Salt Company) from three wells located adjacent to the southwestern boundary of the Bolo Station site. In addition, Leslie Salt is interested in utilizing the brackish water that underlies the site. Two wells owned and operated by National Chloride are located within one-quarter mile east of the Bolo Station site boundary. These wells are only operated intermittently.

3. ATSF uses water supplied from wells approximately seven miles east of the Bolo Station site near Cadiz. Potable water is transported by rail tank car from wells at Newberry Springs to Amboy by ATSF. This water is used by Amboy businesses, schools, post office, residences, and others. Also, National Chloride obtains process water from ATSF in Amboy, then trucks it to its production site at Bristol Dry Lake.

4. Ground water usage in Cadiz Basin has been limited to brine extraction and domestic supply. Only one domestic well was identified, which was a well drilled by ATSF at Archer Siding in 1910 for operating purposes. However, a recalculation of the 1910 water quality analysis indicated the water would be usable for domestic purposes, but that its foaming and scale forming characteristics made it unsuitable for boiler purposes (Shafer, 1964). This well was reportedly producing 1,100 gallons per minute in 1933, retired from service in 1956, and was leased to Highland Stucco and Lime, Inc. in 1963 (ATSF, n.d.).

5. Typically, recharge to basin ground water can occur via subsurface flow from nearby basins, from infiltration of rainwater and runoff from surrounding mountain ranges, infiltration of direct precipitation, and infiltration of irrigation water. The amount of recharge due to direct precipitation in desert basins receiving only a few inches of rainfall annually is typically negligible compared with the amount of recharge from subsurface inflow from nearby basins. Recharge to the Bristol and Cadiz basin ground water systems occurs primarily from subsurface flow from Fenner Basin and from infiltration of irrigation water.

TABLE 4.4.3

WATER WELLS WITHIN SEVEN MILES OF BOLO STATION SITE[1]

WELL LOCATION AND DISTANCE FROM BOLO STATION SITE[2]	WELL OWNER	NUMBER OF WELLS	WELL IDENTIFICATION NUMBER[2]	WELL YIELD (estimated gallons per minute)[3]	WELL USE	ANNUAL WATER USE (acre-feet)
Within One Mile of Site						
• Within 1/4-mile west of site	Leslie Salt	3	119, 121, 122	40 - 140	Brine	220 - 260[3]
• Within 1/4-mile east of site	National Chloride	2	85, 86	Not Known	Not Known	Not Known
Within Three Miles of Site						
• Town of Saltus, 3 miles west of site	Leslie Salt	5	16, 34, 35, 36, 38	N/A	Injection	N/A
• Near Chambless, 6 miles east of site	R. Tull	1	98	13	Domestic	<1
• Near Chambless, 6 miles east of site	H.B. Burris	1	97	1,050	Not in Use	0
Within Seven Miles of Site						
• Town of Chambless, 6 miles east of site	Leslie Salt	1	103	300	Domestic	<1
• Town of Chambless, 6 miles east of site	Various	6	99, 100, 101, 102, 104, 105	12 or Less	Domestic	6 - 10
• Town of Amboy, 6 miles west of site	Not Known	2	24, 25	10	Domestic	<1
• Town of Cadiz, 6 miles east of site	ATSF	2	88, 89	200+	Domestic & Irrigation	20 - 25
• Near Cadiz, 6.5 miles east of site	Pacific Agriculture	2	117, 118	1,800	Irrigation	7,500[4]

91-109 (7/12/92/mg)

(1) Jacobs, 1990c.

(2) Most well locations are shown in Figure 4.4.8. Distances measured from center of site.

(3) Calculated by taking the overall estimated use from 1910 to 1965, subtracting domestic use and ATSF use, and multiplying the result by 1.25 to account for expansions of the Leslie Salt operations since 1965. The upper estimate was calculated by assuming the wells were pumped continuously at 140 gallons per minute.

(4) An annual water use of 5,000 to 7,200 acre-feet per year was estimated using the method published by U.S. Department of Agriculture/SCS in their *Irrigation Application Guide for Citrus and Grapes*, assuming 1,440 acres of crops in irrigation.

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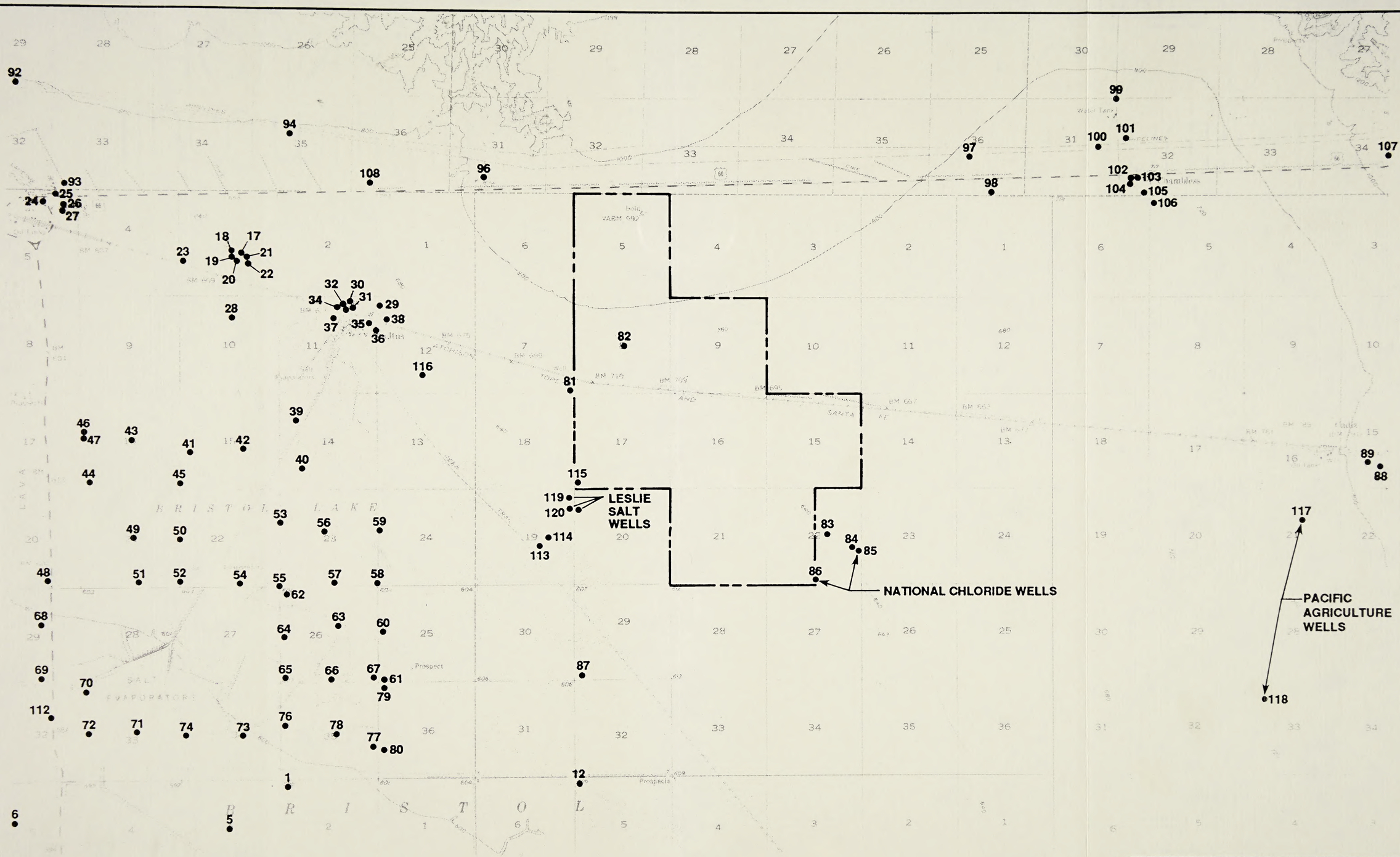


NOTE: APPENDIX F CONTAINS INFORMATION ON WELLS ILLUSTRATED ON THIS FIGURE.

FIGURE 4.4.8

EXISTING WELLS NEAR BOLO STATION SITE

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

6. When water is used to irrigate crops, the amount applied is usually several times as much as natural rainfall. Although crops consume much more water than native vegetation, part of the water usually penetrates below the root zone and into the ground water basin (DWR, 1975). The SCS typically assumes a 15 to 20 percent water loss due to leaching (SCS, 1986). Applying this assumption to the irrigation water use estimated in Table 4.4.3 for Pacific Agriculture indicates that a potential recharge to the ground water basins of 1,125 to 1,500 acre-feet per year.

7. Recharge from Fenner Valley into Bristol and Cadiz basins (combined) was estimated to average approximately 2,200 acre-feet annually (Shafer, 1964). Total recharge into Bristol Basin was estimated in 1975 at 2,100 acre-feet per year, and recharge to Cadiz Basin at 500 acre-feet per year (DWR, 1975). Including the estimated recharge from irrigation return water the total recharge into Bristol Basin would be 3,400 acre-feet per year.

8. An estimated total of 14,300 acre-feet of fresh water was extracted from both Bristol and Cadiz basins, between 1910 when production of calcium chloride began, until 1964 (Shafer, 1964). Based on water level data collected within Bristol Basin, this usage rate (which is equivalent to 260 acre-feet per year) did not cause a decline in water levels from 1910 to 1965 (Jacobs, 1991b, as in Moyle, 1967). The annual safe yield of the fresh water zone of both Bristol and Cadiz basins was estimated to be 70 percent of the annual recharge (Shafer, 1964). The remaining 30 percent is assumed to be lost to evaporation. Applying this criteria to the DWR estimates results in a safe annual yield of 1,470 and 560 acre-feet per year from Bristol and Cadiz basins, respectively. Applying the same criteria to the updated estimate of recharge to Bristol Basin (i.e., 3,400 acre-feet per year) results in a safe annual yield of 2,380 acre-feet per year. The current total annual usage rate of the region is not reported, but significant development has occurred since 1964.

9. A preliminary estimate of total annual consumptive use in Bristol Basin has been made, as shown in Table 4.4.4. It is estimated that approximately 7,800 acre-feet per year may be withdrawn from the Bristol Basin for various uses. This estimated use indicates significant exceedance of the estimated safe annual yield of 2,380 acre-feet per year.

4.4.2.2 Local Site Ground Water

4.4.2.2.1 Bolo Station Site

1. The thickness of saturated alluvium underlying the Bolo Station site is variable, depending on the depth to ground water and depth to the relatively impermeable basement complex. Depth to bedrock has been estimated through a geophysical survey (gravity and magnetic study), but has not been confirmed by drilling onsite (Biehler, 1991). The geophysical survey indicated that a subsurface bedrock ridge, trending northwest-southeast, underlies a portion of the site at a depth of about 500 to 1,000 feet below the surface (Biehler, 1991). This ridge extends from the bedrock outcropping in Section 5 to the northernmost outliers of the Calumet Mountains (see Figure 4.4.6) and appears to have once been an extension of the Bristol and Calumet mountains, which has subsequently been buried by alluvium. To the north of the ridge is a structural trough in the bedrock, which underlies the valley between the Bristol and Marble mountains. Depth to bedrock on the portion of the site to the southwest of the subsurface ridge is approximately 1,500 feet below ground surface (Biehler, 1991). Comparison of the geophysical data and a field study to determine the limits of the fresh water zone indicates this barrier underlies the transition zone between fresh and brackish water, and may be partially responsible for the separation of these two water types (Biehler, 1991; Shafer, 1964). The location of the transition zone fluctuates as a result of the balance between upgradient recharge of fresh water and downgradient pumping, as evidenced by historic fluctuations (refer to Section 4.4.2.2.1) (Jacobs, 1991b).

2. Based on monitoring well data, depth to ground water ranges from 195 feet below ground surface at the northern part of the site, to approximately 37 feet below ground surface at the southern part of the site. The latter depths are dependent on the cone of depression caused by the Leslie Salt brine pumping wells. Existing ground water elevations are listed in Table 4.4.5, and the existing water level contours are depicted in Figure 4.4.9. If pumping of these wells was discontinued, the water level would rise substantially under the southern portion of the site. Class III landfills are required by CCR Title 23 to maintain a minimum clearance of 5 feet between waste and ground water. Table 4.4.5 also shows the estimated water elevations expected to result if Leslie Salt were to discontinue pumping their wells.

TABLE 4.4.4

ESTIMATED ANNUAL GROUND WATER WITHDRAWAL
BRISTOL BASIN

LAND USE	TOTAL ANNUAL CONSUMPTIVE USE
Domestic (assumes 50 to 75 gallons per day per person x 500 people)	30-40 acre-feet
ATSF	20 to 25 acre-feet
Leslie Salt	220 to 260 acre-feet
Pacific Agriculture	7,500 acre-feet
TOTAL	7,770 to 7,825 acre-feet

91-109 (10/7/92/ds)

TABLE 4.4.5

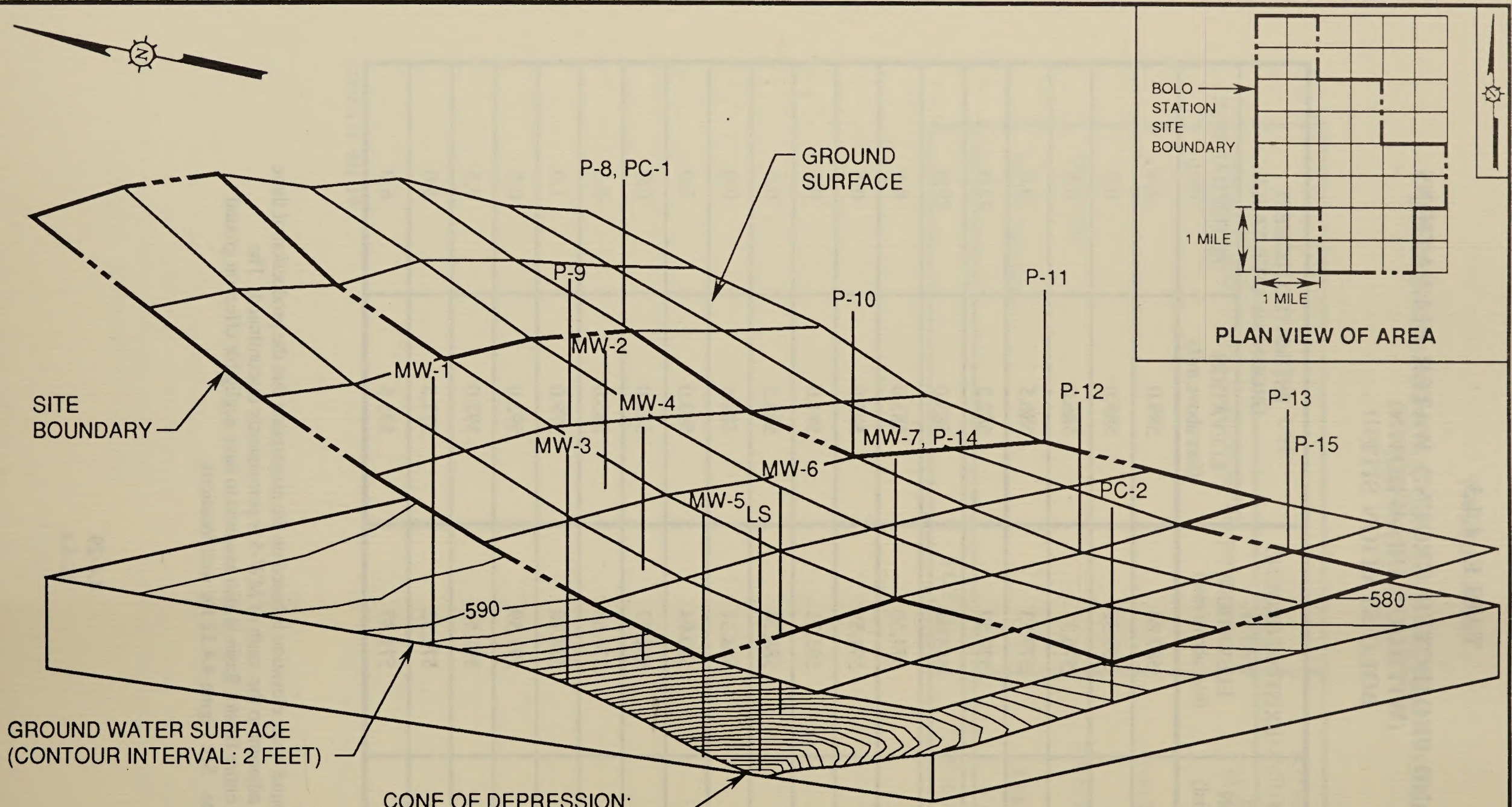
EXISTING AND PROJECTED GROUND WATER ELEVATIONS (WITHOUT DRAWDOWN) BOLO STATION SITE[1]

WELL[2]	GROUND SURFACE ELEVATION (feet above msl)	EXISTING GROUND WATER ELEVATION (feet above msl)	ESTIMATED HIGHEST GROUND WATER TABLE	
			ELEVATION (feet above msl)	POTENTIAL RISE (feet)
MW-1	707.50	587.84	589.0	1.0
MW-2	710.12	589.32	589.0	0.0
MW-3	657.81	576.37	586.0	9.5
MW-4	664.15	577.53	586.5	9.0
MW-5	616.95	539.52	582.5	43.0
MW-6	623.93	553.94	583.0	29.0
MW-7	634.41	574.50	583.0	8.5
P-8	784.56	591.59	592.0	0.5
P-9	753.24	591.31	591.0	0.0
P-10	699.46	588.24	588.5	0.0
P-11	675.61	588.31	588.5	0.0
P-12	640.41	580.94	583.0	2.0
P-13	636.00	581.77	582.0	0.0
P-14	634.43	574.63	583.0	8.5
P-15	623.03	578.18	579.0	1.0
PC-1A	784.19	591.59	592.0	0.5
PC-1B	784.19	591.58	592.0	0.5
PC-2A	609.77	572.52	577.5	5.0
PC-2B	609.77	571.37	575.5	6.0

91-109 (11/5/92)

(1) Jacobs, 1991b.

(2) The estimated highest ground water elevation is based on the assumption that the production of three existing Leslie Salt wells adjacent to the south of MW-5 is permanently discontinued. The hydrologic balance of the entire Bristol Basin is also assumed to have negligible effect on ground water elevations at the site. See Figure 4.4.12 for well locations.



LEGEND

MW	MONITORING WELL.
P	PIEZOMETER
PC	PIEZOMETER CLUSTER
LS	LESLIE SALT WELL FIELD

SOURCE: JACOBS, 1991b.

FIGURE 4.4.9

ORTHOGRAPHIC PROJECTION OF GROUND WATER CONTOURS RELATIVE TO GROUND SURFACE

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

Figure 4.4.10 depicts the ground water contours expected to result if the Leslie Salt wells discontinued pumping.

Hydrogeologic Parameters

1. Ground water elevations shown in Table 4.4.5 and Figure 4.4.9, as based on water level measurements taken in April 1991 (Jacobs, 1991b). Based on the data collected during these measurements, the existing horizontal ground water gradient generally is toward the south beneath the northern portion of the site, with a flat flow gradient of about 4 feet per mile ($7.6x10^{-4}$ feet per foot) (Jacobs, 1991b). Flow is toward the southwest in the southern portion of the site, with the gradient increasing to 46 feet per mile ($8.7x10^{-3}$ feet per foot) within one mile of the Leslie Salt brine extraction wells (Jacobs, 1991b).

2. The potential presence of a vertical gradient was considered but not observed in the northeastern portion of the site at piezometer cluster PC-1 on Section 9, as shown in Figure 4.4.10 (Jacobs, 1991b). However, a 1-foot difference in water levels between two screened intervals was indicated in the southwestern corner of the site at piezometer cluster PC-2 on Section 21. The cause of this upward vertical gradient is unknown, but it could be the result of adjacent brine extraction at the Leslie Salt wells (Jacobs, 1991b). While the actual thickness of the aquifer is not known, it is expected to extend fairly deep; the geophysical analysis indicated the depth of bedrock to be approximately 750 feet below the surface near PC-2. If a single aquifer were present it would be expected to extend to bedrock given this depositional environment (Jacobs, 1991b). This implies that water produced from the Leslie Salt wells, which pump from approximately 270 feet below surface, may come from the upper part of the aquifer.

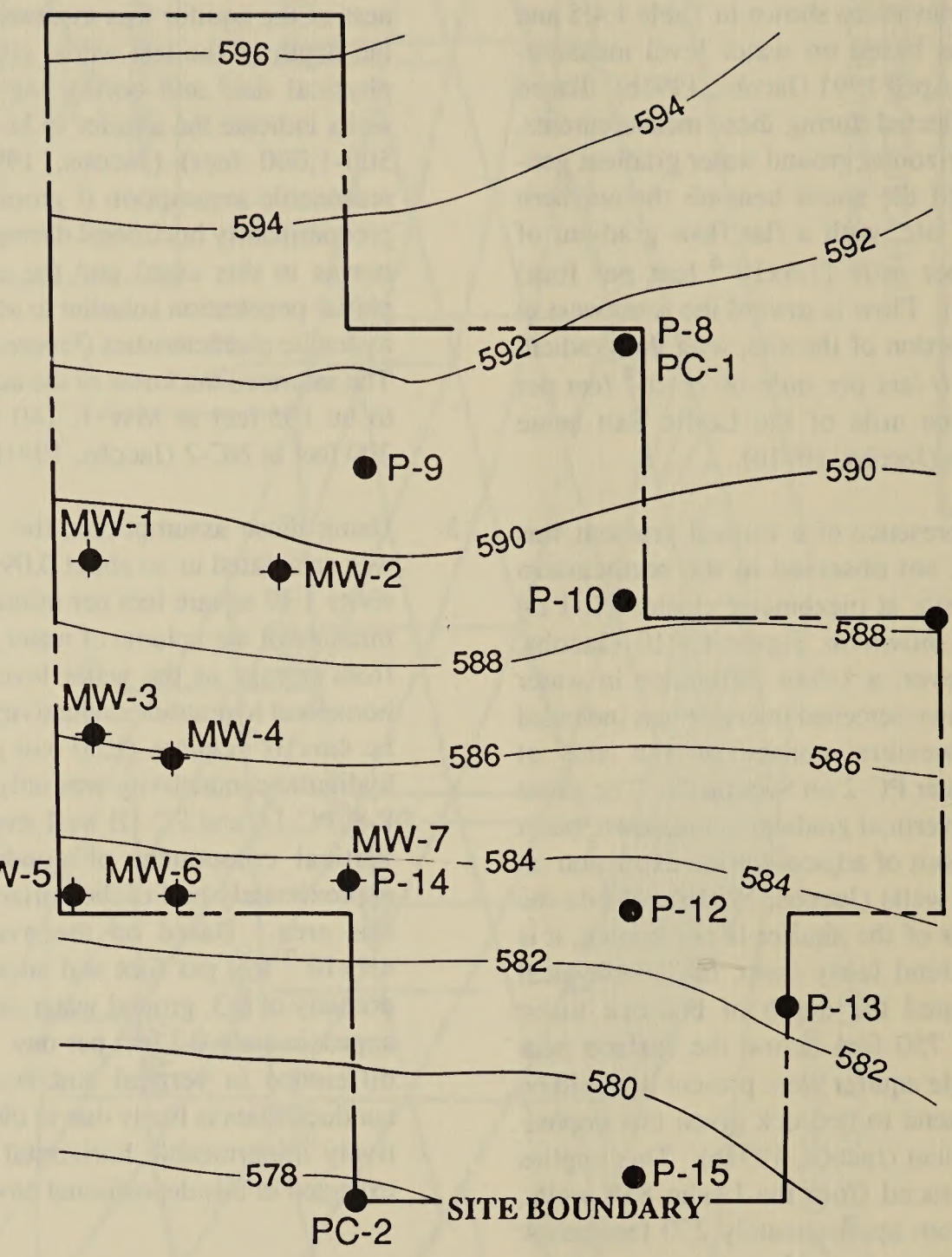
3. The hydraulic characteristics of the aquifer underlying Bolo Station were investigated by performing several pump tests and slug tests. Four step drawdown pump tests were conducted in Wells MW-7, P-8, NC-1, and NC-2 (NC-1 and NC-2 are wells located just south of the site, and were developed by Rail•Cycle to be used by National Chloride.) Constant flow rate pump tests were also conducted on Wells MW-7 and P-8. Slug tests were performed on all 19 wells. The results of the pump tests were interpreted using the computer program AQTESOLV, developed by Geraghty & Miller, Inc.

4. For analysis of the test data, the saturated thickness of the aquifer was assumed to be the same as the depth of the test wells, although onsite geophysical data and boring log data from offsite wells indicate the aquifer to be thicker (i.e., up to 500-1,000 feet) (Jacobs, 1991b). This is a reasonable assumption if ground water flow was predominantly horizontal during the pump test (as it was in this case) and the analysis utilized a partial penetration solution to solve for the desired hydraulic characteristics (Freeze and Cherry, 1979). The saturated thickness of the aquifer was assumed to be 135 feet at MW-7, 140 feet at NC-1, and 200 feet at NC-2 (Jacobs, 1991b).

5. Using these assumptions, the aquifer storativity was calculated to be about 0.09, and the transmissivity 1.12 square feet per minute. Storativity is a measure of the volume of water an aquifer releases from storage as the water level drops. Average horizontal hydraulic conductivity was calculated to be $4.6x10^{-3}$ cm/sec (13.0 feet per day). Vertical hydraulic conductivity was only calculated for the P-8, PC-1A and PC-1B well area, and resulted in a vertical component of conductivity equal to approximately half of the horizontal component in this area. Based on the average gradient of $4.7x10^{-3}$ feet per foot and an assumed kinematic porosity of 0.3, ground water is expected to travel approximately 0.2 feet per day horizontally. The difference in vertical and horizontal hydraulic conductivities is likely due to the existence of relatively impermeable horizontal layers of soil, as expected in this depositional environment.

Ground Water Quality

1. Most of the Bolo Station site occupies the brackish ground water transitional zone between freshwater (upgradient) and brine (downgradient). Based on available monitoring well data, approximately 60 percent of the ground water underlying the site is probably brackish and nonpotable, but the remaining approximately 40 percent could possibly be used for potable requirements; Sections 5, 9, 15 and 16, are underlain by potable quality water as shown in Figure 4.4.11.



NOTE: CONTOURS DEVELOPED ASSUMING THE LESLIE SALT BRINE EXTRACTION WELLS ARE NOT PUMPING.

0 4,000 8,000 FEET

SCALE

LEGEND

- MW-1 GROUND WATER MONITORING WELL
- PC-1 PIEZOMETER CLUSTER
- P-8 PIEZOMETER
- 580 GROUND WATER ELEVATION IN FEET

SOURCE: JACOBS, 1991b.

FIGURE 4.4.10

ESTIMATED NATURAL GROUND WATER CONTOURS

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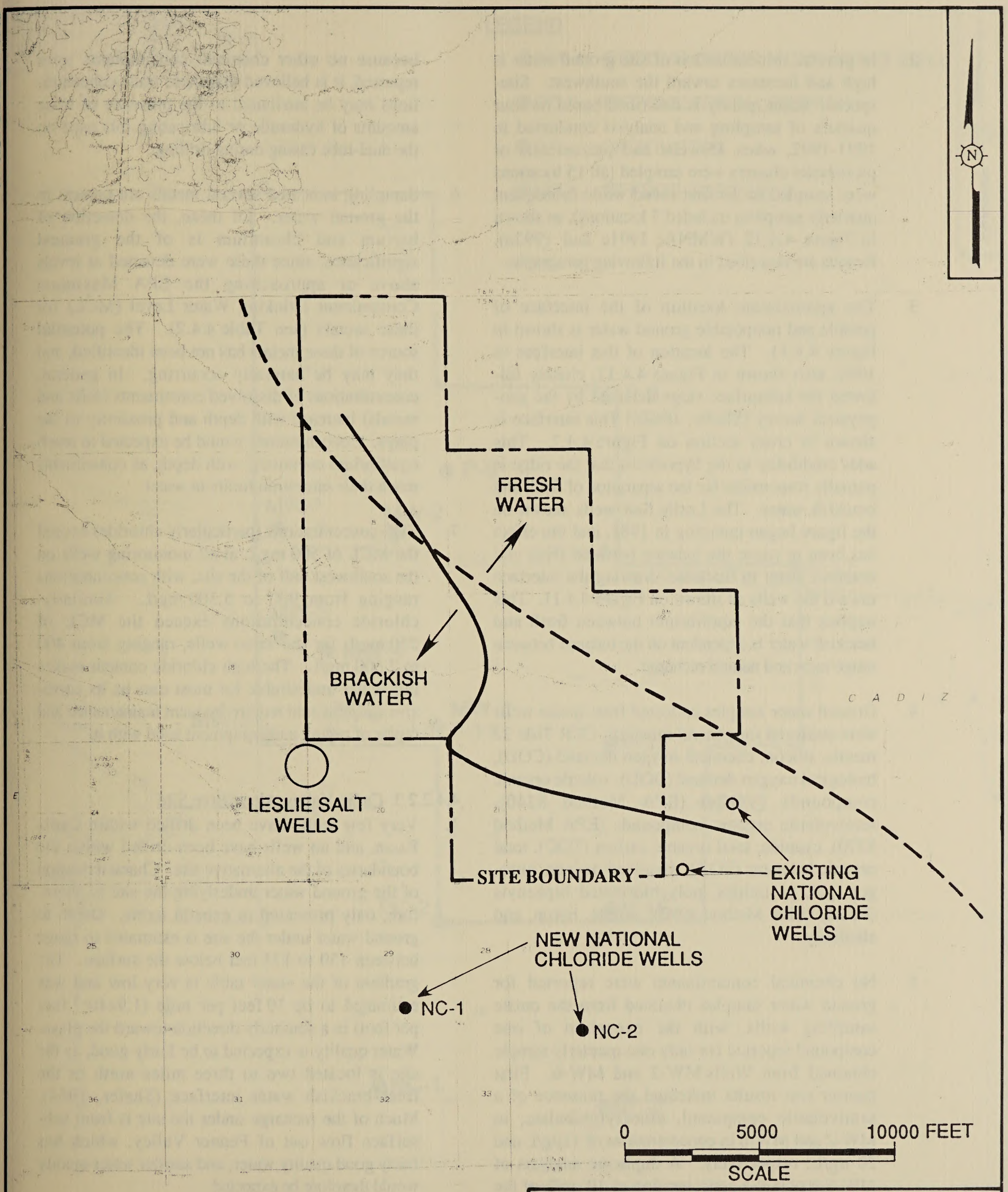

LEGEND

CURRENT TRANSITION LINE

1964 TRANSITION LINE

SOURCE: JACOBS, 1991b; SHAFER, 1964.

FIGURE 4.4.11

EXISTING VS. HISTORIC FRESH WATER-BRACKISH WATER INTERFACE

RAIL•CYCLE

BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

2. In general, mineralization of site ground water is high and increases toward the southwest. Site-specific water quality is described based on four quarters of sampling and analysis conducted in 1991-1992, when 15 wells and piezometers or piezometer clusters were sampled (all 15 locations were sampled in the first round while subsequent quarterly sampling included 7 locations), as shown in Figure 4.4.12 (WMNA, 1991c and 1992a). Results are described in the following paragraphs.

3 The approximate location of the interface of potable and nonpotable ground water is shown in Figure 4.4.11. The location of this interface in 1964, also shown in Figure 4.4.11, closely followed the subsurface ridge detected by the geophysical survey (Shafer, 1964). This interface is shown in cross section on Figure 4.4.7. This adds credibility to the hypothesis that the ridge is partially responsible for the separation of fresh and brackish water. The Leslie Salt wells shown on the figure began pumping in 1981, and the effect has been to cause the balance between fresh and brackish water to fluctuate, drawing the interface toward the wells as shown on Figure 4.4.11. This implies that the equilibrium between fresh and brackish water is dependent on the balance between usage rates and natural recharge.

4. Ground water samples collected from onsite wells were analyzed for general minerals, CCR Title 22 metals, silicon, chemical oxygen demand (COD), biological oxygen demand (BOD), volatile organic compounds (VOCs) (EPA Method 8240), semivolatile organic compounds (EPA Method 8270), cyanide, total organic carbon (TOC), total organic halogens (TOX), dissolved oxygen, nitrogen, pH, pesticides, polychlorinated biphenyls (PCBs) (EPA Method 8080), sulfate, boron, and alkalinity.

5. No chemical contaminants were reported for ground water samples obtained from the onsite sampling wells, with the exception of one compound reported for only one quarterly sample obtained from Wells MW-2 and MW-6. First quarter test results indicated the presence of a semivolatile compound, dinoctylphthalate, in MW-2 and MW-6 in concentrations of 11µg/L and 20 µg/L, respectively. A duplicate analysis of MW-6 reported a concentration of 19 µg/L of the same compound. Subsequent sampling events have not detected this compound. Because the project site is located in a very remote area, and because no other chemical contaminants were reported, it is believed that these trace concentrations may be attributed to the presence of trace amounts of hydraulic or lubricating oils used on the dual-tube casing during drilling.

6. Sampling indicated several metals are present in the ground water. Of these, the detection of barium and chromium is of the greatest significance, since these were detected at levels above or approaching the EPA Maximum Contaminant Drinking Water Level (MCL) for these metals (see Table 4.4.2). The potential source of these metals has not been identified, and they may be naturally occurring. In general, concentrations of dissolved constituents (salts and metals) increase with depth and proximity to the playa. Concentrations would be expected to reach equilibrium eventually with depth, as constituents reach their saturation limits in water.

7. TDS concentrations (particularly chloride) exceed the MCL of 500 mg/L at all monitoring wells on the southwest half of the site, with concentrations ranging from 900 to 5,300 mg/L. Similarly, chloride concentrations exceed the MCL of 250 mg/L for the same wells, ranging from 400 to 2,600 mg/L. The high chloride content makes this water undesirable for most uses as its corrosive nature would require frequent maintenance and repair of piping and equipment used with it.

4.4.2.2.2 Cadiz Valley Alternative Site

1. Very few wells have been drilled within Cadiz Basin, and no wells have been drilled within the boundaries of the alternative site. Characterization of the ground water underlying the site is, therefore, only presented in general terms. Depth to ground water under the site is estimated to range between 150 to 175 feet below the surface. The gradient of the water table is very low and was estimated to be 10 feet per mile (1.9×10^{-3} feet per foot) in a southerly direction toward the playa. Water quality is expected to be fairly good, as the site is located two to three miles north of the fresh-brackish water interface (Shafer, 1964). Much of the recharge under the site is from subsurface flow out of Fenner Valley, which has fairly good quality water, and similar water quality would therefore be expected.

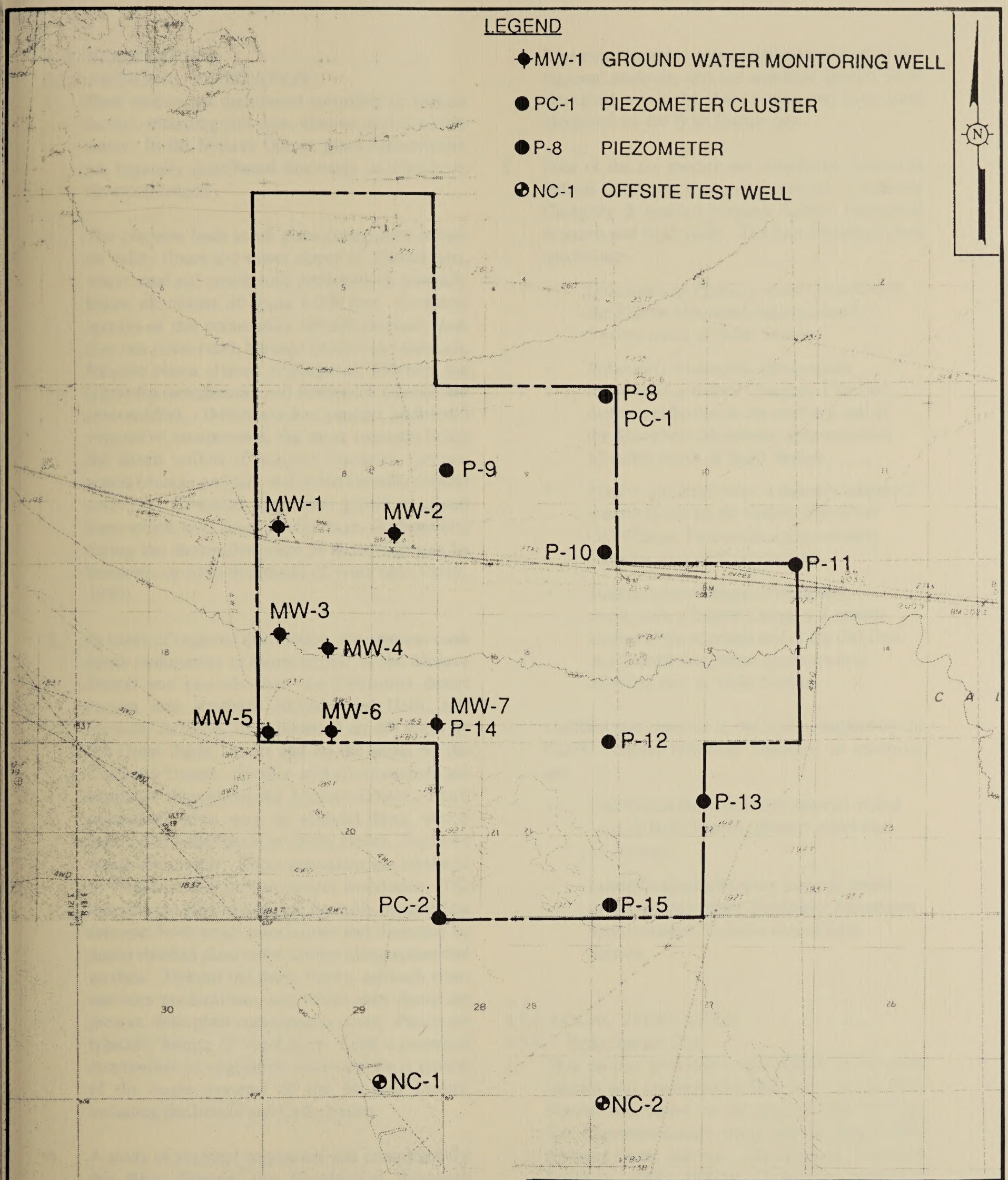

FIGURE 4.4.12

APPROXIMATE LOCATIONS OF TEST WELLS AND PIEZOMETERS

RAIL•CYCLE
BOLO STATION LANDFILL

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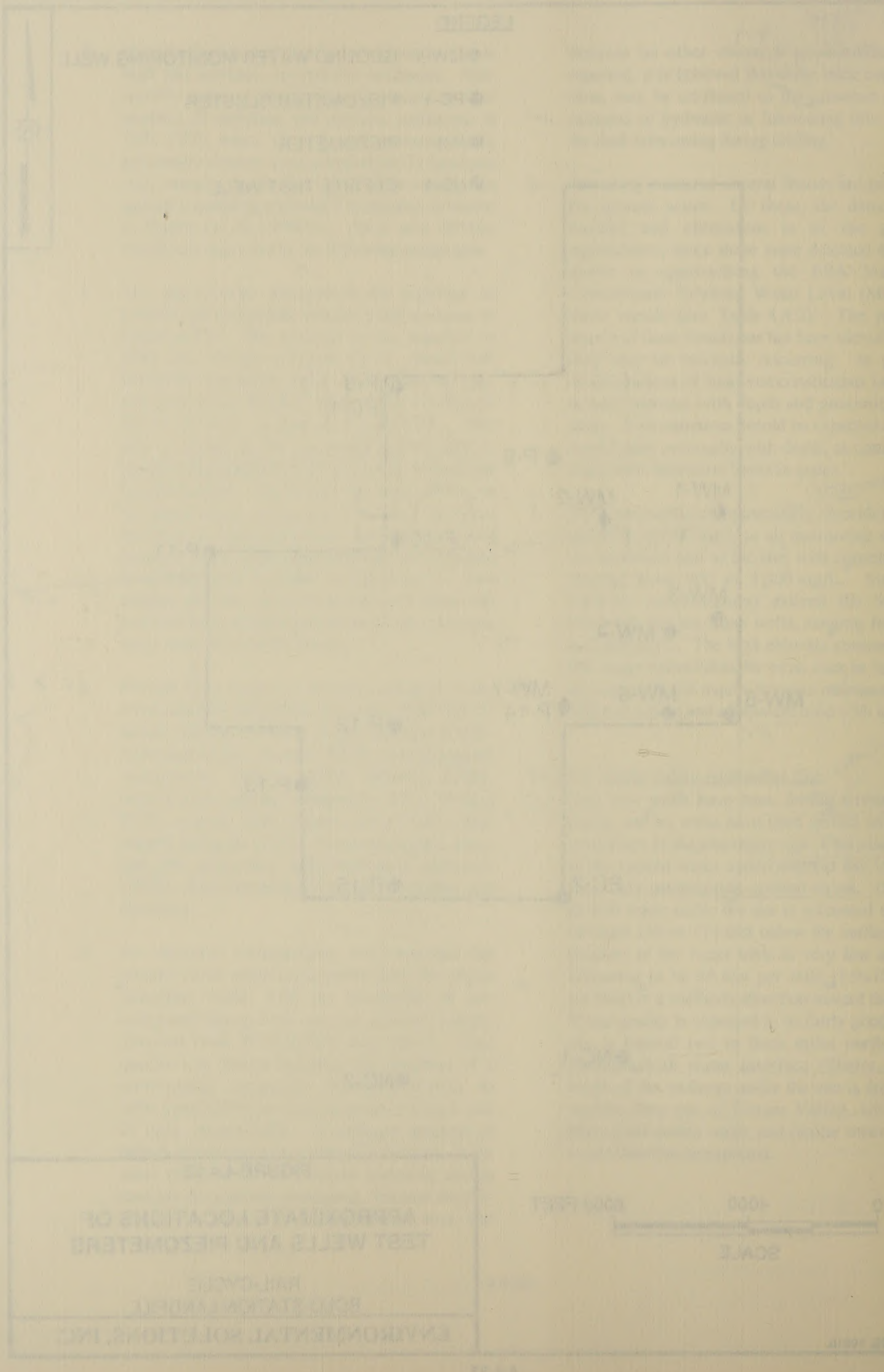
SOURCE: JACOBS, 1991b.



4.5 VEGETATION

4.5.1 REGIONAL VEGETATION

1. Plant species are distributed according to various factors, including soil type, climate, and available water. In the Mojave Desert, plant communities are typically distributed discretely in relation to elevation ranges.

2. The creosote bush scrub plant community occurs on valley floors and lower slopes of alluvial fans, where sand and coarse soils predominate, generally below elevations of about 4,000 feet. Common species of this community include creosote bush (*Larrea tridentata*), bursage (*Ambrosia dumosa*), Mojave yucca (*Yucca schidigera*), Mormon tea (*Ephedra nevadensis*), and fiddleneck (*Amsinckia intermedia*). Desert washes support additional vegetative components, the most common being the desert willow (*Chilopsis linearis*), catclaw acacia (*Acacia greggii*), and desert lavender (*Hyptis emoryi*). Creosote sometimes grows in clonal form which, over time, creates rings. Radiocarbon dating has shown that some of these rings can be hundreds or even thousands of years old (Vasek, 1980).

3. In terms of regional distribution, the creosote bush scrub community is characteristic of the Mojave Desert and extends from the California desert region into southern Nevada and Utah, and northern Arizona. It is bounded on the north by the Great Basin Desert and on the south by the Colorado Desert. Similar arid environments are available throughout the Mojave Desert. Stark mountains give way to alluvial fans, which descend to either basin or valley floors. Enclosed basins are typical. Upper elevations are inhabited by Joshua tree or pinyon-juniper woodlands. The vast alluvial fans/bajadas are typically occupied by creosote bush scrub associations and dissected by desert riparian plant communities along ephemeral washes. Toward the basin floors, saltbush communities predominate, and where sand dunes are present, dune plant communities occur. Playas are typically barren of vegetation. Such a patterned distribution of vegetation communities is typical of the basin systems of the Mojave Desert, including the Bristol and Cadiz basins.

4. A study of regional vegetation was completed for the Bolo Station site (Ecological Research Services, 1992d). The study area was defined to include terrain within a 30-mile radius of the proposed action. A search of the CDFG Natural Diversity Database was completed as part of the regional analysis, and six sensitive species were identified within the study region, but none were identified for the Bolo Station site.

5. Four of the six species are considered federal or federal Candidate Category 2 species. Candidate Category 2 species require further biological research and field study. The four identified plant species are:

   - Orocopia sage (*Salvia greatae*), recorded in the Marble Mountains approximately 5 miles north of Bolo Station.
   - Robinson's monardella (*Monardella robinsonii*), a federal Category 2 species that was collected in the northern end of the Sheephole Mountains approximately 15 miles south of Bolo Station.
   - Mojave monkeyflower, a federal Category 2 species found on the eastern side of the Old Woman Mountains approximately 30 miles east of Bolo Station.
   - Stephen's beardtongue (*Penstemon stephensii*), a federal Category 2 species located at the southern end of the Old Dad and Granite mountains approximately 35 miles east of Bolo Station.

6. Unlisted plant species in the region, tracked by the CDFG Natural Diversity Database as sensitive, are:

   - Crucifixion thorn (*Castela emoryi*), noted west of Bolo Station, about 5 miles east of Amboy.
   - Lobed fleabane (*Erigeron lobatus*), found in the vicinity of the Stepladder Mountains approximately 35 miles east of Bolo Station.

4.5.2 LOCAL VEGETATION

4.5.2.1 Bolo Station Site

1. This section provides a description of the plant species and communities that occur at the Bolo Station site, based on the August 1990 *Biology Site Characterization Study* and the March 1992 *Annual Plant Survey* (Ecological Research Services, 1990; 1992b). Literature and field studies were conducted to identify species and indicate the presence of threatened or endangered species. Botanical surveys were conducted during

March and April 1990, and April and December 1991. Various interim reports were prepared prior to the final document issued by Jacobs in early March 1992 (Ecological Research Services, 1992b). Interim reports are listed in Chapter 12.0.

2. Bolo Station was surveyed by driving the majority of the dirt roads within and near the site and walking the areas without roads. Many dirt roads exist throughout the site, especially in Sections 15, 16, and 17. Disturbance from these roads, plus the ATSF tracks, associated levees, and an oil pipeline has resulted in removal of about 24 acres of natural vegetation. (Ecological Research Services, 1990).

3. The inventoried floral assemblage at the Bolo Station site comprises 78 species of plants, including 51 annuals, as listed in Appendix G. The most common is bursage, followed by creosote bush, which visually dominates the floral assemblage (Ecological Research Services, 1990). Six of the 78 species inventoried are naturalized exotics of non-native origin. Two additional species, smoke tree (*Dalea spinosa*) and *Isomeris arborea*, were noted in the vicinity of the site but were not observed within the site boundary. Shrub density is sparse, estimated at about 10 percent cover for the northern portion of the Bolo Station site (Ecological Research Services, 1992b).

4. Aerial photographs indicate numerous areas where shallow desert washes cross the site and contain water during times of heavy rainfall or runoff (see Figure 4.4.2). Desert wash-type vegetation is infrequent on the site, and where it does exist is typically characterized by more robust species common in the surrounding scrub community.

4.5.2.1.1 Plant Communities

1. Vegetation species and diversity are limited across the Bolo Station site, likely due to two factors:

   - Salinity associated with Bristol Dry Lake, which lies immediately southwest of the site.
   - Levees along the ATSF rail line, which artificially channel water through the southern portion of the site.

   The range of species within Bolo Station is notably depauperate, probably due to windblown salt from Bristol Dry Lake. Minor increases in salinity are known to be a factor in the elimination of species from an area. An additional contributor to the depauperate assemblage may be the drought experienced in southern California over the four years prior to the botanical surveys.

2. Onsite vegetation is subdivided into five scrub communities:

   - Creosote brush scrub
   - Creosote bush-allscale scrub
   - Desert dune scrub
   - Desert wash scrub
   - Desert saltbush scrub

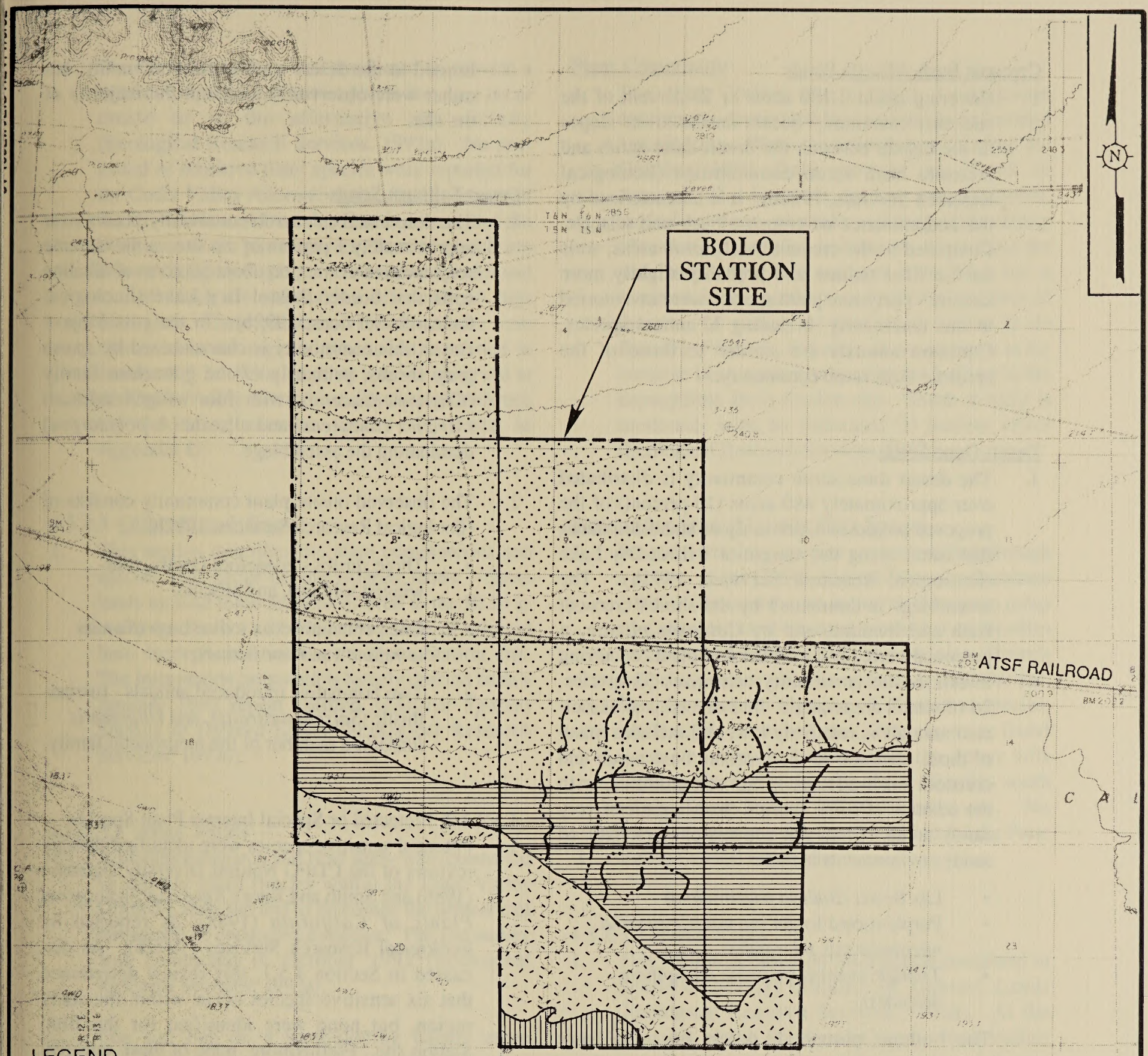
   These are described in the following sections, and their distributions within the Bolo Station site are shown in Figure 4.5.1.

Creosote Bush Scrub

1. Approximately 3,100 acres (65 percent) of the Bolo Station site are vegetated with creosote bush scrub, a plant community dominated by creosote bush and bursage (Ecological Research Services, 1992b). Additional common onsite shrubs include cheesebush *(Hymenoclea salsola)*, allscale *(Atriplex polycarpa)*, and white ratany *(Krameria grayi)*. This community occurs on nonalkaline soils and generally is best developed above an elevation of 650 feet at the site. The Bolo Station creosote bush scrub community is depauperate in species diversity and abundance. Several species that are normally components of this community were not noted during the botanical surveys. For example, *Ephedra, Yucca, Phacelia, Eucrypta*, and others were not observed.

2. The inventoried onsite assemblage of the creosote bush scrub community comprises 64 plant species, 45 of which are annuals. The following annuals were common during the April 1991 survey:

   - Fremont's pincushion *(Chaenactis fremontii)*
   - Chuckwalla pectocarya *(Pectocarya heterocarpa)*
   - Arizona lupine *(Lupinus arizonicus)*
   - Bottle cleaner *(Camissonia boothii* ssp. *condensata)*
   - Wooly plantain *(Plantago insularis* ssp. *fastigiata)*
   - *Schismus barbatus*



SOURCE: ECOLOGICAL RESEARCH SERVICES, INC., 1992b.

FIGURE 4.5.1

BOLO STATION PLANT COMMUNITIES

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

Creosote Bush-Allscale Scrub

1. Covering about 1,130 acres or 23 percent of the site, this community occurs on the lower slopes of the bajada between the desert dune scrub and creosote bush scrub communities (Ecological Research Services, 1992b). It is characterized by the codominance of creosote bush and allscale. Compared to the creosote bush scrub areas, soils have a finer texture and probably slightly more salinity. Forty-one plant species were inventoried in this community, including 32 annual species. Common annuals are similar to those of the creosote bush scrub community.

Desert Dune Scrub

1. The desert dune scrub community is distributed over approximately 480 acres (10 percent) of the proposed project site, primarily on stabilized dunes that occur along the margin of Bristol Dry Lake (Ecological Research Services, 1992b). The assemblage is dominated by the shrubs creosote bush and bursage, and by *Coldenia plicata*, a perennial herb. The inventory of plants occurring in this onsite community comprises 33 species, 26 of which are annuals. The diversity of associated annuals is relatively low, and includes many of those common to the creosote bush scrub and creosote bush-allscale scrub communities, with the addition of some species characteristic of very sandy areas. Observed annuals characteristic of sandy environments include:

   - Lax flower *(Baileya pauciradiata)*
   - Purple-rooted forget-me-not *(Cryptantha micrantha* ssp. *micrantha)*
   - Triangle evening primrose *(Oenothera deltoides)*

   The bulbous perennial, desert lily, also very characteristic of sandy areas, occurs infrequently.

Desert Wash Scrub

1. The desert wash scrub community occurs along several small ephemeral drainage channels, or washes, that comprise about 50 acres (1 percent) of the Bolo Station site (Ecological Research Services, 1992b). Typical species are cheesebush, creosote bush, and bursage. Some catclaw acacia is associated with washes in the northern portion of the site. Nineteen plant species were inventoried in the onsite desert wash scrub community, including 12 annuals. The annuals noted were not limited to the desert wash scrub community, but rather were observed throughout the majority of the site.

Desert Saltbush Scrub

1. The desert saltbush scrub community occurs over approximately 1 percent of the site, in the extreme southwestern corner, on about 50 acres of alkaline soils that border Bristol Dry Lake (Ecological Research Services, 1992b). In the east Mojave Desert this community is characterized by sparse gray shrubs, primarily of the goosefoot family (*Chenopodiaceae*), with four-winged saltbush *(Atriplex canescens)* and allscale (*A. polycarpsa*) dominating the assemblage.

2. The observed onsite plant community consists of (Ecological Research Services, 1992b):

   - Three shrubs - goosefoot family, four-winged saltbush, and allscale.
   - One perennial herb - iodine bush (*Suaeda torrefana* var. *ramosissina*).
   - Two non-native introduced annuals - russian-thistle (*Salsola australis*), and *Oligomeris linifolia* a member of the megronette family.

4.5.2.1.2 Protected or Special Interest Plant Species

1. Potential sensitive species were identified through reviews of the CDFG Natural Diversity Database (1988) and Smith and Berg's *Rare and Endangered Plants of California* (1988), as reported by Ecological Research Services (1992b). As discussed in Section 4.5.1, this review determined that six sensitive species occur within the study region, but none were identified for the Bolo Station site. Furthermore, none of these sensitive species were found during various onsite botanical surveys at the Bolo Station site (Ecological Research Services, 1992b).

4.5.2.2 Cadiz Valley Alternative Site

1. A literature research was conducted to identify the presence of and potential for protected or sensitive plant species to occur at the Cadiz Valley Alternative site. A review of the CDFG Natural Diversity Database -- Rare Find (1991) was conducted. As directed by BLM and County, field study of the alternative site was not required.

2. The literature survey was conducted to provide a brief description of sensitive plants that may occur onsite or in the alternative site vicinity (Ecological Research Services, 1992e). No protected or sensitive plant species were reported for the Cadiz Valley Alternative site, but the search of the CDFG Natural Diversity Database revealed the presence of six plant species, four of which are federal Category 2 species or candidate species and two of which are unlisted but of interest to state biologists. These plants and their locations were discussed in the regional discussion presented in Section 4.5.1. A list of plant species observed at the Cadiz Valley Alternative site during fieldwork for the desert tortoise survey is located in Appendix G.

4.5.2.3 Offered Lands Sites

1. This section describes the plant communities and species that occur on the offered lands. These lands include three sections offered to the BLM in exchange for two and one-half sections of selected land incorporated within the Bolo Station site. The information presented is largely derived from a January 1992 report entitled *Sensitive Species Studies of Offered Lands* (Ecological Research Services, 1992a).

4.5.2.3.1 Piute Valley

1. A literature research and field study were conducted to identify plant species within the Piute Valley Offered Lands site and to determine the presence of threatened or endangered species. The site survey was conducted in October 1991 (Ecological Research Services, 1992a).

2. The site lies on a west-sloping bajada at an elevation of about 2,375 feet, less than two miles east of the Piute Mountains. The proximity of the site to the mountains influences its substrate, which is cobbly with scattered boulders (approximately 30 to 50 percent cover) in the western and northwestern portions of the site and gravelly with scattered cobble in most other areas. The southeastern corner consists of soft, loose sand with scattered gravel. Soil throughout the site is soft sandy loam with varying quantities of gravel. The northern portion of the site is intersected by incised washes, about 6- to 10-feet deep.

Plant Community

1. The Piute Valley site exhibits a vegetation community dominated by creosote bush-bursage associations. Plant species observed during the October 1991 field survey are listed in Appendix G. Forty-six species were observed, including four annuals. Little-leaf ratany *(Krameria parvifolia)* is common throughout the site. Mojave yucca is scattered throughout, but is common in the northern and western portions of the site. A variety of cacti occur onsite as do *Ephedra, Phacelia,* and other plants common to the creosote bush scrub community but lacking at the depauparate Bolo Station site. Shrub density is moderate, with an estimated 25 percent cover (Ecological Research Services, 1992a).

Protected or Special Interest Plant Species

1. Potential sensitive species were identified through a review of the CDFG Natural Diversity Database (1988a). The search area included 130 square miles of California land situated northwest of Needles and north of I-40. One plant species, Howe's hedgehog cactus (*Echinocereus engelmannii* var. *howei*), a federal Category 2 Candidate species, was listed in the search area. This plant was found at an elevation of 1,400 feet in the desert hills south of Homer Mountain, about 20 miles south of the Piute Valley Offered Lands site. No sensitive plant species were identified for the Piute Valley Offered Lands site.

4.5.2.3.2 Cadiz Valley

1. This section is based on information contained in *Sensitive Species Studies of Offered Lands* (Ecological Research Services, 1992a). At the direction of the BLM and County, field studies were not conducted. A literature search was completed to identify sensitive species that may be present on the site.

2. The Cadiz Valley Offered Lands site has sand dune and alluvial fan slope topography similar to that of the Bolo Station site, but also contains coarse boulder and cobble sediments and more extensive areas of exposed bedrock. The species composition of plants is projected to be similar to that of the Bolo Station site (Ecological Research Services, 1992a). The CDFG Natural Diversity

Database was searched to identify species of concern within an area generally bordered by I-40 on the north, the Dale Lake area on the south, Amboy on the west, and Sheep Camp Spring on the east. The Natural Diversity Database lists only Orocopia sage (*Salvia greatae*) and a mint (*Salvia funerea*) for this area. The two species were not reported for the Cadiz Lake Northwest USGS quadrangle, which contains the Cadiz Valley Offered Lands site.

4.5.2.3.3 Fenner Valley

1. The Fenner Valley Offered Lands site is situated in creosote bush scrub habitats in the southeastern portion of the East Mojave National Scenic Area (EMNSA). The site was selected by the BLM late in the environmental analysis process. At the direction of BLM and County, field studies and literature or archival reviews were not conducted specifically for the site.

2. The USGS quadrangle containing the Fenner Valley Offered Lands site (Fenner, California) was reviewed as part of a regional biological study for the Bolo Station site, entitled *List of Sensitive Plants and Animals in the Region Surrounding the Bolo Station Facilities Project Site, San Bernardino County* (Ecological Research Services, 1992d). Additionally, the area immediately north and west of the Fenner Valley site was investigated through literature review for the Piute Valley Offered Lands site, and reported in *Sensitive Species of Offered Lands* (Ecological Research Services, 1992a). The Fenner Valley site is located at the periphery of the 30-mile diameter regional study area for Bolo Station. The closest sightings of sensitive plants were approximately 25 or more miles south-southeast of the Fenner Valley site, and included Lobid fleabane (*Erigeron lobalus*) and Mojave monkeyflower. The former is an unlisted species and the latter is a federal Candidate Category 2 species.

4.6 WILDLIFE

4.6.1 REGIONAL WILDLIFE OVERVIEW

1. Mojave Desert wildlife habitats, especially the creosote bush scrub community characteristic of the Bolo Station and Cadiz Valley Alternative sites, are widespread and support a fauna that consists mostly of widely distributed species. Field studies accomplished for the proposed action found this to be the case, although species diversity was significantly less than anticipated from literature review (Ecological Research Services, 1990).

2. In terms of regional distribution, wildlife in the project region display species diversity and spatial distributions similar to their occupations elsewhere in the Mojave Desert. While some wildlife species are closely tied to specific vegetation communities, others are adapted to wider ranges, and some migrate seasonally. Specific vegetation communities provide cover, food, and/or water requirements ideal for survival for some species, while other animals tolerate, or even require, a broader range of habitat conditions. Soil characteristics, latitude and elevation, which influence the spatial distribution of vegetation communities, are also important factors affecting wildlife distribution. The environment of the project region is similar to other environments in the extensive Mojave Desert region, with similar distributions of wildlife species. Habitat quality, including manmade disturbances, affects the local abundance of wildlife species.

3. A regional wildlife study was completed for the Bolo Station site (Ecological Research Services, 1992d). The study area was defined to include terrain within a 30-mile radius of the proposed action. A search of the CDFG Natural Diversity Database (Ecological Research Services, 1992d, as in CDFG, 1991) was completed for the regional analysis, and nine species were identified as sensitive by the database. Most of the species are not federally- or state-listed as threatened or endangered, but were included in the database by state biologists. The locations of sensitive wildlife species in the region, as identified in the database, are shown in Figure 4.6.1.

4. Sensitive species include birds, reptiles, and mammals. Avian species include prairie falcon (*Falco mexicanus*), which is included as a Bird Species of Special Concern (Category 3) by the state of California and is a BLM Sensitive Species; LeConte's thrasher (*Toxostoma lecontei*), and Bendire's thrasher (*Toxostoma bendirei*) are listed as Bird Species of Special Concern (Category 3) by the State of California; grey vireo (*Vireo vicinior*); and hepatic tanager (*Piranga flava*). The latter two species are not included on state or federal listings of threatened or endangered species.

5. Sensitive reptilian species include desert tortoise (*Gopherus agassizii*), a state- and federally-listed threatened species, and San Diego horned lizard (*Phsynosoma coronatum blainvillei*), which is a federal Category 2 species. Sensitive mammalian species include Nelson's bighorn sheep (*Ovis canadensis nelsoni*) and kit fox (*Vulpes macrotis*). The former is a BLM-sensitive species and the latter has no special listing.

4.6.2 LOCAL WILDLIFE SPECIES

4.6.2.1 Bolo Station Site

1. This section provides a description of wildlife occurring on and in the vicinity of Bolo Station. Species known or expected to occur were evaluated to provide:

   - Baseline data for the site.
   - Information on the potential occurrence of rare, threatened, or endangered species.

2. Data on wildlife presented are based on literature research and field studies completed during the springs of 1990 and 1991, and during December 1991 and January 1992 (Ecological Research Services, 1990, 1991, and 1992c; Karl, 1992a). Information on habitat types, animals observed, and observations of tracks and scat was recorded in field notes, topographic maps, or aerial photographs.

3. The Bolo Station site is situated in predominantly creosote bush scrub-bursage habitat with sparse shrub cover (approximately 10 percent). The site has a gently sloping surface, which descends to the south toward Bristol Dry Lake. Isolated sections of well-developed desert pavement occur north of the ATSF railroad tracks, notably in Section 9. Onsite surface features are limited, but vary from rocky outcrops at the northern end of the property (Bolo Hill) to sand dunes at the southern end in Sections 20 and 21.

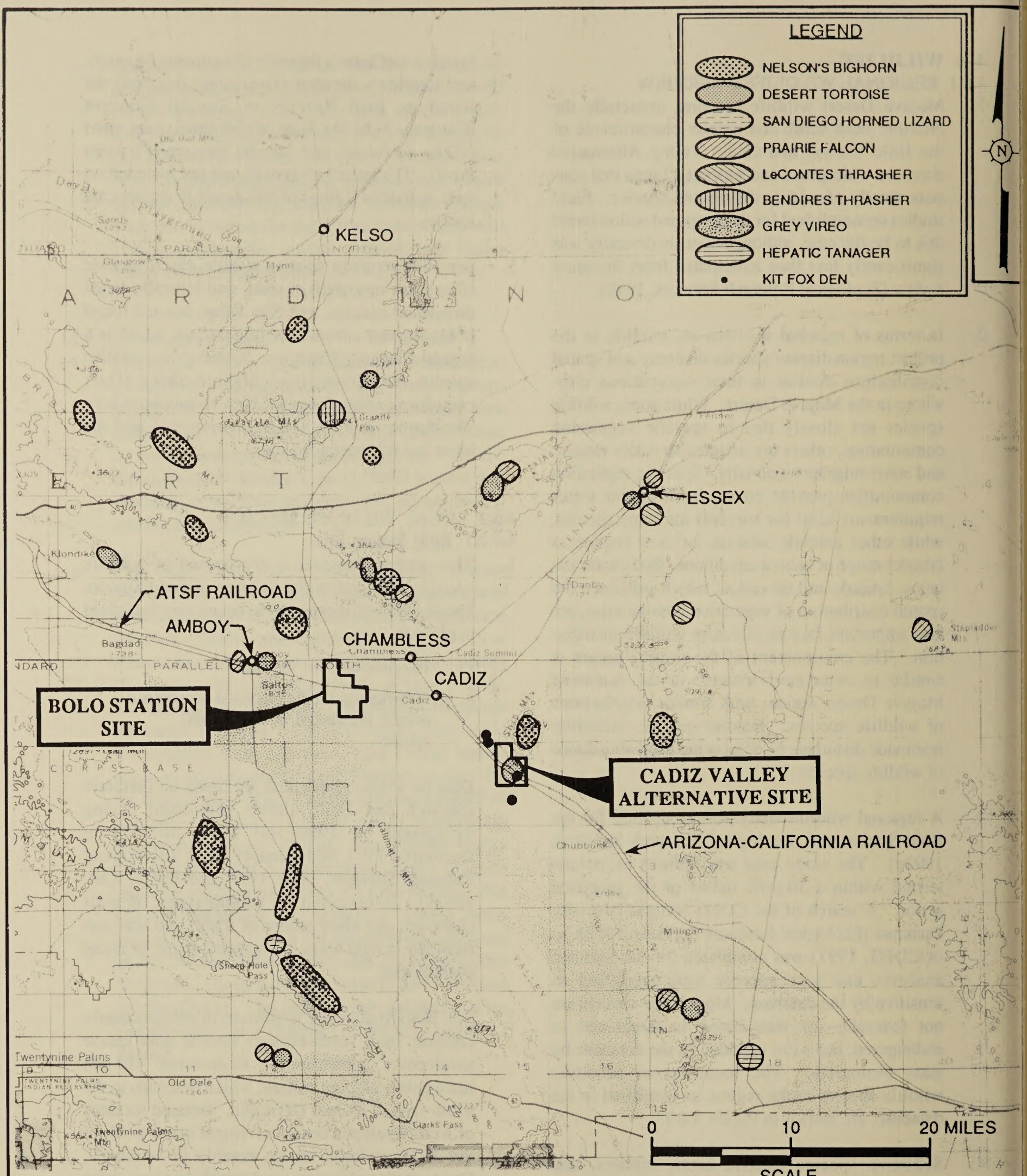


FIGURE 4.6.1

APPROXIMATE LOCATIONS OF PROTECTED OR SPECIAL INTEREST ANIMAL SPECIES

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

REFERENCES: 1. ECOLOGICAL RESEARCH SERVICES, 1992e.

2. USGS 1:2,000,000 SCALE MAP OF SOUTHERN CALIFORNIA, DATED 1973.

4.6.2.1.1 Reptiles

1. Six species of lizards and two species of snakes were observed during the field surveys, including desert iguana (*Dipsosaurus dorsalis*), Mojave fringe-toed lizard (*Uma scoparia*), desert horned lizard (*Phrynosoma platyrhinos*), sidewinder (*Crotalus cerastes*), and Mojave rattlesnake (*C. scutulatus*). Reptiles observed and those expected to occur, based on known range and habitat, are listed in Appendix G.

2. In addition, the desert tortoise is known to exist in the general vicinity of the site and is listed as a threatened species on both the state and federal threatened and endangered species lists. Extensive field surveys indicate that desert tortoise are not in residence at the Bolo Station site (see Section 4.6.2.1.4).

4.6.2.1.2 Birds

1. Forty-nine species of birds were observed in the Bolo Station study area, including golden eagle (*Aguila chrysaetos*), turkey vulture (*Cathartes aura*), red-tailed hawk (*Buteo jamaicensis*), greater roadrunner (*Geococcyx californianus*), and common raven (*Corvus corax*). This is considered a reasonably diverse assemblage, considering the absence of trees and the sparse desert wash vegetation (Ecological Research Services, 1990; 1991). A list of the species observed, as well as those expected to occur, based on known range and habitat, is included in Appendix G.

2. A sensitive species, the prairie falcon, was observed in the vicinity of the site. The specimen was assumed to be foraging over the area because suitable prairie falcon nesting areas were not found in the study area. This species is not listed as endangered or threatened by the USFWS, but is included as a Bird Species of Special Concern (Category 3) by the state of California. Category 3 species "...are not in any present danger of extirpation and their populations within most of their range do not appear to be declining seriously. However, simply by virtue of its small populations in California, the prairie falcon is vulnerable to extirpation should a threat materialize" (Ecological Research Services, 1991, as in Remsen, 1978).

3. While the Bendire's thrasher is known to breed over a widespread area in the eastern Mojave Desert, its breeding habitat occurs at an elevation range from approximately 2,200 to 5,600 feet above msl and is restricted to vegetative communities consisting of Joshua Trees, Mojave yucca, and/or Spanish Bayonet (England and Laudenslayer, 1989). As the Bolo Station site is at an approximate elevation ranging from 600 to 900 feet above msl, it does not provide breeding habitat for this species.

4.6.2.1.3 Mammals

1. The most numerous animals on the Bolo Station site are small mammals. Both the desert kangaroo rat (*Dipodomys deserti*) and Merriam's kangaroo rat (*D. merriami*) are so abundant that in many areas their burrows cause the soil surface to be unstable. Also common are pocket mice (*Perognathus* spp.) and round-tailed ground squirrel (*Spermophilus tereticaudis*). Common larger mammals include black-tailed jackrabbit (*Lepus californicus*), coyote (*Canis latrans*), and kit fox (*Vulpes macrotis macrotis*). In all, 23 mammal species were observed or are expected to occur as a result of site studies (Ecological Research Services, 1990). Observed mammalian species, as well as those expected to occur based on known range and habitat preferences, are listed in Appendix G (Ecological Research Services, 1990).

2. Kit fox is a wildlife species with no special legal status, except for two subspecies that are either extinct or endangered. The subspecies present in the Mojave Desert is not considered in danger of population demise.

4.6.2.1.4 Protected or Special Interest Wildlife Species

<u>Desert Tortoise</u>

Tortoise Management Characteristics

1. The single threatened or endangered species known or expected to occur in the vicinity of the Bolo Station site is the desert tortoise. The desert tortoise was included on the California List of Threatened Species on June 22, 1989, by the California Fish and Game Commission pursuant to the CESA. This decision was based on studies suggesting that tortoise populations have declined in the recent past. Subsequent to this listing by the state, an outbreak of virulent desert tortoise respiratory disease was documented. The disease, often referred to as upper respiratory tract disease, is believed to have caused significant declines in certain desert tortoise subpopulations.

2. As a result of these population declines and the potential threat represented by upper respiratory tract disease, the USFWS listed the Mojave populations of the desert tortoise as threatened on April 2, 1990, pursuant to the ESA. These populations include desert tortoises north and west of the Colorado River in California, southern Nevada, Arizona, and southwestern Utah (USFWS, 1990). The desert tortoise population is subdivided into three groups — eastern Mojave, western Mojave, and Sonoran, as shown in Figure 4.6.2 (BLM, 1988a). Tortoises in the vicinity of the Bolo Station site are part of the western Mojave population.

3. Desert tortoise populations may have declined in the recent past due to taking of animals as pets, shootings, road kills, raven predation, degradation of habitat by off-road vehicles and cattle, disease, reduction in habitat, and destruction of habitat quality by development and urbanization. In response to this decline, and in an effort to manage multiple uses of public land, the BLM adopted the *Desert Tortoise Habitat Management on the Public Lands: A Rangewide Plan* (BLM, 1988a). The BLM also prepared *Recommendations for Management of the Desert Tortoise in the California Desert* (BLM, 1988b).

4. The BLM classifies habitat within the range of the desert tortoise into three categories based on estimated habitat quality and potential tortoise occurrence. Classifications are ranked as Category 1, 2, and 3, with Category 1 being most important and Category 3 being least important. Category 1 habitat is an area with a high probability for encountering desert tortoises. There are increasingly reduced probabilities of encountering tortoises in Category 2 and Category 3 habitats due to reduced habitat quality within and adjacent to these areas. Uncategorized terrain is managed as Category 3 habitat when desert tortoises are known to be present.

5. Bolo Station is located in a large uncategorized area and as such is managed as Category 3 habitat. The general area in the vicinity of the Bolo Station site have an estimated density of zero to two tortoises per square mile, as projected by BLM (BLM, 1988a).

6. Known areas of desert tortoise habitat within the CDCA have been identified by BLM on an interim map of tortoise habitat categories for management purposes (BLM, 1989). This map, a reduced version of which is shown in Figure 4.6.3, is in use until the CDCA Plan is formally amended. As shown in the figure, the Bolo Station site is not within designated habitat areas. However, BLM recognizes any land where tortoise occur to be at least Category 3 habitat. The BLM's management goals for Category 3 habitat are to limit habitat and population declines "to the extent possible by mitigating impacts."

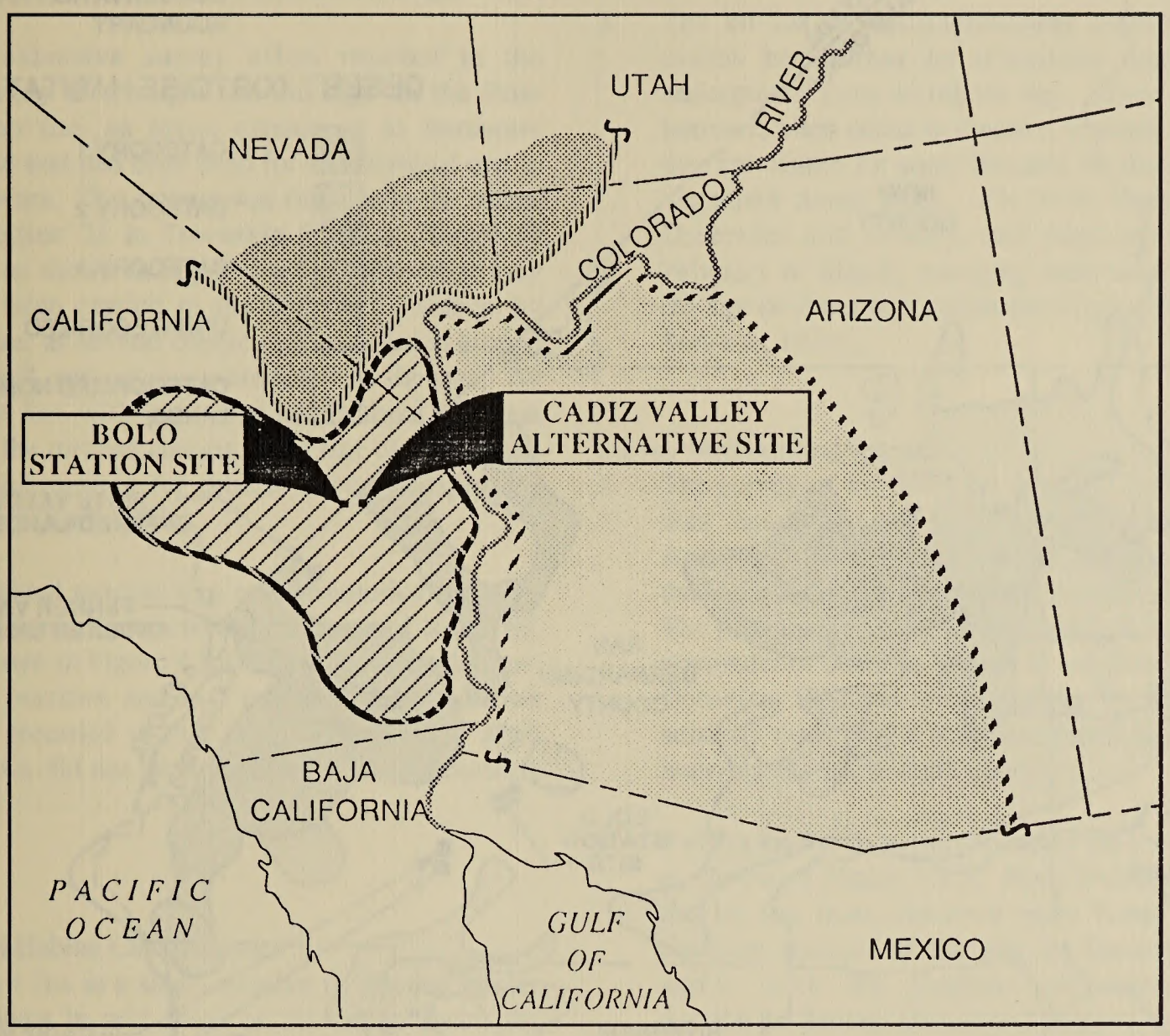
Desert Tortoise Survey Methods and Results

1. Optimal desert tortoise habitat generally does not occur within the proposed project site or the surrounding vicinity. Habitat east and north of the Bolo Station site is mostly poor to fair. The areas south and west of the site do not contain suitable tortoise habitat (Karl, 1992a).

2. While habitat available at the Bolo Station site is variable, it is poor in quality for the desert tortoise. Sections 21 and 22 in the southern portion of the site comprise a low, flat, silty sink that experiences seasonal flooding. Sandy hummocks and sand dunes occur in this area. Northward, the topography flattens, and plant species are less halophytic (adapted to salty soils). Surface soils are soft, loamy sands and fine gravels with scattered larger gravels and cobbles, which are underlain by siltier sediments. A bedrock outcrop occurs in Section 5.

3. Previous investigations in the vicinity yielded little or no evidence of a local tortoise population. During a 1989 study along the east-west Mojave Pipeline route in the vicinity of the northern boundary of the site, only one sign was found in the Cadiz Valley portion of the pipeline route. A survey of ten sections of land for an agricultural project (Pacific Agriculture development) located about seven miles east of the Bolo Station site resulted in few tortoise sign being found, and these occurred only in the northeastern portion of the approximately 6,400-acre study area (Karl, 1992a).

4. The Bolo Station site was surveyed for desert tortoise on February 1-7, March 11-15, May 16-19, and December 6-13, 1991. Survey teams of three to four people each walked parallel, linear transects at 10-yard intervals. An average of 167 transects per section of land were completed.



0 125 250 MILES

APPROXIMATE SCALE

LEGEND

DESERT TORTOISE POPULATIONS

- SONORAN POPULATION
- EASTERN MOJAVE POPULATION
- WESTERN MOJAVE POPULATION

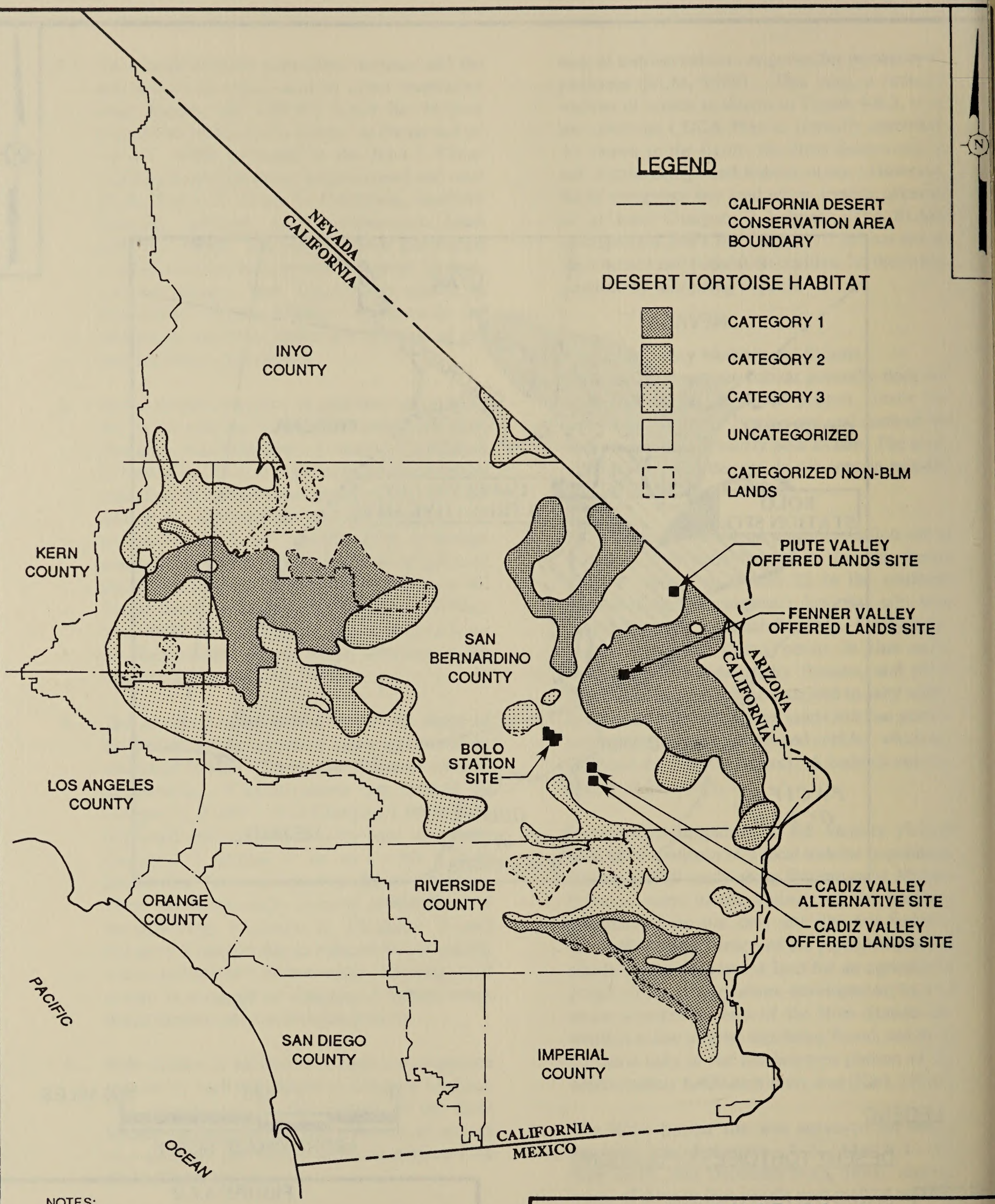
SOURCE: BLM, 1988a.

FIGURE 4.6.2

GENERALIZED DESERT TORTOISE POPULATION AREAS OF THE SOUTHWEST

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.



NOTES:

1. UNCATEGORIZED AREAS ARE CONSIDERED TO BE CATEGORY 3, TORTOISES ARE KNOWN TO BE PRESENT.
2. CATEGORY 3 DESIGNATION REFERS TO AREAS LESS THEN OR EQUAL TO 20 TORTOISES PER SQUARE MILE.

0 50 100 MILES

SCALE

SOURCE: BLM, 1989.

FIGURE 4.6.3

CDCA DESERT TORTOISE HABITAT CATEGORIES

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

Additional "zone of influence" transects were walked beyond the eastern, northern, and western perimeters of Bolo Station site north of the railroad. These offsite transects were walked at distances of 110, 220, 440, 1,320, and 1,760 yards parallel to the site, as shown in Figure 4.6.3. This search protocol meets USFWS standards for 100 percent coverage.

5. The extensive survey effort resulted in the inventory of a single tortoise sign on the Bolo Station site, an intact carcass of an immature animal that had been dead for an estimated one to two years. The carcass was found near the center of Section 21 in Township 5 North, Range 13 East, as shown in Figure 4.6.4. The tortoise may have been carried to the discovery location by coyotes, as several coyote scat were noted around the shell, and coyotes were active in the area. An active den with pups was noted about 600 feet from the tortoise carcass. The size of the carcass was appropriate for predation and transport by coyotes (Karl, 1992a).

6. Additional tortoise sign was inventoried on zone-of-influence transects walked north of Route 66, as shown in Figure 4.6.4. Two positive adult tortoise burrows and two potential adult burrows were recorded in this area. The positive adult burrows did not show evidence of being recently active.

Kit Fox

Species and Habitat Characteristics

1. The kit fox is a small member of the dog family that lives in arid areas of the Great Basin, the American Southwest, and northern Mexico. Eight subspecies have been identified and one, the San Joaquin kit fox (*Vulpes macrotis muticus*), has been federally-listed as endangered and state-listed as threatened. The subspecies found on the Bolo Station site (*V. macrotis macrotis*) is neither threatened nor endangered, is widely distributed, and is common in the eastern Mojave Desert. However, because of impacts to this subspecies from agriculture and urbanization in other parts of its range, the site was surveyed for evidence of this mammal.

2. In the Mojave Desert, kit foxes are found in creosote bush scrub habitats such as exist on the Bolo Station site, where they feed on nocturnal rodents, primarily kangaroo rats. Kit foxes are almost exclusively carnivorous and apparently obtain adequate moisture from their prey. Although the Bolo Station site is unusually dry and the vegetation is sparse, the soft, sandy soil is undermined with large numbers of kangaroo rat burrows, the abundance of which may be responsible for the presence of kit foxes.

3. The kit fox is characteristically nocturnal and avoids heat stress by remaining inactive in underground dens during the day. These dens, or burrows, often occur in clusters, forming mounds that are visible for some distance on the sparsely vegetated desert floor. Kit foxes mate during December and January, and pups are born in February or March, emerging from their dens at the age of about one month (Ecological Research Services, 1992c).

Survey Methods and Results

1. The survey of kit foxes on the Bolo Station site was conducted in two field sessions. In April 1991, Sections 15, 16, 17, part of 21 and the western one-half of Section 22 were surveyed. The subsequent survey of Sections 5, 8, 9, and the remainder of Sections 21 and 22 was conducted in December 1991 and January 1992. For both field sessions, three people walked transects at 450-foot intervals in a north-south direction.

2. Twenty kit fox dens were found in the survey area as shown in Figure 4.6.5. Sixty-five percent of the kit fox dens observed were found on the northern portion of the site in Sections 5, 8, and 9, with the greatest concentration in Section 8. Several abandoned burrows were also found. Kit fox movement from one den to another can be due to ectoparasites in the burrows and other factors. Assuming that each den represents one adult pair, a density of about 2.5 pairs per square mile within the Bolo Station site is estimated. Actual kit fox population could be lower than estimated as a result of the severe drought (Ecological Research Services, 1992c).

4.6.2.2 Cadiz Valley Alternative Site

1. Wildlife studies of the Cadiz Valley Alternative site focused on the desert tortoise due to its status as a threatened species. The information presented in this section is based on the March 1992, *Desert Tortoise Survey, Rail•Cycle Alternative Project Site* (Karl, 1992b), and the June 1992

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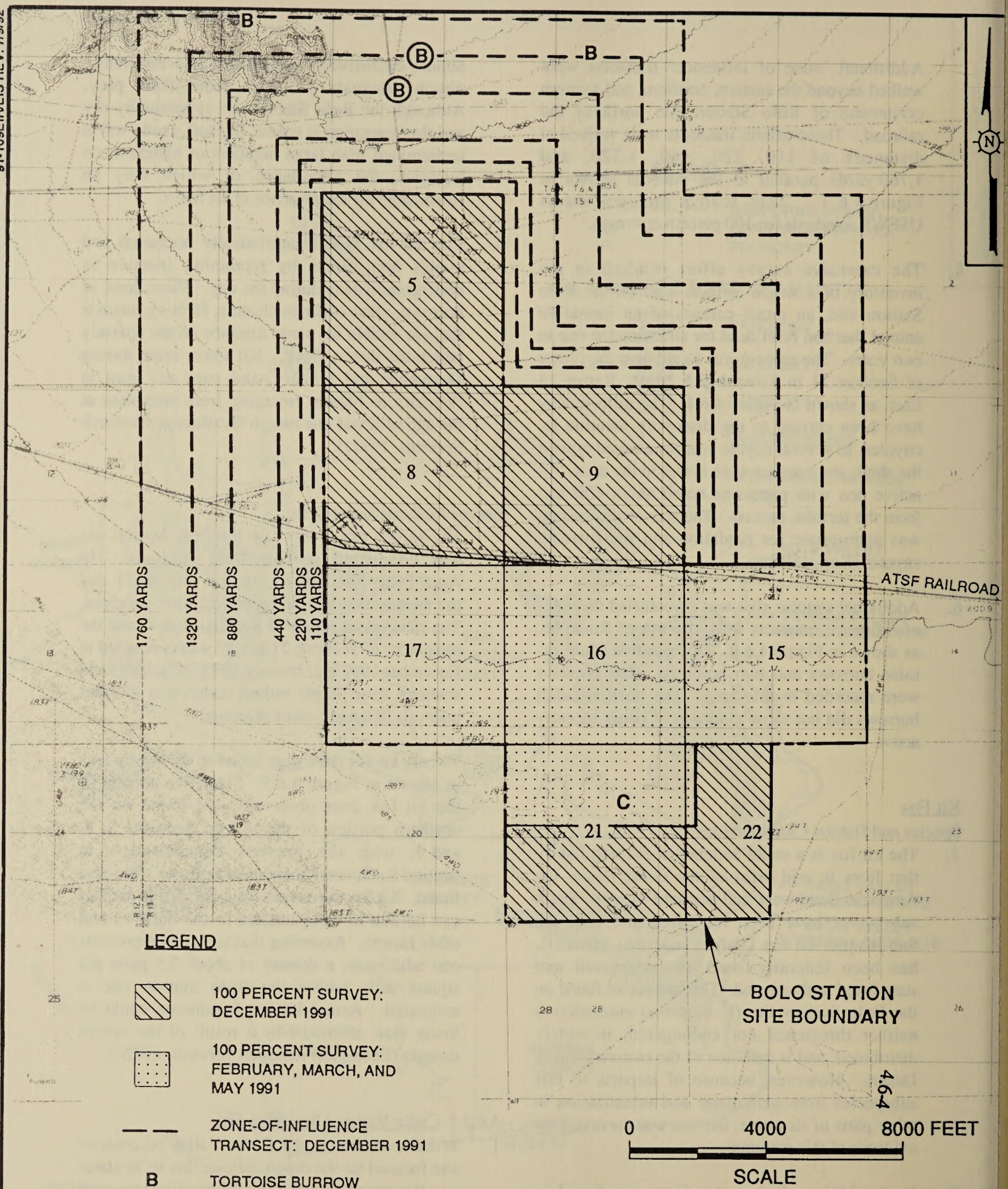

LEGEND

▨	100 PERCENT SURVEY: DECEMBER 1991
⠿	100 PERCENT SURVEY: FEBRUARY, MARCH, AND MAY 1991
— —	ZONE-OF-INFLUENCE TRANSECT: DECEMBER 1991
B	TORTOISE BURROW
Ⓑ	QUESTIONABLE TORTOISE BURROW
C	TORTOISE CARCASS

BOLO STATION SITE BOUNDARY

REFERENCES: U.S.G.S. 7.5 MINUTE TOPOGRAPHIC MAPS OF AMBOY (1985), CADIZ (1985), CALUMET MINE (1985), AND BRISTOL LAKE NW (1984).

KARL, 1992a.

FIGURE 4.6.4

DESERT TORTOISE SURVEY METHODS AND RESULTS BOLO STATION SITE

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

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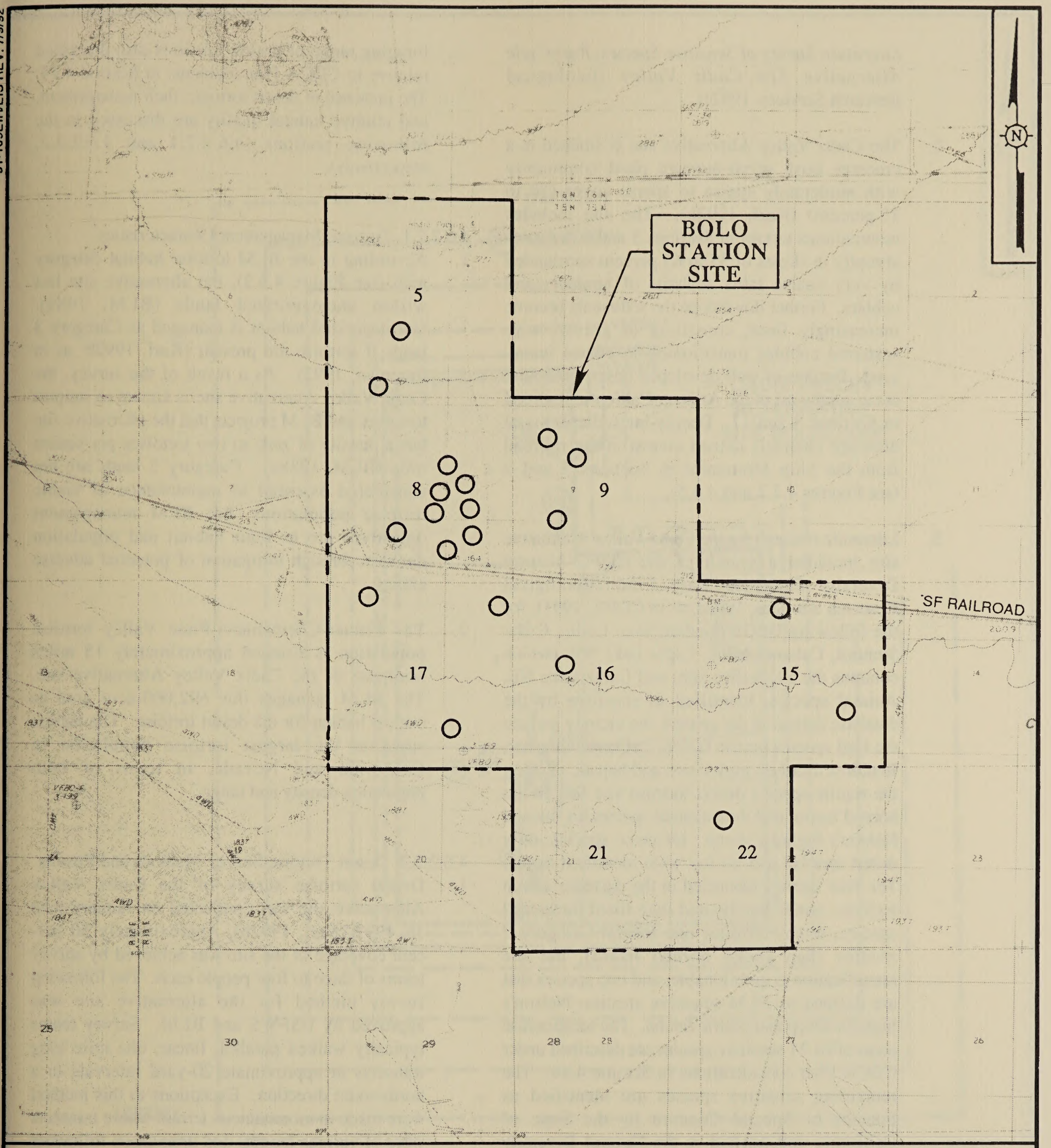


0 4000 8000 FEET

SCALE

LEGEND

KIT FOX DEN

REFERENCES: U.S.G.S. 7.5 MINUTE TOPOGRAPHIC MAPS OF AMBOY (1985), CADIZ (1985), CALUMET MINE (1985), AND BRISTOL LAKE NW (1984).

ECOLOGICAL RESEARCH SERVICES, 1992c.

FIGURE 4.6.5

KIT FOX DEN DISTRIBUTION
BOLO STATION SITE

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

Literature Survey of Sensitive Species, Rail•Cycle Alternative Site, Cadiz Valley (Ecological Research Services, 1992e).

2. The Cadiz Valley Alternative site is situated in a creosote bush scrub-bursage plant community with moderately sparse to sparse cover (10 to 15 percent) (Karl, 1992b). The site includes mountainous terrain in Sections 5 and 9 that rises abruptly in slopes of 35 to 65 percent surrounded by very coarse talus deposits of boulders and cobbles. Further downslope the sediments become increasingly finer, consisting of gravels with scattered cobbles transitioning to coarse loamy sand. Patches of well-developed desert pavement occur southwest of the Arizona-California Railroad in Sections 8 and 17. Deeply-incised ephemeral drainage channels extend almost to the railroad from the Ship Mountains in Sections 5 and 9 (see Figures 4.2.2 and 4.4.5).

3. Literature research for the Cadiz Valley Alternative site included a search of the CDFG Natural Diversity Database--Rare Find (Ecological Research Services, 1992e, as in CDFG, 1991), for the following USGS quadrangles: Cadiz, Cadiz Summit, Calumet Mine, Cadiz Lake NW (which contains the alternative site) and Cadiz Lake NE. Animal species, identified as sensitive by the database listing, in the general site vicinity include the bird species prairie falcon, LeContes thrasher, Bendires thrasher, grey vireo, and hepatic tanager; the reptile species desert tortoise and San Diego horned lizard; and the mammal species kit fox and Nelson's bighorn sheep. Of these species, only desert tortoise and kit fox were identified onsite. The nine species identified in the database search include: one federally- and state-listed threatened species, desert tortoise; one federal Category 2 species (San Diego horned lizard), but the identification is questionable; and two species that are defined as BLM-sensitive species--Nelson's bighorn sheep and prairie falcon. The location/use areas of BLM-sensitive species are described under CDCA Plan considerations in Section 4.14. The remaining sensitive species are identified as Species of Special Concern by the State of California and tracked in the Natural Diversity Database.

4. Nelson's bighorn sheep occupy the offsite Ship Mountain/Old Woman Mountain areas and other areas in the project region (see Section 4.14). The foraging range of prairie falcon is also described relative to CDCA Plan elements in Section 4.14. The presence of desert tortoise, their management, and relative habitat quality are discussed in the following sections (4.6.2.2.1 and 4.6.2.2.2, respectively).

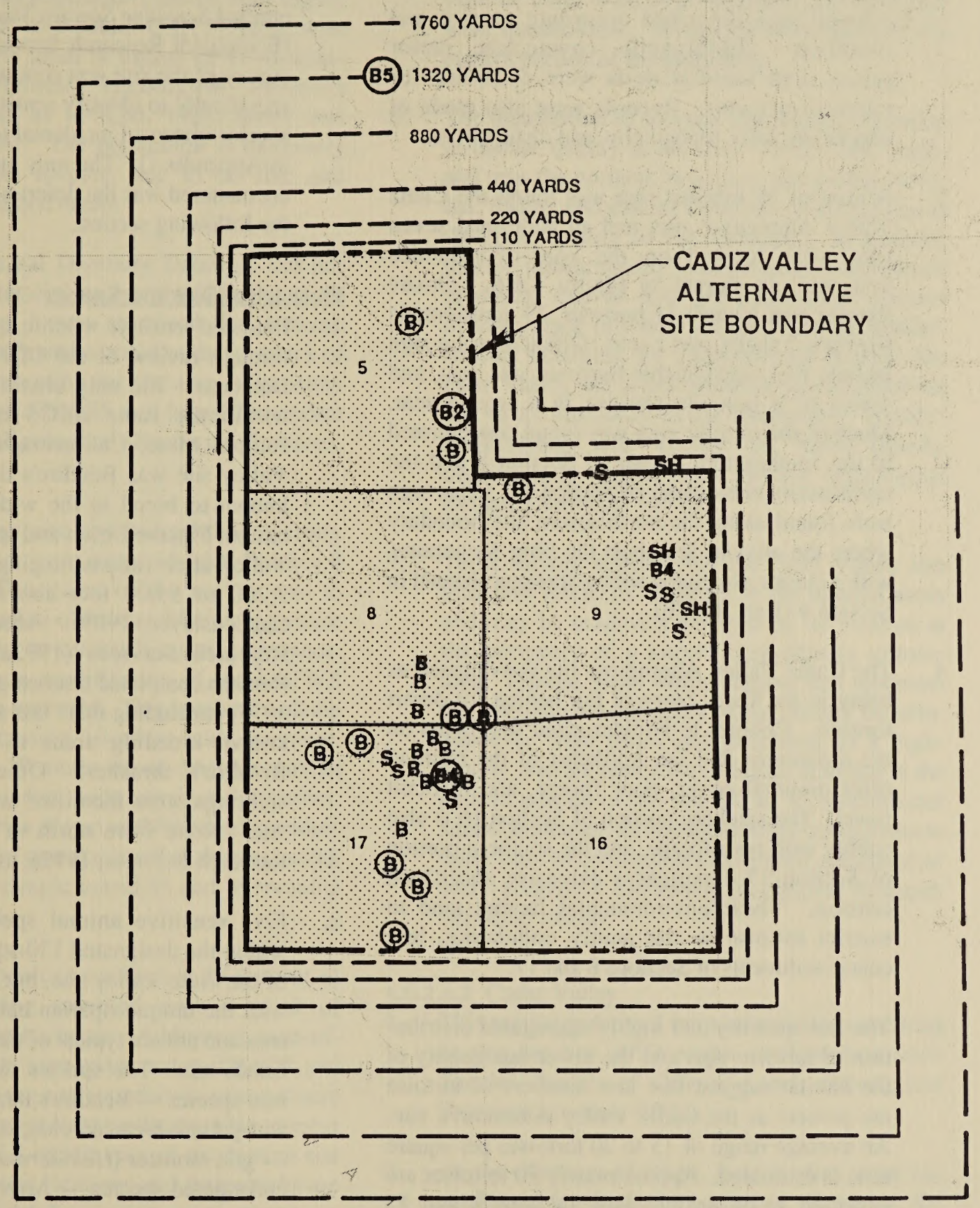
4.6.2.2.1 Tortoise Management Characteristics

1. According to the BLM tortoise habitat category map (see Figure 4.6.2), the alternative site lies within uncategorized lands (BLM, 1989). Uncategorized habitat is managed as Category 3 lands if tortoise are present (Karl, 1992b, as in Foreman, 1992). As a result of the survey, the Cadiz Valley Alternative site is known to support tortoises and BLM projects that the alternative site has a density of zero to two tortoises per square mile (BLM, 1988a). Category 3 lands are not considered essential to maintenance of viable tortoise populations, but BLM management objectives are to limit habitat and population declines through mitigation of potential adverse effects.

2. The Fenner-Chemehuevi-Piute Valley tortoise population is situated approximately 15 miles northeast of the Cadiz Valley Alternative site. The BLM manages this 692,000-acre area as critical habitat for the desert tortoise. The habitat supports the largest tortoise population in California and Nevada, in terms of both population density and range.

4.6.2.2.2 Desert Tortoise Survey Methods and Results

1. Desert tortoise survey of the Cadiz Valley Alternative site was conducted on January 8 to 16, 1992 (Karl, 1992b). Approximately 50 percent coverage of the site was achieved by survey teams of three to four people each. The following survey method for the alternative site was approved by USFWS and BLM. Survey teams typically walked parallel, linear, one mile long transects at approximate 20-yard intervals in a north-south direction. Exceptions to this method were made in mountainous terrain where transects were of various lengths and orientation following natural contours. Additional zone-of-influence transects were walked within one mile of the Cadiz Valley Alternative site, as shown in Figure 4.6.6. These linear transects were surveyed parallel to the site boundary at distances of 110, 220, 440, 880,



LEGEND

- 50 PERCENT COVERAGE: JANUARY 1992
- ZONE-OF-INFLUENCE TRANSECT: JANUARY 1992
- B2 TORTOISE BURROW AND COUNT
- (B2) QUESTIONABLE TORTOISE BURROW AND COUNT
- C TORTOISE CARCASS
- S SCAT
- SH SHELL

REFERENCES: U.S.G.S. 7.5 MINUTE TOPOGRAPHIC MAP OF CADIZ LAKE NW DATED 1986.
KARL, 1992b.

0 4000 8000 FEET

SCALE

FIGURE 4.6.6

DESERT TORTOISE SURVEY METHODS AND RESULTS CADIZ VALLEY ALTERNATIVE SITE

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

1,320, and 1,760 cubic yards, except in Section 4 where only the 110-, 220-, and 440-yard transects were surveyed due to the mountainous terrain.

2. Tortoise signs such as burrows, scat, tortoises, carcasses, tracks, and drinking sites, were recorded, mapped, and described according to size and condition. Additionally, coyote scat, raptor pellets, and woodrat nests were examined for tortoise fragments. Records were also made of vegetation, soils, topography, and disturbances.

3. A total of 38 tortoise sign was found the Cadiz Valley Alternative site, and an additional seven sign were located on the zone-of-influence transects, as shown in Figure 4.6.6. Onsite tortoise sign include 11 burrows, 19 questionable burrows, 2 shells, and a scat. Offsite tortoise sign include five questionable burrows, one scat, and scutes of a juvenile tortoise in a coyote scat. Much of the tortoise sign was found concentrated in the southeastern corner of Section 8 and the northeastern one-quarter of Section 17. Other sign were found along the northeastern site boundary where the alluvial fan abuts the Ship Mountains, with a cluster associated with a drainage channel in Section 9 (Karl, 1992b).

4. The Cadiz Valley Alternative site is evaluated as being in the lower range of fair habitat for desert tortoise. Cobble- to boulder-sized sediments on the mountains and fan northeast of the railroad offer minimal cover, poor forage, and difficult travel. The southern portion of Section 16 is also cobbly with poor forage, and the southern portion of Section 17 experiences extensive sheetflood erosion. These environmental factors tend to restrict tortoise to the gently undulating, less coarse sediments of Sections 8 and 17.

5. The low quantity and highly aggregated distribution of tortoise sign and the lower fair quality of the habitat suggest that low numbers of tortoise are present at the Cadiz Valley Alternative site. An average range of 15 to 20 tortoises per square mile is estimated. Approximately 80 tortoises are expected to be onsite, with Sections 8 and 17 projected to have the most (about 20 each) and Section 5 the least (about 10) (Karl, 1992b).

4.6.2.3 Offered Lands Sites

4.6.2.3.1 Piute Valley

Overview of Species

1. This section provides a description of wildlife species that occur on the Piute Valley Offered Lands site, based on the January 1992 report entitled *Sensitive Species Studies of Offered Lands* (Ecological Research Services, 1992a). A field survey of the site was conducted in October 1991 specifically to identify sensitive species. Wildlife species observed incidental to this effort are listed in Appendix G. The only special interest species encountered was the desert tortoise as described in the following section.

Protected or Sensitive Species

1. Potential sensitive wildlife species were identified through review of the CDFG Natural Diversity Database. The only sensitive species identified within the same USGS quadrangle (west of Juniper Mine, California/Nevada) as the Piute Valley site was Bendire's thrasher. This bird is known to breed in the widespread areas of the eastern Mojave Desert and specifically in the Piute Valley at elevations ranging from approximately 2,200 to 5,600 feet above msl (England and Laudenslayer, 1989). According to Ecological Research Services (1992a), Cardoff and van Remsen completed a series of surveys in 1976 and 1977, concluding that "this area is one of the best known breeding areas in California" for the Bendire's thrasher. Other sensitive species sightings were identified west and south of the site. None were north of the site (Ecological Research Services, 1992a, as in CDFG, 1989).

2. Five sensitive animal species were identified within the designated 130-square mile search area of the Piute Valley site, but most were associated with the unique riparian habitat of the Fort Piute area and are not typical of the Piute Valley Offered Lands site. The species include three sensitive bird species — Bendire's thrasher, hepatic tanager, and yellow-breasted chat; one Category 2 reptile — gila monster (*Heloderma suspectum*); and one endangered species — Arizona bell's vireo (*Vireo belli arizonae*).

Desert Tortoise

1. The Piute Valley site lies on the eastern edge of the Fenner-Chemehuevi-Piute Valley desert tortoise population, the largest single tortoise population (in density and area) in both California and Nevada. This population extends from Danby Lake, California, to Boulder City, Nevada, with densities in some areas in excess of 95 tortoises per square kilometer (Ecological Research Services, 1992a, as in Karl, 1983; Berry and Nicholson, 1984). The population is extremely important to the species, due to its size and relatively undisturbed nature.

2. The CDFG Natural Diversity Database did not identify desert tortoise as being within the study area. However, it was surmised that tortoise absence from the database could be due to a lack of studies and/or reporting for the area. The study conducted for this EIR/EIS will be used to update the database (Ecological Research Services, 1992a).

3. The Piute Valley site and surrounding vicinity within 800 meters were surveyed from October 8 to 16, 1991. The intent of the survey was to determine the quality of habitat relative to tortoise requirements and to establish tortoise presence. For this survey, a modification of the USFWS survey technique was used. This involved walking a series of alternating 10-meter wide transects. Bordering each 10-meter travel corridor was an unsurveyed 10-meter wide corridor. Further, between each series of two or three travel corridors was an unsampled corridor equal to the total width of the adjacent sample corridors and intervening unsurveyed areas.

4. This field methodology resulted in 25 percent of Section 29 being sampled with a total of 44 one-mile long transects. Additional zone-of-influence transects were conducted at 100, 400, and 800 meters from the site boundary in places where habitat quality was at least moderate. One transect was also walked 5 meters east of the eastern site boundary. Transect locations and their results are shown in Figure 4.6.7.

5. Within each 10-meter wide transect, observed tortoise sign (burrows, scat, tortoises, carcasses, tracks, drinking sites, eggshell fragments) were examined, recorded, mapped, and described according to size and condition. Also, coyote scat, raptor pellets, and woodrat nests were examined for tortoise parts. Tortoise sign observed outside transect boundaries were mapped and noted as being beyond the transect. A total of 106 sign was found within the site boundary and zone-of-influence transects, as shown in Figure 4.6.7. Four of these were small tortoises, and five sign were questionable. Most sign were found in the eastern portion of the study area.

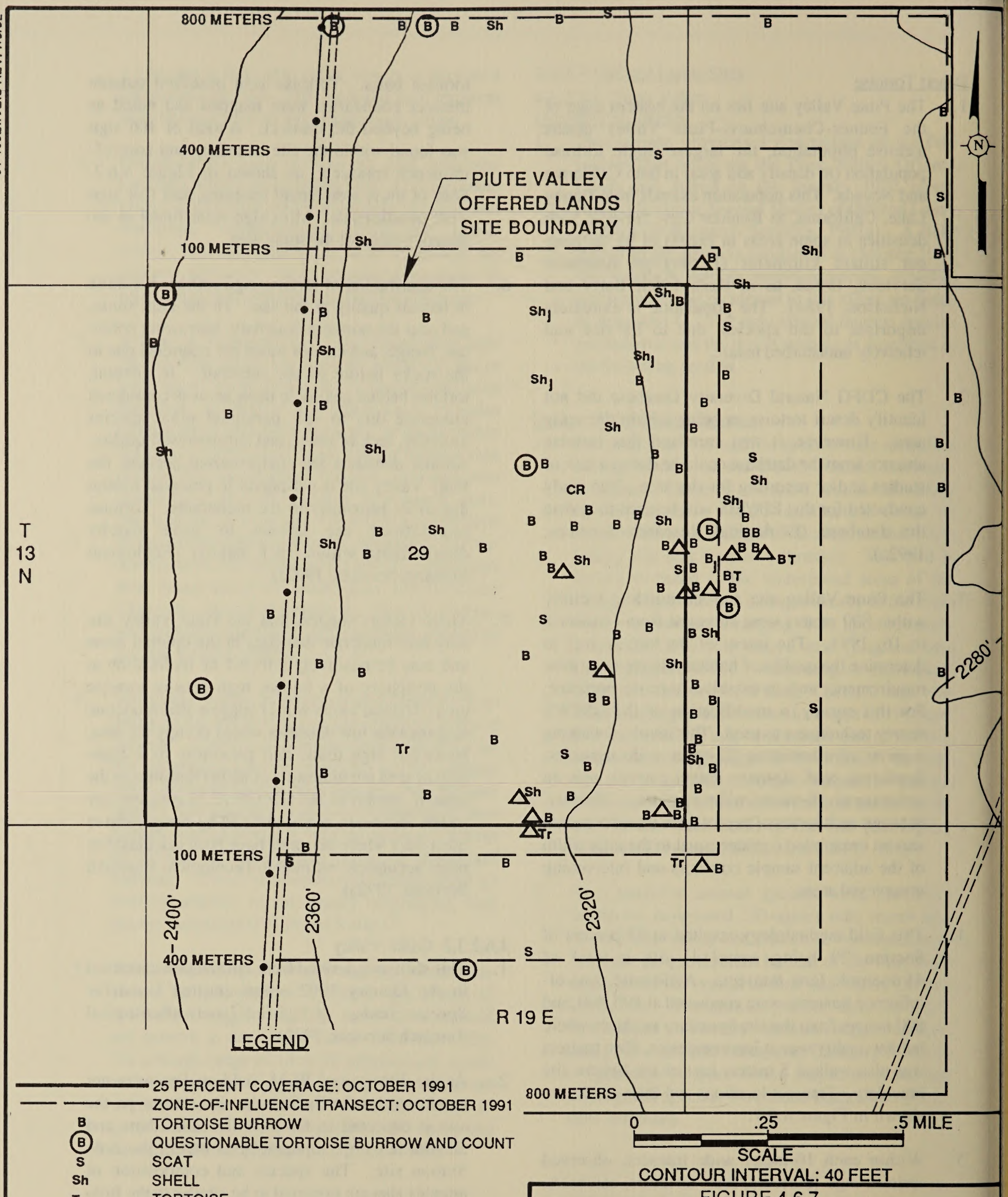
6. The distribution of tortoise sign reflects variation in habitat quality at the site. To the east, south, and near the northern boundary, burrowing potential, forage, and ease of travel are restricted due to the rocky nature of the substrate. In general, tortoise habitat quality in these areas is considered moderate due to low perennial plant species diversity, lack of relief, and substrate/soil quality. Animal densities are compromised because the Piute Valley site is peripheral to potential habitat due to its proximity to the mountains. Tortoise populations are known to have patchy distributions within such habitat (Ecological Research Services, 1992a).

7. These factors suggest that the Piute Valley site may host moderate densities in the optimal areas and may be positively affected by its location at the periphery of a known high-density tortoise area. Habitat alone would suggest that moderate to somewhat low densities would occupy the area. However, sign totals and proximity to a high-density area are indicative of higher densities in the eastern portion of the site (30 to 35 tortoises per square kilometer, as extrapolated by comparison to other sites where densities have been calculated or more accurately estimated) (Ecological Research Services, 1992a).

4.6.2.3.2 Cadiz Valley

1. This section is derived from information contained in the January 1992 report entitled *Sensitive Species Studies of Offered Lands* (Ecological Research Services, 1992a).

2. At the direction of BLM, field studies were not conducted for the Cadiz Lake site. However, the site is expected to have similar sand dune and alluvial fan slope topography as that of the Bolo Station site. The species and composition of animals also are expected to be similar to the Bolo Station site (Ecological Research Services, 1992a).



LEGEND

- 25 PERCENT COVERAGE: OCTOBER 1991
- ZONE-OF-INFLUENCE TRANSECT: OCTOBER 1991
- B — TORTOISE BURROW
- (B) — QUESTIONABLE TORTOISE BURROW AND COUNT
- S — SCAT
- Sh — SHELL
- T — TORTOISE
- Tr — TRACKS
- CR — COURTSHIP RING
- J — JUVENILE TORTOISE
- △ — SIGN FOUND OUTSIDE SURVEY TRANSECT

REFERENCES: USGS 15 MINUTE TOPOGRAPHIC QUADRANGLE MAP OF HOMER MOUNTAIN, SAN BERNARDINO COUNTY, CALIFORNIA. DATED 1956.

ECOLOGICAL RESEARCH SERVICES, 1992a.

0 .25 .5 MILE

SCALE

CONTOUR INTERVAL: 40 FEET

FIGURE 4.6.7

DESERT TORTOISE SURVEY
METHODS AND RESULTS
PIUTE VALLEY OFFERED LANDS SITE

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

3. The CDFG Natural Diversity Database was searched for potential sensitive wildlife species in the vicinity of the Cadiz Lake site. The area addressed in the search extends approximately from I-40 on the north to the Dale Lake area on the south and from Amboy on the west to Sheep Camp Spring on the east. The database search revealed no sensitive, threatened, or endangered species within the search area.

4. According to BLM's Desert Tortoise Habitat Interim Map (BLM, 1989), the Fenner Valley Offered Lands site is situated in the middle of a large BLM Category 1 desert tortoise habitat that encompasses the Fenner-Chemehuevi-Piute Valley desert tortoise population (in density and area). This is the largest single tortoise population in both California and Nevada. Desert tortoise is a federally- and state-listed threatened species.

4.6.2.3.3 Fenner Valley

1. The Fenner Valley Offered Lands site is situated in the southeastern periphery of EMNSA. At the direction of BLM and County, field studies and archival or literature searches were not completed for this site. However, information is known for the site based on the *List of Sensitive Plants and Animals in the Region Surrounding the Bolo Station Facilities Project Site, San Bernardino County* (Ecological Research Services, 1992d), *Sensitive Species Studies of Offered Lands* (Ecological Research Services, 1992a), and BLM's Desert Tortoise Habitat Interim Map — 1988 (BLM, 1989).

2. During the regional study for the Bolo Station site, the USGS quadrangle containing the site was reviewed (Fenner, California), as were quadrangles situated immediately west (Blind Hills), south (Danby, Essex and Little Piute Mountains), and east (Fenner Spring) of the offered lands site (Ecological Research Services, 1992d). No protected or sensitive animal were reported for these quadrangles (Ecological Research Services, 1992e). The CDFG Natural Diversity Database search for the Piute Valley Offered Lands site included the USGS quadrangles immediately north and northwest of the Fenner Valley site (Fenner Hills, California, and Goffs, California) (Ecological Research Services, 1992a). No protected or special interest species were reported for these quadrangles.

3. The nearest sightings were for LeContes thrasher, prairie falcon, and desert tortoise in the vicinity of Essex. The former two are bird species that prefer open desert terrain; they have no official listing relative to rare, threatened or endangered listings prepared by USFWS or CDFG, but are identified as Bird Species of Special Concern by the State of California.

4.7 AIR QUALITY

1. Air quality is directly influenced by an area's topographic features; therefore, CARB has divided California into regional air basins according to topographic air drainage features. The Bolo Station and Cadiz Valley Alternative sites are situated in the Mojave Desert portion of the Southeast Desert Air Basin (SEDAB), which includes the hottest and driest portions of California. It encompasses the desert portions of San Bernardino, Riverside, Kern, Los Angeles, and San Diego counties and all of Imperial County, as shown in Figure 4.7.1, covering an area of approximately 33,000 square miles. It is separated from the coastal regions by mountain ranges, which also provide a climatological boundary. These ranges and the mountain passes which allow transport of air contaminants from adjacent air basins into the SEDAB are identified in Figure 4.7.2.

2. This document addresses air quality impacts of the proposed action upon the SEDAB. As each potential MRF is developed, its associated air emissions will be addressed with its individual CEQA documentation.

3. The following discussion highlights the climatic and air quality conditions typical of the SEDAB, in general, and the Bolo Station and Cadiz Valley Alternative sites, in particular. Regulations pertinent to the proposed action that have been enacted to protect and improve air quality in the SEDAB are also discussed.

4.7.1 CLIMATIC AND METEOROLOGICAL CONDITIONS

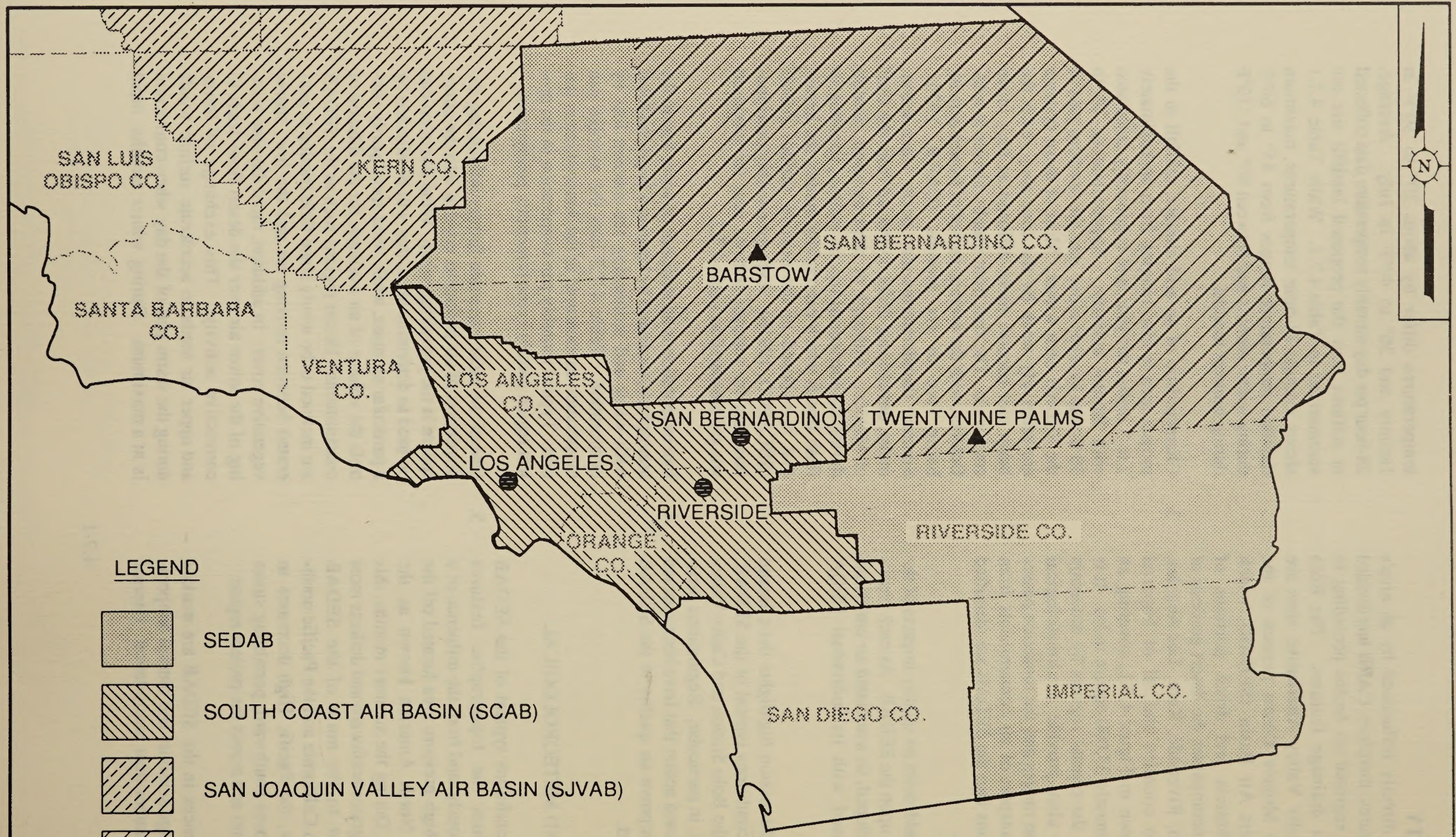
1. Arid weather conditions typical of the SEDAB result both from the topographic features mentioned previously, and from the influence of a semipermanent high-pressure area located off the west coast of North America known as the "Pacific High." During the summer months, this pressure area migrates northward and deflects most storm fronts far to the north of the SEDAB through northern California and the Pacific northwest. In winter, the Pacific High decreases in intensity and moves southward, permitting storm fronts to move into and across the project region.

2. Seasonal differences in the SEDAB are marked principally by large seasonal and diurnal temperature differences rather than precipitation. Diurnal temperatures differ by about 20° to 30°F in January and 30° to 40°F in July. Average, 24-hour per day monthly temperature data collected at stations near the proposed landfill site are summarized in Table 4.7.1. While Table 4.7.1 shows average 24-hour temperatures, maximum daytime temperature ranges from 45° to 60°F during winter months and between 90° and 110°F during summer months.

3. Characteristic of an arid climate, rainfall in the project area is low, ranging from approximately 2 to 5 inches per year, and is generally associated with frontal activity. Approximately 20 to 30 frontal systems move into the northern part of the SEDAB each winter. Most of these systems are relatively weak by the time they reach the basin and become more diffused as they move southward. The first front usually arrives in mid-October, with the average period of frontal activity being five to six months (CARB, 1975). Summer thunderstorms may occur when warm, moist, unstable air drifts northward from the Gulf of Mexico. Although of short duration, rainfall during thunderstorms can be intense, resulting in flash floods which can rapidly modify the terrain that is exposed to the erosive surface runoff (SBCAPCD, 1991b). Average monthly precipitation data for selected stations near the proposed site are presented in Table 4.7.2.

4. Pan evaporation is an indicator of water loss to the atmosphere, measured by keeping a large pan filled with water and monitoring the amount lost by evaporation. Table 4.7.2 lists the average pan evaporation as measured at the Amboy/Saltus station. Typical monthly pan evaporation in the project region greatly exceeds monthly precipitation.

5. One of the most important factors influencing the dispersion of air pollutants emitted into the atmosphere is the prevailing wind. Wind direction can be used to determine areas that will be affected by a particular air mass, while wind speed partly controls the volume of air available for the dilution of contaminants. Desert regions such as the SEDAB are inclined to be windy since little friction is generated between moving air and the low, sparse vegetative cover. In addition, rapid daytime heating of the lower air over the desert floor leads to convective activity. This exchange of lower and upper air tends to accelerate surface winds during the warm part of the day when convection is at a maximum. During winter months, rapid



SOURCE: BASED ON FIGURE PRESENTED IN JACOBS, 1990b.

FIGURE 4.7.1

AIR BASINS ASSOCIATED WITH THE PROPOSED ACTION

RAIL • CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

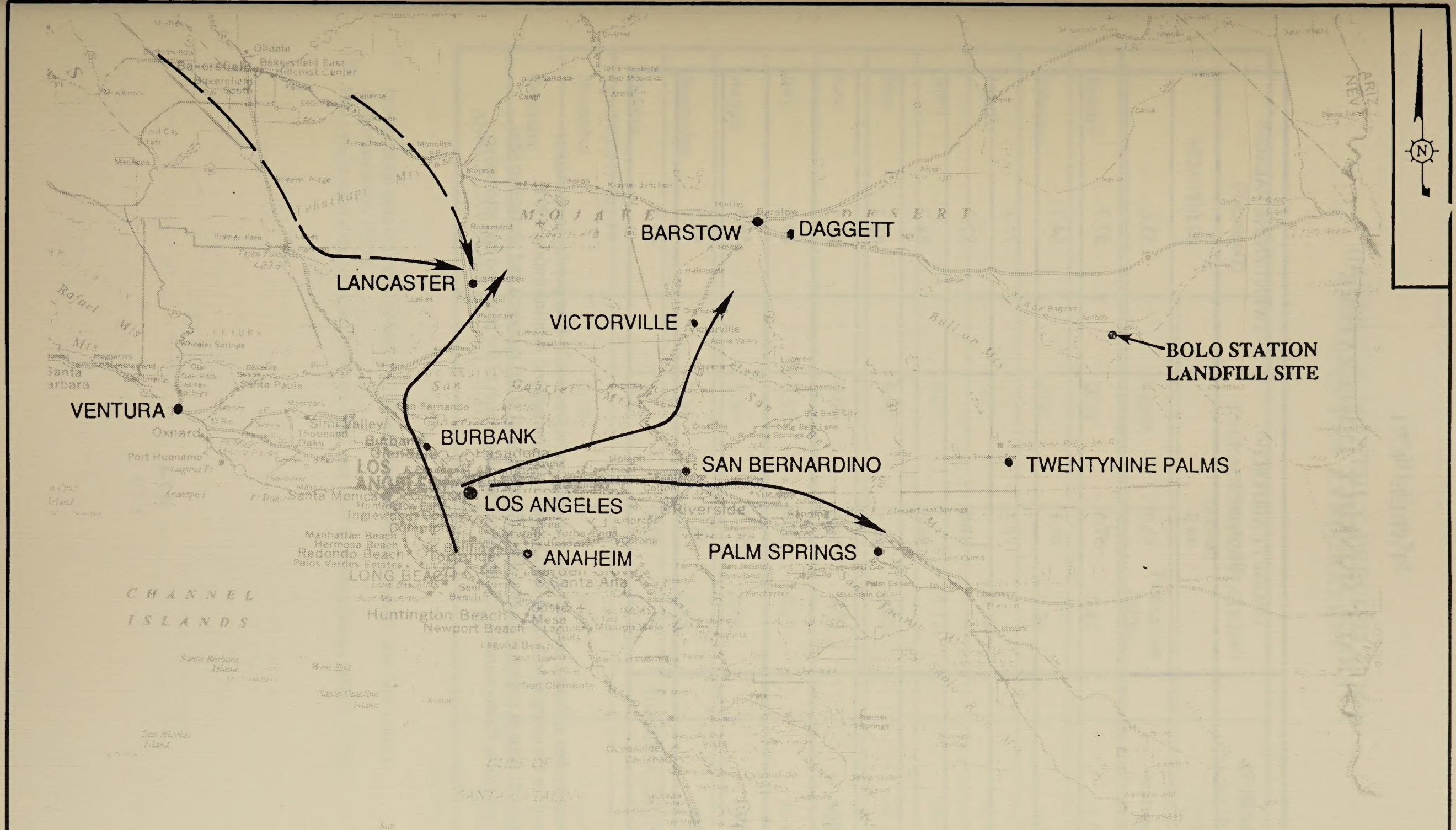


FIGURE 4.7.2

INTERBASIN POLLUTANT TRANSPORT CORRIDORS BETWEEN ADJACENT AIR BASINS AND SEDAB

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

TABLE 4.7.1

AVERAGE MONTHLY TEMPERATURE[1]

MONTH	DAGGETT AIRPORT[2] (Degrees F)	TWENTYNINE PALMS[3] (Degrees F)
January	48.3	49.0
February	53.2	53.6
March	57.5	57.7
April	64.1	64.7
May	72.7	73.1
June	81.8	82.3
July	88.6	88.7
August	86.5	86.7
September	79.9	80.3
October	68.9	69.4
November	56.3	56.8
December	48.7	49.5
ANNUAL AVERAGE	67.2	67.7

91-109 (11/5/92/mg)

(1) Temperature data collected between 1951 and 1980 and represents 24-hour per day temperatures averaged for the entire month (National Oceanic and Atmospheric Administration, 1991).
(2) The Daggett Airport station is located about 80 miles west of the proposed and alternative sites.
(3) The Twentynine Palms station is located about 40 miles south of the proposed and alternative sites.

TABLE 4.7.2

AVERAGE MONTHLY PRECIPITATION AND PAN EVAPORATION

MONTH	AVERAGE PRECIPITATION[1] (inches)		AVERAGE PAN EVAPORATION[2] (inches)
	Daggett	Twentynine Palms	Amboy/Saltus
January	0.56	0.42	4.96
February	0.36	0.29	7.80
March	0.35	0.28	11.77
April	0.27	0.12	14.37
May	0.09	0.08	18.23
June	0.08	0.02	22.05
July	0.32	0.67	22.76
August	0.50	0.68	19.33
September	0.44	0.49	15.16
October	0.17	0.26	10.67
November	0.28	0.26	6.61
December	0.39	0.32	4.72
ANNUAL AVERAGE	3.81	3.89	158.43

91-109 (11/5/92/mg)

(1) Precipitation data collected between 1951 and 1980 (National Oceanic and Atmospheric Administration, 1991).

(2) Pan evaporation data collected between 1967 and 1977 at Amboy/Saltus (DWR, 1979).

nighttime cooling near the ground retards this exchange of momentum, resulting in a greater frequency of calm winds. During all seasons, prevailing wind direction is generally from the south and west (CARB, 1975; SBCAPCD, 1991b). Average wind speed and direction for the project region are shown in Figure 4.7.3. Prevailing winds bring air through the mountain passes from the South Coast and San Joaquin Valley air basins. Pollutants from these air basins are carried by the wind into the desert region, impacting the air quality of the desert.

6. Atmospheric stability (in addition to prevailing winds) also plays a major role in controlling dispersion of pollutants emitted into the atmosphere. Atmospheric stability is an indicator of the extent to which an air mass is mixed in the vertical direction. Pollutants are dispersed most effectively during unstable conditions, and least effectively during stable conditions. Data collected at Rail•Cycle's Bolo Monitoring Station from March 1991 through February 1992 indicate that stable atmospheric conditions (stability categories E and F) occur approximately 60 percent of the time.

7. Dispersion of air pollutants can also be limited by inversion conditions which act to trap a layer of cooler air (extending from ground level to several hundred meters above ground level) beneath a layer of warmer air. The SEDAB is typically affected by inversion conditions resulting from rapid cooling of the earth's surface at night. This cooling does not affect the air above the first few hundred feet; therefore, the upper layer remains warmer. These inversions tend to terminate early in the day during summer, but persist throughout much of the day during winter, when they limit the mixing in the lower atmosphere to a height of 400 to 1,200 meters (CARB, 1975). Mean mixing heights for the SEDAB are given in Table 4.7.3.

4.7.2 AMBIENT AIR QUALITY

1. Air quality is determined primarily by the types and amounts of contaminants emitted into the atmosphere, the size and topography of the local air basin, and the pollutant dispersing properties of local weather patterns. When airborne pollutants are produced in such volume that they are not dispersed by local meteorological conditions, air quality problems result. Dispersion of pollutants in the County area is inhibited by periodic temperature inversion and climatic conditions which also tend to carry pollutants into the SEDAB from the surrounding basins. As the pollutants become more concentrated in the atmosphere, photochemical reactions occur, producing ozone and other oxidants.

2. Ambient air quality is monitored at 18 locations in the SEDAB, seven of which are in the County. The nearest stations to the project site are at Twentynine Palms (approximately 40 miles to the south) and Barstow (approximately 80 miles to the west). Air quality data collected at these stations from 1987 to 1989 are presented in Tables 4.7.4 and 4.7.5, respectively.

3. Rail•Cycle operated an air quality and meteorological monitoring station near the southwestern boundary of the Bolo Station site to acquire one year of local ambient air quality data for use in the air quality impact analyses for the proposed action. This monitoring was conducted in accordance with a SBCAPCD-approved monitoring plan, which is consistent with EPA monitoring requirements for PSD. The following pollutants and parameters were measured:

   - Ozone (O_3)
   - Nitric oxide (NO)
   - Nitrogen dioxide (NO_2)
   - NO_x
   - Sulfur dioxide (SO_2)
   - PM_{10}
   - Reactive organic compounds (ROC)
   - Total hydrocarbons (THC)
   - Precipitation
   - Wind speed
   - Wind direction
   - Ambient temperature
   - Station temperature

4. For planning purposes, EPA and CARB classify regions with respect to their attainment (or nonattainment) of ambient air quality standards. An attainment designation means that federal or state standards for a specific pollutant have not been violated in the designated area. A non-attainment designation means that the pollutant concentration in the area exceeded federal or state standards for a specific pollutant at least once in the last three years. A district with a nonattainment designation is required to develop plan for attaining and maintaining the standard for each of the

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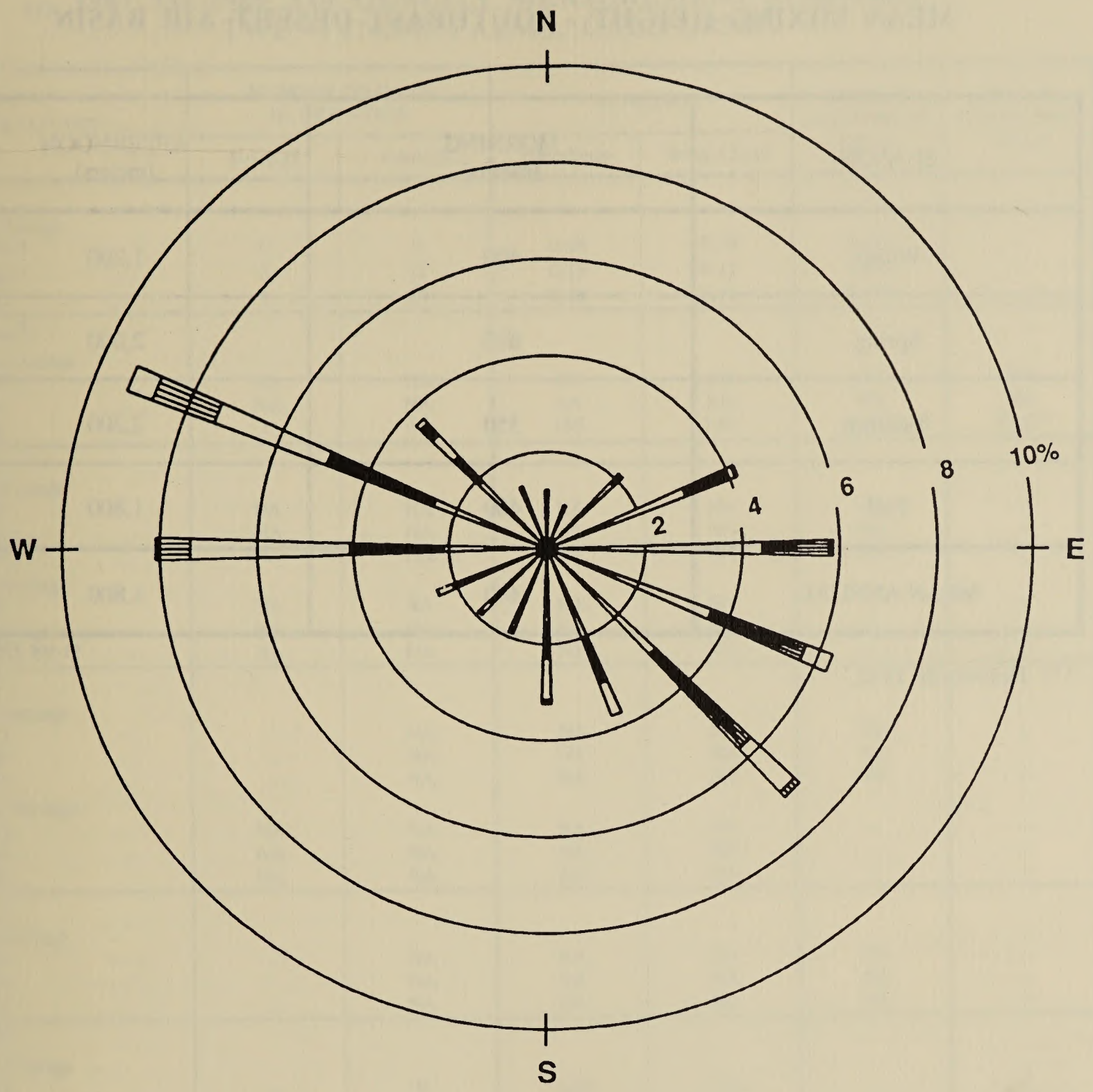
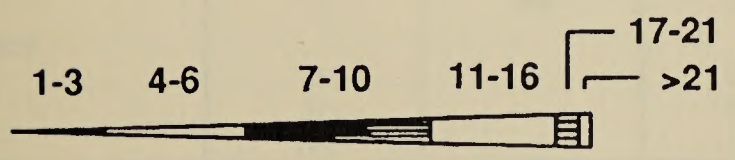




WIND SPEED CLASSES
(KNOTS)

NOTE:
DIAGRAM OF THE FREQUENCY OF OCCURENCE FOR EACH WIND DIRECTION. WIND DIRECTION IS THE DIRECTION FROM WHICH THE WIND IS BLOWING. EXAMPLE - WIND IS BLOWING FROM THE NORTH 1.2 PERCENT OF THE TIME.

SOURCE: JACOBS, 1992a.

FIGURE 4.7.3

WIND ROSE

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

TABLE 4.7.3

MEAN MIXING HEIGHT - SOUTHEAST DESERT AIR BASIN[1]

SEASON	MORNING (meters)	AFTERNOON (meters)
Winter	400	1,200
Spring	600	2,000
Summer	350	2,200
Fall	400	1,800
MEAN ANNUAL	400	1,800

91-109 (7/11/92/mg)

(1) Holzworth, 1972.

TABLE 4.7.4

1987 TO 1989 AIR QUALITY MEASUREMENT SUMMARY
TWENTYNINE PALMS, CALIFORNIA

POLLUTANT	NUMBER OF DAYS IN VIOLATION		RANKING		ANNUAL ARITHMETIC MEAN	ANNUAL GEOMETRIC MEAN
	NAAQS	CAAQS	First Peak	Second Peak		
O_3 (ppm)						
1-Hour Average						
1987[1]	0	0	0.09	0.09	0.032	--
1988[1]	3	37	0.15	0.13	0.048	--
1989	3	33	0.13	0.13	0.046	--
PM_{10} ($\mu g/m^3$)						
24-Hour Average						
1987	NA	NA	NA	NA	NA	NA
1988	NA	NA	NA	NA	NA	NA
1989	1	15	155	146	46.5[1]	39.9[1]
CO (ppm)						
1-Hour Average						
1987	NA	NA	NA	NA	NA	--
1988	NA	NA	NA	NA	NA	--
1989	NA	NA	NA	NA	NA	--
8-Hour Average						
1987	NA	NA	NA	NA	--	--
1988	NA	NA	NA	NA	--	--
1989	NA	NA	NA	NA	--	--
SO_2 (ppm)						
1-Hour Average						
1987	--	NA	NA	NA	NA	--
1988	--	NA	NA	NA	NA	--
1989	--	NA	NA	NA	NA	--
24-Hour Average						
1987	NA	NA	NA	NA	--	--
1988	NA	NA	NA	NA	--	--
1989	NA	NA	NA	NA	--	--
NO_2 (ppm)						
1-Hour Average						
1987	--	NA	NA	NA	NA	--
1988	--	NA	NA	NA	NA	--
1989	--	NA	NA	NA	NA	--
Pb ($\mu g/m^3$)						
30-Day Average						
1987	--	0	0.03	0.02	--	--
1988	--	0	0.04	0.04	--	--
1989	--	NA	NA	NA	--	--
Calendar Quarter						
1987	0	--	0.02	0.02	--	--
1988	0	--	0.04	0.02	--	--
1989	NA	--	NA	NA	--	--
SO_4 ($\mu g/m^3$)						
24-Hour Average						
1987	--	0	6.4	5.9	--	1.94
1988	--	0	6.4	6.2	--	2.58[1]
1989[2]	--	0	3.7	2.4	--	2.16[1]

91-109 (11/5/92/mg)

[1] CARB, 1988, 1989, 1990.

[2] Data presented are valid but incomplete in that valid data points were insufficient to meet the representative criteria for EPA and/or CARB.

NA = Data Not Available (Pollutant not monitored at this station.)

TABLE 4.7.5

1987 TO 1989 AIR QUALITY MEASUREMENT SUMMARY
BARSTOW, CALIFORNIA[1]

POLLUTANT	NUMBER OF DAYS IN VIOLATION OF		RANKING		ANNUAL ARITHMETIC MEAN	ANNUAL GEOMETRIC MEAN
	NAAQS	CAAQS	First Peak	Second Peak		
O_3 (ppm)						
1-Hour Average						
1987[2]	1	31	0.15	0.12	0.033	--
1988[2]	13	77	0.15	0.15	0.042	--
1989	6	67	0.14	0.14	0.040	--
PM_{10} ($\mu g/m^3$)						
24-Hour Average						
1987	0	9	88	70	32.9	25.5
1988	0	5	63	62	38.9[1]	37[1]
1989	1	12	191	83	43.1	38.4
CO (ppm)						
1-Hour Average						
1987	0	0	6.0	6.0	0.31	--
1988	0	0	13	9	0.95	--
1989	0	0	7	6	1.00	--
8-Hour Average						
1987	0	0	4.30	3.10	--	--
1988	0	0	3.80	3.30	--	--
1989	0	0	3.90	3.60	--	--
SO_2 (ppm)						
1-Hour Average						
1987	--	NA	NA	NA	NA	--
1988	--	NA	NA	NA	NA	--
1989	--	NA	NA	NA	NA	--
24-Hour Average						
1987	NA	NA	NA	NA	--	--
1988	NA	NA	NA	NA	--	--
1989	NA	NA	NA	NA	--	--
NO_2 (ppm)						
1-Hour Average						
1987[2]	--	0	0.13	0.13	0.025	--
1988[2]	--	0	0.09	0.09	0.022	--
1989	--	0	0.10	0.10	0.026	--
Pb ($\mu g/m^3$)						
30-Day Average						
1987	--	0	0.06	0.04	--	--
1988	--	0	0.04	0.04	--	--
1989	--	NA	NA	NA	--	--
Calendar Quarter						
1987	0	--	0.04	0.03	--	--
1988	0	--	0.04	0.03	--	--
1989	NA	--	NA	NA	--	--
SO_4 ($\mu g/m^3$)						
24-Hour Average						
1987	--	0	8.6	7.2	--	4.38
1988	--	0	11.0	10.6	--	3.98[1]
1989[2]	--	0	5.2	4.5	--	3.98[1]

91-109 (11/6/92/mg)

[1] CARB, 1988, 1989, 1990.

[2] Data presented are valid but incomplete in that valid data points were insufficient to meet the representative criteria for EPA and/or CARB.

NA = Data Not Available (Pollutant not monitored at this station.)

nonattainment pollutants or their precursors. If an area is designated as "unclassified," it is because there is a lack of adequate air quality data or other information on which to base an attainment or nonattainment designation. In designating an area as unclassified, EPA or CARB signal the need for additional data collection and analysis.

5. A summary of the data collected by Rail•Cycle to date is presented in Table 4.7.6. Table 4.7.7 summarizes current attainment status for the County portion of the SEDAB. Data collected at the Bolo Station site, as summarized in Table 4.7.6, are consistent with attainment/ nonattainment designations highlighted in Table 4.7.7.

6. Assessment of regional O_3 standard violations in California indicates that O_3 levels in the SEDAB are influenced by pollutant transport from the adjacent San Joaquin Valley and South Coast air basins, and also by local pollutant emissions. Depending on climate conditions, O_3 violations in the SEDAB can occur either solely as a result of pollutant transport from adjacent air basins, or solely as a result of local pollutant emissions (SBCAPCD, 1991b).

4.7.3 REGULATORY OVERVIEW

1. Air emissions from the proposed action are subject to federal, state, and local rules and regulations as implemented through provisions of the Federal Clean Air Act as amended in 1991, the California Clean Air Act of 1988, and the County 1991 Draft Air Quality Attainment in 1991 Plan (AQAP). EPA Region IX (San Francisco) has federal jurisdiction over the area. CARB is responsible at the state level, while SBCAPCD has jurisdiction in the local area.

2. The Federal Clean Air Act was established in an effort to ensure that minimum levels of air quality are maintained in all areas of the United States. These minimum levels were based upon health-related exposure levels and were termed National Ambient Air Quality Standards (NAAQS). NAAQS are legal limits on allowable ambient levels of air pollutants in the atmosphere and characterize the amount of exposure deemed safe to the public. The NAAQS has established the following as pollutants: NO_2, SO_2, carbon monoxide (CO), PM_{10}, O_3, sulfates (SO_4), lead (P_b), hydrogen sulfide (H_2S), vinyl chloride, and visibility reducing particles. Ambient O_3 concentrations result from the photochemical reaction of NO_2 with ROG. NAAQS have not been established for ROG.

3. Primary and secondary NAAQS have been established and are shown in Table 4.7.8. Primary standards reflect levels of air quality deemed necessary to provide an adequate margin of safety to protect public health. Areas found to be in violation of primary standards are termed "nonattainment areas." Secondary standards reflect levels of air quality necessary to protect public welfare (such crops, livestock, vegetation, buildings, and visibility) from known or anticipated adverse effects of a pollutant.

4. Under the Federal Clean Air Act, state and local authorities are given primary responsibility for assuring that their respective regions are in attainment of, or have a verifiable plan to attain, the NAAQS. This provision also gives state and local agencies authority to promulgate more stringent ambient air quality standards, if necessary. The state has promulgated its own set of California Ambient Air Quality Standards (CAAQS) which are included in Table 4.7.8. The California Clean Air Act calls for attainment of the CAAQS by the earliest possible date. To date, SBCAPCD has not adopted ambient air quality standards more stringent than the CAAQS.

4.7.3.1 <u>San Bernardino County Air Quality Attainment Plan</u>

1. SBCAPCD has local regulatory review and primary authority over potential sources of air pollution associated within the County. CARB serves as a technical review and advisory agency, providing technical advice to SBCAPCD when necessary and offering guidance when SBCAPCD regulations are not sufficiently detailed to address a particular issue.

2. Under the provisions of the Federal and California Clean Air Acts, areas not in attainment of the NAAQS or CAAQS are required to prepare AQAPs. An AQAP establishes an area-specific program to control existing and proposed sources of air emissions so that the NAAQS or CAAQS may be attained by the applicable target date. The County has been designated as a federal and

TABLE 4.7.6

AIR QUALITY MEASUREMENT SUMMARY[1][2]
BOLO STATION SITE

POLLUTANT	1991										1992	
	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY
NO_2 (ppm)												
• 1 hour	0.021	0.026	0.020	0.014	0.025	0.021	0.017	0.022	0.23	0.028	0.027	0.021
SO_2 (ppm)												
• 1 hour	0.002	0.004	0.004	0.002	0.002	0.002	0.003	0.003	0.002	0.002	0.002	0.004
• 3 hours	0.002	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.001	0.002	0.001	0.003
• 24 hours	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.001	0.001	0.001	0.002
PM_{10} (µg/m3)												
• 24 hours	24.0	55.4	397.8	25.6	139.4	52.9	54.3	19.7	63.5	13.5	11.6	21.2
O_3 (ppm)												
• 1 hour	0.073	0.012	0.010	0.096	0.093	0.095	0.081	0.079	0.23	0.057	0.043	0.047

91-109 (11/5/92/mg)

(1) Environmental Monitoring Company, Inc., March 1991 to February 1992.
(2) Maximum reported values.

TABLE 4.7.7

CRITERIA POLLUTANT ATTAINMENT STATUS SAN BERNARDINO PORTION OF THE SOUTHEAST DESERT AIR BASIN[1]

POLLUTANT AND AVERAGING TIME	STANDARD		ATTAINMENT STATUS[2]	
	FEDERAL	STATE	FEDERAL	STATE
NO_2[3]				
• 1 Hour	--	0.25 ppm	–	A
• Annual Average	0.053 ppm	–	A	--
SO_2[3]				
• 1 Hour	--	0.25 ppm	–	A
• 3 Hours	0.5 ppm	–	A	--
• 24 Hours	0.14 ppm	0.05 ppm	A	A
• Annual Average	0.03 ppm	–	A	--
CO				
• 1 Hour	35 ppm	20 ppm	A	A
• 8 Hours	9 ppm	9 ppm	A	A
PM_{10}				
• 24 Hours	150 µg/m^3	50 µg/m^3	N	N
• Annual Geometric Mean	--	30 µg/m^3	–	N
• Annual Arithmetic Mean	50 µg/m^3	–	N	--
O_3				
• 1 Hour	0.12 ppm	0.09 ppm	N	N

91-109 (7/12/92/cm)

(1) CARB, 1991.

(2) Attainment Status Designation:
-- = No Standard
A = Attainment
N = Nonattainment

(3) Regulated as a nonattainment pollutant (NO_2 is a precursor to both ozone and PM_{10}; SO_2 is a precursor to PM_{10}).

TABLE 4.7.8
AMBIENT AIR QUALITY STANDARDS

POLLUTANT	AVERAGING TIME	CALIFORNIA STANDARDS(1)		NATIONAL STANDARDS(2)		
		CONCENTRATION (3)	METHOD (4)	PRIMARY (3,5)	SECONDARY (3,4,6)	METHOD (7)
O_3	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	0.12 ppm (235 µg/m^3)	Same as Primary Standards	Ethylene Chemiluminescence
CO	8 Hour	9.0 ppm (10 mg/m^3)	Nondispersive Infrared Spectroscopy (NDIR)	9 ppm (10 mg/m^3)	–	NDIR
	1 Hour	20 ppm (23 mg/m^3)		35 ppm (40 mg/m^3)		
NO_2	Annual Average	–	Gas Phase Chemiluminescence	0.053 ppm (100 µg/m^3)	Same as Primary Standards	Gas Phase Chemiluminescence
	1 Hour	0.25 ppm (470 µg/m^3)		–		
SO_2	Annual Average	–	Ultraviolet Fluorescence	0.03 ppm (80 µg/m^3)	–	Pararosoaniline
	24 Hour	0.05 ppm (131 µg/m^3)(8)		0.14 ppm (365 µg/m^3)	–	
	3 Hour	–		–	0.5 ppm (1300 µg/m^3)	
	1 Hour	0.25 ppm (655 µg/m^3)		–	–	
PM_{10}	Annual Geometric Mean	30 µg/m^3	Size Selective Inlet High Volume Sampler and Gravimetric Analysis	–	–	Inertial Separation and Gravimetric Analysis
	24 Hour	50 µg/m^3		150 µg/m^3	Same as Primary Standards	
	Annual Arithmetic Mean	–		50 µg/m^3		
SO_4	24 Hour	25 µg/m^3	Turbidimetric Barium Sulfate	–	–	–
Pb	30 Day Average	1.5 µg/m^3	Atomic Absorption	–	–	Atomic Absorption
	Calendar Quarter	–		1.5 µg/m^3	Same as Primary Standards	
H_2S	1 Hour	0.03 ppm (42 µg/m^3)	Cadmium Hydroxide STRactan	–	–	–
Vinyl Chloride (chloroethene)	24 Hour	0.010 ppm (26 µg/m^3)	Tedlar Bag Collection, Gas Chromatography	–	–	–
Visibility Reducing Particles(9)	8 hour (10 am to 6 pm, PST)	Insufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent. Measurement in accordance with CARB Method V.		–	–	–

91-109 (7/12/92/cm)

(1) California standards for O_3, CO, SO_2 (1 hour), NO_2, PM_{10}, and visibility reducing particles are values that are not to be equaled or exceeded.

(2) National standards, other than O_3 and those based on annual averages or annual arithmetic means, are not to be exceeded more than once a year. The O_3 standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one.

(3) Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of of 760 mm mercury. Measurements of air quality are corrected to a reference temperature of 25°C and a reference pressure of 760 mm mercury (1,013.2 millibar); ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

(4) Equivalent procedure, which can be shown to the satisfaction of CARB to provide equivalent results at or near the level of the air quality standard, may be used.

(5) National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect public health. Each state must attain the primary standards no later than three years after that state's implementation plan is approved by EPA.

(6) National Secondary Standards: The levels of air quality necessary to protect public welfare from any known or anticipated adverse effect of a pollutant. Each state must attain the secondary standards within a "reasonable time" after the state implementation plan is approved by EPA.

(7) Reference method as described by EPA. An "equivalent method" of measurement may be used, but must have a "consistent relationship to the reference method" and must be approved by EPA.

(8) At locations where state standards for oxidant and/or PM_{10} are violated. National standards apply elsewhere.

(9) This standard is intended to limit the frequency and severity of visibility impairment due to regional haze and is equivalent to a 10-mile nominal visual range when relative humidity is less than 70 percent.

California nonattainment area for O_3 and PM_{10} (Table 4.7.7). To comply with the California and Federal Clean Air Acts, the County released an AQAP in 1991.

3. The 1991 AQAP includes stationary source, mobile source, and transportation control measures to reduce emissions of air pollutants. The AQAP projects that attainment of CAAQS and NAAQS for O_3 will be achieved in the County by the end of 1994. The plan does not address control strategies for PM_{10}.

4.8 PUBLIC HEALTH AND SAFETY

1. Public health and safety relates to those issues regarding the protection of public health and the environment. The term public is defined as not only the general public, but also workers at the proposed landfill facility and public having access to the proposed landfill facility. The following specific areas are provided in detail under separate sections and are not addressed here:

   - Section 4.4, Surface Hydrology and Ground Water
   - Section 4.7, Air Quality
   - Section 4.12, Transportation
   - Section 4.13, Noise

2. The intent of this section is to highlight health and safety issues, and specific regulations that are pertinent to protection of public health and safety, property, and the environment. The discussion is equally applicable to the Bolo Station site as well as the alternatives. In addition, local and regional distinctions are not necessary.

4.8.1 SPILL PREVENTION AND WASTE MANAGEMENT PLANNING

1. Oil pollution prevention regulations contained within 40 CFR Part 112 of the Clean Water Act and the Aboveground Petroleum Storage Act contained in Chapter 6.67, Division 20, of the California Health and Safety Code require a written plan known as a Spill Prevention, Control and Countermeasures (SPCC) Plan. A SPCC Plan addresses the locations, spill prevention practices including containment, employee training, spill response, reporting and recordkeeping for those facilities in which petroleum products are stored or used.

2. Goals of the SPCC Plan are to first reduce the likelihood that a spill would occur, provide containment should a spill occur, and have a plan to quickly respond to a spill should one occur. Employee training is key to the success of a plan, both to prevent spills and to properly respond to a spill. Response plans include locations of equipment and critical environmental areas, designation of a response coordinator, materials and instructions on how to use the materials to support response. Response plans also provide for immediate notification of the response coordinator, response personnel, and responsible oversight agencies.

3. Regulations contained in CCR Title 22 contain provisions for the proper handling of waste oils and sludges produced from industrial waste treatment facilities. These regulations generally preclude land disposal and encourage recycling of petroleum products. Hazardous wastes are also identified in CCR Title 22 and are regulated to preclude disposal at solid waste landfills. CCR Title 22 contains provisions for the proper identification, storage and handling of hazardous wastes, including transportation and disposal.

4.8.2 OPERATING CRITERIA

1. Operations of Class III solid waste disposal facilities are required to comply with various regulations which cumulatively contain operating provisions and plans that protect both the public and the environment.

2. Significant regulations include:

   - 40 CFR Parts 257 and 258, Subtitle D of RCRA. Criteria for municipal solid waste landfills.
   - CCR Title 14, Division 7, Minimum standards for solid waste handling and disposal.
   - CCR Title 23, Chapter 15, Discharge of Waste to Land

3. The above regulations contain requirements addressing the following:

   - **Hazardous Materials/Hazardous Waste Identification:** CCR Title 14, Division 7, Sections 17670-17672 includes training and safety precautions. Requirements of CCR Title 23, Chapter 15, Section 2521 and CCR Title 14, Division 7, Section 17742 are designed to preclude disposal of hazardous wastes in Class III landfills and provide safe handling provisions.
   - **Cover Requirements:** Requirements of CCR Title 14 Division 7, Sections 17682, 17707 and 17711 to 17713. Include provision for daily and intermediate cover to prevent or control disease, vectors, fires, odors, litter and burning litter and scavenging. Also includes provisions for final landfill cover.

- **Vector Control:** CCR Title 14, Division 7, Section 17677 includes additional requirements for control of vectors in the event cover requirements are not sufficient for such control.

- **Explosive Gases:** Requirements of CCR Title 14, Division 7, Section 17705 and 40 CFR, Part 258.23 includes monitoring provisions to prevent gases, such as methane, from resulting in fire or explosions. Provisions include siting of buildings, monitoring of site buildings, and monitoring at property boundaries. Remediation/response plans are required for concentrations of methane greater than the lower explosive limit (LEL), or 25 percent of the LEL inside buildings.

- **Access:** CCR Title 14, Division 7, Sections 17658, 17674 includes provisions to prevent or control public access to prevent illegal dumping, potential public exposure and unauthorized vehicle access.

- **Recordkeeping:** Various sections of each regulation include requirements for inspection, training and notification procedures. These procedures include the identification and prevention of hazardous material/waste disposal, monitoring requirements, employee records and other recordkeeping requirements.

The above requirements generally apply not only to active landfilling operations, but also during landfill closure and postclosure monitoring and maintenance.

4.8.3 EMPLOYEE PROGRAMS

1. Numerous regulations govern or define programs for worker safety. Significant regulations include those of California Occupational Safety and Health Administration (Cal-OSHA) contained in CCR Title 8. In addition, the federal Occupational Safety and Health Administration's (OSHA) Hazard Communication Standard (29 CFR 1910.120) was designed to alert employees about workplans, chemicals, safe handling procedures and precautions, and emergency and first aid procedures.

2. Requirements include employee awareness training, health and safety training, injury and illness prevention programs, medical surveillance programs, where applicable, and recordkeeping requirements.

4.8.4 RAILROAD OPERATIONS

1. Various state and federal regulations govern safe operation of railroads. As an industry, railroads are regulated by the Department of Transportation, Federal Railroad Administration, and the Interstate Commerce Commission. In California, railroads are also regulated by the California Public Utilities Commission (PUC).

2. Regulations pertinent to the proposed action, in addition to employee safety, are those pertaining to safe operations of trains, construction, maintenance and inspection of track structures, equipment operation, maintenance and inspection, and accident reporting. The intent of the regulations is to prevent or reduce accidents that can result in damage to workers, the public, community and property.

4.8.5 COMMUNITY RIGHT-TO-KNOW

1. State and federal regulations require programs to identify operations and hazardous materials to the community that may present a potential risk to the community. The regulations and procedures are contained in the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Title 3, the Emergency Planning and Community Right to Know Act (EPCRA), and are implemented by California Health and Safety Code, Chapter 6.95 as the Hazardous Materials Release Response Plans and Inventory Law. In addition, the Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) requires public notification of certain chemicals which may be present particularly those which are suspected of being carcinogenic.

2. The intent of the regulations is to alert the community and appropriate response agencies of the potential risk, as well as the location and types of operations that could affect the community, should upset conditions occur. Requirements contain provisions to aid response personnel by identifying access routes, utilities, emergency resources and environmentally sensitive areas to minimize the potential for upset, provide control, and to minimize public exposure. Emergency response plans and training are required should an upset occur.

4.9 VISUAL RESOURCES

1. This section reviews the visual quality and character of the Bolo Station site, Cadiz Valley Alternative Site, and surrounding region in the context of County and BLM visual management objectives. Photographs showing existing views of the area and visual simulations of the proposed action at different operational stages and completion are presented and discussed in Section 5.9.

4.9.1 VISUAL MANAGEMENT

4.9.1.1 San Bernardino County Plans and Policies

1. The County General Plan addresses visual issues under Section II-C-5, Natural Resources, Open Space/Recreation/Scenic. Among the County's goals for visual resources, the following relate to the proposed action:

   - Develop scenic, cultural resource, and historic sites of regional value for public enjoyment.
   - Preserve and protect outstanding scenic resources for future enjoyment.
   - Restrict development along scenic corridors.
   - Provide for visual enhancement of existing and new developments through landscaping.

2. Consideration of the scenic highways and trails systems is an integral part of the County planning process. Therefore, the goals stated above and the policies/actions listed below will be considered as they relate to the proposed action. The following policies/actions are considered:

   - Review of proposed development along scenic highways shown on the County Resource Overlay Maps shall ensure preservation of scenic values for the traveling public and those seeking a recreational driving experience.
   - Scenic County Corridors shall be defined to extend 200 feet on either side of a designated route. Development along scenic corridors shall be required to demonstrate through visual analysis that proposed improvements are compatible with the scenic qualities present.
   - Vantage or vista points along scenic routes shall be provided by new development proposed adjacent to scenic corridors and should include interpretive displays, and roadside rests.
   - Ample and varied recreational and scenic opportunities shall be provided by new development in coordination with local, state, and federal agencies, particularly for projects fronting state routes. This could include scenic vistas in parking lots.
   - Utilities shall be installed underground for new projects.
   - Development, particularly commercial and industrial development, shall install and maintain a minimum of 10 percent onsite landscaping which is drought-tolerant and compatible with the regional environment.
   - Site planning, including architectural design, shall be reviewed to prevent obstruction of scenic views, and to blend in with the surrounding landscape.
   - Compliance shall be required with grading and vegetation removal standards as set forth in the Scenic Routes Overlay District.

3. The County (and, in some instances, Caltrans) has 61 designated scenic routes, of which five are within the general region of the Bolo Station or Cadiz Valley Alternative sites:

   - I-40 between Ludlow and Needles.
   - Kelbaker Road between I-15 and I-40.
   - Kelso-Cima Road between Kelso and Cima.
   - Cima Road between I-15 and Cima.
   - Essex Road between Essex and Mitchell Caverns.
   - Route 66 between Oro Grande and Lenwood.

   These scenic routes are described in Section 4.9.2.1. The portion of Route 66 in the project vicinity is not a designated scenic route.

4.9.1.2 Bureau of Land Management Plans and Policies

1. The Bolo Station and Cadiz Valley Alternative sites are located within a larger area managed for visual and other resources by BLM. Guidelines for management of the area's visual resources reflect requirements of both NEPA and FLPMA. NEPA states that it is the responsibility of the federal government to "...assure for all Americans safe, healthy, productive, and aesthetically pleasing surroundings." FLPMA requires that "...public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air, atmospheric, water resource, and archaeological values..." [FLPMA, Section 102(a)(8)].

2. Visual resources include land, water, vegetation, and other natural or man-made features evident on public lands. To integrate visual resources into the management process, Visual Resource Management (VRM) classes are assigned to public lands managed by BLM according to inherent visual quality, viewer sensitivity levels, and distance zones.

3. The VRM system is an analytical process that identifies, sets, and meets objectives for maintaining scenic values and visual quality. Management classes describe the different degrees of modifications allowed to the basic element (form, line, color, and texture) of the landscape, and are used to assess the visual impact of proposed development. VRM classes range from I to V and are assigned to areas with the following management objectives:

   - **Class I** - Natural ecological changes and very limited management activity are allowed. Any contrast created within an existing landscape must not attract attention. This classification is applied to wilderness areas, wild and scenic rivers, and similar situations.

   - **Class II** - Changes in any basic element (form, line, color, texture), as caused by a management activity, should not be evident in the characteristic landscape. Contrasts can be seen, but should not attract attention.

   - **Class III** - Contrasts to basic elements caused by a management activity are evident, but should remain subordinate to the existing landscape.

   - **Class IV** - Contrasts can attract attention and form dominant landscape features in terms of scale, but they should repeat the form, line, color, and texture of the characteristic landscape.

   - **Class V** - This classification is applied to areas where the natural character of the landscape has been disturbed to a point where rehabilitation is needed to allow the terrain to be classified into one of the previous four classifications.

4.9.2 REGIONAL CHARACTERISTICS

1. The project region reflects characteristic desert landscape features with sandy soil, sparse vegetation, and widely dispersed human activity and habitation. In the project vicinity, visual topographic interest is provided by the areally-limited but abrupt mountain ranges that surround Bristol and Cadiz basins. An element of interest is the large Cadiz Dunes area situated between three and seven miles from the Bolo Station and Cadiz Valley Alternative sites.

2. The prominent topographic feature in the project vicinity is Amboy Crater, which is about one-third square mile in area and rises approximately 250 feet above the desert floor. This crater, formed by relatively recent volcanic activity (about 6,000 years or less before the present) (see Section 4.2.2), is about seven miles west of the Bolo Station site. The crater is visible throughout the Bristol Basin and northern Cadiz Basin, especially from surrounding summits. The crater is a registered National Historic Landmark.

3. Small settlements scattered throughout the region provide intermittent visual diversion to travelers. These desert communities include Amboy, Saltus, Chambless, Cadiz, Essex, and others. Due to their small size and population, these settlements provide minimal intrusion into the spaciousness of the desert.

4.9.2.1 Designated Scenic Highways/Trails

1. The following highways and roads have been designated as scenic routes either by the County, state, or by the County and state (County, 1989):

   - **I-40: Ludlow to Needles** - This stretch of I-40 traverses the southern boundary of the EMNSA. The portion of this scenic highway nearest the proposed action is at Kelbaker Road interchange, approximately 12 miles north of the Bolo Station site and approximately 20 miles northwest of the Cadiz Valley Alternative site.

   - **Kelbaker Road: I-40 to I-15** - Kelbaker Road extends northward from Route 66 in the vicinity of the Bolo Station site towards I-40. The designated scenic route portion of Kelbaker Road extends north and northwest of I-40, approximately 12 miles north of the site, to I-15 at Baker, a distance of approximately 65 miles.

   - **Kelso-Cima Road: Kelso to Cima** - Kelso-Cima Road extends in a north-northeasterly direction from Kelbaker Road and lies about 31 miles north of the Bolo

Station site and 40 miles north-northwest of the Cadiz Valley Alternative site.

- **Cima Road: Cima to I-15** - This road extends in a north-south direction through the EMNSA. The portion of this road that is nearest the proposed action is at Cima, about 45 miles north-northeast of the Bolo Station site and 53 miles north of the Cadiz Valley Alternative site.

- **Essex Road: Essex to Mitchell Caverns** - This road lies about 25 miles northeast of the Bolo Station site and 21 miles north-northeast of the Cadiz Valley Alternative site.

- **Route 66 (National Trails Highway)** - Route 66 is not a designated scenic highway in the project region. It is a designated scenic highway between Oro Grande and Lenwood. Lenwood is 85 miles north-northwest of the Bolo Station site and 98 miles north-northwest of the Cadiz Valley Alternative site.

4.9.3 LOCAL VISUAL CHARACTERISTICS

4.9.3.1 Bolo Station Site

4.9.3.1.1 Scenic Quality

1. The Bolo Station site is located in northern Bristol Basin between the northwestern shore of Bristol Dry Lake and Route 66. The site is on an alluvial fan surface with a gentle north-to-south slope and elevations ranging from about 610 to 935 feet above msl. The site is transected by the ATSF railroad. The railroad is buffered by soil levees which range from 5 to 10 feet in height. The primary natural topographic variation and visual interest to the otherwise flat landscape is provided by the rocky outcrop, known as Bolo Hill, in Section 5 at the northern extent of the project site. South of the railroad tracks, several sand dunes also are evident. Onsite vegetation consists primarily of a sparse creosote bush scrub community, with a more robust community on the northern portion of the site than on the southern portion (see Section 4.5).

2. Existing onsite man-made disturbances include the railroad and associated levees, culverts, and bridges for surface water control. Dirt roads flank both sides of the railroad, and unmaintained roads parallel the shoreline of Bristol Dry Lake and extend around the southern site perimeter. Three additional unmaintained dirt roads cross the northern portion of the site: two run in an east-west direction, and one extends from Route 66 to the railroad. Other existing disturbances in the northern site area are a radio transmission facility situated on Bolo Hill and a telephone pole line.

3. The visual appearance of the Bolo Station site is consistent with the surrounding area. It is an even, regular surface with sparse vegetation and few human modifications. Currently, the primary focal point is the ATSF railroad, which traverses the center of the site in an east-west direction, but is difficult to discern from Route 66. The approximate 7.5-square mile site displays buff to tan colored soils with sparsely-distributed yellowish-green to grayish-green vegetation, depending on the season. The low-growing vegetation provides more intense green color in the spring and after precipitation events, varying from a brilliant lime green in spring to a deep gray-green during most other seasons.

4. The Bolo Station site is situated within a large Class IV VRM area, as designated by BLM. It is bounded by Class III areas at some distance from the site. North of Route 66 is a mix of Class II, III, and IV areas. This mix reflects the varied visual quality of the area, which consists of a series of small stark mountain ranges with intervening flat, sandy, sparsely vegetated desert valleys. This configuration provides a sense of space and openness. The site vicinity is characterized by Amboy Crater and the various mountain ranges rising sharply from the desert floor.

4.9.3.1.2 Site Visibility

1. Views to the Bolo Station site are available to the public from Route 66, Amboy Road, and the network of roads in the area. Average daily traffic along these roadways is light to moderate. The Bolo Station site is partially visible from I-40 via the Orange Blossom Wash.

2. For east-bound travelers along Route 66, the site is visible from a distance of about six miles. For west-bound travelers, the site is visible from Cadiz Summit, also a distance of about six miles. For travelers on Amboy Road, the site is visible from Sheephole Summit located approximately 20 miles south of the site. Moving northward from the summit, Amboy Road descends to the basin floor, and the view of the site changes from an elevated overview to a line-of-sight view.

In the area of the lakebed saltworks, line-of-sight views to the Bolo Station site from Amboy Road are blocked by mining and processing operations.

3. Bolo Station site provides expansive views of Bristol and Cadiz basins and surrounding mountain ranges. Views are sometimes obscured during the warmer and drier times of the year, due to naturally occurring dust and haze (see Section 4.7). The site's viewshed includes the following:

   - Bristol Mountains to the northwest.
   - Marble Mountains to the north-northeast.
   - Ship Mountains to the east.
   - Calumet Mountains to the south-southeast.
   - Sheephole Mountains to the southwest.
   - Bullion Mountains to the west-southwest.
   - Amboy Crater National Natural Landmark to the west.

4.9.3.2 Cadiz Valley Alternative Site

4.9.3.2.1 Scenic Quality

1. The Cadiz Valley Alternative site is located on mountainous and alluvial fan terrain at the southern periphery of the Ship Mountains. Onsite elevations range from 650 to 1,000 feet above msl, with bedrock outcrops in Sections 5 and 9 giving way to talus and alluvial deposits that slope downward in a southwest direction. The site is vegetated by a sparse creosote bush scrub community, but is barren in areas containing exposed bedrock, coarse talus or flood deposits, and well-consolidated desert pavement. The primary visual quality of the site is its sense of space and openness. The higher elevations yield expansive panoramas of Bristol and Cadiz basins that include Amboy Crater, Cadiz Dunes, and surrounding mountain ranges.

2. Existing onsite man-made disturbances are clustered in a corridor that roughly bisects the alternative site in a northwest-southeast direction. Mountainous and steep terrain occurs on the northeastern side of the corridor and more gently sloping alluvial fan terrain characterizes the opposite side. The disturbance corridor contains the single-track Arizona-California Railroad, Cadiz Road, and the Celeron-All American pipeline installation. Levees control surface water drainage patterns on the northeastern side of the railroad, and direct surface waters through man-made structures associated with the railbed. Cadiz Road is a graded dirt road through the site area. Tracked vehicle scars are also apparent on the ground surface northeast and southwest of this corridor.

3. The visual appearance of the Cadiz Valley Alternative site is consistent with the surrounding area. Currently, the primary focal point is the Arizona-California Railroad and Cadiz Road. The approximate five-square mile site displays dark brown to gray to buff colored surface outcrops and soils with sparsely distributed yellowish-green to grayish-green vegetation. Plant species have more dense, linear distributions in the desert washes southwest of Cadiz Road than elsewhere on the site. The effects of geological processes are apparent at the site, notably the talus deposits adjacent to the Ship Mountains in Sections 5 and 9, and the effects of past major flooding events, which transported large cobbles and boulders downstream along well-developed drainage channels.

4. The alternative site is included in a Class III VRM area, according to the BLM classification system. Most adjoining lands are of a lesser visual quality (Class IV). The nearest area of higher visual quality is located about six miles north of the site, a Class II area north of the ATSF railroad.

4.9.3.2.2 Site Visibility

1. Views to the alternative site are available to the public primarily from Cadiz Road and the town of Cadiz. The site is also visible from Route 66, but is currently indiscernible from the surrounding terrain. The Cadiz Valley Alternative site's viewshed is similar to the Bolo Station site and includes the following:

   - Bristol Mountains to the northwest.
   - Marble Mountains to the north-northeast.
   - Ship Mountains immediately northeast.
   - Old Woman Mountains to the east.
   - Kilbeck Hills to the southeast.
   - Iron Mountains to the southeast.
   - Calumet Mountains to the southwest.
   - Sheephole Mountains to the southwest.
   - Amboy Crater National Natural Landmark to the west.

4.10 CULTURAL RESOURCES

1. Cultural resources are places or objects that are important for scientific, historic, and/or religious reasons to cultures, communities, groups, or individuals. Cultural resources include historic and prehistoric archaeological sites, architectural remains, structures, and artifacts that provide evidence of past human activity and places of importance in the traditions of societies or religions.

4.10.1 REGIONAL SETTING

1. The prehistory, ethnography, and history of the project region are briefly summarized in this section. Human settlement of the region may have begun as early as 12,000 years ago, at the end of the Pleistocene, but the earliest cultural materials with reliable dates are known from the Lake Mojave period (10,000 to 5000 B.C.). These early sites have been recorded along the shores of ancient lakes and streams at Danby Lake and Pinto Basin in the general project region (Warren, 1984; New Mexico State University, 1989; Campbell and Campbell, 1935; Campbell et al., 1937). Native peoples adapted through time to the increasingly arid environment. Historically, the railroad spurred Euroamerican settlement of the region.

4.10.1.1 Prehistory

1. The prehistory of the Mojave Desert is generally divided into six distinct cultural periods (Warren, 1984). The earliest and most problematic is the Pleistocene period, which occurred prior to 10,000 B.C. Cultural evidence for this period is scarce and consists of nondiagnostic pebble tools associated with relict geomorphological features.

2. The Lake Mojave period is distinguished by the presence of diagnostic projectile points, including Lake Mojave, Silver Lake, Clovis, and other types, as well as distinctive crescents, knives, and other tools. The climate was considerably cooler and wetter than today, and many basin floors were occupied by large freshwater lakes fed by streams. Native peoples lived in large groups in the vicinity of the lakes, streams, and springs where plant and animal foods were plentiful. The marsh environments additionally provided raw materials needed for housing and clothing. The tool assemblage indicates a dependence on hunting for subsistence.

3. The succeeding Pinto period (5000 to 2000 B.C.) was a time of stress for the native peoples. As the Mojave Desert became increasingly warmer and dryer, the lakes and rivers dried up, and the distribution of plants and animals altered dramatically. The native subsistence economy was required to adapt to these conditions. Hunting continued to be important, as evidenced by the distinctive Pinto type of projectile point, but the subsistence value of small, hard seeds gained increasing importance during this time as emphasized by the appearance of a ground stone industry including large flat or basined milling stones and hand-held grinding implements. During the Pinto period, it is hypothesized that the size of settlements were reduced, but their number increased, indicating a limitation on the number of people that could be supported by a local environment.

4. The subsequent Gypsum period (2000 B.C. to A.D. 500) is a time when populations were more successfully adapted to the arid desert environment. The subsistence base was more diversified than that of the previous period, and use of a wider range of environmental zones was pursued. A diagnostic artifact of the period is the Gypsum Cave type of projectile point, and seed grinding tools are common in the cultural assemblage. A marked increase in the number of petroglyphs and the appearance of split-twig figurines, which are interpreted to signify the increased importance of ritual activities, are also notable for the Gypsum period, as is the use of cryptocrystalline toolstones for biface production. Toward the end of this period, the bow-and-arrow was introduced, a technological change that improved the success of hunting activities.

5. The Saratoga Springs period (A.D. 500 to 1200) represents a continuation of the earlier Gypsum period, but is marked by strong regional developments. Three regional developments are recognized:

   - Eastern Mojave, which is defined by strong Anasazi influence including characteristic grayware pottery.
   - Northwestern Mojave, which is marked by the dominance of the smaller Rose Springs and Eastgate points over the earlier dart points.

- Southern Mojave, which reflects strong influence from the Lower Colorado River cultures including introduction of the Cottonwood Triangular projectile point and brownware and buffware pottery.

Contact with California Coast and Lower Colorado River peoples is evident in the material culture. The Bolo Station and Cadiz Valley Alternative sites fall within the southern Mojave region.

6. The final chronological period in the prehistoric cultural sequence is the Protohistoric period (1200 A.D. to historic contact). The regional cultural developments that began during the Saratoga Springs period continued during this period. Brownware and buffware pottery and Desert Side-notched points are common in the southern Mojave region, and increased trade relationships between the California coast and the Lower Colorado River peoples is more strongly evidenced by the diversity in material culture.

4.10.1.2 Ethnography

1. The Bolo Station site is situated in a transitional ethnographic region considered an area of intermittent use by the Chemehuevi to the northeast and the Serrano to the southwest (Knack, 1981). These two groups spoke different languages within the Uto-Aztecan family of languages (Moratto, 1984), but had several factors in common. Both groups were hunters and gatherers, and the territories of both peoples included several different biota ranging from the low desert valley floors to the higher mountain elevations. Small family groups moved throughout their territory in accordance with a subsistence economy based on a seasonal round of resource exploitation. The Serrano were not agriculturalists in precontact times, while the Chemehuevi, while basically gatherers, did farm along riverways in their territory (Knack, 1981).

2. Hunting was primarily a male activity, while the gathering of plant and small animal foods was characteristically performed by women and children. Animals commonly taken as game include deer, mountain sheep, pronghorn antelope, hares, rabbits, rodents, and birds. Hunting technologies included the bow-and-arrow, snares, throwing sticks, and dead falls. Among the important plant foods exploited were screw beans, mesquite beans, agave, pinyon nuts, acorns, cactus fruits, and chia.

3. It is likely that one or more of the ethnographic groups in the project region collected salt from Bristol Dry Lake (Michael K. Lerch & Associates, 1990). Both the Chemehuevi and the Mojave, who lived along the lower Colorado River historically, sang the Salt Song. This song is an element of each group's oral history and relates the itinerary of a singer to various places in the Mojave Desert, including the project area (Michael K. Lerch & Associates, 1990, as in Kroeber, 1972; Laird, 1976). Kroeber identifies one stop in the Mojave Salt Song as *Selye'aya-kuvataye*, whose location was identified by his informant as the "sandhills south of Amboy, two deserts [i.e., valley systems] away to the west from the Colorado River at Parker" (Michael K. Lerch & Associates, 1990, as in Kroeber, 1972). Chemehuevi from the Parker area are reported to have traditionally gathered salt at Bristol Dry Lake (Michael K. Lerch & Associates, 1990, as in CSRI, 1979).

4.10.1.3 History

1. Historic use of the project region centers around transportation and mining. Both rail and road transportation were important in the historic development of the area. The earliest known historic activity in the project region occurred in 1868 when General William J. Palmer and his party surveyed the railroad route. The Southern Pacific Railroad later built the railroad, and service to Amboy was established in 1883. In 1884, the Amboy to Needles line was purchased by the Atlantic and Pacific Railroad, and sold to ATSF in 1890.

2. A section camp and railroad siding were established at the proposed project site in 1883 to service the steam-powered locomotives. First known as Bristol, ATSF changed the name to Bombay in 1898 and then to Bengal. It was changed again in 1915 to Bolo. A number of historic maps of the project area depict the location of the section camp and label the location as Bengal (Rueger, 1903; Mendenhall, 1909; Auto Club, 1914) or Bolo (Thompson, 1921; State Railroad Commission, 1926).

3. Additional section camps were also established in the project region to service the steam-powered train system. These include Siberia, Bagdad, Amboy, Cadiz, Siam, Danby, Arimo, Edson (Essex), Fenner, and Archer. The section camps housed maintenance crews and served as water and fuel stops for the steam locomotives. Water was imported from Newberry Springs to Bolo section camp in rail tank cars.

4. By 1941, the railroad was converting to diesel-powered locomotives, which required less maintenance and fewer water stops than steam-powered engines. The conversion to diesel power was completed by 1952 (Michael K. Lerch & Associates, 1990, as in Duke and Kistler, 1963; Bryant, 1974). The Bolo section camp was abandoned around this time, with many of the usable materials salvaged for use elsewhere (Michael K. Lerch & Associates, 1990). On the 1956 USGS 15-minute topographic quadrangle of Cadiz Lake, Bolo section camp is not labeled, but the hill north of the railroad, at the northern boundary of the proposed project site, is labeled "Bolo."

5. Another aspect of the historic development of the project region was the establishment of the National Old Trails Road, which is described as an oiled dirt road (Michael K. Lerch & Associates, 1990, as in Thompson, 1921). It is shown on a 1914 Auto Club road map of the region as passing through Ludlow, Nome, Amboy, and Fenner (Michael K. Lerch & Associates, 1990). In 1926, the oiled road was designated as part of Route 66, which connected Chicago to Los Angeles. By 1934, the section through the California desert was paved (Michael K. Lerch & Associates, 1990, as in Scott and Kelly, 1988). When Interstate Highway 40 was completed in 1972, Route 66 was bypassed as a major automobile thoroughfare. The current paved route is about one-quarter mile north of the original oiled road route in the project vicinity (Michael K. Lerch & Associates, 1990).

6. Settlement of small towns in the vicinity of the Bolo Station and Cadiz Valley Alternative sites was related to the extension of the railroad into the project region and later development of mineral deposits at Bristol Dry Lake. Amboy and Cadiz were settled in 1883 as railroad section camps. Saltus was established sometime in the 1920s after gypsum and salt mills were developed in the area (Weil et al., 1984). Production of salt and calcium chloride from Bristol Dry Lake was initiated in 1909 (Smith, 1966).

4.10.2 LOCAL SETTING

4.10.2.1 Bolo Station Site

4.10.2.1.1 Cultural Resource Inventory

1. An archival search, literature review, and intensive field survey of the proposed project site was conducted in 1990 and 1991 (Michael K. Lerch & Associates, 1990, 1991; Lerch, 1991). The purpose of these efforts was to produce an inventory of the cultural resources that could potentially be affected by the proposed action and to make preliminary evaluations of the potential significance of each resource. Additionally, Native American consultation was completed by BLM.

2. Archival data search and literature review was completed at the San Bernardino Archaeological Information Center located at the San Bernardino County Museum, which is the official repository for archaeological information pertaining to the County. Additional review of mapped data was conducted at the Tomas Rivera Library, University of California, Riverside. Data reviewed included historical maps, resource index maps, survey reports, site records, referenced literature, and other available archaeological, ethnographic, and historical literature. BLM conducted a review of the Native American sacred lands inventory, which revealed that no known locations of religious importance occurred within the Bolo Station site (BLM, 1992).

3. The results of the archival and literature research revealed that portions of the Bolo Station site had been subject to archival and/or field research previously. Previous research was conducted for the Celeron-All American Pipeline project, an oil pipeline development (New Mexico State University, 1989), the SCE Allen-Warner Valley Energy System project (CSRI, 1979; Barker et al., 1979), and development of the BLM CDCA Plan (von Till Warren et al., 1981; Gallegos et al., 1980; Ritter and Coombs, 1990). Three sites were previously recorded in the project area: National Old Trails Road (site SBr-2910H), a small historic trash scatter (site SBr-5813H), and an historic railroad camp (SBr-5814H) (New Mexico State University, 1989). In addition, two campsites (SBr-3262 and SBr-3268) and an isolated basalt biface tool (A151-1) were

previously recorded in the sand dunes skirting the southwestern periphery of the site (Gallegos et al., 1980). During the field survey for the proposed action, three additional isolated prehistoric artifacts (isolated finds I-8, I-9, and I-13) were recorded outside the southwestern site boundary.

4. Through the archival research and field survey efforts, 22 sites and 8 isolated finds were inventoried at the proposed Bolo Station site (Table 4.10.1). The recorded cultural resources reflect Native American use of the area during prehistory and historical use of the area in support of, or as a result of, rail and road transportation.

5. Eight sites date to the prehistoric period as do the eight isolated finds. The remaining 14 sites date to the historic period. The prehistoric sites are dominated by small lithic scatters of jasper (sites SBr-6677, SBr-6679, SBr-6680, SBr-6681, SBr-6683, and SBr-6684) or rhyolite (site SBr-6678). These archaeological properties consist of a few flakes (4 to 40), sometimes in association with a core. The remaining prehistoric property, site SBr-6682, is a temporary camp and extensive lithic scatter recorded in the sand dune deposits along the northeastern margin of Bristol Dry Lake. This site extends beyond the boundary of the Bolo Station site, but the greatest area of the archaeological property is situated onsite (approximately 75 to 80 percent) (Lerch, 1991).

6. The 14 historic period cultural resources in the Bolo Station site include the National Old Trails Road (site SBr-2910H) and two temporary roadside camps (sites SBr-6685H and SBr-6686H), one with a vehicle wreck. The road, a segment of an oiled dirt feature that was the original path of Route 66, is estimated to have been primarily in use from prior to 1914 until 1934, when Route 66 was moved about one-quarter mile northward and paved with asphalt (Michael K. Lerch & Associates, 1990). The two roadside camps contain rock alignments (tent foundations) and scattered historic trash. A wrecked car, estimated to date to the 1940s, is associated with the historic remains at site SBr-6686H. Also associated with the National Old Trails Road is a small trash scatter with a rock cairn (site SBr-6687H).

7. A second historic road (site SBr-6694H) was recorded during the survey of the Bolo Station site, and it predates (pre-1914) the National Old Trails Road. This road was the original road from Amboy to Cadiz, and continued onward to Needles.

8. Other historic period cultural resources are related to the railroad. The railroad berm, which dates from 1883 to the present, was recorded as site SBr-6693H. Camps occupied during construction or operation of the railroad include the Bolo section camp (site SBr-6690H), a small satellite to the section camp (site SBr-6689H), and a construction camp (site SBr-5814H). Bolo section camp was occupied from 1883 to 1950 and known by various names in addition to Bolo including Bristol, Bombay, and Bengal.

9. Three trash scatters (sites SBr-5813H, SBr-6688H, and SBr-6691H) and a cache of insulators (site SBr-6692H) are also related to the presence of the railroad in the project area. A small dump of approximately 100 cans (site SBr-6834H) was recorded unassociated with a road or campsite, and is assumed to be railroad related. This ineligible site was not relocated during field survey and is assumed to have been destroyed during installation of the Celeron-All American Pipeline (Michael K. Lerch & Associates, 1991).

4.10.2.1.2 Cultural Resource Significance

1. The evaluation of cultural resource significance is required under:

   - Federal law - NHPA, as amended, and its implementing regulations (e.g., 36 CFR Part 800 and 36 CFR Part 60).
   - State law - CEQA.

2. Under NHPA and CEQA, significant cultural properties are considered, including treatment of adverse effects that may result from a proposed action. The County General Plan defines important cultural resources as those that meet either the criteria of CEQA or meet those of 36 CFR Part 60.4, which define the criteria for eligibility to the NRHP. Additionally, CEQA specifically provides that treatment of cultural resources following federal guidelines may be used when a federal action is part of project approval. Because the proposed action includes federal actions, the significance of cultural resources in the Bolo Station site was evaluated using federal guidelines.

TABLE 4.10.1

CULTURAL RESOURCES
BOLO STATION SITE AND NEAR VICINITY

SITE/ISOLATE	SITE TYPE	PROPERTY JURISDICTION	NATIONAL REGISTER STATUS	COMMENTS
SBr-2910H	H - National Old Trails Road: oiled dirt road (pre-1914 to 1934)	County	Onsite segment recommended eligible (July 14, 1992).(1)	Onsite portion will be affected by proposed action, but no adverse effect due to "adaptive reuse" of road as part of project.
SBr-3262	P - Temporary campsite	BLM	Not evaluated.	Not relocated during recent survey (in sand dunes; not onsite).
SBr-3268	P - Temporary campsite (ca. A.D. 900 to Historic)	BLM	Not evaluated.	Not relocated during recent survey (in sand dunes; not onsite).
SBr-5813H	H - Trash scatter	BLM	Eligible. Recommended ineligible.	Not relocated during recent survey; assumed destroyed.
SBr-5814H	H - Railroad construction camp (1902 to 1920)	BLM	Recommended ineligible (July 14, 1992).(1)	Subsurface testing determined site not to be eligible.
SBr-6677	P - Lithic scatter	County	Recommended ineligible.	--
SBr-6678	P - Lithic scatter	County	Recommended ineligible.	--
SBr-6679	P - Lithic scatter	County	Recommended ineligible.	--
SBr-6680	P - Lithic scatter	County	Recommended ineligible.	--
SBr-6681	P - Lithic scatter	County	Recommended eligible.	Collected.
SBr-6682	P - Temporary campsite	BLM/County	Recommended ineligible.	Partially collected.
SBr-6683	P - Lithic scatter	County	Recommended ineligible.	--
SBr-6684	P - Lithic scatter	County	Recommended ineligible.	--
SBr-6685H	H - Temporary roadside campsite	County	Recommended ineligible.	Associated with National Old Trails Road.
SBr-6686H	H - Temporary roadside campsite with vehicle wreck (1940s vintage), tent foundations, and trash scatter.	County	Recommended ineligible.	Associated with National Old Trails Road.
SBr-6687H	H - Trash scatter and rock cairn.	County	Recommended ineligible.	--

(1) Jacobs, 1992c

H = Historic
P = Prehistoric

TABLE 4.10.1

CULTURAL RESOURCES
BOLO STATION SITE AND NEAR VICINITY
(Continued)

SITE/ISOLATE	SITE TYPE	PROPERTY JURISDICTION	NATIONAL REGISTER STATUS	COMMENTS
SBr-6688H	H - Trash scatter	BLM	Recommended ineligible.	--
SBr-6689H	H - Campsite with tent foundations and trash scatter (ca. 1906 to 1915).	BLM	Recommended ineligible.	Satellite of Bolo section camp.
SBr-6690H	H - Railroad section camp: Bristol/Bombay/ Bengal/Bolo (1883 to 1950).	BLM	Recommended ineligible (July 14, 1992).(1)	Subsurface testing conducted. Previous disturbance results in lack of historic integrity of the site.
SBr-6691H	H - Trash scatter.	County	Recommended ineligible.	--
SBr-6692H	H - Cache of telephone pole insulators.	County	Recommended ineligible.	--
SBr-6693H	H - Railroad (1883 to present).	BLM/County	Recommended ineligible.	--
SBr-6694H	H - Road and telephone pole line (pre-1914).	County	Recommended ineligible.	Original automobile route between Amboy and Cadiz
SBr-6834H	H - Tin can dump.	BLM	Recommended ineligible.	--
I-1	P - Isolated flake.	County	Recommended ineligible.	--
I-2	P - Isolated flake.	County	Recommended ineligible.	--
I-3	P - Isolated flake.	County	Recommended ineligible.	--
I-6	P - Isolated unifacial tool.	County	Recommended eligible.	Collected.
I-7	P - Isolated biface.	County	Recommended ineligible.	--
I-8	P - Isolated core.	BLM	Recommended ineligible.	Not located in Bolo Station site.
I-9	P - Isolated flake.	BLM	Recommended ineligible.	Not located in Bolo Station site.
I-10	P - Isolated core/chopper tool.	County	Recommended eligible.	Collected.
I-11	P - Isolated core.	County	Recommended ineligible.	--
I-12	P - Isolated flake.	County	Recommended ineligible.	--
I-13	P - Isolated flake.	BLM	Recommended ineligible.	Not located in Bolo Station site.

91-109 (11/4/92/mg)

(1) Jacobs, 1992c

H = Historic
P = Prehistoric

As cited in 36 CFR Part 60.4, these are as follows:

- The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of state and local importance that possess integrity of location, design, setting, materials, workmanship, feeling and association, and:

  (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or

  (b) that are associated with the lives of persons significant in our past; or

  (c) that embody the distinctive characteristics of a type, period, method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack distinction; or

  (d) that have yielded, or may be likely to yield, information important to prehistory or history.

3. The final evaluation of cultural resource significance for the Bolo Station has been completed (Jacobs, 1992c). Of the 22 sites and 8 isolated finds recorded within the proposed action's area of potential effect (APE), three sites required further clarification of eligibility status:

   - **SBr-2910H**: A segment of the National Old Trails Road (1914 to 1934) was determined eligible for the NRHP in September 1990. Investigations conducted as part of the proposed action determine the onsite portion of the road to be eligible for the NRHP under criterion (a) ... "associated with events ..." (Jacobs, 1992c).

     Since this site is eligible, a determination of effect has been prepared and submitted to the BLM for consultation with the SHPO and ACHP (see Section 5.10 for a discussion of affect to this site from the proposed action).

   - **SBr-5814H**: A railroad construction camp (1902 to 1920) was determined via subsurface testing conducted as part of the proposed action not to be eligible for the NRHP (Jacobs, 1992c). This finding will be provided by the BLM to the SHPO for its concurrence in accordance with 36 CFR 800.

   - **SBr-6690H**: The railroad section camp referred to by various names including Bristol, Bombay, Bengal, and Bolo (1883-1950). Through subsurface testing conducted as part of the proposed action, the site was determined to lack historic integrity and is not eligible for the NRHP (Jacobs, 1992c). This finding will be provided by the BLM to the SHPO for its concurrence in accordance with 36 CFR 800.

4.10.2.2 Cadiz Valley Alternative Site

4.10.2.2.1 Cultural Resource Inventory

1. As agreed by the County and BLM, assessment of cultural resources of the Cadiz Valley Alternative site was limited to archival data and literature review. No field study was required or completed.

2. Archival data search and literature review were conducted at the San Bernardino Archaeological Information Center, located at the San Bernardino County Museum. Data reviewed included resource index maps, site records, survey and excavation reports, cultural resource and ethnographic overviews, historical maps, and additional literature.

3. The archival and literature research revealed that two surveys had previously been conducted in the alternative site area. Both were accomplished for the Celeron-All American Pipeline Project in a narrow corridor centered along the railroad (Weil et al., 1984; New Mexico State University, 1989).

4. The earlier study encompassed archival search, literature review, and a sample survey using 1/8x1 mile transects (Weil et al., 1984). One transect was surveyed across the corners of Sections 5, 6, 7, and 8 with negative results. The subsequent survey effort, conducted in 1985, included a 200-foot wide corridor centered on the railroad (New Mexico State University, 1989). It was also negative for cultural resources in the alternative site area.

5. Additional cultural resource surveys were conducted in the vicinity of the alternative site.

These include two studies conducted immediately west of the site in Sections 7 and 18, one for a proposed earth and gravel borrow pit (Leonard, 1981) and the other for the BLM (Westec Services, 1978). A small scatter of five flakes, site SBr-4759, was recorded in Section 7, and an isolated find was recorded in Section 18. Neither of these cultural resources were recommended as potentially eligible.

6. Southeast of the Cadiz Valley Alternative site is a historic railroad section camp known as Archer or Archer Station. The camp was developed to service steam locomotives along ATSF's Cadiz to Parker line, which became operational around 1910. Cultural material currently remaining at Archer (site SBr-3282H) include a well and a small cemetery with nine graves, two of which date to 1919 and 1924 (Weil et al., 1984). No siding and few railroad materials remain at the site, but a large tamarisk tree still thrives in the location.

7. The section camp was probably established in 1910, based on well data dated from this time. A review of historic maps for the alternative site area (Rueger, 1903; Mendenhall, 1909; Auto Club, 1914; Thompson, 1921; and State Railroad Commission, 1926) do not identify Archer until 1914. The 1921 and 1926 maps also show a location for McCoy, a probable section camp within or just northwest of the Cadiz Valley Alternative site. No evidence of McCoy was found during the Celeron-All American Pipeline survey field efforts (New Mexico State University, 1989).

8. Review of the California Historic Landmark Record indicates that the eastern one-third of the County has the potential to contain the dispersed remains of General Patton's Desert Training Center and maneuver areas, which date between 1942 and 1944. The locations of these remnants are largely unknown, but any recorded remains would be identified as CHL-985. None were found during fieldwork for the Bolo Station site, and none are known for the Cadiz Valley Alternative site, which was not field-surveyed. The closest military base camp to the alternative site area is Camp Iron Mountain, situated in the Iron Mountains. Additional base camps in the general vicinity include Camp Essex and Camp Coxcomb.

4.10.2.2.2 Cultural Resource Significance

1. Little is known of the cultural resources of the Cadiz Valley Alternative site due to the lack of previous field studies in the majority of the site area. The closest known cultural resources of potential significance is Archer Station, which has a small cemetery and is located about 1.5 miles southeast of the alternative site boundary. Additionally, if remnants of General Patton's training exercises are located onsite, these resources would be considered to have California Historic Landmark status and potential NRHP eligibility status.

2. BLM conducted a review of the Native American sacred lands inventory for the alternative site (BLM, 1992). No known locations of religious importance were identified within the Cadiz Valley Alternative site as a result of this study.

4.11 PALEONTOLOGICAL RESOURCES

1. Paleontological resources are the fossilized remains of ancient environments. Resources include fossilized bones and plant parts, impressions of plant, insect, or animal parts preserved in stone, and preserved tracks of insects and animals. Paleontological resources are best preserved in fine-grained sedimentary rocks, such as limestone and siltstone, and can be found in metamorphosed sedimentary rocks such as shale. Paleontological resources are valued for the information they yield about the history of the earth and its past ecological settings. In addition, fossils provide important chronological information used to interpret geological processes and regional history.

2. Paleontological resources are managed according to a number of federal and state laws including, among others, the Antiquities Act of 1906, NEPA, FLPMA, and CEQA. These laws provide for the consideration and protection of the nation's and state's fossil resources.

4.11.1 REGIONAL SETTING

1. The Bolo Station and Cadiz Valley Alternative sites lie within the same general region. The proposed project site lies near the floor of Bristol Basin adjacent to Bristol Dry Lake, while the alternative site is situated to the southeast along the northeastern slope of the adjoining Cadiz Basin.

2. In Pleistocene times (1 million to 12,000 years ago), a series of permanent lakes existed in southern California. The project region is situated at the northern end of one such potential lake system defined by a topographic depression known as the Bristol-Cadiz-Danby Trough; however, there is disagreement among experts as to whether the lakes were permanent or emphemeral (Rosen, 1991; Brown and Rosen, 1992). The structural nature of the trough and extent and relationships of Pleistocene paleohydrology in the project region remain unresolved. The recovery of chronologically diagnostic fossils from the Bolo Station or Cadiz Valley Alternative sites could provide biostratigraphic data that would have important implications for understanding the structural development of the southeastern Mojave Desert and the Pleistocene drainage systems in the region.

3. Previous research of the project region indicates that the sites lie within the basin of a large Pleistocene lake that filled the combined Cadiz-Bristol Basin to an elevation of 800 feet. These Pleistocene lake sediments are known to contain fossil assemblages near Cadiz and Archer (San Bernardino County Museum, 1991). Changes in the water level of the Pleistocene lake allowed deposition of late Pleistocene sediments at lower elevations than mid-Pleistocene sediments.

4.11.2 PREVIOUS PALEONTOLOGICAL RESEARCH IN PROJECT REGION

1. Previous research in the project region has been undertaken intermittently since about 1959. The USGS conducted drilling programs at Bristol, Cadiz, and Danby dry lakes, and fossil foraminifera, ostracods, and seeds were recovered from Cadiz Lake (San Bernardino County Museum, 1991, as in Bassett et al., 1959). Mount (1974) conducted paleontological investigations on the Lower Cambrian faunas in the southeastern Marble Mountains, northeast of Cadiz.

2. Recently, additional paleontological research was performed for the Celeron-All American Pipeline project (San Bernardino County Museum, 1991, as in Reynolds, 1986; 1988) and for the Pacific Agriculture project (Reynolds, 1991). The Celeron-All American pipeline is installed parallel to the ATSF rail line and the Arizona-California Railroad through the project region. The pipeline project resulted in the salvage of Pleistocene vertebrate fossils from two distinct localities: one near Cadiz approximately one mile from the Bolo Station site; and the other near Archer approximately 1.5 miles from the Cadiz Valley Alternative site. The Cadiz locality fossils were recovered from Pleistocene lake sediments when a lake stood 150 feet higher than the present elevation of Bristol Dry Lake and approximately 200 feet higher than Cadiz Lake existed. The Archer assemblage was recovered from sediments representing the high stand of the Pleistocene lake that filled the combined Cadiz-Bristol Basin to an elevation of 800 feet. Both the Bolo Station and Cadiz Valley Alternative sites are within the depositional basin of this Pleistocene lake.

3. The Pacific Agriculture project site is located south of Route 66 near Cadiz, approximately 2.5 miles east of the Bolo Station site and 2.5 miles northwest of the alternative site. Field survey of this large parcel of land located 169 paleontological resource localities, yielding

an average of 13 sites per square mile. Fossils include extinct camel, pronghorn antelope, giant tortoise, and horse, as well as additional taxa that still exist today.

4.11.3 LOCAL SETTING

1. Paleontological resources known for the Bolo Station and Cadiz Valley Alternative sites are reviewed in the following sections. Information is derived from a series of reports prepared by the San Bernardino County Museum (San Bernardino County Museum, 1991; Springer, 1992). Research methods for both sites include a background archival records search and review of existing literature. Additionally, a field survey of the Bolo Station site was completed.

2. Background research was performed through a review of pertinent geological and paleontological literature, maps, and unpublished manuscripts and field notes housed in the Earth Science Division of the San Bernardino County Museum and in the museum curator's personal library and files. A search of institutional site records was completed at the Department of Earth Sciences, University of California, Riverside; the Section of Vertebrate Paleontology, Natural History Museum of Los Angeles County; and the Regional Paleontologic Locality Inventory at the San Bernardino County Museum.

3. The field inventory of the Bolo Station site was accomplished using a systematic survey method. The surface of the site was traversed on foot with transects spaced approximately 70 meters apart. Subsurface drilling was not performed.

4.11.3.1 Bolo Station Site

1. Background archival and literature research for the Bolo Station site revealed that no fossil localities were previously known for the site. Some localities were known for the near vicinity, as discussed in Section 4.11.1.

4.11.3.1.1 Paleontological Resources Inventory

1. The field inventory located 63 paleontological resource localities, which is an average of over eight sites per square mile. Table 4.11.1 provides a listing of locality density by section. However, localities were not uniformly distributed, and the onsite abundance of localities is consistent with the previously reported density of fossil localities in the Pacific Agriculture project area, situated at similar elevations 2.5 miles to the east.

2. The 63 fossil localities yielded a total of 19 taxa, including extinct camel, as listed in Table 4.11.2. Most of the fossil vertebrates were recovered as isolated single skeletal elements or as fragments of limbs and teeth. This condition is common, since specimens fracture as they weather from their original point of deposition and migrate upward through recent alluvium. The density of onsite paleontological localities suggests that the underlying sediments are fossiliferous and may produce articulated skeletal remains, such as those located at the Cadiz locality (San Bernardino County Museum, 1991, as in Reynolds, 1988).

4.11.3.1.2 Paleontological Resource Significance

1. Significant paleontological resources include fossils or assemblages of fossils that are unique, unusual, rare, uncommon, diagnostically or stratigraphically important, or those that add to an existing body of knowledge in specific areas, stratigraphically, taxonomically, or regionally (San Bernardino County Museum, 1991).

2. The location of a minimum of 19 taxa from the surface survey of Bolo Station indicates a high potential for additional taxa to be encountered during excavation (San Bernardino County Museum, 1991). The onsite fossil assemblage inventoried includes large and small fauna that appear to be of two distinct ages, as suggested by the state of preservation of the fossils and the range of elevations of the localities.

3. Most of the fossils occur between elevations of 630 and 670 feet, and appear to be Holocene or latest Pleistocene (Rancholabrean) in age. These fossils are estimated to be 8,000 to 10,000 years old.

4. A second, earlier fauna is also represented in the assemblage. This older Pleistocene fauna may be early Rancholabrean or late Irvingtonian in age and date between 300,000 and 500,000 years before the present. On the Bolo Station site, sediments containing the older fauna are fine-grained sandy silts and silty sands that are white, gray, tan, or brown in color. These sediments range in elevation from approximately 590 to 840 feet.

TABLE 4.11.1

DISTRIBUTION OF PALEONTOLOGICAL RESOURCE LOCALITIES BOLO STATION SITE[1]

SECTION	NUMBER OF RESOURCE LOCALITIES	PROPOSED PROJECT FACILITY	SECTION JURISDICTION
5	1	Vicinity of Proposed visitor's center, aboveground water tank, and access road	County
8	1	Vicinity of access road	BLM
9	1	–	County
15	5	Landfill and railyard	BLM
16	13	Landfill and railyard	County
17	19	Landfill, offloading facility, and administration and maintenance facilities (landfill entrance area)	County
21	9	Landfill	County
22 (western one-half)	2	Landfill	BLM

91-109 (9/29/92/mg)

(1) San Bernardino County Museum, 1991.

TABLE 4.11.2

PALEONTOLOGICAL RESOURCES
BOLO STATION SITE[1]

SCIENTIFIC NAME[2]	COMMON NAME	NUMBER OF FOSSIL ELEMENTS[1]
Vertebrata, large	Large vertebrates	9
Vertebrata, medium	Medium vertebrates	2
Vertebrata, small	Small vertebrates	23
Lacertilia	Lizards	3
Phrynosoma sp.	Horned toad	1
Aves	Birds	1
Mammalia, large	Large mammals	6
Camelidae	Camel-like mammals (extinct)	1
Camelops sp.	Camel (extinct)	1
Mammalia, medium	Sheep-sized mammals	2
Artiodactyla, small	Small hoofed mammals	5
Ovis canadensis	Sheep	1
Mammalia, small	Small mammals	6
Taxidea sp.	Badger	1
Vulpes cf. *V. macrotis*	Kit fox	1
Sylvilagus sp.	Cottontail rabbit	3
Lepus sp.	Jackrabbit	43
Dipodomys sp., small	Small kangaroo rat	1
Perognathus sp.	Pocket mouse	1

91-109 (7/12/92/mg)

(1) San Bernardino County Museum, 1991.
(2) Fossil elements are identified to the lowest taxon possible.

5. The Bolo Station fossil assemblage comprises resources representing two distinct fauna of different ages. These data may be considered significant because they:

   - Are vertebrate fossils.
   - Have the ability to provide chronological associations to ancient sediments.
   - Can be used to model the character of past local environments.
   - Can contribute to a regional understanding of the structural development of the Mojave Desert and the definition of Pleistocene drainage systems.

   Additional factors affecting significance include specimen and matrix integrity and relative abundance of the data.

4.11.3.2 Cadiz Valley Alternative Site

1. As agreed by the BLM and the County, inventory of existing paleontological resources of the Cadiz Valley Alternative site was limited to data available in archives and existing literature. Archival data review and a review of pertinent literature was conducted by the San Bernardino County Museum (Springer, 1992).

2. The data review indicated that a previous resource assessment had not been conducted in the alternative site area. Paleontological assessment with field work conducted within three miles of the site, however, revealed the presence of significant fossil remains within the boundary of the Pacific Agriculture project area (Reynolds, 1991). Additionally, field work in support of installation of the Celeron-All American pipeline led to the salvage of fossils in two localities in the alternative site vicinity: Archer and Cadiz (San Bernardino County Museum, 1991, as in Reynolds, 1986; 1988). The results of these previous research efforts are briefly reviewed in Section 4.11.2.

3. The results of previous research in the project vicinity and archival data and literature review for the Cadiz Valley Alternative site indicate that elevations at or below 800 feet above msl are sensitive for significant paleontological remains. The Cadiz-Bristol lake basin filled to the 800 foot elevation in mid-Pleistocene (Rancholabrean-Irvingtonian) times, with later shorelines forming at lower elevations. As a result, the mid-Pleistocene fossil assemblage has a wider areal distribution than late Pleistocene remains.

4. The earlier fossil assemblage includes extinct camel, antelope, pronghorn antelope, large and small horse, and giant tortoise, as known from the Pacific Agriculture project area (Reynolds, 1991), the Archer and Cadiz localities, and the Bolo Station site (San Bernardino County Museum, 1991, as in Reynolds, 1986; 1988). The late Pleistocene faunal assemblage includes species that are extant today, such as rabbits, kangaroo rats, pocket mice, lizards, kit fox, artiodactyls, and other vertebrates.

5. Review of geological literature and site locality records indicates that older, fossilferous lake sediments potentially underlie a thin veneer of recent alluvium at elevations of approximately 800 feet and lower. These sediments have been shown to produce Rancholabrean-Irvingtonian Land Mammal Age fossils as well as later-aged paleontological resources. Areas of the Cadiz Valley Alternative site near or below the 800-foot elevation are therefore considered to be sensitive for paleontological resources. Onsite sensitive areas include the southwestern one-quarters of Sections 5 and 9, most of Section 8, and all of Sections 16 and 17.

4.12 TRANSPORTATION

1. Existing transportation in the project region includes the network of roads, highways, and rail lines. Rail transportation is the primary mode of transportation considered for the proposed action. Existing roads and highways are considered as they relate to access by the public, workers, and servicing vendors. The existing capacity of roads and highways, rail lines, and rail crossings are used as the baseline from which potential effects of the proposed action are evaluated. Regional and site-specific transportation systems are addressed.

2. Factors which have been used to evaluate changes to the existing transportation system associated with the proposed action include:

   - Level of Service (LOS) is a qualitative measure describing operational conditions within a traffic stream, and how these conditions are perceived by motorists and passengers. These conditions can include factors such as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety (TRB, 1985). Table 4.12.1 provides a brief description of the various LOS values.

   - The hazard index is a factor used by the PUC in conjunction with the U.S. Department of Transportation, and Federal Railroad Administration to indicate potential hazards at railroad grade crossings. This factor is relative and cannot be used to directly compare different crossings. Rather, the index is used to compare the same crossing, taking into account different conditions, such as average daily traffic (ADT), number of trains, and a coefficient based on the type of warning signal present. The equation for calculating the hazard index for a specific railroad grade crossing is:

     Hazard Index = ADT * No. of Trains * k/1,000

     k = Warning Signal Coefficient

	Crossing Type(1)	k
Cross Buck	1R	1.0
Cross Buck/Flasher	8	0.33
Cross Buck/Flasher/Gate Arms	9	0.13
Cross Buck/Overhead Flasher/ Gate Arms	9A	0.13

     In the equation, a lower value for k produces a lower hazard index.

   - Railroad Grade Crossing Delay Time - Railroad grade crossing delay time was used to indicate the changes in delay time for a certain grade crossing from existing 1991 conditions to those due to the proposed action. Factors used to calculate delay time include ADT, number of lanes, train length and speed, an hourly factor (based on the time of day that the train crosses), and vehicle departure rate (a fraction of lane capacity and number of trucks in the queue). Delay time is commonly expressed in vehicle-hours. One vehicle-hour is equivalent to 60 vehicle-minutes of delay or 60 vehicles delayed for one minute each.

3. By using the above factors, each roadway or railroad grade crossing potentially affected by the proposed action can be compared with existing 1991 conditions described in this section.

4.12.1 REGIONAL TRANSPORTATION SYSTEM

4.12.1.1 Highways

1. Major highways in the project area are east-west I-10 approximately 60 miles south of the Bolo Station site and east-west I-40 approximately 10 miles north of the site. I-10 and I-40 are currently operating at LOS A. Other roads in the project area include Route 66 and Amboy Road, which also operate at LOS A, and Kelbaker Road, which is not heavily traveled and considered to operate at LOS A.

2. I-10 would serve the site from the south carrying vehicular traffic from the San Bernardino and Riverside locales, connecting with Route 62 into Twentynine Palms, and Amboy Road, which intersects Route 66 at Amboy. Route 66 serves as the direct access to the Bolo Station site. I-40 is north of the site carrying vehicular traffic between Barstow and Needles. Access to the site from I-40 can be attained either via Route 66 from Ludlow or via Kelbaker Road and south to Route 66. These roadways comprise foreseeable access routes to the proposed Bolo Station and Cadiz Valley Alternative sites.

(1) Refer to Appendix I for figures depicting crossing type.

TABLE 4.12.1

INTERSECTION LEVEL OF SERVICE CHARACTERISTICS[1]

LEVEL OF SERVICE	VOLUME/CAPACITY RATIO	CHARACTERISTICS
A	0 to 0.60	• Free flow conditions. • No vehicle waits longer than one signal indication.
B	0.61 to 0.70	• Stable traffic flow. • Motorists rarely wait through more than one signal indication.
C	0.71 to 0.80	• Stable and acceptable flow but speed and maneuverability somewhat restricted due to higher volumes. • Motorists intermittently wait through more than one signal indication. • Occasional backups behind left turning vehicles.
D	0.81 to 0.90	• Extensive delays at times. • Some motorists, especially those turning left, may wait through one or more signal indications, but enough cycles with lower demand occur to prevent excessive backups. • Maneuverability restricted.
E	0.91 to 1.00	• Very long queues may create lengthy delay, especially for left turning vehicles. • Volume at or near capacity. • Unstable flow.
F	> 1.00	• Backups from locations downstream restrict movement at intersection approaches. • Forced flow conditions. • Stoppage for long periods due to congestion. • Volumes drop to zero in extreme cases.

91-109 (11/10/92/mg)

[1] TRB, 1985.

4.12.1.2 Rail Transport

1. Solid wastes will be transported from MRFs to the landfill using existing rail lines. Currently, project planning considers a maximum of seven MRFs being serviced by the proposed Bolo Station Landfill. Loaded trains would arrive at the proposed landfill early in the morning. At the landfill offloading facility, loaded containers would be removed from railcars to the landfill. Railcars would then be reloaded with empty containers within a 12-hour "window" for departure and return to a MRF the following evening. Each MRF would be supported by three sets of container equipment: one set offloading at the landfill, one set in transit back to the MRF, and one set being loaded at the MRF.

2. Upon project initiation, the landfill will be serviced by only one MRF resulting in one loaded and one empty container train per six-day work week. At the maximum proposed capacity of 21,000 tons per day of waste, seven loaded and seven empty container trains would serve the proposed action on a six-day work week.

3. Existing rail lines would be used to transport solid waste from the MRFs. Based on preliminary conceptual locations of proposed MRFs, existing rail lines in the southern California region that would serve the proposed Bolo Station Landfill are shown in Figure 4.12.1. Figure 4.12.2 provides a more detailed overview of the existing rail lines that would support the proposed Bolo Station Landfill in the urbanized portion of Los Angeles, Orange, Riverside, and San Bernardino counties.

4. The portion of the existing rail lines in San Bernardino that would support the proposed action have been divided into six segments as shown in Figure 4.12.1. The segments within the County include:

   - Bolo Station to Barstow
   - Barstow to Mojave
   - Barstow to Victorville
   - Victorville to San Bernardino
   - San Bernardino to San Bernardino/ Los Angeles County Line
   - San Bernardino to Riverside County line

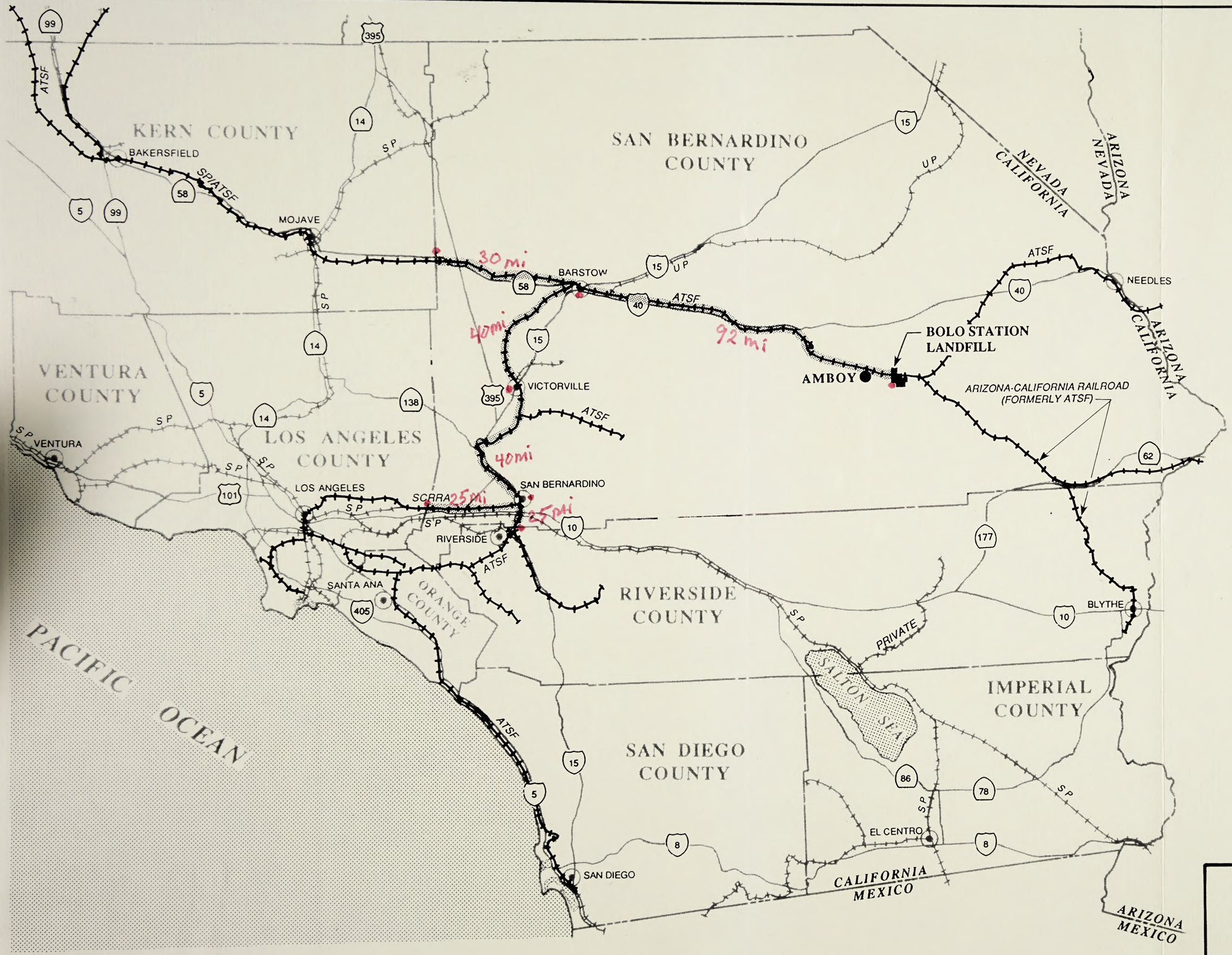
5. Existing rail traffic for each segment within the County has been compiled along with traffic density, and the number of at-grade rail crossings throughout the County. Rail crossings passing either over or under rail lines have not been evaluated since they would not be affected by increased rail traffic over existing tracks; however, they are listed in Appendix I for completeness. Transportation issues outside the County will be evaluated by the individual MRFs as they are proposed.

6. The data was compiled from railway data collected from January through September 1991 and is tabulated in Appendix I and summarized below. Vehicle traffic density and number of accidents associated with at-grade rail crossings have been compiled from information furnished by the PUC. Individual crossings are listed in Appendix I along with ADTs, east and westbound train counts, and train speed at each crossing.

   - **Bolo Station to Barstow** - This segment runs between Bolo Station and Barstow, is owned and operated by ATSF (Needles Subdivision), and consists of two main tracks. This segment would serve the proposed Commerce MRF as well as other preliminary conceptual MRF locations, and provides direct access to Bolo Station. The segment is approximately 92 miles long and has a total of 14 rail crossings of which 10 are at-grade vehicle crossings. The maximum authorized freight train speed at each grade crossing is 70 miles per hour (mph). An average of 18 eastbound trains and 19 westbound trains travel along the segment between Barstow and Bolo Station each day. The portion of rail line between Barstow and Daggett is also used by the Union Pacific Railroad. The average number of ATSF and Union Pacific trains using this segment is 31 eastbound and 29 westbound. Vehicle traffic density ranges from 50 to 2,100 vehicles per day, with an average crossing traffic density of approximately 430 vehicles per day.

     ATSF's Barstow classification yard is located on the Needles Subdivision. This yard has facilities in place for fueling, inspection and repair of locomotives and rail cars. Empty trains from Bolo Station will be inspected at this yard.

   - **Barstow to San Bernardino/Kern County Line** - This segment runs between Barstow and the San Bernardino/Kern County line, is owned and operated by



LEGEND

BAIL LINE SEGMENTS FOR NOISE AND TRANSPORTATION ANALYSES

- BOLO STATION TO BARSTOW
- BARSTOW TO KERN COUNTY LINE
- BARSTOW TO VICTORVILLE
- VICTORVILLE TO SAN BERNARDINO
- SAN BERNARDINO TO LOS ANGELES COUNTY LINE
- SAN BERNARDINO TO RIVERSIDE COUNTY LINE

INTERNATIONAL BOUNDARY

STATE BOUNDARY

COUNTY BOUNDARY

MAJOR HIGHWAY

MAJOR RAILROAD LINE

ATSF	ATCHISON, TOPEKA, AND SANTA FE RAILROAD
SP	SOUTHERN PACIFIC RAILROAD
UP	UNION PACIFIC RAILROAD
SCRRA	SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY

0 25 50 MILES

SCALE

REFERENCE: U.S.G.S. BASE MAP OF CALIFORNIA, SOUTHERN ONE-HALF. DATED 1968 AND REVISED IN 1981.

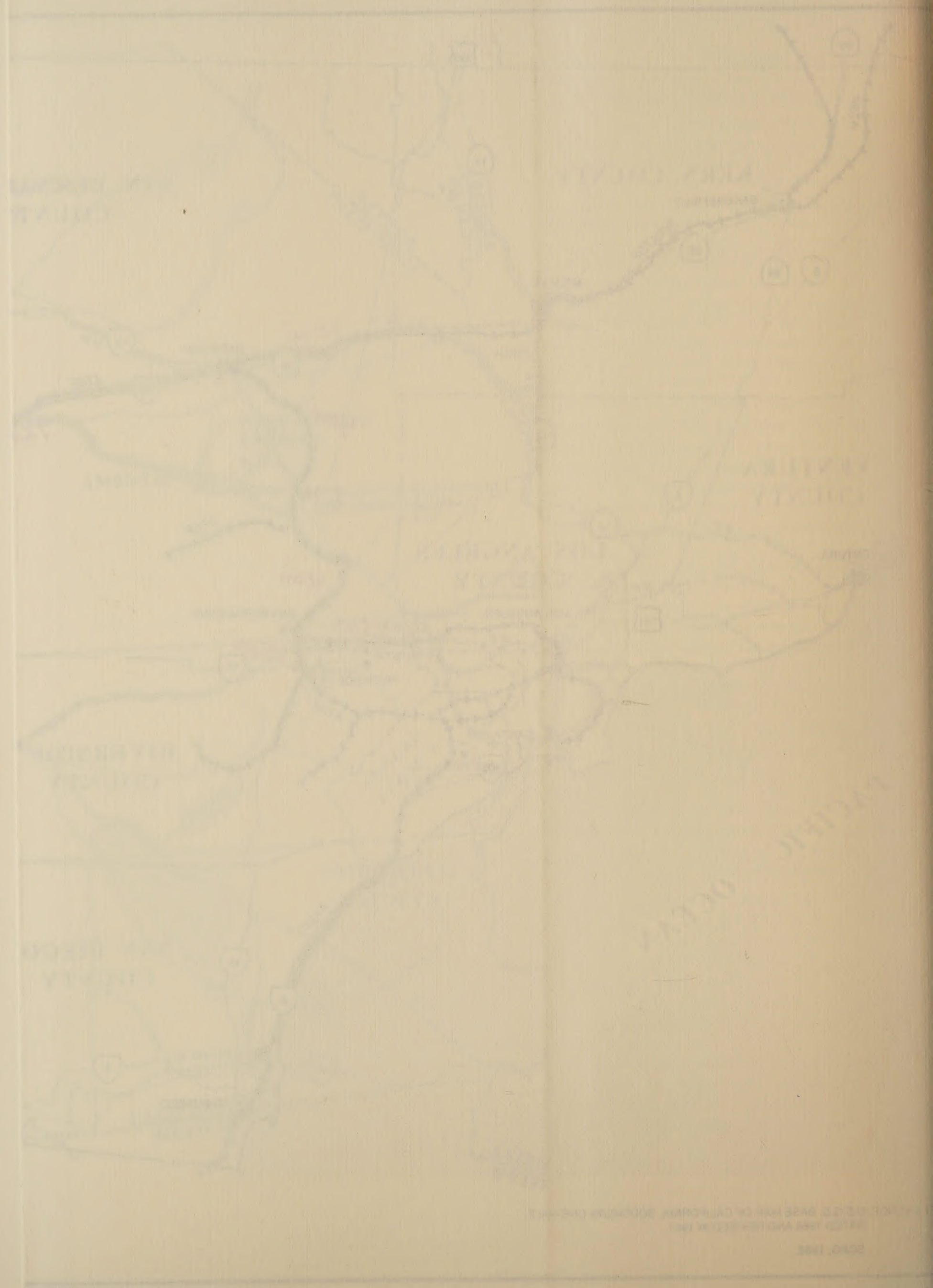
SCAG, 1988.

FIGURE 4.12.1

RAIL TRANSPORTATION SEGMENTS

RAIL·CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.



LEGEND

ATSF (ATCHISON, TOPEKA AND SANTA FE RAILWAY COMPANY)

SCRRA (SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY)

NOTE: SCRRA RECENTLY PURCHASED THIS RAIL LINE FROM ATSF, ATSF HAS RETAINED RAIL RIGHTS ON THIS LINE.

0 4 8 MILES

SCALE

REFERENCE: USGS 1 X 2 DEGREE TOPOGRAPHIC MAPS OF LOS ANGELES AND SAN BERNARDINO, CALIFORNIA, BOTH DATED 1975 AND 1969 RESPECTIVELY.

FIGURE 4.12.2

URBAN SOUTHERN CALIFORNIA WASTE-BY-RAIL HAUL ROUTES

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

ATSF (Mojave Subdivision), and consists of a single main track with seven passing tracks. This segment would serve a MRF, should one be sited in the Santa Clarita Valley. This rail segment would extend to Mojave at which point trains would interchange with the Southern Pacific to Santa Clarita. This segment is approximately 30 miles long and has a total of eight rail crossings of which seven are at-grade vehicle crossings. The maximum authorized freight train speed at each grade crossing is 70 mph. An average of nine eastbound trains and eight westbound trains travel along the segment each day. Vehicle traffic density ranges from 46 to 7,900 per day at crossings with an average of 2,370 per day.

- **Barstow to Victorville** - This segment runs between Barstow and Victorville, is owned and operated by ATSF (Cajon Subdivision), and consists of two parallel main tracks. The Union Pacific Railroad also utilizes this line. This segment would be used by trains serving the Commerce MRF as well as other conceptual MRF locations, except a location in Santa Clarita. This segment is approximately 40 miles long and has a total of 20 rail crossings of which 11 are at-grade vehicle crossings. The average freight train speed at each grade crossing is about 55 mph with a range between 45 and a maximum authorized freight train speed of 70 mph. Including both the ATSF and Union Pacific, an average of 26 eastbound trains and 24 westbound trains travel along the segment each day. Vehicle traffic at crossings ranges from 30 to 4,000 per day with an average of 1,018 per day.

- **Victorville to San Bernardino** - This segment runs between Victorville and San Bernardino, is owned and operated by ATSF (Cajon Subdivision), and consists of two parallel main tracks. The Union Pacific Railroad also uses this line. This segment would be used by trains serving the Commerce MRF as well as other conceptual MRF locations, except a location in Santa Clarita. This segment is approximately 40 miles long and has a total of 12 rail crossings of which four are at-grade roadway traffic crossings. The average freight train speed at each grade crossing is about 45 mph with a maximum authorized freight train speed of 55 mph. Including both the ATSF and Union Pacific, an average of 26 eastbound trains and 24 westbound trains travel along the segment each day. Vehicle traffic at crossings ranges from 100 to 9,428 per day with an average of 3,380 per day.

- **San Bernardino to San Bernardino/ Los Angeles County Line** - This segment runs between San Bernardino and the San Bernardino/Los Angeles County line, and consists of a single track line with three passing tracks. ATSF is currently working with the SCRRA to finalize the sale of this segment as a component of a regional commuter rail system. ATSF will retain track usage rights on this segment. This segment could serve as a secondary route to the Commerce MRF and would serve other anticipated MRFs (including those on the San Gabriel Valley), excepting those anticipated at Santa Clarita, San Bernardino, and Victorville locales. This segment is approximately 25 miles long and has a total of 41 rail crossings of which 38 are at-grade traffic crossings. The authorized maximum freight train speed at each grade crossing is 55 mph. On average one eastbound train and five westbound trains travel along the segment each day. Vehicle traffic at grade crossings ranges from 600 to 30,000 per day with an average of 5,970 per day.

- **San Bernardino to San Bernardino/ Riverside County Line** - This segment runs between San Bernardino and the San Bernardino/Riverside County line, is owned and operated by ATSF (2nd Subdivision), and consists of two and three main tracks. The Union Pacific Railroad also uses a portion of this line. This segment would serve as the primary access to the proposed Commerce MRF and other anticipated MRFs, except those in the San Gabriel Valley and at Santa Clarita. The segment is approximately 25 miles long and has a total of 18 rail crossings of which nine are at-grade traffic crossings. The average train speed over each grade crossing is about 30 mph, with a range between 20 and maximum authorized speed of 55 mph.

On average 25 eastbound trains and 19 westbound trains travel along the segment each day. Vehicle traffic at crossings ranges from 500 to 7,500 per day with an average of 2,260 per day.

7. ATSF has reciprocal agreements with both the Union Pacific Railroad and the Southern Pacific Transportation Company for alternative routing and detour of trains in the event of a significant emergency. Although detour routing is very seldom required, these alternative routes provide access to the Bolo Station site and could be used for such emergencies.

8. Most rail segments are double track and can provide service on at least one of the tracks in an emergency. In addition, significant track blockages in which both tracks are affected can normally be cleared and rail service restored within 24 hours. In the event rail blockages extend beyond 24 hours, alternate routes are available as shown in Figure 4.12.3. ATSF has holding tracks which can hold trains in progress at Barstow, San Bernardino and Los Angeles. Additional container equipment is also available in Los Angeles and other locations, therefore, track blockages are not expected to affect operations at MRFs.

4.12.2 LOCAL TRANSPORTATION SYSTEM

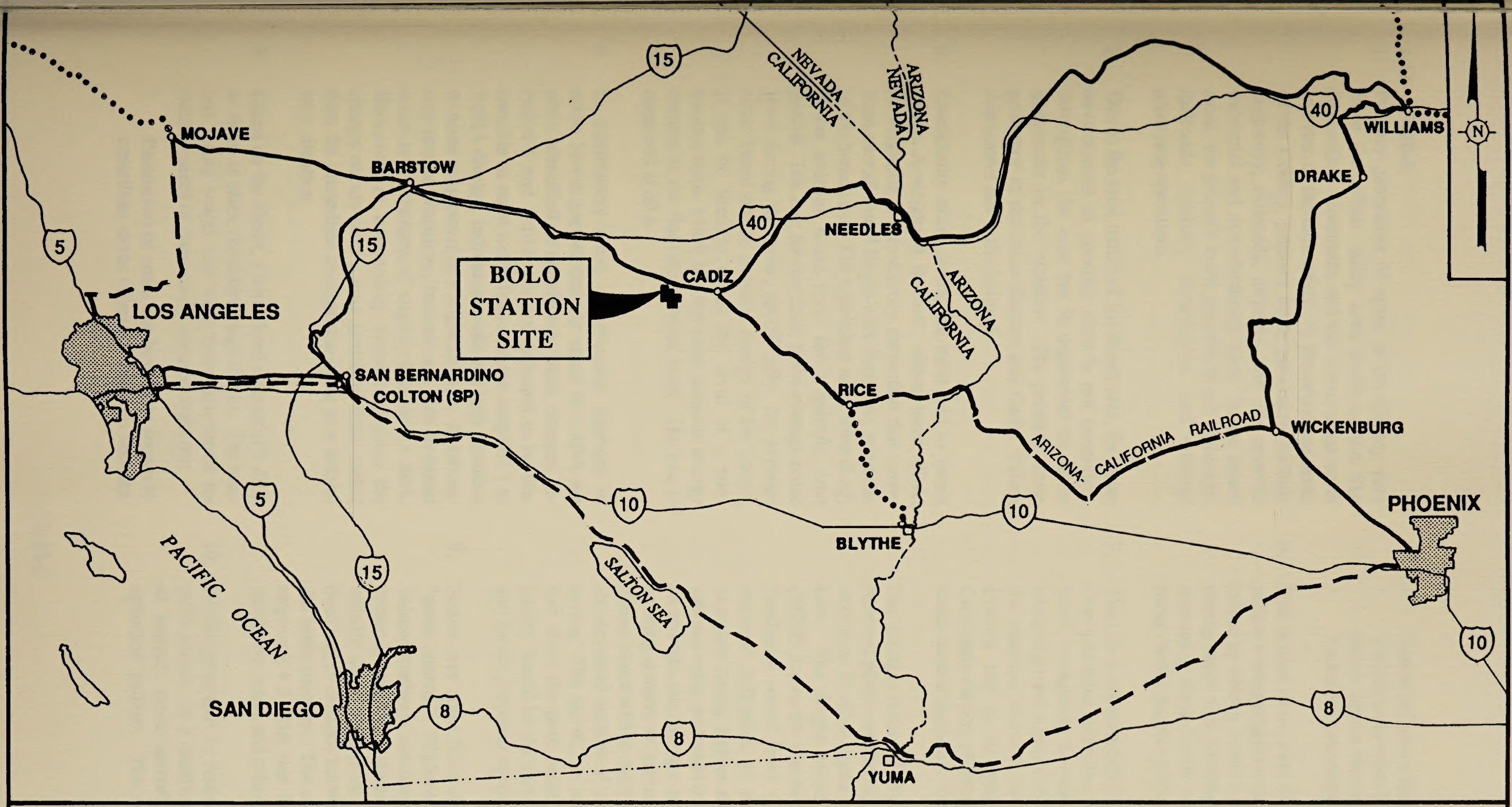
4.12.2.1 Bolo Station Site

1. Roads near the Bolo Station site include Route 66, a two-lane paved highway north of the site; Bolo Road, an unmaintained dirt road which runs north-south through the site; and an unnamed, maintained dirt road which follows along the north side of the ATSF railroad tracks approximately bisecting the site.

4.12.2.2 Cadiz Valley Alternative Site

1. ATSF operates on the Arizona-California Railroad just east of the Bolo Station site. This short line railroad provides access from ATSF's mainline tracks at Cadiz to the Cadiz Valley Alternative site.

2. The only road near the Cadiz Valley Alternative site is Cadiz road which follows the California-Arizona Railroad running from northwest to southeast through the site.



LEGEND

- ATSF MAIN RAIL LINE
- RAIL LINES NOT PART OF ALTERNATE ROUTING SYSTEM
- SOUTHERN PACIFIC MAIN RAIL LINE
- ARIZONA-CALIFORNIA RAILROAD LINE

0 40 80 MILES

APPROXIMATE SCALE

REFERENCE: USGS MAP OF SOUTHERN CALIFORNIA. DATED 1973.

FIGURE 4.12.3

EMERGENCY ALTERNATE RAIL LINE ROUTING

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

4.13 NOISE

1. Primary generators of noise in the County vary from the urban valley area south of the San Bernardino Mountains and the desert areas north and east of the mountains. In the urbanized areas of the County, primary noise generators include highways, railroads, airports, and site specific industrial and manufacturing sites. In the desert areas, the primary noise generation are highways, railroads, military installation, and mining/ quarrying operations.

2. Due to the rural nature of the desert area, the noise environment at specific sites is not consistent throughout the area but is dependent on noise generators in the vicinity. The primary noise generator at the Bolo Station and Cadiz Valley Alternative site is the railroad.

3. Community noise levels are measured in terms of the A-weighted decibel, abbreviated dBA. A-weighting is a frequency correction that correlates overall sound levels with frequency response of the human ear. The equivalent noise level (Leq) is the average noise level for a specific time period. The Leq for one hour is the average noise level during the hour, specifically, the average noise based on the acoustic energy of the sound. It can be thought of as the level of a continuous noise which has the same acoustic energy content as the fluctuating noise level. The Leq is measured in dBA.

4. In community noise assessments, changes in noise levels greater than or equal to 3 dBA are often identified as significant, while changes between 1 and 3 dBA are not expected to be discernible to most individuals. In the range of 1 to 3 dBA change, individuals who are very sensitive to noise may perceive a slight change. In laboratory testing situations, humans are able to detect noise level changes of slightly less than 1 dBA. However, in community noise situations the change occurs over a long period of time, rather than the immediate comparison made in a laboratory situation.

5. Based on the above, a noise level change of 3 dBA or more is often considered significant. The various rating scales that have been developed for measurement of community noise account for:

   - Parameters of noise that have been shown to contribute to the effects of noise on humans.
   - Variety of noises found in the environment.
   - Variations in noise levels that occur as a person moves through the environment.
   - Variations associated with time of day.

6. Ldn is used to account for the lower tolerance of people during nighttime periods. This level is obtained by adding 10 dBA to noise levels measured during night time periods (10 p.m. to 7 a.m.) and averaging these levels with noise levels which occur during daytime periods.

7. The Ldn is representative of noise levels occurring over a 24-hour averaging period and is appropriate when comparing several similar noise events occurring over a period of time. Ldn is currently the standard of noise measurement used by the County and is the preferred method of the California Office of Noise Control and federal noise control agencies (County, 1989).

8. For a single noise of high magnitude (i.e., train passing, plane overflight), the single event noise exposure is often more representative than the Ldn. The single event noise exposure level (SENEL) uses the duration and magnitude of the maximum sound level (Lmax) to give a more accurate indication of the peak level of noise exposure during a given time period. Analyses of railroad noise presented in this chapter use the Ldn to provide the average noise level based on the existing number of trains over a 24-hour period. These values will be used to evaluate the effects of the increased number of trains, due to the proposed action. The SENEL is not used in this comparison since the peak noise level of a single train passby would be the same for existing conditions and for the proposed action.

9. Noises may come from either a "line source" or a "point source." Highway traffic noise on high volume roadways simulates a line source. The decrease in sound over distance from a line source is usually about a nominal 3 dBA drop with each doubling of distance between the noise source and the noise receiver. The actual rate, however, can approach 4.5 dBA due to attenuation by grass, shrubbery, trees, and other noise barriers.

10. Noises generated by stationary objects simulate a point source. In a relatively flat environment free of barriers, noise spreads from the source in a spherical pattern. The decrease in sound over

distance from a point source is approximately 6 dBA for each doubling of distance.

4.13.1 REGIONAL NOISE ENVIRONMENT

1. The regional environment of concern for noise impacts includes the area surrounding the Bolo Station site, as well as areas surrounding access routes (i.e., rail line and highway corridors) leading to the site within the County.

4.13.1.1 Railroad Corridors

1. Ldn values were used to express levels of noise associated with existing rail traffic. The values were developed based on a method of calculation recommended for rail line operations (Wyle Laboratories, 1973). The calculations account for the length and speed of trains over each of the rail line segments previously identified in Section 4.12, as well as track grade and the number of locomotives, including helper engines. The calculations also account for the number of daytime and nighttime operations where nighttime operations are additionally weighted by a factor of 10.

2. Table 4.13.1 shows a summary of the calculated existing (i.e., without the proposed action) Ldn values for the individual rail segments associated with the proposed action. Individual calculations and assumptions are included in Appendix J. A summary of the calculated existing values for each segment is presented below:

   - **Bolo Station to Barstow** - Ldn levels between Bolo Station and Barstow ranged from 75.9 dBA 100 feet from the centerline of the track to 57.0 dBA 1,200 feet from the centerline of the track.
   - **Barstow to San Bernardino/Kern County Line** - Ldn levels between Barstow and the San Bernardino/Kern County Line ranged from 72.2 dBA 100 feet from the centerline of the track to 53.4 dBA 1,200 feet from the centerline of the track.
   - **Barstow to Victorville** - Ldn levels between Barstow and Victorville ranged from 76.9 dBA 100 feet from the centerline of the track to 58.1 dBA 1,200 feet from the centerline of the track.
   - **Victorville to San Bernardino** - Ldn levels between Victorville and San Bernardino ranged from 77.9 dBA 100 feet from the centerline of the track to 60.2 dBA 1,200 feet from the centerline of the track.
   - **San Bernardino to San Bernardino/ Los Angeles County Line** - Ldn levels between San Bernardino and the San Bernardino/Los Angeles County Line ranged from 67.5 dBA 100 feet from the centerline of the track to 49.5 dBA 1,200 feet from the centerline of the track.
   - **San Bernardino to San Bernardino/ Riverside County Line** - Ldn levels between San Bernardino and the San Bernardino/Riverside County Line ranged from 76.6 dBA 100 feet from the centerline of the track to 59.1 dBA 1,200 feet from the centerline of the track.

4.13.1.2 Motor Vehicle Traffic

1. Typically, noise levels created by traffic on a six-lane highway with an ADT volume of about 60,000 would be expected to range from 75 dBA, 120 feet from the road, to 60 dBA, 1,000 feet from the road. Roads with traffic volumes less than 5,000 ADT, that are representative of the roads providing access to the Bolo site (i.e., Route 66, and Amboy and Kelbaker Roads), do not usually generate significant noise contours beyond the edge of the road (County, 1989).

4.13.2 LOCAL NOISE ENVIRONMENT

1. The local environment includes the area surrounding the Bolo Station site, as well as the areas surrounding the local access roads and rail line. Sensitive receptors would include individuals residing within close proximity to the landfill boundary and/or residing close to the local access. Noise effects on wildlife is addressed in Section 5.6.1.

4.13.2.1 Bolo Station Site

1. The Bolo Station site is undeveloped and can be expected to have noise levels of 20 dB or greater depending on wind conditions, similar to levels in other rural undeveloped areas. Noise levels may occasionally rise slightly due to overflights from the Twentynine Palms Marine Corps Base.

TABLE 4.13.1

EXISTING Ldn NOISE LEVEL CONTOURS(1)

RAIL SEGMENT	DISTANCE FROM TRACK (dBA)					
	100 FEET	200 FEET	400 FEET	600 FEET	800 FEET	1,200 FEET
Bolo Station to Barstow	75.9	71.9	65.9	62.3	59.9	57.0
Barstow to San Bernardino/ Kern County Line	72.2	68.2	62.2	58.6	56.2	53.4
Barstow to Victorville	76.9	72.9	66.9	63.3	60.9	58.1
Victorville to San Bernardino	77.9	73.9	67.9	65.0	61.9	60.2
San Bernardino to San Bernardino/ Los Angeles County Line	67.5	63.5	57.5	54.6	51.5	49.5
San Bernardino to San Bernardino/ Riverside County Line	76.6	72.6	66.6	63.8	60.6	59.1

91-109 (11/5/92/mg)

1) Noise levels calculated in accordance with Associate of American Railroads Recommended Methods (Wyle Laboratories, 1973).

Average noise levels within proximity of existing rail lines (i.e., within 1,200 feet of track) were approximated. Ldn values are shown in Table 4.13.1. Noise from adjacent Route 66 would be minimal since its ADT is about 350 less than the 5,000 ADT criteria for which significant noise contours fall within the highway right-of-way.

4.13.2.2 Cadiz Valley Alternative Site

1. Since the Cadiz Valley site is also an undeveloped site, current noise levels would be similar to those found at the Bolo Station site.

4.14 LAND USE

1. The proposed action must comply with a number of County, state, and federal policies and regulations that address solid waste disposal and related land use issues. Since the ATSF rail line and rail traffic are existing uses, they are consistent with pertinent land use plans and policies. This section focuses on land use issues related to the siting and operation of a Class III landfill at either the Bolo Station site or Cadiz Valley Alternative site.

2. Land use issues related to the siting and operation of the proposed landfill include the following:

   - Compatibility with land use classifications established by the County and BLM.
   - Compatibility with surrounding land uses.
   - Compatibility with the CoSWMP.
   - Exchange in fee of BLM lands for ATSF lands. Such exchanges must provide a benefit to the public.
   - Right-of-way for access road and power line upgrade and extension across BLM lands and development of site access road intersection.
   - Amendment of the CDCA Plan.
   - Amendment of the County General Plan.
   - Issuance of a CUP by the County.

4.14.1 LAND USE PLANS AND POLICIES

1. The County and BLM have primary land management responsibilities over the project region. Both have land use plans and regulations that classify lands under their control and define the types of land uses appropriate for each classification. These plans and regulations are reviewed in the following sections.

4.14.1.1 San Bernardino County

1. The proposed action falls under the jurisdiction of five County departments, as follows:

   - County Planning Department
     - Reviews and issues permits for development in unincorporated areas of the County.
     - Conducts environmental review and review of CUPs for development in unincorporated areas of the County.
   - SBCDEHS
     - Acts as the LEA, as designated by the CIWMB.
     - Enforces state solid waste management requirements for County landfills.
     - Issues the SWFP.
   - Solid Waste Management Department
     - Manages municipal waste facilities and monitors wastes disposed at these facilities.
     - Prepared the CoSWMP.
     - Prepares the CoIWMP, as required by AB 939.
   - County Building and Safety Department
     - Regulates construction activities through development requirements and use of the Uniform Building Code (UBC).
   - SBCAPCD
     - Enforces federal and state air emission control regulations.
     - Reviews and issues ATCs and PTOs.
     - Develop and implement AQAP.

4.14.1.1.1 County General Plan

1. The General Plan subdivides the County into three regions: valley, mountain, and desert. Of these three, the desert is the largest region, comprising about 95 percent of the County in terms of area (19,236 square miles) (County, 1989). The Land Use/Growth Management Element of the General Plan identifies 14 Official Land Use Districts, with most of the desert region designated within the Resource Conservation District. Both the Bolo Station and Cadiz Valley Alternative sites are located within the Resource Conservation District. Management goals for this district are:

   - Encourage limited rural development that maximizes preservation of open space, watershed, and wildlife habitat areas.
   - Identify areas where rural residences may be established on lands that have limited grazing potential, but significant open space values.
   - Prevent inappropriate urban population densities in remote and/or hazardous areas of the County.

- Establish areas where open space and nonagricultural activities are the primary land uses, but where agriculture and compatible uses may coexist.

2. The Land Use/Growth Management Element of the General Plan includes several policies to minimize land use conflicts between County and other agencies that have jurisdiction over County lands. These policies include:

   - Work with the BLM to eliminate conflicts between public and private lands by reducing the checkerboard pattern of ownership.
   - Facilitate public/private land exchange to eliminate the need to cross public land to reach private land.

   An amendment of the County General Plan is required to establish the appropriate land use district designation for onsite lands exchanged as part of the proposed action.

3. The Open Space Element of the General Plan has as its goal the preservation of open spaces and vistas to ensure a high quality of life in the County. As such, five types of open space have been identified by the County, including open space for managed production of resources (i.e., agriculture and mineral resources), and open space for scenic resources.

4. An issue of land use compatibility relative to the establishment of solid waste landfills is addressed in Section II-D of the General Plan. While the County has ample landfill capacity, most landfills are located in the desert, at some distance from urban areas generating the waste. The County General Plan acknowledges that desert residents oppose use of the desert as a "dumping ground" for waste generated elsewhere.

5. The EIR for the General Plan identifies the Bolo Station site as potentially sensitive for paleontological resources and desert tortoise habitat. Since the proposed land use could be incompatible with the protection of these resources, site-specific studies have been conducted to determine the occurrence of desert tortoises and paleontological resources. The results of these studies are discussed in Sections 4.6 and 4.11.

4.14.1.1.2 County Development Code

1. The County Development Code specifies uses permitted in each land use district, and outlines standards for development. The code allows a solid waste facility in any official land use district, subject to an approved CUP (Sections 84.0401, 84.0410).

2. In accordance with the County Development Code, a project is required to meet at least one of five criteria. Two of those criteria apply to the proposed action:

   - The character of the proposed use is such that it requires a remote location away from other land uses.
   - The land use is deemed essential or desirable to public convenience or welfare.

4.14.1.1.3 County Solid Waste Management Plan

1. The CoSWMP implements solid waste disposal land use considerations, as required by state law and applicable County regulations and policies. The overall goal of the CoSWMP is to provide a cost-effective solid waste management system that integrates source reduction, storage, collection, transport and transfer, recycling, transformation (incineration), and disposal. Among other objectives in achieving this goal, the County strives to:

   - Protect public health and safety.
   - Meet or exceed state and federal source reduction and recycling guidelines.
   - Strengthen the economic bases of all County regions.
   - Minimize adverse environmental effects of the solid waste management system.
   - Protect the County's aesthetic values.

2. AB 939 requires each county to restructure its solid waste management systems and to prepare a CoIWMP by January 1, 1994. The CoIWMP will replace the CoSWMP and will include city source reduction and recycling elements, a County source reduction and recycling element for unincorporated areas, and a facilities siting element. A major feature of AB 939 is reduction in volume of the waste stream destined for landfill disposal. A 25 percent reduction is required by January 1, 1995, and a 50 percent reduction is required by January 1, 2000.

3. AB 939 prohibits a city or county from approving a new solid waste facility or expanding an existing facility until a CoIWMP has been approved by the CIWMB. In October 1990, AB 2296 was approved as an urgency statute to resolve conflicts between AB 939 and earlier CoSWMP requirements. AB 2296 allows those new or expanded solid waste facilities that were included in the most recently approved CoSWMP or those that are approved by the local jurisdiction to proceed prior to the completion of the CoIWMP.

4. A landfill for municipal solid waste in the Amboy area of the desert was referenced in the County's 1989 revised draft CoSWMP as a significant private-sector proposal. The general location was provided. A waste-by-rail system in the desert area was also considered. Rail haul was discussed as possibly comprising the optimal medium- or long-term means to minimize transport costs to distant disposal sites, and as a means to reduce the impacts of hauling on San Bernardino Valley and Victor Valley highway networks. This draft CoSWMP was not adopted by the County due to the passage of AB 939. The Bolo Station Landfill was not included in the prior adopted CoSWMP. As the proposed action is scheduled to be implemented prior to the planned adoption of the County's CoIWMP in January 1994, the authority for the County to approve the project is found in AB 2296, as discussed above.

4.14.1.2 Bureau of Land Management

1. Portions of the Bolo Station and the Cadiz Valley Alternative sites are under federal management by the BLM. The project region falls within the CDCA, which is managed for multiple uses in accordance with the CDCA Plan.

2. The CDCA is a broad expanse of arid land in southeastern California that contains approximately 25 million acres. Of this total, over 12 million acres are public lands administered by the BLM. FLPMA directed BLM to inventory resources within the CDCA and to develop a plan to "provide for the immediate and future protection and administration of public lands in the California Desert within the framework of a program of multiple use and sustained yield, and the maintenance of environmental quality." The CDCA Plan, which was adopted in 1980, and which has been amended several times since, is the result of this directive.

3. The primary land use planning feature of the CDCA Plan is that public lands in the CDCA are designated into four multiple use classes on a geographic basis. The multiple-use classes (C, L, M, and I) define different types and degrees of use that can be undertaken within each class, with C receiving the most conservative treatment and I the most intensive uses. Considering only BLM-administered lands in the CDCA, approximately 17.3 percent are Class C, 48.5 percent are Class L, 27.5 percent are Class M, 4.1 percent are Class I, and 2.6 percent are unclassified. The multiple use classes are defined as:

   - **Class C (Controlled Use)** - Includes those areas that are formally designated as wilderness areas and those that are preliminarily recommended.
   - **Class L (Limited Use)** - Designation is used to protect sensitive natural, scenic, ecological, and cultural resource values. Class L lands are managed to provide low-intensity, controlled multiple use of resources so that sensitive values are not significantly diminished.
   - **Class M (Moderate Use)** - Designation provides for a wide variety of present and future uses such as mining, livestock grazing, recreation, energy, and utility development. Its objective is a controlled balance between higher intensity uses and the protection of public lands.
   - **Class I (Intensive Use)** - Provides for concentrated uses of lands and resources to meet human needs. Protection of sensitive natural and cultural values is provided. Mitigation of impacts on resources and the rehabilitation of impacted areas are undertaken.

4. The Multiple-Use Class Guidelines (BLM, 1980a; 1986) identify appropriate and inappropriate land uses within each use category. Under these guidelines, waste disposal is not allowed on Class C lands, and new nonhazardous waste disposal sites are not allowed on Class L lands. For Class M and Class I lands, the guidelines state that:

   > "Public lands managed by BLM may not be used for waste disposal (either hazardous or non-hazardous). Where locations suitable for disposal are found on BLM-managed lands, consideration will be given to transfer of

such sites through sale or exchange to other ownership for this use. In land sales or exchanges, NEPA requirements will be met" (BLM, 1986).

5. The guidelines further state that:

> "Lands will be acquired, disposed of, or exchanged in accordance with FLPMA and other applicable federal laws and regulations, to assure more efficient management of the public lands and to reduce conflicts with other public and private landowners to provide more consistency and logic in desert-wide land-use patterns" (BLM, 1980a).

This policy recognizes that mixed ownership of desert lands creates problems for effective management. To address this concern, BLM encourages land exchanges that consolidate lands for which the agency is responsible, thereby improving opportunities for protection and effective management. Consistent with this policy, it is the goal of the BLM to:

> "Acquire lands which are needed to provide for effective BLM management of existing public lands and resources in the California Desert" (BLM, 1980a).

2. ACECs or SAs do not occur within the Bolo Station site or the Cadiz Valley Alternative site, but one ACEC and one SA are present in the near vicinity as shown in Figure 4.14.1. The Marble Mountain Fossil Beds (ACEC-48) is situated immediately northeast of the town of Cadiz. This 289-acre area, which is critical for paleontological values, is located approximately six miles east of the Bolo Station site and four miles northwest of the Cadiz Valley Alternative site. Amboy Crater (Special Area J) is a National Natural Landmark. Amboy Crater is located on the southern side of the ATSF railroad tracks west of Bristol Dry Lake. Bolo Station is approximately seven miles east of the Amboy Crater, while the Cadiz Valley Alternative site is about 17 miles east-southeast of the crater.

3. As shown in Figure 4.14.1, additional ACECs and SAs are designated in the general project region for a variety of values. The most notable SA in the project region is EMNSA (see Figure 4.12.1), which encompasses six ACECs and four SAs within it. The southern boundary of this large area is north of I-40, about 15 miles north of the Bolo Station site and 25 miles north of the Cadiz Valley Alternative site.

4.14.1.2.1 BLM CDCA Plan Elements

1. The CDCA Plan is organized according to 12 elements, which are specific resources or activities of significant concern to the public. Each element provides more specific application, or interpretation, of the multiple-use class guidelines to address these concerns. Elements involving land use constraints in the project region are discussed in the following sections.

Areas of Critical Environmental Concern

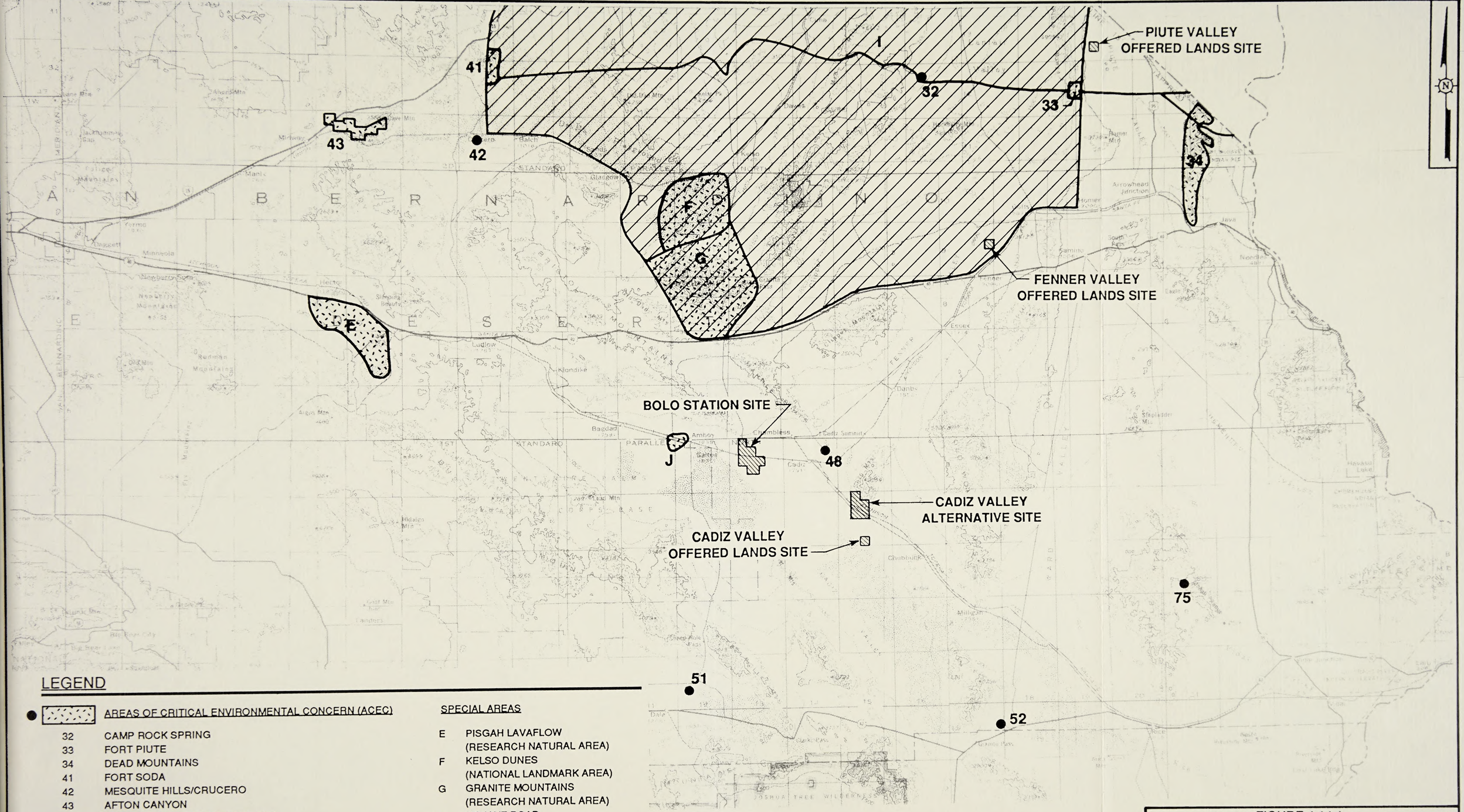
1. ACEC are areas where special management attention is required to protect and prevent damage to historic, cultural, or scenic values, fish and wildlife resources, or other natural systems. Additional areas possessing rare, unique, or unusual qualities of scientific, educational, cultural, or recreational significance may be designated as a Special Area (SA). These two categories are important management tools for defining appropriate objectives for achievement and defining actions to be allowed on such designated areas.

Planned Management Areas for Fish and Wildlife

1. Three types of planned management areas for fish and wildlife are addressed in the CDCA Plan. These are: ACECs, Habitat Management Plans (HMPs), and SAs. None of the management areas for fish and wildlife are located in the vicinity of the Bolo Station or Cadiz Valley Alternative sites.

2. **Habitat Management Plans:** HMPs are detailed plans developed specifically for wildlife habitats or species that require intensive, active management programs. HMPs have been prepared for two areas in the project region: Marble and Bristol mountains north of I-40 for bighorn sheep; and Old Dad Peak north of the Kelso Dunes for other species.

3. Several other areas in the project region have been designated as HMP areas for which BLM will develop HMPs in the future. While HMPs have not been developed for the areas discussed below, they are still considered to represent significant wildlife habitats.



LEGEND

AREAS OF CRITICAL ENVIRONMENTAL CONCERN (ACEC)

32	CAMP ROCK SPRING
33	FORT PIUTE
34	DEAD MOUNTAINS
41	FORT SODA
42	MESQUITE HILLS/CRUCERO
43	AFTON CANYON
48	MARBLE MOUNTAINS FOSSIL BED
51	DALE LAKE
52	PATTON'S IRON MOUNTAIN DIVISIONAL CAMP
75	MOPAH SPRINGS

SPECIAL AREAS

E	PISGAH LAVAFLOW (RESEARCH NATURAL AREA)
F	KELSO DUNES (NATIONAL LANDMARK AREA)
G	GRANITE MOUNTAINS (RESEARCH NATURAL AREA)
I	MOJAVE ROAD (HISTORIC TRAIL)
J	AMBOY CRATER (NATIONAL NATURAL LANDMARK)
	EAST MOJAVE NATIONAL SCENIC AREA

0 10 20 MILES

SCALE

REFERENCE: USGS 1:2,000,000 SCALE MAP OF SOUTHERN CALIFORNIA, DATED 1973. CDCA PLAN (BLM,1980a)

FIGURE 4.14.1

AREAS OF CRITICAL ENVIRONMENTAL CONCERN AND SPECIAL AREAS IN THE PROJECT REGION

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

4. Four HMP designated areas are situated in close proximity to either the Bolo Station site or Cadiz Valley Alternative site, as shown in Figure 4.14.2. Two of these occur to the north and are the Old Dad Mountains (W-32), a 19,000-acre area managed for bighorn sheep habitat, and the Granite Mountains (W-33), which is a 56,000-acre area managed for other species. Both areas are situated in the vicinity of I-40 and northward, approximately 15 miles north of the Bolo Station site and 25 miles northwest of the Cadiz Valley Alternative site.

5. Southeast of the Bolo Station and Cadiz Valley Alternative sites lie the Bullion Mountains (W-40), which is managed as bighorn sheep habitat. This 16,000-acre area is situated approximately 15 miles south-southwest of Bolo Station and 25 miles southwest of the Cadiz Valley Alternative site.

6. Situated closer to the Cadiz Valley Alternative site than to Bolo Station is the large Fenner-Chemehuevi Valleys (W-35). Managed as critical habitat for desert tortoise, a federally- and state-listed threatened species, this 692,000-acre area is located approximately 15 miles northeast of the Cadiz Valley Alternative site and 20 to 25 miles east-northeast of Bolo Station. Adjoining this area to the southeast, at increasing distances from the sites, are the following: Chemehuevi Wash (W-37), Whipple Mountains (W-38), and Vidal Wash (W-39).

7. **Special Areas:** Seven SAs are delineated in the CDCA Plan, one of which is in the vicinity of Bolo Station and Cadiz Valley Alternative sites, as shown in Figure 4.14.2. The Cadiz Dunes SA (W-41) incorporates about 32,000 acres and extends from the eastern shore of Cadiz Lake to the western shore of Danby Lake, as well as incorporating a large area south of Cadiz Lake. The Cadiz Dunes SA is located approximately ten miles southeast of Bolo Station and three miles south of the Cadiz Valley Alternative site.

8. In addition to the Cadiz Dunes SA, two other SAs are located within 25 to 40 miles of Bolo Station and the Cadiz Valley Alternative sites: Kelso Dunes (W-34) and Pisgah Lava Flow (W-31). The Kelso Dunes include 31,000 acres situated in the Devil's Playground area of the EMNSA. This location is north of I-40, about 25 miles northeast of Bolo Station and 32 miles northeast of the Cadiz Valley Alternative site. The Pisgah Lava Flow is a 17,000-acre area that lies west of Ludlow. It is situated at the northwestern perimeter of the Twentynine Palms Marine Base, approximately 40 miles west-northwest of Bolo Station and 55 miles west-northwest of the Cadiz Valley Alternative site.

Unusual Plant Assemblages

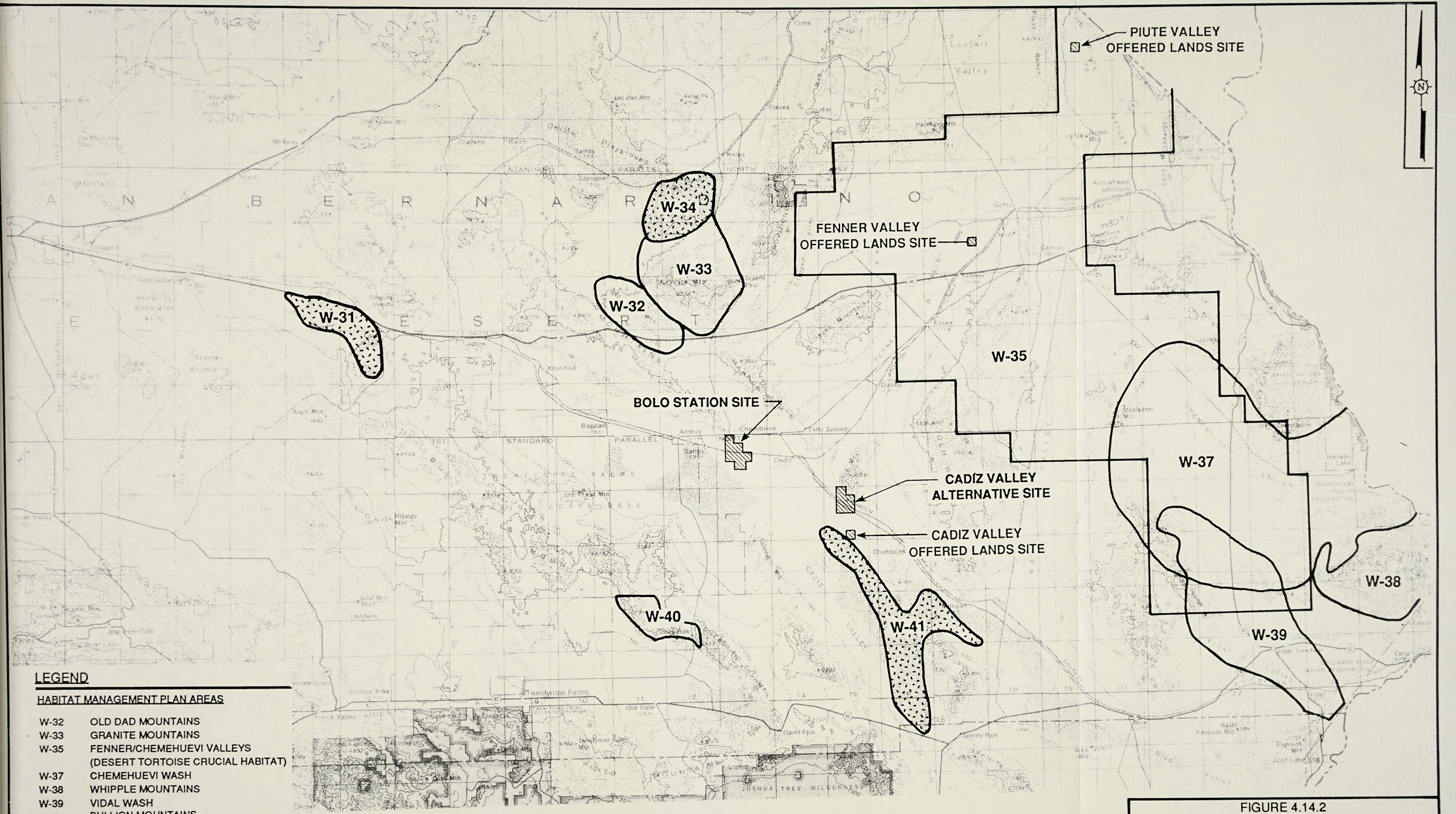
1. Unusual Plant Assemblages (UPAs) are those stands of vegetation within the CDCA that are unusual for one or more of the following four factors: age, size, high cover or density, or disjunction from main centers of distribution. No UPAs occur on the Bolo Station or Cadiz Valley Alternative site. The UPA closest to the sites is a crucifixion thorn assemblage located in the Sheephole Mountains near Sheephole Summit Pass. The location is approximately 20 miles south-southwest of Bolo Station and 20 miles southwest of the Cadiz Valley Alternative site.

2. The next nearest UPA is situated near Ludlow, where I-40 and Route 66 meet. Similar to the UPA previously described, it is a Class II crucifixion thorn assemblage. It is located approximately 25 miles west-northwest of Bolo Station and 40 miles northwest of the Cadiz Valley Alternative site.

Wilderness Element

1. The Wilderness Act of 1964 provided for the establishment of a national wilderness preservation system. Public lands managed by the BLM in the CDCA were evaluated for recommendation as Wilderness Study Areas (WSAs). An objective of the Wilderness Element of the CDCA Plan is to provide a variety of physical settings and challenges that offer opportunities for primitive recreation and solitude.

2. BLM's wilderness review program recommended 45 WSAs for wilderness designation. One of the recommended WSAs, the Sheephole/Cadiz WSA (WSA-305), is situated five miles south of Bolo Station and eight miles southwest of the Cadiz Valley Alternative site, as shown in Figure 4.14.3. This WSA extends southward and joins another recommended wilderness area, the Coxcomb Mountains WSA in turn adjoins Joshua Tree National Monument managed by the National Park Service.



LEGEND

HABITAT MANAGEMENT PLAN AREAS

W-32	OLD DAD MOUNTAINS
W-33	GRANITE MOUNTAINS
W-35	FENNER/CHEMEHUEVI VALLEYS (DESERT TORTOISE CRUCIAL HABITAT)
W-37	CHEMEHUEVI WASH
W-38	WHIPPLE MOUNTAINS
W-39	VIDAL WASH
W-40	BULLION MOUNTAINS

SPECIAL AREAS

W-31	PISGAH LAVAFLOW
W-34	KELSO DUNES
W-41	CADIZ DUNES

REFERENCE: USGS 1:2,000,000 SCALE MAP OF SOUTHERN CALIFORNIA, DATED 1973, CDCA PLAN (BLM,1980a)

FIGURE 4.14.2

HABITAT MANAGEMENT PLAN AREAS AND SPECIAL AREAS IN THE PROJECT REGION

RAIL•CYCLE
BOLO STATION LANDFILL

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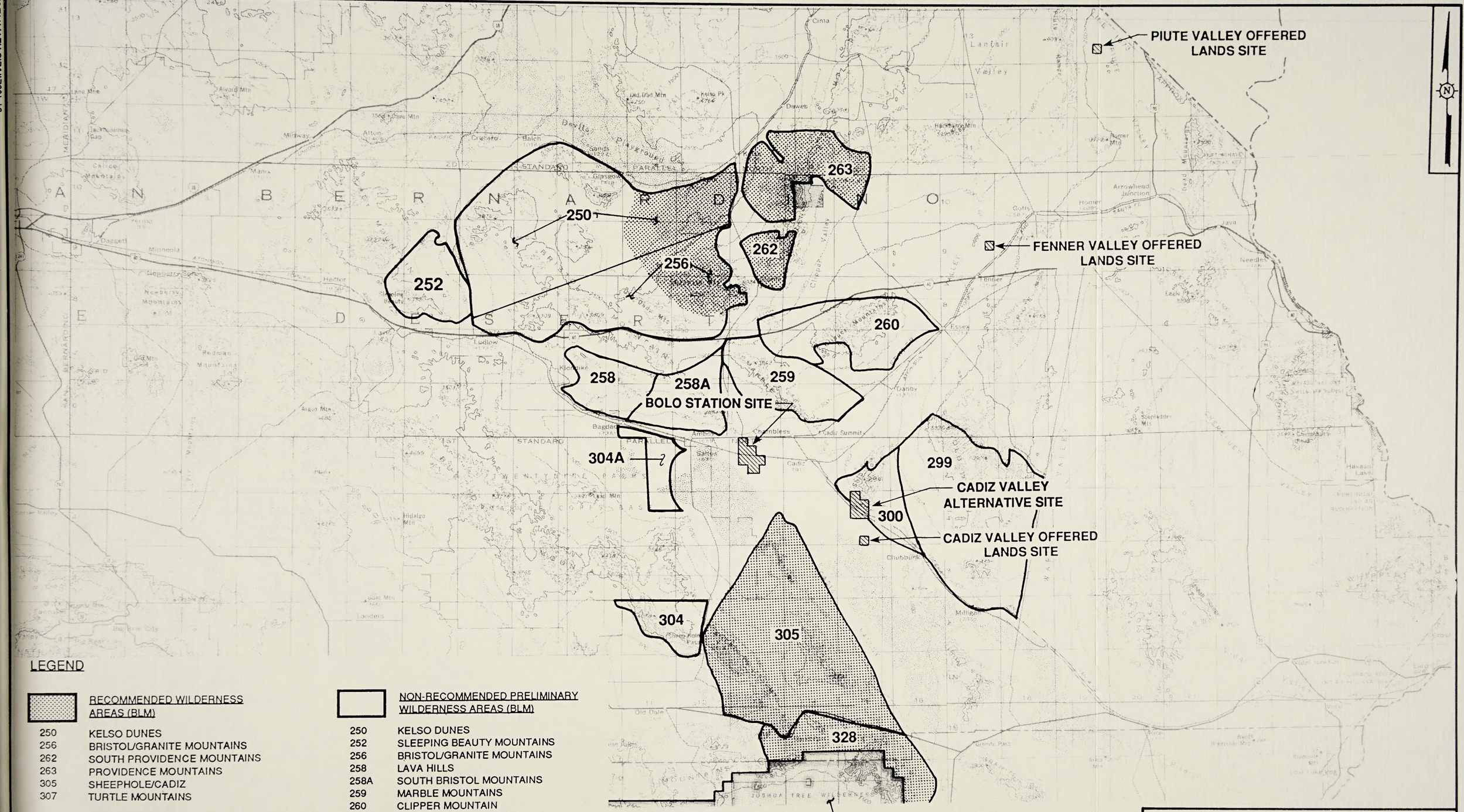


LEGEND

RECOMMENDED WILDERNESS AREAS (BLM)

250	KELSO DUNES
256	BRISTOL/GRANITE MOUNTAINS
262	SOUTH PROVIDENCE MOUNTAINS
263	PROVIDENCE MOUNTAINS
305	SHEEPHOLE/CADIZ
307	TURTLE MOUNTAINS

NON-RECOMMENDED PRELIMINARY WILDERNESS AREAS (BLM)

250	KELSO DUNES
252	SLEEPING BEAUTY MOUNTAINS
256	BRISTOL/GRANITE MOUNTAINS
258	LAVA HILLS
258A	SOUTH BRISTOL MOUNTAINS
259	MARBLE MOUNTAINS
260	CLIPPER MOUNTAIN
299	OLD WOMAN MOUNTAINS
300	SHIP MOUNTAINS
304	CLEGHORN LAKES
304A	AMBOY CRATER

NON-BLM WILDERNESS AREA

JOSHUA TREE NATIONAL MONUMENT (DISCRETE AREAS)

NOTE:

RECOMMENDED AND NON-RECOMMENDED WILDERNESS AREAS WITHIN 30 MILES OF THE BOLO STATION SITE ARE SHOWN.

REFERENCE: USGS 1:2,000,000 SCALE MAP OF SOUTHERN CALIFORNIA, DATED 1973, CDCA PLAN (BLM,1980a)

FIGURE 4.14.3

REGIONAL WILDERNESS AREAS

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

3. The next closest preliminary wilderness areas are located north of I-40, approximately 15 miles north of Bolo Station and 25 miles northwest of the Cadiz Valley Alternative site. Four WSAs are in this general location: Kelso Dunes (WSA-250), Bristol/Granite Mountains (WSA-256), South Providence Mountains (WSA-262), and Providence Mountains (WSA-263).

4. Surrounding Cadiz Valley, but not recommended for further consideration as wilderness areas, are a number of areas, as shown in Figure 4.14.3. BLM, as directed by FLPMA, manages these areas "so as not to impair the suitability of such areas for preservation as wilderness," until Congress acts on wilderness designation.

Wild Horse and Burro Element

1. No wild horse or burro management areas occur within or near the Bolo Station or Cadiz Valley Alternative sites. The nearest herd management area is the Granite/Providence Mountains area, which is managed for burro. This area extends from the vicinity of I-40 northward and is approximately 12 miles north of Bolo Station and 22 miles northwest of the Cadiz Valley Alternative site.

Livestock Grazing Element

1. No livestock grazing allotments occur within or near the Bolo Station or Cadiz Valley Alternative sites. The nearest grazing allotment is in the Granite Mountains vicinity, where a large area comprised of contiguous grazing allotments occurs. This area is located about 12 miles north of Bolo Station and 20 miles north of the Cadiz Valley Alternative site. To the east is situated a second grazing allotment, the Lazy Daisy allotment. This allotment is located approximately 20 miles east-northeast of Bolo Station and 15 miles northeast of the Cadiz Valley Alternative site.

Recreation Element

1. Portions of the CDCA are designated as open areas for motorized vehicle play, and three long-distance competitive routes are also delineated. These three include the Johnson Valley to Parker route, the Parker "400" route, and the Stoddard Valley to Johnson Valley route. The Johnson Valley to Parker route passes through Cadiz Valley in the vicinity of the Bolo Station and Cadiz Valley Alternative sites. From Amboy the route traverses the western and southern shore of Bristol Dry Lake, circles the northern and eastern flanks of the Sheephole Mountains, and proceeds eastward. The route is located within five miles of Bolo Station and six miles of the Cadiz Valley Alternative site.

Motorized Vehicle Access Element

1. Motorized vehicle use in areas of the CDCA is designated in one of three ways: open, closed, or limited. By contrast, motorized vehicle play is addressed separately under recreation, as discussed in Section 4.14.2.1.4, and can occur only in specified areas.

2. The open designation for motorized vehicle use indicates that a vehicle can travel anywhere within the area. A closed designation indicates that no vehicle travel is allowed. A limited designation indicates that vehicle access is allowed only on certain routes of travel, the range of which is determined by the area's land use classification. For Class L and C, routes of travel consist only of "approved" routes, which are identified by signs and maps. For Class M and I, existing routes of travel can be used for vehicle access, excepting those that are specifically identified as closed.

3. The Bolo Station site is designated as limited for vehicle access, with the portion north of the railroad tracks limited to existing routes of travel and the portion south of the tracks limited to approved routes of travel. The Cadiz Valley Alternative site is designated as limited to existing routes of travel.

4. Two areas in the project vicinity are designated as closed to vehicle access. These are the preliminary recommended Sheephole Mountain/Cadiz WSA and the northern portion of the Cadiz Dunes.

4.14.2 LAND USE SETTING

4.14.2.1 Regional Land Use

1. Low density land use activities characterize the desert area of the eastern County. Open space prevails, and there also are military, mineral extraction, agriculture, and recreation/tourism uses. Transportation and transmission facilities,

including state and interstate highways, roads, railroads, power transmission lines, utility pipelines, and communication stations, are located throughout the region.

2. Residential uses consist of small communities widely dispersed throughout the region. For the most part, these scattered residential clusters are closely tied to the area's major transportation corridors such as I-40, Route 66, and the ATSF rail line. The nearest large residential use in the region is the city of Twentynine Palms, home to about 15,000 civilian and military personnel and located about 30 miles south of Bolo Station. In addition, Needles is located about 70 miles east of the Bolo Station site, and Barstow is located about 80 miles to the west.

4.14.2.1.1 Military Use

1. Other than the County and BLM, the largest single land user in this region is the U.S. Marine Corps, with its 932-square mile Twentynine Palms Marine Corps Base. The eastern boundary of this military reservation is located about nine miles west of Bolo Station and 16 miles west of the Cadiz Valley Alternative site. Among other activities, the base is used for gunnery, demolition, and flight training activities.

4.14.2.1.2 Mineral Extraction

1. California is ranked second in the nation in value of nonfuel mineral production, with approximately 10 percent of the total domestic mineral production in 1989 (BLM, 1991). Many of the mineral resources of the state are located in the CDCA. Excluding oil and gas, the CDCA produces 50 percent of the state's revenue from mineral resources (BLM, 1980a).

2. The importance of the mineral industry in the County is increasing with demand. In addition, rising transportation and energy costs have increased the value of the County's mineral resources due to its proximity to the southern California consumption region. While most land uses have options as to the location for site development, mineral extraction is limited to sites where minerals occur. Therefore, it is important for mineral resources to be protected and managed, so as not to be lost due to encroachment of incompatible land uses.

3. Both the County and BLM actively manage mineral resources in the desert region through their land use plans, policies and objectives. The 1989 County General Plan includes specific goals to conserve mineral resources and preserve access to them for recovery. The BLM, through the CDCA Plan and its GEM Resource Area Assessment, implements various federal legislation and regulations associated with management resources on federal lands. A complete discussion of mineral resources and management policies in the project region is included in Section 4.3 - Mineral Resources.

4. The primary mineral extraction activity in the project area relates to salt production activities at Bristol Dry Lake (i.e., sodium chloride and calcium chloride). Leslie Salt and National Chloride have facilities in the area, and Hills Brothers has a processing plant in Amboy.

5. In addition, two proposed mining operations are being considered in the general area of Bolo Station:

   - **America Mine** - a proposed heap leach gold mining facility is located west of Bristol Dry Lake, west of Amboy Road, in the northern Bullion Mountains, approximately ten miles southwest of Bolo Station. This project is expected to be permitted within the next two years and may be operational by 1994.
   - **Desert Garnet Mine** - a proposed open pit low grade garnet mine (used for sandblasting) is located northeast of Bristol Dry Lake on the eastern slope of the Marble Mountains, approximately five miles northeast of Bolo Station.

4.14.2.1.3 Agriculture

1. The primary agricultural activity in the region is Pacific Agriculture Holdings, Inc. (Pacific Agriculture), a grape and citrus growing industry with fields situated south of Cadiz between Bolo Station and Cadiz Valley Alternative sites. Pacific Agriculture currently has 1,440 acres of privately held land in crops, including 800 acres in table grapes and 640 acres in citrus. Permanent staff live in trailer homes on the northeastern periphery of Cadiz, while seasonal workers are temporarily housed south of Cadiz. Wells supply

water for irrigation and domestic needs. The agribusiness has filed applications with the County for expansion of agricultural development into an additional 3,840 acres of privately held land (six sections) and development of housing and other facilities elsewhere in the vicinity, raising the potential size of the Pacific Agriculture site to 9,600 acres (15 sections) of privately held land.

4.14.2.1.4 Recreation/Tourism

1. Various recreational opportunities are available in the desert, including both solitary and group activities. Open space, such as lakebeds, provide opportunities for such activities as soaring, land sailing, hang gliding, model rocket and airplane flying, and others. A wealth of geological resources are available for recreational rock collectors, and scenic areas are abundant for the photographer, painter, and sightseer. Hunting of game species such as quail and mule deer is another recreational opportunity of the desert.

2. Resource-oriented recreation, such as camping and hiking, is popular in the desert. Opportunities for solitude and primitive forms of recreation are provided by wilderness areas, which are managed to protect many features unique to the desert as well as a variety of ecosystems.

3. The BLM recreation management of the region has emphasized information and interpretation through the use of maps, brochures, and other publications. These materials provide visitors with the information needed for self-guided recreational activities and maintain the predominant casual use of the area.

4. The nearest developed facility for recreation/tourism is Amboy Crater, located about seven miles west of Bolo Station. The most popular developed recreational area in the project region is Joshua Tree National Monument, located about 30 miles south of Bolo Station and extending to I-10. Managed by the National Park Service, the monument's peak visitor season is March through May.

4.14.2.2 Local Land Use

4.14.2.2.1 Bolo Station Site

1. The Bolo Station site includes two and one-half sections of public land managed by the BLM as Class L and M lands, and five sections of land owned by ATSF, as shown in Figure 4.14.4. The County land use designation for the ATSF property and other private lands in the vicinity is Resource Conservation.

2. Presently, BLM manages Sections 8, 15, and the western one-half of Section 22 within the Bolo Station site. The proposed action includes a land exchange of these parcels for three sections currently owned by ATSF (offered lands), that would consolidate ownership of the Bolo Station site under Rail•Cycle, as well as BLM ownership in the area of the offered lands. This consolidation is consistent with the goals of the CDCA Plan.

3. Development of solid waste management facilities on federal lands designated as Class L is not consistent with the CDCA Plan. In considering the proposed land exchange, BLM must review the ultimate use of the land and its consistency with the goals and policies of the CDCA Plan. The amendment process will remove the BLM property from consideration in the CDCA Plan and evaluate the consistency issue.

Onsite Easements

1. ATSF maintains lands along the railroad corridor which transects the central portion of the Bolo Station site in an east-west direction and crosses BLM lands in Sections 8 and 15. The Celeron-All American pipeline is a 30-inch diameter oil pipeline installed south of and parallel to the railroad berm.

Mineral Extraction

1. The primary land use in the vicinity of the Bolo Station site is mineral extraction. Bristol Dry Lake adjoins the southwestern site boundary and provides an active mining area for sodium chloride and calcium chloride. National Chloride and Leslie Salt both have mining operations on the dry lake. National Chloride's operations consist of salt evaporation, brine ponds, and salt mining facilities. Leslie Salt has an active well field in Sections 18 and 19, situated within one-quarter mile southwest of the Bolo Station site boundary. Brine is withdrawn from the wells and evaporated for salt production. Company facilities are located facilities. Leslie Salt has an active well field in Sections 18 and 19, situated within one-quarter mile southwest of the Bolo Station site boundary.

PRIVATE 29 (SUBDIVIDED)
SOUTHERN PACIFIC 33 LAND CO.
PRIVATE 25 (SUBDIVIDED)
PRIVATE 36 (SUBDIVIDED)
PRIVATE 1 (SUBDIVIDED)
ATSF 5
CADIZ VALLEY DEVELOPMENT CORP. 1
BOLO STATION SITE
ATSF 9
ATSF 17
ATSF 16
ATSF 21
PRIVATE (SUBDIVIDED) 22
CADIZ VALLEY DEVELOPMENT CORP. 13
SOUTHERN PACIFIC 25 LAND CO.
ATSF 33
PRIVATE 36 (SUBDIVIDED)
STATE OF CALIFORNIA 36 (SUBDIVIDED)

Bolo VABM 992
Water Tanks
Saltus
BM 675
BM 699
Well
BM 740
BM 709
BM 695
BM 667
BM 663
BM 677
ATCHISON TOPEKA AND SANTA FE
Prospect
TRAIL

0 1 2 MILES
APPROXIMATE SCALE

LEGEND:

- BLM CLASS L
- BLM CLASS M
- BLM CLASS I

REFERENCE: U.S.G.S. 15 MINUTE TOPOGRAPHIC MAP OF CADIZ AND BRISTOL LAKE, CALIFORNIA BOTH DATED 1956.

FIGURE 4.14.4

LAND USE
BOLO STATION SITE VICINITY

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

Brine is withdrawn from the wells and evaporated for salt production. Company facilities are located in Saltus, a railroad siding located north of the lakebed and about three miles west of the Bolo Station site. Salt is processed at this facility, then shipped via rail to various destinations.

Residential Use

1. The nearest residential uses in the area include the small towns of Amboy, Cadiz, and Chambless. Bolo Station is situated six miles east of Amboy, six miles west of Cadiz, and five miles west of Chambless. Populations of these towns are limited. For example, Amboy has a population of approximately 20 people. Amboy has residential and light commercial uses, including a cafe and motel. Amboy also has an elementary school for children in kindergarten through eighth grade (K-8). Chambless has a small roadside store and gas station. Cadiz contains a trailer park, which houses permanent workers employed by Pacific Agriculture. Other residential uses in the region are outside the vicinity of the Bolo Station site (see Section 4.15).

4.14.2.2.2 Cadiz Valley Alternative Site

1. The Cadiz Valley Alternative site is comprised of five sections of land, as shown in Figure 4.14.5. Section 8 is public land managed by the BLM as Class M. Sections 5 and 9 are private lands owned by the Southern Pacific Land Company, which is owned by the parent company of ATSF. The Cadiz Valley Development Corporation owns Section 17, and Section 16 is state land. The County General Plan designates the area as Resource Conservation.

2. Land uses such as recreation and tourism in the site vicinity are limited. A nonrecommended preliminary WSA, the Ship Mountains, extends from the northeastern portion of the alternative site.

Onsite Easements

1. Cadiz Road and the Arizona-California Railroad transect the central portion of the site in a northwest to southeast direction. Cadiz Road is a dirt road through the area, and the railroad is a single track line set on a berm. Formerly owned by ATSF, the Arizona-California Railroad maintains patented lands along the railroad corridor. The Celeron-All American Pipeline is a 30-inch diameter crude oil pipeline installed parallel to and southwest of Cadiz Road.

Residential Uses

1. The town of Cadiz is the residential community closest to the Cadiz Valley Alternative site. Situated about six miles northwest of the site, the town contains a number of residences including a mobile home park for Pacific Agriculture's employees. The town does not have a school.

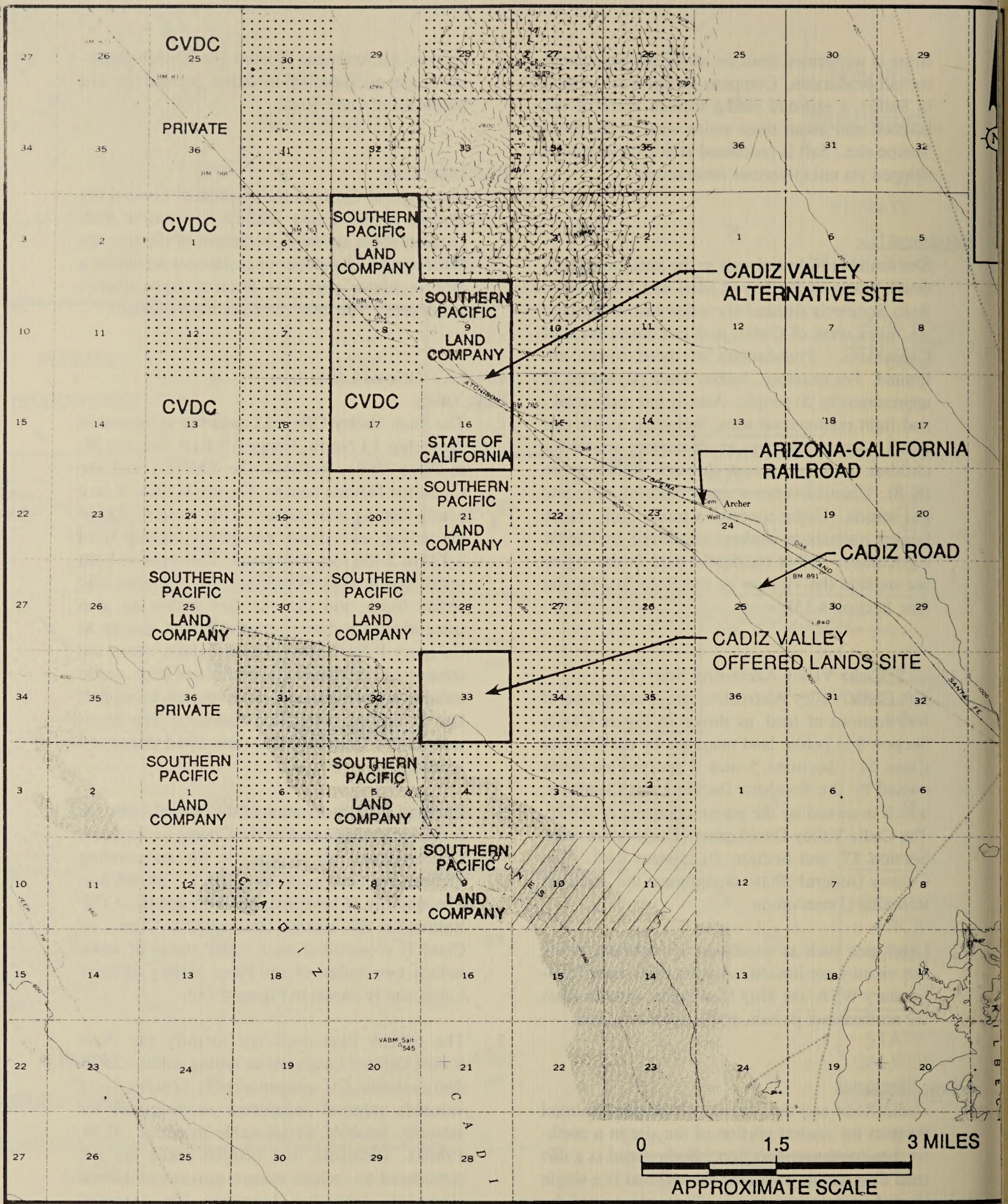
4.14.2.2.3 Offered Lands Sites

Piute Valley

1. The Piute Valley Offered Lands site is located in Township 13 North, Range 19 East, Section 29, in Piute Valley between the EMNSA and the California-Nevada border. The site is situated on a gently-sloping alluvial fan on the western side of the valley, with onsite elevations ranging from 2,320 to 2,400 feet above msl. The creosote bush scrub community comprises the characteristic onsite biota, and the site lies within an area categorized for desert tortoise habitat quality as Category 1 by BLM. These habitat areas are considered essential to maintenance of large, viable tortoise populations and are expected to support low to medium population densities. The desert tortoise is a federally- and state-listed threatened species.

2. The land use classification of the offered lands site is currently designated by the County as Resource Conservation. BLM lands in the surrounding vicinity are designated as Class L, limited use. The majority of lands between I-15 and the ATSF Railroad in this area are designated as Class L or Class C (controlled use). The status of lands within two miles of the Piute Valley Offered Lands site is shown in Figure 4.14.6.

3. The CDCA Plan does not identify the Piute Valley Offered Lands site as falling within CDCA designations for georesources, prospectively valuable mineral resources, or potential for saleable, leasable, or locatable minerals (BLM, 1980a). Therefore, the offered lands are not considered to include known mineral resources. However, extensive locations for potential locatable minerals are in the immediate vicinity of the site. This offered lands site is less than



LEGEND:

BLM CLASS M

CVDC CADIZ VALLEY DEVELOPEMENT CORPORATION

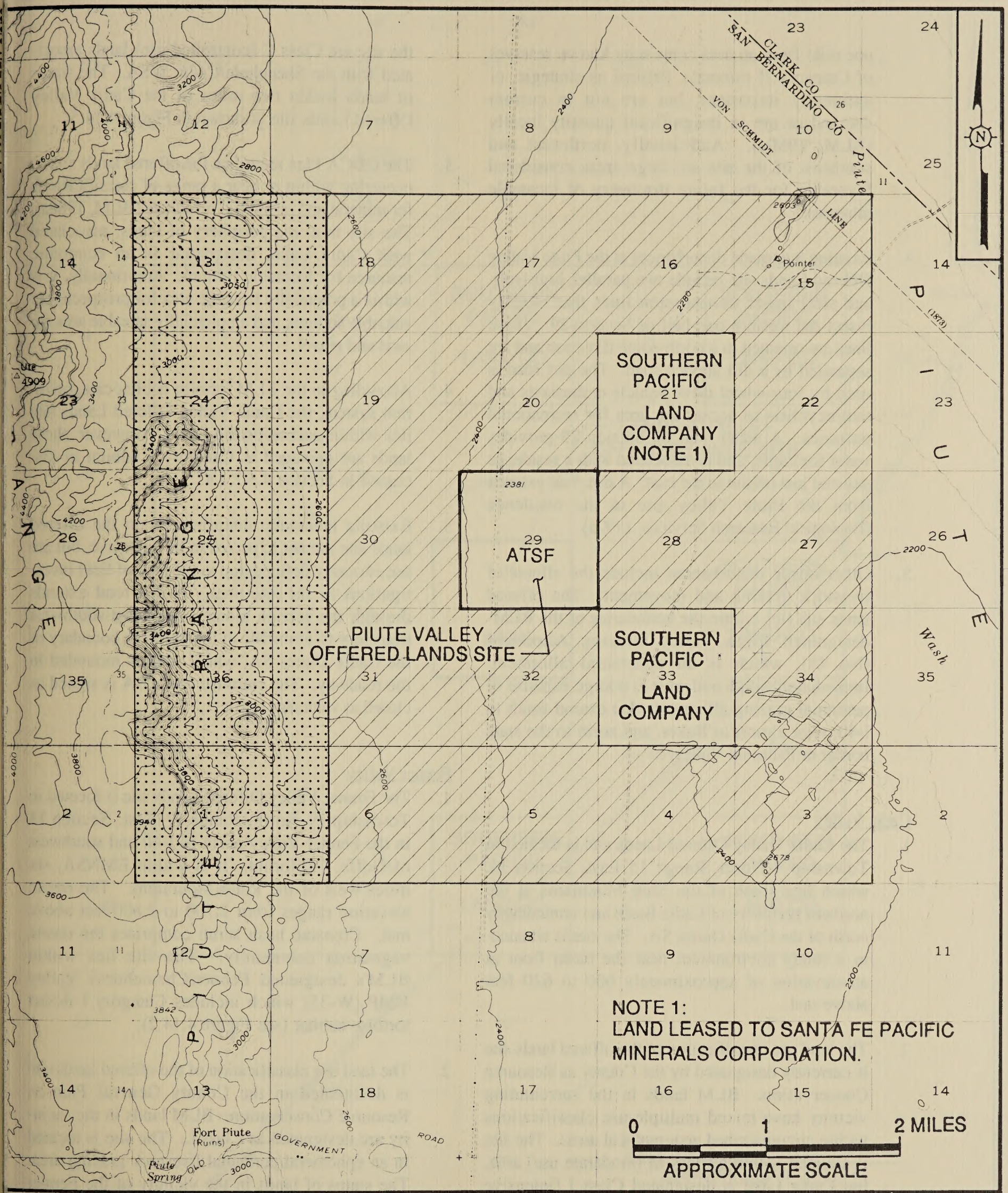
REFERENCE: U.S.G.S. 15 MINUTE TOPOGRAPHIC MAP OF CADIZ, CALIFORNIA DATED 1956.

FIGURE 4.14.5

LAND USE CADIZ VALLEY ALTERNATIVE SITE AND CADIZ VALLEY OFFERED LANDS SITE VICINITY

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.



LEGEND:

BLM CLASS L

BLM CLASS C

FIGURE 4.14.6

LAND USE
PIUTE VALLEY
OFFERED LANDS SITE

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

one mile from an area containing known reserves of Category II minerals, defined as strategic, or nationally important, but are not in current demand or are in insignificant quantity locally (BLM, 1980a). Additionally, northwest and southeast of the site are large areas considered favorable for the future discovery of locatable minerals.

4. Existing manmade disturbances at the Piute Valley Offered Lands site include two parallel, high-voltage steel tower transmission lines that roughly bisect the western one-half of Section 29. These lines are oriented in a north-south direction and are separated by a dirt service road. The dirt road is used by four-wheel drive vehicle enthusiasts and motorcyclists to access the area for recreational purposes. A water well on Section 29 provides water for cattle, and is associated with a residence situated just offsite to the east. A dirt road extends from the Piute Valley site to the residence (Ecological Research Services, 1992a).

5. Other onsite disturbances include the effects of livestock grazing and movement. The offered lands site lies within the boundaries of the BLM-designated Piute Valley Grazing Allotment (No. 48), which is an ephemeral allotment. Immediately south and west is a large expanse of perennial grazing allotments that extend south to I-40, west almost to Baker, and north to the state border or Pahrump Valley.

Cadiz Valley

1. The Cadiz Valley Offered Lands site is located in Township 4 North, Range 15 East, Section 33, which lies south of the Ship Mountains at the northern periphery of Cadiz Basin and immediately north of the Cadiz Dunes SA. The site is situated in a sandy environment near the basin floor at an elevation of approximately 600 to 620 feet above msl.

2. The land use classification of the offered lands site is currently designated by the County as Resource Conservation. BLM lands in the surrounding vicinity have mixed multiple-use classifications within circumscribed geographical areas. The site is situated within a Class M (moderate use) area, but Cadiz Lake is designated Class I (intensive use), and the Cadiz Dunes SA, immediately south of the offered lands site, is designated as Class L (limited use). Approximately five miles west of the site are Class C (controlled use) lands associated with the Sheephole/Cadiz WSA. The status of lands within two miles of the Cadiz Valley Offered Lands site is shown in Figure 4.14.5.

3. The CDCA Plan identifies the offered lands site as occurring within or near a range of classifications for mineral and economic resources (BLM, 1980a). The site is at the periphery of lands, associated with Cadiz Lake, designated as an economic resource for locatable lithium. Additionally, it is within a potentially leasable area for prospectively valuable sodium, and a potentially saleable area for sand and gravel.

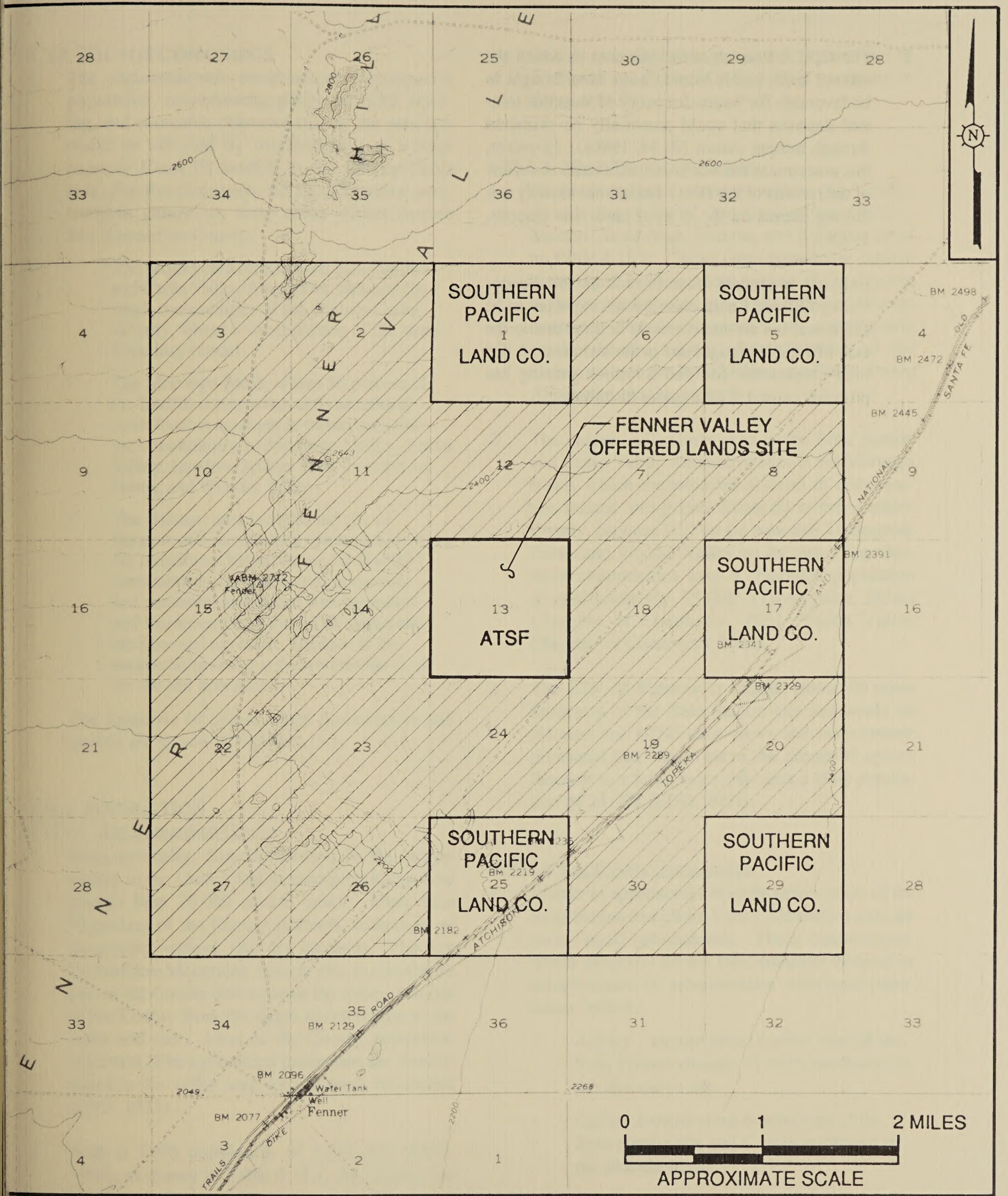
4. According to the BLM tortoise habitat categorization system, the Cadiz Valley Offered Lands site lies within uncategorized lands. However, these lands are managed as Category 3 habitat as discussed in Section 4.6.2.1.4.

5. Existing manmade disturbances on the offered lands site are not expected to be extensive, but are not currently defined due to the lack of field investigations in the site area. A dirt road extends through the section along a northeast-southwest trajectory to terminate at the northern boundary of the Cadiz Dunes SA, where sand is mounded in the roadway. The entrance to the SA is signed as closed to vehicular traffic.

Fenner Valley

1. The Fenner Valley Offered Lands site is located in Township 19 North, Range 17 East, Section 13 in the Fenner Valley north of I-40 and southwest of Goffs, California. It is within EMNSA, six miles west of the Piute Mountains. The onsite elevation ranges from 2,700 to 2,800 feet above msl. Creosote bush scrub comprises the onsite vegetation community. The site lies within BLM's designated Fenner/Chemehuevi Valley HMP (W-35) which includes Category 1 desert tortoise habitat (see Figure 4.14.2).

2. The land use classification of the offered lands site is designated in the County General Plan as Resource Conservation. BLM lands in the vicinity are designated as Class L. The site is located in an ephemeral/perennial livestock grazing area. The status of lands in the vicinity of the Fenner Valley Offered Lands site is shown in Figure 4.14.7.



LEGEND

BLM CLASS L

REFERENCE: U.S.G.S. 15 MINUTE TOPOGRAPHIC MAP OF FENNER, CALIFORNIA. DATED 1956.

FIGURE 4.14.7

LAND USE
FENNER VALLEY
OFFERED LANDS SITE

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

3. The CDCA Plan identifies the area in which the offered lands site is located as an area thought to be favorable for future discovery of locatable mineral deposits that could potentially be extracted through mining claims (BLM, 1980a). However, this assessment has not been confirmed. A review of the records of the DMG and did not identify any mining claims on the offered lands site (Jacobs, 1992b).

4. Existing manmade disturbances at the Fenner Valley Offered Lands sites are not expected to be extensive, but are not currently defined due to the lack of field investigations in the site area. A dirt road crosses the site and livestock grazing has probably caused at least minor disturbance.

4.15 SOCIOECONOMICS

1. The socioeconomic environment encompasses population, employment, public services, housing, and economic characteristics of the area that could be affected by establishment of a large capacity Class III landfill in the Amboy-Cadiz area. For this discussion, the socioeconomic environment comprises three areas within eastern San Bernardino County:

   - The project area includes the Bolo Station and Cadiz Valley Alternative sites and the small communities of the Amboy-Cadiz vicinity, where a small portion of the work force may reside.
   - The Morongo Basin, where 50 percent of the landfill construction and operational work force is assumed to reside, includes the communities of Morongo Valley, Yucca Valley, Landers, Joshua Tree, Twentynine Palms, and Wonder Valley.
   - The Barstow area includes the city of Barstow and surrounding communities where the remaining 50 percent of the landfill construction and operational personnel, and personnel associated with operation and maintenance of the ATSF unit trains are assumed to reside. Barstow is the maintenance center and crew transfer point for the rail operations.

   The locations of communities discussed in this section are shown in Figure 4.15.1.

4.15.1 POPULATION

4.15.1.1 San Bernardino County

1. Geographically, San Bernardino is the largest county in the United States, incorporating an area greater than 20,000 square miles. More than 90 percent of the County is desert, consisting of mountains, valleys, and dry lakebeds. The San Bernardino Mountains occupy the southwestern part of the County and separate the valley portions of the County from the larger desert region to the north and east. Most of the County population and much of its agricultural production are concentrated in the valley area west of these mountains (EDD, 1991).

2. With a 1990 population of 1,396,000 (EDD, 1991), as shown in Table 4.15.1, the County has an average density of approximately 70 persons per square mile. Between 1980 and 1990, County population increased an average of 5.8 percent per year (U.S. Bureau of the Census, 1983). County population is projected to increase to 2,171,615 by 2010 (SCAG, 1991), as shown in Table 4.15.2.

4.15.1.2 Major Population Centers

1. Major population centers within the County include the cities of San Bernardino, Ontario, Rancho Cucamonga, Fontana, and Rialto, as listed in Table 4.15.1. These large population centers are situated in the western portion of the County, in the vicinity of coastal Los Angeles and Orange counties. Population centers are considerably smaller in the eastern, desert portion of the County, where the Bolo Station and Cadiz Valley Alternative sites are located.

2. The nearest full-service area to the Bolo Station and Cadiz Valley Alternative sites is the Morongo Basin, which encompasses a series of communities located along State Route 62 in the southern County, between I-10 on the west and Twentynine Palms and Wonder Valley on the east. Together, these communities have a combined population of approximately 75,000 (Twentynine Palms Chamber of Commerce, 1991; Yucca Valley Chamber of Commerce, 1991).

3. The City of Barstow is located about 80 miles northwest of the Bolo Station site and would be the base for ATSF train crews and maintenance personnel that would serve the proposed action. Barstow is a full-service city with a 1990 population of 21,200 (EDD, 1991).

4.15.1.3 Local Area Communities

1. Within an approximate 40-mile radius miles of the Bolo Station and Cadiz Valley Alternative sites are seven small communities. These communities, which generally do not have adequate housing or infrastructure to accommodate additional population, include:

   - Amboy – located about 6 miles west of the Bolo Station site and 19 miles northwest of the alternative site.
   - Cadiz – located about 6 miles east of the Bolo Station site and 6 miles northwest of the alternative site.
   - Chambless – situated about 6 miles east of the Bolo Station site and 9 miles northwest of the alternative site.

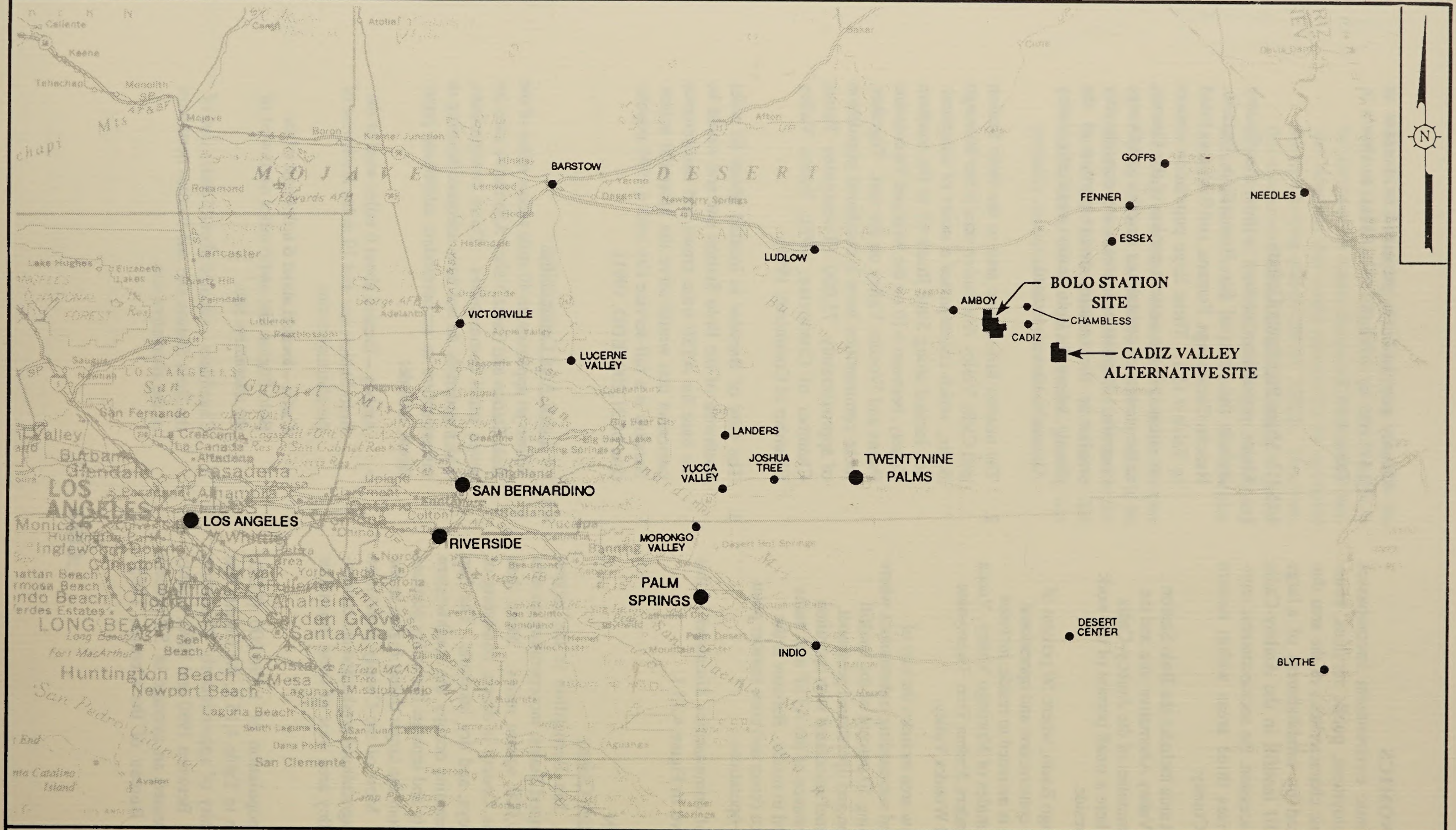


FIGURE 4.15.1

REGIONAL SOCIOECONOMIC STUDY AREA

RAIL•CYCLE
BOLO STATION LANDFILL

REFERENCE: USGS MAP OF SOUTHERN CALIFORNIA. DATED 1973.

ENVIRONMENTAL SOLUTIONS, INC.

TABLE 4.15.1

POPULATION OF SAN BERNARDINO COUNTY[1]

CITY	JANUARY 1, 1990	JANUARY 1, 1991	PERCENT CHANGE
Adelanto	8,250	8,700	5.5
Apple Valley	44,850	48,550	8.2
Barstow	21,200	21,850	3.1
Big Bear Lake	5,300	5,375	1.4
Chino	59,500	60,600	1.8
Colton	39,500	41,350	4.7
Fontana	85,200	91,300	7.2
Grand Terrace	10,750	12,600	17.2
Hesperia	49,100	53,200	8.4
Highlands	33,800	35,650	5.5
Joshua Tree[2]	–	11,500	–
Loma Linda	17,000	18,450	8.5
Montclair	28,100	28,800	2.5
Morongo Valley[2]	–	6,500	–
Needles	5,050	6,000	18.8
Ontario	129,900	135,500	4.3
Rancho Cucamonga	98,400	104,900	6.6
Redlands	59,700	63,200	5.9
Rialto	70,300	75,700	7.7
San Bernardino	162,000	171,600	5.9
Twentynine Palms[3]	11,750	11,950	1.7
Upland	62,600	64,000	2.2
Victorville	39,100	44,500	13.8
Yucaipa	32,250	33,850	5.0
Yucca Valley[4]	–	30,000	4.0
Unincorporated	322,900	333,700	3.3
TOTAL COUNTY	1,396,600	1,471,300	5.3
State of California	29,558,000	30,351,000	2.7

91-109 (7/12/92/cm)

(1) EDD, 1991 (except as otherwise noted).
(2) Enterprise Opportunities, 1989.
(3) Does not include approximately 22,000 military personnel and dependents assigned to the Twentynine Palms Marine Base (Yucca Valley Chamber of Commerce, 1991).
(4) Includes Lander (Yucca Valley Chamber of Commerce, 1991).

TABLE 4.15.2

SELECTED POPULATION PROJECTIONS
PROJECT IMPACT AREA

AREA	1991[1]	PROJECTED 2010[2]	PERCENT CHANGE
Barstow	21,850	30,544	40
Twentynine Palms	11,950[3]	17,618	47
Unincorporated County	322,900	774,159	140
TOTAL COUNTY	1,396,600	2,171,615	55

91-109 (11/5/92/mg)

(1) EDD, 1991.
(2) SCAG, 1991.
(3) Does not include approximately 21,000 military personnel and dependents assigned to the Twentynine Palms Marine Corps Base (Yucca Valley Chamber of Commerce, 1991).

- Essex – located about 25 miles northeast of the Bolo Station site and 21 miles northeast of the alternative site.
- Fenner – located about 30 miles northeast of the Bolo Station site and 28 miles northeast of the alternative site.
- Goffs – located about 35 miles northeast of the Bolo Station and 38 miles northeast of the alternative site.
- Ludlow – located about 32 miles northwest of the Bolo Station site and 44 miles northwest of the alternative site.

4.15.2 HOUSING

1. Housing in the vicinity of the Bolo Station and Cadiz Valley Alternative sites is addressed in this evaluation to provide perspective on the availability of accommodations suitable for project construction and operations personnel and their families. Such information also will be useful in providing a basis for determining the likely choice of residential location and, therefore, potential impacts to existing housing availability as a result of the proposed action (see Section 5.15).

4.15.2.1 Project Area

1. Housing in communities in the immediate vicinity of the proposed action generally consist of single family and mobile homes. Virtually all of these residences are occupied. Facilities for trailers, recreational vehicles (RVs), or other temporary residences generally are not available.

4.15.2.2 Morongo Basin

1. The housing market in the Morongo Basin communities is limited. Permanent housing in the area primarily consists of single family homes and apartments. The median value of single family homes is $65,000 to $70,000, with new homes priced at approximately $100,000 (Milner, 1992). Rentals range from $350 to $800 for single family homes and from $350 to $575 for apartments (Culver, 1992; Milner, 1992).

2. The housing market in Twentynine Palms is influenced to a great extent by requirements of military personnel assigned to the Twentynine Palms Marine Corps Base, resulting in a low vacancy rate. Houses usually are sold before construction is complete, and apartments tend to be rented promptly upon listing. Little new civilian housing is being built in Twentynine Palms; however, a 600-unit development is being constructed exclusively for military use. Scheduled for completion in 1993, this housing complex would be leased to the Marine Corps for 20 years (Stephens, 1992).

3. Within the Morongo Basin, housing availability improves with distance from the Marine Corps base. Vacancy rates in Joshua Tree are estimated at about 7 percent (Milner, 1992), and in Yucca Valley at about 10 percent (Culver, 1992). Generally, mobile homes are not available, although land is available where mobile homes could be located (Milner, 1992).

4. Temporary housing is available in the area's hotels/motels and established RV parks. Most provide daily, weekly, and monthly rates. The availability of rooms and RV spaces varies seasonally, with peak occupancy during the cool months of October through March, when facilities may be completely full. However, Twentynine Palms facilities may be full even in summer, when families arrive to visit reservists who are on duty at the Marine Corps base.

4.15.2.3 Barstow

1. In 1990, the Barstow Chamber of Commerce reported 5,102 detached single family homes, 2,322 multiple apartments, and 771 mobile homes within the city limits (Barstow Chamber of Commerce, n.d.). Additionally, housing is available in the surrounding, unincorporated area. One- and two-bedroom apartment rentals and single-family homes for purchase are generally available, while it is difficult to find single family homes for rent (Luse, 1992). Monthly rentals for apartments and duplexes range from about $350 to $550 and for homes from $550 to $750. Sale prices for homes ranged from about $65,000 to $180,000 in 1990. Space rentals in Barstow's 14 mobile home parks range from about $175 to $230 per month (Barstow Economic Development Department, 1990).

4.15.3 EMPLOYMENT

4.15.3.1 San Bernardino County

1. As indicated in Table 4.15.3, major industries in the County include services, wholesale and retail trade, and government. Every sector of the County economy, except agriculture, is expected to increase between 1989 and 1996, with the greatest increase occurring in the services sector. This anticipated trend is indicated by the data presented in the table.

2. While the smallest industry in the County is mining, it is an important source of employment in rural areas of the desert region. A complete discussion of the mineral resources in the project region and its importance in the County is included in Section 4.3.

3. Civilian labor force and employment reflect the overall growth in County population. Between 1983 and 1990, the civilian labor force grew from 401,500 to 605,400, an increase of 51 percent, with projections to 785,400 by the year 2010, as shown in Table 4.15.4. Unemployment declined overall during the 1983-1990 period, decreasing steadily from 9.3 percent in 1983 to 4.9 percent in 1989, then increasing to 5.7 percent in 1990. The year 1991 may also show an increase in unemployment, reflecting the overall economic recession.

4.15.3.2 Morongo Basin

1. The major source of employment in the Morongo Basin is government, primarily related to military and civilian employment at the Twentynine Palms Marine Corps Base, as shown in Table 4.15.5. The Morongo Valley Unified School District is the next largest employer in the basin. The largest private employers are the Hi-Desert Medical Center, located in Joshua Tree, and K-Mart Retail Stores in Yucca Valley.

4.15.3.3 Barstow

1. The major employers in the Barstow area also are government-related, primarily military, associated with the Fort Irwin National Training Center and the Marine Corps Logistics Base, as well as the Barstow Unified School District, as shown in Table 4.15.5. The largest private sector employers are Yellow Truck Freight, Bendix, and ATSF.

4.15.4 PUBLIC SERVICES

4.15.4.1 Project Area

4.15.4.1.1 Schools

1. The Bolo Station and Cadiz Valley Alternative sites are in the Needles Unified School District, which includes Needles, Amboy, Essex, and other communities to the south and east. Enrollment for the 1991-1992 school year (K through 12) was 1,650. Student enrollment increased 7 percent per year for the past three years, a rate that is expected to continue for the next several years. With six administrators and a teaching staff of 78, the student-teacher ratio is 21:1 (Murray, 1992).

2. Amboy School serves a student population of 16 in grades K through 8. The school is below maximum capacity, with facilities available for four classrooms. However, considerable renovation would be necessary before the remaining unused classrooms could be utilized (Needles Unified School District, 1992). High school students in the area are bused to Needles.

3. A one-room school in Essex, with one teacher and an aide, serves a student population of 13 in grades K through 8. High school students are bused to Needles (Murray, 1992).

4.15.4.1.2 Health Care Facilities

1. The nearest health care facilities are in Joshua Tree, Barstow, and Needles. There are no facilities in the small communities near the Bolo Station and Cadiz Valley Alternative sites.

2. The health care facilities in Joshua Tree, Barstow, and Needles are not equipped as trauma centers. The nearest trauma center to the project area is the Palm Springs Desert Hospital. It is located approximately 130 miles southwest of the project area. Response time to the project area is approximately 5 to 10 minutes by helicopter, usually by a California Highway Patrol air ambulance with a travel time to the hospital of 20 to 25 minutes (Cole, 1992).

3. Other trauma centers that serve the project areas are located at the Loma Linda University Hospital and the San Bernardino County Medical Center. The Loma Linda trauma center is located approximately 150 miles southwest of the project area with a helicopter travel time of 40 to 45 minutes (Schaffer, 1992). The San Bernardino

TABLE 4.15.3

EMPLOYMENT BY INDUSTRY[1][2]
RIVERSIDE - SAN BERNARDINO METROPOLITAN STATISTICAL AREA[3]

INDUSTRY	1980	1985	1987	1988	1989	1990	FORECAST 1996[4]	PERCENT OF TOTAL	PERCENT CHANGE 1990-1996
Agriculture[5]	18,900	22,600	22,200	22,600	21,800	21,700	21,000	3	-3
Mining	2,300	1,300	1,300	1,400	1,400	1,400	1,600	<1[6]	14
Construction[7]	26,100	38,400	49,700	55,700	65,200	67,500	88,200	8	31
Manufacturing	63,800	69,800	80,100	84,800	88,400	89,800	108,500	11	21
Transportation and Public Utilities	25,600	29,400	30,500	31,400	33,000	35,400	46,300	5	31
Wholesale and Retail Trade	106,300	132,800	151,400	158,200	168,800	184,200	225,900	24	23
Finance, Insurance and Real Estate	18,900	21,900	26,100	27,300	28,700	32,600	38,200	4	17
Services	89,700	121,500	141,500	149,000	159,300	179,500	223,400	25	24
Federal Government[8]	17,500	19,200	19,600	20,200	20,500	21,700	19,100	2	-12
State and Local Government[8]	83,800	90,600	100,700	108,400	117,200	128,300	155,100	18	21
TOTAL	**452,900**	**547,500**	**623,100**	**659,000**	**704,300**	**762,100**	**927,300**	**100**	**22[9]**

91-109 (111/5/92/mg)

(1) EDD, 1991, except where noted.
(2) Wage and Salary Employment only. Does not include proprietors, the self-employed, unpaid volunteer or family workers, domestic workers in households, or persons in labor management trade disputes.
(3) Employment reported by place of work. Does not include farmers or unpaid family workers.
(4) EDD, 1991.
(5) Agricultural services, forestry, and fishing - Definition changed to exclude veterinary, other animal, landscape and horticultural services.
(6) Although mining employs a relatively small number of persons compared to the entire county, it is a major employer in the rural desert portions of the eastern County.
(7) Includes employees of construction contractors and operative builders; does not include force account or government.
(8) Includes all civilian employees regardless of activity in which employee is engaged.
(9) Total percent change for all industries.

TABLE 4.15.4

EMPLOYMENT AND UNEMPLOYMENT IN SAN BERNARDINO COUNTY (1983 to 1990)[1]

EMPLOYMENT FACTOR[2]	YEAR								
	1983	1984	1985	1986	1987	1988[3]	1989[3]	1990	Projected 2010[4]
Labor Force	401,500	422,900	453,000	482,000	508,300	541,600	578,800	605,400	–
Employment	364,300	391,900	423,700	454,100	482,000	513,900	550,300	570,700	785,400
Unemployment	37,200	31,000	29,300	27,900	26,300	27,700	28,500	34,700	–
Unemployment Rate (percent)[5]	9.3	7.3	6.5	5.8	5.2	5.1	4.9	5.7	–

91-109 (10/10/92/hs)

(1) EDD, 1991 (years 1983-1990).
(2) Civilian labor force only. Civilian labor force, employment, and unemployment are by place of residence.
(3) Data obtained between April 1988 and October 1989 were derived from a different methodology and therefore are not specifically comparable to other time periods.
(4) SCAG, 1991.
(5) The unemployment rate is computed from unrounded data and may differ from rates using rounded figures in this table.

TABLE 4.15.5

MAJOR EMPLOYERS
RAIL•CYCLE PROJECT IMPACT AREA[1]

LOCATION	EMPLOYER	NUMBER OF EMPLOYEES
MORONGO BASIN		
• Joshua Tree	Hi-Desert Medical Center	285
• Twentynine Palms	Twentynine Palms Marine Corps Base - Military	10,000
	Twentynine Palms Marine Corps Base - Civilian	1,470
	Morongo Valley Unified School District	75
	Alamo Market	50
• Yucca Valley	Morongo Valley Unified School District	230
	K-Mart Retail Stores	190
	Hi-Desert Convalescent Center	80
	Von's Markets	75
	Moyles Healthcare, Inc.	75
BARSTOW	Fort Irwin National Training Center - Civilian	2,400
	Fort Irwin National Training Center - Military	4,000[2]
	Marine Corps Logistics Base - Military	550[2]
	Marine Corps Logistics Base - Civilian	2,000[2]
	Barstow Unified School District	1,075
	Yellow Truck Freight	800
	Bendix	300
	ATSF	250
	NASA/JPL Goldstone Deep Space Tracking Station	225

91-109 (11/5/92/mg)

(1) San Bernardino County, n.d.
(2) Barstow Chamber of Commerce, 1990.

trauma center is also approximately 150 miles southwest of the project area with approximately the same helicopter travel time as Loma Linda (Schaffer, 1992).

4. Both the Loma Linda and San Bernardino trauma centers are supported by helicopters provided by Mercy Air Services. Response time to the project area by Mercy Air Service varies according to the time of day. Between 11:00 a.m. and 11:00 p.m. response time is approximately 15 to 20 minutes by a helicopter based at Adelanto, California (Harrison, 1992). Between 11:00 p.m. and 11:00 a.m. the response time is approximately 40 minutes by a helicopter based near Loma Linda University Hospital (Harrison, 1992).

4.15.4.1.3 Police and Firefighting Services

Police

1. Police services are provided by the County Sheriff's Department for criminal matters and the California Highway Patrol for traffic enforcement.

Firefighting Services

1. The Bolo Station and Cadiz Valley Alternative sites and nearby communities are in the jurisdiction of the County Forestry and Fire Warden Department. The Department is under contract to the California Department of Forestry and Fire Protection to provide fire and emergency services to the County. The nearest fire warden stations are at Hazard and Needles, approximately 70 miles from the sites (Kawasaki, 1992).

2. According to the County Forestry and Fire Warden Department, there is no emergency medical services or fire protection service currently available to reasonably serve the project (Miller, 1992a). The Department's current facilities would provide service to the project area with two type I engines within 45 minutes to one hour. These engines would respond from the Harvard and Needles fire stations.

3. The Department has a mutual aid agreement with the Wonder Valley and Twentynine Palms fire departments (Kawasaki, 1992). The closest mutual aid engine is located approximately 50 miles from the project area, and could provide service within approximately 45 minutes (Miller, 1992a).

4. Hazardous materials (HAZMAT) response is also the responsibility of the County Forestry and Fire Warden Department. First response to a hazardous materials incident would come from either the Hazard and/or Needles fire station(s). These stations are located approximately 70 miles from the project area with a response time of 45 minutes to 1 hour (Miller, 1992b). Personnel at the two fire stations are trained to stabilize hazard materials situations unless the incident involved exotic materials, explosives, or nuclear materials. The County HAZMAT team, made up of individuals from the County Forestry and Fire Warden Department and SBCDEHS, would respond as required to hazardous material incidents in the project area within two hours.

4.15.4.2 Morongo Basin

4.15.4.2.1 Schools

1. The Morongo Basin is served by the Morongo Unified School District, with a student enrollment of approximately 10,710 for the 1991-1992 school year. About 29 percent of this enrollment is comprised of children of military personnel stationed at the Marine Corps base. The student enrollment is projected to increase by almost 50 percent over the next ten years (Brown, 1992).

2. The Morongo Unified School District consists of 16 schools and approximately 500 teachers and administrative personnel. The student/teacher ratio is 22:1. The school district has ten elementary, two junior high, and two high schools, plus two continuation high schools. In general, enrollment exceeds capacity. The district has a need to build six new schools by the year 2000, to be financed by a general obligation bond (Brown, 1992)

3. Growth in the student population generally is district-wide. Further growth would result in the need to construct new classrooms (Brown, 1992).

4. The Copper Mountain campus of the Desert Community College District is located between Twentynine Palms and Joshua Tree. The college offers associate degrees and certificates in 15 areas, has an enrollment of about 4,000, and is expanding.

4.15.4.2.2 Health Care Facilities

1. Health care in the Morongo Basin is provided by a variety of health care professionals, including doctors, dentists, optometrists, and psychologists. The Hi-Desert Medical Center, a fully accredited, 56-bed acute care hospital, is located in Joshua Tree. The medical center, with a staff or more than 200, is one of the largest employers in the area. During 1990, more than 40 patients per day were treated in the emergency department, a 100 percent increase from 1985. The facility utilizes Lifeline, an emergency call and response system. The hospital operates at full capacity, with an average daily occupancy of 85 percent (Yucca Valley Chamber of Commerce, 1992). The facility is developing plans for expansion. The initial expansion phase has an estimated cost of $5 million (Hi-Desert Medical Center Foundation, 1991).

4.15.4.2.3 Police and Firefighting Services

Police

1. Police protection for the unincorporated areas of the Morongo Basin is provided by the County Sheriff's Department. The Morongo Basin Station, located in Joshua Tree, is staffed by approximately 60 civilians and sworn deputies, with the additional support of about 40 volunteer Reserve and Search and Rescue officers (Yucca Valley Chamber of Commerce, 1992).

2. The incorporated City of Twentynine Palms contracts with the County Sheriff's Department for law enforcement services. In addition, a Citizen Patrol vehicle contributes to street patrol in the city (Twentynine Palms Chamber of Commerce, 1991).

Firefighting Services

1. Firefighting services are provided to Morongo Basin communities by individual fire departments, which provide firefighters (primarily paid-call volunteers), paramedics, and equipment.

2. The Wonder Valley and Twentynine Palms fire departments also have mutual aid agreements with the County Forestry and Fire Warden Department. In the event of an emergency in the County's area of jurisdiction (such as at the Bolo Station site), the Wonder Valley and Twentynine Palms fire departments could respond.

4.15.4.2.4 Solid Waste Disposal

1. Residential and commercial solid waste collection and disposal services are provided by private commercial enterprises that deliver primarily to local landfills in Morongo Valley, Landers, and Twentynine Palms. Given present rates of disposal, it is estimated that the Morongo Valley facility has adequate capacity until 2003, the Twentynine Palms facility until 2013, and the Landers Landfill until 2022 (Barton, 1992). It is expected that, once local facilities reach capacity, solid waste will be deposited at local waste transfer stations for final disposal at a regional Class III facility. Additional information on regional solid waste disposal needs are addressed in Chapter 3.0.

4.15.4.3 Barstow

4.15.4.3.1 Schools

1. The Barstow area is served by two school districts, the Barstow Unified School District and the Silver Valley Unified School District. The Barstow district has 13 schools and a 1991-1992 enrollment of about 7,400 students, with projections for steady growth to about 7,860 students in the 1995-1996 school year. The district is nearing capacity and utilizes portable classrooms at some schools. There are no plans for expansion. Two of the schools in the district are currently closed and could be reopened, if necessary (Pitcher, 1992).

2. The Silver Valley District has seven schools, a 1991-1992 enrollment of about 2,700 students, and excess capacity in its existing facilities. Even so, the district is in an expansion mode, in response to the planned expansion of the Fort Irwin National Training Center, with plans to build a new high school for the 1994-1995 school year. The district's enrollment is influenced to a great extent by Fort Irwin and the Marine Corps Logistics Base, as more than 50 percent of its students are military dependents (Bowbridge, 1992).

4.15.4.3.2 Health Care Facilities

1. Health care in the community is provided by a wide range of professionals that include physicians, surgeons, dentists, and optometrists. Barstow Community Hospital is a 56-bed acute-care facility with staff that provides care in numerous specialties, and a 24-hour emergency

room. With an average occupancy of less than 60 percent, the hospital has sufficient capacity to serve existing needs (Weiss, 1992).

4.15.4.3.3 Police and Firefighting Services

Police

1. Police protection is provided by the Barstow City Police Department, County Sheriff's Department, and California Highway Patrol. Law enforcement in the city is provided by the Barstow City Police Department, with 45 paid employees and 21 volunteers (Barstow Chamber of Commerce, n.d.). Personnel and coverage are considered adequate to meeting existing demand. It is expected that additional personnel and/or equipment to meet future growth could be obtained, as needed (Cedilio, 1992). The Barstow police utilizes the County Sheriff's jail facilities.

2. In the County, law enforcement is provided by the County Sheriff's Department. Personnel are considered adequate for the existing population, although additional demand could require additional personnel. Jail facilities are overcrowded, and additional jail personnel are needed. There are no plans for expansion (Webster, 1992).

Firefighting Services

1. Fire protection for the city and surrounding unincorporated area is provided by the Barstow Fire Protection District, with four stations, 25 professional firefighters, and 45 paid call volunteers (Soto, 1992) that provide firefighting, paramedic, rescue, and fire prevention services (Barstow Chamber of Commerce, 1990). Personnel and facilities are considered adequate to meet existing demand. Plans to meet the needs of future growth include one additional paid-call station and one full-time station (Soto, 1992).

4.15.4.3.4 Solid Waste Disposal

1. The City of Barstow has an exclusive franchise with Desert Disposal Services, Inc. for the collection of solid waste. Waste is transported to the Barstow Landfill, a County-owned site. At the present rate of fill, the landfill is projected to have adequate capacity until June 2005. The County is evaluating the potential for landfill expansion (Brand, 1992).

4.15.5 PUBLIC UTILITIES

4.15.5.1 Project Area

4.15.5.1.1 Telephone

1. Pacific Bell Telephone Company provides service to the Amboy and Cadiz communities. Microwave dishes transmit telephone communication in Amboy since telephone lines do not extend to that community. Leslie Salt has an existing telephone line, and ATSF has a telephone line that runs along the railroad.

4.15.5.1.2 Natural Gas

1. Natural gas is not available in the Amboy area (Southern California Gas Company, 1992).

4.15.5.1.3 Electricity

1. SCE provides electrical service to Amboy, Cadiz, and other residential communities in the project area. Limited options exist for the provision of electrical service to the Bolo Station site. Leslie Salt has electrical lines that extend to the western end of the site at pumping wells near Section 20. SCE provides service through an existing easement to Leslie Salt. This is the closest source of electricity to the site. Current service in the vicinity of the Bolo Station and Cadiz Valley Alternative sites is not sufficient to provide the power needs of the operating landfill (SCE, 1992).

4.15.5.1.4 Sewage Disposal

1. Individual septic systems are utilized for sewage and wastewater disposal in the project area.

4.15.5.1.5 Water

1. Water is provided to the project area primarily by private wells. Amboy and Saltus purchase and store potable water transported by ATSF. Additional discussion of water supply and use is found in Sections 4.4.2.1.4 and 4.4.2.2.

4.15.5.2 Morongo Basin

4.15.5.2.1 Telephone

1. Telephone service is provided to the Morongo Basin by General Telephone (GTE). According to GTE, the addition of about 150 new connections could be accommodated by existing facilities and equipment. A line extension charge would be assessed if service were required more than 700 feet from existing facilities (Bardon, 1992).

4.15.5.2.2 Natural Gas

1. Natural gas is provided by Southern California Gas Company to the Morongo Basin and the Marine base. There is ample supply for existing demand, although system expansion might require additional regulator stations (Southern California Gas Company, 1992).

4.15.5.2.3 Electricity

1. Electrical power is provided to the Morongo Basin by SCE. The existing system is being enlarged through construction of a major substation in Twentynine Palms, which is expected to be operational in August 1992. This substation will provide 20 years of growth capability (SCE, 1992).

4.15.5.2.4 Sewage Disposal

1. Sewage disposal for Morongo Basin communities is provided by individual septic systems. These are pumped and hauled to local landfills in Twentynine Palms, Landers, and Morongo Valley (Rotello, 1992).

4.15.5.2.5 Water

1. Water is supplied to Morongo Basin communities by individual water districts. Increasing demand generally exceeds supply capability, and some local aquifers are in overdraft. There are plans to expand existing supply and distribution systems through further development of local aquifers and purchase of water from other areas (Cron, 1992; Hi-Desert Water District, 1991).

4.15.5.3 Barstow

4.15.5.3.1 Telephone

1. Telephone service is provided by the Continental Telephone Company of California. Current facilities are adequate for current demand and any future expansion that may occur in the area. Service can be provided outside of the city with installation of new lines, at the expense of the user (Herrera, 1992).

4.15.5.3.2 Natural Gas

1. Natural gas is supplied by the Southwest Gas Corporation. Current supplies are more than adequate to meet existing demand. Plans to accommodate future growth assure ample supplies well past the year 2000 (Mason, 1992).

4.15.5.3.3 Electricity

1. SCE provides electrical power to the Barstow area.

4.15.5.3.4 Sewage Disposal

1. The City of Barstow operates a 4.5-million gallons per day wastewater reclamation plant that serves most of Barstow and some of the outlying area. The plant is operating at a rate of about 2.5-million gallons per day and is anticipated to last for about another 20 years (Aviles, 1992).

4.15.5.3.5 Water

1. Water supply for the City of Barstow is provided by the Southern California Water Company. Water is obtained from the Mojave River. The supply is considered adequate for the existing population. Because of a limited supply of available water, the California Department of Health Services (DHS) has placed a limit of 9,950 connections to the Barstow system. As of March 1992, there were 9,343 connections. Therefore, the existing system is close to its regulated capacity (Seaman, 1992).

2. Plans for the future include drilling more wells. There also are plans to establish a pipeline between Barstow and the California aqueduct, a project that is estimated to be at least five to seven years in the future (Seamans, 1992).

CHAPTER 5.0
POTENTIAL ENVIRONMENTAL IMPACTS

5.0 POTENTIAL ENVIRONMENTAL IMPACTS

1. This chapter reviews the potential environmental consequences and mitigation measures of the proposed action and alternatives. Based upon these evaluations, significant unavoidable adverse effects of the proposed action are identified by topical area. The potential for cumulative impacts from the proposed action, and other projects in the region are addressed in Chapter 6.0.

5.1 IMPACT CONSIDERATIONS

5.1.1 INTRODUCTION

1. Impact evaluations in this chapter address foreseeable effects on the existing environment that could occur from implementation of the proposed action at either the Bolo Station site, Cadiz Valley Alternative site, or the Reduced or No Action Project Alternatives. At the direction of BLM, studies regarding natural resources of the Offered Lands sites in the Piute and Cadiz valleys were limited to mineral resources, vegetation (with regard to desert tortoise habitat), and wildlife (desert tortoise). The Offered Lands site in the Fenner Valley was evaluated for mineral resources only. For other topical areas, the Offered Lands sites were not analyzed as the exchange will not result in potential environmental impacts.

2. The analyses have been formulated on the basis of available information, using reasonable projections of the worst case consequences of the proposed action and alternatives. For purposes of this report, an environmental impact is defined as a change in the status of the existing physical conditions that would be affected by the proposed action or alternative. Effects can be direct (primary), which are caused by the project and occur at the same time and place, or indirect (secondary), which are caused by the project and are later in time or farther removed in distance, but are still reasonably foreseeable. The duration of an effect can be temporary (short-term) or relatively permanent (long-term). Anticipated effects are assessed quantitatively and/or qualitatively, as appropriate.

3. The significance of projected impacts is assessed based upon criteria established for each environmental issue area. In many cases, criteria are derived from standards in regulations or guidelines such as the ESA, Clean Air Act, NHPA, and regulations such as AB 939. Appendix G of the guidelines for implementation of CEQA also provides guidance on effects that would normally be significant. Impact analyses were based upon acceptable change to the existing environment that would not result in a substantial detrimental effect, and include:

   - Resource sensitivity or the probable response of a particular resource to project-related activities.
   - Resource quality or the present condition of the resource potentially affected.
   - Resource quantity or the amount of the resource potentially affected.
   - Duration of impact or period of time over which the resource would be affected, stated as short-term (up to a few years) or long-term (beyond the operational life of project).

   These criteria are stated at the beginning of each section for the topic and specific issues being considered.

4. Analyses in this chapter are based upon the current details of the proposed action and alternatives provided in Chapter 3.0. The major elements considered for construction and operation of a waste-by-rail disposal facility include:

   - Project construction.
   - Rail haul of waste to the landfill using existing rail lines.
   - Landfill operations and continued phased expansion of the landfill (including environmental monitoring).
   - Closure/postclosure activities.

5.1.2 MITIGATION MEASURES

1. Mitigation measures are identified for each significant environmental effect. Methods available to mitigate potential environmental impacts generally include:

   - Avoiding the impact altogether by not taking a certain action or parts of an action.
   - Minimizing impacts by limiting the degree or magnitude of an action.

- Rectifying the impact by repairing, rehabilitating, or reclaiming the impacted environment.
- Reducing or eliminating the impact over time by preservation and maintenance.
- Compensating for the impact by replacing or providing substitute resources or environments.

2. Many measures designed to reduce potential environmental impacts would be implemented through existing agency rules and regulations (see Section 2.6 on regulatory compliance). Measures incorporated for compliance with these rules and regulations are described in Chapter 3.0 and included in the mitigation measure section for specific topical area in this chapter, as appropriate. Mitigation measures developed through the EIR/EIS process that are recommended in addition to those required by regulations are also described in each section. Mitigation measures are also developed for impacts that by themselves would not be considered significant, but that on a project-wide or a cumulative basis could result in significant impacts. The effectiveness of these mitigation measures has been considered in the impact evaluation in relation to their ability to reduce or eliminate the identified effects on the project, so that no significant impact would occur. Identified measures will be incorporated into final design plans and operational procedures.

3. In accordance with California Public Resources Code §21081.6, a mitigation measures monitoring program will be developed to demonstrate compliance with measures adopted as conditions of approval to avoid significant effects on the environment. The program will, at minimum when completed, identify the measure undertaken, when it was completed or when it is expected to be completed, and the agency having jurisdiction by regulation over the resource.

4. In some cases, even with implementation of the mitigation measures identified in this EIR/EIS, specific impacts will not be reduced below a level of significance and will result in a significant adverse impact. Such impacts are identified in the specific topical areas of this chapter. For purposes of CEQA, if an impact is determined to be significant and unavoidably adverse, a statement of overriding considerations will be required in accordance with Section 15093 of the CEQA Guidelines. While NEPA does not have a similar requirement for a statement of overriding considerations, this information will be useful to the decision makers during preparation of the Record of Decision.

5.2 GEOLOGY AND SOILS

1. Geologic hazards and constraints are discussed in this section. Terminology and definitions are provided in Appendix C. The potential hazards include ground rupture due to faulting, ground shaking during earthquake, liquefaction, seismic settlement and differential compaction, landslides, lurching, tsunami or seiche, ground subsidence (nonseismic), collapsing or expansive soils, and volcanic hazards. The analysis is derived from a review of relevant material in open literature, review of aerial photographs, site visits, and documentation provided by Rail•Cycle.

2. Impacts would be considered significant if they could result in one or more of the following conditions:

   - One or more of the proposed action components could be severely damaged or destroyed, as a direct consequence of a geologic event.
   - The release of contaminants from the project into the environment due to the occurrence of a geologic event.
   - A proposed action component creating a substantial geologic hazard, which could affect persons or property near the site.

5.2.1 BOLO STATION SITE

5.2.1.1 Seismic Hazards

1. A computer program (Blake, 1989b) was utilized to predict the deterministic horizontal accelerations at the Bolo Station site, resulting from the maximum probable earthquake occurring on faults within the region. The results of this program are summarized in Table 5.2.1 and provided in full in Appendix C. The seismic recurrence curve, based on historical earthquakes in the region, indicates that on the average, a M4.0 earthquake will occur in the region (a radius of 100 miles) every three to four years, and a M6.0 earthquake may occur every 15 to 20 years. However, most of the seismic activity will probably occur more than 20 miles from the site, and the accelerations experienced at the site will be much less than the accelerations at the epicenter.

2. Based on the studies conducted to date (e.g., aerial photo reviews, records and literature search, site reconnaissance, geologic mapping), no active or potentially active faults are known to be within or trending towards the Bolo Station site, and therefore, no impact is expected. Also, the site does not lie within an Alquist-Priolo Special Studies Zone. However, a north-south trending surface feature or lineament was observed on aerial photographs and during a site reconnaissance visit, on the western edge of Section 29, south of the Leslie Salt brine pumping wells (Jacobs, 1990c). The lineament could be a result of subsidence due to brine extraction. The photo trace does not extend onto the Bolo Station site. However, as part of its permitting process under CCR Title 23, the RWQCB is requiring further verification of the lack of active or potentially active faults in the project area.

3. Rail•Cycle is addressing this requirement by implementing a supplemental site verification study, involving geophysical surveys and geologic mapping. The workplan for this study includes exploration to verify the absence of Holocene faults (i.e., active or potentially active faults) using shallow penetrating electromagnetic surveys and ground penetrating radar. The workplan also includes performance of a fracture trace analysis from aerial photographs of the region and comparison to fracture patterns identified during the previous geologic evaluations.

4. Based on the estimated recurrence intervals for the regional faults, and the expected life span of the proposed action, it is considered likely that the site will experience ground shaking due to regional seismic activity. However, due to the relatively flexible nature of landfill deposits and support structures, the impacts and hazards to the project are not expected to be significant. Impacts and hazards to the project resulting from seismic activity are discussed below.

5. The largest potential peak acceleration at the site, as shown in Table 5.2.1, is 0.09g, due to the maximum probable earthquake occurring on the Ludlow Fault 15 miles away. This would be capable of causing some damage in well built structures, considerable damage in poorly built structures, but little or no damage to structures specially designed to withstand seismic activity. The maximum historic site acceleration at Bolo Station was 0.063g, occurring December 22, 1943.

TABLE 5.2.1

DETERMINISTIC SITE PARAMETERS
BOLO STATION SITE[1]

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE TO SITE		MAXIMUM CREDIBLE EVENT			MAXIMUM PROBABLE EVENT		
	Miles	Km	Maximum Credible Magnitude	Peak Site Acc. (g)	Site Intensity (MM)[2]	Maximum Probable Magnitude	Peak Site Acc. (g)	Site Intensity (MM)
Bicycle Lake	68	110	7.00	0.021	IV	5.75	0.011	III
Blackwater	93	150	7.00	0.012	III	5.75	0.006	II
Blue Cut	41	66	7.00	0.045	VI	6.25	0.030	V
Borrego Mountain (San Jacinto)	97	156	6.50	0.009	III	6.25	0.007	II
Calico-Newberry	36	57	7.00	0.055	VI	6.25	0.037	V
Camp Rock - Emerson	41	65	7.50	0.060	VI	6.00	0.027	V
Casa Loma - Clark (San Jacinto)	87	141	7.50	0.018	IV	7.00	0.013	III
Cleghorn	94	151	6.50	0.009	III	6.25	0.008	III
Coyote Creek (San Jacinto)	90	144	7.50	0.017	IV	6.00	0.008	II
Death Valley (West)	83	133	7.50	0.019	IV	6.25	0.010	III
Drinkwater Lake	72	116	7.00	0.019	IV	4.00	0.004	I
Garlock (East)	84	136	7.75	0.022	IV	7.00	0.014	IV
Glen Helen - Lytle Creek - Claremont	90	145	7.50	0.017	IV	7.00	0.013	III
Harper	79	128	7.00	0.016	IV	5.75	0.008	III
Helendale	65	104	7.50	0.030	V	6.25	0.015	IV
Hot Springs - Buck Ridge (San Jacinto)	84	135	7.50	0.019	IV	6.25	0.010	III
Lenwood	60	96	7.25	0.030	V	6.00	0.015	IV
Lockhart	87	140	7.50	0.018	IV	6.00	0.008	III
Ludlow	15	24	7.50	0.200	VIII	6.00	0.090	VII
Manix	52	84	6.50	0.025	V	6.00	0.019	IV
Mojave River (Ord Mountain)	59	96	7.00	0.026	V	6.25	0.018	IV
Old Woman Springs	53	86	7.00	0.031	V	5.75	0.016	IV
Pinto Mountain - Morongo	32	52	7.50	0.083	VII	6.00	0.037	V
Pisgah-Bullion	29	47	7.00	0.071	VI	6.25	0.048	VI
San Andreas (Southern)	61	99	8.00	0.042	VI	7.25	0.028	V
Sand Hills	81	130	8.00	0.027	V	7.00	0.016	IV
San Gorgonio - Banning	62	101	8.00	0.041	V	7.00	0.024	V

91-109 (10/11/92/jtw)

(1) Petra Geotechnical, Inc., 1992.
(2) MM = Modified Mercali.

6. In the spring and summer of 1992, southern California experienced three major earthquakes, and subsequent after shocks that are still occurring, with epicenters on faults in the Mojave Desert. The recent seismic events with epicenters in Desert Hot Springs (M6.1), Landers (M7.5), and Big Bear (M6.6) produced accelerations of 0.017g, 0.038g, and 0.016g, respectively, at the Bolo Station site (Petra Geotechnical, 1992). Table 5.2.2 lists these events and related activity of M6.0 or greater, and the subsequent accelerations projected at the site. A detailed historic list of seismic events, including the recent events of M4.0 or greater, is included in Appendix C. Figure 5.2.1 depicts the locations of these recent events relative to the project location.

7. Liquefaction is a process in which loose, saturated, cohesionless (sandy) soils behave like a fluid when subjected to extreme shaking or vibration. During shaking, water pressure increases in the intergranular spaces, support of soil particles is reduced to near zero, and the soil behaves like a fluid. In general, the liquefaction potential has been found to be greatest where ground water is shallow and loose fine-to-medium sands occur within a depth of about 50 feet or less. Liquefaction potential is reduced in soils exhibiting cementation, high standard penetration test blow counts (i.e., 30 or more, representing dense to very dense cohesionless soils), or containing high silt and/or clay content. The potential for liquefaction at the Bolo Station site is considered to be very low, based on the following (Jacobs, 1991b):

   - Portions of the site which have sandy deposits indicate ground water occurs at relatively great depths (i.e., 70 to 195 feet below ground surface).
   - Portions of the site which have shallow ground water indicate the soils have a high silt and clay content.
   - All areas of the site exhibited relatively high standard penetration test blow counts, ranging from 25 to 40 for silty sand deposits, and from 40 to refusal for sandy deposits.

8. Seismic settlement and differential compaction occur when loose to medium dense granular soils densify during ground shaking. It can occur in dry or partially saturated soils. Soils encountered in borings beneath the Bolo Station site were heterogeneous (sand, gravel, silt, and clay mixed together) and dense in nature; thus, the potential for seismic settlement is considered very low (Jacobs, 1991b). If such settlement were to occur, it would probably be small and relatively uniform across the site, which would minimize any damage expected.

9. Lurching is ground movement at right angles to steep slopes during strong ground shaking events. Bolo Station is located on gently sloping ground with no slope stability problems and no potential for lurching. The site is not located on a landslide area, or in the path of a potential landslide (Jacobs, 1991b). Construction of the landfill cells will create steeper slopes during both excavation and filling activities, but it is not considered likely that landsliding and/or lurching would occur as the slopes will only be exposed for relatively short time periods (1.5 to 4 years), and seismic design analyses will establish safe working slope angles.

10. Although the site is near Bristol Lake, there is rarely standing water on the lakebed, and even when standing water occurs, it is generally not of sufficient quantity to affect the site if a seiche occurred. The site is not downgradient to a dam or reservoir, so there is no potential for inundation of the site due to failure of such a structure during a seismic event.

5.2.1.2 Non-Seismic Settlement

1. Several types of settlement are possible as a result of the proposed action, including:

   - Ground settlement of the underlying soils due to the additional load from the proposed action.
   - Ground settlement of the underlying soils due to ground water withdrawal.
   - Landfill settlement within the waste prism due to decomposition and subsequent loading of the waste.

Fracturing ? P-5.2-9 ?

5.2.1.2.1 Ground Settlement Due to Loading on Foundation Soils

1. The ground settlement due to the proposed landfill load on subsurface soils was estimated based on reasonable estimates of the soil properties underlying the landfill areas. The preliminary landfill design provided in the Conceptual Site

TABLE 5.2.2

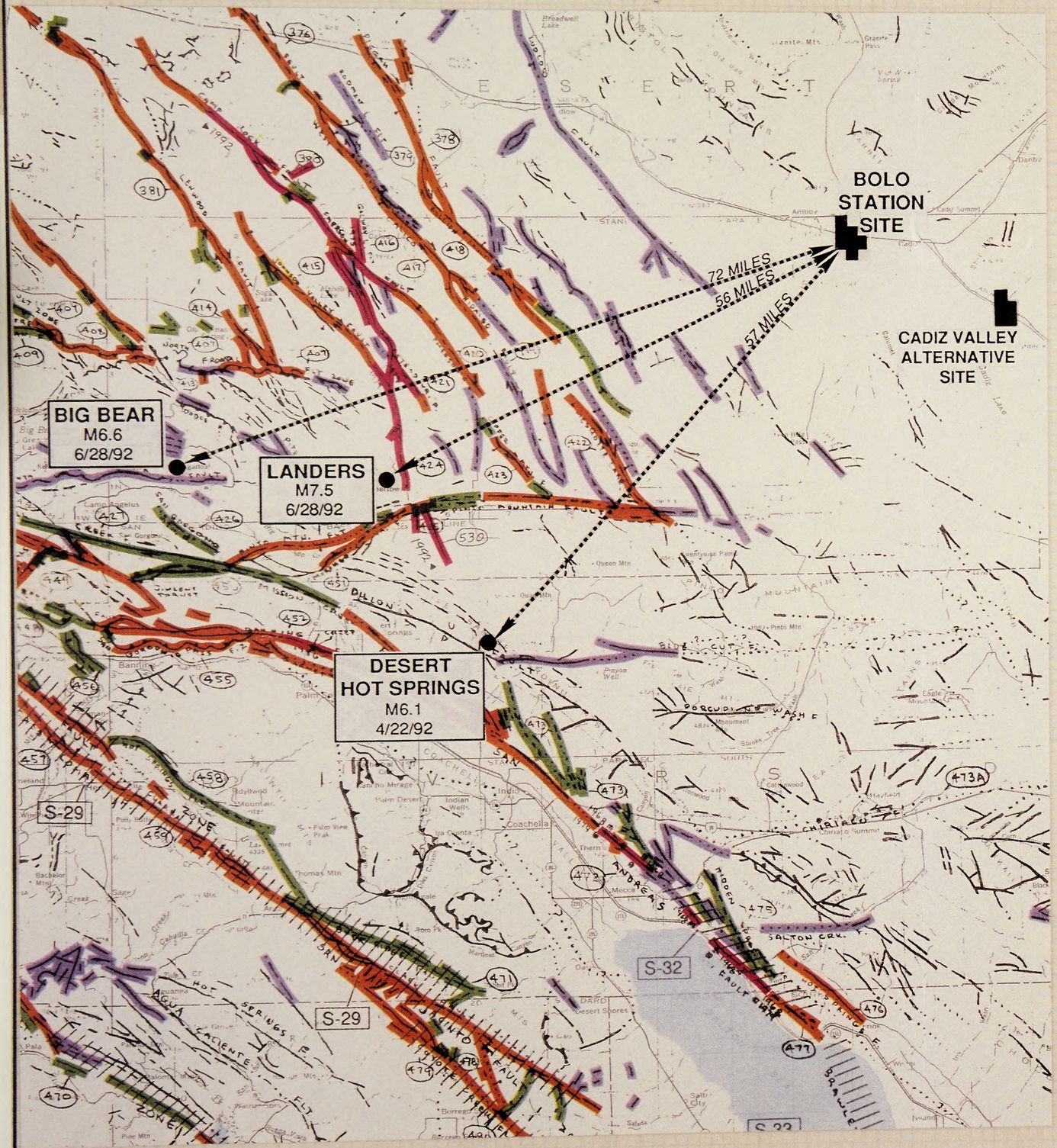
RECENT SEISMIC EVENTS[1]

EVENT	DATE	TIME (PDT)	MAGNITUDE	BOLO STATION SITE		CADIZ VALLEY ALTERNATIVE SITE	
				SITE ACCELERATION[2] (g)	APPROXIMATE DISTANCE TO SITE (miles)	SITE ACCELERATION[2] (g)	APPROXIMATE DISTANCE TO SITE (miles)
Desert Hot Springs	4/22/92	9:50	6.1	0.017	57	0.015	62
Landers	6/28/92	4:58	7.5	0.038	56	0.030	65
Big Bear	6/28/92	8:05	6.6	0.016	72	0.012	82

91-109 (11/11/92/mg)

(1) Petra Geotechnical, Inc., 1992.
(2) Calculated using Joyner and Boore's Mean Attenuation Relationship (1982).

91-109 EIR/EIS-REV.-10/9/92



Geologic Time Scale			Years Before Present (Approx.)	Fault Symbol	Recency of Movement	DESCRIPTION	
						ON LAND	OFFSHORE
Quaternary	Late Quaternary	Historic				Displacement during historic time (e.g. San Andreas fault 1906). Includes areas of known fault creep.	
		Holocene	200		?. ?. ?.	Displacement during Holocene time.	Fault offsets seafloor sediments or strata of Holocene age.
		Pleistocene	10,000			Faults showing evidence of displacement duing late Quaternary time.	
					?. ?.	Mesozoic Foothills fault system along which short segments of late Cenozoic faulting has taken place.	
	Early Quaternary		700,000		?.	Undivided Quaternary faults – most faults in this category show evidence of displacement during the last 1,600,000 years; possible exceptions are faults which displace rocks of undifferentiated Plio-Pleistocene age.	Fault cuts strata of late Pleistocene or older Quaternary age.
Pre-Quaternary			1,600,000			Faults without recognized Quaternary displacement or showing evidence of no displacement during Quaternary time. Not necessarily inactive.	Fault cuts strata of Pliocene or older age.
			4.5 billion (Age of earth)				

NOTE:
SEE TABLE 5.2.2 FOR INFORMATION REGARDING ACCELERATIONS AT THE SITES FROM THE RECENT ACTIVITIES.

REFERENCE:
"PRELIMINARY FAULT ACTIVITY MAP OF CALIFORNIA", COMPILATION AND INTERPRETATION BY CHARLES W. JENNINGS FOR THE STATE OF CALIFORNIA DEPARTMENT OF CONSERVATION, 1992.

N

0 12 24 MILES
SCALE

FIGURE 5.2.1

LOCATION OF RECENT SEISMIC ACTIVITY

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

Development Plans by Rail•Cycle (1991) was considered in deriving the estimated amount of ground settlement. Long-term ground settlement has been estimated to range from 1 to 14 feet, with the larger settlements occurring on the southern side of the site, due to the predominantly cohesive (i.e., more compressible) soils in that area (Jacobs, 1991b). The upper limit of estimated settlement is based on a conservative combination of conditions including:

- 130-year period (100-year landfill life and 30-year post-closure monitoring period).
- Maximum landfill loading (approximately 17,000 pounds per square foot).
- Instantaneous load application.
- Maximum thickness of vertically uniform compressible soils (i.e., 200 feet).

For a shorter (100-year) period, average load conditions (14,000 psf) and average thickness of compressible soils (150 feet), the maximum settlement predicted would be in the 6 to 7 foot range. Also, the relatively slow filling process for each cell (i.e., one to two years) would tend to reduce the elastic compression component of settlement.

2. The estimated ground settlement will occur due to:

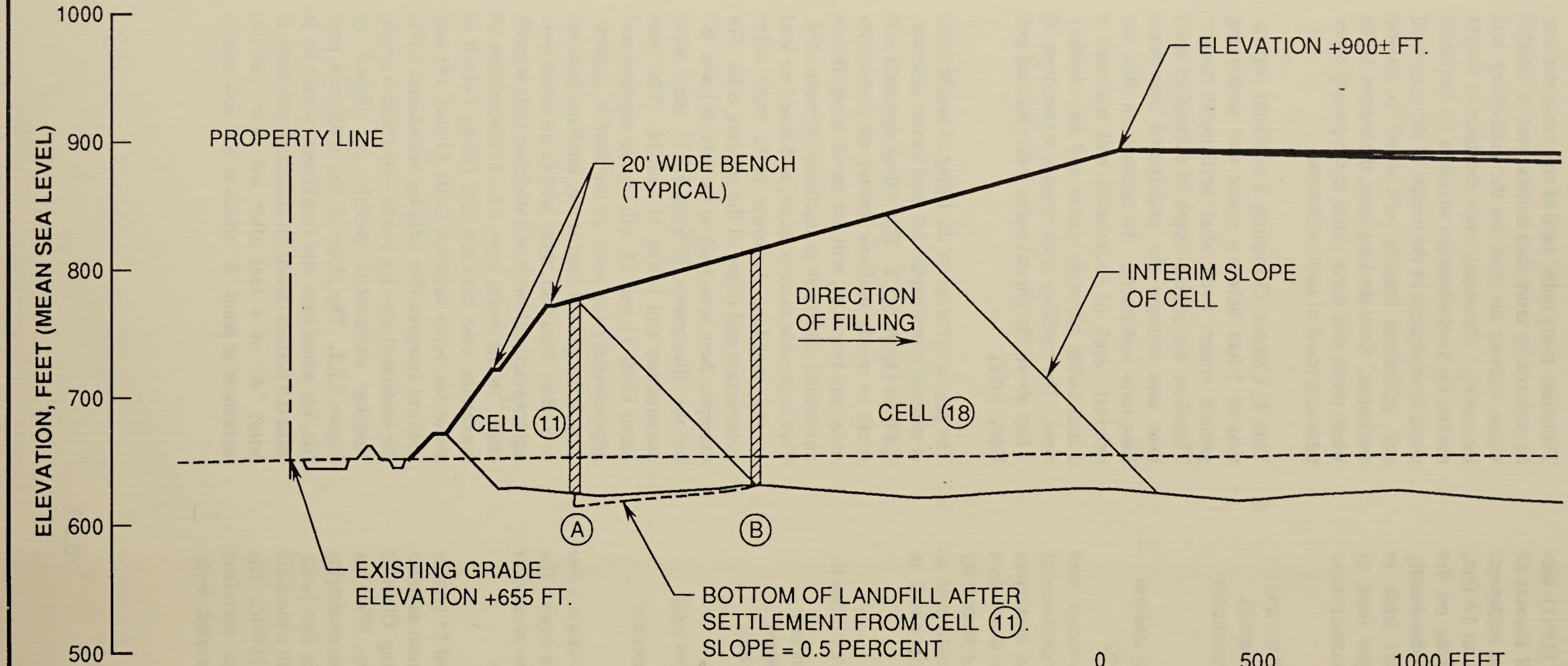
   - Elastic compression (or instantaneous compression of an elastic body upon loading) of soils (both cohesive and cohesiveless).
   - Primary consolidation of cohesive soils.
   - Secondary consolidation (or volumetric creep) of cohesive soils.

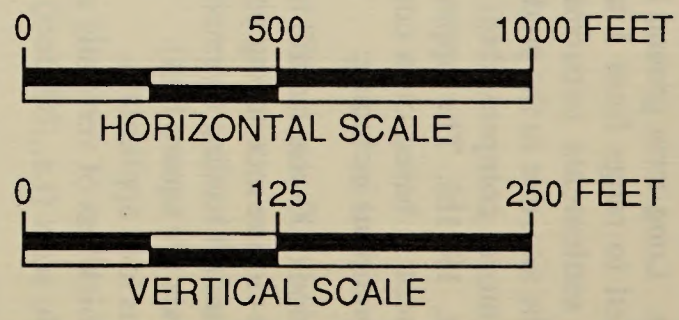
   The first two components may occur within a few months after the application of landfill loads. The secondary consolidation is projected to occur over a period of 130 years (Jacobs, 1991b).

3. An average density of landfill waste of 55 pounds per cubic foot was used in the settlement estimate based on data derived from existing Class III landfills operated by WMNA (Jacobs, 1991b, as in WMNA, 1991a). The density of the underlying soils range from 110 to 125 per cubic foot (wet), or 85 to 115 per cubic foot (dry), with a moisture content of 10 to 25 percent (Jacobs, 1991b). The density of the landfill waste is therefore substantially lighter than the excavated soils. Therefore, every cubic yard of soil excavated can be replaced by more than a cubic yard of landfill waste without the load on the underlying soil increasing. However, once the landfill height reaches the level where the weight of the landfilled waste is equivalent to the weight of the excavated soil, additional loading will result in ground settlement. Over the long-term, the bottom of the waste prism will move closer to the ground water table as a result of such settlement.

4. Title 23 Chapter 15 requires a minimum separation of 5 feet between waste and underlying ground water, even after settlement occurs. Therefore, the original depth of excavation must take into account the anticipated maximum long-term settlement. To accomplish this, the original depth of excavation will maintain a 5 foot buffer between wastes and the capillary zone. The capillary zone extends a maximum of 9 feet above the ground water level (Metcalf and Eddy, 1992).

5. The planned process for the filling of landfill cells is described in Chapter 3.0 and shown schematically in Figure 5.2.2. This filling approach will result in nearly uniform loading on foundation soils, and therefore, will not result in significant differential settlement at interfaces between cells. This is because there is no fill and hence no load at the interface between cells until after construction and filling of the adjacent cells. For example, there is no load on the liner at point "B" on the illustration (Figure 5.2.2) until after construction and filling of Cell 18. The liner under Cells 11 and 18 will settle together and approximately the same as the load is applied. This is the general case at any interface between two cells. However, there will be an initial time lag between settlement of foundation soils beneath cells. In the worst case, i.e., a combination of maximum time between cell filling (which is about ten years between Cells 11 and 18) and uniform compressible silt/clay foundation soils, the settlement time lag would only create a gently sloping settlement profile as shown in Figure 5.2.2. The slope of this settlement profile, for worst case site conditions, would be at most 0.5 percent (based on estimated settlement at point "A" of 4 feet after ten years and no settlement at point "B" which is 850 feet away).





LEGEND

- EXTENT OF FILL, CELL (11)
- (A) POINT OF MAXIMUM LOADING AFTER FILLING CELL (11)
- (B) LOADING AT THIS POINT (AND HENCE SETTLEMENT) WILL BE ZERO AFTER FILLING CELL (11)

NOTES

1. MAXIMUM DIFFERENCE IN SETTLEMENT BETWEEN POINT A AND POINT B WOULD OCCUR 5 TO 10 YEARS AFTER FILLING CELL (11) AND PRIOR TO FILLING CELL (18).
2. REFER TO FIGURE 3.5 FOR LOCATION OF LANDFILL CELL NOS. (11) AND (18).

FIGURE 5.2.2

SCHEMATIC FILL PROCESS AND ASSOCIATED SETTLEMENT

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

This settlement profile (with maximum slope of 0.5 percent) between adjacent cells is not expected to impact the following structural components:

- Conventional HDPE liner (which is flexible).
- Clay liner (which will settle along the sloped profile).
- Gravel layers for leachate collection (which will settle along the slope profile).
- Flexible PVC piping (used for leachate and landfill gas collection systems, and constructed with flexible joints).

It will be necessary as part of the final design to accommodate a higher amount of settlement in the southern portion of the site, to assure that the leachate collection system maintains adequate sloping for drainage during and after the time settlement occurs.

5.2.1.2.2 Ground Settlement Due to Ground Water Withdrawal

1. Ground settlement is a common phenomenon in regions where ground water extractions exceed aquifer recharge. Settlement occurs as the ground water table is lowered, increasing the effective stress in the underlying soils. The resulting settlement often causes subsidence cracks on the ground surface. Although no subsidence cracks were observed on the Bolo Station site, several were located south of the site, in the vicinity of existing ground water extraction wells owned by Leslie Salt and National Chloride (Jacobs, 1991b).

2. The soils underlying the Bolo Station site in the vicinity of Leslie Salt wells were found to be completely consolidated (i.e., no more consolidation or settlement would occur under current overburden loading) at the existing ground water elevation. Continued pumping of the existing Leslie Salt wells at the current rates is not expected to create additional ground settlement. Additional water level drawdown from increased pumping could result in ground settlement. Termination of ground water withdrawal from these wells will have no significant effect with regard to ground surface settlement/rebound at the subject site (Jacobs, 1991b).

3. Withdrawal of ground water for onsite use from the northeast quarter of Section 9 (in the vicinity of Well P-8) may result in subsidence cracks near the well.

5.2.1.2.3 Landfill Settlement

1. Settlement within the waste prism will occur and is unavoidable. A landfill settlement is expected at 10 percent in height and 6 percent by volume, which occurs from decomposition of the waste. Settling may not occur uniformly over the site and could result in a misalignment of the landfill gas and leachate collection system, and final cover. Therefore, the design, construction, monitoring, and maintenance of these systems must take into account the anticipated total and differential settlements.

5.2.1.3 Collapsible or Expansive Soils

1. In arid depositional environments, certain silt and clay minerals may, upon saturation, increase or decrease in volume resulting in distress to overlying structures. These conditions are not likely to be present at Bolo Station, except possibly in the southernmost sections. Collapsible/expansive soils, if present, would not occur at depths exceeding 20 feet, which would have a negligible effect on the landfill operation (Jacobs, 1991b) that would involve excavation to much greater depths. At greater depths, conditions are such that a collapsible soil structure typically does not exist due to overburden pressures, more uniform or higher moisture contents and the lack of capillary tension. Expansive soils are also more typically found near surface when concentration, flocculation and moisture conditioning have not had adequate time to reduce the swell potential of the clay soils. Areas with structures (offices, support facilities, offloading facilities) which could be affected by collapsible or expansive soils are predominantly located north of the landfill where the soils are mostly coarse grained, cohesionless gravels and sands. Site-specific designs will be developed for individual structures underlain by such soils.

5.2.1.4 Volcanic Hazards

1. Amboy Crater and the surrounding volcanic field is an area that is subject to potential hazards from volcanic eruptions. The probability for renewed activity at the Amboy volcanic field is considered to be low. Although several recorded earthquake epicenters (greater than M3.0) may be related to

the Amboy volcanic area, earthquake swarms or other precursors of volcanic activity have not been recorded in the last 200 years (Jacobs, 1991b). In the unlikely event of an eruption, the site area south of ATSF railroad tracks may be subject to basaltic lava flows (Jacobs, 1991b, as in Miller, 1989). Potential volcanic ejecta or tuff deposits from a renewed volcanic activity are not expected to pose potential hazards beyond the Leslie Salt operations at Saltus (about 2.5 miles west of the western Bolo Station site boundary).

5.2.2 CADIZ VALLEY ALTERNATIVE SITE

1. The following natural phenomena are characterized as geologic hazards and may occur at the alternative site: collapsible/expansive soils, seismic subsidence, liquefaction, landsliding, induced flooding, ground surface rupture, or subsidence.

5.2.2.1 Seismically Induced Hazards

1. A computer program (Blake, 1989b) was utilized to predict accelerations at the alternative site resulting from the maximum probable seismic event on local capable faults (Petra Geotechnical, Inc., 1992). Faults within a 100-mile radius and considered to be capable by DMG were included in the analysis. The results are summarized in Table 5.2.3, and provided in detail in Appendix C.3. The maximum historic site acceleration was 0.043g, occurring December 22, 1943. Regional faults are shown in Figure 4.2.3.

2. The closest mapped faults to the alternative site are located in the northern portion of the Ship Mountains, approximately five miles north of the site. These faults are considered inactive and therefore do not constitute a seismic hazard to the project. The Ludlow Fault is the closest capable fault to the site, at a distance of 26 miles to the northwest. It is also capable of generating the largest acceleration (0.05g) at the site during the maximum probable earthquake event. Strong ground motions associated with such an event have the potential to directly impact the stability of structures on the site, and can also impact the site through secondary effects such as liquefaction, landsliding, induced flooding, and subsidence. However, due to the relative seismic inactivity in the site vicinity and the flexible nature of landfill deposits and support structures, the impacts and hazards to the project are not expected to be significant.

3. The recent seismic events with epicenters in Desert Hot Springs, Landers, and Big Bear produced accelerations of 0.015g, 0.030g, and 0.012g respectively, at the Cadiz Valley Alternative site (see Table 5.2.2) (Petra Geotechnical, 1992). Figure 5.2.1 depicts the location of these events relative to the project location.

4. The potential for liquefaction on the alternative site is considered very low due to the depth to ground water (greater than 50 feet) and the coarse, dense nature of the alluvial deposits. Mass landsliding would not be expected due to the high strength integrity of the bedrock. However, some rock fall would likely occur in a seismic event. Falling rocks will roll down steep slopes and accumulate at the toe of the slope, but would not be expected to continue rolling out onto the alluviated surface.

5. Although the site is relatively close to Cadiz Lake, there is rarely standing water on the lakebed, and even then, not sufficient quantity to affect the site if a seiche occurred. Induced subsidence and associated lurching along the margin of the valley is expected to be minor, if at all. Preliminary information indicates that the site is probably underlain by a bedrock pediment, which limits the thickness of the alluvial sequence and thus lessens the effects of potential subsidence and lurching. If subsidence was to occur across the valley it would probably be non-differential across the site.

6. There are no known or mapped faults trending through or toward the alternative site, and the site does not lie within an Alquist-Priolo Special Studies Zone. Therefore, based on current knowledge of the local and regional tectonic framework, it is highly unlikely that surface fault rupture would occur onsite.

5.2.2.2 Non-Seismic Subsidence

1. Excessive ground water withdrawal can result in consolidation of saturated soil and ground surface subsidence. While this is not a common occurrence, there have been cases reported in California and Arizona where basins are heavily pumped for agricultural purposes and settlement has resulted. Subsidence of this type may cause large tension cracks to open, which usually parallel the basin margin, often along old basin bounding faults or at the distal edges of buried bedrock pediments.

TABLE 5.2.3

DETERMINISTIC SITE PARAMETERS
CADIZ VALLEY ALTERNATIVE SITE[1]

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE TO SITE		MAXIMUM CREDIBLE EVENT			MAXIMUM PROBABLE EVENT		
	Miles	Km	Maximum Credible Magnitude	Peak Site Acc. (g)	Site Intensity (MM)[2]	Maximum Probable Magnitude	Peak Site Acc. (g)	Site Intensity (MM)
Bicycle Lake	80	129	7.00	0.016	IV	5.75	0.008	III
Blue Cut	34	55	7.00	0.058	VI	6.25	0.039	V
Borrego Mountain (San Jacinto)	96	155	6.50	0.009	III	6.25	0.008	II
Calico-Newberry	46	75	7.00	0.038	V	6.25	0.026	V
Camp Rock - Emerson	50	81	7.50	0.044	VI	6.00	0.020	IV
Casa Loma - Clark (San Jacinto)	89	144	7.50	0.017	IV	7.00	0.013	III
Coyote Creek (San Jacinto)	93	149	7.50	0.016	IV	6.00	0.007	II
Death Valley (West)	94	151	7.50	0.015	IV	6.25	0.008	II
Drinkwater Lake	84	135	7.00	0.014	IV	4.00	0.003	I
Garlock (East)	96	154	7.75	0.017	IV	7.00	0.011	III
Glen Helen - Lytle Creek - Claremont	97	157	7.50	0.014	IV	7.00	0.011	III
Harper	93	149	7.00	0.012	III	5.75	0.006	II
Helendale	75	121	7.50	0.023	IV	6.25	0.012	III
Hot Springs - Buck Ridge (San Jacinto)	86	138	7.50	0.018	IV	6.25	0.009	III
Lenwood	71	115	7.25	0.022	IV	6.00	0.011	III
Ludlow	26	41	7.50	0.109	VII	6.00	0.049	VI
Manix	65	104	6.50	0.017	IV	6.00	0.013	III
Mojave River (Ord Mountain)	70	113	7.00	0.020	IV	6.25	0.013	III
Old Woman Springs	64	103	7.00	0.023	IV	5.75	0.012	III
Pinto Mountain - Morongo	35	57	7.50	0.072	VII	6.00	0.033	V
Pisgah-Bullion	35	56	7.00	0.056	VI	6.25	0.038	V
San Andreas (Southern)	65	105	8.00	0.038	V	7.25	0.026	V
Sand Hills	76	123	8.00	0.029	V	7.00	0.017	IV
San Gorgonio - Banning	66	107	8.00	0.037	V	7.00	0.022	IV

91-109 (10/12/92/mg)

1) Petra Geotechnical, Inc., 1992.
2) MM = Modified Mercali.

No reported significant ground water withdrawal is taking place within several miles of the site. Although the future extent of ground water withdrawal is unpredictable, it is not likely that the amount of settlement, if any, resulting from such withdrawal would impact the landfill operation.

5.2.2.3 Collapsible or Expansive Soils

1. Surface soils observed during the field reconnaissance were coarse grained and lacked silt and clay fractions. It is unlikely that fine-grained, expansive soils underlie the surface, since the site is located near to the mountain front where the current and past depositional regime is a high energy regime which does not create silt and clay formations. Collapsible soils are usually associated with mudflows, which have a high silt content. Such soils were not identified at the ground surface, where they are most susceptible to collapse upon wetting or loading.

5.2.3 REDUCED ACTION ALTERNATIVE

1. The Reduced Action Alternative would reduce the areal extent and height of the landfill, as well as the depth of excavation prior to landfilling. However, the effect of overburden placed on underlying soil will not be substantially reduced, as reduction in excavation offsets the decreased height. Additional studies would be necessary to determine the expected ground settlement resulting from the reduced loading.

2. The impacts resulting from settlement due to ground water withdrawal, landfill settlement within the waste prism, collapsible or expansive soils, and seismic and volcanic activity would be similar to, but proportionally less than, those expected for the proposed action.

5.2.4 NO ACTION ALTERNATIVE

1. Implementation of this alternative would mean the proposed action would not be developed. The Bolo Station and Cadiz Valley Alternative sites would remain in their present state, and no potential for increased environmental impacts due to geologic hazards would occur. However, other landfill sites will be required to serve the communities which the proposed action would have served, and geologic impacts may occur at those sites.

5.2.5 MITIGATION MEASURES

1. To mitigate the potential impacts from earthquakes, the following measures will be employed at either the Bolo Station Site, Cadiz Valley Alternative site, or if the Reduced Action Alternative is implemented:

   - The landfill and associated structures can be designed and constructed, as required by the Uniform Building Code and CCR Title 14 §17777 and Title 23, Chapter 15, Article 3, §2547(a), to withstand the expected ground motions and potential effects of seismic stability, liquefaction, subsidence, and differential settlement.
   - A postearthquake inspection plan would be implemented which would detail the site inspections to be conducted after an earthquake to determine the integrity of all landfill structures and systems. Appropriate measures could then be initiated to mitigate any significant adverse effects.

2. The landfill and associated structures can be designed to accommodate ground settlement due to loading and the expected settlement within the waste prism resulting from waste compression and decomposition. Typical design, construction, and monitoring procedures for mitigating settlement impacts include:

   - Specifying and monitoring the construction of the landfill base grade (which will dictate the slope of the leachate collection system) to accommodate settlement without causing flow reversals.
   - Use of flexible or adjustable connections for all piping at interfaces between cells and around the landfill perimeter (e.g., where leachate or landfill gas collection piping is routed to pumps or sumps, etc. located outside the area which is undergoing settlement).
   - Incorporation of monitoring systems in the leachate and landfill gas collection systems to verify systems' integrity and operational efficiency.
   - Designing vertical pipes or elements extending through the landfill to withstand or reduce the downdrag forces applied by settling waste. For example, outer casings and friction reducing materials placed in the

annulus can be used to reduce downdrag on vertical pipes or elements.

- Specifying and monitoring compaction of clay cap materials to aid in reducing settlement.
- Implementation of visual monitoring and periodic engineering surveys to evaluate clay cover integrity and surface drainage system effectiveness. Grading adjustments can be made, as required, to maintain the cover.

5.2.6 FEASIBILITY OF MITIGATION MEASURES

1. The mitigation measures identified are deemed to be feasible and expected to be capable of reducing impacts to below a level of significance.

5.2.7 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

1. While the impacts from subsidence and seismicity are considered unavoidable, the mitigation measures identified above would reduce the impacts to below a level of significance. Therefore, no significant unavoidable adverse impacts are expected.

5.3 MINERAL RESOURCES

Impacts to mineral resources are discussed in this section and would be considered significant if the following were to occur:

- If the project involved a land exchange in which the land received by BLM was less valuable than the land exchanged.
- If the project affects the existing economic production of a mineral resource, either by limiting access to the resource or degrading the quality of the resource.
- If the project could eliminate access to a potential mineral resource which has been determined by the County or BLM to be rare, unique, or regionally significant.

5.3.1 BOLO STATION SITE

1. For purposes of the land exchange in fee, the BLM will not reserve the mineral rights of the selected lands (Sections 8, 15, and 22). A determination of the economic value of the mineral ore body (brines) under the selected parcels is required to provide a fair market value of the lands for exchange purposes. An exploration program is currently being developed by Rail•Cycle, in consultation with BLM, to assess the mineral value of the brine. This program will be designed to evaluate the mineral value of federal lands selected for exhange. The evaluation of data may identify additional impacts or refine existing impacts. This program will be submitted to the BLM for approval, and will be implemented by Rail•Cycle prior to the final decision by BLM on the exchange value.

2. The proposed action at the Bolo Station site has the potential to affect the existing brine extraction operations in the basin as follows:

   - Changes in ground water flow resulting from consolidation of soils within the water table under landfill loading.
   - Significantly reducing ground water levels across the entire lake.
   - Withdrawal of a mineral resource within a KLA, or contamination of a mineral resource within a KLA.
   - Causing ground water degradation and contamination of the brine ore body, due to leachate and/or landfill gas from the proposed action.
   - Potential loss of an unknown quantity of calcium chloride and sodium chloride from Sections 15 and 22 that would not be available for production.
   - Generating airborne particulates or dust which may collect in the salt evaporation tanks, thus adding impurities to the crystalline salt produced in these tanks.

   These cases could economically impact the salt recovery operations in the Bristol Lake area. The production of calcium chloride from the brines extracted from Bristol Lake represents one of only two such production areas in the state (Cadiz Lake is the other). National Chloride and Leslie Salt extract brines from Bristol Lake with the latter operations being the single largest supplier of calcium chloride in the state (Majmundar, 1985b).

5.3.1.1 Brines

5.3.1.1.1 Well Yields

1. Rail•Cycle has proposed to extract water for landfill construction and operation from one well to be located on the Bolo Station site. Water will be supplied by a new well to be installed at the northeast corner of Section 9. It is expected that an extraction rate not exceeding 100 gallons per minute (equivalent to approximately 160 acre-feet per year) from the well would be sufficient to supply the project water requirements. The average daily demand for water at the proposed landfill is 54,270 gallons per day (approximately 60 acre-feet per year). See Section 3.3.4.5.3 and Table 3.5 for a detailed description of the water required by the proposed action. While this water could be supplied by a continuous pumping rate of 40 gallons per minute from the well, it is more feasible to pump at a higher rate for short intervals rather than to engage in continuous pumping. Therefore, impacts were based on a 100-gallons per minute pumping rate, which is not expected to be exceeded.

2. An evaluation of hydrogeologic conditions indicated that a continuous discharge rate not exceeding 100 gallons per minute would not cause a measurable change in the concentration of the brines extracted by the current Leslie Salt wells, and would cause negligible ground water drawdown in the area (Jacobs, 1991b).

3. Consolidation of soils under loading due to landfill development will occur primarily in the cohesive silts and clays in the southern portion of the site.

Ground water flow beneath the site is primarily within the sand layers that alternate with silts and clays. As indicated in Section 4.2.2.1.2, sands are 100 to 1,000 times more permeable than the cohesive soils. Only minor consolidation can occur within sands; therefore, ground settlement due to the landfill will not have a significant effect on ground water flow patterns or rates, and the brine product rate at the Leslie Salt wells is not expected to be affected. In addition, portions of the brine ore body located under the site would still be accessible from offsite pumping wells.

5.3.1.1.2 Reduction of Water Levels

1. The mining technique employed by the salt evaporation operations on Bristol Lake relies upon the inflow of ground water recharge to maintain fluid levels within the production zone and to dissolve additional saline minerals. These brines are pumped into surface ditches across the lake, which channel the brine to a central production point, evaporating water as it goes. This production method is possible because the water table is shallow. Long-term water withdrawal during overdraft conditions may jeopardize the mining methods employed. If overdraft requires alteration of current mining technique, it could significantly impact the economic viability of the mineral resource.

2. Ground water modeling results have indicated that pumping from a single well at a rate not to exceed 100 gallons per minute will cause only negligible drawdown in most of the basin. Therefore, ground water pumping to supply water for the proposed action will not significantly affect ground water levels beneath the lake.

5.3.1.1.3 Impacts to a Known Leasing Area

1. The significance of an area being designated as a KLA is that the resource has been identified as an economically exploitable mineral deposit, and leases within the area can generally only be issued by competitive bidding. BLM is bound by law and regulation to conserve and protect such resources. Policies require that if a leasable resource is damaged, produced, or adversely affected by other actions, so as to prohibit their development, royalty or equivalent compensation may be due to the federal government. In particular, pumping of water containing economical concentrations of sodium chloride or calcium chloride may be considered production of the mineral resource, and if the mineral resource is reserved to the federal government, royalty would be due. Since the BLM will not reserve the mineral rights of the selected lands, ground water withdrawal would not require royalties to be paid at the Bolo Station site. However, if the ore body was contaminated by the landfill and remediation efforts were unsuccessful, royalties or other compensation may be due to the federal government and/or other brine extraction operators for the value of the mineral resource rendered unusable.

5.3.1.1.4 Potential Ground Water Degradation

1. The potential exists for leachate and/or landfill gas to contaminate the ground water and brines under Bolo Station and downgradient; these impacts are addressed in Section 5.4. If landfill operations were to result in contamination of ground water, the nature of the cone of depression around the Leslie Salt wells would tend to draw this contaminated ground water from under the landfill and into the wells. As the basic process used by Leslie Salt is dehydration of the minerals pumped from their wells, contaminated water would produce a contaminated product if no additional processing occurred. Contaminated water not drawn into the Leslie Salt wells would flow toward the basin center and, if not intercepted, could potentially contaminate the brine ore body in the basin.

2. If contamination of the ground water occurred due to landfill operations, Rail•Cycle would be required to remediate this impact through the implementation of a corrective action program in accordance with CCR Title 23, Chapter 15, Article 5. Remediation schemes currently used involve pumping and treating the affected water, which could further impact the Leslie Salt wells by reducing well yields, depending on the quantity of water extracted for treatment and location of the extraction well(s). While some degree of purification by Leslie Salt is currently required to ensure quality in its final product, additional processing required due to impurities resulting from landfill leachate and/or gas would affect the profitability of the Leslie Salt facility. The significance of this impact would depend on the severity of ground water contamination, should it occur, from the proposed action.

5.3.1.1.5 Airborne Contaminants

1. The salt evaporators on Bristol Dry Lake are susceptible to dust and other airborne contaminants

potentially generated by the proposed action, since the moist surface of the evaporators tend to trap particulates. Dust and airborne contaminants from the proposed action would contribute to impurities in the crystallized product, which could require further processing to ensure a quality final product. However, this impact is not expected to be significant, since the evaporators are approximately five miles southwest of the Bolo Station site, and air quality modeling results indicate that the predominant wind direction is to the east, away from the evaporators.

5.3.1.2 Other Potential Impacts

1. No rare, unique, or regionally significant mineral resources exist on the Bolo Station site which the landfill would eliminate access to. Sand and gravel deposits exist in abundant quantities onsite, and could potentially be quarried for sand and gravel. Placement of the proposed landfill on this site would eliminate access to these deposits; however, this is not considered to be a significant impact as:

   - There is little economic potential for development of these resources, due to the low bulk value and high transportation cost for shipping to distant markets.
   - The region contains vast quantities of similar deposits which have the same economic potential for being exploited.
   - The deposits excavated prior to placement of the landfill liner will be stockpiled and used as daily cover material, thus reducing the need for additional soils to be quarried offsite for the project.

   Therefore, no significant loss of access to a mineral resource would result from the proposed action. However, if the project is permitted on the Bolo Station site, sand and gravel deposits within the site boundary will be used for onsite roads and fill material. The use of this material from the selected lands (Sections 15 and 22) may require payment as part of the exchange in fee with BLM for the mineral value of the tonnage used. A final decision on the value, if any, of saleable mineral resources to be used onsite will be determined in consultation with the BLM.

.3.2 CADIZ VALLEY ALTERNATIVE SITE

. The salt evaporators operated by the Lee Chemical Company on Cadiz Lake are the only known resources currently in production which could potentially be impacted should the proposed action be located at the Cadiz Valley Alternative site. It is very unlikely that the brines extracted by Lee Chemical would become contaminated due to leachate and/or landfill gas should the proposed action be located at the alternative site and contaminate ground water. The brine extraction wells are located more than six miles south of the alternative site. This distance and ground water gradient in the area provide adequate time for an efficient corrective action program to be designed and implemented in accordance with CCR Title 23, Chapter 15, Article 5. Therefore no significant impacts would be expected.

2. Dust and airborne contaminants generated by the proposed action and carried by the wind, may be deposited in the salt evaporators, thus contributing to impurities in the crystalized salt. This impact is further evaluated in Section 5.7. Due to the distance between the alternative site and salt evaporators (ranging from 6.6 miles to the nearest evaporators, to over 12 miles to the farthest group of evaporators), and the predominant wind direction, which is to the east rather than to the south, this is not anticipated to create a significant impact to the Lee Chemical facility.

3. Portions of Sections 5, 8, and 17 of the alternative site are included in an area considered to have potential uranium and/or thorium deposits, as interpreted from airborne survey data (BLM, 1980a). However, no field studies have been accomplished to verify that economic deposits of these minerals are located on the sections. Before the proposed action could be implemented at the alternative site, additional studies would be necessary to determine the significance of eliminating access to these potential resources.

4. No rare, unique, or regionally significant mineral resources are known to exist on the Cadiz Valley Alternative site which the proposed action would eliminate access to. The alternative site contains abundant amounts of alluvial deposits which could potentially be quarried for sand and gravel. Placement of the proposed landfill on this site would eliminate access to these deposits; however, this is not considered to be a significant impact as:

   - There is little economic potential for development of these resources due to the low bulk value and high transportation cost for shipping to distant markets.

- The region contains vast quantities of similar deposits which have the same economic potential for being exploited.

- The deposits excavated prior to placement of the landfill liner will be stockpiled and used as daily cover material, thus reducing the need for additional soils to be quarried offsite.

5.3.3 REDUCED ACTION ALTERNATIVE

1. This alternative would reduce the land requirements at the Bolo Station site to five sections. The land exchange with BLM would still occur, as would any impacts related to the exchange of lands. The potential impacts to the Leslie Salt brine extraction wells and salt evaporation pits could still occur, although they may be reduced somewhat due to the 60-percent reduction in capacity of the landfill. The Reduced Action Alternative could potentially have a reduced water requirement, which could be supplied through a lower ground water pumping rate, thereby reducing the potential impact to the Leslie Salt brine extraction wells due to competitive pumping. It is expected that the water requirements for the Reduced Action Alternative will be reduced as compared to the proposed action on a day-to-day and annual basis. In addition, over the lifetime of the project, a more substantial reduction in water requirements should be realized as this alternative has a life span of 40 years as compared to 60 to 100 years for the proposed action.

5.3.4 NO ACTION ALTERNATIVE

1. Implementation of this alternative would result in the Rail•Cycle project not being developed. The Bolo Station and Cadiz Valley Alternative sites would remain in their present state, and no potential for increased environmental impacts to mineral resources would occur. The sites would be available for future mineral exploitation, as permitted by BLM policy and County land use designations. However, other landfill sites will be required to serve the communities which the proposed action would have served, and mineral resource impacts may occur at these sites.

5.3.5 OFFERED LANDS

1. The three offered land sites were selected by BLM based on their "value" to the federal government associated with the consolidation of federal lands, and in the case of the Piute Valley and Fenner Valley Offered Land sites, for their "value" as Category 1 desert tortoise habitat. No significant minteral resources are believed to exist on the offered lands and Rail•Cycle intends to stipulate that no mineral value exists for the offered lands in the interest of time and expense. Therefore, mineral value will not be considered in determining the appraisal value of the offered lands.

5.3.6 MITIGATION MEASURES

5.3.6.1 Bolo Station Site

1. The following mitigation measures have been identified which will be incorporated into the proposed action to reduce impacts to below a level of significance:

    - The requirements of CCR Titles 14 and 23 are designed to protect the environment from impacts resulting from the implementation of the proposed action. The composite liner system, leachate collection system, landfill gas collection system, and final cover are designed to prevent leachates and landfill gas from contaminating the underlying ground water. Landfill gas and leachate collection systems will be designed to prevent accumulation of excess landfill gas and leachate within the landfill, thereby minimizing advective flow potential, should such flow be possible. In the event that contamination occurs, ground water, vadose zone, and landfill gas monitoring systems are being designed to detect contamination as soon as practical. If water quality protection standards are exceeded, Rail•Cycle would be required by CCR Title 23, Chapter 15, Article 5 to implement, in consultation with the LEA and RWQCB, a corrective action program to remediate the affected ground water. These and other mitigation measures recommended for the protection of ground water quality are discussed in Section 5.4 and would also serve to protect the mineral resources contained in the brines beneath and adjacent to the site.

    - In the event that ground water impairment occurred that could not be mitigated by the measures identified in Section 5.4 and either rendered the brine ore body useless or unprofitable, due to the implementation of the proposed action, it would be mitigated by a financial assurance program, funded by Rail•Cycle, payable to the entities involved,

including the federal government, to compensate for the increased cost of purification or loss of a mineral resource. The amount of the financial assurance program will be based on the potential mineral value of the brine ore body. The program may also include direct cleanup efforts by Rail•Cycle, via measures discussed in Section 5.4.

- Dust and other airborne contaminants which could potentially impact the salt evaporators on Bristol Lake shall be controlled by frequent watering of unpaved roads and working areas, and by operation of a landfill gas collection system. These mitigation measures are addressed in Section 5.7.
- If subsequent evaluations indicate the additional pumping from the new well in the southern part of Section 9 would reduce the current Leslie Salt well yields, then, depending on the severity of the impact, the pumping rate will be reduced from the Rail•Cycle wells, new wells shall be located further from the Leslie Salt wells, or a combination of these measures will be implemented, to reduce impacts to "less than significant."

5.3.6.2 Cadiz Valley Alternative Site

1. The following mitigation measures have been identified, and would be incorporated into the project to reduce the level of impacts to a level of insignificance if the alternative site were selected:
   - The requirements of CCR Titles 14 and 23 are designed to protect the environment from impacts resulting from the implementation of the proposed action. A composite liner system, leachate collection system, landfill gas collection system, and final cover would be designed to prevent leachates and landfill gas from contaminating the underlying ground water. In the event that contamination occurs, ground water, vadose zone, and landfill gas monitoring systems would be included as part of the design to detect the contamination as soon as practical. If water quality protection standards are exceeded, Rail•Cycle would be required by CCR Title 23 to implement, in consultation with the LEA and RWQCB, a corrective action program to remediate the affected ground water.

   These and other mitigation measures recommended for the protection of ground water quality are discussed in Section 5.4.
   - In the event that ground water impairment in the vicinity of the Lee Chemical brine pumping wells on Cadiz Lake occurred, due to implementation of the project at the alternative site, it would be mitigated through a corrective action program as described above. This program could also include a financial mechanism, funded by Rail•Cycle and payable to Lee Chemical, to pay for increased purification costs.
   - Dust and other airborne contaminants which could potentially impact the salt evaporators on Cadiz Lake would be controlled by frequent watering of unpaved roads and working areas, and by operation of a landfill gas collection system.

5.3.6.3 Reduced Action Alternative

1. Mitigation measures similar to those identified for the proposed action would be implemented for the Reduced Action Alternative.

5.3.6.4 No Action Alternative

1. The No Action Alternative would not require mitigation measures.

5.3.7 FEASIBILITY OF MITIGATION MEASURES

1. The mitigation measures discussed are considered feasible and expected to be capable of reducing impacts to below a level of significance.

2. A corrective action program designed to remediate ground water contamination may compound the impacts to the brine pumping wells if it includes a pump-and-treat component, which could create a cone of depression and thereby reduce available brines at the Leslie Salt wells and other operators affected by the proposed action. To avoid this additional impact, and since calcium chloride and sodium chloride requires purification, Rail•Cycle could implement a financial assurance program to pay for increased processing required to purify the final product. Other options which could reduce impacts from a pump-and-treat system include:
   - Reuse of treated water for onsite dust control.

- Reinjection of the treated water, down-gradient of the remedial extraction well, but upgradient of the brine extraction wells.
- Direct reuse of treated water by Leslie Salt or National Chloride.

5.3.8. SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

1. The potential loss of an unknown quantity of calcium chloride and sodium chloride that would not be available for production from the proposed site is considered an unavoidable adverse impact. However, this impact is not considered to be significant as available resources exist to meet future demands.

2. The removal of access to locatable and salable mineral resources potentially contained within the boundaries of the selected project site would be an unavoidable adverse impact. However, this impact is not considered to be significant as these mineral resources are limited to sand and gravel which are readily available at numerous locations throughout the region.

.4 SURFACE HYDROLOGY AND GROUND WATER

This discussion addresses the impacts to surface and ground water which could result from the proposed action. Data are based on a review of available literature and studies completed by Jacobs Engineering Group, Inc., evaluated in conjunction with project information provided by Rail•Cycle. The analysis of potential effects includes consideration of mitigation measures for compliance with water pollution control and reclamation regulations.

An impact would be considered significant if it were to result in one or more of the following:

- A project component to be located in a designated floodway or floodplain, or located within a Federal Emergency Management Agency hazard zone.
- Alter surface flows so as to adversely affect downstream properties.
- Cause substantial flooding, erosion or siltation.
- Allow wastes to come within 5 feet of the highest anticipated water table level (this restriction is included in CCR Title 23, Chapter 15).
- Degrade surface water quality, thereby affecting downstream use(s).
- Deplete ground water quantity such that other existing and proposed uses of the Bristol Basin resource would be affected.
- Withdraw significant water quantities from an aquifer which is already in overdraft.
- Interfere substantially with ground water recharge.
- Degrade ground water quality such that other existing and proposed uses of the Bristol Basin resource would be affected or exceedance of threshold criteria as set forth in water quality protection standards.

.4.1 BOLO STATION SITE

.4.1.1 Surface Water and Drainage

Implementation of the proposed action at the Bolo Station site may result in the following impacts to surface water and drainage:

- Alteration of the existing drainage patterns onsite and downgradient of the site.
- Surface water contamination resulting from failure of a component of the stormwater management system.

5.4.1.1.1 Drainage Pattern Alteration

1. Alteration to the natural features of the Bolo Station site would occur as a result of project implementation. Within the northern project area, construction of the visitor's center, fire station, Route 66 interchange, and north-south access road between the highway and the southern landfill area would result in some disruption to natural flow patterns and drainage channels. This disruption would be relatively minor, as the dominant north-south direction of flow would be maintained.

2. Stormwater surface runoff north of the ATSF rail line is channeled by existing storm control dikes north of the railbed through railway bridge structures. This runoff would then be intercepted by an unlined earthen diversion channel to be constructed parallel and immediately south of the existing railway bordering the north side of the proposed railyard and offloading facility. Water flowing into this channel would be diverted east of the site. These drainage channels will have the capacity to divert flows resulting from the 100-year, 24-hour storm event. This could result in a concentration and channelization of flows which would otherwise flow freely across several miles of land that would be occupied by the landfill. There are no existing drainage structures downgradient of the proposed landfill site to be impacted. However, downgradient erosion may require mitigation.

5.4.1.1.2 Surface Water Contamination

1. Surface water contamination could potentially occur due to the discharge of stormwater which may become contaminated onsite. There are three areas of operation with differing degrees of potential discharge and contamination: the off-loading facility and railyard area, completed landfill portions, and active landfill working areas. These potential discharge areas are discussed below. Undisturbed areas will drain in their natural existing flow patterns without intervention.

2. Precipitation falling on the paved offloading facility and railyard area (combined area is

approximately 130 acres) will be collected and directed to sedimentation basin/evaporation ponds sized to retain the 25-year storm. Any overflow from this system would be discharged to the 150-foot wide earthen perimeter channel. Potential sources of contamination in the discharge include litter, fuels, and other petroleum hydrocarbons from the transport vehicles. Fuel storage and transfer areas will be operated under a Stormwater Pollution Prevention Plan (SWPPP) as discussed in Section 5.4.5. The intermodal waste containers are sealed and significant leakage is not expected. Upset conditions for the waste containers will also be addressed in the SWPPP. Implementation of best management practices (BMPs) and spill prevention or containment procedures, as described in the SWPPP, will reduce or eliminate contaminants from the surface areas. Therefore, the potential for contamination of surface runoff from the offloading facility is expected to be minor.

3. Surface water collected from portions of the landfill which have received intermediate or final cover, are directed into a perimeter drainage channel (see Figure 3.5) which discharges into a sedimentation basin at the southern boundary of the landfill. This basin will be designed to retain the 25-year storm. When this basin is full, the contents will overflow onto the playa. It is unlikely that this water would be contaminated from the closed portions of the landfill, as the final cover would have to become eroded for surface water to come in contact with wastes. Therefore, significant impacts are not expected.

4. Surface runoff from the active working area will be eliminated by berming that will force precipitation falling on solid waste to infiltrate into the waste. Leachate potentially generated by this infiltration would be collected by the leachate collection system installed at the base of the landfill cell. Leachate generated by the landfill and collected will be discharged into bermed, double-lined evaporation ponds designed for adequate freeboard during the 100-year, 24-hour storm event. If any of the bermed retention or evaporation basins are damaged by erosion or overfilling so that the contents can leak out, surface water contamination could occur.

5.4.1.1.3 100-Year Floodplain

1. A small portion of the sideslopes of the landfill area along the southern boundary of the site may lie within the 100-year floodplain (based on a preliminary estimate using the Rational Method and general assumptions), as shown in Figure 4.4.4. During design of the project, the 100-year floodplain boundaries need to be further evaluated following the procedures outlined in the County Hydrology Manual, which may result in a different estimate of the floodplain limits. New Class III landfills are required by CCR Title 23, Chapter 15, and 40 CFR, Part 258, Subtitle D to be protected from the 100-year flood.

2. Final design of the landfill will exclude landfilling in areas potentially affected by the 100-year floodplain. Landfill cells in the southwest corner of the landfill will be reconfigured to stay above the 620-foot contour.

5.4.1.2 Ground Water

1. Implementation of the proposed action at the Bolo Station site may result in the following impacts to ground water:

   - Contribute to ground water withdrawal in a basin which may already be in overdraft.
   - Reduce quantity or concentration levels of brines available to Leslie Salt and National Chloride wells.
   - Ground water contamination resulting from a leak in the liner (leachate) or landfill gas migration through the liner.

5.4.1.2.1 Quantity

1. The proposed action is expected to require an average of approximately 75 acre-feet of water per year (or 47 gallons per minute) for onsite uses. The maximum annual water requirement would be about 83 acre-feet per year (or 52 gallons per minute), and would include the water demand for normal daily landfill operations, plus the installation of both a landfill cell clay liner and clay cap in the same year. The site will be supplied by an onsite well to be developed near the northeast corner of Section 9 in the vicinity of P-8, and piped to a 600,000-gallon above-ground tank to be located near the visitor's center.

2. A continuous discharge pump test and evaluation was conducted at P-8 in order to estimate the potential impact to Leslie Salt's wells if a well in the vicinity of P-8 was used to supply water (Jacobs, 1991b). Based on computer modeling and evaluation of hydraulic conductivity, permeability and hydraulic gradient values across the site, and based on engineering judgment with regard to complex, heterogeneous factors influencing brine chemistry, the analysis concluded that a well in this vicinity could maintain a constant maximum pumping rate of 100 gallons per minute without affecting the Leslie Salt wells by causing a drawdown within the cone of depression (the current cone of depression was estimated based on water level readings in wells located on the Bolo Station site) for the existing wells or by moving the interface between fresh and brackish water.

3. The annual safe yield of ground water which can be withdrawn from Bristol Basin has not been quantified by the DWR since 1975. Bristol Basin recharge estimates (pre-1975), cited in reviewed literature, range from 2,100 to 2,200 acre-feet per year, with safe yields ranging from 1,470 to 1,540 acre-feet per year (Shafer, 1964; DWR, 1975). Annual water use, excluding the Pacific Agriculture operations near Cadiz, is estimated to be 270 to 325 acre-feet per year. The proposed action's use of an additional 67 to 83 acre-feet of water per year would not significantly impact the basin. However, the Pacific Agriculture operations are currently withdrawing approximately 7,500 acre-feet per year. Considering partial recharge by infiltrating irrigation water (15 to 20 percent), the net use by Pacific Agriculture is 6,000 to 6,375 acre-feet per year which is several times the estimated safe annual yield. There is some possibility of recharge to Bristol Basin from Cadiz Basin but there is inadequate information available to evaluate this possibility and quantify the recharge, if any. Additional withdrawal from an overdrafted basin is considered a significant impact. However, the proposed action's additional withdrawal of 67 to 83 acre-feet per year is only a minor incremental increase to the present overdraft and by itself is within the expected variance which could be expected of the 1975 DWR estimate of safe yield.

4. If the basin is in overdraft, the ground water level under the lake may continue to decrease if the overdraft condition is not reversed. Mining techniques employed by the salt evaporation operations on Bristol Lake rely on the inflow of ground water recharge to maintain fluid levels within the production zone and to dissolve additional saline minerals. These brines are pumped into surface ditches on the lakebed, which channel the brine to a central production point, evaporating water as it goes. This production method is possible because the water table is shallow. Long-term water withdrawal during overdraft conditions may jeopardize the mining methods employed. If it requires alteration of the mining technique currently employed, it could significantly impact the economic viability of the mineral resource.

5. Ground water modeling results have indicated that pumping from a single well at a rate not to exceed 100 gallons per minute will cause only negligible drawdown in most of the basin. Therefore, ground water pumping to supply project water is not expected to significant ground water levels beneath the lake.

5.4.1.2.2 Quantity and Concentration of Brines at Existing Wells

1. An extraction rate not to exceed 100 gallons per minute (estimated project water demand averages 20 gallons per minute, but intermittent pumping to storage could require rates higher than the average) at a well placed in the vicinity of P-8, and with a screened interval depth similar to the existing piezometer, is not expected to impact the quantity of water or concentration of the brines available to the Leslie Salt brine extraction wells (EW-3, EW-4, or EW-5), if existing pumping rates at those wells are not exceeded. P-8 is located far enough from the remaining wells in the region to preclude impacts.

5.4.1.2.3 Ground Water Contamination

1. Regulations established by the EPA under 40 CFR, Part 258 require municipal solid waste operators to maintain a network of monitoring wells which meets specific criteria. Operators are required to sample ground water and analyze for

certain "indicator parameters." These parameters are constituents which EPA has identified to be potential indicators of ground water contamination from landfills, based on studies conducted across the nation. The list of indicator parameters includes 47 VOCs and 15 metals, which are listed in Appendix F of this EIR/EIS. It is unlikely that a landfill would cause elevated levels of all of these parameters. The list is intended to cover a wide variety of situations and reliably indicate whether a release has occurred from the landfill. Samples collected at the Bolo Station site will be analyzed for the full list of indicator parameters. The impacts, if such a release were to occur, are discussed below.

Leachates

1. Potential ground water contamination resulting from leachates generated by the landfill is expected to be minimized due to the following:

   - Leachate generation is expected to be very low due to the arid climate and nature of the waste (e.g., no liquids or sludges). The HELP model was used to design leachate sumps. Findings indicate that moisture content of the waste as received at the landfill is considerably less than the field capacity. As a result it is unlikely that leachate will be generated through the active life of the landfill and through its 30-year closure period.
   - A leachate collection system will be installed above the liner system, and the bottom of each landfill cell will be sloped to ensure any leachate generated will drain toward the collection system and not accumulate on the liner.
   - The liner is composed of a 60-mil thick HDPE flexible membrane liner. A 3-foot clay liner (compacted to a minimum of 1×10^{-7} cm/sec) will be placed underneath the HDPE liner for extra protection.
   - Each landfill cell will begin receiving final cover placement within 30 days after completion of waste placement. This will minimize the amount of infiltration by precipitation, thus reducing water available for leachate production.
   - The landfill will be designed and constructed in a manner such that even after settlement, a 5-foot buffer zone will be maintained between wastes (after settlement) and the highest expected rise of ground water. This reduces the possibility of ground water infiltration contributing to leachate production.
   - Leachate collected within the landfill will be removed from each sump by a submersible pump and the liquid delivered to a tanker truck for reintroduction into the waste at the active working face.

2. The following issues have the potential to impact ground water either by creating more leachate, allowing leachate to escape from the liner, or failing to stop the migration of leachates released into the environment. However, these issues can be adequately controlled through engineering and design:

   - The potential of up to 14 feet of settlement of the soils underlying the southern portion of the site, if it were to occur, could cause a reversal of slopes in portions of the liner system which could affect the drainage of leachate. This can be controlled by designing initial slopes to accommodate the expected settlement, and by using components, such as flexible joints in the leachate collection system, which can withstand the expected settlement.
   - The liner has only been tested in landfills for a 10-year span; the performance for 50 to 100 years has not been evaluated.
   - Under portions of the landfill where the 3-foot clay liner is installed over dry native soils (with a ground water table below 30 to 40 feet in depth), the clay may become desiccated over time thus reducing its protective abilities. Normal subgrade preparation and placement procedures (e.g., clay at 2 percent above optimum moisture content), should minimize the desiccation.
   - The final cover is planned to be revegetated with native vegetation. However, only a minimum 1 foot of topsoil applied over the clay cover is required by CCR Title 23. Most varieties of desert vegetation have roots which will exceed depths of 1 foot when in search of water. Roots are capable of applying up to several thousand pounds per square inch of pressure when seeking water. If roots penetrated the clay cover,

2. A continuous discharge pump test and evaluation was conducted at P-8 in order to estimate the potential impact to Leslie Salt's wells if a well in the vicinity of P-8 was used to supply water (Jacobs, 1991b). Based on computer modeling and evaluation of hydraulic conductivity, permeability and hydraulic gradient values across the site, and based on engineering judgment with regard to complex, heterogeneous factors influencing brine chemistry, the analysis concluded that a well in this vicinity could maintain a constant maximum pumping rate of 100 gallons per minute without affecting the Leslie Salt wells by causing a drawdown within the cone of depression (the current cone of depression was estimated based on water level readings in wells located on the Bolo Station site) for the existing wells or by moving the interface between fresh and brackish water.

3. The annual safe yield of ground water which can be withdrawn from Bristol Basin has not been quantified by the DWR since 1975. Bristol Basin recharge estimates (pre-1975), cited in reviewed literature, range from 2,100 to 2,200 acre-feet per year, with safe yields ranging from 1,470 to 1,540 acre-feet per year (Shafer, 1964; DWR, 1975). Annual water use, excluding the Pacific Agriculture operations near Cadiz, is estimated to be 270 to 325 acre-feet per year. The proposed action's use of an additional 67 to 83 acre-feet of water per year would not significantly impact the basin. However, the Pacific Agriculture operations are currently withdrawing approximately 7,500 acre-feet per year. Considering partial recharge by infiltrating irrigation water (15 to 20 percent), the net use by Pacific Agriculture is 6,000 to 6,375 acre-feet per year which is several times the estimated safe annual yield. There is some possibility of recharge to Bristol Basin from Cadiz Basin but there is inadequate information available to evaluate this possibility and quantify the recharge, if any. Additional withdrawal from an overdrafted basin is considered a significant impact. However, the proposed action's additional withdrawal of 67 to 83 acre-feet per year is only a minor incremental increase to the present overdraft and by itself is within the expected variance which could be expected of the 1975 DWR estimate of safe yield.

4. If the basin is in overdraft, the ground water level under the lake may continue to decrease if the overdraft condition is not reversed. Mining techniques employed by the salt evaporation operations on Bristol Lake rely on the inflow of ground water recharge to maintain fluid levels within the production zone and to dissolve additional saline minerals. These brines are pumped into surface ditches on the lakebed, which channel the brine to a central production point, evaporating water as it goes. This production method is possible because the water table is shallow. Long-term water withdrawal during overdraft conditions may jeopardize the mining methods employed. If it requires alteration of the mining technique currently employed, it could significantly impact the economic viability of the mineral resource.

5. Ground water modeling results have indicated that pumping from a single well at a rate not to exceed 100 gallons per minute will cause only negligible drawdown in most of the basin. Therefore, ground water pumping to supply project water is not expected to significant ground water levels beneath the lake.

5.4.1.2.2 Quantity and Concentration of Brines at Existing Wells

1. An extraction rate not to exceed 100 gallons per minute (estimated project water demand averages 20 gallons per minute, but intermittent pumping to storage could require rates higher than the average) at a well placed in the vicinity of P-8, and with a screened interval depth similar to the existing piezometer, is not expected to impact the quantity of water or concentration of the brines available to the Leslie Salt brine extraction wells (EW-3, EW-4, or EW-5), if existing pumping rates at those wells are not exceeded. P-8 is located far enough from the remaining wells in the region to preclude impacts.

5.4.1.2.3 Ground Water Contamination

1. Regulations established by the EPA under 40 CFR, Part 258 require municipal solid waste operators to maintain a network of monitoring wells which meets specific criteria. Operators are required to sample ground water and analyze for

certain "indicator parameters." These parameters are constituents which EPA has identified to be potential indicators of ground water contamination from landfills, based on studies conducted across the nation. The list of indicator parameters includes 47 VOCs and 15 metals, which are listed in Appendix F of this EIR/EIS. It is unlikely that a landfill would cause elevated levels of all of these parameters. The list is intended to cover a wide variety of situations and reliably indicate whether a release has occurred from the landfill. Samples collected at the Bolo Station site will be analyzed for the full list of indicator parameters. The impacts, if such a release were to occur, are discussed below.

Leachates

1. Potential ground water contamination resulting from leachates generated by the landfill is expected to be minimized due to the following:

   - Leachate generation is expected to be very low due to the arid climate and nature of the waste (e.g., no liquids or sludges). The HELP model was used to design leachate sumps. Findings indicate that moisture content of the waste as received at the landfill is considerably less than the field capacity. As a result it is unlikely that leachate will be generated through the active life of the landfill and through its 30-year closure period.
   - A leachate collection system will be installed above the liner system, and the bottom of each landfill cell will be sloped to ensure any leachate generated will drain toward the collection system and not accumulate on the liner.
   - The liner is composed of a 60-mil thick HDPE flexible membrane liner. A 3-foot clay liner (compacted to a minimum of $1x10^{-7}$ cm/sec) will be placed underneath the HDPE liner for extra protection.
   - Each landfill cell will begin receiving final cover placement within 30 days after completion of waste placement. This will minimize the amount of infiltration by precipitation, thus reducing water available for leachate production.
   - The landfill will be designed and constructed in a manner such that even after settlement, a 5-foot buffer zone will be maintained between wastes (after settlement) and the highest expected rise of ground water. This reduces the possibility of ground water infiltration contributing to leachate production.
   - Leachate collected within the landfill will be removed from each sump by a submersible pump and the liquid delivered to a tanker truck for reintroduction into the waste at the active working face.

2. The following issues have the potential to impact ground water either by creating more leachate, allowing leachate to escape from the liner, or failing to stop the migration of leachates released into the environment. However, these issues can be adequately controlled through engineering and design:

   - The potential of up to 14 feet of settlement of the soils underlying the southern portion of the site, if it were to occur, could cause a reversal of slopes in portions of the liner system which could affect the drainage of leachate. This can be controlled by designing initial slopes to accommodate the expected settlement, and by using components, such as flexible joints in the leachate collection system, which can withstand the expected settlement.
   - The liner has only been tested in landfills for a 10-year span; the performance for 50 to 100 years has not been evaluated.
   - Under portions of the landfill where the 3-foot clay liner is installed over dry native soils (with a ground water table below 30 to 40 feet in depth), the clay may become desiccated over time thus reducing its protective abilities. Normal subgrade preparation and placement procedures (e.g., clay at 2 percent above optimum moisture content), should minimize the desiccation.
   - The final cover is planned to be revegetated with native vegetation. However, only a minimum 1 foot of topsoil applied over the clay cover is required by CCR Title 23. Most varieties of desert vegetation have roots which will exceed depths of 1 foot when in search of water. Roots are capable of applying up to several thousand pounds per square inch of pressure when seeking water. If roots penetrated the clay cover,

almost certain to provide preferred infiltr. pathways

opening cracks within it, additional precipitation could infiltrate into the landfill, thereby potentially creating more leachate. Increasing the depth of topsoil applied will minimize this impact.

3. Although the landfill is being designed with state-of-the-art protection systems, including the HDPE liner, the leachate collection system and the 3 feet of clay below the HDPE liner, there is some potential that a leak could possibly develop within the time the landfill is capable of generating leachate.

4. In the event that leachates from the landfill leak into the ground water underlying the site, down-gradient water uses may be impacted. Pumping from the Leslie Salt wells has created a cone of depression which affects ground water flow under a large portion of the site. The influence of these wells would tend to draw the contaminated water into the wells. As the basic process used by Leslie Salt is dehydration of the water pumped from their wells, contaminated water could produce some degree of contamination in the product.

5. Contaminated water not drawn into the Leslie Salt wells would migrate toward the basin center, and if not remediated, or if remediation is unsuccessful, would accumulate within the basin. This could potentially contaminate the entire orebody or render it no longer economically exploitable. If this were to occur, Rail•Cycle may be required to pay compensation to entities producing from the brines and the United States for loss of a leasable mineral resource.

Landfill Gas

1. The landfill gas control system for the proposed action will be designed as an active gas collection system. It will utilize mechanical blowers to create a pressure gradient to maximize the extraction of landfill gas. The objective of the landfill gas control system is to limit the migration of gas so that it does not travel laterally or vent into either the atmosphere or nearby engineered structures, while at the same time to ensure that atmospheric oxygen is not pulled into the covered waste, so as to prevent subsurface fires at the landfills.

2. Landfill gas is produced by the biological decomposition of waste contained in a landfill. The gas consists primarily of methane, carbon dioxide, and organic compounds. The final biological phase of landfill gas production in municipal solid waste landfills is a steady state condition that may last approximately 60 years. Gas generated during this phase contains approximately 25 to 60 percent methane and 40 to 75 percent carbon dioxide, withtrace amount of gases from organic compounds, some of which are ozone precursors (CAPCOA, 1990).

3. The HDPE liner is not gas impermeable, although the active gas collection system should prevent landfill gas from being generated in such quantities that could build up the necessary pressure to permit landfill gas to permeate the liner. Generally, landfill gas will migrate along the path of least resistance. In the event that landfill gas does permeate the liner, it may become dissolved in the ground water, thus potentially contributing to ground water degradation.

4. A perimeter and interior gas monitoring plan will be implemented to evaluate landfill gas generation and the performance of the landfill gas management system. Permanent perimeter gas monitoring probes will be used to obtain and evaluate pressure measurements and concentrations of methane and oxygen. The probes will be monitored on a quarterly basis by Rail•Cycle staff during landfill construction and operation, and after landfill closure. It is expected that the low annual rainfall will greatly reduce the amount of gas generation at this site, as compared to other possible site locations with higher rainfall. A vadose zone monitoring system designed as a vertical detector utilizing key indicator parameters to detect migrating gas will be constructed. Thus, the potential for landfill gas migration to go undetected is very low.

5. Failure of the gas collection system could allow landfill gases to migrate offsite, either in the vadose zone or to ground water which would impact adjacent land users and ground water quality.

5.4.2 CADIZ VALLEY ALTERNATIVE SITE

5.4.2.1 Surface Water and Drainage

1. Impacts due to the implementation of the waste-by-rail project at the Cadiz Valley Alternative site can only be evaluated in general terms. Assuming drainage structures and containment/collection systems are similar in design to the Bolo Station site, the following impacts may result:

   - Alteration of the existing drainage patterns onsite and downgradient of the site.
   - Surface water contamination resulting from damage or failure of a component of the stormwater management system.

5.4.2.1.1 Drainage Pattern Alteration

1. Impacts related to the alteration of existing drainage channels would be similar to the impacts described for the Bolo Station site. Of additional concern is the potential for the channelized flow discharged from the landfill site to erode portions of the Cadiz Dunes. However, the dunes are located several miles away from the southern end of the site, and diversion systems, if properly designed with sedimentation basins and energy dissipators at discharge points, should not result in dune erosion.

5.4.2.1.2 Surface Water Contamination

1. Impacts related to surface water contamination are expected to be similar to those impacts described for the Bolo Station site.

5.4.2.2 Ground Water

1. Implementation of the waste-by-rail project at the Cadiz Valley Alternative site may result in the following impacts related to ground water resources:

   - Contributing to ground water withdrawal in a basin which may already be in overdraft.
   - May contaminate ground water as a result of a leak in the liner (leachates) or landfill gas migration through the liner.

5.4.2.2.1 Quantity

1. The project is anticipated to require approximately 75 acre-feet of water per year. The annual safe yield of ground water which can be withdrawn from Cadiz Basin has not been officially quantified by DWR. Safe annual yield has been estimated at 560 acre-feet per year, which represents 70 percent of the estimated annual recharge to the basin (800 acre-feet per year) (Shafer, 1964). Project water could probably be obtained from the Archer well, located 2-1/4 miles southeast of the site, along the Arizona-California Railroad. No other fresh water wells were identified in the valley. The nearest identified brine extraction well is located 6.6 miles south, near a group of salt evaporators on Cadiz Lake bed. Five such groupings of salt evaporators were identified from the 1985 versions of USGS maps of the Cadiz Basin. These groupings are located (in order of increasing distance to the site) 6.6, 8.4, 10, 11.2, and 12 miles south of the site. Each grouping appears to have associated brine extraction wells, but the withdrawal rates are currently unknown. Since the project would primarily use water extracted six miles north of these brine extraction wells, the average withdrawal of 75 acre-feet per year from a well onsite or the Archer well would probably not impact the salt extraction wells.

5.4.2.2.2 Quality

1. Impacts related to the potential for ground water contamination are expected to be similar to those impacting the Bolo Station site.

5.4.3 REDUCED ACTION ALTERNATIVE

1. Impacts related to the potential for ground water contamination and ground water overdraft from this alternative at Bolo Station are expected to be similar to those for the proposed action at Bolo Station but would be proportionally less due to lower daily water usages and shorter duration, the possibility of shifting the landfill footprint to avoid flood potential and relatively less difficulty to divert or handle surface flows north of the railroad line.

5.4.4 NO ACTION ALTERNATIVE

1. This alternative would result in no ground water impacts at Bolo Station. However, the solid waste will be landfilled at some location, and potential ground water impacts could occur at other sites.

5.4.5 MITIGATION MEASURES

5.4.5.1 Bolo Station Site

1. The following mitigation measures will be applied to the proposed action, thereby reducing impacts to surface and ground water resources.

- Surface Water and Drainage
  - To protect the proposed landfill from run-on inundation from surface water flowing through the ATSF drainage structures; an earthen drainage channel will be constructed to intercept and divert the stormwater to the 150-foot wide perimeter drainage channel system along the east and west boundaries of the proposed landfill (refer to Figure 3.5). This channel will collect water flowing south of the railbed, redirect it around the perimeter of the landfill, and discharge it from the south side of the site. These drainage channels will also intercept sheet flow runoff from the unloading area and railyard and other nonlandfill areas adjacent to the channels. Each channel will be designed to carry the flow expected during the 100-year, 24-hour storm event.
  - A sedimentation basin and energy dissipators will be installed at the discharging end of the drainage channels to reduce flow velocity and resulting erosion.
  - Drainage structures, such as the perimeter drainage channels, the sedimentation basin, leachate evaporation ponds, stormwater retention basins, and the various collection pipes and ditches, will all be inspected and maintained on a regular basis.
  - Stormwater discharges from the project fall under recently approved EPA regulations (40 CFR, 122, 123, and 124) and the State Water Resources Control Board will require a NPDES permit. This permit will require regular monitoring (and possibly testing) of the perimeter drainage channels and retention ponds to ensure stormwater discharged to the playa does not contain contaminants from the landfill.
  - The NPDES permit for discharge of stormwaters require the owner/operator to complete a SWPPP. This includes a Spill Prevention and Response Plan, and a monitoring plan for RWQCB approval. The NPDES permit also requires the facility to implement "best management practices" (BMPs). Mitigation measures required by the NPDES permit will be implemented.
  - Surface runoff from the active working area will be eliminated by berms that will force precipitation falling on solid waste to infiltrate into the waste. Leachate potentially generated by this infiltration would be collected by the leachate collection system installed at the base of the landfill cell. Stormwater runoff will be diverted to an unlined collection sump and reused for dust control within the active work area only. The sump will be designed to hold the runoff from the 100-year, 24-hour storm event. If overfilling or erosion damage occurred, the sump would immediately be restored and enlarged as required.
- Ground Water Usage
  - To reduce the quantity of water required for the project, the following measures will be implemented:
    - Low-flow plumbing fixtures will be installed in onsite facilities.
    - Washwater from cleaning waste containers will be collected and recycled for container washing.
    - Surface runoff from the landfill, collected in the drainage channel, will be retained in the sedimentation basin, and if not contaminated, will be used for dust control.
  - If further analyses and/or pump testing indicate that withdrawal of ground water from any Rail•Cycle wells is significantly affecting either the quantity of water available to the Leslie Salt wells (EW-3, EW-4, or EW-5), or the concentration of the

brines at those wells, Rail•Cycle will either reduce the pumping rate of their wells until the impact is reduced to a less than significant level, or relocate their well(s) to a location which does not impact the Leslie Salt wells. Impacts shall be based on current (1991) pumping rates from the Leslie Salt wells.

- Ground Water Quality
  - Rail•Cycle has prepared a detailed technical report outlining the design and operational features of the landfill that will prevent and mitigate ground water contamination (Rail•Cycle, 1992b). The major features included within this program are summarized below.
  - A perimeter gas monitoring system and a vadose zone monitoring system will be implemented to provide early warning of landfill gas migration.
  - The single-liner system described in the project description will be upgraded to a double-liner system consisting of the following components (from bottom to top layer):
    - Prepared subbase, natural soil.
    - 60-mil HDPE geomembrane liner.
    - Geosynthetic drainage layer.
    - Geosynthetic clay liner.
    - 60-mil HDPE geomembrane liner.
    - Geosynthetic drainage layer.
    - 2-foot-thick native soil protective layer.

    The HDPE liner and geosynthetic clay liner add increased protection against leaks. The geosynthetic clay liner eliminates the need for watering (conditioning) clay during construction, and eliminates truck traffic otherwise needed to import clay material.
  - Two leachate collection systems will be constructed in each cell: one directly above the top HDPE liner, and the other between the top HDPE liner and the geosynthetic clay liner.
  - Rail•Cycle has proposed to replace the 1-foot clay layer of the final cap with a 40-mil HDPE liner. Under ideal conditions, the 1-foot of clay and the HDPE liner provide approximately the same protection. However, in a desert environment HDPE has a number of advantages:
    - It does not desiccate and crack like clay will.
    - It discourages root penetration and animals from burrowing.
    - It does not require water for installation.
    - It eliminates truck traffic which would otherwise be necessary to bring clay onto the site.
  - The vegetative soil cover will be increased from 1-foot to 2-feet thick above the HDPE liner to prevent the breaching of the cap by plant roots.
  - "Point of compliance" ground water monitoring wells, as required by CCR Title 23, will be installed on 1,000-foot centers along the downgradient perimeter of the landfill footprint. These wells will be sampled on a quarterly basis beginning one year prior to landfilling each respective cell, and will provide a secondary warning of a leak in the liner system. The primary early warning of a leak will be from the leachate collection system installed between the two HDPE liners.
  - A conceptual plan for monitoring of gas and liquid potentially releases beneath the liner system in the unsaturated zone has been developed. Ambient air will be introduced beneath the liner and swept through the unsaturated zone. This air will be collected in perforated pipes running beneath the center of each landfill cell. Gases withdrawn from the pipes will be analyzed for constituents of concern. Based on the early and sensitive detection of gas releases provided by the unsaturated zone monitoring system, the extent of gas and/or a liquid release is expected to be minimal or non-existent. In addition, the dryness of the vadose zone and operation of the unsaturated zone monitoring is expected to evaporate any potential moisture released.

- If leachate or landfill gas generated by the project is determined to be contaminating ground water, a corrective action plan will be developed and implemented in conjunction with the RWQCB as required by CCR Title 23, Chapter 15.
    - Opening a landfill cell for liner repair is not expected to be a means of remediation except in extreme conditions. Control of releases will more likely be through the installation of gas wells or ground water pumping wells along the perimeter of the landfill. Ground water removed by pumping would be treated. Treated water could be used onsite, delivered to Leslie Salt or National Chloride for process water, or reinjected.
    - In the event additional remedial measures are deemed necessary, construction of a grout curtain or cutoff wall down-gradient of the release would isolate the release of contamination from ground water. Ground water from behind the grout curtain would be pumped and treated.

2. A corrective action program designed to remediate ground water contamination may compound the impacts to the Leslie Salt brine pumping wells if it includes a pump-and-treat component, which could create a cone of depression and thus reduce available brines at the wells. To avoid this additional impact, and since calcium chloride and sodium chloride requires purification, Rail•Cycle could implement a financial mechanism which would pay for the increased processing required to purify the final product.

5.4.5.2 Cadiz Valley Alternative Site

1. The following mitigation measures have been identified by the EIR/EIS and shall be applied to the proposed action at the Cadiz Valley Alternative site, thereby reducing impacts to surface and ground water resources if this alternative were selected as the preferred alternative.
    - Energy dissipaters would be installed at the discharging ends of drainage channels to reduce flow velocity.
    - Measures detailed in the NPDES permit would be implemented for the project; measures are expected to be similar to those described for the Bolo Station site.
    - Measures to reduce the quantity of water required by the proposed action, preventive maintenance of onsite drainage structures, and the development of a corrective action plan (if necessary), would be similar to the measures described for the Bolo Station site.
    - The sedimentation basin for stormwater collected on the landfill site would be upgraded to accommodate (without overflowing) flow capacity in excess of the 100-year, 24-hour storm.
    - A monitoring program would be developed to monitor the altered drainage pattern as it flows towards Cadiz Lake. If the pathway for the altered drainage is determined to be capable of washing away portions of the Cadiz Dunes, diversion structures would be constructed to avoid this impact.

5.4.6 FEASIBILITY OF MITIGATION MEASURES

1. Mitigation measures identified are considered feasible and expected to be capable of reducing impacts from the proposed action.

5.4.7 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

1. The withdrawal of an average 75 acre-feet of water per year for use onsite will be a significant adverse impact if the aquifer is currently being overdrafted.

2. Even with implementation of the mitigation measures identified above, this impact may not be reduced to below a level of significance. For purposes of CEQA, a statement of overriding considerations will be required for unavoidable adverse impacts in accordance with CEQA guidelines. While NEPA does not have a similar requirement, this information will be useful to the decision makers during preparation of the ROD for the EIS.

5.5 VEGETATION

1. The environmental impacts of the proposed action to vegetation are limited to impacts associated with development and operation of the landfill and associated facilities. This section provides an analysis of impacts to vegetation that could result from establishment of a landfill facility at the Bolo Station or Cadiz Valley Alternative sites. Mitigation measures to reduce these impacts are also provided in this section.

2. The following impacts to vegetation would be considered significant if they were to occur:

   - Disturbance or destruction of protected or sensitive plant species.
   - Disturbance or destruction of habitat that supports protected or sensitive species.
   - Substantial diminishment of a plant community.

5.5.1 BOLO STATION SITE

1. The proposed action would impact vegetation primarily through direct removal of plants for construction of facilities, including roads. Approximately 2,700 acres of the 4,800-acre site will be lost or disturbed for project facilities during the estimated 60- to 100-year life of the landfill. Of the 2,700 acres to be impacted, 2,400 acres will be associated with the landfill and landfill perimeter facilities. However, not all of the acreage will be disturbed concurrently, as the landfill will be developed on a phased cell-by-cell basis with revegetation designed to occur upon the completion of each cell and application of final cover. After the initial six- to nine-month construction period, which will disturb approximately 360 acres, a maximum of 180 acres of the landfill will be disturbed at one time during operations.

2. Protected or sensitive plant species were not found on the Bolo Station site during various field investigations (Ecological Research Services, 1990: 1992b). The proposed action, therefore, does not have a significant potential to disturb or destroy such species or their habitats. Similarly, the plant communities onsite do not support protected or sensitive wildlife species.

3. During the initial construction phase, the proposed action will result in the loss of approximately 300 acres of the creosote bush scrub community for onsite facilities, excluding the landfill and perimeter facilities. The landfill and its perimeter facilities include approximately 2,400 acres, of which:

   - 690 acres are creosote bush scrub habitat.
   - 1,130 acres are creosote bush allscale scrub habitat.
   - 480 acres are desert dune scrub habitat.
   - 50 acres are desert saltbush scrub habitat.
   - 50 acres are desert wash scrub habitat.

   These onsite habitats are characterized as limited in species density and diversity relative to their occurrence elsewhere in the Mojave Desert.

4. The vegetated areas that would be permanently lost as a result of the proposed action comprise 300 acres, or less than 7 percent of the Bolo Station site, and are in the creosote bush scrub habitat. This area is associated with the landfill support facilities. This habitat is the dominant plant community in the Mojave Desert, which extends across southern California into Arizona, Utah, and southern Nevada. The loss of onsite creosote bush scrub habitat is not considered a significant impact of the proposed action. The 2,400 acres of the landfill and associated facilities are not considered to be permanently lost, as state regulations governing the operation of landfills (CCR Titles 14 and 23) require reclamation of the landfill site through revegetation. Revegetated areas are expected to require 50 to 100 years after completion of a landfill cell to establish a functional perennial plant community that approaches predisturbance plant cover, density, and species composition. Since the last landfill cell would be completed at year 60 or 100, it is expected to take from 110 to 200 years for the plant community to become reestablished.

5. The disturbance of other onsite habitats is similarly not considered a significant impact of the proposed action. These communities have more limited areal distributions in the Mojave Desert, but are commonly found surrounding desert playas or, as in the case of the desert wash scrub community, are linearly distributed in the shallow channels of ephemeral drainages. These habitats in the Bolo Station site are not unique or outstanding examples of their vegetation community types.

5.5.2 CADIZ VALLEY ALTERNATIVE SITE

1 The biotic environment of the Cadiz Valley Alternative site is known through literature research and a field visit related to the desert tortoise survey (Ecological Research Services, 1992e), as discussed in Section 4.5.2.2.

2. The siting and operation of a landfill and associated facilities at the Cadiz Valley Alternative site would have effects similar to those discussed for the Bolo Station site, except that the creosote bush scrub community and desert wash scrub habitat would receive most of the effects.

3. The Cadiz Valley Alternative is not considered to have the potential to substantially diminish a plant community because the majority of the site is situated in the creosote bush scrub community, which is the dominant vegetation community in the Mojave Desert.

5.5.3 REDUCED ACTION ALTERNATIVE

1. Impacts to vegetation as a result of the Reduced Action Alternative would be similar to those of the proposed action but at a slightly lesser scale. The primary difference between the proposed action and the alternative would be a reduction of 320 acres of disturbance. This would result in a reduction in the disturbance and loss of creosote bush-allscale scrub and desert dune scrub habitats.

5.5.4 NO ACTION ALTERNATIVE

1. Adverse impacts to vegetation would not result from the No Action Alternative. The vegetation environment of the Bolo Station and Cadiz Valley Alternative sites would remain as it currently exists.

5.5.5 MITIGATION MEASURES

5.5.5.1 Bolo Station Site

1. The following mitigation measures will be applied to minimize impacts to vegetation:

   - Landfill cells will be revegetated as a final step in the closure of each cell.
   - A native plant seed mixture will be used for revegetation. A list of native plant species will be included in the Closure Plan developed for the proposed facility.
   - Areas on which no project related facilities are to be located will be protected and avoided, to the degree possible, during construction and operations.
   - Construction and operations vehicles will be restricted to paved roads or designated unpaved roads.
   - Construction support yards will be restricted, to the degree possible, to areas previously disturbed by construction activities.

5.5.5.2 Cadiz Valley Alternative Site

1. If the Cadiz Valley Alternative were selected, mitigation measures to minimize adverse effects to vegetation at the alternative site would be the same as those for the proposed action.

5.5.5.3 Reduced Action Alternative

1. Mitigation measures for the Reduced Action Alternative will be the same as those presented for the Bolo Station site.

5.5.5.4 No Action Alternative

1. Mitigation measures will not be required for the No Action Alternative.

5.5.6 FEASIBILITY OF MITIGATION MEASURES

1. The mitigation measures identified are considered feasible and expected to be capable of reducing the environmental consequences of the proposed action to below a level of significance. The mitigation measure identified in Section 5.5.5 for the revegetation of closed portions of the landfill with a native plant mix may require a layer of topsoil over the clay cap that is thicker than the 1-foot layer specified by CCR Title 23. A topsoil layer in excess of 1 foot may be necessary to ensure that the root structure of desert shrubs, such as creosote bush, do not breach the clay cap. The final thickness of the topsoil layer will be developed as part of the revegetation plan for the landfill and will be based on the mix of vegetative species included in the reclamation plan.

2. Mitigations for this impact include using a seed mix including native plants that may not include some desert shrubs. However, this issue will be

"topsoil" Not enough pursuant to be reclaimed

more fully studied during development of the Closure Plan and during the operations life of the facility.

3. As the native vegetation is sparse, with a limited density, native vegetation may not be adequate to hold the topsoil component of the final cover. The Bolo Station site can be subjected to high surface winds during six months of the year. These winds would tend to erode topsoil that is not held in place by the root structure of the vegetative cover. Without protection it is considered likely that the topsoil will be eroded, leaving the clay cap portion of the final cover exposed. This impact can be mitigated through the replacement of lost topsoil identified during routine monitoring of the closed portions of the landfill, as required by CCR Title 14.

but that extends the recovery time

5.5.7 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

1. No significant unavoidable adverse impacts to vegetation are expected to occur as a result of the proposed action or alternatives. The proposed mitigation measures will reduce impacts to below a level of significance.

if trees won't grow (because of clay layer) have changed habitat

5.6 WILDLIFE

1. The environmental impacts of the proposed action to wildlife include potential impacts associated with train traffic and potential impacts associated with development and operation of the landfill and associated facilities. This section provides an analysis of impacts to wildlife that could result from the proposed action and alternatives. Mitigation measures to reduce these impacts are also provided in this section.

2. The following impacts to wildlife would be considered significant if they were to occur:

   - Disturbance of protected or sensitive wildlife species.
   - Disturbance or destruction of habitat that supports protected or sensitive wildlife species.
   - Substantial interference with the movement of resident or migratory wildlife species.
   - Substantial diminishment of habitat for a wildlife species.

5.6.1 BOLO STATION SITE

1. The proposed action would impact wildlife primarily through direct removal of habitat for construction of facilities, including roads. Approximately 2,700 acres of the 4,800-acre site will be lost or disturbed for project facilities during the estimated 60- to 100-year life of the landfill. Approximately 2,400 acres of disturbance will be associated with the landfill and landfill perimeter facilities.

2. Protected or sensitive wildlife species do not occur on the Bolo Station site. The proposed action, therefore, does not have the potential to disturb or destroy such species onsite. However, there is a concern that the landfill will attract populations of ravens, which are known to prey on desert tortoises, a federally- and state-listed threatened species. A Category 1 desert tortoise habitat, the Fenner-Chemehuevi-Piute Valleys HMP and DMAs, is situated approximately 20 to 25 miles northeast of the Bolo Station site.

3. As part of endangered species management, USFWS, in consultation and cooperation with other federal and state agencies and private groups, plans for establishment of viable populations of threatened and endangered species to ensure the species does not become extinct. Such a plan has been prepared in draft form for the desert tortoise. The draft Desert Tortoise Recovery Plan includes various areas (i.e., Desert Management Areas [DMAs]) will be managed as part of the recovery plan for the tortoise (Boarman, 1992). The proposed tortoise DMAs in the project region are:

   - Chemehuevi Valley, located approximately 23 miles from Bolo Station.
   - Fenner Valley, located approximately 25 miles from Bolo Station.
   - Joshua Tree, located approximately 35 miles from Bolo Station.
   - Ivanpah, located approximately 36 miles from Bolo Station.

4. The distance to the Category 1 tortoise habitat and the DMAs are important as ravens are known to travel over 40 miles to forage. If ravens become resident in the landfill vicinity, adverse impacts to dense tortoise populations in the HMP and DMAs may occur. Juvenile tortoises would be most prone to predation.

5. The proposed action does not have the potential to disturb or destroy habitat for protected or sensitive wildlife species. These species are not resident onsite, and the environment was evaluated as representing poor habitat for the desert tortoise.

6. The proposed action does not have the potential to affect the movement of resident or migratory wildlife species. Travel corridors used by Nelson's bighorn sheep and mule deer are defined in the CDCA Plan, but are not located within or near the Bolo Station site. Desert tortoise may travel across the site, but few sign were found during the field surveys, indicating minimal use of the site. Potential impacts to desert tortoise travel patterns are considered insignificant. Use of the site vicinity by migratory birds is not expected to be affected by the proposed action. The number of wintering birds in the site vicinity is low, and is not reported to include federally- or state-listed threatened or endangered species (Ecological Research Services, 1991).

7. The proposed action will not substantially diminish a wildlife community. The proposed action will result in the loss of approximately 2,700 acres of native habitat, which provides cover and forage for some species. Wildlife species resident onsite are expected to move to either undisturbed localities onsite or offsite as

their range becomes affected by construction or operations activities. Ample offsite area is available for relocation, and the movement of non-sensitive species is not considered to be a significant effect of the proposed action. The revegetation of completed landfill cells will restore vegetative cover, resulting in repopulation of disturbed areas. Revegetation of individual landfill cells is expected to require 50 to 100 years to establish a functional perennial plant community that approaches pre-disturbance cover, density, and species composition capable of supporting wildlife.

8. The environmental consequences of increased railroad traffic, noise, and light are also considered relative to their potential to impact wildlife species. At maximum operation, the proposed action will increase train traffic between Bolo and Barstow by approximately 38 percent and between Barstow and San Bernardino by approximately 24 percent. Most of the increased traffic will occur in the evening and early morning hours. Because the ATSF line is in existing use, an increase in traffic is likely to have minimal effect on tortoises and other wildlife species.

9. Studies have shown that some wildlife species are sensitive to loud noise (Brattstrom and Bondello, 1983). Some animals, such as kangaroo rats and lizards, are rendered temporarily deaf when subject to intense noise. This can facilitate their increased predation by snakes and coyotes, which results in lower species densities. Noise may also interfere with animal communications or vocalizations, relative to territoriality or courtship for example.

10. The Bolo Station site is uncategorized habitat for desert tortoise and surveys of the site found little evidence of tortoise (Karl, 1992a). However, tortoise that may potentially utilize the site would be subjected to noise from operation of the landfill and its support facilities (i.e., railyard and offloading facility), and from increased train traffic. Biological studies of the potential effect of noise from a similar rail-haul landfill (e.g., Eagle Mountain Landfill) found desert tortoise not to be adversely affected by noise associated with main line rail activities or landfill operations (BLM and County of Riverside, 1991).

11. Additional potential impacts to desert tortoise from the proposed action include:

    - Illegal collection of tortoise by landfill employees or visitors, or by individuals that move to the area based on the growth-inducing effects of the proposed action.
    - Tortoise being struck by onsite vehicles.

    As Bolo Station provides only marginal tortoise habitat and surveys have found only indirect evidence of tortoise, onsite impacts are not considered significant. However, offsite impacts may occur from illegal collection and roadkill of tortoise resulting from the growth including nature of the project.

12. Noise is attenuated by distance, atmospheric conditions, and topography in such a way that noise effects would be limited to the immediate source area and its near vicinity. The majority of noise effects are expected to be minimal at distances greater than one-quarter mile from the noise source. The ATSF line is paralleled by two dirt roads which lack vegetative cover and are poor habitat for wildlife species. Other onsite noises are expected to derive from standard landfill operations activities, including offloading, working face, and excavation activities. No substantial effect on wildlife is expected to occur as a result of noise.

13. The effects of light and glare are not expected to produce significant effects on wildlife populations. The presence of lighting during nighttime hours may alter vertebrate communities by attracting some species and repelling others. The project is designed to limit the amount of light that impacts surrounding areas.

5.6.2 CADIZ VALLEY ALTERNATIVE SITE

1. The biotic environment of the Cadiz Valley Alternative site is poorly defined at present due to the lack of field studies, except for the desert tortoise. Studies were completed for the desert tortoise because it is a federally- and state-listed threatened species.

2. Desert tortoise habitat in the site area is evaluated as being in the lower fair range (Karl, 1992b)

The site supports a resident tortoise population that gives evidence of being a breeding population. Most tortoise sign was clustered in Sections 8 and 17, where surface contours are more gentle and vegetation cover is more dense than in the northeastern, mountainous site area. Based on habitat quality and the type, density, and distribution of sign found during site survey, it is estimated that approximately 80 tortoises may be affected by implementation of the Cadiz Valley Alternative (Karl, 1992b).

The construction and operation of a landfill and associated facilities at the Cadiz Valley Alternative site, while affecting some tortoises, would not produce significant impacts because (Karl, 1992b):

- The alternative site is several miles distant from core tortoise populations, and habitat in high density areas will not be destroyed or degraded.
- Biologically significant buffers or connecting corridors to high-density tortoise areas will not be affected.
- A large expanse of low-quality tortoise habitat surrounds the alternative site.
- Railroad impacts have existed since the early 1900s, and wildlife populations have adjusted to them.

Nelson's bighorn sheep are known to move between the Old Woman and Ship mountains. While there is limited data on the extent of this use, it is known that bighorn sheep use the Ship Mountains during spring foraging for new growth vegetation. It is reasonable to expect that operation of a landfill at the Cadiz Valley Alternative site would have the potential to adversely affect the bighorn sheep that may use portions of the site.

Potential impacts from noise and light will be similar to the proposed action, except that neighboring industrial uses are not common in the vicinity of the Cadiz Valley Alternative site.

The siting and operation of a landfill and associated facilities at the Cadiz Valley Alternative site may have the potential to adversely affect sensitive wildlife, which are as-yet unknown.

The Cadiz Valley Alternative is not considered to have the potential to substantially diminish a wildlife community because the majority of the site is situated in the creosote bush scrub biotic community, which is widespread in the project region and the dominant community in the Mojave Desert.

5.6.3 REDUCED ACTION ALTERNATIVE

1. Impacts to wildlife as a result of the Reduced Action Alternative would be similar to those of the proposed action but at a slightly lesser scale. The primary difference between the proposed action and the alternative would be a reduction of 320 acres of disturbance in the landfill vicinity, since the landfill footprint is reduced under the alternative. In the short-term, this would result in a reduction in the disturbance and loss of creosote bush-allscale scrub and desert dune scrub biotic communities near the southern terminus of the site. In the long-term (100 to 200 years), there would be no significant difference between the proposed action and the Reduced Action Alternative because the landfill acreage would be reclaimed.

5.6.4 NO ACTION ALTERNATIVE

1. Adverse impacts to wildlife would not result from the No Action Alternative. The wildlife environment at the Bolo Station site would remain as it currently exists.

5.6.5 MITIGATION MEASURES

5.6.5.1 Bolo Station Site

1. The following mitigation measures, incorporated into the design of the proposed action, will be applied to minimize impacts to wildlife:
   - Construction Phase:
     - An education program will be developed to inform construction employees of the habits of the desert tortoise, the need to protect this species, what to do if they find a tortoise, and that harassing, killing, or collecting tortoise is illegal.
     - Onsite, vehicle speeds will be maintained under 20 mph (15 mph for trucks) during tortoise activity periods (spring, fall, and early morning and late evening in the summer).

- The working area of the site will be fenced to deter offsite tortoises from moving onto the site. Fences and power poles will be designed and installed to discourage perching by ravens.
- As a precaution, initial land clearance prior to construction of the access road, in Section 22, and the eastern one-half of Section 15 will be monitored by a qualified desert tortoise biologist or person trained by a qualified biologist. While it is not anticipated that tortoises will be found, some tortoises from the east or north could move onto the site between the time of the surveys conducted to support the preparation of the EIR/EIS and consultation with the BLM and USFWS, and the construction period.
- Kit foxes located onsite will be trapped and relocated to similar offsite environments in the near vicinity.
- If necessary, relocation of tortoises will proceed using state-of-the-art techniques and animals will be located adjacent to the site boundary (north and east) with more favorable habitats during appropriate weather conditions. Unoccupied burrows of appropriate size nearest the point of capture shall be utilized as these may be familiar to the relocated animals. Alternatively, tortoises will be placed in the shade of shrubs if the weather is appropriate. Relocated animals will be observed for as long as is necessary (to be determined by a qualified desert tortoise biologist) to ensure the safety of the animals. Tortoises will be relocated to a site simulating the original nest site. Each site would be caged initially in such a manner that predators will be excluded but normal thermal conditions in the nest will be maintained. Following a period of one month (in which time local predators should become habituated to initial disturbance at the nest site), cages may be removed.
- Any tortoise eggs found will be monitored periodically to determine progress of hatching and success of anti-predation measures. Alternatively, cages may be kept in place through hatching, as long as the nests are closely monitored through the hatching period such that hatchlings are not endangered.
- In other construction areas, tortoises sighted by workers will be relocated by a qualified desert tortoise biologist or other trained onsite personnel. Workers will be educated as to the natural history, endangerment factors for tortoises, and appropriate protocol for initiating relocation procedures. The latter will be established in consultation with tortoise biologists and agency biologists.

• Operations Phase

- An education program will be developed to inform landfill employees of the habits of the desert tortoise, the need to protect this species, what to do if they find a tortoise, and that harassing, killing, or collecting tortoise is illegal.
- During the life of the facility, tortoises found onsite will be removed from danger and relocated using established protocol. Relocation will be completed by a qualified desert tortoise biologist or onsite personnel trained specifically for this function.
- To minimize tortoise entering the landfill site, special fencing (wire mesh) will be installed along the perimeter fence.
- Fencing and facility operations will be designed such that trash does not blow out of the facility.
- A nylon line grid system, or other approved method, will be used over the active landfill working face to deter predatory birds (i.e., raven). In the event a nylon line grid system is not effective in controlling ravens and other bird species, other methods which have been effective at other landfills would be implemented. These include: distress tapes, propane cannons, racket bombs, and blank 0.22 caliber shells.

As an operator of many landfills throughout the country, WMNA has an established bird control procedures and has prepared a bird control manual used at its landfills (WMNA, 1987).

- Vehicle speeds in uncleared portions of the site and on access roads will remain at 20 mph (15 mph for trucks) during tortoise activity periods (spring, fall, and early morning and late evening in the summer).
- Landfill cells will be revegetated during the final closure of each cell, minimizing the impact of onsite habitat loss.

2. The above mitigation measures that involve a "take" of desert tortoise (as defined by the ESA to include handling and moving) will be included in the pending Section 7 consultation with USFWS. This consultation process will be initiated by BLM, based on data provided by Rail•Cycle and will be completed prior to the construction of the EIR/EIS process.

3. In addition to the above mitigations, Rail•Cycle will:

- Conduct a regional raven baseline study and monitoring program in consultation with BLM and USFWS. Rail•Cycle has prepared a draft workplan for the baseline study and monitoring program and submitted it to the BLM in June 1992 for review and approval (Ecological Research Services, 1992f). As of October 1992, BLM has not completed its review of the workplan. The study is designed to provide baseline information on distribution and density of ravens prior to landfill development. During initial operation phase, the project region will be monitored so that changes in raven concentrations or densities can be detected early and brought to the attention of BLM and USFWS. Increases in raven density or attraction of a raven population to the desert valleys of the site vicinity may require additional mitigation measures, which Rail•Cycle would develop and accomplish in consultation with BLM and USFWS.

5.6.5.2 Cadiz Valley Alternative Site

1. If the Cadiz Valley Alternative were selected, mitigation measures to moderate effects to wildlife would be the same as those for the proposed action with the addition of specific mitigation measures for bighorn sheep. Should compensation for potentially-disturbed desert tortoise habitat be required, the BLM formula would be used (BLM, 1988b).

5.6.5.3 Reduced Action Alternative

1. Mitigation measures for the Reduced Action Alternative will be the same as those presented for the proposed action.

5.6.5.4 No Action Alternative

1. Mitigation measures will not be required for the No Action Alternative.

5.6.6 FEASIBILITY OF MITIGATION MEASURES

1. The mitigation measures are considered feasible and are expected to be capable of maintaining potential environmental impacts of the proposed action at below a level of significance.

5.6.7 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

1. The removal of approximately 2,700 acres of habitat over the 60 to 100 years of the proposed action is an unavoidable impact. However, the impact is not considered significant as this removal will occur in phases over 60 to 100 years and completed portions of the landfill will be reclaimed. In addition, as the site does not support protected or sensitive wildlife species, the loss of habitat does not trigger the significance criteria.

2. No significant unavoidable adverse impacts to wildlife are expected to occur as a result of the proposed action or alternatives. The proposed mitigation measures will reduce impacts to below a level of significance.

3. The potential exists for raven populations to increase in the vicinity of the proposed Bolo Station site and possibly affect several high quality desert tortoise habitat ranging from approximately 20 to 35 miles from the site.

Rail•Cycle will implement a regional raven baseline study and monitoring program in consultation with the BLM and USFWS. This program will document actual raven use at the site and will be used to determine if additional mitigation measures are required.

5.7 AIR QUALITY

1. Existing air quality in the vicinity of the Bolo Station site may be affected by fugitive dust, fuel use, and toxic air contaminant emissions generated during project construction, operations, and biological decomposition of materials disposed in the landfill. Potential air quality impacts associated with the proposed action would be considered significant if one or more of the following were to occur:

   - Violation of an ambient air quality standard or substantial contribution to an existing or projected air quality violation. For purposes of this EIR/EIS "substantial contribution" will be the same as the SBCAPCD proposed Best Available Control Technology (BACT) threshold of 80 pounds per day of PM_{10} and 137 pounds per day of NO_X or ROC (Jacobs, 1992a, as in SBCAPCD, 1991b).
   - Exceedance of any federal PSD allowable increment.
   - Exposure to a toxic air pollutant source which would result in a greater than 10 in 1 million probability of contracting cancer from a lifetime (70-year) of exposure.
   - Exposure to a toxic air pollutant source which would result in an acute or chronic "hazard index" greater than 1.0 (Jacobs, 1992a, as in CAPCOA, 1991). The hazard index is the estimated exposure to a given toxic air contaminant emitted from a facility divided by the acceptable exposure level for that substance summed over all applicable pollutants.
   - Degradation of visibility at any PSD Class I area.
   - Determination that the project is inconsistent with the County's 1991 AQAP, indicated by one or more of the following:
     - Demonstration that the proposed action will result in a negative impact on the jobs/housing balance in the region.
     - Failure to demonstrate that vehicle trips and vehicle miles traveled have been reduced to the greatest feasible extent by implementing transportation control measures.
     - Demonstration that the proposed action will have a significant impact on air quality.
     - Indication that transportation, land use, and/or energy conservation control measures are not used to the extent possible to mitigate the impact of a proposed action on air quality.

2. This section identifies the sources and quantities of air contaminant emissions expected from the proposed action. Potential air quality impacts associated with these emissions are assessed with respect to State and Federal ambient air quality standards, and the SBCAPCD's 1991 Draft AQAP.

3. The data and analysis provided herein are summarized from a detailed report prepared by Jacobs Engineering Group, Inc., entitled *Air Quality Impact Analysis (AQIA) Bolo Station Facility, San Bernardino County*, submitted to SBCAPCD (Jacobs, 1992a). The AQIA contains detailed background information on emission factors used and operational parameters assumed in compilation of the air contaminant emissions inventory and the air quality modeling methodologies, and assumptions utilized to prepare the impact assessment.

4. Emissions of criteria and precursor pollutants (SO_X, NO_X, ROG, CO, and PM_{10}) and potential toxic air contaminants have been evaluated for the proposed action and each of the project alternatives. These pollutants are regulated by federal and state ambient air quality standards and PSD increments. Toxic air contaminants are considered to be those pollutants defined under California's AB 2588 program (Air Toxics "Hot Spots" Information and Assessment Act of 1987). Analysis of air quality impacts have been performed for both initial landfill startup (3,000 tons per day) and full operation of the landfill (21,000 tons per day) conditions.

5. Precursor pollutants are emissions that undergo chemical reactions in the atmosphere to form other pollutants. The most important of these are NO_X and ROG, the primary reactants that form O_3. Similarly SO_2 is a precursor of somewhat lesser importance in the formation of PM_{10}.

5.7.1 BOLO STATION SITE

5.7.1.1 Air Contaminant Emissions

1. The proposed action would generate air contaminant emissions in the form of fugitive dust and gaseous pollutants from a variety of activities, including:

   - Construction
     - Heavy-duty construction equipment and fugitive dust emissions associated with the initial six- to nine-month construction period, which includes the initial site grading, construction of landfill support facilities and the initial landfill cell, construction of rail siding, modifications to existing railroad drainage structures, storm drains, and construction of Railyard No. 1.
     - Heavy-duty construction equipment and fugitive dust emissions associated with construction of Railyard No. 2.
     - Construction-related air contaminant emissions are summarized in Table 5.7.1. Calculations are summarized in Appendix H, and in the Rail•Cycle AQIA (Jacobs, 1992a).
   - Landfill operations
     - Fugitive dust generated by vehicle travel on paved roads, vehicle travel on unpaved roads, cell excavation activities, daily, intermediate, and final soil cover application, and windblown dust.
     - Emissions from unpaved roads would be controlled with application of water and dust suppressants to achieve a 95 percent reduction (Jacobs, 1991a).
     - Wind erosion emissions are assumed to be reduced by 95 percent to account for the use of chemical stabilizers on storage piles and 50 percent to account for watering and wind berms for the remaining areas. Other various fugitive dust sources are conservatively assumed to have no emission control reductions.
     - Landfill operation-related fugitive dust emissions are summarized in Tables 5.7.2 and 5.7.3.
   - Fugitive landfill gases
     - Methane, VOCs, and potential toxic air contaminants generated due to biological decom-position of organic materials disposed in the landfill.
     - Emissions were calculated based on a gas generation model developed by WMNA (previously accepted for use by the SCAQMD, the Bay Area AQMD, and CARB), and assuming a landfill gas recovery system efficiency of 75 percent.
     - Fugitive landfill gas-related criteria pollutant emissions are summarized in Tables 5.7.2 and 5.7.3.
     - Fugitive landfill gas-related toxic air contaminant emissions are summarized in Table 5.7.4.
   - Onsite stationary equipment
     - The proposed action calls for a staged development of the landfill gas management system:

Project Years	Landfill Gas Management System
1 to 3	No landfill gas generated. No control system necessary.
3 to 5	Flare.
5 to 25	Gas turbines, with electricity generation
25 to 75+	Steam boiler, with electricity generation

     - VOCs and potential toxic air contaminants will result from combustion of collected gases by the landfill gas management system
     - Emissions were calculated assuming a landfill gas recovery system efficiency of 75 percent (Jacobs, 1992a, as in EPA, 1990; 1991, and CARB, 1990).

TABLE 5.7.1

CONSTRUCTION EMISSIONS SUMMARY
BOLO STATION SITE(1)

EMISSIONS	NO_x		CO		ROG		SO_2		PM_{10}	
	PHASE I(2)	PHASE II(3)	PHASE I	PHASE II	PHASE I	PHASE II	PHASE I	PHASE II	PHASE I	PHASE II
Maximum 24-hour (lbs.)	2,077.6	1,087.5	2,368.4	1,230.3	298.9	165.5	109.2	71.1	1,077.9	1,017.91
Construction Phase Total (tons)	54.2	27.7	65.5	35.6	7.6	4.1	2.0	1.1	43.4	41.7

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(1) Emission calculations are summarized in Appendix H and in Jacobs, 1992a.
(2) Phase I construction includes excavation of the first landfill cells, extension of existing railroad drainage structures, storm drain, site grading, and construction of the rail siding and Railyard No. 1.
(3) Phase II construction includes Railyard No. 2.

TABLE 5.7.2

MAXIMUM DAILY OPERATIONS EMISSIONS
BOLO STATION SITE[1]

SOURCES	ESTIMATED 24-HOUR EMISSIONS (pounds/day)									
	NO_x		CO		ROG		SO_2		PM_{10}	
	3,000 tpd	21,000 tpd	3,000 tpd	21,000 tpd	3,000 tpd	21,000 tpd	3,000 tpd	21,000 tpd	3,000 tpd	21,000 tpd
I. Onsite Sources										
• Miscellaneous										
- Onsite Mobile Sources	476.6	2,531.6	580.1	3,000.0	70.0	340.5	15.2	78.8	28.4	149.7
- Onsite Locomotives	17.1	119.6	7.9	55.6	2.8	19.7	1.2	8.2	0.6	4.3
- Fugitive Landfill Gas	--	--	--	--	1,512.0	1,512.0	--	--	--	--
- Fugitive Dust	--	--	--	--	--	--	--	--	517.6	969.8
- Clay Liner Hauling & Placement	--	--	--	--	--	--	--	--	581.7	581.7
- Gravel Liner Hauling & Placement	--	--	--	--	--	--	--	--	322.4	322.4
• Landfill Gas Management System										
- Flare (years 3 - 5)	22.9	22.9	86.9	86.9	192.1	192.1	6.4	6.4	32.0	32.0
- Turbine (years 5 - 25)	--	664.9	--	949.9	--	66.5	--	133.0	--	956.5
- Boiler (years 25 - 75+)	--	896.4	--	99.6	--	996.0	--	278.9	--	916.3
• Onsite Subtotal										
- Flare (years 3 - 5)	516.6	2,674.1	674.9	3,142.5	1,776.9	2,064.3	22.8	93.4	1,482.7	2,059.9
- Turbine (years 5 - 25)	--	3,316.1	--	4,005.5	--	1,938.7	--	220.0	--	2,984.4
- Boiler (years 25 - 75+)	--	3,547.6	--	3,155.2	--	2,868.2	--	365.9	--	2,944.2
II. Offsite Sources										
• Offsite Locomotives	1,125.9	7,881.6	149.4	1,045.8	43.9	307.0	80.4	562.5	24.2	169.6
• Miscellaneous Offsite Vehicles	3.8	9.2	33.8	81.0	3.3	7.8	0.2	0.5	0.8	1.8
• Clay Loading at Hector	--	--	--	--	--	--	--	--	0.4	0.4
• Clay Liner Transportation	294.3	294.3	164.5	164.5	38.4	38.4	17.4	17.4	45.7	45.7
• Gravel Loading at Newberry Springs	--	--	--	--	--	--	--	--	1.8	1.8
• Gravel Liner Transportation	132.2	132.2	73.9	73.9	17.3	17.3	7.8	7.8	20.5	20.5
Offsite Subtotal	1,556.2	8,317.3	421.6	1,365.2	102.9	370.5	105.8	588.2	93.4	239.8
III. Total Operational Emissions										
• Flare (years 3 - 5)	2,072.8	10,991.4	1,096.5	4,507.7	1,879.8	2,434.8	128.6	681.6	1,576.1	2,299.7
• Turbine (years 5 - 25)	--	11,633.4	--	5,370.7	--	2,309.2	--	808.2	--	3,224.2
• Boiler (years 25 - 75+)	--	11,864.9	--	4,520.4	--	3,238.7	--	954.1	--	3,184.0

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(1) Jacobs, 1992a.

TABLE 5.7.3

MAXIMUM ANNUAL OPERATIONS EMISSIONS
BOLO STATION SITE[1]

SOURCES	ESTIMATED ANNUAL EMISSIONS (tons/year)									
	NO_x		CO		ROG		SO_2		PM_{10}	
	3,000 tpd	21,000 tpd	3,000 tpd	21,000 tpd	3,000 tpd	21,000 tpd	3,000 tpd	21,000 tpd	3,000 tpd	21,000 tpd
I. Onsite Sources										
• Miscellaneous										
- Onsite Mobile Sources	73.9	394.5	88.4	465.9	9.9	52.1	2.3	12.2	4.4	23.3
- Onsite Locomotives	2.7	18.7	1.2	8.7	0.4	3.1	0.2	1.3	0.1	0.7
- Fugitive Landfill Gas	--	--	--	--	275.9	275.9	--	--	--	--
- Fugitive Dust	--	--	--	--	--	--	--	--	91.0	161.5
- Clay Liner Hauling & Placement	--	--	--	--	--	--	--	--	41.9	41.9
- Gravel Liner Hauling & Placement	--	--	--	--	--	--	--	--	23.2	23.2
• Landfill Gas Management System										
- Flare (years 3 - 5)	4.2	4.2	15.9	15.9	35.1	35.1	1.2	1.2	5.8	5.8
- Turbine (years 5 - 25)	--	121.3	--	173.4	--	12.1	--	24.3	--	174.6
- Boiler (years 25 - 75+)	--	163.6	--	18.2	--	181.8	--	50.9	--	167.2
• Onsite Subtotal										
- Flare (years 3 - 5)	80.8	417.4	105.5	490.5	321.3	366.2	3.7	14.7	166.4	256.4
- Turbine (years 5 - 25)	--	534.5	--	648.0	--	343.2	--	37.8	--	425.2
- Boiler (years 25 - 75+)	--	576.8	--	492.8	--	512.9	--	64.4	--	417.8
II. Offsite Sources										
• Offsite Locomotives	175.7	1,229.5	23.3	163.1	6.8	47.9	12.5	87.8	3.8	26.5
• Miscellaneous Offsite Vehicles	0.6	1.4	5.2	12.5	0.5	1.2	0.03	0.1	0.1	0.3
• Clay Loading at Hector	--	--	--	--	--	--	--	--	0.03	0.03
• Clay Liner Transportation	23.0	23.0	12.8	12.8	3.0	3.0	1.4	1.4	3.6	3.6
• Gravel Loading at Newberry Springs	--	--	--	--	--	--	--	--	0.13	0.13
• Gravel Liner Transportation	10.3	10.3	5.8	5.8	1.4	1.4	0.6	0.6	1.6	1.6
Offsite Subtotal	209.6	1,264.2	47.1	194.2	11.7	53.5	14.5	89.9	9.3	32.2
III. Total Operational Emissions										
• Flare (years 3 - 5)	290.4	1,681.6	152.6	684.7	333.0	419.7	18.2	104.6	175.7	288.6
• Turbine (years 5 - 25)	--	1,798.7	--	842.2	--	396.7	--	127.7	--	457.4
• Boiler (years 25 - 75+)	--	1,841.0	--	687.0	--	566.4	--	154.3	--	450.0

91-109 (10/5/92/dh)

(1) Jacobs, 1992a.

TABLE 5.7.4

SUMMARY OF TOXIC CONTAMINANT EMISSIONS[1]

TOXIC CONSTITUENT	LANDFILL GAS EMISSIONS						ONSITE MOBILE EQUIPMENT		ONSITE STATIONARY SOURCES		LOCOMOTIVE IDLING	
	FUGITIVES			FLARE			3,000 tpd (lb/yr)	21,000 tpd (lb/yr)	3,000 tpd (lb/yr)	21,000 tpd (lb/yr)	3,000 tpd (lb/yr)	21,000 tpd (lb/yr)
	(lb/hr)	Peak (lb/yr)	Average (lb/yr)	(lb/hr)	Peak (lb/yr)	Average (lb/yr)						
ORGANICS												
Perchloroethylene	4.20E-03	81	62	5.50E-04	4.8	3.7	--	--	--	--	--	--
Trichloroethylene	5.70E-03	50	39	3.40E-04	3	2.3	--	--	--	--	--	--
Methlyene Chloride	4.60E-03	40	31	2.70E-04	2.4	1.9	--	--	--	--	--	--
Vinyl Chloride	9.70E-03	42	33	5.80E-04	2.5	2	--	--	--	--	--	--
Ethylene Dichloride	7.40E-04	3.3	2.5	4.50E-05	0.2	0.15	--	--	--	--	--	--
Chloroform	1.40E-04	0.61	0.47	8.30E-06	0.037	0.028	--	--	--	--	--	--
Carbon Tetrachloride	2.70E-04	1.2	0.91	1.60E-05	0.071	0.055	--	--	--	--	--	--
Ethylene Dibromide	8.10E-05	0.48	0.37	4.60E-06	0.029	0.022	--	--	--	--	--	--
Hydrogen Sulfide	2	17,400	13,500	0.12	1,050	810	--	--	--	--	--	--
1,1,1-Trichloroethane	3.90E-04	1.7	1.3	2.30E-05	0.1	0.079	--	--	220	870	--	--
1,1,3-Trichlorotriflouroethane	--	--	--	--	--	--	--	--	20	78	--	--
Benzene	1.50E-02	66	51	9.00E-04	4	3.1	3.50E+02	1.90E+03	--	--	1.50E+01	1.10E+02
Formaldehyde	--	--	--	--	--	--	1.80E+03	9.50E+03	--	--	7.70E+01	5.40E+02
Toluene	--	--	--	--	--	--	3.60E+02	1.90E+03	--	--	1.50E+01	1.10E+02
Xylenes	--	--	--	--	--	--	1.80E+02	9.70E+02	--	--	7.90E+00	5.50E+01
METALS												
Arsenic	--	--	--	--	--	--	2.60E-02	1.40E-01	--	--	5.70E-04	4.00E-03
Cadmium	--	--	--	--	--	--	5.80E-01	3.10E+00	--	--	1.30E-02	8.90E-02
Chromium	--	--	--	--	--	--	3.90E-03	2.10E-02	--	--	8.60E-05	6.00E-04
Lead	--	--	--	--	--	--	2.60E-01	1.40E+00	--	--	5.70E-03	4.00E-02
Nickel	--	--	--	--	--	--	1.30E-01	7.00E-01	--	--	2.90E-03	2.00E-02
Selenium	--	--	--	--	--	--	3.50E-02	1.90E-01	--	--	7.60E-04	5.30E-03
Zinc	--	--	--	--	--	--	3.50E+00	1.90E+01	--	--	7.60E-02	5.30E-01

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(1) Jacobs, 1992a.

- Landfill gas combustion-related criteria pollutant emissions are summarized in Tables 5.7.2 and 5.7.3.
- Landfill gas combustion-related toxic air contaminant emissions are summarized in Table 5.7.4.

• Onsite mobile equipment
  - Heavy-duty, diesel-fueled construction equipment associated with regular operation of the landfill.
  - Locomotive engine emissions resulting from idling at the landfill.
  - Onsite mobile equipment-related criteria pollutant emissions are summarized in Tables 5.7.2 and 5.7.3.
  - Onsite mobile equipment-related toxic air contaminant emissions are summarized in Table 5.7.4.

• Offsite mobile equipment
  - Vehicle exhaust emissions related to employee travel to and from the landfill facility. Employee commuting emissions conservatively assume one employee per vehicle. However, emissions are expected to be reduced through the encouragement of ride sharing.
  - Locomotive engine emissions resulting from travel to and from the landfill facility.
  - Offsite mobile equipment-related criteria pollutant emissions are summarized in Tables 5.7.2 and 5.7.3.
  - Offsite locomotive engine-related toxic air contaminant emissions are summarized in Table 5.7.4.

• Ancillary onsite facilities
  - Hazardous waste temporary storage area: a small storage area will be constructed near the operations and maintenance facility for the temporary storage of hazardous waste. This area will be covered and will consisted of a curbed concrete slab. Small volumes of unacceptable wastes discovered during routine load checking procedures at the active working face will be stored for a maximum of 90 days at this temporary storage area prior to transport to a suitable, permitted disposal site. If volatile organic compounds are discovered, they will be stored in Department of Transportation approved sealed containers to prevent emissions during the temporary storage period. An evaluation of potential waste quantities and expected emissions associated with operation of the temporary storage area will be conducted in consultation with SBCAPCD, and will be included in the Final EIR/EIS.
  - Public waste drop-off area: calculations of offsite mobile sources emissions for the proposed action includes two pickup loads from the local area per week of solid waste brought to the proposed landfill by the public and placed in rolloff containers provided near the visitor's center for this purpose. The roll-off container will be transported to the active working face on a weekly or as-needed basis to avoid odors. To the extent that local solid waste disposal exceeds two pickup truck loads per week, the Final EIR/EIS will be revised to reflect additional air emissions from offsite related traffic.
  - Leachate evaporation ponds: in the event regulatory agencies (RWQCB and LEA) do not allow reintroduction of landfill gas condensate or leachate into the waste at the active working face as proposed, these liquids would be transported to lined evaporation ponds that are not currently part of the proposed action. As these liquids evaporate, VOCs would be released into the atmosphere. In addition to potential odors, these emissions may include ROG and toxic organic constituents. If leachate evaporation ponds are required in the future, specific permitting, including CEQA, will be necessary.

Doesn't incl emission of finished, unveg. cells

5.7.1.2 Air Quality Impact Analysis

1. Air quality impacts may occur on a local scale as a result of air pollutant emissions from the proposed action. These impacts would result from the various emission sources associated with the landfill, including fugitive landfill gas, landfill flare, locomotives while at the site, and heavy-duty construction equipment. Local impacts would occur primarily as a result of criteria pollutants and toxic air contaminants emitted by project sources. The local study area (see Figure 1.2) encompasses the landfill facility and the surrounding area within a radius of approximately 10 kilometers. This area encompasses the towns of Amboy, Chambless, Cadiz, the industrial area at Saltus, and Pacific Agriculture near Cadiz.

2. Dispersion modeling is a frequently employed tool to evaluate the effects of a proposed emission source on ambient air quality. A dispersion model uses detailed information regarding an air pollution source (e.g., source location, release height, pollutant emission rate, etc.) and combines it with meteorological data to simulate air pollution dispersal and transport. The model calculates downwind concentrations of each pollutant at a series of offsite locations termed receptors. Impacts are evaluated for various averaging durations. The highest impact at any receptor is added to the preexisting background concentration for that pollutant to yield a "total" concentration. This "total" is then compared to the applicable state or federal ambient air quality standard to evaluate project compliance.

3. The regional study area for the proposed action includes the remainder of the SEDAB and the South Coast Air Basin. The primary regional impact of concern is that of the photochemical pollutant ozone. Impacts at Joshua Tree National Monument are also of regional concern since this is the closest PSD Class I area.

4. The Industrial Source Complex Short-Term (ISCST) dispersion model was selected for evaluation of project-related impacts (Jacobs, 1992a). The ISCST model is a steady-state Gaussian dispersion model developed by EPA. Approval for using the ISCST model was obtained from the SBCAPCD.

5.7.1.2.1 Criteria Pollutant Impact Analysis

1. A dispersion modeling analysis was performed to quantitatively evaluate criteria pollutant impacts from the proposed action. A summary of modeling results is presented in Table 5.7.5. The results indicate that impacts would meet applicable state and federal standards with the exception of PM_{10}. PM_{10} monitoring conducted between March 1991 and February 1992 at the Bolo Station site indicates that the state 24-hour standard was exceed on 7 of the 51 sampling days, and the national 24-hour standard was exceeded on 1 of the 51 sampling days (Jacobs, 1992a). Comparison of these exceedances with the 12-month record of meteorological monitoring data indicates that the exceedances occur during relatively high wind speed conditions, and are primarily attributable to regional windblown fugitive dust. Therefore, PM_{10} emissions would exacerbate 24-hour and annual standard exceedances resulting from naturally-occurring episodes of regional windblown fugitive dust.

2. Continuous monitoring at the Bolo Station site between March 1991 and February 1992 measured four hours during which California's standard for O_3 of 0.095 ppm was exceeded, with a maximum concentration of 0.102 ppm (Jacobs, 1992a). The proposed action will result in substantial additional emissions with SEDAB of the two primary O_3 precursors: NO_x and ROG. It is reasonable to expect that the frequency and magnitude of exceedances of the O_3 standard in the project area will increase as a result of these emissions. Due to the complexities of atmospheric chemistry and transport on the formation of O_3, it is not possible to project the extent of this impact. However, an indication of the potential relative magnitude of the impact can be derived through comparison of the proposed action's emission of a combined 2,200 tons per year of NO_x and ROG to SEDAB's total estimated combined emissions of NO_x and ROG of 61,000 tons per year. Based on this comparison, the proposed action results in an approximate 4 percent increase in combined NO_x and ROG emission in the SEDAB.

3. Impacts during the pre-operational construction phase can be inferred by comparing construction

TABLE 5.7.5

MODELING ANALYSIS
SUMMARY OF IMPACTS
BOLO STATION LANDFILL[1]

POLLUTANT	AVERAGING PERIOD	MAXIMUM BACKGROUND CONCENTRATION ($\mu g/m^3$)	MAXIMUM PROJECT IMPACT[2] ($\mu g/m^3$)		TOTAL CONCENTRATION ($\mu g/m^3$)		CALIFORNIA STANDARD ($\mu g/m^3$)	FEDERAL STANDARD ($\mu g/m^3$)
			3,000 Tons Per Day	21,000 Tons Per Day	3,000 Tons Per Day	21,000 Tons Per Day		
NO_2	1-hour	49	238	304	287	353	470	–
	Annual	6	85	87	91	93	–	100
SO_2	1-hour	10	21	168	31	178	655	–
	3-hour	8	10	66	18	74	–	1,300
	24-hour	5	2	14	7	19	131	365
	Annual	3	<1	3	<4	6	–	80
CO	1-hour	14,880	1,710	2,325	16,590	17,205	23,000	40,000
	8-hour	4,920	688	477	5,608	5,397	10,000	10,000
PM_{10}	24-hour	>50	31	46	-- [3]	-- [3]	50	150
	Annual	33	5	9	38	42	30	50

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(1) Jacobs, 1992a.

(2) The maximum modeled project impact is added to a representative background concentration (based on preproject monitoring data) to yield a total concentration. This total concentration is then compared to applicable federal and/or state ambient air quality standards to evaluate project compliance.

(3) The maximum 24-hour PM_{10} concentration from the Bolo Station onsite monitoring program was 398 $\mu g/m^3$ and occurred during a high wind event. However, the maximum modeled project impact was predicted to occur under relatively light wind conditions. Therefore, it was considered inappropriate to total these concentrations.

phase estimates (Table 5.7.1) to the operational phase emissions estimates (Tables 5.7.2 and 5.7.3). Peak-hour, peak-day, and annual construction emissions are considerably lower than the corresponding operations phase emissions. Therefore, it is reasonable to conclude that NO_2, SO_2, and CO construction-phase impacts would be within applicable standards. PM_{10} emissions would exacerbate existing 24-hour and annual standard exceedances.

4. Project impacts at the Joshua Tree National Monument, located approximately 35 miles south of Bolo Station, are summarized in Table 5.7.6. Impacts at Joshua Tree are within the allowable Class I incre-ments. Project impacts on visibility at Joshua Tree are summarized in Section 5.7.1.2.3.

5. The following summarizes potential criteria pollutant impacts with respect to the applicable significance criteria listed in Section 5.7:

   - **Ambient Air Quality Standards**: Estimated emissions summarized in Tables 5.7.1 and 5.7.2 indicate that 24-hour NO_x and ROG emissions will exceed 137 pounds per day, and 24-hour PM_{10} emissions will exceed 80 pounds per day. This is considered a significant adverse impact.

     In addition, PM_{10} modeling results indicate that PM_{10} emissions would exacerbate 24-hour and annual standard exceedances resulting from naturally-occurring episodes of regional windblown fugitive dust. This is considered a significant adverse impact.

   - **PSD**: Estimated project-related impacts at Joshua Tree National Monument are not significant.

   - **Visibility**: Potential impacts are summarized in Section 5.7.1.2.3.

   - **AQAP Consistency**: Project conformity with the County's 1991 AQAP is discussed in Section 5.7.1.2.6.

5.7.1.2.2 Toxic Air Contaminant Health Risk Assessment

1. A multipathway health risk assessment (HRA) was performed to quantitatively evaluate the effects of toxic air contaminant emissions from the proposed action. Routine air emissions from the proposed action contain a number of toxic air contaminants, such as aromatic hydrocarbons (e.g., benzene), H_2S contained in the landfill gas, and heavy metals (e.g., arsenic) from the combustion of diesel fuel.

2. The quantified risks are not absolute risks, but are mathematical estimates based on several assumptions. The assumptions were selected in order to overestimate the overall potential health risks, since a number of uncertainties are associated with these assumptions. The primary receptor selected for evaluation was a hypothetical, maximally exposed individual (MEI). This hypothetical individual is considered to be simultaneously exposed to all potentially emitted chemicals at the maximum concentrations for 24 hours a day over an entire 70-year lifetime. Modeling the MEI's exposure allows a conservative assessment of maximum risk to which the public may be exposed. The MEI significantly overestimates the risk to any real individual and is therefore protective of public health.

3. Toxic effects are often grouped as either acute or chronic. Acute effects are generally associated with a short-term exposure, and chronic effects are observed after a relatively long period. Chemicals can have both acute and chronic effects, and chronic effects can be carcinogenic or noncarcinogenic. An example of a common acute effect is irritation of the respiratory tract and eyes experienced by a sensitive person in a smoke-filled room. A common noncarcinogen chronic health effect is cirrhosis of the liver due to habitual alcohol abuse.

4. The following definitions are useful in understanding the health risk of exposure to toxic air contaminants:

   - **Incremental Cancer Risk**: The number of excess cancer cases per one million people exposed to the calculated toxic air contaminant concentrations. These numbers assume that an individual is exposed to the peak year concentrations for 24 hours per day, for 70 years, and that all contaminants inhaled are absorbed into the body.

TABLE 5.7.6

MODELING ANALYSIS
PSD CLASS I IMPACT SUMMARY
BOLO STATION LANDFILL[1][2]

POLLUTANT	AVERAGING PERIOD	MAXIMUM IMPACT AT CLASS I AREA[3] ($\mu g/m^3$)	ALLOWABLE CLASS I AREA INCREMENT ($\mu g/m^3$)
NO_2[4]	Annual	<0.1	2.5
SO_2	3-hour	0.3	25
	24-hour	0.1	5
	Annual	0.0	2
PM_{10}	24-hour	0.9	10
	Annual	<0.1	5

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(1) Jacobs, 1992a.
(2) Results shown are for the 21,000 tons per day scenario.
(3) Impacts were modeled at a series of receptors located along the northern boundary of Joshua Tree National Monument. The presented impacts are for the maximum receptor.
(4) Due to the relatively long transport time, full conversion of NO to NO_2 was assumed.

Joshua Tree Natl Mon
37 mi SSE of site

Since wind rose (Fig 4.7.3) shows northerlies occur only 5.2% of the time & in lowest wind speed class, distance from site to Class I & allowable increment greater to ESE & WNW

All we know from table is that to S, that distance is < 37 mi, poss ≤ 37 mi?

only for Class I
Don't know for anything else

(10 for 24-hr 5 for ann.)

- **Chronic Noncarcinogenic Hazard Index**: Provides a measure of the long-term health effects other than cancer. The hazard index is the sum of the hazard quotients of the individual toxic compounds emitted from the site. For each compound, the hazard quotient is the estimated lifetime dose divided by the acceptable lifetime dose.

- **Acute Noncarcinogenic Hazard Index**: Provides a measure of the effects of short-term exposure to one or more chemicals. This hazard index is analogous to the chronic noncarcinogenic hazard quotient, except that one-hour average exposures (concentra-tions) are divided by acceptable short-term exposure limits to determine the hazard quotients.

5. The analysis was performed consistent with AB 2588 guidelines established by the state and by the SBCAPCD (Jacobs, 1992a, as in CAPCOA, 1991; SBCAPCD, 1991b). Both carcinogenic and non-carcinogenic (acute and chronic) health effects were evaluated. A detailed description of the HRA methodology is included in the AQIA (Jacobs, 1992a).

6. The results of the HRA are summarized in Table 5.7.7. Impacts are predicted to be below applicable significance criteria. The maximum predicted incremental excess carcinogenic risk is 3.9×10^{-6} (3.9 excess cancer cases per million population). Figure 5.7.1 graphically illustrates the 70-year carcinogenic risk estimates.

7. The acute and chronic hazard indices are predicted to be less than 1.0 at all receptors including the MEI; therefore these impacts are not significant. Impacts at the nearby populated areas are predicted to be considerably less than at the MEI.

8. The following summarizes potential toxic air pollutant impacts with respect to the applicable significance criteria:

   - **Carcinogenic Health Risk**: Impacts are not significant, as they are estimated to be below the 10×10^{-6} significance threshold.

   - **Chronic and Acute Health Risks**: Impacts are not significant, as they are estimated to be below the 1.0 significance threshold.

5.7.1.2.3 Visibility Impacts at PSD Class I Areas

1. A PSD Level-1 visibility screening analysis (Jacobs, 1992a, as in EPA, 1980) was performed to estimate proposed action impacts on visibility at Joshua Tree National Monument. Three contrast parameters were calculated:

   - Plume contrast against the sky.
   - Plume contrast against terrain.
   - Change in sky/terrain contrast caused by primary and secondary aerosol.

   A background visual range of 110 kilometers and a distance of 52 kilometers were used in the calculations. Landfill gas emissions, locomotive idling emissions, diesel-fuel combustion emissions, and fugitive dust emissions were considered. Based on the results of the analyses, it is considered unlikely that landfill emissions would cause adverse visibility impairment.

5.7.1.2.4 Carbon Monoxide "Hot Spot" Impacts

1. Operation of a waste-by-rail project would result in some incremental increase in vehicle delays at rail crossings. Vehicles idling would cause a localized increase in CO impacts. To assess the potential impacts associated with vehicle idling at rail crossings, average daily traffic and potential traffic delay times were estimated at grade rail crossings between Bolo Station and San Bernardino. Maximum localized CO impacts were estimated to occur at Rialto Avenue (in San Bernardino), the intersection having the highest potential traffic delay time.

2. Impact of the proposed action on CO levels at rail crossings was assessed using the Caltrans CALINE4 Air Quality Model, contained in the CARB modeling package, AQAT3. This model allows microscale CO concentrations to be estimated along a roadway corridor or intersection. The emissions package utilized in this version of CALINE4 is EMFAC7D, which results in greater impacts than the previous version, EMFAC7C. EMFAC7E, which includes CARB's new emission control strategy is not available in the present AQAT package. Analyses performed using EMFAC7D overestimates future CO levels as it does not include the impact of recently enacted CARB motor vehicle standards for CO, which sharply reduce these emissions in future vehicles.

TABLE 5.7.7

HEALTH RISK ASSESSMENT
SUMMARY OF RESULTS
BOLO STATION LANDFILL(1)

LOCATION	70-YEAR CARCINOGENIC RISK(2)	MAXIMUM CHRONIC HAZARD INDEX(3)	MAXIMUM ACUTE HAZARD INDEX(3)
Maximum Exposed Individual (MEI)	3.9×10^{-6}	5.7×10^{-2}	0.7
Amboy	8.2×10^{-8}	1.4×10^{-3}	4.1×10^{-2}
Cadiz	1.0×10^{-7}	1.7×10^{-3}	7.7×10^{-2}
Chambless	3.9×10^{-8}	6.5×10^{-4}	4.3×10^{-2}
Pacific Agriculture	1.0×10^{-7}	1.8×10^{-3}	4.1×10^{-2}
SIGNIFICANCE CRITERIA	**1.0×10^{-5}**	**1.0**	**1.0**

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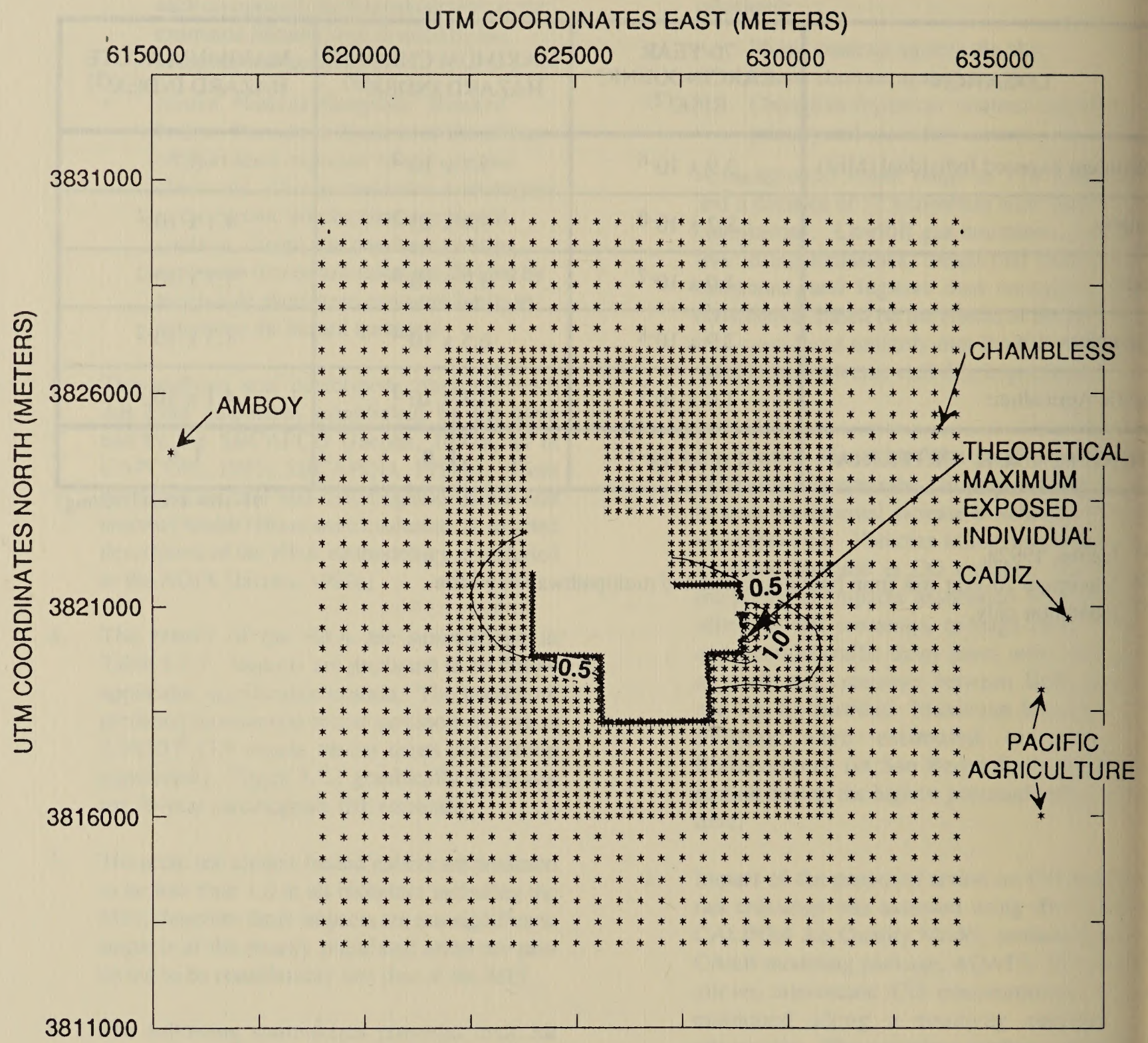
(1) Jacobs, 1992a.
(2) Maximum 70-year risk from both inhalation and multipathway exposure.
(3) Inhalation only.



LEGEND

* RECEPTOR GRID MODELING POINT

0.5 HEALTH RISK OF EQUAL VALUE

SOURCE: JACOBS, 1992a.

FIGURE 5.7.1

SENSITIVE RECEPTORS AND HEALTH RISK ASSESSMENT RESULTS

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

3. Modeling was performed on the basis of average daily traffic data which were extrapolated to peak hourly traffic estimates on the basis of guidance issued by SCAG. Since train movements will occur at nighttime, these estimates are considered to be conservative. Computer output files generated as part of these analyses are included in Appendix H.

4. Table 5.7.8 summarizes the results of CO modeling analyses, which indicate that CO levels at rail crossings would, at a maximum, increase by approximately 0.2 ppm as a result of project-related train movements. Although SBCAPCD does not have a similar rule, SCAQMD's Rule 1303 defines an allowable increase in 8-hour CO levels as less than 0.45 ppm. Vehicle traffic associated with the proposed action will result in CO increases of less than 0.45 ppm. Results shown in Table 5.7.8 indicate that CO impacts at rail crossings will not differ considerably from existing conditions to the 3,000 ton per day and 21,000 tons per day project scenarios. This is a result of EMFAC7D's built-in assumption that cleaner-running motor vehicles will constitute a larger share of on-road vehicles as time progresses.

5. Based on the results of the CO modeling, the proposed action is not expected to result in a significant impact on CO levels at rail crossings in the SEDAB or South Coast Air Basin.

5.7.1.2.5 Vegetation Impacts

1. The land in the general area of the proposed action supports sparse vegetation. The Pacific Agriculture farm near Cadiz represents the only sensitive vegetation receptor. Criteria pollutant modeling data, summarized in Section 5.7.1.2.1, indicate that the incremental criteria pollutant impacts associated with the proposed action upon Pacific Agriculture are well below the primary and secondary NAAQS, which have been promulgated with an adequate margin of safety, to protect public health and welfare from known or anticipated adverse effects of a pollutant. In addition, the results of the multipathway health risk assessment summarized in Section 5.7.1.2.2 consider potential health risks associated with toxic air pollutant impacts upon crop ingestion. These analyses demonstrated that, even at the maximum impact location, the proposed action is not likely to result in unacceptable health risks.

2. Based on the above, the proposed action is not expected to result in a significant impact upon sensitive vegetation.

5.7.1.2.6 County Air Quality Attainment Plan Consistency

1. The SBCAPCD has developed an AQAP as required by the California Clean Air Act requirements. Currently the SEDAB is considered nonattainment for O_3 (and its precursors NO_x and ROG) and PM_{10}, and is classified as a "moderate" nonattainment area. When an area is classified as "moderate" the district "need only, to the extent necessary, implement specific strategies identified in the California Clean Air Act." The proposed action must remain consistent with these strategies and other requirements of the AQAP. The following discussion summarizes AQAP conformity criteria, as identified in Appendix II-D of the County's 1992 AQAP, and in verbal communication with County staff (SBCAPCD, 1992):

   - Demonstration that the proposed action is improving (or having a neutral effect on) the region's jobs/housing balance.
   - Demonstration that vehicle trips and vehicle miles traveled have been reduced to the greatest feasible extent by implementing transportation control measures.
   - Demonstration that the proposed action will not have a significant impact upon air quality.
   - Demonstration that transportation control measures are used to the extent possible to mitigate the impact of the proposed action on air quality.

2. Air quality impacts associated with the proposed action are compared with AQAP conformity criteria in the following discussion:

   - **Regional Jobs/Housing Balance**: Information presented in Section 5.15 indicates that the proposed action is expected to have either a positive or

Air Quality Attainment Plan

TABLE 5.7.8

ESTIMATED CARBON MONOXIDE LEVEL AT RAIL CROSSINGS[1][2]

SCENARIO	MAXIMUM CO[3] CONCENTRATION (ppm)	
	One-Hour	Eight-Hour[2]
Existing	0.2	0.14
3,000 Tons Per Day	0.2	0.14
21,000 Tons Per Day	0.2	0.14

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(1) Estimated impacts do not include ambient background CO concentration.
(2) Eight-hour concentrations were extrapolated from one-hour concentrations using a CARB and EPA-approved scaling factor of 0.7.
(2) Detailed computer modeling printouts are included in Appendix H.
(3) Results indicate that impacts will not differ considerably from existing conditions to the 3,000 ton per day and 21,000 tons per day project scenarios. This is a result of EMFAC7D's built-in assumption that cleaner-running motor vehicles will constitute a larger share of on-road vehicles as time progresses.

neutral effect on the region's jobs/housing balance.

- **Transportation Control Measures:** The following transportation control measures have either been adopted or are inherent in the project design:
  - Movement of waste material by railroad.
  - Commitment to utilize ridesharing and/or busing of employees when feasible.
  - Busing of employees to onsite work locations.
- **Significant Air Quality Impact:** Information presented in Section 5.7.1.2.1 indicates that construction and operations emissions of NO_X, ROG, and PM_{10} constitute a significant air quality impact, as compared with the significance criteria.
- **Extent of Transportation Control Measures:** The transportation control measures addressed above and information presented in Section 5.12 indicates that transportation control measures for the proposed action will be implemented to the greatest feasible extent.

3. Based on the above, the proposed action may not be consistent with the County's 1991 AQAP. Mitigation measures specified in Section 5.7.5 may not be successful in reducing these potential impacts below the applicable significance levels. Pending further evaluation of the effectiveness of these mitigation measures by the County with SBCAPCD participation as part of EIR/EIS process, impacts above are considered to be significant according to the significance criteria in Section 5.7, and will not be reduced to below a level of significance through implementation of mitigation measures discussed in Section 5.7.6.

4. The proposed action, together with the anticipated development of MRFs in urbanized southern California, is projected to result in a net reduction in the emission of criteria pollutants in the South Coast Air Basin (David Evans and Associates, Inc., 1992). This net emission reduction is due to more centrally located and efficient MRFs, as compared with landfills in urbanized southern California, that result in:
   - Reduced vehicle miles traveled by waste collection trucks.
   - Reduced vehicle travel time by waste collection trucks.
   - Reduced waiting time for waste collection trucks at urban landfills.

5. To at least a minor extent, reduced emissions in the South Coast Air Basin is expected to translate into less pollutant transport into the SEDAB (SBCAPCD, 1991c). However, the anticipated reduction in transport of O_3 and its precursors of NO_X and ROG (combined reduction of 246 pounds per day of NO_X and ROG) will not significantly offset the addi-tional combined emissions of NO_X and ROG (968 pounds per day) expected to result from the proposed action.

5.7.2 CADIZ VALLEY ALTERNATIVE SITE

1. Locating the landfill in the Cadiz Valley, or another alternate area would have some effect on transportation emissions. The actual effect would depend on the difference in rail mileage to the landfill location. The additional rail mileage to the Cadiz Valley Alternative site would have a negligible impact upon train movement emissions. Emissions associated with the landfill operation (e.g., landfill gas emissions, onsite mobile equipment emissions, etc.) would be essentially identical to the proposed action. Ambient air quality impacts for inert criteria pollutants (e.g., CO, NO_2, SO_2, and PM_{10}) would also be essentially identical to the proposed action. However, compliance with PSD increments could be more difficult for an alternative located close to a Class I area such as the Joshua Tree or Death Valley National Monuments. Toxic air contaminant impacts would be adverse for an alternative located adjacent to a populated area or sensitive receptor (e.g., a public gathering spot).

5.7.3 REDUCED ACTION ALTERNATIVE

1. This alternative would include two types of reductions from the proposed action: a reduction in overall capacity and/or a reduction in the incoming waste rate. The capacity reduction would result in lower landfill gas generation rate

(which is a function of the amount of waste in place), which would reduce certain toxic air contaminant emissions. The reduction in overall capacity would not result in decreased criteria pollutant air quality impacts on its own without the reduction in the daily incoming waste rate. This is because most air quality impacts (with the exception of carcinogenic risk) are based on relatively short averaging periods ranging from 1 hour to 24 hours to annual averages. Thus, reductions in peak hourly, daily, and annual activities would be necessary to reduce emissions and associated impacts. Reductions in the incoming waste rate to 12,000 tons per day would reduce certain emissions including locomotive emissions, onsite mobile source emissions, and fugitive dust emissions. Associated criteria pollutant impacts can be inferred by interpolating between the initial startup and full operation modeling results (see Table 5.7.5).

5.7.4 NO ACTION ALTERNATIVE

1. The No Action Alternative is analyzed to determine environmental effects associated with waste disposal in the absence of the Rail•Cycle proposed project.

2. Recent studies indicate that Los Angeles County has approximately four years of permitted landfill capacity remaining as of January 1, 1990 (Jacobs, 1992a, as in CIWMB, 1992). Although some increase in permitted capacity at existing landfills is likely, the data suggests that additional capacity will need to be permitted in the form of new landfills. The most likely locations for any new landfills would be away from populated areas (i.e., outside of the Los Angeles Basin). This is consistent with SCAQMD Air Quality Management Plan (AQMP) Measure No. A-D-1, which supports out-of-basin transport of biodegradable solid waste. Therefore, for purposes of this assessment, the No Action Alternative is defined as truck transport of waste to out-of-basin landfills. An average one-way haul distance of 100 miles has been assumed. This distance represents a conservative estimate (i.e., tends to underestimate No Action Alternative emissions). The actual distance could be considerably longer. For comparison purposes, the rail distance from the City of Commerce to Amboy is approximately 225 miles.

3. For comparison purposes, waste transportation emissions have been quantified for the landfill initial startup (3,000 tons per day) scenario. Emissions associated with a larger waste disposal scenario can be scaled upward from initial startup estimates. As summarized in Table 5.7.9, landfill operational emissions (e.g., onsite mobile equipment, landfill gas, and fugitive dust emissions) would be essentially the same between the proposed action and the No Action Alternative. However, No Action Alternative waste transportation emissions (except SO_2) are higher compared to the proposed action, as summarized in Table 5.7.10. For example, No Action Alternative NO_X emissions drop from 317 to 308 tons per year for the proposed action, CO emissions drop from 239 to 61 tons per year, ROG emissions drop from 57 to 15 tons per year, and PM_{10} emissions drop from 13 to 9 tons per year.

4. The results of this analysis indicate that, given the projected landfill capacity shortage in Los Angeles County, the Rail•Cycle project would result in a regional "net air quality benefit" when compared to a future baseline without the Rail•Cycle project. This includes lower emissions of O_3 precursors (i.e., NO_X and ROG). Rail transportation is an inherently more efficient method of waste transportation. The differences between the proposed action and the No Action Alternative would be considerably larger if a transportation distance comparable to the proposed action was assumed.

5.7.5 MITIGATION MEASURES

1. In order to minimize the potential for adverse air quality impacts, Rail•Cycle has incorporated a number of mitigation measures into the project design. These are briefly summarized below.

   - Operation of a landfill gas collection system and associated landfill gas flare to minimize ROC/toxic air contaminant emissions.
   - Use of locomotives to transport waste as opposed to trucks. The projected landfill capacity shortage in Los Angeles County along with SCAQMD support of out-of-basin transport of biodegradable solid waste strongly suggests long distance waste transportation scenarios.

TABLE 5.7.9

COMPARISON OF PROPOSED ACTION LANDFILL EMISSIONS TO THE NO ACTION ALTERNATIVE[1]

IMPACT DESCRIPTION	COMPARISON TO NO ACTION ALTERNATIVE
Landfill Mobile Source Emissions	• Emissions under the proposed action would be essentially the same as the No Action Alternative; only the location would be changed.
Landfill Gas Emissions	• Emissions under the proposed action would be essentially the same as the No Action Alternative; emissions under the No Action Alternative could be higher if the landfill were located in a less arid climate. Toxic air contaminant impacts associated with the No Action Alternative could be adverse if located near a population area or sensitive receptor.
Fugitive Dust Emissions	• Emissions under the proposed action would be essentially the same as the No Action Alternative; only the location would be changed.

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(1) Jacobs, 1992a.

TABLE 5.7.10

COMPARISON OF PROPOSED ACTION ANNUAL TRANSPORTATION EMISSIONS TO THE NO ACTION ALTERNATIVE[1]

ALTERNATIVE	ESTIMATED EMISSIONS (tons per year)				
	NO_X	CO	ROG	SO_2	PM_{10}
Proposed Action[2]	308	61	15	22	9
No Action Alternative[3]	317	239	57	20	53

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(1) Jacobs, 1992a.

(2) Based on a 3,000 tons per day transportation scenario. Proposed action emissions include City of Commerce MRF emissions and locomotive emissions occurring in the SDAB and in the South Coast Air Basin.

(3) No Action Alternative is based on using 9-ton capacity trucks to transport waste 100 miles (one way) to a hypothetical landfill located outside of the South Coast Air Basin.

- Permanent onsite roadways will be paved to minimize fugitive dust emissions.
- A miscellaneous crushed base will cover unpaved roadways to minimize fugitive dust emissions.
- Unpaved roadways will be sprayed regularly with water and chemical dust suppressants to minimize fugitive dust emissions.
- Chemical binding agents will be applied to cover stockpiles to minimize wind erosion emissions.
- Daily cover or an alternative daily cover as permitted by the LEA and RWQCB will be placed over the compacted in-place waste periodically during the day and over the working face at the end of each day to control odors.
- Heavy-duty diesel operational equipment, which meets or exceeds state and federal emission standards applicable at the time of equipment acquisition, will be used (based on equipment availability).
- Completed landfill cells will be revegetated to minimize wind erosion emissions.
- Construction sequence will be designed to minimize double handling of cover soils.
- Low-sulfur diesel fuel of 0.05 percent will be used to minimize SO_2 (PM_{10} precursor) emissions.
- High combustion efficiency/low-NO_x flare will be used to minimize O_3 precursor emissions.
- Ridesharing and van pool programs will be implemented where feasible.
- Investigate potential air emission reductions to offset increases in project-related nonattainment and precursor emissions from closure of high desert landfills, and control of emissions from other, as yet unidentified, air contaminant emission sources.
- ATSF has an annual replacement program for their system fleet of locomotives. Each year new locomotives are added to their fleet, replacing older locomotives. ATSF is proactive with the Association of American Railroads and locomotive manufacturers working with CARB to improve locomotive performance criteria. This proactive approach will be continued to ensure that, as new locomotives are purchased "best available technology" is used so that locomotive emissions are continuously reduced.

5.7.6 FEASIBILITY OF MITIGATION MEASURES

1. Emissions calculated for the proposed action in the AQIA are based on implementation of all mitigation measures listed in Section 5.7.5 with the exception of ridesharing and offsite non-project emission reductions. The emissions reductions from the remaining mitigation measures are summarized in Table 5.7.11.

2. With the exception of railway electrification, the mitigation measures are deemed to be feasible and not expected to result in significant adverse effect on the environment. However, even with the implementa-tion of the remaining mitigation measures, the proposed action is expected to have impacts on air quality that are considered significant, as the project vicinity is designated a nonattainment area for PM_{10} and O_3 through its precursors: NO_x and ROG.

3. Electrification of the ATSF rail line into the South Coast Air Basin is not economically feasible for the proposed action. ATSF is actively working with other southern California railroads through SCAG to evaluate the economic feasibility of electrification of a shared railway corridor in and out of the SCAQMD. Results of the evaluation are not known at this time.

5.7.7 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

1. As noted in Section 5.7.1.2.1, existing background levels of PM_{10} at the site currently exceed the state 24-hour and annual standards. Therefore, proposed action PM_{10} emissions would exacerbate existing 24-hour and annual standard exceedances. Implementation of the mitigation measures presented in Section 5.7.5 will decrease the relative magnitude of the air quality impacts, but, due to the fact that the project vicinity is already exceeding PM_{10} ambient air quality standards, impacts would continue to be considered significant, according to the significance criteria.

TABLE 5.7.11

EMISSION REDUCTIONS MITIGATION MEASURES[1][2]

MITIGATION MEASURES	EMISSIONS WITHOUT MITIGATION (tons per year)					REDUCTION DUE TO MITIGATION (tons per year)					EMISSIONS WITH MITIGATION (tons per year)				
	NO_x	CO	ROG	SO_2	PM_{10}	NO_x	CO	ROG	SO_2	PM_{10}	NO_x	CO	ROG	SO_2	PM_{10}
Waste transport by train[3]	2,219	1,673	399	140	371	63	1,246	294	(14)	308	2,156	427	105	154	63
Pave permanent onsite roadways[4]	0	0	0	0	94	0	0	0	0	66	0	0	0	0	29
Miscellaneous crushed base on unpaved roadways (5% silt versus 25% silt)	0	0	0	0	281	0	0	0	0	225	0	0	0	0	56
Unpaved road watering	0	0	0	0	1,115	0	0	0	0	1,059	0	0	0	0	56
Stockpile stabilization	0	0	0	0	193	0	0	0	0	184	0	0	0	0	10
Diesel fuel 0.05% sulfur (versus 0.5% standard)	0	0	0	152	0	0	0	0	137	0	0	0	0	15	0
Ridesharing and vanpooling (assume 25% participation)	1	13	1	0	0	0	3	0	0	0	1	9	1	0	0
TOTAL EMISSIONS CONTROLLED BY MITIGATION	2,220	1,686	400	292	2,054	63	1,249	294	123	1,841	2,157	436	106	169	213

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(1) Emissions reductions are applicable only to mitigation measures. See Tables 5.7.2 and 5.7.3 for net emissions from the proposed action after mitigation.
(2) Emission reductions are based on full operation of 21,000 tons of waste per day.
(3) See Table 5.7.10.
(4) Jacobs, 1992a.

2. Sections 5.7.1.2.1 and 5.7.1.2.6, indicate that estimated project construction and operations emissions of NO_X, ROG, and PM_{10} exceed the significance threshold levels. Also, as noted in Section 5.7.1.2.6, the proposed action may not be consistent with the County's 1991 AQAP. Mitigation measures specified in Section 5.7.5 may be successful in reducing these impacts below the applicable significance levels. However, pending further evaluation of the effectiveness of these mitigation measures by County Planning Department with SBCAPCD participation as part of the EIR/EIS process, impacts are considered to be significant and will not be reduced below a level of significance even with implementation of all feasible mitigation measures.

3. As the above impacts cannot be mitigated to below a level of significance, these impacts are considered to be significant and unavoidably adverse. For purposes of the EIR, a statement of overriding considerations will be required for the significant unavoidable adverse impacts in accordance with CEQA Guidelines. While NEPA does not have a similar requirement, this information will be useful to the decision makers as they prepare the Record of Decision for the EIS.

5.8 PUBLIC HEALTH AND SAFETY

1. This section addresses health and safety issues associated with the proposed action regarding operation of the landfill and rail transportation of solid waste to the landfill. Impacts would be considered significant if:

   - Current regulations and project design, construction, and operational components are not sufficient to prevent significant hazards or nuisance to the public, community, environment and/or property.

2. The public scoping process identified a potential health and safety concern regarding the transport, storage and inadvertent disposal of hazardous materials/wastes as a constituent of solid waste.

3. Consideration of potential impacts associated with the following specific environmental issues are provided in detail under the sections indicated and are not addressed here.

   - Section 5.4, Surface Hydrology and Ground Water
   - Section 5.7, Air Quality
   - Section 5.12, Transportation
   - Section 5.13, Noise

5.8.1 BOLO STATION SITE

5.8.1.1 Landfill Operations

1. Various issues associated with landfill operation could potentially result in environmental health and safety impacts. These issues are addressed in the following sections.

5.8.1.1.1 Surface Fire

1. A surface fire at the landfill could result in health and safety concerns for landfill workers, visitors, and the public residing in or passing by the vicinity of the proposed Bolo Station Landfill. Hazards could result from fires that originate in the vicinity and move onto the landfill, or from fires originating on the landfill.

2. The potential impacts of a surface fire could include:

   - Burn injuries and smoke exposure to persons at the site.
   - Loss of life.
   - Release of toxic emissions from burning material.
   - Structural and machinery damage.

3. There is little potential for a fire to originate in the vicinity and move onto the landfill. The area surrounding the landfill is rural, and relatively barren and non-combustible. Fires originating from landfill support facilities located adjacent to the north side of the landfill would not likely spread to the working face due to the lack of combustible material between the facilities and the landfill.

4. Many surface fires that have historically occurred at landfills have resulted from a "hot load." A hot load originates during municipal pickup and is a waste hauling vehicle which contains hot or smoldering materials which can ignite when exposed to air. Hot loads would be a rare occurrence at the proposed landfill. Nearly all of the waste transported to the proposed landfill will originate from MRFs. The inspection and sorting process at the MRFs will eliminate the likelihood of a hot load reaching the landfill. A hot load could occur at the public drop-off facility; however, this is a very small volume of the total waste to be landfilled. Inspection at the public drop-off facility and landfill working face would preclude the occurrence of a hot load resulting in a significant surface fire. In the event a small hot load is encountered, it would be spread and extinguished by the operator with water and/or soil.

5. Fires that could occur at the active working face would likely be small and of short duration, as there is limited available combustible material at the surface of the landfill. Daily cover and compaction practices are designed so that potentially combustible subsurface material is without a sufficient supply of oxygen to either initiate or maintain a burn.

6. Surface fires or fires involving storage of hazardous materials or hazardous wastes are of concern as depending on the nature of the material, they could release toxic materials and/or result in explosions. Support facilities to be sited at Bolo Station include a diesel fuel tank, 2,000 gallon waste oil and a temporary storage area for hazardous waste. Each of these facilities will be designed and located in accordance with the Uniform Fire Code and County Fire Building Codes to provide proper buffer from potential ignition sources including sparks from vehicles and machinery.

7. A 600,000-gallon aboveground capacity tank will be constructed at the site to store water for onsite use, including fire protection. This tank will maintain 360,000 gallons on reserve for potential firefighting purposes. This reserve volume is twice the 180,000 gallon reserve required by the County Fire Marshal. The proposed action also provides for fire support personnel, equipment, and facilities to be located at or near the Bolo Station site. This provision is a cooperative agreement and would be further coordinated with the County Fire Marshall as project design and planning matures. Additionally, landfill water trucks and earthmoving equipment would be available onsite to augment the fire response personnel and equipment.

8. Based on design and siting requirements incorporated into the proposed action and the rural area chosen for the landfill, the potential for the occurrence and spread of surface fires is low. In addition, the project includes provision for nearby trained fire support personnel, equipment, and facilities in coordination with the County Fire Marshall. Significant impacts from surface fires are therefore not expected.

9. Based on proper siting of facilities and fire response procedures which include evacuating the immediate area downwind of a fire and the rural location of the landfill, significant impacts are not expected from potential toxic emissions as a result of a potential fire at the landfill or hazardous materials/waste facilities.

5.8.1.1.2 Subsurface Fire

1. In addition to surface fires originating either at the landfill or in the vicinity of the landfill and moving onto the site, landfills also have potential hazards associated with subsurface fires that ignite in the covered waste. Subsurface fires at landfills are dependent on the following:

   - Composition of the waste.
   - Moisture content.
   - Subsurface oxygen levels.
   - Soil and air pressure.
   - Insulating capabilities of the cover material.
   - Operation of the landfill gas collection system.

2. In the event a subsurface fire were to occur, open flames at the landfill are not likely to occur. However, subsurface fires could have the following potential impacts:

   - Accelerated or potentially sudden settling of the landfill surface in the vicinity of the fire. This settling could impact the landfill gas/leachate collection system and cause cracks or fissures in the cover material. The damage to these systems could result in percolation of rainwater into the waste or render the landfill gas/leachate collection system inoperative.
   - Venting of smoke or combustion by-products through the cover material. These by-products could include particulates, unburned hydrocarbons, CO, and various volatile and/or toxic compounds.

3. Subsurface landfill fires may be triggered by one or a combination of the following:

   - Burial of a hot load with other waste materials, which could act as an ignition source.
   - Uncontrolled or improper operation of the landfill gas collection system. Most collection systems remove landfill gas from the waste by creating a negative pressure (i.e., a vacuum) in the collection system. Overpumping, or creating too high of a vacuum in the system, can pull atmospheric oxygen through the cover material and into the covered waste. In addition, landfill settling may result in broken or separated collection laterals, which could permit atmospheric oxygen to be pulled into the covered waste by the collection system.
   - Inadvertent burial of chemical wastes which may increase the heat in the covered waste and increase the potential for spontaneous ignition of the waste in the presence of adequate oxygen.

4. Application of daily and intermediate cover materials is one of the primary methods required by CCR Titles 14 and 23 to prevent subsurface fires in covered waste, control such fires and prevent them from spreading throughout the landfilled waste. Cover material, in addition to controlling landfill odor, litter, and percolation of rainwater, also is intended to remove the source of oxygen from the covered waste. However, the very nature of the use of various cover materials in

conjunction with the insulating characteristics of the landfill waste results in the retention of heat generated by the anaerobic (i.e., without oxygen) decomposition of waste.

5. Anaerobic decomposition of waste continues to generate heat as chemical oxidation of the waste accelerates. The chemical oxidation process is enhanced by the increasing amount of heat trapped in the covered waste. At some point, the chemical oxidation overtakes the biological degradation process and destroys the anaerobic bacteria. Spontaneous ignition of the decomposing waste may occur when the chemical oxidation process generates sufficient heat to ignite the waste, if an adequate source of oxygen is present at the point the ignition temperature is reached. Therefore, the introduction of atmospheric oxygen into covered waste could result in spontaneous combustion and subsurface fires.

6. Subsurface fires may occur in the event of improper design of a landfill, lack of controls regarding the types of incoming waste, or incorrect design and/or operation of the landfill gas collection system. As a result of subsurface fires at older landfills where one or more of these conditions existed, CCR Title 14 includes various measures to prevent the above conditions. Due to the design features required for new landfills, such as Bolo Station, and the operations requirements of the various landfill permits, subsurface fires have become rare or nonexistent at new landfills. Significant design inspection, operation, and monitoring features include:

   - Compaction of wastes and minimizing the height of lifts from 15 to 20 feet thick with soil cover between lifts reduces the likelihood of oxygen reaching other than the active working face. This method of construction also controls the spread of subsurface fires to adjacent cells or lifts.
   - The gas collection system will incorporate design operation and monitoring requirements to limit lateral migration of gas and to prevent the introduction of oxygen into the covered waste. Additionally, the system would be designed so that individual portions of the collection system could be isolated in the event of a fire. This prevents the collection system from becoming a conduit for spreading subsurface fires. Also, should a component of the system be damaged from a fire, repairs can be affected without shutting down the remainder of the system.
   - Hot loads as previously discussed under surface fires are not likely to occur. Sources for hot loads would be the public drop-off area. Inspection and immediate extinguishing should a hot load occur would preclude inadvertent burial.
   - Inadvertent burning of chemical waste is not likely to occur in a sufficient volume to result in a subsurface fire. Procedures to preclude such wastes through screening at both a MRF and at the landfill are discussed in more detail in Section 5.8.1.1.4.

7. While it is not possible to entirely eliminate the risk of subsurface fires, the design and operating requirements incorporated as part of the proposed action and various regulatory requirements are expected to significantly reduce the potential for subsurface fires to occur. As with surface fires, impact from potential toxic emissions are not expected due to fire fighting response procedures, which include evacuating the immediate area downwind of a fire and the rural location of the landfill.

5.8.1.1.3 Landfill Gas Hazards

1. Landfill gas is produced during the anaerobic (i.e., without oxygen) decomposition of organic waste materials. The volume of landfill gas generated is a function of the total volume of the waste landfilled at a disposal site. While the constituents of landfill gas are dependent on the waste composition and the length of time the waste has been landfilled, landfill gas typically consists of:

   - 25 to 60 percent methane.
   - 40 to 75 percent carbon dioxide.
   - Trace amounts (i.e., less than 1 percent) of various toxic constituents.

2. Methane is approximately half as dense as natural soil air. Therefore, methane in landfill gas tends to migrate upwards through the landfill cover or, if the landfill cover is sealed, it tends to migrate laterally to the edges of the landfill where it again migrates upwards through more permeable soil. CO_2, on the other hand, is heavier than normal soil air and subsequently migrates down through the landfill and possibly through and into the underlying formations. If ground water is

encountered by the migrating CO_2, the ground water would become more acidic due to the presence of carbonic acid generated during such contact. The increased acidity would increase the ground water solubility of minerals and result in increased hardness of the water.

3. Landfill gas can represent a significant health and safety hazard. Issues associated with landfill gas and its potential impact on ground water and air quality are discussed separately in Sections 5.4 and 5.7, respectively. These discussions include trace amounts, normally less than 1 percent, of other gases such as propane, butane, ethane, chlorinated hydrocarbons and other ROGs which are present in addition to methane and CO_2. The discussion in this section focuses on the potential for methane to result in fumes or explosions in nearby structures.

4. Accumulation of landfill gas inside structures has the potential to be explosive when concentrations of the methane component are in the range of 5 to 15 percent by volume. If an ignition source is present, such as a spark from a standard light switch, methane may ignite and an explosion occur. Serious personal injury and structural damage could result.

5. The design and construction of facilities at Bolo Station will contain various features to ensure that landfill gas does not pose a health or safety problem onsite. These features include:

   - The landfill composite liner system that will prevent lateral and downward migration of landfill gas.
   - An active landfill gas extraction and treatment system that will withdraw gas as it is generated.
   - A monitoring system to be installed under the composite landfill liner that will be monitored continuously for landfill gas and leachate in the event the liner system fails.
   - Perimeter landfill gas monitoring wells to verify that gas migration is not occurring.

6. The above features are designed to ensure that landfill gas will not migrate into any structures onsite. Given proper design, installation, and operation of these features, significant impacts from landfill gas hazards are not expected for the proposed action.

5.8.1.1.4 Hazardous Wastes

1. Hazardous wastes and other special wastes, as defined by CCR Title 22, will not be accepted at Bolo Station. Commercial wastes such as radioactive wastes, infectious wastes, asbestos and municipal sewage, also will not be accepted at the landfill. However, small quantities of hazardous wastes may inadvertently enter the waste stream. Hazardous wastes, including household hazardous wastes, typically represent less than 0.5 to 1.0 percent (i.e., 15 to 30 tons per day at the proposed maximum daily rate of 21,000 tons of waste to be landfilled at Bolo Station) of the total municipal waste stream. To prevent, to the maximum extent practicable, the introduction of hazardous wastes and other unacceptable waste into the Bolo Station Landfill, routine load checking programs will be employed at MRFs proposed by WMNA and at the landfill to reduce the quantity of hazardous wastes. The inspection program, which is also a requirement of 40 CFR Part 258.20, includes inspection of each incoming load to the MRFs, and inspection of each load at the landfill active working face. In addition, personnel will be trained to identify suspicious loads. Procedures to document the occurrence of hazardous wastes, and a program to educate the public will also be in place. Monitoring for radioactive wastes will be conducted at the MRFs; if these wastes are detected, an alarm would sound, the load would be directed to a specific holding area, and the Fire Department Hazardous Materials Team would be notified.

2. Many existing and older landfills do not have the advantage of the primary screening conducted at MRFs. This additional screening is expected to significantly reduce the inadvertent introduction of hazardous waste at the landfill. Because of this, the proposed landfill will not accept waste from other than WMNA operated MRFs unless an equivalent checking program at the MRF is in place.

3. Hazardous materials, that may be inadvertently present in the waste stream, have the potential to impact ground water (through leachate production) and air quality (through landfill gas emissions and dust). These issues are discussed in Sections 5.4 and 5.7, respectively. The small percentage (i.e., less than the 0.5 to 1 percent typically expected due to primary screening conducted at MRFs) of hazardous waste that would potentially be included in the waste stream is not expected to

create a significant health risk from the release of toxic gases or leachates based on the following:

- Hazardous and special wastes are restricted from the waste stream.
- A load checking program is required at the MRFs to identify suspected hazardous or special waste which may inadvertently be introduced and to prevent, to the maximum extent practical, the landfilling of such waste at Bolo Station.
- Inspection of incoming waste at Bolo Station would be performed at the public drop-off facility and at the landfill working face.

5.8.1.1.5 Nuisance Vectors, Litter, and Odors

1. Various nuisances including vectors, litter, and odors could result from the improper operation of the landfill. Noise related concerns are addressed in Section 5.13. The visual impact of the landfill during its operation and at closure is addressed in Section 5.9.

2. CCR Titles 14 and 23, and 40 CFR, Part 258 Subtitle D require daily and immediate cover of waste and other measures to minimize impacts from vectors, litter and odor.

3. Potential litter sources associated with the operation of landfills include:

   - Waste blown from or dropped by waste transfer vehicles in route to the landfill or at the landfill prior to reaching the active working face.
   - Waste blown or scattered from the active working face by wind or by the movement of waste transfer vehicles and landfill equipment.

4. Rail haul of waste from MRFs to the offloading facility, or from the offloading facility to the landfill, will be in enclosed steel containers and would not be a source of litter along routes to the landfill, on the landfill access road, or at the landfill itself. Private vehicles (e.g., pickup trucks and trailers) used to transport waste to the landfill public drop-off facility by the public may not be covered resulting in litter along access routes within this local area, even though it is a legal requirement to cover waste transported on public roads and highways.

5. During windy conditions, waste can be blown from the active working face and onto adjacent property, or waste can be scattered by landfill equipment working at the active face.

6. A litter control team would be in place at the landfill on a full time basis to monitor surrounding areas including roads at the landfill and the public drop-off area. A perimeter security and litter fence will be constructed around the landfill area, a 6-foot high chain link fence around the active cell, and portable litter fences employed at the working face. In addition, the size of the working face will be controlled by the regular use of soil or synthetic cover. The working face would not be left unexposed overnight and would be further restricted during high winds.

7. Based on the above components incorporated into the proposed action, litter is not expected to be a significant nuisance.

8. Landfills have the potential for providing food, cover, and breeding grounds for disease vectors. In this context, a vector is defined as an organism that could transmit diseases from one host to another. Vectors of concern at landfills include certain insects (e.g., flies and mosquitoes) and small rodents (rats and mice). To control vectors at landfills, specific techniques will be in force at the landfill and are required by CCR Title 14. These techniques include compaction of waste at the working face, the application of daily cover and regular inspection as follows:

   - The working face of the landfill will be covered periodically during the day with a minimum 6-inch thick soil layer or an equivalent alternative cover. When additional waste materials will not be placed over the surface within one month, the top and side slopes of the advancing lift receive additional cover to provide a minimum 12-inch thick intermediate soil cover.
   - Personnel will frequently inspect the site for signs of vector activity. If such activity is observed, a vector eradication program will be implemented, using a professional pest controller, if necessary.

9. Small rodents, as well as rabbit, fox and coyote, have in the past been a problem source for unattended desert landfills. The animals dig up soil cover, particularly at night, allowing smaller

rodents and birds (i.e., ravens) to the landfill. The Bolo Station Landfill will be attended on 24-hour, 7-day a week basis and would preclude the problems typical of the unattended landfills.

10. Ravens are of special concern not only as a vector but also as a predator of the desert tortoise. The measures to be undertaken to control other vectors and litter would reduce the occurrence of ravens and other birds. Devices such as overhead nylon line may be used. Compacting waste at the active working face, periodic application of cover material and keeping the working face as small as safely possible are expected to be effective at reducing the presence of the ravens and other birds. The proposed action will conduct regional raven baseline monitoring in conjunction with the BLM and USFWS to determine effectiveness of programs by monitoring the short and long term changes in the raven population.

11. Sources of odor from the landfill include the active working face, landfill gas collection, recovery facilities and uncollected landfill gas. Daily cover would be applied to keep the working face as small as possible, in addition cover would be applied on top of particularly odorous waste. These measures would reduce odors at the landfill face. Odors from the landfill gas collection, recovery system and from uncollected landfill gas is a function of the operation, maintenance and efficiency of the gas collection system.

12. Odors from transport of waste from MRFs to the landfill are not expected to be significant. The containers used to transport the waste are closed rather than open and doors on the containers are sealed. In addition, the containers would be cleaned on a routine basis, as needed, but no less than once each six months.

5.8.1.2 Railroad Operations

1. Existing rail lines and their operation are regulated by the U.S. Department of Transportation, Federal Railroad Administration, Interstate Commerce Commission and the PUC. The rail lines to be used to support the proposed action are operated based on ATSF rules and regulations which meet or exceed existing regulations to provide safe operating conditions. These rules and regulations govern train operations, equipment repair and maintenance, and track repair and maintenance. The rules also include provisions for employee safety and prescribe safe working practices. In addition, ATSF has an employee right-to-know program and an accident/illness prevention program.

2. Train operations are run on signals and much of the track is operated by a Centralized Traffic Control in which train movements are controlled by a central dispatcher. In addition, each train is in radio communication with other trains as well as the dispatcher.

3. Tracks and track structures are inspected for defects at a minimum of twice a week. Records of these inspections are maintained and indicate the nature of identified defects as well as when the defects are corrected. In addition, these tracks are inspected by Federal Railroad Administration inspectors. Equipment is also subject to frequent inspection by the railway and Federal Railroad Administration. Inspections include locomotive and freight car running gear, air lines and journal (axle) bearings. For the proposed action, these inspections would normally be accomplished at ATSF's Barstow yard.

4. Accidents and track defects, should they occur, are reported to the ATSF dispatcher located in San Bernardino. The dispatcher controls the movement of successive trains in accordance with the severity and nature of the accident or defect. In addition, the train dispatcher maintains a list of supervisors, repair crews, and equipment available on 7-day, 24-hour basis for responding to such calls. Accidents involving injuries, vehicles, and private public property are reported and appropriate response coordinated with local agencies.

5. Solid waste would be transported in enclosed steel containers and would be cleaned at Bolo Station. Doors on the containers are equipped with a seal to prevent blowing trash, odors and significant drips from liquids which may be in the waste. These measures will control vectors, litter, and odor during rail transport.

6. Based on the above procedures, potential impacts associated with railroad transport of solid waste are not expected.

5.8.1.3 Spill Prevention and Waste Management

1. The proposed landfill facility includes provisions for storage of diesel fuel in an aboveground tank.

The tank will be constructed on a concrete pad within a concrete containment structure sized to contain the entire stored volume of diesel fuel in the event of a spill or tank rupture. Fuel will be supplied by railroad tank car or tank truck. Fueling of landfill equipment would occur at various locations within the boundary of the landfill. Fueling at the offloading facility and railyard would occur for mobile cranes and hostler trucks. Locomotive fueling would occur at existing ATSF facilities at Barstow or other locations, and is not required at Bolo Station.

2. A potential spill during fuel transfer from railway tank cars or tank trucks to the storage tank, or equipment fueling at the landfill and offloading facility has the potential to affect employees and the environment. These effects are normally cumulative over several years of operation. Potential impact due to overtopping of tanks during fill operations, leaks or rupture of the aboveground fuel storage tank are not expected based on construction design that includes impermeable containment for the storage tank and rail car or tank truck transfer point.

3. The proposed action includes storage of various lubricating oils, hydraulic fluids, waste oils for recycling, and temporary storage for household hazardous wastes inadvertently transported to the landfill. Potential impacts could arise during handling, storage and use of these products, and during the handling and storage of these wastes.

5.8.1.4 Employee Programs

1. WMNA has operating plans and procedures concerning its injury and illness prevention program for operating landfills (WMNA, 1991b). The programs are consistent with Cal-OSHA guidelines contained in CCR Title 8. Similar plans and procedures will be prepared for Bolo Station. WMNA will also prepare employee right to know programs (29 CFR 1910.1200). These programs pertain to hazardous materials and include employee awareness training, proper identification and handling of hazardous materials, and response and reporting of spills. WMNA has a record keeping system in accordance with the requirements of the above programs.

2. On the basis of the above programs, significant safety impacts are not expected.

5.8.1.5 Community Right-To-Know

1. The proposed action is located in a rural portion of the County. Adjacent communities are not presently located within six miles of the proposed landfill. Release of toxic emissions from fires or spills, while not likely, will be addressed in community right-to-know awareness programs as required under CERCLA Title III, and California Health and Safety Code, Chapter 6.95. These programs include proper employee notification of the hazards of various materials as required by Proposition 65.

2. Potential impacts to the communities adjacent to the landfill, based on use or handling of hazardous materials/wastes or release of toxic materials, would not be expected based on location, design and construction, operating procedures, and required regulatory compliance programs.

5.8.2 CADIZ VALLEY ALTERNATIVE SITE

1. Public health and safety impacts for the Cadiz Valley Alternative are expected to be the same as those identified for the proposed action.

5.8.3 REDUCED ACTION ALTERNATIVE

1. Public health and safety impacts identified for the Reduced Action Alternative are expected to be the same as identified for the proposed action.

5.8.4 NO ACTION ALTERNATIVE

1. Implementation of this alternative would mean the proposed action would not be developed. Bolo Station would remain in its present state and the potential for public health and safety impacts associated with the operation of a waste-by-rail system and the Bolo Station Landfill would not occur. However, the transport of solid waste to existing or new landfills at other locations, and the operation of existing or new landfills at other locations, have the potential for similar impacts as those identified for the proposed action.

5.8.5 MITIGATION MEASURES

1. The following mitigation measures will be applied to the proposed action to reduce impacts to below a level of significance:

   - Compliance with the requirements of 40 CFR 112, and the California Health and Safety Code Chapter 6.67 of Division 20,

including preparation and implementation of an SPCC Plan, as well as design, construction, and operation of facilities in accordance with the Oil Pollution Act of 1990, National Fire Protection Association guidelines, and Uniform Fire Code, will be implemented during design, construction and operation of the proposed action. This will reduce potential impacts to an insignificant level.

- A temporary hazardous waste storage area will be sited, designed, and constructed at Bolo Station pursuant to CCR Title 22.

  - Hazardous material/waste exposure or disposal, nuisance and vectors, litter and odor, and public exposure are addressed by requirements of 40 CFR, Part 258, Subtitle D, and those of CCR Titles 14 and 23. Compliance with these requirements during design, construction and operation including preparation of operating guidelines will reduce potential impacts to an insignificant level. Requirements include necessary employee training, monitoring and record keeping.

- Rail•Cycle will provide controls including, at a minimum, daily cover requirements to minimize nuisance, vectors, litter, and odors. Controls include, but are not limited to, litter and security fencing, litter policing and inspection, and response to vector problems.

- Procedures for screening local inbound waste to Bolo Station, and training for operators at the MRFs, public drop-off facility and landfill working face, will be implemented by the operator to preclude landfill disposal of hazardous wastes, and to minimize accidental exposure to workers and other persons.

- Rail•Cycle will follow procedures contained in 40 CFR, Part 258, Subtitle D, and CCR Titles 14 and 23. Compliance with these design, construction and operational procedures will provide prevention of and response in the event of potential fires and explosions.

- Rail•Cycle will provide facilities for fire, paramedic and sheriff in coordination with the County Fire Warden including trained response personnel, equipment and facilities including reserve water supply for fire fighting.

- Rail•Cycle, in cooperation with the County Fire Warden, will develop a response plan and procedures for fire response and hazardous material response including appropriate procedures for the evacuation of employees and the public, downwind of surface or subsurface fires, or hazardous material incidents, if necessary.

- Preparation of a site-specific community and employee right-to-know programs in accordance with state and federal requirements, California Health and Safety Code, Chapter 6.95 and CERCLA Title III, and Proposition 65. These programs will reduce potential public, worker and community impacts to an insignificant level.

- Diesel fuel unloading from railway tank cars and/or tank trucks and fuel storage can result in cumulative effects over time from operational spills and drips. Design features will be implemented by Rail•Cycle to minimize operational spills and drips, and to collect spills and drips that occur for recovery and recycling proper containment will also be provided. Rail•Cycle will install fuel loading and unloading equipment which operate from the top of tank cars and onsite storage tanks to prevent spills from bottom valves, and installation of track collection pans to contain smaller spills and leaks. Tanks will be equipped with overtopping prevention controls.

- SPCC plans should include prevention and response for small spills and leaks that can occur during mobile equipment fueling.

- Areas or locations for storage of various lubricating oils, hydraulic fluids and waste oils for recycling will be designed and operated in accordance with an SPCC Plan including proper containment, and overtopping controls. Areas will be properly signed, fenced, and constructed on a concrete pad with proper containment.

- MRFs (including potential transfer stations) will provide primary inspection screen for hazardous and other special wastes. This screening greatly minimizes potential for inadvertent exposure during transport and landfill operations. The Bolo Station landfill facility will have operational criteria restricting receipt of wastes from facilities that do not provide prescreening for hazardous wastes.

5.8.6 FEASIBILITY OF MITIGATION MEASURES

1. Mitigation measures identified are regulatory requirements or considered to be a recognized industry standard (i.e., design/construction guidelines) and are expected to be capable of reducing impacts to below a level of significance. No impacts are expected from implementation of the mitigation measures.

5.8.7 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

1. No significant unavoidable adverse impacts are identified for the proposed action or alternatives.

5.9 VISUAL RESOURCES

1. The environmental consequences of the proposed action to visual resources are based on the Open Space Element of the County's General Plan and BLM's VRM system for visual resources. This section addresses the changes that would occur to the scenic quality of northern Bristol and Cadiz basins and provides an analysis of impacts utilizing visual simulations of the proposed action at the Bolo Station and Cadiz Valley Alternatives sites. Mitigation measures to reduce visual impacts are also provided in this section.

2. The following impacts to visual resources would be considered significant if they were to occur:

   - If, during operations or after reclamation, the visual quality of the site fails to meet the standards of the Open Space Element of the County General Plan or the General Plan's Visual Quality policies.
   - If, during operations or after reclamation, the visual quality of the Bolo Station site or the Cadiz Valley Alternative site failed to meet VRM Class IV or Class III standards, respectively, which is the existing rating systems of the site vicinities as established by the Needles Resource Area required by the CDCA Plan.(1)

5.9.1 BOLO STATION SITE

1. This section evaluates the changes that would occur to the scenic quality of northern Bristol Basin as a result of the proposed action. The scenic quality of the region is managed in accordance with the criteria set forth in the Open Space Element of the County General Plan and by the BLM through its VRM system. Bolo Station is located within a BLM-designated Class IV VRM area, for which the criteria state: "Contrasts can attract attention and form dominant landscape features in terms of scale, but they should repeat the form line, color, and texture of the characteristic landscape" (BLM, 1980b).

2. The Open Space Element of the County General Plan has as its goal the presentation of open space areas and vistas to ensure a high quality of life in the County. As such, five types of open space have been identified by the County, including open space for scenic resources.

3. The Open Space Element also establishes various criteria for defining areas of scenic value. The major criteria that applies to the Bolo Station site is based on the site providing views of major mountain ranges and undisturbed natural areas. During the 60 to 100 year operational life of the proposed landfill, the visual qualities of the site allowing it to meet these two criteria will be implemented.

4. The proposed action would affect the visual character of Bolo Station by changing its nature from passive to active during the operations phase and by long-term changes to the site's topography, surface material, and vegetation cover. In addition, the anticipated increase in population related to project construction and operations could result in an increase in human use and settlement of the project area, with accompanying visual impacts related to residential development and other human use of the area.

5. Views of the Bolo Station site are confined to locations within Bristol and Cadiz basins and from Amboy Road as it leads northward from the summit of Sheephole Pass located approximately 20 miles south of the site. To assess potential impact, the proposed action at Bolo Station is evaluated relative to its visibility from areas in the Bristol Basin and Cadiz Valley and the surrounding elevated areas.

6. Portions of each of the project facilities would be visible from public roads in the vicinity of Bolo Station. The degree to which the proposed action would be visible would be related to the ultimate project configuration and the specific location of the observer in relation to elevation and intervening vegetation and topography. The scale of the landfill would significantly alter the visual environment when viewed from onsite locations. However, from offsite locations such as area roadways, the visual scale of project would be attenuated by distance. Also, some potential visual impacts would be moderated by location of project facilities, design factors such as contour grading, and revegetation.

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(1) Note: Although the Needles Resource Area maps delineate VRM classes, only EMNSA received approval of its classification. Other classifications have not been officially approved.

7. The proposed landfill operations include the installation of lights for 24-hour per day operations at the railyard and offloading facility, portable lights at the active working face, and area lighting at the operation and maintenance center. While there are other limited light sources in the area (i.e., Leslie Salt's operation at Saltus and the communities of Amboy, Cadiz, and Chambless), the proposed landfill would represent a major new light and glare source in this rural area of the Mojave Desert.

5.9.1.1 Photographic Simulations

1. To assess the potential visual impact of the proposed action at Bolo Station during operations and at completion, visual simulations were prepared. Site photographs were taken from nearby roadways and used to prepare scaled photo-simulations, based on the planned locations and elevations of the proposed landfill. Two photo locations were chosen to represent a typical north-to-south view and east-to-west view as available from traveled roads in the site vicinity. The locations from which the photographs were taken are shown in Figure 5.9.1.

2. The site photographs and simulations are presented in Figures 5.9.2 and 5.9.3. Each figure shows three views:

   - Existing view.
   - Expected view at 50 percent completion of the landfill.
   - Expected view at full build-out after closure and revegetation.

3. Photographs are scaled to depict what the viewer would see with the unaided eye. The visual renderings depict the extent that closure procedures result in the reduction of visual contrast based on the area's soil color, anticipated final grading design, and revegetation program. Specific changes anticipated for the visual environment are described for each photo location. It should be noted that closure and revegetation procedures would be accomplished in conjunction with project operation so that, over the life of the landfill, cells would be reclaimed as they are completed.

5.9.1.1.1 Photo Location at Route 66

1. The view in Figure 5.9.2 looks southward from Route 66 to the landfill facility, a distance of approximately two miles. The existing visual environment shows Bolo Hill in the foreground and the low-lying Sheephole Mountains in the background.

2. At 50 percent completion, Bolo Hill would partially shield the developing landfill, visible in the middle-ground. The landfill, in turn, would partially block the view of the more distant Sheephole Mountains. The slope of the landfill would rise toward the east and is expected to be similar to other topographic variation in the area.

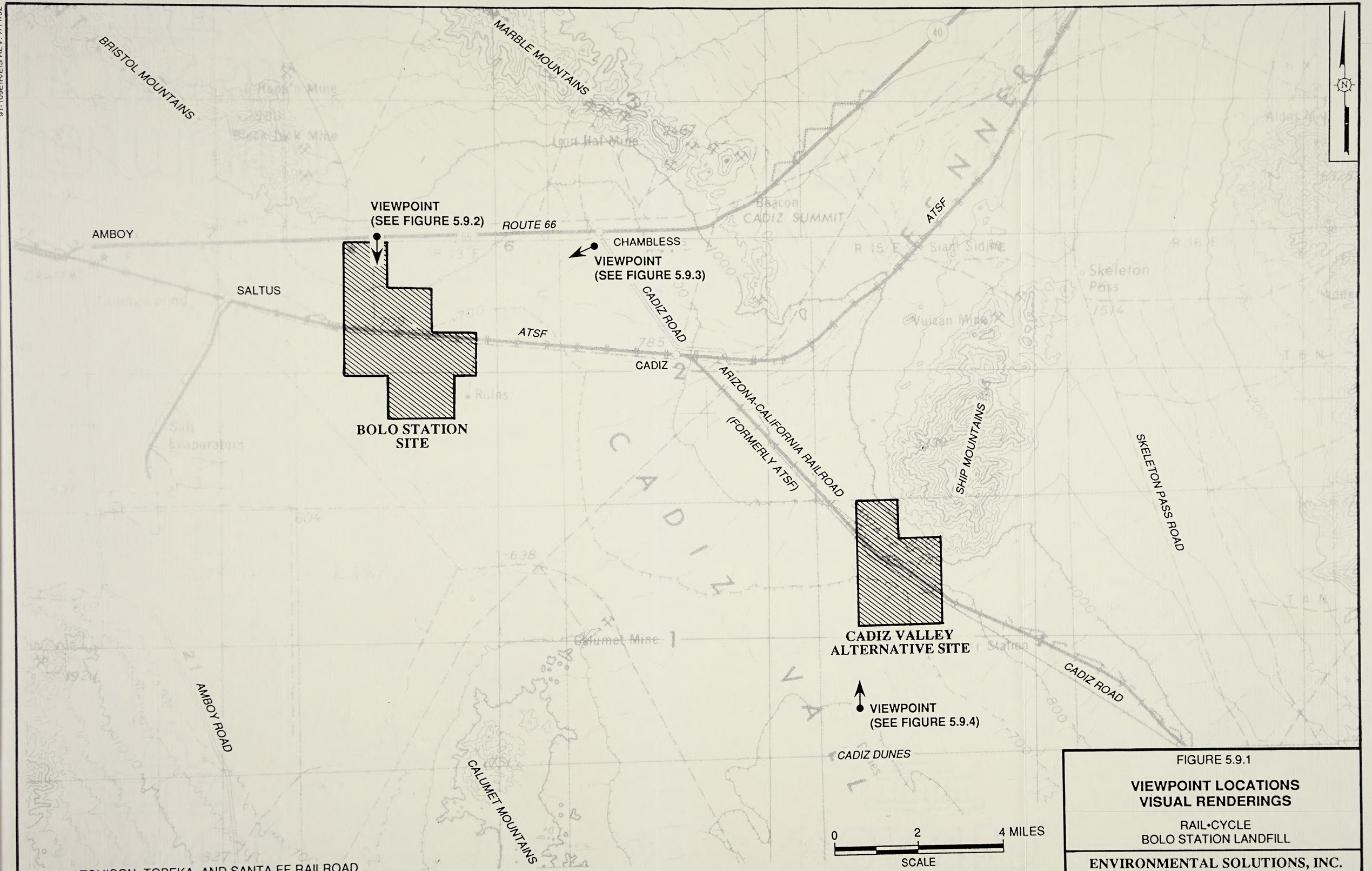
3. At project completion (60 to 100 years in the future), the landfill would be visible in the middle-ground and partially obstruct views of the Sheephole Mountains. However, the predominant long, low line of the completed project would repeat the general form and line of the more distant mountains, providing visual consistency to the view. The lighter coloration of the landfill compared to the surrounding landforms would be expected to become darker over time as revegetation proceeds, further reducing the visual impact. Revegetation in accordance with the landfill closure plan would reduce the color contrast and provide texture to the landfill.

5.9.1.1.2 Photo Location at Cadiz Road

1. The view in Figure 5.9.3 looks west from Cadiz Road, just south of Chambless and approximately six miles east of the Bolo Station site. As shown in the photograph, the existing environment is one of a flat desert floor with low-lying mountains to the north and west.

2. From this view, the landfill at 50 percent completion would have the appearance of another low-lying range of hills. From this location, the partially complete landfill would block some of the distant view of the Bullion Mountains.

3. At project completion, the landfill would partially block the distant view of the Bullion Mountains. Contrast with the surrounding environment would be reduced by contouring and revegetation. The profile of the completed landfill is expected to be similar to that of the distant Bullion Mountains. The landfill would form a shallow, elongated ridge with a variable surface that is expected to be similar to other elevated features in the surrounding area.



ATSF - ATCHISON, TOPEKA, AND SANTA FE RAILROAD

REFERENCE: USGS 1:250,000 SCALE MAP OF NEEDLES, CALIFORNIA DATED 1969.

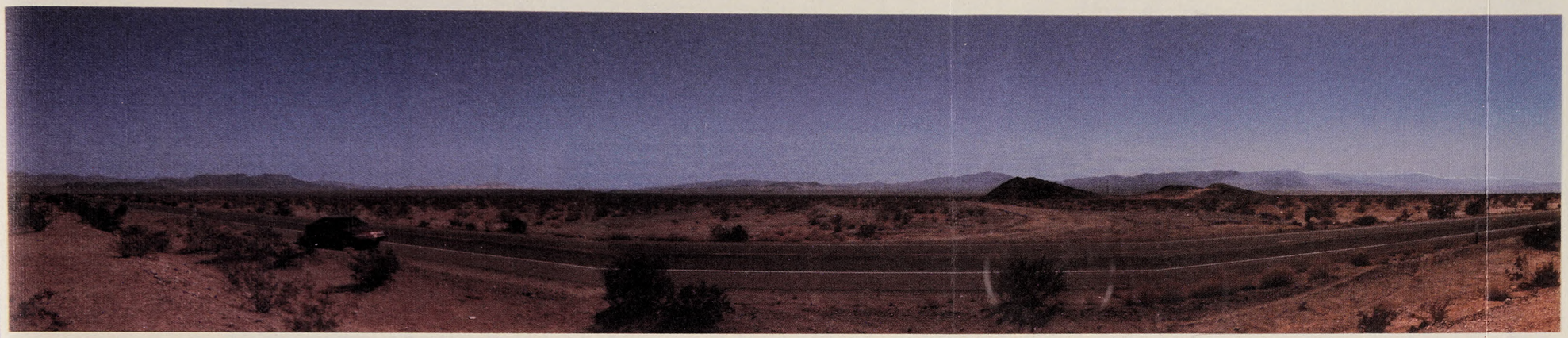
FIGURE 5.9.1

VIEWPOINT LOCATIONS
VISUAL RENDERINGS

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

91-109 EIRVSIS REV. 3/30/92

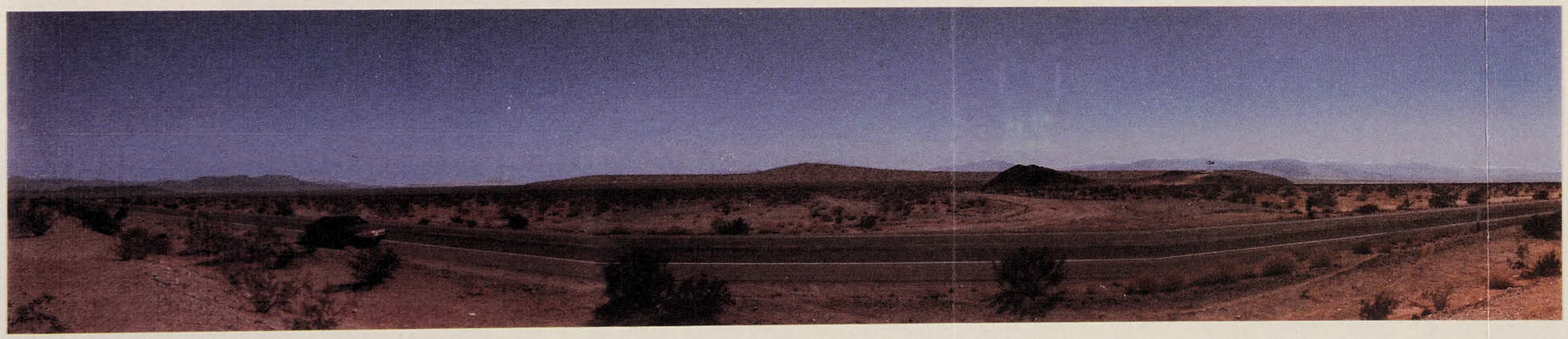


CURRENT VIEW:

EXISTING VIEW FROM ROUTE 66 AT BOLO OUTCROP APPROXIMATELY TWO MILES NORTH OF THE BOLO STATION LANDFILL SITE.

MID-POINT VIEW

EXPECTED VISUAL APPEARANCE OF BOLO STATION LANDFILL AT THE POINT THAT APPROXIMATELY HALF THE LANDFILL FOOTPRINT HAS RECEIVED ITS CAPACITY OF WASTE AND HAS BEEN CLOSED. THIS DEPICTS A VIEW THAT MAY BE OBTAINED IN 20 TO 30 YEARS.



FINAL GRADE:

EXPECTED VISUAL APPEARANCE AFTER BOLO STATION LANDFILL HAS REACHED ITS FINAL CAPACITY AND HAS BEEN COMPLETELY CLOSED. THIS DEPICTS A VIEW THAT MAY BE OBTAINED IN APPROXIMATELY 60 YEARS.

NOTES:

1. THIS IS AN ENHANCEMENT OF A SERIES OF THREE PHOTOGRAPHS TAKEN WITH A 50mm LENS. THE 50mm LENS WAS SELECTED AS IT IS THE CLOSEST REPRESENTATION TO THE UNAIDED HUMAN EYE AND CLOSELY PORTRAYS WHAT WOULD BE SEEN AT THIS LOCATION.

2. THE APPARENT CURVATURE OF U.S. ROUTE 66 IS A RESULT OF CREATING A PANORAMIC VIEW FROM A SERIES OF THREE PHOTOGRAPHS. WHILE THE FOREGROUND HAS BEEN DISTORTED, THE COMPOSITE PHOTOGRAPH IS ACCURATE FOR THE VISUAL APPEARANCE OF THE LANDFILL.

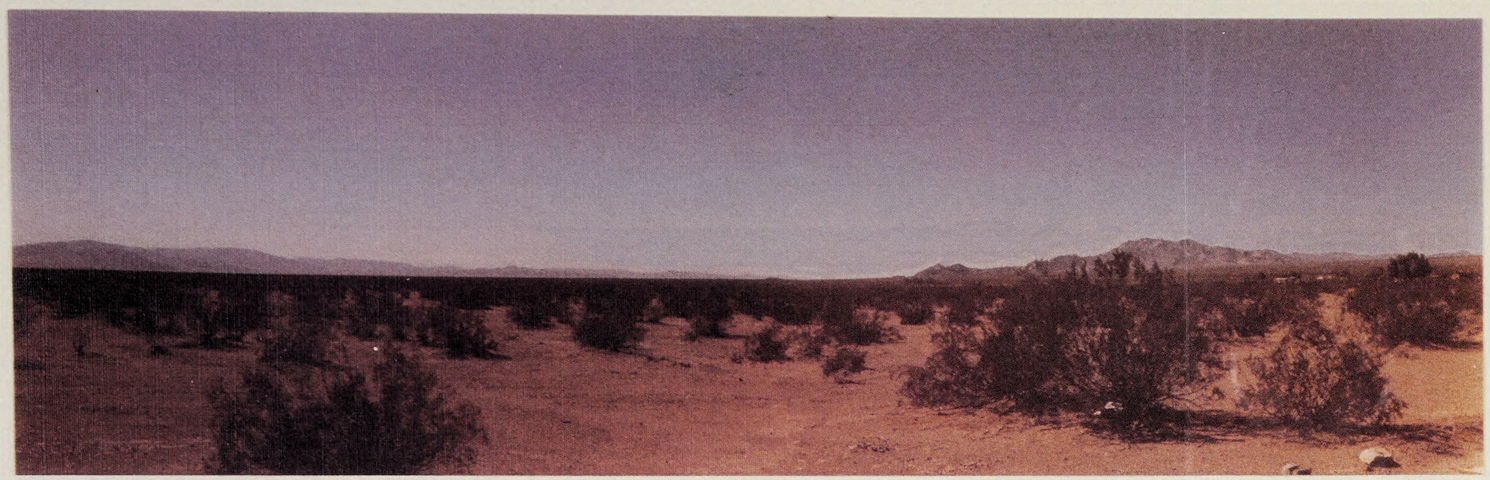
FIGURE 5.9.2

VISUAL RENDERING LOOKING SOUTH FROM ROUTE 66

RAIL•CYCLE
BOLO STATION LANDFILL

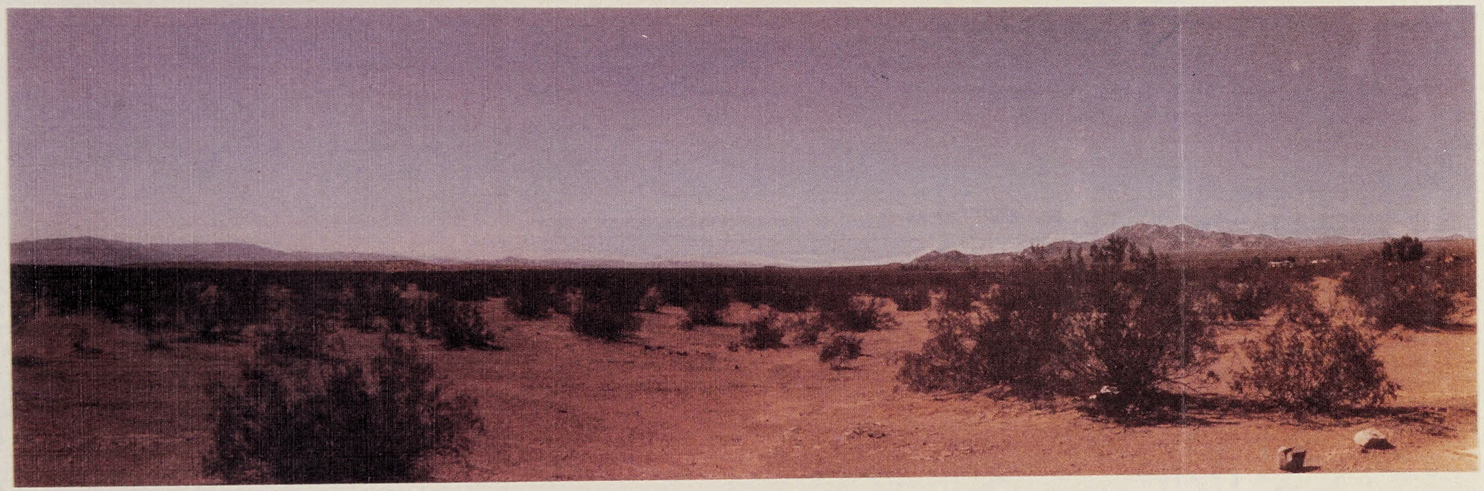
ENVIRONMENTAL SOLUTIONS, INC.

91-109 EIR/EIS REV. 3/30/92



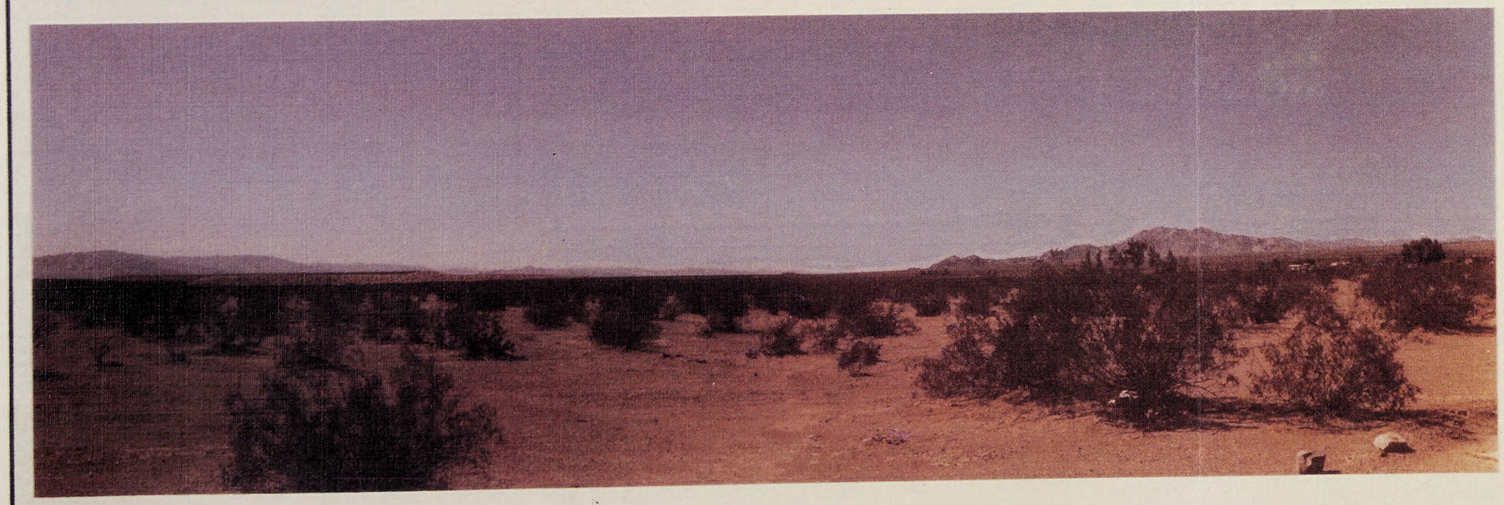
CURRENT VIEW:

EXISTING VIEW FROM CADIZ ROAD APPROXIMATELY SIX MILES EAST OF THE BOLO STATION LANDFILL SITE.



MID-POINT VIEW

EXPECTED VISUAL APPEARANCE OF BOLO STATION LANDFILL AT THE POINT THAT APPROXIMATELY HALF THE LANDFILL FOOTPRINT HAS RECEIVED ITS CAPACITY OF WASTE AND HAS BEEN CLOSED. THIS DEPICTS A VIEW THAT MAY BE OBTAINED IN 20 TO 30 YEARS.



FINAL GRADE:

EXPECTED VISUAL APPEARANCE AFTER BOLO STATION LANDFILL HAS REACHED FINAL CAPACITY AND BEEN COMPLETELY CLOSED. THIS DEPICTS A VIEW THAT MAY BE OBTAINED IN APPROXIMATELY 60 YEARS.

NOTE:

THIS IS AN ENHANCEMENT OF A SERIES OF THREE PHOTOGRAPHS TAKEN WITH A 50mm LENS. THE 50mm LENS WAS SELECTED AS IT IS THE CLOSEST REPRESENTATION TO THE UNAIDED HUMAN EYE AND CLOSELY PORTRAYS WHAT WOULD BE SEEN AT THIS LOCATION.

FIGURE 5.9.3

VISUAL RENDERING LOOKING WEST FROM CADIZ ROAD

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

5.9.1.2 Visual Impact Analysis

5.9.1.2.1 Operations Activities and Equipment

1. During the anticipated 60- to 100-year operational life of the proposed action, structures and equipment such as buildings, fuel and water storage tanks, utility lines, mobile equipment, and night lighting/glare would be visible on the project site. Most equipment, structures, and lighting would be clustered in three locations:

   - Northern site area adjacent to Route 66.
   - Landfill entrance.
   - Offloading facility and railyard.

2. The operations facilities would be limited in size, location, and number. It is expected that their presence would substantially change the visual character of the site while the landfill is operational. Closure procedures require that facilities be removed at project completion. Therefore, visual changes related to these facilities would not be present subsequent to landfill operations.

3. During the operations phase, movement of vehicles, heavy equipment, and the unit trains through the site would change its nature from passive to active. Graded roads would be constructed and used to connect the areas of the operating landfill. Fugitive dust emissions from landfilling operations, although limited by dust control measures, are expected to be visible. Blowing litter is not expected to cause a visual impact, as portable litter fences will be used, and daily site inspections. Litter and subsequent collection will occur.

4. Measures to reduce the impact of the landfill and activities to the extent practicable would be employed. Operating facilities would be visible from certain locations within Bristol and Cadiz basins during the life of the landfill. Lighting for the offloading facility, and railyard working face, and other areas of night activities would create new artificial illumination and glare, although these lights would be shielded and directed downward to reduce fugitive offsite illumination and glare to the degree practicable. The landfill gas flare will have an internal combustion chamber, so no illumination would be visible.

5. Existing industrial uses present on Bristol Dry Lake west of Bolo Station provide a comparative character to the site vicinity and will diminish the visual contrast between the proposed action and the surrounding environment. Following final landfill closure and completion of revegetation (100 to 200 years in the future), the Bolo Station site is not expected to be markedly distinguishable from the surrounding terrain. However, the configuration of the landfill will indicate the artificial nature of the feature. Visual impacts to regional viewsheds as a result of the proposed action are not considered to be significant following landfill closure, but will impact the viewshed during construction and operations. The effects of landfill operations on the visual quality of the regional viewsheds from Cadiz Dunes, ten miles southeast of the site, and Sheephole Summit, 20 miles south of the site, would be attenuated by distance and by elevation of the viewpoint.

6. The Cadiz Dunes area lies at a slightly lower elevation than the Bolo Station site and is separated from the site by slightly elevated midground. Bolo Station is expected to blend into the tan colored background of the alluvial fan environment and provide little visual contrast except for occasional fugitive dust emissions during operations. Following closure and revegetation, the Bolo Station site is not expected to be readily discernible from the surrounding environment, given the distance to the site from Cadiz Dunes.

7. In terms of the scenic resource goals of the Open Space Element of the County General Plan, the views of major mountains and undisturbed natural areas from the site will be impacted during the 60- to 100-year life of the proposed landfill. This impact is not a result of the specific views being blocked, but rather is based on the destructive nature of onsite activities that will occur in the foreground of the distant vistas.

5.9.1.2.2 Surface Disturbance and Landform Modification

1. The primary visual impact of the operating and completed project would be changes in color contrasts, landform, and line resulting from removal and redistribution of earth materials, placement of waste, and removal of vegetation. The effects of these changes would be long term and would permanently alter the character of the site from the close visual perspective. As shown in Figures 5.9.2 and 5.9.3, these changes would be visible from a distance. However, these are not considered to comprise a significant impact, as existing industrial uses are visible on the lakebed west of Bolo Station extending to Amboy Road.

5.9.2 CADIZ VALLEY ALTERNATIVE SITE

1. Impacts from a landfill at the Cadiz Valley Alternative site would be similar to those at Bolo Station. The primary difference would be the setting of the Cadiz Valley Alternative site at the toe of the Ship Mountains, rather than within an area of minimal topographic relief such as Bolo Station. From a visual standpoint, the mountain range, which would rise approximately 1,600 feet above the landfill site, would soften the vertical element of the completed landfill against the desert floor.

2. Another difference between the two sites is the locations from which the Cadiz Valley Alternative site is visible, as it would not be in close proximity to well-traveled public roadways. However, the alternative site would be visible from Cadiz Road, at some distance from Route 66, and from the Cadiz Dunes and Sheephole Summit. During project operations, visibility of the ATSF unit trains, offloading process and landfilling, night lighting, and glare, and would be partially attenuated by distance. During construction and operations, dust might be visible. During the estimated 60- to 100-year operations phase of the landfill, visual impacts to the viewshed of Cadiz Dunes, three miles south of the site, and Sheephole Pass Summit, 20 miles southwest of the site, have the potential to be significant.

3. Subsequent to completion of the landfill, closure would involve removal of structures and equipment, and revegetation of the landfill surface. As a result, the completed facility would largely blend into the background alluvial fan and mountain and appear as a foothill of the Ship Mountains. Following closure, visual impacts to the regional viewshed are expected not to be significant.

4. The Cadiz Valley Alternative site is within a BLM VRM Class III area, where "contrasts to basic elements caused by a management activity are evident but should remain subordinate to the existing landscape." This is somewhat more restrictive than the Class IV designation of the Bolo Station site, and activities would be required to be in conformance. Following closure, the alternative site would be expected to meet VRM Class III standards, and significant impacts are not anticipated.

5.9.2.1 Photographic Simulation

1. To assess the potential visual impact of the proposed action at the Cadiz Valley Alternative site at project completion, a visual simulation was prepared. Site photographs were taken from the Cadiz Dunes and used to prepare a scaled photo-simulation, based on a conceptual landfill at the alternative site. The photographs were taken from the Cadiz Dunes, looking northward to the alternative site, a distance of approximately two miles. The existing visual environment of the site is dominated by the Ship Mountains with the Marble Mountains in the distance. The location where the photographs were taken is shown in Figure 5.9.1.

2. The site photograph and simulation are presented in Figure 5.9.4. The figure shows two views:

   - Existing view.
   - Expected view at full build-out after closure and revegetation.

3. The photograph is scaled to depict what the viewer would see with the unaided eye. The visual rendering depicts the extent that closure and revegetation would reduce the visual contrast of the landfill at completion.

4. At project completion (60 to 100 years in the future), the landfill would rise 800 feet above the existing terrain of the alternative site and would partially obstruct the view of the Ship Mountains. The light coloration of the landfill compared to the dark hues of the Ship Mountains would remain even after establishment of the revegetation program.

5.9.3 REDUCED ACTION ALTERNATIVE

1. The Reduced Action Alternative would operate for an estimated 40 years, compared to the anticipated 60 to 100 years of the proposed action. Further, the project boundary would encompass 2.5 square miles less than the proposed action, the footprint of the landfill would be reduced by 0.5 square miles, and the ultimate height would be approximately 45 feet less than that of the proposed action.

CURRENT VIEW:

EXISTING VIEW LOOKING NORTH FROM CADIZ DUNES APPROXIMATELY TWO MILES SOUTH OF THE SITE

FINAL GRADE:

EXPECTED VISUAL APPEARANCE AFTER THE LANDFILL HAS REACHED FINAL CAPACITY AND HAS BEEN COMPLETELY CLOSED. THIS DEPICTS A VIEW THAT MAY BE OBTAINED IN APPROXIMATELY 60 YEARS.

FIGURE 5.9.4

VISUAL RENDERING
CADIZ VALLEY
ALTERNATIVE SITE

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

2. The range of visual effects associated with the Reduced Action Alternative would be the same as those for the proposed action, but on a lesser scale relative to both the operating life of the facility and its final configuration. For these reasons, the overall visual impact would be reduced from the proposed action.

5.9.4 NO ACTION ALTERNATIVE

1. Under this alternative, the disturbance proposed for the Bolo Station site would not occur. The visual elements of the Bolo Station site and surrounding area would remain in their current state of open space, with the existing salt extraction activities as the primary impact to the otherwise undisturbed desert environment.

5.9.5 MITIGATION MEASURES

5.9.5.1 Bolo Station Site

1. The following mitigation measures are proposed to reduce the visual impacts of the proposed action:

   - The final surface of the landfill will be contoured in an undulating pattern so as to blend with surrounding topography.
   - The final surface of the landfill will be revegetated for runoff control and to enhance visual blending with the surrounding area.
   - Procedures to prevent illegal dumping will be established by Rail•Cycle as part of its site management plan.
   - Procedures to minimize the presence of litter on the operating landfill will be established by Rail•Cycle as part of its site management plan.
   - Onsite lighting will be directed inward and downward to minimize offsite illumination.
   - Onsite lighting will be shielded.
   - Dust control measures will be rigorously maintained to minimize emission of fugitive dust.

5.9.5.2 Cadiz Valley Alternative Site

1. The mitigations proposed for the Cadiz Valley Alternative site would be the same as those for the proposed action.

5.9.5.3 Reduced Action Alternative

1. The mitigations proposed for the Reduced Action Alternative would be the same as those for the proposed action.

5.9.5.4 No Action Alternative

1. Mitigation measures to reduce the visual impact of the operating or completed landfill would not be necessary under the No Action Alternative.

5.9.6 FEASIBILITY OF MITIGATION MEASURES

1. The mitigation measures proposed are feasible and standard procedures at other landfills in California. No adverse impacts are associated with implementation of the proposed mitigation measures.

5.9.7 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

1. A significant unavoidable adverse impact associated with implementation of the proposed action would be the establishment of a long-term, large-scale industrial activity in a rural portion of the Mojave Desert. Long-term, industrial use associated with the extraction of brine is present on the lakebed west of the proposed action, but terrain to the east, south and north presently yields uninterrupted vistas of open space dominated by the open desert and major mountain ranges. The vistas available from the site meet the scenic criteria of the Open Space Element of the County General Plan and little human habitation.

2. A second significant unavoidable adverse impact would be alteration of the land topography and the establishment of an artificial mound on the flat desert floor. This feature interferes with established topography and vegetation, and affects the visual character of the area.

3. The illumination of the night sky resulting from nighttime landfill operations would also be a significant unavoidable adverse impact.

4. Even with implementation of the mitigation measures, these impacts would still be significant and unavoidable. For purposes of CEQA, a statement of overriding considerations is required for significant unavoidable adverse impacts. While NEPA does not have a similar requirement, this information will be useful to the decision makers during preparation of the Record of Decision for the EIS.

5.10 CULTURAL RESOURCES

1. This section provides an analysis of impacts to cultural resources that could result from establishment of a landfill facility at the Bolo Station or Cadiz Valley Alternative sites. Mitigation measures to reduce impacts to cultural resources are also provided in this section.

2. Direct project activities, such as grading and excavation, or indirect activities, such as increased human presence in the area, have the potential to affect nonrenewable cultural resources at either the Bolo Station or the Cadiz Valley Alternative sites. The following impacts would be considered significant if they were to occur:

   - Destruction of a significant cultural resource.
   - Disturbance of those heritage values within a resource that gives the property its significance.
   - Exchange of BLM lands containing significant resources without assuring that adverse effects to the properties will be avoided.

   Significant cultural resources are those that are determined to meet the eligibility criteria for listing in the NRHP.

5.10.1 BOLO STATION SITE

1. Development of the proposed landfill and associated facilities has the potential to affect significant cultural resources as follows:

   - Land-altering activities have the potential to disturb or destroy cultural resources.
   - Increased human presence, through establishment of a large onsite work force, could facilitate recreational collection of artifacts, which destroys their scientific value and degrades the heritage value of a cultural resource.
   - Improved access to the site vicinity, through establishment of the access road from Route 66, could facilitate recreational activities by the public, including artifact collection, in the vicinity of the site and elsewhere in the basin accessible by the network of dirt roads.

2. Cultural resource investigations at Bolo Station resulted in the inventory of 22 archaeological sites. Of these, only one site met the eligibility requirements for NRHP listing: site SBr-2910H. The remaining 21 sites were either determined not to be eligible for the NRHP or were found not to be potentially affected by the proposed action.

3. Site SBr-2910H is a segment of the National Old Trails Road (1914 to 1934), the original path of old Route 66. It was determined eligible for inclusion on the NRHP in September 1990. The onsite portion was determined eligible based on the NRHP criteria (a) ... "associated with events..." (Jacobs, 1992c).

4. Site SBr-2910H will be affected by the development of the access road on Section 5 and cannot be avoided. In consultation with the BLM, it has been determined that the effect on this site will not be adverse, as the proposed action's use of the site will maintain its historic use as a road, a form of "adaptive reuse" (Jacobs, 1992c). Persons driving on that portion of the access road that follows the National Old Trails Road will experience the same setting and scenic vista as travelers did between 1914 and 1934.

5. An eligibility determination and no adverse effect determination through "adaptive reuse" has been prepared and submitted to BLM. In accordance with BLM's Programmatic Agreement with the SHPO and ACHP for compliance with Section 106 of the NHPA and 36 CFR Part 800, the BLM will consult with the SHPO regarding the effect of the proposed action on this eligible site.

6. The eligibility and no adverse effect determinations represent the recommendations of the consulting archaeologist who prepared the determinations. While these recommendations have been tentatively approved by BLM as the lead federal agency, they are still considered preliminary. The final determination of eligibility for the properties potentially affected by the proposed action will be made by BLM in consultation with SHPO. In addition, final determination of effect will also be made by BLM in consultation with SHPO.

7. There is a possibility that the recommendations for eligibility and no adverse effect may change as a result of BLM's consultation with SHPO. Any changes to these determinations resulting from consultation with SHPO will be incorporated into the Final EIR/EIS for the proposed action. Final recommendations for mitigation measures for

affected properties may also change as a result of consultation with SHPO. Any such changes would also be incorporated into the Final EIR/EIS.

5.10.2 CADIZ VALLEY ALTERNATIVE SITE

1 Archival data and literature review revealed that the cultural resource environment of the Cadiz Valley Alternative site is poorly defined at present, due to the lack of previous field investigations within most of the alternative site. The narrow, linear onsite corridor previously surveyed was negative for cultural remains (Weil et al., 1984; New Mexico State University, 1989). The sensitivity of the remainder of the site for containing significant cultural resources, however, cannot be predicted from the results of the limited linear survey. There is potential for significant cultural resources to be present onsite. The alternative site may be similar to the Bolo Station site in that little was known of the latter until intensive field survey was completed. Factors affecting prehistoric settlement in arid environments include the presence of potable water; strategic economic resources for subsistence, stone tool manufacture; and household items, religious or traditional cultural values; and other factors. A review of the USGS map for the area (Cadiz Valley NW) does not indicate springs or seeps for the project area. There is some potential for a shoreline of a terminal Pleistocene lake to occur onsite (Reynolds, 1988). Other factors affecting human settlement cannot be evaluated without field and ethnographic research.

2. The siting and operation of a landfill and associated facilities at the Cadiz Valley Alternative site has the potential to adversely affect significant cultural resources, which are as yet unknown.

5.10.3 REDUCED ACTION ALTERNATIVE

1. Impacts to cultural resources as a result of the Reduced Action Alternative would be the same as those of the proposed action as the landfill access road would still affect site SBr-2910H.

5.10.4 NO ACTION ALTERNATIVE

1. Adverse impacts to cultural resources would not result from the No Action Alternative. The cultural resource environment would remain as it currently exists, with the primary threat to site integrity arising from geomorphological processes (natural erosion) and unauthorized disturbance (artifact collectors and/or disturbance from offroad vehicles).

5.10.5 MITIGATION MEASURES

5.10.5.1 Bolo Station Site

1. Proposed mitigation measures include the following to control collection or disturbance of cultural resources:

   - **Worker Education Program**: Construction and operations personnel will be briefed on the no collection policy for cultural resources situated both onsite and offsite. Information on the provisions of the Archaeological Resources Protection Act of 1979, as amended, and penalties for unauthorized artifact collection and disturbance of historic properties shall be provided to all personnel in written form.

   - **Public Awareness Program**:
     - Information on prehistoric and historic land use of the project area, including native industries and habitation related to stands of Bristol Lake, as well as the history of the ATSF railroad, Bolo section camp, and the National Old Trails Road, will be included in interpretive displays at the visitor's center.
     - Public information signs that advise of the provisions of the Archaeological Resources Protection Act of 1979, as amended, and penalties for unauthorized artifact collection and disturbance of historic properties will be posted in the visitor's center.

2. In addition, the following mitigation measures will be implemented to minimize effects to site SBr-2910H:

   - An archaeological monitor will be present during grading and construction of the access road for a distance of 100 meters (300 feet) north and south of its development in the vicinity of site SBr-2910H.
   - If necessary, a treatment plan will be prepared and implemented, in consultation with SHPO and ACHP, and will address the significant values contained by the site.

- Signs will be placed along the landfilled access road indicating it follows the National Old Trails Road. Turnouts at each end of the segment of the old road used as an access road will contain interpretive signs and information.
- To ensure that undiscovered buried cultural resources are not inadvertently disturbed during the initial landfill construction phase or during subsequent development of landfill cells, qualified cultural resource monitors will be present during grading and excavation activities. Monitors will have the authority to temporarily halt or redirect construction in the event undisturbed buried cultural resources are uncovered, until such time as those resources are evaluated and salvaged, if necessary, in consultation with BLM.

3. Section 106 consultation for cultural resources at Bolo Station will be completed prior to issuance of the Final EIR/EIS. The regulatory requirements of 36 CFR Part 800, the ACHP "Procedures for Protection of Historic Properties," will be completed by BLM in consultation with SHPO and ACHP, as necessary, to satisfy the requirements of NHPA, NEPA, and FLPMA. Consultation will address:

- Determination of resource significance, as determined by a site's potential to meet requirements for NRHP listing.
- Determination and documentation of potential of the proposed action to result in effects or adverse effects to significant cultural resources (including effects related to the transfer of cultural resources out of federal stewardship). The full inventory of onsite cultural resources will be addressed in the documentation related to determination of project effects, but potential adverse effects are limited to significant resources.
- Preparation and implementation of a treatment plan, as needed, designed to offset potential adverse effects to eligible historic properties. This plan would address the significant values contained by the site(s), and could include the following elements:
  - Research design and statement of research goals.
  - Field work, including excavation and surface collection.
  - Document and archival research.
  - Artifact identification, cataloguing and analysis.
  - Technical report preparation and dissemination.
  - Curation of data and reports into an established repository with retrievable storage.

4. In accordance with CEQ implementing regulations, findings of the completed Section 106 process will be provided in the Final EIR/EIS. The findings will include a listing of onsite cultural resources determined eligible for NRHP listing, a review of potential adverse effects upon eligible properties that could result from the proposed action, and a synopsis of proposed treatment, as necessary, to mitigate anticipated adverse effects of the proposed action.

5.10.5.2 Cadiz Valley Alternative Site

1. Measures to mitigate adverse effects to cultural resources would be similar to those for the proposed action with the following qualifications. If the alternative site is selected, a thorough field inventory will be completed, and evaluation of resource significance accomplished. The results of these efforts will be used to determine the need for further action relative to protection of significant cultural resources. Should significant properties be present that cannot be avoided during facilities development and operation, a treatment plan will be developed and implemented. A Worker Education Program and Public Awareness Program similar to those for the proposed action will also be implemented as mitigation measures for the alternative site. Consultation with SHPO and ACHP, as necessary, will be completed by BLM to satisfy regulatory requirements.

5.10.5.3 Reduced Action Alternative

1. Mitigation measures for the Reduced Action Alternative will be the same as those presented for the proposed action.

5.10.5.4 No Action Alternative

1. Mitigation measures will not be required for the No Action Alternative.

5.10.6 FEASIBILITY OF MITIGATION MEASURES

1. The mitigation measures are considered feasible and expected to be capable of reducing the environmental consequences of the proposed action to below a level of significance.

5.10.7 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

1. No significant unavoidable adverse impacts to cultural resources are expected to occur as a result of the proposed action or alternatives. The proposed mitigation measures will reduce impacts to below a level of significance.

5.11 PALEONTOLOGICAL RESOURCES

1. This section provides an analysis of impacts to paleontological resources that could result from establishment of a landfill facility at the Bolo Station or Cadiz Valley Alternative sites. Mitigation measures to reduce impacts to paleontological resources are also provided in this section.

2. Direct and indirect activities in or near fossiliferous sediments may impact significant nonrenewable paleontological resources. The following impacts would be considered significant if they were to occur:

   - Disturbance or destruction of an articulated fossil skeleton, or removal of portions of it in a manner inconsistent with the standards of the Society of Vertebrate Paleontology.
   - Disturbance, or destruction of significant vertebrate fossils or their removal.
   - Disturbance or destruction of an intact fossil bed or removal of portions of it in a manner inconsistent with standards of the Society of Vertebrate Paleontology.

5.11.1 BOLO STATION SITE

1. Development of the proposed landfill and associated facilities at the Bolo Station site has the potential to affect paleontological resources as follows:

   - Land-altering activities, both surface and subsurface, have the potential to disturb or destroy significant paleontological resources, if present.
   - Increased human presence, through establishment of a large onsite work force, could facilitate the recreational collection of significant fossils, if present, which would destroy their scientific value.
   - Improved access to the site vicinity, through establishment of the access road from Route 66, could facilitate the recreational activities by the public, including fossil collection, in the near vicinity of the site and elsewhere in the basin accessible by the network of dirt roads.

2. Potentially significant paleontological resources were identified throughout the site, with the majority recorded from the vicinity of the ATSF rail line southward, in the area of the proposed landfill facility (San Bernardino County Museum, 1991). Developments north of the ATSF rail line, including roads and facilities, would also have the potential to adversely affect significant paleontological resources, if present, but resource localities were more sparse in the northern site area. Improved access and increased presence could facilitate the collection of fossils as a recreational activity.

3. The fossil assemblage inventoried at the Bolo Station site has been identified as significant due to the abundance of specimens, diversity of species represented, and the assemblage's potential to resolve, or contribute to the resolution of, research questions addressing paleoclimatic reconstruction, the structural and tectonic history of this portion of the Mojave Desert, the history of Cadiz/Bristol basins, and paleohydrologic relationships within the southern Great Basin and Mojave Desert provinces (San Bernardino County Museum, 1991). However, the significance of individual localities has not been completed. Such evaluation would include a review of fossil quality, contextual integrity, relative abundance of data both onsite and in known offsite localities, and research applicability. Additionally, it is expected that a greater range and quality of paleontological remains may be available in subsurface contexts, which are currently unknown.

5.11.2 CADIZ VALLEY ALTERNATIVE SITE

1. Archival data and literature review revealed that the alternative site has the potential to contain paleontological resources similar to those inventoried at the Bolo Station site, Pacific Agriculture lands, and the Cadiz and Archer localities. Similar to the Bolo Station site, the majority of the impacts would be associated with landfill development on the southwestern side of the rail line at the Cadiz Valley Alternative site. Impacts to the paleontological resource database could occur from direct project activities, such as landfill cell excavation and facilities development, and from indirect activities, including increased site access through road development and establishment of an onsite employee population.

5.11.3 REDUCED ACTION ALTERNATIVE

1. Impacts to paleontological resources as a result of the Reduced Action Alternative would be similar to those of the proposed project, but at a lesser scale. The Reduced Action Alternative removes Sections 8, 9, and the western one-half of Section 22 from the Bolo Station site. The road would still be placed in Sections 8 and 9, so no differences between the proposed action and the reduced action is realized in this area. Reduction in impacts relative to the proposed action would result from the elimination of the western one-half of Section 22 from the landfill footprint and from shallower excavations for landfill cell development. Indirect impacts relative to improved access and establishment of an employee population in the site area would be similar to those of the proposed action.

5.11.4 NO ACTION ALTERNATIVE

1. Adverse impacts to paleontological resources would not result from the No Action Alternative. Increased knowledge of the database and research applications relative to defining the geologic history of the Bristol-Cadiz-Danby Trough vicinity, among others, would not be available.

5.11.5 MITIGATION MEASURES

5.11.5.1 Bolo Station Site

1. The following mitigation measures will be applied to the proposed action to reduce impacts to paleontological resources to below a level of significance.

2. Proposed mitigation measures include a resource evaluation phase, a field salvage phase, compliance phase, a worker education program, and a public information program as follows:

   - **Resource Evaluation Phase**: This phase will evaluate known onsite resource localities and prioritize significant sites relative to focused research, scientific value, and potential for project effects. The availability of similar data elsewhere in the region will also contribute to the evaluation of significance. Evaluations are expected to be made from the previously accomplished literature review, field inventory, and collected specimens (San Bernardino County Museum, 1991). Resource evaluation is expected to be an ongoing process for the proposed action as:
     - New localities requiring evaluation are expected to be uncovered during project construction and operations phases.
     - Data have the potential to become redundant (collection of redundant data will be avoided).
     - Research goals may be satisfied or the nature of the data may require development of other appropriate research objectives.
   - **Field Salvage Phase**: This phase will consist of pre-excavation salvage and excavation monitoring.
     - Pre-excavation salvage will involve intense inspection and removal of fossil resources at the most significant localities identified during the resource evaluation phase. Prior to excavation, salvage of significant fossils is the first step toward clearing resources from parcels, with the second step being excavation monitoring.
     - Excavation monitoring will be conducted full- or part-time in areas identified as likely to contain significant paleontological resources, depending on the intensity of the excavation. Excavation for site facilities and landfill cell development has a high potential for impacts to significant paleontological resources where fossiliferous sediments are exposed on or near the surface. Monitoring will be carried out by a qualified paleontological monitor. The monitor will be equipped to:
       - Salvage significant fossils as they are unearthed so that excavation and construction delays are avoided.
       - Remove samples of sediments that are likely to contain remains of small fossil vertebrates. Salvage of small fossils through removal of standardized sediment samples to stockpile areas away from the active working area will be employed. Monitoring will be part-time (50 percent) at the

commencement of excavation activities in potentially significant localities, in order to allow characterization of the fossil assemblage and evaluate significance. Equipment operators and site personnel will be instructed regarding correct protocol during monitoring and during discovery situations when a monitor is not present. In the latter event, the monitor will be contacted immediately to recover exposed fossils and mitigate adverse impacts to the resource. Should an unusually dense, extensive, or well-preserved concentration of fossils be encountered during monitoring activities, monitoring will be increased to full-time. Upon prudent and timely collection of sufficient data to address research objectives, construction would continue.

- **Compliance Phase**: This phase is designed to identify, curate, and permanently house recovered fossils, and to produce a report that indicates to the lead agency that the paleontological resource impact mitigation program has been completed. During this phase:
  - Recovered specimens will be prepared to the point of identification, including washing of sediments to recover small vertebrates.
  - Identified specimens will be curated into an established museum repository with retrievable storage.
  - A report of findings with an appended itemized inventory of specimens will be prepared and submitted to the appropriate lead agency in accordance with an agreed upon submittal schedule.
- **Worker Education Program**: Employees will be briefed as to proper procedures when working with a paleontological monitor and when fossils are discovered in an unmonitored situation. Management will have adequate work-around plans for discovery situations so that excavation work can continue unimpeded away from a discovery site. Employees will additionally be briefed on the no collection policy for paleontological resources.
- **Public Information Program**: Information on the paleontology of the site and region will be included in an interpretive display at the visitor's center. In addition, signs that advise of the provisions of the Antiquities Act of 1906 and FLPMA will be posted at the visitor's center.

5.11.5.2 Cadiz Valley Alternative Site

1. Mitigation measures to minimize adverse effects to paleontological resources at the Cadiz Valley Alternative site would be the same as those for the proposed action, with one addition. Prior to the field salvage phase, the alternative site would receive a thorough surface survey by a qualified paleontological team. The inventory results would be used to determine where onsite monitoring would be conducted and what intensity of monitoring would be required, based on the type and distribution of fossils identified during the walkover survey.

5.11.5.3 Reduced Action Alternative

1. Mitigation measures for the Reduced Action Alternative will be the same as those presented for the proposed action.

5.11.5.4 No Action Alternative

1. Mitigation measures will not be required for the No Action Alternative. The Bolo Station site will continue to exist in its current condition.

5.11.6 FEASIBILITY OF MITIGATION MEASURES

1. The mitigation measures discussed are considered feasible and capable of reducing impacts to paleontological resources to below a level of significance. The mitigation measures are not expected to result in environmental consequences.

5.11.7 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

1. No significant unavoidable adverse impacts to paleontological resources are expected to occur as a result of the proposed action. The proposed mitigation measures will reduce impacts to below a level of significance.

5.12 TRANSPORTATION

1. This section addresses potential impacts to the regional and local transportation system from construction and operations associated with the proposed action and its alternatives. Potential impacts to transportation have been divided into highway or roadway, and rail transport. Short-term impacts were evaluated for the construction phase and long-term impacts for the operations phase.

2. An impact would be considered significant if one or more of the following were to occur:

   - A decrease in LOS values for existing roadways and/or intersections impacted by the proposed action.
   - A significant increase in delay time at railroad/vehicle grade crossings due to additional train traffic from the proposed action when compared with non-project related traffic increases.
   - A significant increase in accident potential at railroad/vehicle grade crossings, due to additional train traffic from the proposed action when compared with non-project related traffic increases.

5.12.1 BOLO STATION SITE

5.12.1.1 Regional Transportation System

1. The regional transportation system consists of both highways and rail lines. The system is evaluated in the following sections.

5.12.1.1.1 Highways

Construction

1. Regional access to the Bolo Station site includes I-10 and I-40, Route 66, and Amboy and Kelbaker roads. Interstate freeways such as I-10 and I-40 typically have capacities of 80,000 vehicles per day each. Roads such as Route 66, and Amboy and Kelbaker roads (two-lane undivided) usually have capacities of 12,000 vehicles per day.

2. I-40 east of Barstow currently carries about 11,000 vehicles per day, well below its capacity. I-10 also operates below capacity at about 63,000 vehicles per day near the San Bernardino/ Riverside County border. Route 66 near Amboy has a daily traffic count of about 350 vehicles per day. Amboy and Kelbaker Roads are not heavily traveled. Amboy Road has an estimated ADT of approximately 630 vehicles per day, while Kelbaker Road would also be expected to be low.

3. The initial construction phase of the proposed action is estimated to last six to nine months. During that time, a maximum of approximately 260 people will be working on the site at any one time. The work shift will last ten hours per day, six days per week. To consider a worst-case scenario, it was assumed that all workers would drive individual cars and arrive at the site within a one-half hour time period. It was also assumed that half of the workers would be traveling from east of the site and half from west of the site. Other traffic such as supply trucks bringing construction materials to the site would be expected to arrive at the site throughout the day. Since these trucks would arrive at different times throughout the day rather than within a short time of each other they would not create a significant impact on the highway system.

4. The additional traffic on these roads due to the proposed action would not be expected to have a significant impact and would account for less than 5 percent of the 12,000 vehicle per day capacity of the two-lane roads near the project and a much smaller percentage of the interstates.

5. An exception is transport of clay which will be transported by truck to the site. Approximately 250,000 cubic yards of clay would be required every one to two years. This amount of clay would require an additional 80 trucks per day to enter the site over a six-month period, six days per week. The most likely route for the trucks to travel would be on I-40 to Kelbaker Road, then south to Bolo Station. The trucks would avoid driving through Ludlow to prevent traffic congestion.

Operations

1. During operation of the site, one, two, or three work shifts per day would be operating at the site depending on the amount of waste being transported to the site. The maximum number of employees that would be entering the site during one shift is estimated to be approximately 220, during periods when new landfill cells are being developed. This number would decrease to approximately 150 during normal operations. In either case, the number of employees is less than the

number of workers required for construction and therefore would not be expected to significantly impact the highway transportation system.

2. Other traffic such as supply trucks would be expected to arrive at the site throughout the day but would not be expected to cause a significant impact since they would be arriving at different times rather than within a short time of each other.

5.12.1.1.2 Rail Transport

Construction

1. Most of the materials used in construction of the intermodal yard will be transported to the site using rail cars. Since rail cars bringing these materials to the site would either be delivered by existing freight trains or by a local work train, it is not anticipated that a significant impact to railroad/vehicle grade crossings would result.

Operations

1. During initial operations one train delivering 3,000 tons per day of waste will arrive at the site, six days per week. At project capacity a maximum of seven trains per day, six days per week will deliver 21,000 tons per day of waste to the site. Trains operating throughout the life of the project will pass through urban areas during nighttime or early morning hours when traffic levels are lower than those found during the daytime, thus minimizing potential vehicle delays at grade crossings.

2. Table 5.12.1 shows a summary of the hazard index values and Table 5.12.2 shows a summary of vehicle delay times for the existing vehicle grade crossings based on 1991 rail and vehicular traffic (Handleman, 1992). The tables also show the hazard index values and vehicle delay times for the proposed action at initiation of landfill operations and at maximum capacity versus anticipated non-project levels due to county-wide population increases.

3. For each rail line segment, the hazard index and vehicle delay time to the worst-case presentation of the effects of additional rail haul. Since the locations of planned MRFs are uncertain, the analyses provided conservatively assumes that the maximum number of trains would occur. In each case the increase in hazard index or vehicle delay time would equal the value shown but most likely could be less. The increase in hazard index or vehicle delay time attributed to vehicles is based on anticipated vehicle increase and is not dependent on locations of planned MRFs.

4. A summary impacts to each of the rail line segments identified in Section 4.12 and listed in Tables 5.12.1 and 5.12.2 is listed below.

   - **Bolo Station to Barstow** - For the initial operation of 3,000 tons per day, one additional train would travel each way between Bolo Station and Barstow, six days per week. The hazard index values for each of the ten at-grade rail crossings would be expected to increase by about 6 percent compared with anticipated nonproject-related hazard index values. Total delay times associated with this rail line segment would be about 61.9 vehicle-hours per day, an increase of 4.1 vehicle-hours per day (7 percent) over anticipated nonproject-related delay times.

     At 21,000 tons per day, seven additional trains would travel each way between Bolo Station and Barstow, six days per week. The hazard index values for each of the ten at-grade rail crossings could be expected to increase by about 32 percent compared with anticipated nonproject-related hazard index values. Total delay times associated with this rail line segment would be about 123.2 vehicle-hours per day, an increase of 4.4 vehicle-hours per day (56 percent) over anticipated nonproject-related delay times.

   - **Barstow to San Bernardino/Kern County Line** - For the initial operation of 3,000 tons per day, one additional train would travel each way between Barstow and the San Bernardino/Kern County Line, six days per week if a MRF is located in the Santa Clarita Valley. The hazard index values for each of the seven at-grade rail crossings would not be expected to increase when compared with anticipated nonproject-related hazard index values. Total delay times associated with this rail line segment would also not be expected to increase over anticipated nonproject-related delay times.

TABLE 5.12.1

SUMMARY OF HAZARD INDEX FOR SAN BERNARDINO COUNTY GRADE CROSSINGS

RAIL LINE SEGMENT	EXISTING CONDITIONS[1]	3,000 TONS PER DAY[2]			21,000 TONS PER DAY[3]			REDUCED ACTION ALTERNATIVE[3][4]			NO ACTION ALTERNATIVE HAZARD INDEX[3]
		PROJECTED NON-PROJECT HAZARD INDEX	PROJECT RELATED HAZARD INDEX	TOTAL HAZARD INDEX	PROJECTED NON-PROJECT HAZARD INDEX	PROJECT RELATED HAZARD INDEX	TOTAL HAZARD INDEX	PROJECTED NON-PROJECT HAZARD INDEX	PROJECT RELATED HAZARD INDEX	TOTAL HAZARD INDEX	
Bolo Station to Barstow	3.1	3.4	0.2	3.6	4.7	1.5	6.2	4.7	0.6	5.3	4.7
Barstow to San Bernardino/ Kern County Line	5.3	5.9	0.0	5.9	8.2	1.0	9.2	8.2	0	8.2	8.2
Barstow to Victorville	6.3	7.0	0.3	7.3	9.8	2.3	12.1	9.8	1.2	11.0	9.8
Victorville to San Bernardino	14.8	16.5	0.7	17.2	23.0	4.9	27.9	23.0	2.2	25.8	23.0
San Bernardino to San Bernardino/ Los Angeles County Line	8.5	9.5	0.0	9.5	13.2	8.8	22.0	13.2	4.4	17.6	13.2
San Bernardino to San Bernardino/ Riverside County Line	19.7	22.0	1.0	23.0	30.6	2.8	33.4	30.6	2.8	33.4	30.6
AVERAGE	9.6	10.7	0.4	11.1	14.9	3.6	18.5	14.9	1.9	16.9	14.9

91-109 (7/12/92/cm)

(1) Measured year 1991 traffic flows.
(2) Projected year 1994 traffic flows (two additional trains per day).
(3) Projected year 2000 traffic flows (14 additional trains per day, except No Action Alternative).
(4) Assumes 9,000 tons per day or three trains per day.

TABLE 5.12.2

SUMMARY OF DELAY TIMES FOR SAN BERNARDINO COUNTY GRADE CROSSINGS (VEHICLE-HOURS/DAY)

RAIL LINE SEGMENT	EXISTING CONDITIONS[1]	3,000 TONS PER DAY[2]			21,000 TONS PER DAY[3]			REDUCED ACTION ALTERNATIVE[3][4]			NO ACTION ALTERNATIVE DELAY TIMES[3]
		PROJECTED NON-PROJECT DELAY TIMES	PROJECT RELATED DELAY TIMES	TOTAL DELAY TIMES	PROJECTED NON-PROJECT DELAY TIMES	PROJECT RELATED DELAY TIMES	TOTAL DELAY TIMES	PROJECTED NON-PROJECT DELAY TIMES	PROJECT RELATED DELAY TIMES	TOTAL DELAY TIMES	
Bolo Station to Barstow	57.9	57.9	4.1	61.9	78.8	44.4	123.2	78.8	18.6	97.4	78.8
Barstow to San Bernardino/ Kern County Line	25.3	25.3	0.0	25.3	31.2	8.3	39.6	31.2	0	31.2	31.2
Barstow to Victorville	156.1	174.9	13.8	188.7	204.9	106.7	311.5	204.9	50.7	255.6	204.9
Victorville to San Bernardino	174.0	181.2	13.9	195.0	211.8	98.1	309.9	211.8	51.7	263.5	211.8
San Bernardino to San Bernardino/ Los Angeles County Line	50.3	49.9	0.0	49.9	61.5	117.9	179.4	61.5	52.5	114.0	61.5
San Bernardino to San Bernardino/ Riverside County Line	685.8	711.7	74.1	785.8	900.7	178.4	1079.1	900.7	178.4	1,079.1	900.7
TOTAL	1,149.3	1,200.8	105.8	1,306.6	1,488.9	553.8	2,042.6	1,488.9	351.9	1,840.9	1,488.9

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(1) Measured year 1991 traffic flows.
(2) Projected year 1994 traffic flows (2 additional trains per day).
(3) Projected year 2000 traffic flows (14 additional trains per day, except No Action Alternative).
(4) Assumes 9,000 tons per day or three trains per day.

At 21,000 tons per day, seven additional trains would travel each way between Barstow and the San Bernardino/Kern County Line, six days per week. The hazard index values for each of the seven at-grade rail crossings could be expected to increase by about 12 percent compared with anticipated nonproject-related hazard index values. Total delay times associated with this rail line segment could be about 39.6 vehicle-hours per day, an increase of 8.3 vehicle-hours per day (27 percent) over anticipated nonproject-related delay times.

- **Barstow to Victorville** - For the initial operation of 3,000 tons per day, one additional train could travel each way between Barstow and Victorville, six days per week. The hazard index values for each of the 11 at-grade rail crossings could be expected to increase by about 4 percent compared with anticipated nonproject-related hazard index values. Total delay times associated with this rail line segment could be about 188.7 vehicle-hours per day, an increase of 13.8 vehicle-hours per day (8 percent) over anticipated nonproject-related delay times.

  At 21,000 tons per day, seven additional trains could travel each way between Barstow and Victorville, six days per week. The hazard index values for each of the 11 at-grade rail crossings could be expected to increase by about 23 percent compared with anticipated nonproject-related hazard index values. Total delay times associated with this rail line segment could be about 311.5 vehicle-hours per day, an increase of 106.7 vehicle-hours per day (52 percent) over anticipated nonproject-related delay times.

- **Victorville to San Bernardino** - For the initial operation of 3,000 tons per day, one additional train could travel each way between Victorville and San Bernardino, six days per week. The hazard index values for each of the four at-grade rail crossings could be expected to increase by about 4 percent compared with anticipated nonproject-related hazard index values. Total delay times associated with this rail line segment could be about 195 vehicle-hours per day, an increase of 13.9 vehicle-hours per day (8 percent) over anticipated nonproject-related delay times.

  At 21,000 tons per day, seven additional trains could travel each way between Victorville and San Bernardino, six days per week. The hazard index values for each of the four at-grade crossings could be expected to increase by about 21 percent compared with anticipated nonproject-related hazard index values. Total delay times associated with this rail line segment could be about 309.9 vehicle-hours per day, an increase of 98.1 vehicle-hours per day (46 percent) over anticipated nonproject-related delay times.

- **San Bernardino to San Bernardino/ Los Angeles County Line** - For the initial operation of 3,000 tons per day, one additional train could travel each way between San Bernardino and the San Bernardino/Los Angeles County Line, six days per week. The hazard index values for each of the 38 at-grade rail crossings could not be expected to increase when compared with anticipated nonproject-related hazard index values. Total delay times associated with this rail line segment could also not be expected to increase over anticipated nonproject-related delay times.

  At 21,000 tons per day, seven additional trains could travel each way between San Bernardino and the San Bernardino/ Los Angeles County Line, six days per week. The hazard index values for each of the 38 at-grade rail crossings could be expected to increase by about 67 percent compared with anticipated nonproject-related hazard index values. Total delay times associated with this rail line segment could be about 179.4 vehicle-hours per day, an increase of 117.9 vehicle-hours per day (192 percent) over anticipated nonproject-related delay times.

- **San Bernardino to San Bernardino/ Riverside County Line** - For the initial operation of 3,000 tons per day, one additional train could travel each way between San Bernardino and the San Bernardino/Riverside County Line, six days per week. The hazard index values for each of the nine at-grade rail crossings could be expected to increase by about five percent compared with anticipated nonproject-related hazard index values. Total delay times associated with this rail line segment could be about 785.8 vehicle-hours per day, an

increase of 74.1 vehicle-hours per day (10 percent) over anticipated nonproject-related delay times.

At 21,000 tons per day, seven additional trains could travel each way between San Bernardino and the San Bernardino/ Riverside County Line, six days per week. The hazard index values for each of the nine at-grade rail crossings could be expected to increase by about 9 percent compared with anticipated nonproject-related hazard index values. Total delay times associated with this rail line segment could be about 1,079.1 vehicle-hours per day, an increase of 178.4 vehicle-hours per day (20 percent) over anticipated nonproject-related delay times.

5. Calculations for the hazard index at individual crossings are included in Appendix I. These calculations include type of crossing protection, ADT and average number of trains.

6. Calculations for vehicle delay time at individual crossings are included in Appendix I. These calculations are based on ADT, number of traffic lanes, train length and maximum authorized speed, an hourly factor (based on the time of day/night in which trains are operating), and vehicle arrival and departure rates, which include an allowance for the number of trucks in the traffic queue.

7. The PUC maintains a "Recommended List of Public Crossings in California for Improved Crossing Protection with Federal Funding." This list is updated annually and recommends crossings to be upgraded to reduce the potential for accidents. The PUC determines which crossings are placed on this list using the following site-specific factors, of which the Hazard Index is one factor:

   - Hazard index.
   - Number of accidents.
   - High train speeds (over 50 mph).
   - High vehicular speeds (over 45 mph).
   - View obstruction.
   - Skew of crossing.
   - Steep approach grade (greater than 5 percent).
   - Two or more operating tracks.
   - Heavy school bus and/or tank truck traffic.
   - Amtrak or passenger train traffic.
   - Adjacent to heavy vehicular traffic intersections.

8. Even though hazard index values and delay times at individual grade crossings will increase with implementation of the proposed action, the increases due to the proposed action represent only a portion of the total increases. The increases shown for rail haul are the maximum or worst-case. Actual increases would likely be less and are dependent on actual location of MRFs. The total increases are also due to increased vehicle traffic due to nonproject-related population growth.

9. The increases associated with the proposed action would occur over a short time and then remain constant throughout the life of the project. Increased vehicle traffic due to population growth will continue to grow regardless of whether the proposed action is implemented or not and will continue to occur after the increases caused by the project have stabilized. The impacts caused by the proposed action would be similar to those projected by population growth except on a faster time schedule. Therefore, the impacts are not different than those which would be normally caused by population growth alone, although, they would occur sooner. Thus, the impacts would not be expected to be significant.

10. In the event of a rail accident that could close a segment of the ATSF rail line to Bolo Station, alternative rail routes are available and could be used. Therefore, major interruptions to rail service would not be expected. These alternate routes would be considered only for delays which exceed 24-hours. Most rail segments have two tracks so the possibility of such delays is only expected on an infrequent basis. Additional yard storage and railcar/container equipment would be available for delays less than 24-hours which would allow uninterrupted service to the MRFs.

5.12.1.2 Local Transportation System

1. An increase in traffic is expected on the existing local transportation system during construction and operations of the proposed action. However, since relatively few vehicles currently use these roads it is not anticipated that the increases would be significant.

2. Route 66, which is currently at LOS A, would have additional right and left turn lanes added at the site entrance before construction begins. The addition of these lanes would help to offset the effect

of the additional vehicles slowing and turning into the site. With the addition of these lanes and the increase in traffic, it is estimated that Route 66 would remain at LOS A near the site entrance. Since the LOS would not change from existing conditions, no impact would occur.

3. In addition to waste being delivered to the site by rail line, the surrounding community will have access to the site using private vehicles. It is anticipated that few private vehicles will enter the site due to the low population around the site, and no significant impacts to the local road system are anticipated.

4. The use of Kelbaker Road for trucking of clay estimated at 80 trucks per day, six days per week, (over six-month periods, each one to two years), could affect the condition of the road, necessitating maintenance and repairs beyond present frequency. Similar impacts could occur on Route 66 from Kelbaker Road to the Bolo Station Landfill entrance.

5.12.2 CADIZ VALLEY ALTERNATIVE SITE

5.12.2.1 Regional Transportation System

1. Impacts associated with the regional transportation system would be similar to those previously described for the Bolo Station site in Section 5.12.1.1.

5.12.2.2 Local Transportation System

1. Impacts associated with the local transportation system would be similar to those previously described for the Bolo Station site in Section 5.12.1.2 with the exception of additional turning lanes moved farther to the east near Chambless for access to Cadiz Road. Cadiz Road is currently partially paved to the Cadiz Valley Alternative site and would have to be upgraded as necessary before project construction would begin.

5.12.3 REDUCED ACTION ALTERNATIVE

1. Impacts on the regional and local transportation system would be similar but less than those previously discussed for the Bolo Station site in Section 5.12.1.2. The Reduced Action Alternative represents about a 40 percent reduction in the amount of waste being delivered to the site on a daily basis. Tables 5.12.1 and 5.12.2 show summaries of hazard index values and vehicle delay times at crossings, respectively.

2. A summary of the impacts to each of the rail line segments identified in Section 4.12 and listed in Tables 5.12.1 and 5.12.2 is listed below.

   - **Bolo Station to Barstow** - For the reduced operation of 12,000 tons per day, three additional trains could be needed to travel each way between Bolo Station and Barstow, six days per week. The hazard index values for each of the ten at-grade crossings could be expected to increase by about 13 percent compared with anticipated nonproject-related hazard index values. Total delay times associated with this rail line segment could be about 97.4 vehicle-hours per day, an increase of 18.6 vehicle-hours per day (24 percent) over anticipated nonproject-related delay times.

   - **Barstow to San Bernardino/Kern County Line** - For the reduced operation of 12,000 tons per day, three additional trains could be needed to travel each way between Barstow and the San Bernardino/ Kern County Line, six days per week. The hazard index values for each of the seven at-grade rail crossings could not be expected to increase when compared with anticipated nonproject-related hazard index values. Total delay times associated with this rail line segment could also not be expected to increase over anticipated nonproject-related delay times.

   - **Barstow to Victorville** - For the reduced operation of 12,000 tons per day, three additional trains could be needed to travel each way between Barstow and Victorville, six days per week. The hazard index values for each of the 11 at-grade crossings could be expected to increase by about 12 percent compared with anticipated nonproject-related hazard index values. Total delay times associated with this rail line segment could be about 255.6 vehicle-hours per day, an increase of 50.7 vehicle-hours per day (25 percent) over anticipated nonproject-related delay times.

   - **Victorville to San Bernardino** - For the reduced operation of 12,000 tons per day, three additional trains could be needed to travel each way between Victorville and

San Bernardino, six days per week. The hazard index values for each of the four at-grade crossings could be expected to increase by about 12 percent compared with anticipated nonproject-related hazard index values. Total delay times associated with this rail line segment could be about 263.5 vehicle-hours per day, an increase of 51.7 vehicle-hours per day (24 percent) over anticipated nonproject-related delay times.

- **San Bernardino to San Bernardino/ Los Angeles County Line** - For the reduced operation of 12,000 tons per day, three additional trains could be needed to travel each way between San Bernardino and the San Bernardino/Los Angeles County Line, six days per week. The hazard index values for each of the 38 at-grade crossings could be expected to increase by about 33 percent compared with anticipated nonproject-related hazard index values. Total delay times associated with this rail line segment could be about 114 vehicle-hours per day, an increase of 52.5 vehicle-hours per day (117 percent) over anticipated nonproject-related delay times.

- **San Bernardino to San Bernardino/ Riverside County Line** - For the reduced operation of 12,000 tons per day, three additional trains could be needed to travel each way between San Bernardino and the San Bernardino/Riverside County Line, six days per week. The hazard index values for each of the nine at-grade crossings could be expected to increase by about 9 percent compared with anticipated nonproject-related hazard index values. Total delay times associated with this rail line segment could be about 178.4 vehicle-hours per day, an increase of 1079.1 vehicle-hours per day (20 percent) over anticipated nonproject-related delay times.

5.12.4 NO ACTION ALTERNATIVE

1. The No Action Alternative would not result in an increase in rail traffic through the project area. However, roadway traffic would be expected to increase due to population growth. The base year for this analysis was chosen as 2010, which is the latest year for which population estimates were available. Tables 5.12.1 and 5.12.2 summarize the No Action Alternative and the increases due to population growth alone.

5.12.5 MITIGATION MEASURES

1. Significant impacts are not anticipated due to the proposed action or alternatives. However, several mitigation measures have been identified which will further reduce the impacts.

   - Addition of turning lanes on Route 66 at entrance to the proposed Bolo Station site.
   - Maintenance and repairs, as necessary, to Kelbaker Road and Route 66 from Kelbaker Road to the Bolo Station Landfill entrance.
   - Scheduling of trains to operate in urban areas during late night or early morning hours.
   - Continue working closely with the PUC to evaluate and coordinate grade crossing improvements.
   - Company sponsored ride sharing or busing from areas where large numbers of employees reside.

5.12.6 FEASIBILITY OF MITIGATION MEASURES

1. The mitigation measures listed are considered feasible to implement and would not create adverse impacts due to their implementation.

5.12.7 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

1. No significant unavoidable adverse impacts have been identified for issues relating to transportation for the proposed action.

5.13 NOISE

1. This section addresses potential impacts to humans from noise associated with construction and operations of the proposed action and its alternatives. Effects of noise on wildlife are addressed in Section 5.6.

2. An impact would be considered significant if one or more of the following were to occur:

   - Auditory damage to a sensitive receptor.
   - Noise levels increase by more than 3 dBA in an area which includes sensitive receptors such as a residential area.
   - The Ldn value increases above 65 dBA in a residential area.

   Generally, noise level increases less than 1 dBA cannot be detected by the human ear. Noise level increases between 1 and 3 dBA are detectable but not considered significant. Noise level increases greater than 3 dBA are detected and may be considered significant (David Evans & Associates, Inc., 1992). For a significant impact to occur, the 3 dBA increase must occur in an area with sensitive receptors (e.g., residential areas, schools, hospitals, etc.) and must also occur in an area which exceeds an Ldn of 65 dBA. The County considers 65 dBA to be the maximum recommended for Ldn levels in a residential area (County, 1989).

3. Noise impacts will occur during both construction and operation of the proposed action. Noise levels occurring during construction are short term and generally on the same order as those occurring during operations, these will not be addressed separately. Two general noise sources will be generated during the project; railroad noise along transportation corridors and at the offloading facility, and noise from landfill operations. The noise sources and their corresponding impacts are discussed separately below.

5.13.1 BOLO STATION SITE

5.13.1.1 Regional Noise Environment

1. Noise levels along rail corridors serving the proposed action would increase as a result of additional trains. A summary of the estimated Ldn noise contours for the individual rail segments are provided in Tables 5.13.1 and 5.13.2. The estimated noise contours were calculated for the initial landfill operation (3,000 tons per day, shown in Table 5.13.1) and maximum operating capacity (21,000 tons per day, shown in Table 5.13.2). Calculations used Association of American Railroads recommended methods (Wyle Laboratories, 1973) and the increased number of trains projected for individual rail corridors.

2. Each rail segment was evaluated individually for increases in noise levels due to the proposed action. The following summarizes the projected noise levels:

   - **Bolo Station to Barstow** - For the 3,000 tons per day operating scenario, Ldn levels between Bolo Station and Barstow ranged from 76.4 dBA 100 feet from the centerline of the track to 57.6 dBA 1,200 feet from the centerline of the track. The average increase over existing 1991 conditions is approximately 0.5 dBA.

     For the maximum capacity operating scenario of 21,000 tons per day, Ldn levels between Bolo Station and Barstow ranged from 78.8 dBA 100 feet from the centerline of the track to 60.0 dBA 1,200 feet from the centerline of the track. The average increase over existing 1991 conditions is approximately 2.9 dBA.

   - **Barstow to San Bernardino/Kern County Line** - For the 3,000 tons per day operating scenario, Ldn levels between Barstow and the San Bernardino/Kern County Line ranged from 72.2 dBA 100 feet from the centerline of the track to 53.4 dBA 1,200 feet from the centerline of the track. There is no increase over existing 1991 conditions.

     For the maximum capacity operating scenario of 21,000 tons per day, Ldn levels between Barstow and San Bernardino/Kern County Line ranged from 73.4 dBA 100 feet from the centerline of the track to 54.6 dBA 1,200 feet from the centerline of the track. The average increase over existing 1991 conditions is approximately 1.2 dBA .

   - **Barstow to Victorville** - For the 3,000 tons per day operating scenario, Ldn levels between Barstow and Victorville ranged from 77.4 dBA 100 feet from the centerline of the track to 58.5 dBA 1,200 feet from the centerline of the track. The average increase over existing 1991 conditions is approximately 0.5 dBA.

TABLE 5.13.1

Ldn NOISE CONTOUR LEVELS
3,000 TONS PER DAY OPERATING SCENARIO

RAIL LINE SEGMENT	Ldn NOISE CONTOUR LEVELS (dBA)											
	100 Feet From Track		200 Feet From Track		400 Feet From Track		600 Feet From Track		800 Feet From Track		1,200 Feet From Track	
	Existing[1]	3,000 tons per day[2]	Existing	3,000 tons per day	Existing	3,000 tons per day	Existing	3,000 tons per day	Existing	3,000 tons per day	Existing	3,000 tons per day
Bolo Station to Barstow and Return	75.9	76.4	71.9	72.4	65.9	66.4	62.3	62.8	59.9	60.4	57.0	57.6
Barstow to San Bernardino/ Kern County Line and Return	72.2	72.2	68.2	68.2	62.2	62.2	58.6	58.6	56.2	56.2	53.4	53.4
Barstow to Victorville and Return	76.9	77.4	72.9	73.4	66.9	67.4	63.3	63.8	60.9	61.4	58.1	58.5
Victorville to San Bernardino and Return	77.9	78.3	73.9	74.3	67.9	68.3	65.0	65.4	61.9	62.3	60.2	60.6
San Bernardino to San Bernardino/ Los Angeles County Line and Return	67.5	67.5	63.5	63.5	57.5	57.5	54.6	54.6	51.5	51.5	49.5	49.5
San Bernardino to San Bernardino/ Riverside County Line and Return	76.6	77.1	72.6	73.1	66.6	67.1	63.8	64.3	60.6	61.1	59.1	59.5

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(1) Ldn noise levels calculated in accordance with Association of American Railroads Recommended Methods (Wyle Laboratories, 1973).
(2) Calculated values are representative of noise contours for the Bolo Station and Cadiz Valley Alternative sites.

TABLE 5.13.2

Ldn NOISE CONTOUR LEVELS
21,000 TONS PER DAY OPERATING SCENARIO

RAIL LINE SEGMENT	Ldn NOISE CONTOUR LEVELS (dBA)											
	100 Feet From Track		200 Feet From Track		400 Feet From Track		600 Feet From Track		800 Feet From Track		1,200 Feet From Track	
	Existing[1]	21,000 tons per day[2]	Existing	21,000 tons per day	Existing	21,000 tons per day	Existing	21,000 tons per day	Existing	21,000 tons per day	Existing	21,000 tons per day
Bolo Station to Barstow and Return	75.9	78.8	71.9	74.8	65.9	68.8	62.3	65.2	59.9	62.8	57.0	60.0
Barstow to San Bernardino/ Kern County Line and Return	72.2	73.4	68.2	69.4	62.2	63.4	58.6	59.8	56.2	57.4	53.4	54.6
Barstow to Victorville and Return	76.9	79.1	72.9	75.1	66.9	69.1	63.3	65.5	60.9	63.1	58.1	60.3
Victorville to San Bernardino and Return	77.9	80.1	73.9	76.1	67.9	70.1	65.0	67.2	61.9	64.1	60.2	62.3
San Bernardino to San Bernardino/ Los Angeles County Line and Return	67.5	71.8	63.5	67.8	57.5	61.8	54.6	58.9	51.5	55.8	49.5	53.8
San Bernardino to San Bernardino/ Riverside County Line and Return	76.6	77.5	72.6	73.5	66.6	67.5	63.8	64.3	60.6	61.5	59.1	60.0

91-109 (11/9/92/mg)

(1) Ldn noise levels calculated in accordance with Association of American Railroads Recommended Methods (Wyle Laboratories, 1973).
(2) Calculated values are representative of noise contours for the Bolo Station and Cadiz Valley Alternative sites.

For the maximum capacity operating scenario of 21,000 tons per day, Ldn levels between Barstow and Victorville ranged from 79.1 dBA 100 feet from the centerline of the track to 60.3 dBA 1,200 feet from the centerline of the track. The average increase over existing 1991 conditions is approximately 2.2 dBA.

- **Victorville to San Bernardino** - For the 3,000 tons per day operating scenario, Ldn levels between Victorville and San Bernardino ranged from 78.3 dBA 100 feet from the centerline of the track to 60.6 dBA 1,200 feet from the centerline of the track. The average increase over existing 1991 conditions is approximately 0.4 dBA.

  For the maximum capacity operating scenario of 21,000 tons per day, Ldn levels between Victorville and San Bernardino ranged from 80.1 dBA 100 feet from the centerline of the track to 62.3 dBA 1,200 feet from the centerline of the track. The average increase over existing 1991 conditions is approximately 2.2 dBA.

- **San Bernardino to San Bernardino/ Los Angeles County Line** - For the 3,000 tons per day operating scenario, Ldn levels between San Bernardino and the San Bernardino/Los Angeles County Line ranged from 67.5 dBA 100 feet from the centerline of the track to 49.5 dBA 1,200 feet from the centerline of the track. There is no increase over existing 1991 conditions.

  For the maximum capacity operating scenario of 21,000 tons per day, Ldn levels between San Bernardino and the San Bernardino/Los Angeles County Line ranged from 71.8 dBA 100 feet from the centerline of the track to 53.8 dBA 1,200 feet from the centerline of the track. The average increase over existing 1991 conditions is approximately 4.3 dBA.

- **San Bernardino to San Bernardino/Riverside County Line** - For the 3,000 tons per day operating scenario, Ldn levels between San Bernardino and the San Bernardino/Riverside County Line ranged from 77.1 dBA 100 feet from the centerline of the track to 59.5 dBA 1,200 feet from the centerline of the track. The average increase over existing 1991 conditions is approximately 0.5 dBA.

  For the maximum capacity operating scenario of 21,000 tons per day, Ldn levels between San Bernardino and the San Bernardino/Riverside County Line ranged from 77.5 dBA 100 feet from the centerline of the track to 60.0 dBA 1,200 feet from the centerline of the track. The average increase over existing 1991 conditions is approximately 0.9 dBA.

3. With the exception of the San Bernardino San Bernardino/Los Angeles County Line segment, noise level increases due to additional trains were less than the 3 dBA significance criteria threshold. The San Bernardino to San Bernardino/ Los Angeles County Line segment had an increase of over 3 dBA (approximately 4.3 dBA) for the 21,000 tons per day scenario. The 65 dBA Ldn contour for this segment currently falls between 100 feet and 200 feet from the center line of track. At the maximum capacity of 21,000 tons per day, the 65 Ldn contour is extended to between 200 and 400 feet from the centerline of track. Even though the increase in noise is greater than 3 dBA for the 21,000 tons per day scenario, the increase will not occur at one time since it is due to the addition of two 2-way trains per day. These trains would be added over a period of five to seven years. The addition of the first train would lead to an increase of approximately 2.6 dBA over existing 1991 conditions. The addition of the second train would lead to an additional 1.7 dBA increase for a total increase of 4.3 dBA. Since the increases would be phased and not occur together, the actual maximum increase would be 2.6 dBA, below the significance level of 3.0 dBA.

5.13.1.2 Local Noise Environment

1. The local environment would be affected by noises generated from railroad and landfill operations. Since traffic on local roads would not increase above 5,000 vehicles per day, noise levels are not expected to be significant beyond road rights-of-way.

5.13.1.2.1 Railroad Corridors

1. For the Bolo Station to Barstow corridor, noise from line operations would be increased 2.9 dBA over existing noise levels. Since this increase is less than a 3 dBA incremental increase, significant noise impacts, as defined previously in this chapter, are not expected.

5.13.1.2.2 Landfill Operations Noise

1. Landfill operations produce worst-case noise levels near working face operations. Heavy equipment such as dozers, graders, scrapers, and trucks are responsible for this noise. Typical landfill Leq noise levels range from 70 dBA about 200 feet from landfill operations to 50 dBA at distances greater than 2,000 feet from landfill activity. A 65 dBA contour would be expected at 400 to 500 feet from the point of working face activity (VRSD, 1992).

2. Another facility located within the project boundaries which would produce noticeable noise is the offloading facility and railyard. This facility would be expected to produce noise levels similar to those associated with a railway classification yard such as the ATSF yard in Barstow. Sixty-five dBA noise contours were measured at this yard at distances of 100 to 200 feet from the yard (City of Barstow, 1987).

3. Since sensitive receptors are not located in the adjoining area, ambient noise levels would not be raised significantly, and daily activities of people living in the area would not be significantly impacted by noises generated from the proposed action.

4. Landfill and offloading equipment operators and other personnel working on or next to equipment may experience excessive noise levels during working hours.

5.13.2 CADIZ VALLEY ALTERNATIVE SITE

1. The Cadiz Valley Alternative site would be expected to have similar regional and local impacts to those described for the Bolo Station site. Significant impacts are not expected except for onsite workers who may be exposed to excessive equipment noise levels.

5.13.3 REDUCED ACTION ALTERNATIVE

1. Noise associated with the Reduced Action Alternative for railroad segments is shown in Table 5.13.3. Impacts for each rail line segment are summarized below:

   - **Bolo Station to Barstow** - For the Reduced Action Alternative, Ldn levels between Bolo Station and Barstow ranged from 77.4 dBA 100 feet from the centerline of the track to 58.5 dBA 1,200 feet from the centerline of the track. The average increase over existing 1991 conditions would be approximately 1.5 dBA.

   - **Barstow to San Bernardino/Kern County Line** - For the Reduced Action Alternative, Ldn levels between Bolo Station and Barstow and the San Bernardino/Kern County Line ranged from 72.2 dBA 100 feet from the centerline of the track to 53.4 dBA 1,200 feet from the centerline of the track. There would be increase over existing 1991 conditions.

   - **Barstow to Victorville** - For the Reduced Action Alternative, Ldn levels between Barstow and Victorville ranged from 78.2 dBA 100 feet from the centerline of the track to 59.3 dBA 1,200 feet from the centerline of the track. The average increase over existing 1991 conditions would be approximately 1.3 dBA.

   - **Victorville to San Bernardino** - For the Reduced Action Alternative, Ldn levels between Victorville and San Bernardino ranged from 79.1 dBA 100 feet from the centerline of the track to 61.4 dBA 1,200 feet from the centerline of the track. The average increase over existing 1991 conditions would be approximately 1.2 dBA.

   - **San Bernardino to San Bernardino/Los Angeles County Line** - For the Reduced Action Alternative, Ldn levels between San Bernardino and the San Bernardino/Los Angeles County Line ranged from 70.1 dBA 100 feet from the centerline of the track to 52.1 dBA 1,200 feet from the centerline of the track. The average increase over existing 1991 conditions would be approximately 2.6 dBA.

TABLE 5.13.3

Ldn NOISE CONTOUR LEVELS
REDUCED ACTION ALTERNATIVE

RAIL LINE SEGMENT	Ldn NOISE CONTOUR LEVELS (dbA)											
	100 Feet From Track		200 Feet From Track		400 Feet From Track		600 Feet From Track		800 Feet From Track		1,200 Feet From Track	
	Existing[1]	Reduced Action Alternative[2]	Existing	Reduced Action Alternative	Existing	Reduced Action Alternative	Existing	Reduced Action Alternative	Existing	Reduced Action Alternative	Existing	Reduced Action Alternative
Bolo Station to Barstow and Return	75.9	77.4	71.9	73.4	65.9	67.4	62.3	63.8	59.9	61.4	57.0	58.5
Barstow to San Bernardino/ Kern County Line and Return	72.2	72.2	68.2	68.2	62.2	62.2	58.6	58.6	56.2	56.2	53.4	53.4
Barstow to Victorville and Return	76.9	78.2	72.9	74.2	66.9	68.2	63.3	64.6	60.9	62.2	58.1	59.3
Victorville to San Bernardino and Return	77.9	79.1	73.9	75.1	67.9	69.1	65.0	66.2	61.9	63.1	60.2	61.4
San Bernardino to San Bernardino/ Los Angeles County Line and Return	67.5	70.1	63.5	66.1	57.5	60.1	54.6	57.3	51.5	54.1	49.5	52.1
San Bernardino to San Bernardino/ Riverside County Line and Return	76.6	77.5	72.6	73.5	66.6	67.5	63.8	64.3	60.6	61.5	59.1	60.0

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(1) Ldn noise levels calculated in accordance with Association of American Railroads Recommended Methods (Wyle Laboratories, 1973).
(2) Calculated values are representative of noise contours for the Bolo Station and Cadiz Valley Alternative sites.

- **San Bernardino to San Bernardino/Riverside County Line** - For the Reduced Action Alternative, Ldn levels between San Bernardino and the San Bernardino/Riverside County Line ranged from 77.5 dBA 100 feet from the centerline of the track to 60.0 dBA 1,200 feet from the centerline of the track. The average increase over existing 1991 conditions would be approximately 0.9 dBA.

5.13.4 NO ACTION ALTERNATIVE

1. The No Action Alternative would result in no additional noise sources. Therefore, no impacts would result.

5.13.5 MITIGATION MEASURES

1. Measures to mitigate potential noise impacts are as follows:

   - Rail•Cycle will implement an employee hearing protection program that will specifically address equipment operators and other personnel working on or near heavy equipment.
   - Onsite structures within noise contours exceeding 65 dBA (400 to 500 feet from the landfill and 100 to 200 feet from the offloading facility) will be designed for appropriate noise attenuation.

5.13.6 FEASIBILITY OF MITIGATION MEASURES

1. The mitigation measures identified are based on regulatory requirements and standard design practice. Implementation of the measures is feasible and would not result in additional impacts.

5.13.7 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

1. No significant unavoidable adverse noise impacts have been identified for the proposed action or its alternatives.

5.14 LAND USE

1. Criteria for evaluating potential land use impacts are based on compatibility of proposed activities with surrounding land uses, and on the conformance with applicable ordinances and permit requirements. Impacts would be considered significant if:

   - Project land uses result in a situation where adjacent or nearby properties may no longer be used for existing activities or developed for permitted uses.
   - Project land uses and activities would be in conflict with applicable ordinances and/or permit requirements.
   - Proposed action would not be in conformance with the County General Plan.
   - Proposed action would not be in conformance with BLM's CDCA Plan.

5.14.1 BOLO STATION SITE

5.14.1.1 Consistency with Plans and Policies

5.14.1.1.1 County General Plan

1. The proposed land exchange will consolidate BLM managed land, and will eliminate the need to cross public land to reach private land. However, an amendment to the County General Plan is required to determine the appropriate land use district designation for onsite lands exchanged as part of the proposed action.

2. The Open Space Element of the General Plan includes goals and policies to protect open space values for mineral resource production and scenic resources. As Bolo Station is currently designated as Resource Conservation and undisturbed, it provides open space for both mineral resource production and scenic values. As discussed in Sections 5.3 and 5.9, the proposed action will affect these two open space land uses.

5.14.1.1.2 County Solid Waste Management Plan

1. The proposed action could be approved under AB 2296. The proposed action, if implemented, would then be incorporated into the 1994 CoIWMP.

5.14.1.1.3 California Desert Conservation Area Plan

Land Exchange

1. The BLM's Multiple-Use Class Guidelines were reviewed to determine consistency with the CDCA Plan. Under these guidelines, waste disposal is not allowed on BLM lands, but if the location is suitable for waste disposal, BLM will consider transfer of such sites through sale or exchange to other ownership to allow waste disposal. Two and one-half sections of the Bolo Station site are currently managed by BLM. These lands would be exchanged in fee by BLM for three sections of ATSF land in order for the proposed action to be consistent with the CDCA.

2. The land exchange must represent an exchange for equal or greater value to the public to be approved by BLM. To ensure the land exchange involved lands considered to be of the greatest value to BLM, Rail•Cycle provided BLM with a list of available lands to choose from. From this list, BLM chose the three sections of land identified in the text (i.e., Piute Valley, Cadiz Valley, and Fenner Valley Offered Lands).

3. The land exchange is considered to be an equal value exchange, based on the following:

   - Sections 15 and 22 of the Bolo Station site are within a small area of Class L land, surrounded by primarily Class M and Class I lands. It would be difficult to prevent incompatible land uses from developing around these sections. The Piute Valley Offered Lands site is located on the edge of the CDCA, and is surrounded by Class L lands. Under BLM management, these lands could be consolidated. The Cadiz Valley Offered Lands site is located adjacent to a closed area in the Cadiz Dunes. A road which leads to the Cadiz Dunes ends within this section. Under BLM management, access to the area closed for vehicle traffic would be easier to control. The Fenner Valley Offered Lands site is located within the EMNSA and would allow BLM to consolidate federal lands in this area.
   - Sections 8, 15, and 22 of the Bolo Station site are considered Category 3 habitat for desert tortoise, as is the Cadiz Valley Offered Lands site. However, the Piute Valley and Fenner Valley Offered Lands sites are Category 1 desert tortoise habitat.

Special Management Areas

1. The proposed action would have to be consistent with various CDCA Plan elements, and consistent with land uses within the resource conservation area surrounding the site. Based on the review of special management areas provided in Section 4.14, the following would be applicable:

   - **ACECs**: The proposed action would not infringe on the Marble Mountain Fossil Beds ACEC or the Amboy Crater SA.
   - **HMPs**: No areas managed by the BLM as HMPs would be affected.
   - **SAs**: The viewshed from the Cadiz Dunes SA will be impacted by the proposed action. The increased local population necessary to support the project may increase recreational activity occurring on the Cadiz Dunes. An increase in off-road vehicle use in a closed vehicle area may degrade the value of these lands.
   - **UPAs**: No unusual plant assemblages occur on the site.
   - **WSAs**: The project would not encroach into, and therefore will not impair the wilderness value of the WSAs in the region, or the Joshua Tree National Monument, which is a wilderness area managed by the National Park Service.
   - **Wild Horse/Burro Element**: No wild horse or burro management areas occur within or near the site.
   - **Livestock Grazing Element**: No livestock allotments occur within or near the site.
   - **Recreation Element**: Unsanctioned recreational motor vehicle use may increase, due to increased local population to support the project, which may degrade the multiple use character of the lands in the Bristol and Cadiz basins.
   - **Motorized Vehicle Access Element**: The project will not impact motor vehicle access in the area.

5.14.1.2 Compatibility with Existing and Future Land Uses

1. The Bolo Station site lies in a rural area that receives a limited degree of use. Other existing land uses are generally widespread through the region and distant from the site. The potential exists for conflicts to arise due to the incompatibility of the proposed action with other existing or planned land used. Although many of the other land uses, such as mining, agriculture, transportation, and military use are industrial or higher intensity land uses that would not generally conflict with the operation of a solid waste facility, the reclassification of land currently within a Resource Conservation District to a land use classification that allows more intensive use would represent a significant impact.

2. In addition, the proposed action will impact open space land uses currently available at the site: mineral resource production and scenic values as discussed in Sections 5.3 and 5.9.

5.14.2 CADIZ VALLEY ALTERNATIVE SITE

5.14.2.1 Consistency with Plans and Policies

1. Impacts and inconsistencies with the County General Plan and CoSWMP would be the same as in the proposed action.

2. Section 8 of the site is Class M land, managed by BLM. This section of land would be exchanged with BLM in order for the project to be consistent with the CDCA. If the project were implemented on this site, it would not affect any areas of critical environmental concern areas managed with HMPs, or areas classified as WSAs. The Cadiz Dunes SA would be affected in the same way as for the Bolo Station site.

3. The threatened desert tortoise is present on the site. However, the proposed action at the alternative site would not affect the golden eagle/prairie falcon potential foraging range northwest of the site. The desert bighorn sheep travel corridor in the Ship Mountains would not be impacted. No UPAs exist onsite, and no wild horse or burro management areas occur within or near the site. No livestock grazing allotments will be impacted.

4. Motorized vehicle access and recreational motorized vehicles would be impacted in the same way as for the Bolo Station site.

5.14.2.2 Compatibility with Existing and Future Land Uses

1. There are no existing developed lands surrounding the Cadiz Valley Alternative site. Similar to the Bolo Station site, development of a landfill at the alternative site would require a reclassification of land within a Resource Conservation District to allow more intensive use. It would also impact open space land uses currently available: mineral resource production and scenic values.

5.14.2.3 Land Exchange

1. The Cadiz Valley Alternative site would require the exchange of only one section of land. BLM could choose whichever of the offered lands it determined to be most appropriate. Section 8 of the Cadiz Valley Alternative site is considered to be essentially of the same value as the Bolo Station site lands; therefore, the exchange would still be considered to meet BLM's criteria for determining the value of exchanged lands.

5.14.3 REDUCED ACTION ALTERNATIVE

1. Issues related to land use will be identical to those addressed for the proposed action.

5.14.4 NO ACTION ALTERNATIVE

1. Implementation of the No Action Alternative would mean that the proposed action would not be developed, and no land exchange would occur. Consolidation of federal lands through the exchange of the offered land sites would not occur. The project site would remain in its present state and would be available for future development proposals.

5.14.5 MITIGATION MEASURES

1. The BLM, through the CDCA Plan, and the County, through the County General Plan, and other local plans and regulations, manage multiple-use activities in the study area. The policy framework of these planning documents recognizes waste disposal as an appropriate activity at the Bolo Station site, although some features associated with this activity would conflict with other potential land uses (i.e., mining, recreation, and open space) at the site. However, the proposed use of the site as a long-term landfill would not conflict with the current or reasonably foreseeable land use of adjacent properties.

2. The following mitigation measures will be required to address consistency with land use plans and policies for the County:

   - As the site of the proposed action is not addressed in the adopted CoSWMP, its approval would be based on compliance with AB 2296. If approved, the 1994 CoIWMP would reflect the selected site.
   - The County General Plan will be amended to reflect the proposed action.
   - The project will be subject to a CUP.
   - Construction activities will be subject to development requirements and review by the County Building and Safety Department.
   - Solid waste disposal activities will be monitored by the County Department of Environmental Health Services.

3. The following mitigation measures will be required to address the consistency with land use plans and policies for the BLM:

   - A land exchange in fee will occur consistent with BLM regulations and policies. The land exchange must represent a transaction that would provide lands of equal or greater to the public land system administered by the BLM.

4. No mitigation measures exist for compatibility with existing and future land uses.

5.14.6 FEASIBILITY OF MITIGATION MEASURES

1. The mitigation measures identified above are considered to be feasible and will not result in significant impacts.

5.14.7 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

1. The proposed action represents a major modification of the rural, "limited use" character of the land use of the area. The project site is currently

within a Resource Conservation District and would have to be reclassified to a land use classification which allows more intense use of the land. The proposed action will also impact the open space value of the site associated with mineral resource production and scenic resources.

2. These are considered to be significant unavoidable adverse impacts that cannot be mitigated below a level of significance. For purposes of CEQA, a statement of overriding considerations is required for significant unavoidable adverse impacts. While NEPA does not have a similar requirement, this information will be useful to the decision makers during preparation of the Record of Decision for the EIS.

5.15 SOCIOECONOMICS

1. This section addresses potential socioeconomic impacts that could result from implementation of the proposed action or its alternatives. Impacts consist of those social and fiscal conditions that would change as a result of construction and operation of the proposed action or an alternative. These impacts would be considered significant if they:

   - Represent growth to existing population in the area that would result in development of new land for housing or establishment of additional infrastructure.
   - Result in substantial increases in the use of energy and other resources.
   - Result in a substantially increased demand for public services, such as schools, recreational facilities, medical facilities, and/or police and fire protection.

2. Due to the relative lack of housing and infrastructure in the project area communities, project related population is expected to seek housing elsewhere. For purposes of this analysis, it is assumed that the largest regional urban areas of Morongo Basin and Barstow would be the choice of residence for the majority of project construction and operations personnel.

5.15.1 BOLO STATION SITE

5.15.1.1 Employment

1. The proposed action is expected to employ a range of skilled and unskilled workers during both construction and operational phases. These workers are expected to be available from the existing labor force in the County or nearby Riverside County, therefore, substantial import of labor into the County is not expected. However, to provide an evaluation of "worst-case" potential impact, it is assumed that construction workers and operational employees for the proposed action would relocate to either the Morongo Basin or Barstow from outside eastern San Bernardino County. Tables 5.15.1 and 5.15.2 summarize project employment and population assumptions and impacts. Rationale and assumptions used in this analysis are discussed in the sections that follow.

2. The landfill is expected to be operational for 60 to 100 years depending on annual volumes of waste transported to the site. As such, the landfill would be a source of long-term employment for at least three generations of workers. In addition, it would represent one of the largest sources of private employment in the region, as shown in Table 4.15.5.

5.15.1.1.1 Construction

1. Initial project construction activities (including the administrative and maintenance facilities, initial landfill cell, the first phase of the offloading facility and railyard, initial phase of stormwater control structures, and visitor's center) are expected to employ 262 workers for a six- to nine-month period (see Table 3.6). For the purpose of this analysis, it is assumed that construction personnel will be new to eastern San Bernardino County and that they will relocate to the Morongo Basin and Barstow. This assumption provides the basis for the worst case analysis. However, in actuality, it is likely that some portion of the construction personnel would already reside in the area. Subsequent construction of landfill cells would occur throughout the operational life of the landfill, and are considered as part of project operations.

5.15.1.1.2 Operations

1. Operation of the proposed action would provide an estimated 267 full-time positions for the life of the facility. Initially, 78 people will be employed at the landfill. The permanent staff would increase to 204 during the first five years of landfill operations, at which time 21,000 tons per day of waste would be landfilled. During this five-year period, operation and maintenance of the unit trains would begin with nine positions and increase to a permanent work force of 63. The estimated number of construction and operations personnel is shown in Tables 3.6., 5.15.1, and 5.15.2.

2. For purpose of this analysis, it is assumed that landfill operations employees will be new to eastern San Bernardino County and that 21 of the train crew personnel will be new to Barstow. These assumptions provide the basis for calculating worst-case impacts for the potentially affected communities. However, in actuality, it is likely that some portion of operations employees would already reside in the project area, Morongo Basin, or Barstow, and that some portion of the ATSF unit train personnel would be resident in other areas of Los Angeles and San Bernardino counties.

TABLE 5.15.1

DIRECT EMPLOYMENT/POPULATION ASSUMPTIONS AND IMPACTS

Construction Employment[1]	262	
Morongo Basin Population		
Number of employees:	131[2]	
Total population:	262[3]	
Number of children:	65[4]	
		CONSTRUCTION POPULATION INCREASE = 262
Barstow Population		
Number of employees:	131[2]	
Total population:	262[3]	
Number of children:[2]	65[4]	
		CONSTRUCTION POPULATION INCREASE = 262
	TOTAL CONSTRUCTION POPULATION INCREASE	**524**

Operations Employment[1]	267	
LANDFILL PERSONNEL	204	
Morongo Basin Population		
Number of employees:	102	
Total project-related population:	303[3]	
Number of children:	101[4]	
Barstow Population		
Number of employees:	102	
Total project-related population:	303[3]	
Number of children:	101[4]	
		LANDFILL POPULATION INCREASE = 606
UNIT TRAIN CREWS		63 (21 new employees; 42 existing employees)
Barstow Crews (new)		
Number of employees:	21	
Total population:	62[3]	
Number of children:	21[4]	
Hobart Yard Crews (existing):[5]		
Number of employees:	42	
		TRAIN CREW POPULATION INCREASE = 104
	TOTAL OPERATIONS POPULATION	**710**

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(1) It is assumed on a "worst-case" basis that construction and operational employees are new to the area and that 50 percent will choose to reside in the Morongo Basin and that the remaining 50 percent will reside in Barstow.

(2) It is assumed that one-half of the construction workers will be single or will not be accompanied by their families.

(3) Population = Employees x 2.97. Average family size of 2.97 = average family size for San Bernardino County (County, 1991).

(4) Children (up to 18 years of age) assumed to be one-third of total population (based on 1990 census data for Morongo Basin communities).

(5) These employees already live in Los Angeles and San Bernardino counties, and they would not move their residence in response to the proposed project. Therefore, they are not further considered.

TABLE 5.15.2

POPULATION INCREASE
PROPOSED ACTION
CONSTRUCTION AND OPERATION

PROJECT PHASE AND LOCATION	POPULATION CHARACTERISTICS							
	Employees[1]	Direct Population[2]	Number of Children	Indirect Employees New to Area[3]	Indirect Population New to Area[2]	Number of Indirect Children	Total New Population	Total New Children
CONSTRUCTION[4]								
Morongo Basin	131	262	65[5]	--	--	--	262	65
Project Area	131	262	65[6]	--	--	--	262	65
TOTAL	262	524	130	--	--	--	524	130
OPERATIONS (LANDFILL AND ATSF)								
Morongo Basin	102	303	101[5]	38	113	38	416	139
Barstow[7]	123	365	122[6]	46	137	46	502	168
TOTAL	225	668	223	84	250	84	918	307

(1) Based on Tables 3.6 and 5.15.1.

(2) Population Increase = $\left(\frac{\text{\# employees}}{2}\right) + \left(\frac{\text{\# employees}}{2} \times 2.97\right)$. Operations = # employees x 2.97 (see Table 5.15.1, Notes 1 and 2).

(3) Total jobs x 0.74 ÷ 2 (Assumes that one-half of indirect employment will be new to the area; one-half will be existing residents.).

(4) Construction employees and their dependents are assumed to relocate to the area on a temporary basis only during the six- to nine-month initial construction period. Therefore, it is also assumed that this temporary population increase does not result in the generation of new indirect employment in the area.

(5) These children would be in the Morongo Unified School District.

(6) These children would be in the Barstow or Silver Valley Unified School District.

(7) These numbers are based on the assumption that one-half of the landfill employees and 21 of the unit train employees live in Barstow. The remaining 42 unit train employees are already permanent residents of Los Angeles and San Bernardino counties and will not be considered further. In reality, the 21 unit train employees also may live elsewhere in Los Angeles and San Bernardino counties.

5.15.1.1.3 Indirect Employment

1. An indirect impact of the proposed action would be the related stimulation of additional jobs in other sectors of the economy. Landfill operations would bring new employees and their families to the Morongo Basin and Barstow. The needs and expenditures of these employees for goods and services would create additional, secondary (or indirect) employment.

2. Based upon an economic multiplier of 0.74 (County, n.d.), it is anticipated that the proposed action would create 0.74 indirect jobs for each of the 225 new jobs provided, for a total of 167 indirect jobs associated with the proposed action. For purposes of this analysis, these indirect jobs are expected to be created in the communities where most of the anticipated employees are assumed to live and shop, with one-half occurring in the Morongo Basin and the other half in Barstow. Of these 167 jobs, it is expected that one-half (84) will be filled by existing residents and one-half will provide employment for new residents, thereby contributing to the overall population growth addressed below, as shown in Table 5.15.2.

5.15.1.2 Population

1. It is expected that the majority of landfill construction and operations employees would be provided from the existing County labor pool. Accordingly, the proposed action is not expected to directly attract new population to the County. However, during both the construction and operations phases of the proposed action, an influx of employees and their families to the Morongo Basin and Barstow areas is assumed to occur from other portions of San Bernardino and Riverside counties.

2. For purposes of analysis, it is assumed that one-half of the construction and all of the operations employees would be married, with an average family size of 2.97 (County, 1991), and would have their families with them. However, one-half of the 262 construction employees are assumed to either be single or not accompanied by their families. The assumption that one-half of the construction workers and all of the employees have families provides the basis for calculating worst-case population impacts for the potentially affected communities.

5.15.1.2.1 Construction

1. Initial construction of the landfill and associated facilities is expected to result in a temporary population increase in the Morongo Basin and Barstow areas, based on the assumptions and information provided in Tables 3.6, 5.15.1, and 5.15.2. Population in each of these areas is expected to increase by about 262 persons (employees plus their dependents), based on the assumption that one-half of the construction workers would reside in each area for the six- to nine-month construction period.

2. Although most of the construction positions are expected to be temporary, it is likely that some employees will remain as operations employees. However, to provide a maximum potential impact analysis, it is assumed that all construction workers and their families would leave, to be replaced by operations personnel.

5.15.1.2.2 Operations

1. Although various factors will influence where operations employees choose to live, it is assumed that the number of landfill employees and associated indirect population would be evenly distributed in the Morongo Basin and Barstow areas. Of the 21 new unit train positions, all employees are expected to reside in Barstow. Based on the assumptions and information provided in Tables 5.15.1 and 5.15.2, operations employment is expected to result in long-term population increases to these areas, with an estimated 416 additional residents in the communities of the Morongo Basin, and 502 in the Barstow area.

2. Based on an average family size of 2.97 for the estimated 204 landfill personnel and 21 new unit train personnel, it is assumed that 223 of the population will be children, and that all will be school-age. It is assumed that approximately one-half will be of elementary school age, with the remainder being junior and senior high school age. Based on the assumptions provided in Table 5.15.1, the number of school-age children can be predicted for each area of potential residence. It is assumed that 101 school-age children would be added in the Morongo Basin, and 122 in Barstow, as shown in Table 5.15.2.

5.15.1.2.3 Indirect Population

1. Based on an average family size of 2.97 for the 84 new employees who would fill the estimated 168 indirect jobs generated by landfill operational employees, it is estimated that approximately 250 persons would be added to the area as a result of these jobs. Thirty-eight of these employees are expected to be new residents in the Morongo Basin, resulting in a population increase of 113 in the area. The other 46 new indirect employees are expected to be new to Barstow, resulting in an additional 137 persons there. It is further expected that school-age children would comprise about one-third of this indirect population, with 38 children being added to the population of the Morongo Basin and 46 to Barstow.

5.15.1.3 Housing

5.15.1.3.1 Construction

1. Estimated housing requirements for employees during the six- to nine-month initial construction period are shown in Table 5.15.3. Based on the assumptions presented in the table, 98 housing units would be required in the Morongo Basin during construction, and 98 would be required in Barstow. Most construction workers who seek temporary accommodations in the Morongo Basin are expected to prefer Twentynine Palms where there are established accommodations for visitors, with approximately 300 motel rooms and 90 RV spaces. Other housing, such as apartments and mobile homes, is generally in short supply (Twentynine Palms Chamber of Commerce, 1992).

2. Construction workers who choose to reside in the Barstow area are expected to rely upon the existing established accommodations for visitors, including motels and RV spaces. In addition, apartments and mobile homes tend to be in greater supply in Barstow as compared to the Morongo Basin and would be available for construction workers (Bowdridge, 1992).

5.15.1.3.2 Operations

1. For purposes of this analysis, it is assumed that landfill employees would live either in the Morongo Basin and or Barstow, and that new train crews would live in Barstow, which is an existing ATSF crew base. These assumptions provide the basis for calculating worst-case impacts to potentially affected communities. However, in actuality operational employees may be more widely distributed, resulting in a more dispersed impact than presented in this analysis.

Morongo Basin

1. Based on the assumptions shown in Tables 5.15.1, 5.15.2, and 5.15.3, there would be a need to supply 102 housing units for about 416 persons in the Morongo Basin. The current housing supply is considered adequate for the existing population, with a current average vacancy rate for homes of about 1 percent in Twentynine Palms to 10 percent in Yucca Valley (Twentynine Palms Chamber of Commerce, 1992). It is expected that most of the project-related housing requirements would have to be met by new construction.

2. Given the previous assumptions as to the numbers of employees and their families who are expected to live in the Morongo Basin, the existing housing supply would need to be augmented by more than 100 units to accommodate the anticipated demand of project personnel.

Barstow

1. Based on the assumptions presented in Tables 5.15.1, 5.15.2, and 5.15.3, an estimated 123 housing units would be required for project-related personnel who would move to the Barstow area. Based on existing supplies of apartments and single family homes in Barstow, it is expected that these housing requirements could be met by the existing housing stock (Bowdridge, 1992).

5.15.1.3.3 Indirect Housing

1. An estimated 84 housing units would be required for the indirect population generated as a result of the proposed action. It is expected that 38 would be required in the Morongo Basin communities, while 46 would be required in Barstow. It is anticipated that new construction would be necessary to meet this demand in the Morongo Basin, while existing housing would be sufficient in Barstow.

5.15.1.4 Public Services

1. As previously discussed, this analysis assumes that project employees would live in either the Morongo Basin or Barstow. This approach provides the basis for a worst-case analysis and projection of maximum potential impacts.

TABLE 5.15.3

HOUSING REQUIREMENTS

PROJECT CONSTRUCTION	
Morongo Basin	
Number of employees:	131
Number of Units:	98(1)
Rent	88 (90%)(2)
Purchase	10 (10%)(3)
Barstow	
Number of employees:	131
Number of Units:	98(1)
Rent	88 (90%)(2)
Purchase	10 (10%)(3)
PROJECT OPERATIONS	
Morongo Basin	
Number of employees:	102
Number of Units:	102(4)
Rent	51 (50%)
Purchase	51 (50%)
Barstow	
Number of employees:	123
Number of Units:	123(4)
Rent	66 (50%)
Purchase	65 (50%)

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(1) It is assumed that the 65 married workers would require separate units and that the 66 single workers would share (two single employees per unit are assumed).

(2) As overall construction period is relatively short (six to nine months), rental accommodations will be desired.

(3) Supervisory personnel who anticipate permanent employment may choose to purchase housing.

(4) For this evaluation, it is assumed that each employee will have a separate housing unit. In fact, some employees may share housing.

5.15.1.4.1 Construction

Schools

1. During project construction, it is anticipated that approximately 65 students would be added to the Morongo Unified School District, with approximately 33 elementary students and 32 secondary students. Generally, as indicated in Table 5.15.4, the schools in this district are either at or near capacity. This additional projected enrollment of 65 would be considered a significant impact, and may require new facilities and/or school district personnel.

2. Project construction also is expected to result in about 65 new students in the Barstow area, with an estimated 33 elementary students and 32 secondary students. Based on the presence of unused school facilities in the Barstow Unified School District, plus the excess capacity of the Silver Valley District, these students could be accommodated (see Section 4.15.4.3.1), however, additional school district personnel may be required.

Health Services

1. No health services are available in the immediate project area. Requirements for emergency first aid and health care in the project area could increase during the six- to nine-month initial construction period. Such needs would be expected to increase demand on the nearest health care services, primarily in the Morongo Basin.

2. The primary health service in the Morongo Basin is the Hi-Desert Medical Center, an accredited 56-bed acute-care hospital. It is expected that this facility, as well as individual health care professionals in the basin, would experience an increase in demand for services as a result of the increase in population associated with construction personnel and their families. For the relatively short (six- to nine-months) duration of the initial construction period, this increased demand is not expected to have an adverse affect on the health care capability of personnel and/or facilities in the Morongo Basin.

3. The primary health care facility in Barstow is the Barstow Community Hospital, a 56-bed acute-care hospital. It is expected that this facility, as well as individual health care professionals in the Barstow area, would experience an increase in demand for services as a result of the increase in population associated with construction personnel and their families. For the relatively short (six- to nine-months) duration of the initial construction period, this increased demand is not expected to have an adverse effect on the health care capability of personnel and/or facilities in the Barstow area.

Police and Firefighting Services

1. In the project area, police and fire protection services are not locally available, but are provided from Needles, Wonder Valley, and Twentynine Palms. Requirements for remote emergency response to the project area could increase during project construction. Fire protection and emergency service for this region of the County is provided by the California Department of Forestry under contract to the County. The closest resources that respond to the project area are located in either Harvard or Needles, both approximately 80 miles from the site. The County also has a mutual aid agreement with the Wonder Valley and Twentynine Palms fire departments that respond to the project area and are located approximately 40 to 50 miles from the site.

2. The anticipated increase of 98 additional households in the Morongo Basin during project construction could affect the demand for police and fire protection services. Given the at-capacity status of the County Sheriff's Department, the requirement to provide services for additional population within the service area could be a significant impact. The additional 98 households are expected to occupy mostly existing housing accommodations (either motel rooms or RV lots) for the project construction period. Therefore, potential demand for fire protection is not expected to exceed existing capability to provide adequate response. Impacts to fire protection services are not expected to be significant.

3. The anticipated increase of 98 additional households in the Barstow area during the project construction period could affect the demand for police and fire protection services. Although adequate to serve the current population of the Barstow area, an influx of temporary construction personnel could result in an increased demand for services. The additional 98 households are expected to occupy mostly existing accommodations, primarily apartments and RVs, during project construction. Therefore, potential demand

TABLE 5.15.4

MORONGO UNIFIED SCHOOL DISTRICT
ENROLLMENT PROJECTIONS AND CAPACITIES(1)

ENROLLMENT	SCHOOL YEAR									
	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01
K - 6	6,422	6,735	7,090	7,424	7,833	8,204	8,599	8,991	9,397	9,921
7 - 8	1,517	1,602	1,714	1,809	1,858	1,936	2,077	2,187	2,309	2,419
9 - 12	2,259	2,446	2,559	2,757	2,884	3,062	3,172	3,340	3,515	3,695
Total	10,198	10,783	11,363	11,990	12,575	13,202	13,848	14,518	15,221	15,935
Permanent Capacity	8,501	8,501	8,501	8,501	8,501	8,501	8,501	8,501	8,501	8,501
Percent Over Capacity	17	21	25	29	32	36	39	41	44	47

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(1) Brown, 1992.

for fire protection is not expected to exceed existing capabilities, and potential impacts would not be significant.

Solid Waste Disposal

1. No solid waste disposal facilities are available in the project area. Solid waste that is generated during project construction will be segregated for proper disposal. Inert construction debris will be sorted and stored onsite for disposal in the Bolo Station Landfill, once it is operational. Other waste, such as food and paper, will be collected and stored onsite, then trucked to an approved Class III landfill. The project construction waste would be negligible in terms of total solid waste generated in the desert region, however, it would represent a minor increase in the fill rate of the facility used.

2. Impacts to the Morongo Basin would accrue from the additional population of 262 contributing solid waste to the existing waste stream. Based on the relatively short period of project construction, this is not considered a significant impact to local landfill capacity. However, it would contribute incrementally to the filling of the Landers and Twentynine Palms landfills that service this area.

5.15.1.4.2 Operations

Schools

1. Because housing is generally not available in the project area, new residents are not anticipated. Therefore, local schools are not expected to be affected by population increases related to project operations.

2. As shown in Tables 5.15.1 and 5.15.2, it is estimated that direct project employment would result in 101 school-age children being added to the Morongo Basin. As shown in Table 5.15.4, enrollment for the 1991-1992 school year was approximately 17 percent over the district's permanent capacity. Projected enrollments without the proposed action are expected to exacerbate this situation. Based on existing capacity, additional facilities and personnel would be necessary to accommodate the projected influx of school-age children. The additional enrollment related to project operations would be considered significant. It is estimated that indirect employment related to the proposed action would result in an additional 38 students in the Morongo Unified School District. Combined with students from direct project employment, this would be a significant impact.

3. Enrollment in the two Barstow school districts is expected to increase by a total of about 168 children as a result of project-related employment. About 122 children are expected to result from direct employment provided by landfill operations, and 38 from indirect employment. The impact of this increased enrollment would depend upon the number of students that enroll in each district. The Barstow Unified School District is close to capacity and has no plans for expansion. However, it does have two schools that are unoccupied and that could be made available, if necessary (Pitcher, 1992). The Silver Valley Unified School District is currently under capacity and would be able to accommodate an increase in enrollment. Therefore, potential impacts to the two Barstow school districts are not expected to be significant.

Health Services

1. The 204 landfill operations personnel working at the site may result in some increased demand on the nearest health care services, primarily in the Morongo Basin, as there are currently no health care personnel or facilities in the project area. The proposed action includes provision for emergency vehicles and paramedics, and a helipad that would be accessible to both operations personnel and residents of the project area. Impacts to the health care base in the Morongo Basin are expected to be incremental, related to the projected overall growth of the eastern County.

2. The addition of 303 persons and 113 persons indirectly to the Morongo Basin would create an incremental increase in demand for existing health care and services provided by the Hi-Desert Medical Center. Existing facilities currently serve a population of about 75,000 and are expected to be adequate to accommodate the additional landfill-related population of 416 that is expected to reside in the Morongo Basin. However, this would represent an incremental increase in demand for these services and facilities and put additional pressure on the Hi-Desert Medical Center, which currently operates at an 85 percent occupancy rate.

3. The addition of about 365 persons directly and 137 persons indirectly to the Barstow area would create incremental demand to existing health services and the Barstow Community Hospital. With an occupancy rate of less than 60 percent, the existing 56-bed hospital is adequate to accommodate an anticipated increase in direct and indirect population related to the proposed action.

Police and Firefighting Services

1. The addition of a 204-person workforce in the project area could result in an increase to the existing demand for police and fire protection services. This additional demand is expected to be minor, as the proposed action includes provision for firefighting equipment and personnel, and site security. However, the County Forestry and Fire Warden Department has indicated that a condition for its approval of the project will require the construction of a fire station, and funding for equipment and staff (Miller, 1992b). Impacts to the County Sheriff's Department, which provides police protection, are not expected to be significant.

2. Police protection in the Morongo Basin is provided by the County Sheriff's Department. From 1990 to 1991, calls for service in the Morongo Valley increased approximately 16 percent. During the same period, the number of patrol officers decreased by almost 10 percent. The addition of an estimated 303 direct project-related persons and 137 indirect population to the Morongo Basin would further exacerbate this situation, requiring the addition of at least one patrol officer to the area, plus additional staffing for the jail. According to the Sheriff's Department, "...any increase in population will have a definite impact on our ability to provide service" (Ripley, 1992). Therefore, project-related impacts to the existing police protection capability in the Morongo Basin would be considered significant.

3. As shown in Tables 5.15.1 and 5.15.2, the proposed action would result in about 102 new households being established in the Morongo Basin. These households are expected to be scattered throughout the basin's six communities, from Morongo Valley on the southwest to Twentynine Palms on the northeast. This incremental addition to existing households in these communities is expected to be within the capacity of existing fire protection services, although it would represent an incremental addition to the total number of structures in the service areas, and potential requirements for additional equipment, facilities, and personnel.

4. The proposed action would result in about 123 new households and a population increase of about 502 persons to the Barstow area. This would contribute to the incremental growth of the area and corresponding increase in the demand for services. In general, based on existing levels of police and fire protection, these impacts are not expected to be significant. However, if Barstow's population increase were to result in conditions that affect the County Sheriff's Department, it could be considered significant. Patrol personnel is nearly at capacity, and the jail is overcrowded and in need of additional personnel (Webster, 1992).

Solid Waste Disposal

1. Solid waste generated during project operations would be disposed of onsite. Therefore, requirements for solid waste disposal in the project area would not be affected.

2. The solid waste generated by new project-related population of 416 (303 direct, 113 indirect) in the Morongo Basin would represent an incremental increase to the existing waste stream. The solid waste would likely be disposed of at the Landers or Twentynine Palms landfills and would incrementally contribute to increasing fill rates.

3. The proposed action is anticipated to add about 502 persons to the Barstow area (365 direct, 137 indirect). This additional population would result in an incremental increase in the generation of solid waste in the Barstow area and consequent fill rate of the Barstow Landfill. However, based on the current and anticipated use of the landfill, this impact is not expected to be significant.

5.15.1.5 Public Utilities

5.15.1.5.1 Construction

Telephone

1. In the project area, requirements for additional telephone service to accommodate landfill construction would be met by utilizing a microwave dish. Construction of new facilities would be considered part of the proposed project.

2. Telephone service for construction-related population in the Morongo Basin and in Barstow could be accommodated by existing facilities and equipment. Therefore, the impact to telephone service would not be significant.

Natural Gas

1. Natural gas is not supplied to the project area and so would not be affected by project construction activities.

2. Gas service to the Morongo Basin is adequate for project-related construction population who would reside in existing housing units. Therefore, no impacts are anticipated.

3. Natural gas supplies for Barstow are adequate to supply both existing and increased demands. Therefore, no impacts are anticipated related to project construction personnel.

Electricity

1. Electrical service for construction needs at the landfill site would require the addition of a new service line (see Chapter 3.0). Limited service could be provided during project construction. Impacts are not expected to be significant.

2. Impacts to electrical service in the Morongo Basin as a result of an influx of construction-related population to the Morongo Basin and Barstow areas are not expected to be significant. This population could be accommodated by existing housing facilities and so would not place additional demand on existing systems.

Sewage Disposal

1. During project construction, sewage disposal at the landfill site would be accommodated by portable sanitary toilets that would be maintained by a licensed septic pumper. Impacts would not be significant.

2. In the Morongo Basin, construction-related personnel would occupy existing housing units and facilities and so would not add to the area's sewerage needs. Impacts are not expected to be significant.

3. In Barstow, the increase to existing sewerage requirements from construction-related population would be well within the capacity of the existing system. Therefore, impacts would be minor.

Water

1. Potable water would be supplied to landfill construction workers from an onsite well or would be hauled to the site by rail car or tank truck. During the initial six- to nine-month construction period, approximately 1,000 gallons per day of potable water would be required. Based on hydrogeologic field studies, it has been estimated that the onsite well located in Section 9 can produce a maximum of 100 gallons per minute without impacting offsite ground water uses. The 1,000 gallons per day requirement during construction will not exceed this 100 gallons per minute limitation. Other construction-related requirements for water are addressed in Section 5.4.1.2.

2. Water for construction-related residents in the Morongo Basin would be supplied from existing systems. Water requirements for this temporary and relatively small population would not be significant.

3. Water for construction-related residents of Barstow would be supplied from the existing system. Although the system is close to capacity, it is expected that requirements for this temporary and relatively small population would not be significant.

5.15.1.5.2 Operations

Telephone

1. Requirements for telephone service in the project area are expected to exceed the capability of existing facilities. Although the provider has existing capacity for the additional demand, new facilities and/or equipment would be required in the project area. However, even with the need for additional facilities, the impacts are not considered significant as the increase would not exceed the overall capacity of the system.

2. The requirements of the additional direct and indirect population in the Morongo Basin could be accommodated by existing system capacity and equipment (Bardon, 1992). Therefore, impacts would not be significant.

3. The capabilities of Continental Telephone in Barstow are sufficient to accommodate the additional demand of project-related population growth (Herrera, 1992). Therefore, impacts would not be significant.

Natural Gas

1. Natural gas does not serve the project area and is not planned to be installed for operation of the landfill. Therefore, impacts would not be significant.

2. In the Morongo Basin, there is ample supply of natural gas to meet current demand (Southern California Gas Company, 1992). However, if system expansion were required to meet the demand of expected new population, additional regulator stations and service pipeline extensions may be required. These new facilities would represent an incremental increase in demand to the existing system. However, since existing capabilities would not be affected, impacts would not be considered significant.

3. In Barstow, there is ample supply of natural gas and a five-year plan whereby the provider can get virtually unlimited supplies, as needed (Mason, 1992). Therefore, an increase in demand related to population growth generated by the proposed action would not be significant.

Electricity

1. In the project area, current service would need to be expanded to supply the electrical needs of an operating landfill (SCE, 1992). Upgrading of electrical service would be necessary to meet the landfill power requirements. However, while service would need to be extended to the site, the electrical use at the site will not exceed the capacity of the system. Therefore, the impacts to the SCE system are not considered significant.

2. Impacts to the Morongo Basin would not be expected to be significant, as that system is capable of accommodating projected service requirements for the next 20 years. Population growth such as is anticipated as a result of the landfill has been accommodated in existing plans. A new substation is expected to be operational in August 1992 (SCE, 1992).

3. Effects to electrical service in the Barstow area are not expected to be significant, as the existing system has sufficient capacity to accommodate the potential project-related population increase.

Sewage Disposal

1. During project operations, sewage disposal for employees at the landfill site would be accommodated by septic tanks and leach lines from the permanent landfill support facilities. Portable sanitary toilets would be used at remote areas of the landfill and would be maintained by a licensed septic pumper. Impacts are not expected to be significant.

2. In the Morongo Basin, new housing would require individual septic systems. Some of the project-related population would occupy existing residential units, and some would require new housing. Overall, there would be an incremental increase in the amount of sewage generated in the Morongo Basin. Such an increase in not expected to be significant.

3. Most of Barstow and some of the surrounding area are connected to a wastewater treatment plant that currently operates at about 55 percent of its design capacity. It is projected that the plant is sized to last until about 2010 (Aviles, 1992). Impacts to this system from project-related population growth would not be significant.

Water

1. In the project area, water for landfill operations would be supplied from two new onsite wells. The project demand would represent an increase to existing rates of water use in the project area (see Section 5.4.1.2).

2. With a minimum estimated demand of 59 gallons per day per person (Hillman, 1992), the estimated daily water use of the 416 new residents of the Morongo Basin would be about 24,500 gallons per day. This demand would represent a substantial increase in local requirements for potable water. This water would be supplied from existing systems, which are either in short supply or overdraft. Therefore, the additional requirement would be considered significant.

3. The anticipated population increase of about 502 persons would result in an additional demand to the Barstow water system, which currently is close to capacity (Seamans, 1992). Assuming 59 gallons per day per person, demand would be increased by about 29,600 gallons per day. The impact of this additional demand is considered significant for a system that is within six percent of the number of connections allotted by the DHS.

5.15.1.6 Economic Effects

5.15.1.6.1 General

1. Implementation of the proposed action would result in economic effects during both the construction and operations phases. During construction, there would be expenditures by Rail•Cycle for products and services to support construction efforts and for construction personnel wages and salaries. Further, economic impacts would result from expenditures by Rail•Cycle for landfill equipment and supplies, some of which would be a one-time occurrence for the purchase of materials to construct/install operational facilities and equipment. During construction, revenues would accrue to both the County and local jurisdictions from taxes on Rail•Cycle expenditures for goods and services, wages and salaries, and from taxes on goods and services purchased by construction personnel in the County. Further, there would be direct effects to local jurisdictions from the purchase of goods and services by construction personnel.

2. During operations, revenues to the County are expected to accrue from landfill fees to be negotiated with Rail•Cycle that may be based on the volume of waste received by the Bolo Station landfill. There also would be revenues from the payroll taxes of operations personnel. Sales taxes would accrue to the County from the purchase of goods and services by landfill-related population. Ongoing purchases of landfill supplies and equipment are expected to benefit suppliers in the County, and also provide additional tax revenues to the County and local jurisdictions. Expenditures and taxes from indirect employment also would accrue to the County and to local jurisdictions, primarily the Morongo Basin and Barstow.

3. Other economic effects would accrue from the establishment of additional housing, facilities, and services to accommodate the anticipated influx of population, primarily in the Morongo Basin. The requirement for additional housing would likely be an economic asset, as the housing industry is an economic growth indicator and stimulus for growth in other sectors of the economy. However, the associated need for additional services could stress resources that already are in short supply in the Morongo Basin and/or Barstow, such as water, school facilities and personnel, and emergency services.

5.15.1.6.2 Solid Waste Management System

1. In addition to the expected revenues the County would collect as landfill tipping fees at Bolo Station, the proposed action could result in costs to the County's solid waste management system. Various costs are incurred by the County in operating its solid waste system through the County Solid Waste Management Department. Many of these costs are funded through tipping fees, which normally are established on a per ton basis and reflect the projected cost of County solid waste services. Typical costs for providing solid waste systems include, but are not limited to:

   - Day-to-day landfill operating costs.
   - Purchase or lease of landfill equipment to replace existing equipment or expand operations.
   - Landfill closure costs.
   - Landfill postclosure monitoring and maintenance costs.
   - Acquisition and development of new landfills.
   - Solid waste system management overhead.

2. As long as the amount of solid waste requiring landfilling at County landfills remains relatively consistent with the County's projected volumes used to establish tipping fees, sufficient funds should be collected to offset the costs identified above. However, if solid waste volumes decrease, those costs funded through a per ton tipping fee may not be fully realized, and a deficit could develop. While a portion of the costs can be tied directly to the tonnage requiring disposal, other costs are relatively fixed. If insufficient solid waste volumes are landfilled, the County may have limited alternatives other than to increase the per-ton tipping fee.

3. In addition to the portions of the County-wide solid waste system managed by the Solid Waste Management Department, SBCDEHS also incurs costs for solid waste management programs that are funded through tipping fees collected at County landfills. These programs include but are not limited to:

   - Solid waste facility permitting and regulatory compliance as the County's LEA.
   - County-wide household hazardous waste management.
   - County-wide abandoned vehicle management.
   - Environmental health and safety compliance and inspection.

4. While portions of the costs incurred by the SBCDEHS are funded through permit and inspection fees for landfills located in the County, the costs for household hazardous waste management and abandoned vehicle programs are funded through tipping fees collected at landfills within the County. The costs for these programs are relatively fixed and may be adversely affected by a reduction in tipping fees due to a decrease in the volume of waste being landfilled at County landfills.

5. Decreases in the volume of solid waste landfilled at landfills in the County could occur for several reasons, including, but not limited to:

   - Source reduction, recycling, and composting to meet the goals and objectives of AB 939.
   - Decisions by County municipalities to contract with out-of-county landfills due to lower disposal costs.
   - Diversion of waste to MRFs that have contracts with out-of-county landfills.
   - Diversion of waste to in-county private landfills.

6. Rail•Cycle has discussed the location of MRFs in various cities in southern California, including communities in San Bernardino County. If cities in the County reach an agreement for a Rail•Cycle MRF, waste currently being disposed of at County-owned landfills could be diverted to the proposed Bolo Station Landfill. The County generates approximately 5,000 tons per day of solid waste. As envisioned, Rail•Cycle's MRFs will have a daily capacity of 3,000 to 4,500 tons per day. Therefore, the location of a single MRF in the County could potentially divert 60 to 90 percent of the total solid waste requiring landfilling in the County. Diversion of this percentage of the solid waste requiring landfilling could have a significant adverse impact on the County's ability to fund its solid waste management system. This would be considered to be a significant impact.

5.15.2 CADIZ VALLEY ALTERNATIVE SITE

1. Implementation of the Cadiz Valley Alternative would involve the same schedules, procedures, and numbers of construction and operations personnel as the proposed action. Although the Cadiz Valley Alternative site is about nine miles southeast of the Bolo Station site, the nearest potential locations for housing and facilities are the same. Therefore, it is projected that the social and economic effects would be equivalent, for both this alternative and the proposed action.

5.15.3 REDUCED ACTION ALTERNATIVE

1. The Reduced Action Alternative would result in a landfill that would be about 40 percent of the volume of the proposed action. However, due to facility requirements, there would not be a concurrent 40 percent reduction in construction or operations personnel. Since initial construction includes the visitor's center, access road, and Route 66 interchange, as well as offloading and landfill facilities, the initial construction phase would be the same as that for the proposed action, with a six- to nine-month construction period and a 262-person work force. Therefore, the social and economic impacts of project construction would be the same for the Reduced Action Alternative as for the proposed action.

2. The Reduced Action Alternative would dispose of waste at a rate of about 9,000 tons per day for 40 years, compared to the proposed action rate of 21,000 tons per day for 60 or more years. This reduction in daily operations would result in a smaller work force of about 179 persons, compared to 268 for the proposed action, a reduction of about 33 percent. The anticipated personnel requirements for the Reduced Action Alternative are shown in Table 5.15.5.

TABLE 5.15.5

LANDFILL OPERATIONS PERSONNEL REQUIREMENTS REDUCED ACTION ALTERNATIVE

YEAR	TONS/DAY	DAILY LANDFILL SHIFTS	LANDFILL PERSONNEL	UNIT TRAIN PERSONNEL	TOTAL REQUIRED PERSONNEL
1	3,000	1	73	14	87
2	6,000	1	97	14	111
3-40	12,000	2	151	28	179

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3. Social impacts associated with project operations would be reduced by about 33 percent, corresponding to the lesser personnel requirements for this alternative. Therefore, population growth and the associated demand for housing, utilities, and services, described in Section 5.15.1, also would be reduced by about 33 percent. It is expected that this reduction would be an across-the-board effect, occurring in the two primary areas of expected socioeconomic growth: Morongo Basin and Barstow.

4. Additionally, over the long-term, project economics would be affected by the reduced size of the landfill. However, due to requirements for buildings and facilities, expenditures associated with construction of the landfill and attendant structures and equipment would be about the same for the Reduced Action Alternative as for the proposed action. Further, for the approximate six- to nine-month initial construction period, revenues and expenditures associated with employment and population growth also would be similar to the proposed action.

5. Over the anticipated 40 years of the Reduced Action Alternative, revenues and expenditures associated with employment and population growth would be about 33 percent less for this alternative, compared to the proposed action. Revenues related to operation of the landfill would be reduced by about 60 percent, corresponding to the reduced amount of solid waste disposed of at the proposed landfill.

5.15.4 NO ACTION ALTERNATIVE

1. With this alternative, the social and economic impacts associated with development of a solid waste landfill at Bolo Station would not occur. No long-term employment benefits and no associated population growth would occur. Further, the housing and infrastructure required to accommodate the additional population would not be required. There would be no impact to public services, and the induced employment associated with the growth would not occur. Economic benefits to the County and the local communities, generated by landfill fees, employment spending, and taxes, would not occur.

5.15.5 MITIGATION MEASURES

5.15.5.1 Bolo Station Site

1. The mitigation measures identified below will be applied to the proposed action to reduce impacts to the extent possible.

   - Employment
     - Rail•Cycle will hire from the local labor force to the extent possible, so that the requirements of 262 construction workers and 268 landfill and unit trains operations personnel would have a positive effect on local employment.
     - To the extent practicable, Rail•Cycle will retain the temporary construction personnel for permanent landfill employment positions. This would reduce population fluctuations within the affected communities, in addition to providing consistency in the transition from construction to landfilling operations.
     - Rail•Cycle will implement an ongoing training program so that persons initially hired for entry level positions would be able to improve their skills and their employment status.
   - Population
     - Rail•Cycle will hire construction workers from the local labor force to the extent possible in order to minimize the effect that the temporary project construction requirements would have on local population fluctuations.
     - Rail•Cycle will hire landfill and unit train operations personnel from the local labor force to the extent possible in order to minimize the effect of the proposed action on local population growth.
     - To the extent practicable, Rail•Cycle will hire permanent operations personnel from the construction work force in order to minimize the number of workers and their families who move to the area.

- Housing: It will be a condition of construction and operations contracts that contractor personnel will live in approved housing only. This measure is intended to reduce to the maximum extent possible, the establishment of makeshift camps, temporary, or permanent camps.
- Public Services
  - Fire Protection:
    - A fire/paramedic station will be established in the vicinity of the project area and Rail•Cycle will contribute to a fund for its construction and for the funding of equipment and staff.
    - In compliance with the County Fire Code, 180,000 gallons of water will be reserved for firefighting purposes.
      - A helipad will be constructed in Section 5, at the extreme northeastern site boundary, near the visitor's center. The helipad will be available for use in the event of medical emergencies. The helipad will be illuminated by floodlights at times of emergency.
    - Fire extinguishers will be located throughout the project site.
    - Fire hydrants and hoses will be located to service the facilities.
    - Stored materials will be identified as to their risk of fire, and adequate and proper containment shall be used.
    - Water trucks and tankers utilized in the landfill operation will be available to support the dedicated fire engine, if needed.
    - Buildings and structures will be designed to meet fire prevention standards required by the County Fire Marshall.
  - Schools: The impact to schools will be mitigated through school districts constructing additional classroom space.
  - Public Utilities
    - Telephone: Service will be established at the project site to serve the landfill.
    - Electricity: Low sodium lighting will be used where possible.
    - Wastewater Disposal: A wastewater disposal system will be established at the project site to assure appropriate disposal.
  - Water: A potable water supply and distribution system will be established at the project site to serve the needs of persons at the landfill.

5.15.5.2 Cadiz Valley Alternative Site

1. The socioeconomic mitigation measures for the Cadiz Valley Alternative site would be the same as those proposed for the Bolo Station site.

5.15.5.3 Reduced Action Alternative

1. The mitigation measures for the Reduced Action Alternative would be similar to those for the proposed action.

5.15.5.4 No Action Alternative

1. Mitigation measures are not required for the No Action Alternative.

5.15.6 FEASIBILITY OF MITIGATION MEASURES

5.15.6.1 Employment

1. These mitigation measures are feasible and would minimize potential adverse impacts of labor fluctuation and provide consistency of employment within the eastern County. The costs of implementing these mitigations would be minimal, more a matter of policy than cost. The costs of an ongoing training program would be small and would be compensated by reducing turnover (and its inherent costs) in the landfill workforce.

5.15.6.2 Population

1. These mitigation measures are feasible and would minimize population growth and fluctuation in the eastern County. This would be desirable, as population fluctuations and rapid growth can be socially and economically destabilizing in the communities where they occur.

5.15.6.3 Public Services

1. These mitigation measures are feasible and are planned as part of project implementation. Their primary impact will be to reduce hazards within the landfill area and provide protection for landfill workers.

2. A secondary impact will be to provide facilities and equipment for emergency fire and police protection, as well as emergency medical aid in the project area.

5.15.6.4 Public Utilities

1. Provision of telephone, electricity, sewage disposal, and water to the project area would be feasible and are within the scope of the proposed action.

5.15.7 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

1. Significant unavoidable adverse impacts related to the socioeconomic aspects of the proposed action, would be associated with the employment-related population increase and subsequent consumption of resources. The influx of population relative to the employment provided by the project would result in consumption of additional land and water resources, primarily related to the potential population increase in the Morongo Basin and Barstow areas.

2. In the project area, consumption of ground water would be accelerated by project-related uses. This use of the ground water, while minor, would be considered a significant unavoidable adverse impact of the proposed action as the ground water of the Bristol Basin is being overdrafted by current users.

3. In the Morongo Basin, the increase in population due to the influx of project employees and their families, as well as indirect employees and their families, would result in accelerated use of local ground water so additional consumption is considered to be adverse. Both the Twentynine Palms and Yucca Valley Water Districts are exploring avenues for expanding their current supplies. The increased consumption associated with the project-related population increase in the Morongo Basin is considered a significant unavoidable adverse impact.

4. In the Barstow area, the increase in population due to the influx of project employees and their families, as well as indirect employees and their families, would result in accelerated use of local ground water. The City of Barstow is exploring avenues for expanding its current supply, and the DHS has limited the number of new connections that will be permitted. The increased consumption associated with the project-related population increase in the Barstow area is considered a significant unavoidable adverse impact.

5. The increased consumption of ground water at the project site for landfill operations, and the increased consumption of ground water in the Morongo Basin and Barstow as a result of project related population increases are considered to be significant unavoidable adverse impacts. Therefore, for the purpose of the EIR, a statement of overriding considerations will be required in accordance with the CEQA Guidelines. While NEPA does not have a similar requirement, this information will be useful to the decision makers during preparation of the Record of Decision for the EIS.

CHAPTER 6.0
CUMULATIVE IMPACTS

6.0 CUMULATIVE IMPACTS

6.1 OTHER PROJECTS IN THE AREA

1. A cumulative impact is the effect on the environment which results from the incremental impact of a proposed action when combined with the effects of other past, present, and reasonably foreseeable future actions. The significance of a cumulative impact can be greater than that resulting from individual actions, if the effects of more than one action are additive.

2. In evaluating potential cumulative impacts, it is recognized that future actions will be subjected to a process of environmental review by lead and responsible agencies, and that similar types of mitigation measures and regulatory standards would be required of those future actions. Moreover, it is assumed that if, in the future, the number of new proposed activities were to increase to levels which collectively would cause unacceptable effects, the appropriate agencies would modify their standards and/or policies to reduce the magnitude of effects.

3. Table 6.1 lists significant existing activities and other projects in the study region. The status and potential cumulative effects of the other projects are identified. Projects in the study area identified by the County and BLM are shown in Figure 6.1 and include the following:

- **America Mine** - A proposed open pit mining operation using conventional cyanide heap leach processing methods, designed to process up to 2 million tons of ore annually for up to 15 years. It is anticipated that the project will employ approximately 100 persons during its operational period (Palms Mining Company, 1991).

- **Fort Cady Mine** - Proposed in situ solution mine and processing plant for boric acid. The proposed facility would comprise 250 solution wells, 280 acres of solar evaporation ponds, a 6-acre processing facility, and a 60-acre gypsum deposition area. It is projected to produce 90,000 tons of boric acid per year (County, 1992).

- **Hector Mine Expansion** - Proposed 140-acre expansion of an existing hectorite mine. Mining is expected to continue through 2031 and produce an average of 550,000 cubic yards of overburden annually (County, 1992).

- **Hidden Valley Hazardous Waste Residuals Repository** - The proposed 1,300-acre facility would consist of a receiving area covering approximately 30 acres, several large underground storage areas, unpaved access roads, and a ten-mile road and rail access from Hector. It is estimated that the facility would receive and transfer approximately 30 to 50 rail cars and 10 to 15 truck loads of material per day, with a storage capacity of 120 years (County, 1992).

- **Broadwell Basin Hazardous Waste Residuals Repository** - Proposed facility would accept, treat, and dispose of solid hazardous waste and other wastes that meet state and federal treatment standards (e.g., metal contaminated solid waste residuals and contaminated soils high in liquid fractions). Incoming waste is estimated at 2,000 tons per day with an operational life of 30 years (County, 1992).

- **Parker Mine** - A proposed 12-acre mine site. BLM is conducting a validity examination to ascertain whether valuable mineral rights exist onsite, which is necessary to support the mining claim. This examination is based on the proposed extraction of magnetite, ilmenite, and platinum group metals (County, 1992).

- **Vulcan Mine** - Proposed waste tire repository located at a former open pit iron mine. An estimated 5 to 6 million tons of waste tires could be accommodated at the approximately 30-acre site (White Creek Enterprises, 1990).

- **Ward Valley Low-level Radioactive Waste Facility** - The proposed 1,000-acre facility would consist of a 70-acre disposal area, with an approximately 8-acre area for support facilities, a roadway, and utility corridor. The remaining acreage is intended for use as a buffer zone. The proposed project would provide for the permanent disposal of low-level radioactive waste.

- **Pacific Agriculture Expansion** - Currently, Pacific Agriculture farms 1,440 acres of land near Cadiz. The proposed project would increase the

TABLE 6.1

PROJECTS IN CUMULATIVE IMPACT STUDY REGION

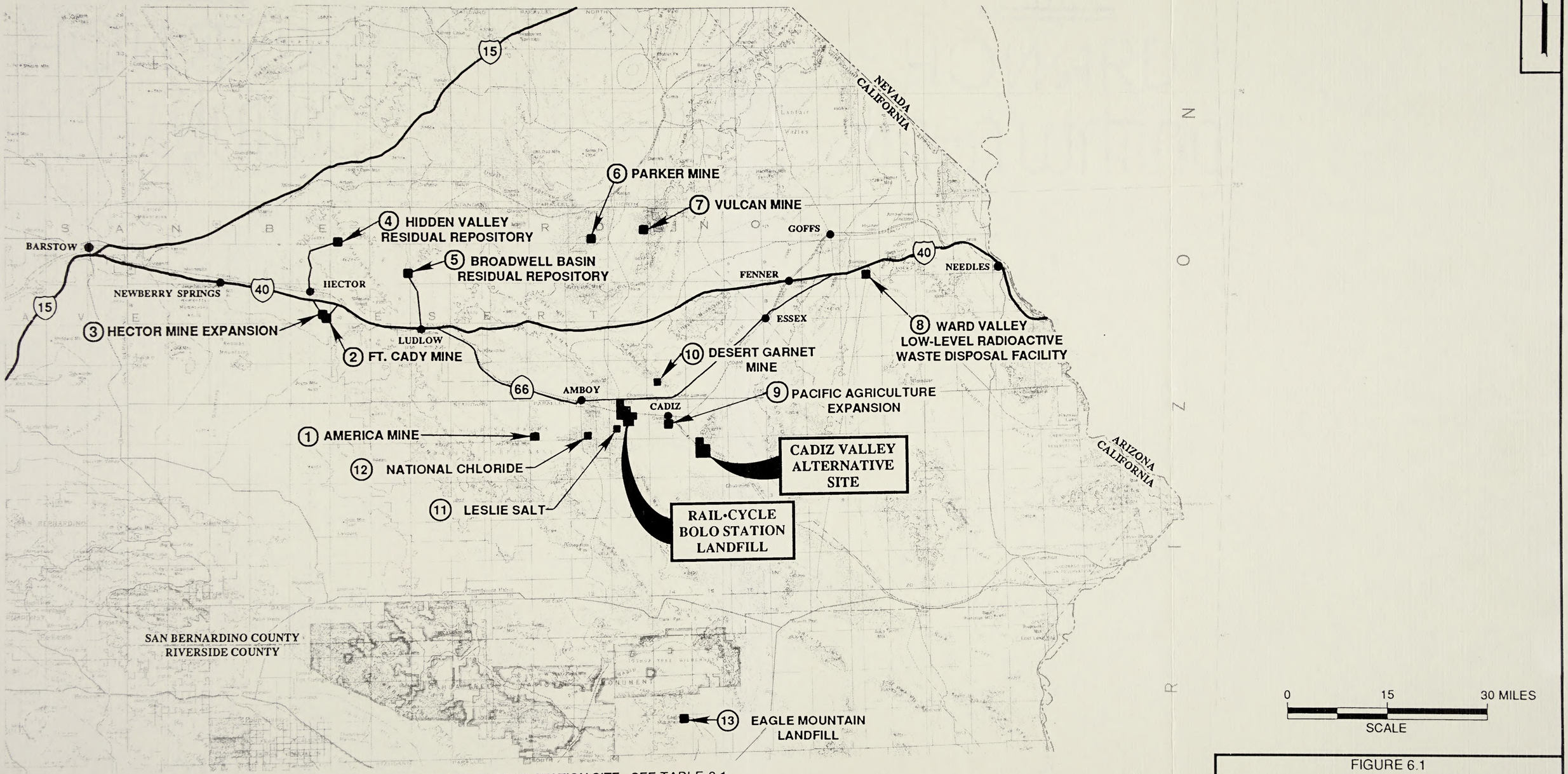
PROPOSED PROJECT[1]	STATUS[2]	POTENTIAL CUMULATIVE ENVIRONMENTAL ISSUES[3]
1. America Mine	Application on file with County - project currently under environmental review.	2, 3, 4, 5, 7, 8, 10, 11, 12, 13
2. Fort Cady Mine	Application on file with County - project currently under environmental review.	3, 4, 5, 7, 8
3. Hector Mine Expansion	Approved by County and BLM in 1992.	3, 4, 5, 7, 8
4. Hidden Valley Residual Repository	Application on file with County - project currently under environmental review.	3, 4, 5, 6, 7, 8, 12, 13
5. Broadwell Basin Residual Repository	Application on file with County - project currently under environmental review. Draft EIR/EIS released for public review and comment in July 1992.	3, 4, 5, 6, 7, 8, 12
6. Parker Mine	BLM is conducting validity examination to ascertain whether valuable mineral rights exist.	3, 4, 5, 7, 8
7. Vulcan Mine	Application for General Plan Amendment on file with County - project currently under environmental review.	5, 7, 12
8. Ward Valley Low-Level Radioactive Waste Facility	Application on file with state - project currently under environmental review.	3, 4, 5, 6, 7, 8, 12
9. Pacific Agriculture Expansion	Application on file with County - project currently under environmental review.	2, 3, 4, 5, 7, 8, 10, 11, 12, 13
10. Desert Garnet Mine	Plan of operations submitted to BLM.	3, 4, 5, 7, 8, 10, 11, 13
11. Leslie Salt	Currently extracting and processing brines from Bristol Dry Lake.	2, 3, 4, 5, 7, 8, 10, 11, 12, 13
12. National Chloride	Currently extracting and processing brines from Bristol Dry Lake.	2, 3, 4, 5, 7, 8, 10, 11, 12, 13
13. Eagle Mountain Landfill	Final EIS/EIR certified by County in October 1992.	3, 4, 5, 7, 8, 12

91-109 (11/4/92/mg)

(1) See Figure 6.1 for location of proposed projects.

(2) Information on the status of proposed projects was provided by the County, except for the Eagle Mountain Landfill which was provided by County of Riverside and BLM.

(3) Issues:
1 Geology or Soils
2 Water
3 Vegetation
4 Wildlife
5 Air
6 Health/Safety
7 Visual Resources
8 Cultural/Paleontological Resources
9 Land Use
10 Socioeconomics
11 Noise
12 Mineral Resources
13 Transportation



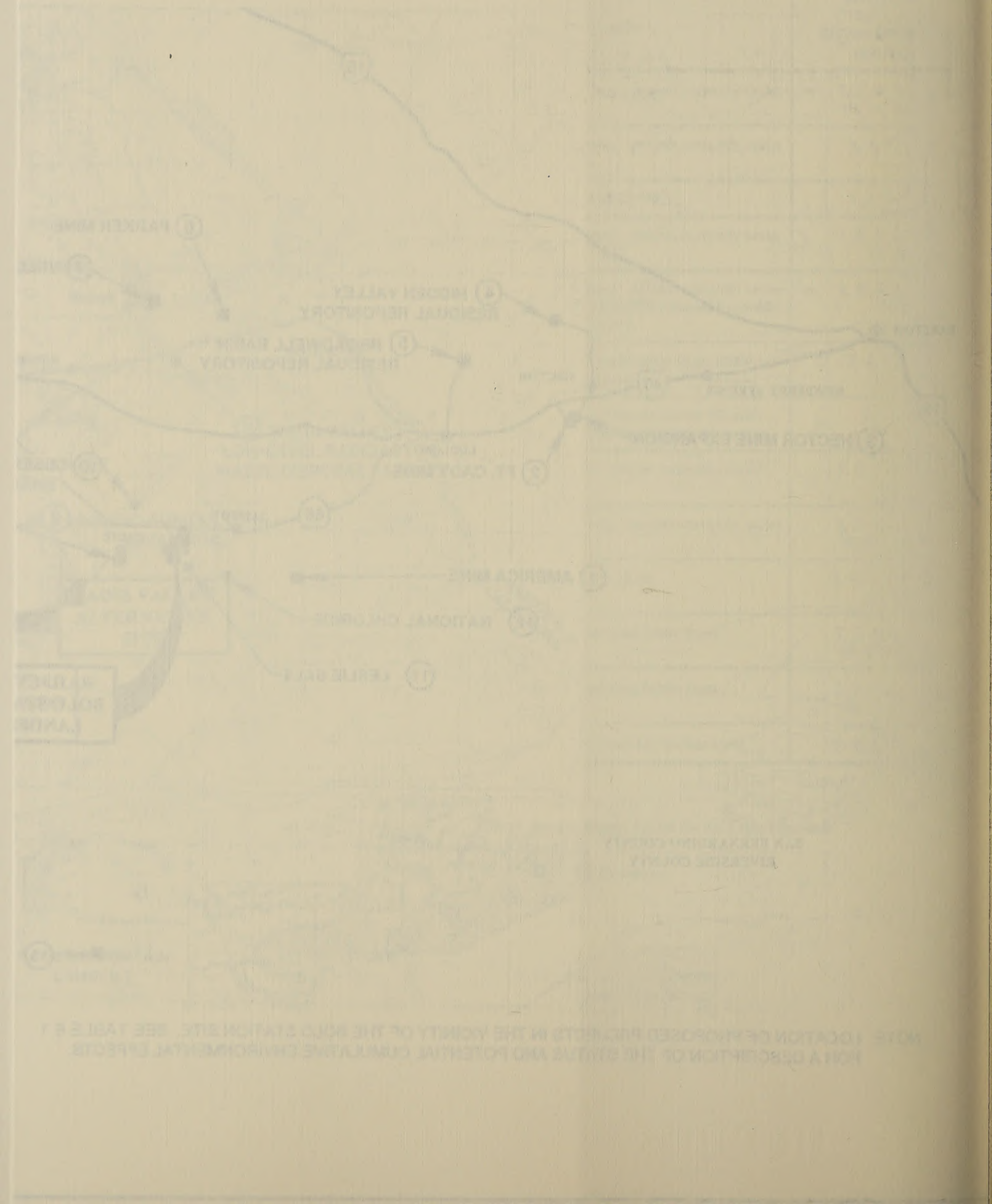
NOTE: LOCATION OF PROPOSED PROJECTS IN THE VICINITY OF THE BOLO STATION SITE. SEE TABLE 6.1 FOR A DESCRIPTION OF THE STATUS AND POTENTIAL CUMULATIVE ENVIRONMENTAL EFFECTS.

FIGURE 6.1

PROJECTS IN THE CUMULATIVE IMPACT STUDY REGION

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.



agricultural area to a total of 9,600 acres including:

- Additional agricultural lands.
- Permanent staff and seasonal workers housing facilities.
- Pre-cooler/processing, maintenance shop, and containers facilities.

Approximately 2,560 acres will be planted with citrus and the remaining with table grapes. The project is expected to be phased over a five- to ten-year period.

- **Desert Garnet Mine** - This proposed mine is located on 120 acres of land on which a mining claim has been filed with the BLM. It is proposed to mine low grade garnet (used for sandblasting) from approximately 3.5 acres. Overburden stockpiles and access roads will occupy an additional 7 acres.

- **Leslie Salt** - This is an ongoing project that extracts brines from beneath Bristol Dry Lake and processes the brine for sodium chloride and calcium chloride. Extraction is conducted from three wells located approximately 2,000 feet southwest of the proposed Bolo Station site.

- **National Chloride** - This is an ongoing project, located near Amboy Road approximately four miles southwest of the proposed Bolo Station site, that extracts brines from beneath Bristol Dry Lake and processes the brines for sodium chloride.

- **Eagle Mountain Landfill** - This proposed 4,695-acre Class III landfill is located in an unused iron ore open pit at Eagle Mountain. As proposed, the landfill would accommodate up to 20,000 tons of nonhazardous solid waste per day for approximately 115 years. Of this total 16,000 tons per day will be shipped in containers by rail and a total of 4,000 tons per day will be delivered by truck (BLM and County of Riverside, 1991).

6.2 GEOLOGY AND SOILS

1. No significant cumulative impacts with regard to geology are expected from the proposed action and other projects in the area.

6.3 MINERAL RESOURCES

1. Several other proposed projects in the study region would be developing lands for purposes other than mineral resources. These projects include: the Vulcan Mine waste tire repository, Pacific Agriculture Expansion, Eagle Mountain Landfill (Riverside County), Hidden Valley Residuals Repository, Broadwell Basin Residuals Repository, and the Ward Valley Low-Level Radioactive Waste Facility. If these projects and the Rail•Cycle project are approved, over 21,000 acres would no longer be available for mining purposes. Two of these projects, the Eagle Mountain Landfill and Vulcan Mine tire repository, are proposed to be located in former iron ore open pit mines. If these projects are approved, remaining iron ore reserves will most likely not be mineable.

2. Four of the projects in the region, will develop or expand mineral resource exploitation: the America Mine, Fort Cady Mine, Hector Mine Expansion, and Parker Mine.

3. Increased urban development in the region, necessary to support the employees from the various projects, would decrease the acreage of land available for mineral resource exploitation, as urban land uses are generally incompatible with mining operations.

4. The Hector Mine Expansion, Fort Cady Mine, and Broadwell Basin Residuals Repository projects are located on land classified as "prospectively valuable" for sodium (BLM, 1980a). However, these sites were not identified as sources for salt in the 1985 Mineral Commodity Report - Salt (Majmundar, 1985b). In 1985, approximately 94 percent of the salt produced in California was from evaporation of sea water. The remaining 6 percent was produced from brines pumped from dry lakes. As no other proposed projects in the region appear to have a significant impact to the quantity and/or quality of salt deposits, no significant cumulative impacts are expected.

5. Bristol and Cadiz dry lakes are sources for calcium chloride through extraction of brines. These brines could be contaminated from surface areas operations. The Pacific Agriculture operations may be capable of contributing to ground water contamination in Bristol Basin through the

leaching of fertilizers, herbicides, and pesticides from the surface into ground water. This creates a cumulative impact on ground water quality in the basin and is addressed in Section 6.4.

6. It is believed that the Bristol Basin is currently in overdraft. A secondary impact to overdraft of the basin is the cumulative lowering of water levels in the lakebed. The mining technique employed by the salt evaporation operations depends on shallow ground water in order to retain brine levels in the ditches. Long-term water withdrawal in overdraft conditions may jeopardize this method. Projects withdrawing water from the Bristol Basin would contribute to the cumulative impact of lower water levels.

6.4 SURFACE HYDROLOGY AND GROUND WATER

6.4.1 SURFACE WATER AND DRAINAGE

1. Surface water runoff from the agricultural lands developed by Pacific Agriculture may contain fertilizers and/or pesticides which could contribute to surface water contamination.

6.4.2 GROUND WATER

1. Only four of the projects included in the cumulative impact study region (i.e., Pacific Agriculture Expansion, the proposed America Mine, the Leslie Salt and National Chloride operations) are located in the Bristol ground water basin. The total water use for these projects is unknown, therefore, although a cumulative impact is expected it cannot currently be quantified.

2. It is believed that the Bristol Basin is currently in overdraft. The additional withdrawal of any quantity of water from an overdrafted aquifer is considered a significant impact. The increase in overdraft developed from the proposed action would only result in a minor incremental additional overdraft above existing or proposed Pacific Agriculture operations.

3. Projects located in the Bristol Basin also have the potential to cumulatively contaminate ground water.

   - Pacific Agriculture has the potential to leach fertilizer and pesticides into the ground water.
   - America Mine has the potential to leach cyanide and metal into the ground water.
   - Leslie Salt and National Chloride also have the potential (although to a lesser degree) to contaminate ground water by carelessness in operations (i.e., oil spills, radiator leaks, etc.).

6.5 VEGETATION

1. Cumulative effects to vegetation from land-altering activities in the project region result in disturbance or loss of vegetated acres. These activities can alter plant communities by facilitating the expansion of invasive species, destroying sensitive or protected plant species or their habitats, or by altering the density or distribution of certain plant communities on a regional basis.

2. The primary cumulative effect related to vegetation is the incremental attrition of native plant communities in the project region. These communities are for the most part widespread in the Mojave Desert, and the loss of small portions of them is not considered to be a significant effect.

3. Within Bristol Basin, cumulative effects to vegetation may be more pronounced. Considering the proposed Pacific Agriculture expansion, the America Mine project, the proposed Desert Garnet Mine and the proposed action, approximately 16,000 acres of native vegetation would be lost or disturbed. Other projects in the region would result in the loss of an additional 2,800 acres of native plant communities. However, revegetation with a native plant mix would be accomplished for the waste disposal and mining projects in the project area. The most notable exception to revegetation in the project area is the ongoing production and expansion of Pacific Agriculture. Therefore, in the long term (100 to 200 years), plant communities are expected to be restored.

4. An additional impact in the project region is the effect of Leslie Salt's and National Chloride's brine extraction operations on Bristol Dry Lake east of Amboy Road. Disturbance of the playa by the brine extraction processes promotes the expansion of tamarisk, a non-native species of tree that is known to establish itself in areas of surface disturbance. While this impact is ongoing, the proposed action is not expected to result in significant disturbance of the playa and is not considered a cumulative impact to the playa. However, the ongoing impacts of Leslie Salt and National

Chloride represents an impact on native vegetative communities in the project region.

6.6 WILDLIFE

1. Cumulative impacts to wildlife can result from land-altering activities that result in disturbance or loss of native biotic communities in project areas. These activities can alter wildlife communities by removing the coversite and forage required by wildlife, destroying sensitive or protected wildlife species or their habitats, or by altering the density or distribution of certain wildlife communities on a regional basis.

2. The primary cumulative impact related to wildlife is the incremental attrition of native wildlife communities in the project region. These communities are common and widespread, and, at this point in time, the loss of small portions of habitat for them is not considered to be a significant effect.

3. Considering the Bristol Basin region only, the cumulative effects of the proposed action, the America Mine project, and the Pacific Agriculture expansion rests in the potential to remove or alter up to 16,000 acres of native biotic communities. This potential disturbance comprises less than 4 percent of Bristol Basin. In the long-term, habitat will be restored during the final closure of most of the proposed projects in the cumulative impact study region, and the productivity of certain areas, such as Eagle Mountain and the Vulcan Mine, for wildlife forage and other values may actually improve.

4. The growth-inducing effects of the cumulative projects in the region, that encourage residential development, may result in an increase in the illegal collection of the desert tortoise.

6.7 AIR QUALITY

1. The primary air contaminant emitted by the various projects in the region is PM_{10}. As noted in Section 5.7.1.2.1, existing background levels of PM_{10} in the vicinity of the proposed action currently exceed the state 24-hour and annual standards. Therefore, cumulative PM_{10} emissions would exacerbate existing 24-hour and annual standard exceedances, and would be considered significant, according to the significance criteria established in Section 5.7.

2. In addition to being a federal and state area for PM_{10}, SEDAB is also a state nonattainment area for O_3 and its precursors NO_X and ROG. As discussed in Section 5.7.1.2.1, the proposed action includes various onsite and offsite sources of NO_X and ROG that will increase the frequency of magnitude of SEDAB's exceedance of California's O_3 standard. However, the other projects in the region have limited sources of NO_X and ROG and are expected to have only a minimal cumulative impact.

3. With the possible exception of the proposed Eagle Mountain Landfill, neither the proposed action nor other projects in the area are expected to have cumulative impact on the PSD Class I area at Joshua Tree National Monument.

6.8 PUBLIC HEALTH AND SAFETY

1. Impacts identified in this section are generally site-specific. However, the operation of the following projects in addition to the proposed project may increase the potential for hazardous materials incidents, which may require an increase in the County hazardous materials response capabilities:

   - Hidden Valley Residual Repository
   - Broadwell Basin Residual Repository
   - Ward Valley Low-Level Radioactive Waste Facility

6.9 VISUAL RESOURCES

1. The cumulative impact of the proposed action, together with other projects in the Amboy/Cadiz area, would be the additive but gradual change to the visual environment from human occupation of the desert by industry and housing. Projects in the area involve:

   - Expansion of the existing Pacific Agriculture operation.
   - Development of the America Mine, a heap leach gold mining operation.
   - Development of the Desert Garnet Mine.
   - Continued operation of brine extraction and processing equipment on Bristol Dry Lake by Leslie Salt and National Chloride.

   These projects, with the proposed action, would involve visual impacts that detract from the existing open and expansive visual character of the desert environment.

2. Potential secondary impacts from all of the projects in the region would be related to housing for project workers, and establishment of additional roads and places of commerce. The cumulative impact would be an increase in the rate of human settlement of the desert and the establishment of a visual environment where open space is interrupted more frequently with evidence of human activity.

6.10 CULTURAL RESOURCES

1. Cumulative effects to cultural resources result from land-altering activities in archaeological deposits, or from recreational collecting from surface and subsurface cultural sites, buildings, or structures. This occurs on all of the cumulative project sites where previously undisturbed land is permitted for development. Existing state and federal legislation and regulations require the inventory and evaluation of cultural resources, and the treatment of significant properties that may be affected by a proposed action. These regulatory requirements serve to offset the potential for cumulative effects because either significant sites are preserved, or the significant data contained by the sites are preserved through research, reporting, and curation.

6.11 PALEONTOLOGICAL RESOURCES

1. Cumulative effects to paleontological resources result from land-altering activities in fossiliferous sediments or formations. In Cadiz and Bristol basins, fossiliferous sediments are associated with an ancient lake basin occurring at elevations of 800 feet above msl and lower. Elsewhere in the proposed region, the distribution of fossiliferous sediments relative to anticipated developments is currently not as well known.

2. Anticipated land-altering activities could result in the incremental disturbance and loss of significant paleontological resources, if present, as a result of these proposed developments if mitigation measures are not implemented. The recovery, identification, and reporting of significant paleontological remains, as described in mitigation measures, is considered beneficial because the regional database is incompletely defined at present. In addition, fossil data would aid in reconstruction of the geologic history of the region by providing chronological controls for the geologic processes represented.

6.12 TRANSPORTATION

1. Other proposed or existing projects within the vicinity of the proposed action which could contribute to cumulative impacts include:

   - Vehicular Impacts
     - America Mine
     - Pacific Agriculture
     - Desert Garnet Mine
     - Leslie Salt
     - National Chloride
   - Railroad Impacts
     - Hidden Valley Residuals Repository

2. The cumulative impacts associated with these projects have not been quantitatively compared with those of the proposed action, but are not expected to create significant impacts, based on the available capacity of existing highways and railroads.

6.13 NOISE

1. Proposed or existing projects within the vicinity of the proposed action which could lead to cumulative impacts include:

   - America Mine
   - Pacific Agricultural Expansion
   - Desert Garnet Mine
   - Leslie Salt
   - National Chloride

   Since the proposed action has relatively minor impacts due to noise and due to attenuation of noise from this proposed action in relation to other projects, cumulative noise impacts are not expected.

6.14 LAND USE

1. No cumulative impacts to land use issues are expected to occur resulting from the proposed action or the other projects in the area.

6.15 SOCIOECONOMICS

1. Cumulative impacts related to socioeconomic issues and resources would occur in response to other major development in the project region. This would lead not only to additional jobs, but also to increased population, housing demand, and requirements for services and utilities. These impacts would be considered significant if they would require new or additional facilities and/or personnel to accommodate the increase in demand.

2. Within the project region, 13 proposed developments are being considered, 12 in San Bernardino County and one in Riverside County, as shown in Figure 6.1. Cumulative socioeconomic impacts to the Morongo Basin communities would occur primarily as a result of implementing the proposed action in conjunction with the two other projects that are within the designated "project area" for this EIR/EIS--the Pacific Agriculture Expansion and the America Mine. Impacts are likely to occur to the Barstow-Newberry Springs area related to the Hector Mine Expansion, Fort Cady Mine, and the Hidden Valley and Broadwell Basin residual repositories. Both Needles and Barstow would likely be affected by development and operation of the Parker, Vulcan and Desert Garnet mines, and the Ward Valley Low-Level Radioactive Waste Facility, with minor effects possible in the nearby desert communities of Goffs, Fenner, Essex, and Ludlow.

3. For the eastern Mojave region delineated by the major population centers of Barstow, Needles, and the Morongo Basin, the cumulative socioeconomic impact of implementing the potential projects would be overall population growth, with the attendant need for housing, public services and utilities. Also, there would be an overall increase in the level of activity in the vicinity of each of these projects, plus an associated increase in the demand for County services, such as for police, fire, and medical emergencies.

4. The extent of the cumulative socioeconomic impact would greatly depend on the timing of these potential developments, as well as on the number of people to be employed by them. Also, cumulative impacts to County financial resources would be affected to the extent that these projects contribute to the County tax base that would provide funding to meet the increased demand for additional services and infrastructure.

5. In the project area, expansion of the Pacific Agriculture facility would result in the addition of about 2,400 seasonal workers and 115 permanent workers and their families. Development of the America Mine would result in year-round employment for about 100 workers. Assuming that each of the permanent employees moves to the area as a new resident, with an average family size of 2.97, the cumulative population increase for the three projects (proposed action, Pacific Agriculture, and America Mine) could be about 1,245 persons. Such cumulative population increase would result in the need for housing, services, and utilities beyond that projected for the proposed Bolo Station Landfill alone.

6. Implementation of the three potential projects in the Amboy-Cadiz area, would be expected to result in the following impacts:

   - Increased demand for housing in the Morongo Basin, with possible associated pressure on rents and housing prices. The extent of this impact is not known at this time, but upward pressure on rents and purchase prices also would affect persons who are in the region but unrelated to the potential projects.
   - Increased demand for police and fire/emergency services. This impact would be significant, as it would require additional personnel and facilities.
   - Need for school facilities and personnel for both elementary and secondary education in the Morongo Basin, Barstow and Needles school districts. This impact would be significant, as it would require the establishment of new personnel and facilities in areas where current resources are near or over capacity.
   - Increased water use to serve the population influx, primarily in the Morongo Basin and Barstow areas. This impact could be significant as existing demand exceeds or approaches supply and is creating the need to secure additional sources of water for these areas.

CHAPTER 7.0
OTHER REQUIRED CONSIDERATIONS

7.0 OTHER REQUIRED CONSIDERATIONS

1. This chapter focuses on certain other impacts of the proposed action as required by CEQA and NEPA. These issues include:

   - Relationship between short-term uses and long-term productivity.
   - Irreversible and irretrievable commitments of resources.

   Additional CEQA-specific requirements include:

   - Growth-inducing effects of the proposed action, whether implemented at the Bolo Station or Cadiz Valley Alternative sites.
   - Energy consumption and conservation.

   This analysis is based on detailed discussions of environmental consequences presented in Chapter 5.0.

7.1 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

1. The purpose of this section is to identify cumulative and long-term project impacts that narrow the range of beneficial site uses or pose long-term risks to public health and safety. The environmental impacts of a proposed Class III landfill must be balanced with societal needs for such facilities. The success of a landfill is measured by the interim and long-term uses it provides, while satisfying environmental requirements included in various regulations (i.e., CCR Titles 14 and 23, and 40 CFR Part 258, Subpart D).

2. The proposed action would provide waste disposal for a number of communities and counties in the southern California area for approximately 60 to 100 years. In return, 3,200 to 4,800 acres of land would be committed to waste disposal and associated, supporting land uses and buffer zone for an indefinite period of time. Implementation of the proposed action at the proposed Bolo Station or Cadiz Valley Alternative sites would result in project-specific and cumulative impacts including, but not limited to, land use, land form alteration, ground water supplies, wildlife, air quality, and aesthetics. While significant, unavoidable impacts associated with the proposed action could occur, as discussed in Chapter 5.0, most impacts can be mitigated to below a level of significance.

3. The biological activity within the landfill footprint and supporting use areas would in part be destroyed or disturbed. Deposited municipal solid waste at the landfill site would remain for the foreseeable future; although the landfill would be closed and covered, long-term constraints on future land uses of the site would remain.

4. Implementation of the proposed action may potentially impact ground water in the area; however, the project will be designed to avoid contamination in accordance with CCR Titles 14 and 23, and 40 CFR, Part 258, Subtitle D. These design features incorporate:

   - Low permeability composite liner.
   - Leachate collection and treatment system.
   - Monitoring wells.
   - Review by regulatory agencies.

   An additional factor that would reduce the potential for ground water impacts include processing the waste through MRFs to remove residual moisture (which could lead to the formation of leachate) and the arid climate of the site. Therefore, the potential for a long-term effect on ground water quality is expected to be reduced to below a level of significance.

5. Although use of the Bolo Station or Cadiz Valley Alternative sites as a Class III landfill would, during the life of the landfill, destroy native plant communities at the site and add incrementally to the loss of natural areas in southern California, this is not considered to be a permanent impact to plant communities because of revegetation during closure. The reduction of natural plant communities would decrease available range for some animals in the Mojave Desert area during operation of the landfill while considered to be a long-term effect is not a significant impact.

6. Air quality impacts attributable to operation of the landfill, as discussed in Section 5.7, would continue until closure of the site. In addition, biological decomposition of organic wastes disposed at the landfill would continue for an undetermined period of time after closure and

would contribute to fugitive emissions of methane, CO_2, ROG, and potential toxic air contaminants through the surface of the closed landfill. In addition, for as long as landfill gas generation is sufficient to sustain combustion, gases would be collected and flared at the landfill flare station which would emit additional quantities of NO_x, SO_x, ROC, CO, PM_{10}, and potential toxic air contaminants. Long-term air resources impacts attributable to fugitive landfill gas emissions and operation of the flare station would, at the time of landfill closure, be equivalent to impacts summarized in Section 5.7, and would reduce gradually over time as the volume of landfill gas production declines.

7. The Bolo Station site is currently undisturbed with the exception of the ATSF rail line. Mineral extraction uses (i.e., Leslie Salt and National Chloride) are located in the immediate vicinity of the site. Aesthetically the site is currently viewed as open, undisturbed land. If the proposed action is approved, the aesthetics of the site would change from undisturbed to a site typical of light industrial uses. As the landfill progresses over a period of 60 to 100 years, portions of the site would have the appearance of an active construction site with heavy equipment on slopes or which the vegetation had been removed. At the end of the proposed action, 60 to 100 years in the future, the site would once again have the appearance of open, undisturbed land, even though the land form will have been altered.

7.2 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

1. Potential project consequences that commit non-renewable resources to uses that are not likely to be reversed in the future are termed irreversible. As with most landfill or other land development projects, the primary irreversible change would be the long-term commitment of the Bolo Station or Cadiz Valley Alternative sites to Class III landfill.

2. The proposed action would result in significant topographic change of the Bolo Station or Cadiz Valley Alternative sites, an alteration which is permanent and irreversible. Both the topography and visual quality of the area would be affected by grading and disposal activities. A discussion of visual impacts is presented in Section 5.9.

3. Surface water drainage paths would be altered by construction of a landfill and associated surface water control structures. Impacts to water availability in Bristol Basin, as affected by project usage, are considered irreversible (see Section 5.4).

4. The use of resources for energy is irreversible, although this is partially balanced by the generation of energy from landfilled waste in the form of landfill gas. As landfills in metropolitan areas reach capacity, more energy will be necessary to transport refuse to more distant landfills, whether at intermediate distances or desert landfills at greater distances. The Rail•Cycle project has several factors which reduce its net energy consumption, the most significant being the emphasis on rail transport. Double-stack, intermodel trains, such as those being proposed by Rail•Cycle, have an energy consumption rate of 237 ton miles per gallon of diesel fuel as compared to 95 ton miles per gallon of diesel fuel for conventional trucks (Association of American Railroads, 1990). This results in a savings of 142 ton miles per gallon of diesel fuel through the rail haul of waste as compared to the truck haul of waste.

7.3 GROWTH-INDUCING EFFECTS

1. A project is considered growth-inducing if it can foster economic or population growth, or construction of additional housing, either directly or indirectly, in the surrounding environment (CEQA, Chapter 3, Article 11, Section 15126 [g]). Examples of growth-inducing actions include extending urban services into previously unserved areas, extending a major roadway into a previously unserved area, and establishing major new employment opportunities.

2. The Rail•Cycle project expects to employ approximately 260 persons during construction, and approximately 260 during operation of the landfill. Housing for construction and operational employees and indirect employees is not currently available in the project area. On a regional basis, housing is available in the Barstow area but limited in the Morongo Basin. The additional direct and indirect employment offered by the proposed action will attract people to the areas and will result in growth inducing effects in the project region.

7.4 ENERGY CONSUMPTION AND CONSERVATION

1. Construction and operation of the landfill would result in consumption of non-renewable energy resources, which would include propane, diesel fuel, and gasoline. Approximately 770,000 gallons of diesel fuel per month is expected to be used for rail transport. Operation of equipment and machinery used onsite is estimated to require approximately 87,000 gallons of diesel fuel per month. Consumption of gasoline, which would be used for some onsite equipment and personnel vehicles is estimated at about 4,300 gallons per month. Equipment used onsite would be that necessary to support operations at the landfill and would be used in a fuel efficient manner. Electric power for lighting purposes will be supplied by SCE.

2. As required by CCR Title 14, landfill gas (which is typically 50 to 60 percent methane) will be collected. The landfill gas generated by the project could potentially be used onsite and/or exported to supplement energy supplies in the region. During the early years of landfill operation, little landfill gas would be generated and would be com-busted in a flare system. However, after 10 to 12 years of operation, a minimum of 10 million cubic feet could be generated per day increasing to a peak daily generation rate of 53 million cubic feet by year 60. While not a part of the proposed action, if economic volumes of landfill gas are collected in the future, Rail•Cycle may consider construction and operation of a cogeneration facility at the landfill to generate electricity from collected landfill gas. If a decision is made to proceed with cogeneration, appropriate permits and approvals, including CEQA, would be obtained.

CHAPTER 8.0
TERMS AND ABBREVIATIONS

8.0 TERMS AND ABBREVIATIONS

8.1 DEFINITION OF TERMS

1. The definitions below are provided as clarification for terms used in this document.

TERM	DEFINITION
Active fault	Fault with recent seismic activity as to have displaced materials not more than 12,000 years old.
Average Daily Traffic (ADT)	Measured as a one-way trip (a round trip is two one-way trips).
Alluvium	A general term for deposits made by streams on riverbeds, flood plains, and alluvial fans. The term applies to stream deposits of recent time.
Ancillary facilities	Secondary support structure and equipment.
Aquifer	A body of rock that is sufficiently permeable to conduct ground water and to yield economically significant quantities of water to wells and springs.
Area of Critical Environmental Concern (ACEC)	Area where special management is required to protect and prevent irreparable damage to: (1) important historic, cultural, or scenic values; (2) fish and wildlife resources; or (3) other natural systems or processes.
Authority to Construct (ATC)	Written permit which must be obtained from the SBCAPCD prior to construction, alteration, or replacement of any article, machine, or equipment which may emit air contaminants or affect in any way the emission of those contaminants.
Bajada	Gently sloping distal portion of an alluvial fan.
Basement rock	The undifferentiated rocks (commonly igneous or metamorphic) that underlie the rocks of interest in a given area.
Bedrock	The rock that underlies gravel, soil, or other superficial material.
Berm	An earthen structure, generally several feet high, which acts as a barrier to make it difficult for a vehicle to cross, or which redirects the flow of traffic or water.
Breccia	Rock consisting of fragments, more or less angular, in a matrix of finer grained material or of cementing material. May form by faulting or crushing (tectonic breccia), by erosion (clastic breccia), by collapse, by replacement bordering fractures, or by volcanism (e.g., *volcanic breccia*).
California Desert Conservation Area (CDCA) Plan	BLM program which provides for the proper use of desert public lands and resources, while safeguarding the environmental, cultural, and aesthetic values.
California Endangered Species Act (CESA)	Legislation enacted in 1984 to protect floral and faunal species by listing them as "rare," "threatened," "endangered," or "candidate" and providing a consultation process for the determination and resolution of potential adverse impact to the species.
California Environmental Quality Act (CEQA)	Legislation enacted in 1970 to protect the quality of the environment for the people of California through requiring public agencies and decision makers to document and consider the environmental consequences of their actions.

TERM	DEFINITION
Cone of depression	The depression produced in a water table or potentiometric surface by pumping.
Confining bed	A low permeability rock or soil formation that will not transmit water readily, and retards or stops the free movement of water underground. Confining beds have also been called aquicludes, aquitards, or semiconfining beds. Few deposits are completely impermeable--most will transmit some water, though slowly, hence aquifer and confining bed are relative terms.
Contrast	The effect of a striking difference in form, line, color, or texture of a landscape's features.
Cumulative impacts	Two or more individual effects which, when considered together, are significant or compound or increase other environmental impacts. The individual effects may be changes resulting from a single project or a number of separate projects.
dBA	A-weighted decibel; decibel weighted to reflect sounds most sensitive to human ears.
Discharge	Rate of flow at a given instant in terms of volume per unit of time: (1) pumping discharge equals pumping rate, usually given in gallons per minute; (2) stream discharge, usually given in cubic feet per second. In ground water use, the movement of water out of an aquifer. Discharge may be natural, as from springs, seepage, or evapotranspiration, or it may be artificial, with use of constructed drains or wells.
Discretionary actions	For the purpose of CEQA, these are actions or approvals by governmental agencies or boards that require the exercise of judgment or deliberation when making a decision to approve, deny, or approve with conditions a proposed project.
Drawdown	The lowering of the water table or potentiometric surface caused by pumping (or artesian flow). Knowledge of the amount of drawdown at a given pumping rate, over a specified length of time, is necessary to estimate the probable long-term effect on the water table.
Effective velocity	The actual or field velocity of ground water percolating through water-bearing material. It is measured by the volume of ground water passing through a unit cross-sectional area, divided by effective porosity.
Effects	Effect and impact are synonymous as used in this report. Direct or primary impacts are those caused by the project and occur at the same time and place. Indirect, or secondary, effects are those which result from the project which occur later in time or farther removed in distance or time, but are still reasonably foreseeable.
Endangered Species Act (ESA)	Federal legislation enacted in 1973, as amended, that extends legal protection to plants and animals listed as "threatened" or "endangered" and includes consultation with the USFWS.
Endangered species	An animal or plant species which is in danger of extinction throughout all or a significant portion of its range, as defined in the ESA Amendments of 1982 and by the CESA of 1984.

TERM	DEFINITION
Environment	The physical conditions which exist within the area which will be affected by a proposed project or alternative, including but not limited to land, air, water, minerals, flora, fauna, ambient noise, and objects of historical or aesthetic significance. The area involved shall be the area in which significant effects would occur either directly or indirectly as a result of the project. The environment includes both natural and man-made conditions.
Environmental Impact Report (EIR)	A detailed report prepared under the CEQA describing and analyzing the significant environmental effects of a project and discussing ways to mitigate or avoid the effects. An EIR is prepared for use by the public, public agencies and agency decision makers to weigh the environmental consequences of a proposed action.
Environmental Impact Statement (EIS)	An analytical document that portrays potential impacts to the human environment of a particular course of action and its possible alternatives prepared under NEPA. An EIS is prepared for use by the public, public agencies, and agency decision makers to weigh the environmental consequences of a proposed action.
Ephemeral stream	A stream or portion of a stream which flows only in direct response to precipitation. Such flow is usually of short duration.
Evapotranspiration	The process by which water is returned to the air through direct evaporation or by transpiration of vegetation, with no attempt being made to distinguish between the two.
Fault	A fracture or fracture zone along which there has been displacement of the sides relative to one another as a result of seismic activity.
Feasible	Capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors.
Flow line	As applied to the movement of ground water, the path that a particle of water follows as it moves down the hydraulic gradient.
g	The acceleration of gravity (32.2 ft/sec^2).
Green waste compost	A mixture of decaying organic solid waste matter used as fertilizer.
Ground water	Water found beneath the land surface, in the zone of saturation below the water table.
Habitat	The place where an animal or plant normally lives, often characterized by a dominant plant and codominant form, such as creosote bush habitat.
Hazardous material	Substance which, because of its potential for either corrosivity, toxicity, ignitability, chemical reactivity, or explosiveness, may cause injury to persons or damage to property.
Head (static)	The height above a standard datum of the surface of a column of water (or other liquid) that can be supported by the static pressure at a given point.

TERM	DEFINITION
Hydraulic gradient	The gradient (slope) of the potentiometric surface or water table in the direction of the steepest slope, generally expressed in feet per foot or feet per mile. May also be stated as the change in static head per unit of distance in a given direction.
Impermeable	Not capable of transmitting fluids or gasses in appreciable quantities.
Infiltration	Movement of water through the soil surface into the ground. Infiltration takes place above the water table, as distinguished from percolation, which is the more or less horizontal movement of water in saturated material, below the water table.
Initial study	A preliminary analysis prepared by the lead agency to determine whether an EIR or a Negative Declaration must be prepared or to identify the significant environmental effects to be analyzed in an EIR.
Isotropic	Having physical properties (e.g., strength characteristics) which do not vary with direction.
Isotropy	That condition in which all significant properties are independent of direction.
Landfill condensate	Liquid from landfill gas resulting from the temperature decline of gas during collection.
Landfill cover	Low-permeability compacted soil placed over completed sections of a landfill to minimize percolation of surface water through the waste and prevent scavenging.
Landfill gas	Gas produced as part of the biological decomposition of the organic matter present in solid wastes.
Landfill liner	Layer of low-permeability soil (clay) and/or synthetic material applied to the bottom of the landfill to direct leachate to the leachate collection system and minimize leakage in cases of leachate production.
Leachate	Liquid resulting from decomposition of organic waste in a landfill which contains dissolved waste materials.
Lead agency	The public agency which has the principal responsibility for carrying out or approving a project.
Materials Recovery Facility (MRF)	A facility used to inspect and separate loads of waste for recoverable or recyclable materials generated locally.
Mitigation	A method or procedures which may: (1) avoid an impact altogether by not taking a certain action or parts of an action, (2) minimize impacts by limiting the degree or magnitude of the action and its implementation, (3) rectify the impact by repairing, rehabilitating, or restoring the impacted environment, (4) reduce or eliminate the impact over time by preservation and maintenance operations during the life of the action, and (5) compensate for the impact by replacing or providing substitute resources or environments.
Mitigation measure	Method or procedure undertaken for the purpose of avoiding or reducing potential impact(s) of an action.

TERM	DEFINITION
National Environmental Policy Act (NEPA)	Legislation enacted in 1969 that require federal agencies to include in their decision-making processes: (1) appropriate consideration of all environmental effects, and (2) procedures to avoid or minimize adverse effects, and restore and enhance environmental quality as much as possible.
Notice of Preparation	A brief notice sent by the public agency with principle responsibility for carrying out or approving a project to notify other agencies that an EIR is being prepared under CEQA.
Notice of Intent	Similar to the Notice of Preparation, used to notify other agencies and the public that an EIS is being prepared under NEPA.
Ozone (O_3)	An end product of complex reactions between ROG and (or non-methane hydrocarbons) and NO_X in the presence of ultraviolet radiation.
Permeability	A measure of the relative ease with which a porous medium can transmit a liquid under a potential gradient. It is a property of the medium alone and is independent of the nature of the liquid and of the force field causing movement. It is a property of the medium that is dependent upon the shape and size of the pores.
Permit to Operate (PTO)	Permit which must be obtained from the SBCAPCD before the article, machine, or contrivance subject to an ATC is put into operation.
Potentiometric surface	The surface which represents the static head, especially in those aquifers in which water is confined under hydrostatic pressure. As related to an aquifer, it is determined by the levels to which water will rise in tightly cased wells. The water table is a particular potentiometric surface, all points of which are at zero hydrostatic pressure.
Project	The whole of an action, which has a potential for resulting in a physical change in the environment.
Prospectively valuable	Used by BLM in the CDCA Plan to define areas of potential mineral value. Identifies areas having similar geologic conditions to other areas where minerals have been extracted; the inference being that similar deposits are probably present. This determination also includes those areas where there is information that the resource is present, but information as to the extent and quality cannot be ascertained. Under both conditions there should be a reasonable expectation that the deposit will meet at least the minimum characteristics for a valuable deposit (BLM, 1980a).
Public land	Any land and interest in land owned by the United States within the several states and administered by the Secretary of the Interior through the BLM, without regard to how the United States acquired ownership, except: (1) lands located on the Outer Continental Shelf, and (2) lands held for the benefit of Indians, Aleuts, and Eskimos.
Rare species	A species which, although not presently threatened with extinction, is in such small numbers throughout its range that it may become endangered if its present environment worsens.
Recharge	Process by which water infiltrates and is added to an aquifer, either directly or indirectly by way of another rock formation; also, the water itself.

TERM	DEFINITION
Resource	A concentration of naturally occurring solid, liquid, or gaseous material in or on the Earth's crust in such form and amount that economic extraction of a commodity from the concentration is currently or potentially feasible. *Identified resources* are resources whose location, grade, quality, and quantity are known or estimated from specific geologic evidence.
Responsible agency	The organization that has the legal duty to ensure that a project complies with the appropriate rules and regulations.
Right-of-way	The right to pass over property owned by another. The strip of land over which facilities such as roadways, railroads, or power lines are built.
Safe yield of an aquifer	The rate at which water can be withdrawn from an aquifer without depleting the supply to such an extent that withdrawal at that rate is: • Harmful to the aquifer itself (such as causing subsidence). • Harmful to the quality of the water (as in salt water intrusion). • No longer economically feasible.
Saturated zone	Zone in which all the connected interstices or voids in rock or soil are filled with water under pressure equal to, or greater than, atmospheric pressure. The water table is commonly considered to be at the top of the zone of saturation.
Seismicity	The likelihood of an area being subject to earthquakes.
Sensitive species	Generic term for any plant or animal species which is recognized by the government or conservation group as being depleted, rare, threatened, or endangered.
Significant effect	A substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project, including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance.
Source reduction	In this document, measures to reduce the amount or types of municipal solid waste generated.
Specific yield	The ratio of: (1) the volume of water which the rock or soil, after being saturated, will yield by gravity to, and (2) the volume of the rock or soil. The definition implies that gravity drainage is complete. In the natural environment, specific yield is generally observed as the change that occurs in the amount of water in storage per unit area of unconfined aquifer as the result of a unit change in head. Such a change in storage is produced by the draining or filling of pore space and is therefore dependent upon particle size, rate of change of the water table, time, and other variables. Hence, specific yield is only an approximate measure of the relation between storage and head in unconfined aquifers. It is equal to porosity minus specific retention.
Static water level	The level at which water stands in a non-pumping well; the pre-pumping level. Also, the level to which water eventually will return after pumping has stopped, sometimes called the recovery level.

TERM	DEFINITION
Storage coefficient	The storage coefficient is the volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in head. In a confined water body, the water derived from storage with decline in head comes from expansion of the water and compression of the aquifer; similarly, water added to storage with a rise in head is accommodated partly by compression of the water and partly by expansion of aquifer. In an unconfined water body, the amount of water derived from or added to the aquifer by these processes generally is negligible compared to that involved in gravity drainage or filling or pores. Hence, in an unconfined water body, the storage coefficient is virtually equal to the specific yield.
Storativity (or storage coefficient)	The volume of water that can be released from storage per unit surface area of a saturated confined aquifer, per unit decline in the component of hydraulic head normal to the surface. It is calculated by taking the product of the specific storage and the aquifer thickness.
Subsidence	Sinking or settlement of the land surface, due to any of several processes but frequently from the removal of ground water. As commonly used, the term relates to the vertical downward movement of natural surfaces, although small-scale horizontal displacement also may be present.
Sump	An excavation dug in a storage area to collect spillage or drainage from the storage area. Usually an impermeable material is used to line the sump to keep solution from escaping into the outside environment.
Transmissivity	Ability of a rock to transmit water under hydraulic head. The transmissivity is the rate of flow of water at the prevailing temperature, through a vertical unit-wide strip of the aquifer, extending the full height of saturation, under unit hydraulic gradient (one unit of head per unit of flow distance).
Threatened species	Species which, although not presently threatened with extinction, is likely to become endangered in the foreseeable future in the absence of special protection and management efforts.
Transmissivity (or transmissibility)	The rate of flow through a hypothetical vertical strip of the aquifer, where the strip is 1-foot wide and extends the full depth of the aquifer. It is calculated by taking the product of the hydraulic conductivity and the aquifer thickness.
Transpiration	The discharge of water vapor by plants.
Unconfined water	Ground water not under artesian conditions. Generally used to describe water that does not rise above the level at which it is first found, at the time it is found. Seasonal changes in both unconfined and confined water levels may take place as a result of variations in recharge and discharge.
Underflow	Water moving parallel to a stream course through alluvium beneath the streambed.
Unsaturated zone	Zone in which the connected interstices or voids in a permeable rock are not filled with water and there can be movement of air. Generally, the zone between the land surface and the water table, but a zone of aeration can exist below an artesian aquifer, and below a perched water body.

TERM	DEFINITION
Unusual plant assemblages (UPA)	Stands of vegetation identified in the CDCA which can be recognized as extraordinary due to one or more factors, which are unusual age, unusual size, unusually high cover or density, or disjunction from main centers of distribution.
Visual resource	The physical features of a landscape which can be seen (e.g., land, water, vegetation, structures, and other features).
Visual Resource Management (VRM)	The systematic means to identify visual values, establish objectives which provide the standards for managing those values, and evaluate the visual impacts of proposed projects to ensure that BLM objectives are met.
Waste Discharge Requirements (WDRs)	Regulations described in CCR Title 23, Diversion 3, Chapter 15, which governs discharge of wastes to land in order to preserve the quality of the state's surface and ground water.
Waste stream	The total sum of waste materials present from origin to disposal.
Wilderness Study Area (WSA)	A roadless area of public lands which the BLM has determined may possess the wilderness qualities described in the Wilderness Act of 1964. WSAs were established in order to study the suitability of the areas for possible designation as wilderness by Congress. BLM protects each WSA's wilderness qualities until Congress decides whether or not the WSA will be designated as wilderness.
Working face	Portion of the landfill where solid wastes are presently being discharged.
Zone of influence	The area overlying the cone of pumping depression, or cone of water table depression. Also used with regard to tortoise survey transects beyond site boundaries.

8.2 DEFINITION OF ABBREVIATIONS

1. The definitions below are provided as clarification for abbreviations used in this document.

ABBREVIATION	DEFINITION
AB 939	Assembly Bill 939, also known as the California Integrated Solid Waste Management Act of 1989
AB 2448	Assembly Bill 2448 (Eastin)
ACEC	Area of Critical Environmental Concern
ACHP	Advisory Council on Historic Preservation
ADT	average daily traffic
APE	area of potential effect
AQAP	Air Quality Attainment Plan
AQIA	Air Quality Impact Analysis
AQMP	Air Quality Management Plan
ATC	Authority to Construct
ATSF	Atchison, Topeka, and Santa Fe Railway Company, Inc.
BACT	Best Available Control Technology
BDPT	ballast deck pile trestle
BDTR	ballast deck T-rail
BLM	Bureau of Land Management
BMP	best management practices
BOD	biological oxygen demand
CAAQS	California Ambient Air Quality Standards
Cal-OSHA	California Occupational Safety and Health Administration
CARB	California Air Resources Board
CCR	California Code of Regulations
CDCA	California Desert Conservation Area
CDFG	California Department of Fish and Game
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CIWMB	California Integrated Waste Management Board
cm/sec	centimeter per second
CO	carbon monoxide
COD	chemical oxygen demand

ABBREVIATION	DEFINITION
CoIWMP	County Integrated Waste Management Plan
CoSWMP	County Solid Waste Management Plan
County	County of San Bernardino
CUP	Conditional Use Permit
dBA	A-weighted sound level in decibels
DHS	California Department of Health Services
DMAs	Desert Management Areas
DMG	California Division of Mines and Geology
DWR	California Department of Water Resources
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EMD	Environmental Monitoring Department
EMNSA	East Mojave National Scenic Area
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right to Know Act
ESA	Endangered Species Act
°F	degrees Fahrenheit
FAA	Federal Aviation Administration
FLPMA	Federal Land Policy Management Act
GCL	geosynthetic clay liner
GEM	Geology-Energy-Minerals (Resource Area Assessment)
GTE	General Telephone
H_2S	hydrogen sulfide
HDPE	high density polyethylene
HMP	Habitat Management Plan
HQ	Hazard Quotient
HRA	Health Risk Assessment
I-40	Interstate 40
ISCST	Industrial Source Short-Term dispersion model
K-12	kindergarten through grade 12
KLA	known leasing area
KGRA	known geothermal resource area
KGS	known geologic structure
Ldn	day-night noise level
LEA	local enforcement agency
LEL	lower explosive limit

ABBREVIATION	DEFINITION
Leq	equivalent sound level
Lmax	maximum sound level
LOS	level of service
MCE	maximum credible earthquake
MCL	Interim EPA Maximum Contaminant Drinking Water Level
MEI	maximum exposed individual
mg/L	milligrams per liter
mph	miles per hour
MRFs	Materials Recovery Facilities
msl	mean sea level
NAAQS	National Ambient Air Quality Standards
National Chloride	National Chloride Company of America, Inc.
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO	nitric oxide
NO_2	nitrogen dioxide
NOAA	National Oceanic Atmospheric Administration
NPDES	National Pollution Discharge Elimination System
NPPA	California Native Plant Protection Act
NRHP	National Register of Historic Places
NO_x	oxides of nitrogen
O_3	ozone
OSHA	Occupational Health and Safety Administration (federal)
P_b	lead
PCBs	polychlorinated biphenyls
PM_{10}	particulate matter less than 10 microns in aerodynamic diameter
ppb	parts per billion
ppm	parts per million
PSD	prevention of significant deterioration
PTO	Permit to Operate
PUC	Public Utilities Commission
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
ROC	reactive organic compounds
ROG	reactive organic gases
RVs	recreational vehicles

ABBREVIATION	DEFINITION
RWQCB	California Regional Water Quality Control Board
SA	Special Area
SBCAPCD	San Bernardino County Air Pollution Control District
SBCDEHS	San Bernardino County Department of Environmental Health Services
SCAG	Southern California Association of Governments
SCE	Southern California Edison
SCS	Soil Conservation Service
SCRRA	Southern California Regional Rail Authority
SEDAB	Southeast Desert Air Basin
SENEL	single event noise exposure level
SHPO	State Historic Preservation Officer
SMARA	Surface Mining and Reclamation Act of 1975
SO_2	sulfur dioxide
SO_4	sulfates
SPCC	Spill Prevention, Control, and Countermeasure Plan
SWFP	Solid Waste Facilities Permit
SWPPP	Stormwater Pollution Prevention Plan
TDS	total dissolved solids
THC	total hydrocarbons
TOC	total organic carbon
TOX	total organic halogens
UBC	Uniform Building Code
UPA	Unusual Plant Assemblages
USC	U.S. Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compounds
VRM	Visual Resource Management
WDRs	Waste Discharge Requirements
WMNA	Waste Management of North America, Inc.
WSA	Wilderness Study Area

CHAPTER 9.0
LIST AND QUALIFICATION OF PREPARERS

9.0 LIST AND QUALIFICATION OF PREPARERS

1. This EIR/EIS has been prepared by Environmental Solutions, Inc. under the direction of the County Planning Department and BLM. The County and BLM provided information and assistance in preparing this report and independently evaluated the information contained herein.

County of San Bernardino

Randy Scott
Senior Planner, Environmental Team

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Senior Associate Planner

Phil Smith
County Liaison - Rail•Cycle/Bolo Station Landfill

Bureau of Land Management

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Doug Romoli
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Donald Armentrout
Biologist, California Desert District

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Larry Foreman
Biologist, California Desert District

Richard Gundry
Geologist, California Desert District

George Meckfessel
Archaeologist, Needles Resource Area

Rob Waywood
Minerals Resource Planner, California Desert District

William Wiley
Environmental Protection Specialist, Needles Resource Area

2. The following staff of Environmental Solutions, Inc. participated in the preparation of this document.

Kathleen A. Bergin
Project Manager/Principal Archaeologist
M.A. Anthropology, University of Nevada Las Vegas, 1982
B.A. Anthropology, University of Nevada Las Vegas, 1975

Seventeen years of experience in archeology, project management, environmental baseline assessment, and impact analysis including:

- Archaeological/cultural resource/paleontological impact analysis for EIS, EIR, and Environmental Assessments.
- Land use, vegetation, noise, traffic, and aesthetics baseline documentation and impact analyses for EIRs and Environmental Assessments.
- Principal Investigator for archival research, surface inventory, testing evaluation, and data recovery of cultural resources sites.
- Development of mitigation or treatment plans for cultural resources.
- Regulatory documentation.

Peter A. Hayden
Project Manager/Air Quality Specialist
B.S. Mathematics, University of the Pacific, 1980

Twelve years experience as an air quality specialist including:

- Air quality modeling and analysis for EIS and EIR documentation involving emissions of criteria and toxic pollutants, odorous substances, hydrocarbon releases, and vapor control.
- Project Manager for construction and operation of a three-station ambient air quality sampling network.
- Development and compilation of database to archive, calculate, and report air contaminant emissions.

Gregory Kindt
Project Engineer
B.S. Chemical Engineering, South Dakota School of Mines and Technology, 1985

Seven years experience in air pollution control technology and environmental research for projects including:

- EIS and EIRs.
- Preparation of transportation, noise, and Risk Assessments.
- Air quality assessments that included source characterization, regulatory analysis, determination of impacts, and identification of mitigation measures.
- Hazardous waste assessments.
- Assisted in development and compilation of database to archive, calculate, and report air contaminant emissions.

Deanna M. Kress
Project Coordinator
B.F.A. Design, California State University, Fullerton, 1989
A.A. Orange Coast College, 1985

Three years experience in preparation of environmental documents including:

- EIS, EIR, and Environmental and Biological Assessments.
- Preparation of technical analyses, including evaluations of existing conditions, visual impacts, land use consistency/compatibility, and cumulative impacts.
- Processing of environmental documentation for NEPA/CEQA compliance.
- Environmental document quality assurance/quality control and coordination.

Tim C. Lassen
Vice President/Project Director
B.S. Civil Engineering, Purdue University, 1970
California Business Law Institute, Environmental Regulations, 1981
Registered Professional Engineer, State of California

Twenty-two years experience in project management and engineering including:

- Management of interdisciplinary team in the preparation of EIS, air quality permitting activities, archaeological inventory and regulatory documentation, and biological assessment.
- Preparation of EISs including analysis of a broad scope of environmental and socioeconomic issues.
- Development of comprehensive risk assessments.
- Projects involving site characterizations, feasibility investigations, hydrogeologic assessment reports, remedial action plan development, and cleanup implementation of contaminated soil and ground water.

Michael L. Leonard
Senior Project Manager
M.S. Civil Engineering (Geotechnical), University of Illinois, 1974
B.S. Civil Engineering, University of Illinois, 1972

Eighteen years experience in geotechnical engineering and hazardous waste consulting, including:

- Project Manager for industrial stormwater NPDES permit applications.
- Technical reviewer of report evaluating remediation alternatives and technologies.
- Technical reviewer for geology and hydrology for EIR/EIS.
- Environmental Assessments as precursors to industrial real estate actions.

Robert C. Mason
Senior Project Manger
M.A. Urban and Regional Studies, University of Southern California, 1978
B.A. Urban and Regional Studies, California State University, Northridge, 1975

Thirteen years experience as project manager for various projects including:

- Management of over two dozen major NEPA/CEQA documents for a variety of projects worldwide.
- Development of risk assessments, extensive archaeological and cultural resources investigations and reporting, biological studies, and analysis of waste disposal methods.
- Management of Phase I and II remedial site investigations for industrial and commercial properties.

Amy M. McGill
Project Scientist
M.A. Applied Mathematics, Oregon State University, 1989
B.A. Mathematics, Oregon State University, 1987

Four years of experience in mathematical and computer modeling including:

- Compilation of criteria air pollutant emissions inventories for air quality modeling.
- Preparation of documentation and technical analyses for geology, hydrology, and minerals assessments for EIR and EIR/EIS.
- Assisted in air quality modeling to predict air pollutant emissions at municipal landfills.

C. Marshall Payne
Associate Principal Geologist
M.S. Engineering Geology, University of Arizona, Tucson
B.S. Geology, University of Arizona, Tempe
Registered Geologist, Certified Engineering Geologist, Registered Geophysicist

Over twenty-five years experience in geologic engineering on a broad scope of projects including:

- Principal Geologist for site assessments and leachate treatment workplans for major landfills.
- Geologic, hydrogeologic, and seismic studies for EISs.
- Principal Geologist for environmental assessment of hydrogeologic conditions on Nevada and California gold mines.
- Geologic and hydrogeologic analyses including regional and local characterization, seismic analysis, and determination of potential impacts to resources.

Carolyn Trindle Smith
Project Manager/Environmental Planner
M.A. Business Administration, Pepperdine University, 1981
M.A. Secondary Education, University of Missouri, Kansas City, 1974
Bachelor of Journalism, University of Missouri, Columbia, 1965

Fifteen years of experience as project manager/environmental planner for various projects including:

- EIS, EIR, and Environmental and Biological Assessments.
- Socioeconomic and planning documents for proposed industrial projects and military installations.
- Preparation and coordination of permits for waste discharge, water quality, air quality, wildlife, and special use permits, as well as Plans of Operation for major mining projects.

CHAPTER 10.0
ORGANIZATIONS AND PERSONS CONSULTED

10.0 ORGANIZATIONS AND PERSONS CONSULTED

1. The persons and organizations listed below submitted comments or substantial information regarding the proposed action during preparation of this document or its supporting documents. Persons or organizations contacted regarding specific information are listed by reference throughout the document and in Chapter 12.0.

FEDERAL AGENCIES

- U.S. Fish and Wildlife Service
  Laguna Niguel, California — Ray Bransfield

STATE AGENCIES

- Public Utilities Commisson
  Los Angeles, California — Raymond Toohey
- California Department of Fish and Game
  Sacramento, California — Frank Hoover

COUNTY OF SAN BERNARDINO

- Air Pollution Control District
  Victorville, California — Tom Guevara, Christian Ihenacho, Kayode Kadara
- Solid Waste Management Department
  San Bernardino, California — Mike Williams
- San Bernardino County Museum
  Redlands, California

LOCAL AGENCIES

- City of Barstow Planning Department
  Barstow, California — Mike Massimini
- City of Twentynine Palms
  Twentynine Palms, California — Bill Gutgesell
- City of San Bernardino
  Department of Planning and Building Services
  San Bernardino, California — Deborah Woldruff
- City of Victorville - Planning Department
  Victorville, California

PRIVATE ORGANIZATIONS

- Rail•Cycle
  Los Angeles, California — Phil Beautrow, Garth Morgan, Glen Odell
- Waste Management of North America
  Irvine, California — Neil Mohr
- Atchison, Topeka, and Santa Fe Railway
  Los Angeles, California — Bob Brendza

- Jacobs Engineering Group, Inc.
  Pasadena, California — Sandra Alarcón-Lopez, Jim Goepel
- Ecological Research Services
  Claremont, California
- Wyle Laboratories
  El Segundo, California — Debby Aber
- Caterpillar Tractor Co.
  Peoria, Illinois — Lester Bergsten

2. The following agencies, organizations, and individuals provided comments on the Notice of Preparation and Notice of Intent to prepare an EIR/EIS:

- San Bernardino County Museum — Dr. Allan Griesemer
- Sierra Club: San Gorgonio Chapter — Peter Burk
- San Bernardino County Museum
  Archeological Information Center
- City of Twentynine Palms
  Community Development Director — William Gutgesell
- California Department of Transportation
  District Development Review Engineer — Tim Chowdhury
- California Department of Transportation
  Chief, Transporation Planning — Harvey Sawyer
- City of El Segundo, Director of Planning — Kendra Morries
- San Bernardino County Fire Warden Department — Jim Rankin
- San Bernardino County Solid Waste Management Department — Kenneth Kaz
- San Bernardino County Building and Safety Department — Wessly Reeder
- Morris A. Balderman - Consulting Geologist
  (Letter to Ms. Barbara Ransom - Leslie Salt Company regarding Rail•Cycle Project)
- ADH Associates, Inc. — Keith Tockman
- Bureau of Land Management
  Area Manager - Needles — Richard Fagan
- Leslie Salt Company — Barbara Ransom
- San Bernardino County Museum
  Earth Sciences — Scott Springer
- California Regional Water Quality Control Board
  Colorado River Basin — Phil Gruenberg
- California Department of Fish and Game-Region 5 — Fred Worthley
- City of San Bernardino - Department of Planning and Building Services — Valerie Ross

•	U.S. Forest Service - San Bernardino National Forest	Elliott Graham
•	City of Victorville Mayor	Terry Caldwell
•	County of Orange - Environmental Management Agency	Kari Rigoni
•	California Air Resources Board	Genevieve Shiroma
•	California Integrated Waste Management Board	John Loane

CHAPTER 11.0
DISTRIBUTION LIST FOR DRAFT EIR/EIS

11.0 DISTRIBUTION LIST FOR DRAFT EIR/EIS

The distribution list for the Draft EIR/EIS was developed by the BLM - Needles Resource Area in consultation with the California Desert District, and by the County Planning Department.

- FEDERAL OFFICIALS AND AGENCIES
  - Edwards Air Force Base Flight Test Center
  - Honorable Al McCandless
  - Honorable Jerry Lewis
  - Honorable Diane Feinstein
  - Honorable Alan Cranston
  - Honorable Barbara Boxer
  - Honorable Duncan Hunter
  - National Park Service, Joshua Tree National Monument
  - U.S. Army Corps of Engineers
  - U.S. Army National Training Center, Fort Irwin
  - U.S. Bureau of Mines
  - U.S. Bureau of Reclamation
  - U.S. Department of Agriculture, Soil Conservation Service
  - U.S. Department of Justice, U.S. Attorney's Office (L.A. Branch)
  - U.S. Environmental Protection Agency, Office of Federal Activities
  - U.S. Federal Aviation Authority
  - U.S. Fish & Wildlife Service
  - U.S. Geologic Survey
  - U.S. Marine Corps, Twentynine Palms Marine Corps Air Base
- STATE OF CALIFORNIA OFFICIALS, AGENCIES, AND REGIONAL AGENCIES
  - California Air Resources Board
  - California Attorney General
  - California Department of Conservation
  - California Department of Fish & Game
  - California Department of Health Services
  - California Department of Transportation
  - California Energy Commission
  - California Highway Patrol
  - California Integrated Waste Management Board
  - California Occupational Safety and Health Agency
  - California Public Utilities Commission
  - California Regional Water Quality Control Board/Colorado Region
  - California State Lands Commission
  - California State Office of Planning and Research
  - California State Resource Agency
  - Colorado River Board
  - Honorable Steve Clute
  - Honorable Don Rogers
  - Honorable Tricia Hunter
  - Honorable Charles W. Bader
  - Honorable Robert B. Presley
  - Honorable Ruben S. Ayala
  - Honorable Phil Wyman
  - Honorable David Kelley
  - Honorable Steve Peace
  - Honorable William Leonard
  - Honorable Jerry Eaves
  - South Coast Air Quality Management District
  - Southern California Association of Governments
- COUNTIES, CITIES, AND LOCAL AGENCIES
  - A.K. Smiley Library
  - City of Adelanto
  - Town of Apple Valley
  - Baker Communities Service District
  - City of Barstow
  - Big Bear Community Service District
  - City of Big Bear Lake
  - City of Chino
  - City of Colton
  - City of Commerce
  - City of Fontana
  - City of Grand Terrace
  - City of Hesperia
  - City of Highland
  - Imperial County Library
  - Imperial County
  - County of Inyo
  - County of Kern
  - Local Agency Formation Commission
  - City of Loma Linda
  - County of Los Angeles
  - Los Angeles County, Department of Regional Planning
  - Lucerne Valley Library
  - Mojave Desert Soil Conservation District
  - Mojave Water Agency

- City of Montclair
- Morongo Basin Unified School District
- City of Needles
- Newberry Springs Community Services District
- City of Ontario
- County of Orange
- City of Rancho Cucamonga
- City of Redlands
- City of Rialto
- County of Riverside
- San Bernardino Associated Governments
- City of San Bernardino
- San Bernardino County Agricultural Commissioner
- San Bernardino County Air Pollution Control District
- San Bernardino County Board of Supervisors
- San Bernardino County Building and Safety Department
- San Bernardino County Department of Economic & Community Development
- San Bernardino County Department of Environmental Health Services
- San Bernardino County Fire Warden
- San Bernardino County Land Development Department
- San Bernardino County Libraries
- San Bernardino County Local Enforcement
- San Bernardino County Museum
- San Bernardino County Planning Commission
- San Bernardino County Public Health Department
- San Bernardino County Regional Parks Department
- San Bernardino County Sheriff's Department
- San Bernardino County Solid Waste Advisory Task Force
- San Bernardino County Solid Waste Management Department
- San Bernardino County Special Districts Department
- San Bernardino County Transportation/Flood Control
- Silver Valley Unified School District
- City of Twentynine Palms
- City of Upland
- City of Victorville
- City of Yucaipa

• ORGANIZATIONS

- ADH Associates, Inc.
- All American Pipeline
- American Motorcycle Association, District 37
- American Borate Company
- Aqua Caliente Indian Reservation
- Audubon Society
- Best, Best and Krieger, Attorneys at Law
- Bighorn Institute
- Cadiz Valley Land Development Corporation
- California Federation of Mineralogical Societies
- California Mining Association
- California Association of 4WD Clubs
- California Native Plant Society
- Cargill Salt
- Citizens for Mojave National Park
- Desert Tortoise Preserve Community
- Desert Bighorn Council
- Desert Protective Council
- Ecology Center of Southern California
- Environmental Defense Fund
- Friends of Mojave Road
- Gresham, Varner, Savage, Nolan & Tilden, Attorneys at Law
- High Desert Multi-Use Coalition
- Holcomb Valley Mining District
- Leslie Salt
- Minerals Exploration Coalition
- National Chloride
- National Association of Mining Districts (Field Office)
- National Audubon Society, Western Region
- Native American Heritage Community
- National Resources Defense Council
- Newberry Springs Property Owners Association
- Orrich Herrington & Sutcliffe, Attorneys at Law
- Pfizer, Inc.
- Rail•Cycle
- San Bernardino Audubon Society
- Sierra Club
- Sierra Club Legal Defense Fund
- Southern California Edison
- Twentynine Palms Reservation
- United Mining Council
- Warner Engineering
- Wilderness Society

- INDIVIDUALS
  - Sharon Apfelbaum
  - Sam Atwood
  - Morris A. Balderman
  - Jean Barbone
  - Dana F. Bell
  - Elmo and Gloria Bennett
  - Virginia C. Benton
  - Howard Blair
  - John A. Brand
  - Mark Bulot
  - Lois Clark
  - William M. Claypool III
  - Phyllis Crawford
  - William M. Davin
  - John Davis
  - James Dodson
  - Joan Dotson
  - Alice Engelskirchen
  - Arthur and Iva Feldman
  - Robert T. Filler
  - Dave Fisher
  - Mary Ann Fisher
  - Kurt Flynn
  - Warren and Elizabeth Forgey
  - Mike Gallagher
  - Frank J. Giesing
  - George Goemans
  - Mary Grimsley
  - Howard Harsh
  - Steven Hartman
  - Oscar Hellrich
  - Mary Ann Henry
  - Esther L. Herbert
  - Susan Hickman
  - Frank Hoover
  - Rick Horlacher
  - Elden Hughes
  - W. Leon Hunter
  - Phillip Ibanez
  - James R. Jenkins
  - Paula Johnston
  - Prescott H. Johnston
  - Joe Kamansky
  - Bert C. Klein
  - Ardyce Koobs
  - Karen Kunde
  - Patricia "Corky" Larson
  - Dr. June Latting
  - Beverly Lowry
  - Ruth Lopez
  - William Manning
  - Emmanuel N. Mba
  - Paula Menger
  - Floyd and Anita Mercy
  - Loleeta Miller
  - Pat Mitchell
  - George and M. Moore
  - Chuck Mueller
  - Jean Nicol
  - Brian Noonan
  - Dr. Kenneth S. Norris
  - Greg Ouellette
  - Gary Overson
  - Fred Owings
  - Art Pacher
  - Judith A. Pruitt
  - Martin Rapp
  - Donald R. Reachert
  - Susan L. Reilly
  - Richard L. Reynolds
  - Vernon and Twila Ring
  - Bill Rinkes
  - Dr. John Rotenberry
  - Peggy Sartor
  - Debbie Sease
  - Robert and Deborah Staggs
  - Fred Steam
  - Glenn R. Stewart
  - Jack Stewart
  - Mary Swedelius
  - Hildamae Voght
  - Francis M. Wheat
  - Cam Wheaton

CHAPTER 12.0
REFERENCES AND RESOURCES

12.0 REFERENCES AND RESOURCES

12.1 BACKGROUND TECHNICAL REPORTS

1. Various technical reports have been prepared by Rail•Cycle which have been used in the preparation of the Draft EIR/EIS, as shown in Table 12.1. These technical reports are available for review at the following locations:

Planning Department
San Bernardino County
385 North Arrowhead Avenue
San Bernardino, California 92415-0180

Needles Resource Area
U.S. Bureau of Land Management
101 West Spikes Road
Needles, California 92363

TABLE 12.1

BACKGROUND TECHNICAL REPORTS

SUBJECT/REPORT	AUTHOR	DATE
GEOLOGY AND SOILS		
• Phase I: Geology, Hydrogeology and Hydrology; Site Characterization Study - Bolo Station Facilities	Jacobs	October 1990
• Phase II: Geologic, Hydrogeologic and Geotechnical Site Characterization Study - Bolo Station Facilities	Jacobs	December 1991
• Gravity and Magnetic Studies of the Rail•Cycle Project Site	Shawn Biehler	May 28, 1992
MINERAL RESOURCES		
• Ground Water Monitoring Report (First Round) and Vertical Mineral Quality Assessment Study	WMNA	July 1991
• Mineral Potential Report for Selected Land in the Mojave Desert Bolo Station Facilities	Jacobs	August 1991
• Records Search of Mineral Resources on the Offered Lands	Jacobs	June 1992
SURFACE HYDROLOGY AND GROUND WATER		
• Phase I: Geology, Hydrogeology and Hydrology; Site Characterization Study - Bolo Station Facilities	Jacobs	October 1990
• Ground Water Monitoring Report (First Round) and Vertical Mineral Quality Assessment Study	WMNA	July 1991
• Ground Water Monitoring Report	WMNA	
- Second Round		October 1991
- Third Round		November 1991
- Fourth Round		April 1992
• Phase II: Geologic, Hydrogeologic and Geotechnical Site Characterization Study - Bolo Station Facilities	Jacobs	December 1991
• Design and Operational Features for Prevention and Mitigation of Ground Water Contamination	Rail•Cycle	September 1992
BIOLOGY		
• Biology, Site Characterization Study, Preliminary Biological Survey-Bolo Station Facilities	Ecological Research Services	August 1990
• Wintering Bird Survey - Bolo Station Facilities	Ecological Research Services	July 1991
• Annual Plant Survey - Bolo Station Facilities	Ecological Research Services	August 1991 March 1992
• Desert Tortoise Survey - Bolo Station Facilities	Alice E. Karl in association with Ecological Research Services	September 1991 Revised March 1992
• Desert Tortoise Survey Rail•Cycle Alternative Project Site - Cadiz Valley	Alice E. Karl in association with Ecological Research Services	September 1991 March 1992
• Kit Fox (*Vulpes Macrotis*) Density Study - Bolo Station Facilities	Ecological Research Services	July 1991 Revised March 1992
• Sensitive Species Studies of Offered Lands - Bolo Station Facilities	Ecological Research Services	January 1992
• List of Sensitive Plants and Animals in the Region Surrounding the Bolo Station Facilities Project Site	Ecological Research Services	March 1992

TABLE 12.1

BACKGROUND TECHNICAL REPORTS
(Continued)

SUBJECT/REPORT	AUTHOR	DATE
BIOLOGY (Continued)		
• Literature Survey of Sensitive Species Rail•Cycle Alternative Site - Cadiz Valley	Ecological Research Services	June 1992
AIR QUALITY		
• Air Quality Site Characterization Study - Bolo Station Facilities- Addendum	Jacobs	October 1990 October 1991
• Enhanced Dust Control Program - Bolo Station Facilities	James Dunbar in Association with Waste Management Regional Design Group	September 1991
• Air Quality Impact Analysis - Bolo Station Facility	Jacobs	February 1992
• Air Quality Monitoring Data Report - Bolo Station Facilities	Jacobs	March 1991 April 1991 May 1991 June 1991 September 1991 October 1991
• Evaluation of Emission Controls For Locomotives Technology Screening Report	Engine, Fuel and Emissions Engineering	January 3, 1992
CULTURAL/PALEONTOLOGICAL		
• Cultural Resources Site Characterization Study Class III Cultural Resources Inventory - Bolo Station Facilities	Michael Lerch and Associates	September 1990
• Addendum to Cultural Resources Site Characterization Study Class III Cultural Resources Inventory - Bolo Station Facilities	Michael Lerch and Associates	April 1991
• Cultural Resources Significance Evaluation and Treatment Plan - Bolo Station Facilities	Michael Lerch in Association with Mecko Archaeological Consulting	August 1991
• Confidential Paleontological Assessment - Bolo Station Facilities	San Bernardino County Museum	December 1991
LAND USE		
• Land Use Site Characterization Study - Bolo Station Facility	Jacobs	September 1990
• Land Use Application - Bolo Station Facilities	Rail•Cycle	March 14, 1991
MISCELLANEOUS		
• San Bernardino County Initial Study	Asher Hartel	December 27, 1990
• Rail•Cycle EIR/EIS Scoping Document - Bolo Station Facilities	Jacobs	December 1990
• Alternative Rail•Cycle Landfill Sites: Preliminary Analysis	Jacobs	December 1990 Updated May 1991
• Bolo Station Landfill - Evaluation of Regulatory Jurisdiction	LSA Associates	March 11, 1992

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CHAPTER 13.0
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APPENDIX A
NOTICE OF PREPARATION AND NOTICE OF INTENT

A.1 NOTICE OF PREPARATION/INITIAL STUDY

Notice of Preparation

Appendix J

To: State Clearinghouse
(Agency)
1400 Tenth St
(Address)
Sacramento CA 95814

Subject: Notice of Preparation of a Draft Environmental Impact Report

Lead Agency:		Consulting Firm (If applicable):	
Agency Name	San Bndo County Planning Dept	Firm Name	
Street Address	385 N. Arrowhead Ave. 3rd Fl	Street Address	
City/State/Zip	San Bndo CA 92415-0182	City/State/Zip	
Contact	Kathleen Browne	Contact	

San Bernardino County will be the Lead Agency and will prepare an environmental impact report for the project identified below. We need to know the views of your agency as to the scope and content of the environmental information which is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency will need to use the EIR prepared by our agency when considering your permit or other approval for the project.

The project description, location, and the potential environmental effects are contained in the attached materials. A copy of the Initial Study (☒ is ☐ is not) attached.

Due to the time limits mandated by State law, your response must be sent at the earliest possible date but *not later than 30 days* after receipt of this notice.

Please send your response to Kathleen Browne, Planner at the address shown above. We will need the name for a contact person in your agency.

Project Title: Rail-Cycle, L.P. Bolo Station Landfill

Project Location: Amboy (City (nearest)) San Bernardino (County)

Project Description: (brief)

The project consists of a General Plan Amendment and Conditional Use Permit through the County of San Bndo. and a Land Exchange, Right-of-Way, and California Desert Plan amendment with the Bureau of Land Management. The applicant proposes to construct and operate a Class III sanitary landfill complex on 4,800 ac. in the Mojave Desert between the communities of Amboy and Cadiz.

Date August 13, 1991

Signature [signature]

Title Planner

Telephone (714) 387-4099

Reference: California Administrative Code, Title 14, (CEQA Guidelines) Sections 15082(a), 15103, 15375.

Revised October 1989

NOTICE OF PREPARATION

ENVIRONMENTAL IMPACT REPORT/ ENVIRONMENTAL IMPACT STATEMENT AND PUBLIC SCOPING MEETINGS FOR THE RAIL-CYCLE, LIMITED PARTNERSHIP'S BOLO STATION LANDFILL

The County of San Bernardino Planning Department will be coordinating with the Bureau of Land Management (BLM) in the preparation of an Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the **Bolo Station Landfill**. The County of San Bernardino will be the Lead Agency in preparing the EIR/EIS with the BLM conducting the public scoping meetings in connection with the preparation of the EIS pursaunt to the National Environmental Policy Act (NEPA).

The project consists of a General Plan Amendment and Conditional Use Permit through the County of San Bernardino and a Land Exchange, Right-of-Way, and California Desert Plan Amendment with the BLM. The applicant, Rail-Cycle, L.P., a partnership of Waste Management of North America and Atchison, Topeka and Santa Fe Railroad Company, is proposing to construct and operate a rail-served Class III sanitary landfill complex on 4,800 acres with a life expectancy of 60-100 years. The project site is located in the Mojave Desert between the communities of Amboy and Cadiz directly adjacent to the Bristol Dry Lake. Major components of the proposal include material recovery facilities/transfer stations (MRFs), rail transport, off-loading station, waste disposal area, and composting facilitites.

The Environmental Initial Study, completed revised March 15, 1990, identified the following areas of potentially significant impact: Geologic Hazards, Flood Hazards, Fire Hazards, Wind/Erosion, Noise, Hazardous Materials, Biological Resources, Cultural/ Paleontological Resources, Air Quality, Water Supply/Water Quality, Open Space/Recreation/Scenic, Soils/Agriculture, Mineral Resources, Utilities/Infrastructure, Transportation/ Circulation, Energy, Housing/Demographics/Socioeconomics, Pulbic Services, and Land Use.

Three public scoping meetings are scheduled to identify public concerns and issues which should be addressed by the EIR/EIS. Date, time and location of the public meetings are:

Twentynine Palms
Junior High School
Multipurpose Room
5798 Utah Trail
Twentynine Palms, Ca
August 27, 1991 - 7:00 pm

Holiday Inn
1511 E. Main St.
Barstow, Ca
August 28, 1991 - 7:00 pm

San Bernardino County
Government Center
Joshua Room, 1st Floor
385 No. Arrowhead Ave.
San Bernardino, CA
August 29, 1991 - 7:00 pm

Copies of the Initial Study are available at the following location:

Planning Department
385 No. Arrowhead Avenue
San Bernardino, CA 92415-0182
Attn: Kathleen Browne

This letter is a request for environmental information that you or your organization feels should be addressed in the EIR/EIS. Detailed information may be included in your response. Due to time limits, as defined by the California Environmental Quality Act, your response should be sent at the earliest possible date, but no later than 30 days after receipt of this notice. If you have questions regarding this notice, please call Kathleen Browne at (714) 387-4099.

8/19 (364) 9639

Aug 19, 1991
THE SUN

PLANNING DEPARTMENT

385 North Arrowhead Avenue • San Bernardino, CA 92415-0180 • (714) 387-4091
Fax No. • (714) 387-3223

COUNTY OF SAN BERNARDINO
ENVIRONMENTAL MANAGEMENT GROUP

SHARON W. HIGHTOWER
Director of Planning

August 13, 1991

To: Responsible and Trustee Agencies
Interested Citizen Groups
Property Owners

Subject: NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT REPORT/ ENVIRONMENTAL IMPACT STATEMENT AND PUBLIC SCOPING MEETINGS FOR THE RAIL-CYCLE, LIMITED PARTNERSHIP'S BOLO STATION LANDFILL

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Sincerely,

PLANNING DEPARTMENT

KATHLEEN BROWNE, PLANNER
ENVIRONMENTAL TEAM

REVISED
3-15-91

SAN BERNARDINO COUNTY
INITIAL STUDY ENVIRONMENTAL CHECKLIST FORM

This form and the descriptive information in the application package constitute the contents of an Initial Study pursuant to County Guidelines under Ordinance 3040 and CEQA Guidelines §15063.

I.

DATES ID: 745DSS90006741GPA/CUP01/06741CF1
COMMUNITY: CADIZ WEST
FILE/INDX: A) GPA/90-0014/DS921-169N
B) CUP/90-0015/DS921-169N
APPLICANT: RAIL-CYCLE JOINT VENTURE
PROPOSAL: A) GENERAL PLAN AMENDMENT TO TEXT TO INCLUDE SITE ON INVENTORY LIST OF WASTE DISPOSAL SITES & AMENDMENT TO INFRASTRUCTURE MAP TO ADD A SOLID WASTE SYMBOL
B) CONDITIONAL USE PERMIT TO ESTABLISH AN INTERMODAL RAIL-SERVED UNLOADING FACILITY & SANITARY LANDFILL COMPLEX TO TRANSPORT & DISPOSE OF NON-HAZARDOUS WASTE ON 4,800 ACRES
LOCATION: BOLO RD, BOTH SIDES AND AT & SF RAILROAD, BOTH SIDES, APPROX. 6 MILES WEST OF CADIZ
REP('S): BEAUTROW, PHIL

USGS Quad: CADIZ

T,R,Section: T05N/R13E/S05,08,09 15, 16, 17, 21, west half of 22

Thomas Bros: 712/B-4 & 5

Planning Area: CADIZ WEST

OLUD: RC

Improvement Level: IL-5

PROJECT CHARACTERISTICS: General Plan Amendment and Conditional Use Permit to establish an intermodal rail-served unloading facility and sanitary landfill complex to transport and dispose of non-hazardous waste on 4,800 acres. The applicant proposes to construct and operate a complete waste-by-rail system consisting of intermodal processing and transfer stations, rail transport, an off-loading station, a landfill disposal site, and composting facilities. The system is to provide service to the Southern California Region; loading and processing stations (Material Recovery Facilities) are planned in the cities of El Segundo and Commerce in Los Angeles County, with others being planned at unspecified locations in the San Gabriel Valley and San Bernardino County; 3,000 tons per train, and up to seven (7) trains per day will be transported to the site at full operation. The proposed landfill is a state-of-the-art Class III facility with a composite liner system for leachate collection and control. A proposed land exchange between the applicant and BLM is underway; the applicant proposes to acquire Sections 8, 15, and the west half of 22 within the project boundaries.

de by
af 3-15-91

The project as proposed consists of the following facilities:

1. Visitor's center with paved parking area.

2. Administrative and maintenance facilities, to include an office building, parking areas, a maintenance building, and fueling area.

3. Rail unloading facilities, container maintenance and storage areas, four new rail spurs to be added to existing rail lines.

4. Leachate collection/containment system and evaporation ponds; gas collection system.

5. Water storage and distribution for dust abatement and fire protection; potable water supply.

6. Storm water drainage and treatment facilities.

7. The landfill complex; a Class III landfill on Sections 15, 16, 17, 21, and west half of 22 with an estimated capacity of 685 million cubic yards and a service life of approximately 66 to 100 years depending on the rate of loading; approximately 1,900 acres will be utilized for the landfill, which will consist of a phased series of 20 acre "cells".

8. Composting facility for "green waste"

9. Bolo Road (existing dirt road on site) to be paved and serve as the access road.

It is proposed to start operations in late 1993 or early 1994. The preliminary staffing plan indicates 75 persons for construction, 39 employees in the first year of operation, increasing ultimately to 134 employees in year 5. Operations are proposed 24 hours a day, 7 days a week. The applicant states that housing will be available in Twentynine Palms, Amboy, and Cadiz; mobile units for temporary use are proposed if there is inadequate housing in the area.

Capacity of the project is estimated to be at least 685 million cubic yards. The site has an estimated service life of approximately 66 to 100 years, depending on the rate of loading.

ENVIRONMENTAL/EXISTING SITE CONDITIONS: The site is directly adjacent to Bristol Dry Lake (to the south and west). Terrain is flat/gently sloping to the south. Elevation ranges from approximately 607 feet at the southern boundary to 951 feet at the northern boundary. National Trails Highway (the old route 66) bounds the site on the north. Two existing rail lines traverse the middle of the site from east to west; there are earthen levees to divert storm runoff to culverts under the tracks. A radio microwave tower is situated atop a granite rock outcrop in the northern portion of the site.

	EXISTING LAND USE	OFFICIAL LAND USE DISTRICT	IL
North	Vacant/undeveloped	RC (Resource Conservation)	IL-5
South	Vacant/undeveloped	"	"
East	Vacant/undeveloped; towns of Chambers & Cadiz approximately six miles to the east; grape/ citrus farms at Cadiz	"	"
West	Leslie Salt and National Chloride Mining Operations; town of Harboy approx. six mile to the west; town of Saltus approx. two miles to the west	"	"

II. **Identification of maximum potential environmental effects of the proposed project.** The purpose is to identify any potentially significant impacts and discuss mitigation measures for identified impacts. Please substantiate your responses by summarizing your assessment of significant impacts and referencing documents used as research (e.g., Norton Air Force Base AICUZ study re: Noise). Include quantification of changes caused by the project's development at maximum potential buildout from existing status.
Circle or underline specific item of concern for "yes" or "maybe" answers if one item applies and others do not. If an impact that would be significant can be mitigated below a level of significance, indicate by checking "yes" or "maybe" with an " " to "no" and discuss mitigative measure(s) under substantiation. Substantiation is also necessary for "no" answers.

NATURAL HAZARDS

	Yes	Maybe	No
1. Geologic Hazards. Will the proposed project result in significant impacts related to:			
a. Unstable earth conditions or changes in geologic substructures?	___	X	___
b. Change in topography or ground surface relief features?	X	___	___
c. The destruction, covering or modification of any unique geologic or physical features?	___	X	___
d. Exposure of people or property to geologic hazards such as earthquakes, landslides, mudslides, ground failure, or similar hazards?	___	X	___
e. Exposure of people or property to water-related seismic hazards such as seiche?	___	X	___

SUBSTANTIATION (check ____ if project is located in the Geologic Hazards Overlay District):

a. Filling in of a man-made open pit area will create a compacted "pocket" of substances that does not normally occur in this area. The existing geologic substructure of the area needs to be evaluated in view of the project's proposed excavation of up to 100 feet in depth in the southern portion of the site where the landfill is proposed.

b. Changes in the existing ground surface relief features will occur as a result of the filling in of the excavated area with waste materials, and the proposed fill area will increase the surface elevation of the site by up to approximately 420 feet. An adequate closure plan shall be required to insure that, upon completion of the land fill operation, the site will be returned to its previous desert environment state. The proposed change in topography and ground surface features shall be addressed as a part of the EIR for the project.

c. A Geologic/Hydrogeologic Site Characterization Study which was limited to review of available records and reports and a brief site reconnaissance visit did not identify any unique geologic resources. Proposed Phase II studies to more fully characterize site geology and hydrogeology are proposed by the applicant. This further study shall be conducted and included in the EIR.

d. The project site is not identified by the San Bernardino County General Plan maps as being located within a Geologic Hazards Overlay. However, the County General Plan Geologic Issue Background Report, February 1988, identifies the project site as being within or very near the Generalized Liquefaction Area of Bristol Dry Lake and near the volcanic activity area of Amboy Crater. The applicant indicates there is a subsidence crack in the vicinity of Leslie Salt's pumping wells westerly of the site. The nearest known catalogued fault is over three (3) miles to the north in the Bristol Mountain range. Due the size and scope of the project, a thorough evaluation of the potential for exposure of people the landfill to geologic hazards shall be addressed in the EIR to be prepared for the project.

e. See item (d) above for reference to water-related liquefaction hazard. Other than Bristol Dry Lake, there are no known existing or potential bodies of water on or near the site. Surface water and depth to groundwater, based on the hydrogeologic study, shall be addressed in the EIR as they relate the liquefaction potential.

	Yes	Maybe	No
2. Flood Hazards. Will the proposed project result in significant impacts related to:			
a. Changes in currents, or the course of direction of water movements?	X		
b. Changes in deposition, erosion, or siltation that may modify the channel of a river, stream, bay, inlet, or lake?		X	
c. Alterations to the course or flow of flood waters?		X	
d. Change in the amount of surface water in any water body?		X	
e. Changes in absorption rates, drainage patterns, or the rate and amount of surface runoff?	X		
f. Exposure of people or property to water-related hazards such as flooding or dam inundation?		X	

SUBSTANTIATION (check if project is located in the Flood Plain Safety Overlay District ___ or Dam Inundation Overlay ___):

a. The design of the landfill project with extensive excavation and mounding on an alluvial fan near the dry lake bed will alter the

direction of water movement on-site and to the lake bed off-site. Surface hydrology impacts shall be evaluated for significance in the EIR.

b. Surface flows on the alluvium will be rerouted and may modify deposits on the lake or alter the channel of blue line streams immediately south and southwest of the site. The hydrology evaluation in the EIR shall determine the significance of this impact.

c. The project site is not located within a Flood Hazard Overlay of the General Plan. However, the project will alter storm runoff and modify surface water flows to the adjacent dry lake bed. Alterations to runoff and potential flood hazards shall be addressed in the EIR.

d. The landfill complex with its temporary and permanent diversion ditches, sedimentation ponds, detention ponds, collection dumps, perimeter collection system and drainage dissipation area may alter the distribution of groundwater on and off-site; the amount of surface water reaching the dry lake may be altered. The potential impacts to the dry lake shall be evaluated in the EIR.

e. The lining of the proposed landfill cells with impervious materials will result in the elimination of absorption in those areas. Changes in absorption rates, drainage patterns, and surface runoff in landfill areas and from additional land disturbance activities of the overall project (compaction of soils associated with any grading or berming for the off-loading facility, visitor facility, entrance facility, gas recovery facility, etc.) shall be addressed in the EIR.

f. The applicant states that the railroad tracks through the site and Route 66 on the north side of the site act as levees to divert storm water runoff around the site. Exposure of people or property to water-related hazards under a 100-year flood scenario, including details of the maximum probable precipitation event, the high water line of the adjacent Bristol Dry Lake, and flash flood sheet flows in this alluvial fan location shall be addressed by a drainage/hydrology study to be included in the EIR to assess the potential for significant impact.

	Yes	Maybe	No
3. **Fire Hazards.** Will the proposed project result in significant impacts related to:			
a. Exposure of people or property to wildland fires?	___	___	X
b. Man-made fire hazards?	___	X	___

SUBSTANTIATION (check ___ if project is located in the Fire Safety Overlay District):

a. The project site is not located within a Fire Safety Overlay on the County General Plan maps. The alluvial fan vegetation on the site is a sparse creosote bush scrub community that poses little or no fire hazard due to the small amount of fuel. The potential for wildland

fire hazards are considered nonsignificant and no mitigation is proposed. This item will not need to be addressed in the EIR.

b. There may be potentially significant man-made fire hazards due to the lack of fire protection facilities at this remote location. The project will generate methane gas from decomposing landfill waste. There is a 48" petroleum pipeline traversing the site adjacent to the existing rail line. The EIR shall address the use of fire resistant building materials, the landfill gas management system in relation to fire hazards, and fire prevention and control equipment and facilities (see also item 20, Public Services).

	Yes	Maybe	No
4. **Wind/Erosion.** Will the proposed project result in significant impacts related to:			
a. Any increase in wind or water erosion of soils, either on or off the site?	___	X	___

SUBSTANTIATION: The project will result in slopes of up to 33% in the landfill which poses potential erosion hazards. Disturbed desert soil is generally very susceptible to wind erosion. There could be a substantial generation of blowsand from soil disturbance areas. The increase in potential erosion may be significant. The EIR shall evaluate the proposed grading and slopes for wind, blowsand, and erosion; the EIR shall also address litter and odor control, and the vulnerability of composted material during periods of high winds.

MANMADE HAZARDS

	Yes	Maybe	No
5. **Noise.** Will the proposed project result in significant impacts related to:			
a. Increases in existing noise levels?	___	X	___
b. Exposure of people to severe noise levels?	___	X	___

SUBSTANTIATION (check if the project is located in the Noise Hazard Overlay District ___ or is subject to severe noise levels according to the General Plan Noise Element ___):

a. The project site is not located in any Noise Hazard Overlay, and is not currently subject to severe noise levels other than those emanating from the rail line. There will be an increase in noise levels on-site and in the vicinity of the site, initially due to traffic, unloading, and landfilling operations. Common background noise levels in the desert where no noise sources exist range from 20 dBA (Ldn) and up depending on wind conditions. Facility operation will increase on-site noise levels to at least 60-70 dBA (Ldn) due to noise generated by earthmoving equipment, truck and rail traffic, and rail unloading facilities. The nearest developments that may be receptors of noise generated by the facility are:

1) The Cadiz Valley Development Corp. (Pacific Agriculture)

agricultural operation on 9,600 acres which, at its nearest point, is 2 miles to the east.

2) The Leslie Salt facilities in and around Bristol Dry Lake and the town of Saltus approximately 2 miles to the west;

3) The town of Amboy 6 miles to the west on National Trails Highway;

4) The town of Chambless 4 miles to the east on National Trails Highway.

The proposed rail-haul landfill operation will operate 24 hours per day, seven days a week. Owing to the regional nature of the project, which involves rail transport and increased rail traffic, the project will have an impact on noise on-site, in the near vicinity of the site, and along the rail route to the point of origin of the rail-hauled waste. The EIR shall address both local and regional noise impacts to determine the level of significance of noise generation.

Desert recreational uses are thought to be of low intensity in this area. The site is not in or near a wilderness area, a wilderness study area (WSA), or a major desert recreation area (BLM 1980). However, the site is located within the historic range of the Desert Tortoise. The change in the noise environment and its significance to recreational users and surrounding wildlife shall also be evaluated in the EIR.

b. On-site construction and operating noise levels will be high enough to create noise levels of concern for equipment operators and workers at the facility. Exposure to severe noise levels can be controlled through use of appropriate hearing protection devices. Such devices shall be required where noise levels can exceed levels that can damage human ears in accordance with federal and state noise protection standards in place at the time the construction or operation activity occurs.

	Yes	Maybe	No
6. Aviation Safety. Will the proposed project result in significant impacts related to:			
a. Exposure of people to risk from aircraft operations?	___	___	X

SUBSTANTIATION (check _____ if project is located in the Airport Safety Overlay District):

a. The project site is not located within an Airport Safety Overlay District and risk from aircraft overflight is non-significant. No mitigation is required and this issue need not be addressed in the EIR.

	Yes	Maybe	No
7. Hazardous/Radioactive Materials. Will the proposed project result in significant impacts related to:			
a. A risk of an explosion or the release of hazardous substances (including, but not			

limited to, oil, pesticides, chemicals, or radiation) in the event of an accident or upset conditions?	___	X	___
b. Possible interference with an emergency response plan or an emergency evacuation plan?	___	X	___
c. Creation of any health hazard or potential health hazard?	___	X	___
d. Exposure of people to potential health hazards?	___	X	___

SUBSTANTIATION:

a. As this project proposes a non-hazardous waste Class III landfill, hazardous waste is to be excluded from the site. However, the possibility of hazardous wastes entering the system is recognized in the proposal, and there is a designated temporary storage area for such materials. The storage of fuel, solvents, and oil in the vehicle maintenance area presents the potential for explosion and fire in the event of an accident or upset condition. Details are needed regarding types of fuel (gasoline, diesel, propane, etc.), location of tanks (above ground or underground?), and size of tanks. The gas generated by landfill decomposition and the system to monitor and manage gas needs to be evaluated for potentially significant impacts. The 48 inch petroleum pipeline traversing the site alongside the rail line should be addressed in this section. The above issues shall be addressed in the EIR.

b. The project site is not located in an area with a known emergency response or evacuation plan. However, a site-specific emergency response and evacuation plan shall be addressed in the EIR in view of the hazardous materials on-site detailed in item 7a above. The project site shall also be included with other proposed projects in the area for an evaluation of local emergency response plans and requirements for such plans to be established. <u>The development of a contingency plan shall also be addressed; the contingency plan should address the possibility of temporary closure of the landfill in the event that hazardous waste enters the system and operations are halted to locate and safely dispose of the waste.</u>

Added by staff 3-15-91

c. The landfill and decomposing waste materials will present potentially significant health hazards, both on-site and off-site due to the close proximity of the Leslie Salt operation to the west and the Cadiz Valley agricultural operation to the east. Consideration shall be given in the EIR to dust, odors, vector control (pests and rodents), litter, and leachate buildup and removal to ensure that human health and safety are not adversely affected.

d. Refer to items 7a and c above.

NATURAL RESOURCES

	Yes	Maybe	No
8. **Biological Resources.** Will the proposed project result in significant impacts related to:			
a. Loss, reduction, or deterioration of habitat and/or change in diversity of species of plants or animals?	___	X	___
b. Reduction of the numbers of any unique, rare, threatened, or endangered species of plants or animals?	___	X	___
c. Introduction of exotic species of plants or animals into an area, or in a barrier to the normal replenishment or migration of existing species?	___	X	___

SUBSTANTIATION (check if project is located in the Biological Resources Overlay _X_ or contains habitat for any species listed in the California Natural Diversity Database _X_):

a. The development and operation of the landfill complex will cause a loss and reduction in habitat. The preliminary Biology Site Characterization Study submitted with the Land Use Application indicates a wide diversity of species at the site. A biological resources survey and impact assessment shall be included in the EIR to evaluate the potential for significant adverse impact due to the resources that will be lost or affected.

b. The project site is located within the historic range of the Desert Tortoise (Gopherus Agassizii), which is State and Federally listed (Class III). The land disturbance and traffic resulting from site operations may result in a "take" of this Federally protected species. Consultation between the Bureau of Land Management (Section 7), the U.S. Department of Fish and Wildlife Services, and the State Fish and Game Department will be required. In addition, the project may contribute to the Raven population by attracting Ravens, a known predator of tortoises. Sea gulls may also be attracted. The BLM Raven Control Management Plan and environmental assessment shall be addressed. In addition to the above, potential impacts and protection of any other protected/endangered/sensitive species shall be addressed in the EIR.

c. The proposed facility includes activities which are expected to introduce exotic species of plants or animals to the area in domestic or commercial waste. The potential impacts to the local desert environment and to existing uses in the area, including agricultural operations, shall be addressed in the EIR. The extensive land disturbance and noise may result in a barrier to the normal activities of protected animals that may occur in the area; this potential impact shall also be addressed in the EIR.

	Yes	Maybe	No
9. **Cultural/Paleontologic Resources.** Will the proposed project result in significant impacts related to:			
a. The alteration or destruction of a prehistoric or historic archaeological site?	X	___	___
b. Physical or aesthetic effects to a prehistoric or historic building, structure, or object?	___	X	___
c. A physical change that would affect unique ethnic cultural values?	___	X	___
d. Restricting existing religious or sacred uses within the potential impact area?	___	X	___
e. Any alteration or destruction of fossil remains?	___	X	___

SUBSTANTIATION (check if the project is located in the Cultural _X_ or Paleontologic _X_ Resources overlays or cite results of cultural resource review):

a. The project site is located within Cultural and Paleontologic overlays. The project will result in substantial disturbance of previously undisturbed areas. The site contains numerous prehistoric and historic archeological resources. A cultural resource survey and management report is required to identify resources, evaluate significance, and mitigate potential adverse impacts. The site also has the potential for containing fossil resources. A paleontologic resource assessment is required; the assessment shall include a literature and records search, a field survey by a qualified vertebrate paleontologist, and a paleontologic resource impact mitigation program. Both cultural and paleontologic issues shall be addressed in the EIR as outlined above.

b. See 9a above

c. See 9a above

d. See 9a above

e. See 9a above

	Yes	Maybe	No
10. **Air Quality.** Will the proposed project result in significant impacts related to:			
a. Substantial air emissions or deterioration of ambient air quality?	X	___	___
b. The creation of objectionable odors?	X	___	___
c. Alteration of air movement, moisture or temperature, or any change in climate, either locally or regionally?	___	X	___

SUBSTANTIATION (discuss conformity with the South Coast Air Quality Management Plan, if applicable):

a. The proposed Bolo Landfill facility project will emit various quantities of nitrogen oxides, carbon monoxide, reactive hydrocarbons, sulfur oxides, and particulate matter from trains and from on-site diesel-powered heavy duty equipment operation. In addition, fugitive dust will result from earth-moving activities and from vehicle travel on paved and unpaved roads at the landfill. Various amounts of carbon dioxide, methane, and assorted reactive hydrocarbons will be produced within the landfill due to anaerobic decomposition of the organic material contained in the wastes. An anticipated New Source Performance Standard (NSPS) from EPA will require the collection of these gases along with a control device capable of achieving a 98 percent reduction in collected non-methane organic emissions.
The project will be permitted under the New Source Review full of the San Bernardino County Air Pollution Control District which will require a full air quality impact analysis. Best available control technology (BACT) will be required on all emission sources.

The volume of emissions is unknown at this time; it is possible that emissions may cause local violations of air quality and particulate standards. An evaluation of all potential air pollutant emissions and the significance to ambient air quality shall be addressed in the EIR. The project may be regionally significant to the Southern California region. The source, collection, and loading facilities will be located in the South Coast Air Basin; the receptor, unloading, and landfill complex is located in the Southeast Desert Air Basin. Trains will be mobile sources of emissions in both air basins. The Air Quality issue should therefore involve both the South Coast Air Quality Management District and the San Bernardino County Air Pollution Control District in an assessment of potentially significant impacts at both local and regional levels in the EIR. The assessment shall include the proposed Materials Recovery Facilities in the cities of El Segundo and Commerce and at unspecified locations in the San Gabriel Valley and San Bernardino County.

b. The operation of diesel trains, trucks, and other equipment, and waste materials at the site and enroute to the site may have odors that are objectionable to humans and to animal species on-site and in the vicinity of the site. Mobile and on-site odors shall be addressed in the EIR for potential significance.

c. The project will not substantially alter moisture, temperature, or the climate either locally or regionally. The creation of a new "mountain" 420 feet above existing grade, however, may have the potential to substantially alter air movement and affect the local micro-climate, especially in view of desert winds, blowsand, and the impact on surrounding lands. Potential significant impacts to the local micro-climate shall be addressed in the EIR.

	Yes	Maybe	No
11. Water Supply/Water Quality. Will the proposed project result in significant impacts related to:			
a. Changes in the quantity of groundwaters, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations (on-site)?	___	X	___
b. Substantial reduction in the amount of water otherwise available for public water supplies?	___	X	___
c. Alteration of the direction or rate of flow of groundwaters?	___	X	___
d. Pollution, contamination, or any change in the quality of groundwater (toxics, nitrates, fluorides, salts, etc.)?	___	X	___
e. Discharge into surface waters, or any alteration of surface water quality, including, but not limited to, temperature, dissolved oxygen, or turbidity?	___	X	___

SUBSTANTIATION:

a. The Land Use application Geologic/Hydrogeologic Site Characterization Study states that the site is in a hydrologically closed groundwater basin with groundwater flowing toward the Bristol Dry Lake playa. The groundwater table is estimated at about 300 feet depth at the northern end of the site, and approximately 50 feet depth at the southern end; the northeast and southwest corners of the site may lie within the fresh and brine groundwater zones, respectively. A leachate control barrier/collection system is proposed, along with surface water management and groundwater monitoring (a hydrogeologic model and monitoring wells).

Proposed project plans include withdrawal of groundwater underlying the site for various uses including dust control. The quantity of groundwater to be withdrawn has not been established because it depends on the quality of the groundwater, groundwater gradient, hydraulic properties of the aquifer, other available sources of water, and the project demand for water. Hydrogeologic studies are in progress that will determine safe yields of groundwater withdrawal.

The applicant proposes to utilize local wells for non-potable water for fire protection and landfill dust control; potable water will be supplied in railroad tank cars, with the possible future development of a well in Amboy and a pipeline to the site.

The potential impact of groundwater extraction is not discussed in the Land Use application, and is therefore unknown at present. Water supply and potential impacts on groundwater aquifers shall be evaluated in the EIR.

b. Groundwater is potable at the north and east margins of the groundwater basin, near the towns of Chambless and Cadiz, but becomes progressively saline and mineralized toward the basin center where brine is extracted for salt production. The proposed site is thought to largely occupy the brackish groundwater transitional zone between fresh water (upgradient) and brine (downgradient). Thus, groundwater underlying most of the site is probably brackish (saline) and non-potable. However, the northeast corner of the site may lie within the fresh groundwater zone. Withdrawal of water for the project may have no impact on public drinking water supplies because of the direction of groundwater flow. The direction of groundwater flow is south to southwest, toward the Bristol Dry Lake. Potable water is pumped from wells east to northeast (upgraduent) of the project site.
The extent of the groundwater basin is not known, consequently it is not known if public water supplies are drawn from the basin or will be affected. The Land Use application states that upgradient groundwater uses include domestic, irrigation, and public supply wells; downgradient wells include only three (3) brine wells owned by Leslie Salt for calcium chloride and sodium chloride production. This issue shall be addressed in the EIR for potential impacts to local water supplies.

c. Withdrawal of groundwater may locally alter flow direction and rate in the vicinity of pumping wells. The number and location of pumping wells have not been established at this time and will depend on project requirements. Additional hydrogeologic studies will be conducted to determine impacts to groundwater flow.

Because the applicant proposes to utilize local groundwater for a majority of its water supply, and to install a non-permeable lining in the landfill portion of the site, the potential exists to alter the direction or rate of flow of groundwaters. This issue shall be addressed as part of the overall groundwater hydrology investigation in the EIR.

d. Potential contamination of groundwater by the landfill is possible. To mitigate this possibility, the landfill design incorporates the use of double-liner and leachate collection system. In addition, a groundwater monitoring program includes downgradient compliance wells for detection of any releases from the site.

The potential of the project to significantly impact the quality of groundwater with pollution or contamination is a key issue and concern. Any potential for the release of pollutants and degradation of groundwater resources in the basin shall be evaluated in the EIR. The potential for degradation of groundwater that would adversely impact groundwater users in the vicinity shall also be addressed. The composite liner system's ability to provide an effective barrier between landfilled waste and groundwater shall be assessed.

e. Project plans do not include discharge into, or alteration of surface waters. Consequently, surface water quality should not be affected.

It is possible that surface water quality may be affected by on-site runoff. The management of surface runoff and the release of contaminants

to Bristol Dry Lake must be evaluated for potential significance in the EIR; this evaluation shall include an analysis of the various pathways any contaminants could use to reach surface water from the facility.

	Yes	Maybe	No
12. Open Space/Recreation/Scenic. Will the proposed project result in significant impacts related to:			
a. The quality or quantity of existing recreational opportunities?	___	X	___
b. The obstruction of any scenic vista or view open to the public?	X	___	___
c. The creation of an aesthetically offensive site open to public view?	X	___	___
d. New light or glare?	___	X	___

SUBSTANTIATION (check ___ if project is located within the viewshed of any Scenic Route listed in the General Plan):

a. The project site is located in a low-lying basin with mountains to the north (Bristol and Marble Mountain ranges) and the south (Calument Mountain range). The East Mojave National Scenic lies approximately 15 miles to the north. Amboy Crater, approximately 8 miles to the west, is a designated National Natural Landmark (BLM, 1980). Marble Mountains Fossil Bed, approximately 8 miles to the east, is a designated Area of Critical Environmental Concern (BLM, 1980). A review of the California Desert Conservation Area Plan (BLM, 1980) and preliminary investigation of the area indicates that the Bristol Basin is occasionally used for low intensity recreation, but it is not an area with high recreation opportunities. Vehicles are restricted to the few roads within the area, and the primary uses are to travel north on Kelbaker Road or east/west on National Trails Highway. Development of the project site will not adversely impact any known recreation values or activities on the site; the proposed development may have an impact on recreational opportunities in area. This issue shall be researched and discussed in the EIR, as information on the issue is limited at this time.

b. Although the project site is not located within a Scenic Highway Overlay, the development of the landfill will create a substantial mound 420 feet above the existing ground level in a relatively flat basin area which will be highly visible from miles away in all directions (i.e., from National Trails Highway, the town of Amboy, and surrounding mountains) as a significant man-made feature on the natural landscape. The relatively barren nature of the desert landscape will accentuate this addition to the natural terrain. Based on this potential for disruption to a sensitive area, a visual evaluation to include visual simulations shall be included in the EIR. The potential for the creation of an aesthetically offensive site open to public view shall be fully addressed in the EIR.

c. Refer to item 12b above.

d. The facility will operate 24 hours a day, therefore, new light and glare will be introduced to the area. Due to the flat terrain, the lighting may be visible for many miles. A lighting design and installation plan will be required to direct light internally and prevent light and glare from extending beyond the project boundaries to the maximum extent possible. The lighting of the site and potential significant impacts shall be addressed in the EIR.

	Yes	Maybe	No
13. **Soils/Agriculture.** Will the proposed project result in significant impacts related to:			
a. Disruptions, displacements, compaction, or overcovering of the soil?	___	X	___
b. Loss of agricultural soils?	___	___	X
c. Reduction in acreage of any agricultural crop?	___	X	___

SUBSTANTIATION (check ___ if project is located in the Important Farmlands Overlay):

a. Soils will be displaced, compacted, and overcovered in the excavated landfill area. After grading and compaction of the subgrade, a 24 inch layer of compacted clay materials will be laid down initially within each cell. If suitable clay materials are not found on-site, an off-site borrow area would be necessary. An estimate of quantities of clay is needed; the project may involve a mining operation at another location in the future; clarification is needed as to when the clay will be needed, when closure of the borrow area will commence, and when closure of the landfill cells will commence. The geotechnical information to hand at present is preliminary; the Land Use Application states that further investigations are underway. As this issue poses potential significant impacts, it shall be addressed in the EIR.

b. The project site is not located within an Important Farmlands Overlay. The loss of soils to be covered, compacted, or utilized for the landfill operation does not include any agriculturally important soils. This issue does not pose any potentially significant impacts and need not be evaluated in the EIR.

c. No agricultural uses exist on the project site; the project will therefore not reduce the acreage of any crop on the site. There is, however, a major agricultural operation in the Cadiz Valley area to the east that is seeking approval from the County for a major expansion. The project site boundary as proposed is within two (2) miles of the agricultural holdings to the east. The EIR shall assess all potentially significant impacts to the nearby agricultural operation to include, but not limited to, sanitation, odors, groundwater, vectors, risk of crop contamination and diseases, etc.

	Yes	Maybe	No
14. **Mineral Resources.** Will the proposed project result in significant impacts related to:			
a. The prohibition or restriction of development of any mineral resource rated as Classified or Designated by the State Mining and Geology Board?	___	X	___

SUBSTANTIATION (check X if project is located within the Mineral Resource Zone Overlay):

a. The project site is adjacent to extractive mineral mining operations. There are active mining operations to the immediate southwest of the project site by Leslie Salt and National Chloride. Two mining claims have been filed on Section 22 of the project site by National Chloride Company. Leslie Salt Company operates a brine extraction facility west of the project site and holds 32 mining claims on an adjacent section (20). Sodium chloride and calcium chloride are currently being mined in this area. The Bristol Lake area is currently under evaluation by the State Mining and Geology office; the minerals found in the Bristol Dry Lake area are not classified by their office. Bulletin 191, Mineral Resources of California, California Division of Mines and Geology, 1966, includes a discussion of calcium chloride. The discussion points out that production of calcium chloride in California comes entirely from the Bristol Dry Lake. The project may have an impact on the potential to extract minerals from Section 22, and in the vicinity generally. The project will consume clay materials from either on-site or from a borrow area, and local sand and gravel resources will be required for construction. The mineral resource issue shall be evaluated in the EIR for potential significant impacts, including access to resource areas.

MANMADE RESOURCES

	Yes	Maybe	No
15/16. **Utilities/Infrastructure.** Will the proposal result in significant impacts related to a need for new systems, or substantial alterations to the following utilities:			
a. Power or natural gas?	___	X	___
b. Communications systems?	___	X	___
c. Water?	___	X	___
d. Sewer?	___	___	X
e. Storm water drainage?	___	X	___
Revised by staff 3-15-91 f. Solid waste and disposal?	___	X	~~X~~

SUBSTANTIATION:

a. Electrical service is not presently available at the site, but is available at neighboring towns and at mining operations to the west. The Land Use application states that electricity will be provided by Southern California Edison, however no details are given regarding service extensions to the site. Any connections will be at the applicant's expense. It is expected that significant new systems will not be required. The site plan does not indicate electrical facilities; this information should be provided on a revised site plan. This issue should be addressed in the EIR as an informational item; no potential significant impacts are expected, but not enough is known at this time.

The use of methane gas from the landfill for co-generation of electricity is mentioned, but no details are known; potential significant impacts shall be addressed in the EIR.

The project will not require connection to any natural gas delivery system, and none is proposed. If gas is used at the site, it is expected that bottled gas will be obtained from commercial sources in the area. This issue will not require discussion in the EIR.

b. Telephone service is not presently available at the site, but is available at neighboring towns and at mining operations to the west. The communications system is expected to be a combination of radios and telephone, however no details are given regarding telephone service extensions to the site or radio communication systems. It is expected that significant new systems will not be required. This issue should be addressed in the EIR as an informational item; no potential significant impacts are expected, but not enough is known at this time.

c. The applicant proposes to bring potable water to the site in railroad tank cars for storage and distribution to on-site buildings and facilities with a hydropneumatic system. The development of an existing well in the town of Amboy, 6 miles to the west, and construction of a distribution pipeline is being considered. The use of non-potable water is proposed for fire protection and dust control. Water issues related to the groundwater aquifer are to be evaluated separately as part of the geohydrolic evaluation. The EIR shall also address potential impacts to existing water supply and distribution systems in the area (i.e., towns of Amboy, Chambless, Cadiz, Saltus and mining operations in the area), proposed amounts of potable water, and clarify the uses of potable vs. non-potable water.

d. No sewer systems exist on or near the site. It is proposed to utilize septic tank and leach line systems for wastewater disposal. Any requirements of the County Department of Environmental Health Services and the Colorado Region Water Quality Control Board will be included as conditions of approval. Portable toilets are proposed at remote locations. No potentially significant impacts are expected; this issue need not be addressed in the EIR.

e. There are no existing storm water drainage systems on the site, with the exception of diversion levees along the rail line. An extensive drainage system is proposed, and as previously discussed in item 2 (Flood Hazards), this issue will be reviewed as part of the hydrology investigation. The potential of the project to significantly impact existing drainage shall be addressed in the EIR.

f. Domestic solid waste arrangements are not discussed in the Land Use application. Total personnel proposed at the site are 75 during construction, 39 in year one (1) of operation increasing to 134 in year five (5) and thereafter. These numbers are greater than the populations of small towns in the area. A plan should be developed for the handling and separation of domestic hazardous wastes, recyclables and non-hazard wastes generated by the workforce on-site. The project will be conditioned to provided for the procedures outlined above. The project site will not have a significant adverse impact on any solid waste disposal system, as there is no existing solid waste disposal system established in the area. However, there is a need for a solid waste disposal system in remote areas such as the project site area, due to the high incidence of illegal dumping rather than transporting solid waste to distant landfills. Consideration shall be given to utilizing the landfill for locally generated wastes in the sub-regional area of the project site. The nearest County landfill is at Twenty-Nine Palms, a distance of approximately 60 miles, therefore the project site should be considered for use for the disposal of locally generated wastes. The above issues shall be addressed in the EIR. ~~and this topic need not be addressed in the EIR.~~

Revised by staff 3-15-91

	Yes	Maybe	No
17. Transportation/Circulation. Will the proposed project result in significant impacts related to:			
a. Generation of substantial additional vehicular movement?	___	X	___
b. Effects on existing parking facilities, or demand for new parking?	___	___	X
c. Substantial effect upon existing transportation systems?	___	X	___
d. Alterations to present patterns of circulation or movement of people and/or goods?	___	X	___
e. Alterations to waterborne, rail, or air traffic?	___	X	___
f. Increase in traffic hazards to motor vehicles, bicyclists, equestrians, or pedestrians?	___	X	___

SUBSTANTIATION:

a. The proposed project will generate 60 vehicle trips (120 total trips) to the site per day during construction from 75 construction employees, and an unknown number of trips for materials and equipment delivery.

On commencement of operations, there will be an estimated 39 vehicle trips (78 total trips) to the site per day in year one (1). This is proposed to increase to 134 employees at the site. An unknown number of vehicle trips are anticipated for delivery of goods and services. These trips will occur on National Trails Highway, a County-maintained secondary highway. Other affected roads will be Amboy Road (County major highway), Kelbaker Road (County major highway) and the Interstate 40, approximately 15 miles to the north.

The additional trips will occur on National Trails Highway, a two-lane road with an Average Daily Traffic (ADT) count of 649 vehicles per day (San Bernardino County Traffic Census, March 16, 1988) for National Trails Highway east of Amboy cutoff. Based on available data, the traffic generated by the project may be substantial. Road capacity, traffic generation, and road conditions shall be addressed in a traffic investigation that will be incorporated into the EIR.

b. The project will not affect existing parking in this remote location. Sufficient parking will be required on-site to handle all vehicles to be parked in association with the landfill complex. No potentially significant impacts are expected with this issue and it need not be addressed in the EIR beyond confirmation that adequate on-site parking will be provided.

c. Refer to item 17a above and 17e below. In addition, the EIR shall assess the need for a company vanpool or bus service to employee housing centers.

d. Existing roads and rail lines will be utilized to transport personnel, equipment, and waste materials to the site. Present patterns of circulation on existing facilities will therefore be altered, and may be significant. The EIR shall address this issue to determine whether altering of the present pattern poses any potentially significant adverse impacts.

e. The proposed project utilizes rail transport exclusively for the movement of waste materials. One train per day is proposed initially in the first year of operation, increasing to seven trains per day in the fifth year and thereafter. Alterations to existing rail systems will occur. This topic shall be addressed in the EIR for potential significance to rail traffic and the rail system.

f. The increase in vehicular and rail traffic, and the potential for increases in hazards shall be addressed in the EIR for potentially significant impacts attributable to this project.

	Yes	Maybe	No
18. **Energy.** Will the proposed project result in significant impacts related to:			
a. An increase in the rate of consumption of any natural resources?	___	___	X
b. Use of substantial amounts of fuel or energy?	___	X	___

c. Substantial increase in demand upon existing sources of energy, or require the development of new sources of energy? ___ ___ X

SUBSTANTIATION:

a. The proposed project is not expected to result in an increased consumption rate of natural energy resources, with the exception of fuel. See item 18b below.

b. It is expected that a substantial amount of fuel will be required to transport waste materials from the Los Angeles area to the project site by train (approximately 500 mile round trip). The proposed ultimate operation would involve seven trains per day, each hauling 3,000 tons of waste materials. At present, there is no data to compare fuel consumption associated with the project to existing landfill operations. It is probable that fuel consumption will compare favorably with hauling wastes to smaller, less efficient landfills by truck. The EIR shall include an analysis of fuel consumption in comparison to conventional existing landfill waste disposal practices; transportation and loading/unloading/processing shall be included in the analysis. Electrical energy consumption is not expected to be significant for the proposed project and its workforce; this topic need not be addressed in the EIR.

c. The project is not expected to significantly increase demand upon existing energy sources or require the development of new energy sources; this issue need not be addressed in the EIR.

	Yes	Maybe	No
19. Housing/Demographics/Socioeconomics. Will the proposed project result in significant impacts related to:			
a. An effect on existing housing, or creation of a demand for additional housing?	X	___	___
b. Alteration of the location, distribution, density, or growth rate of the human population of the area?	___	X	___

SUBSTANTIATION:

a. The applicant states that 134 persons will be employed at the landfill complex by year five (5) of operations; it is also stated that housing will be available in Twentynine Palms, Amboy and Cadiz. In the event of inadequate housing, the applicant proposes mobile units for temporary use. The City of Twentynine Palms, population 12,343 (California State Department of Finance, January, 1990), the nearest significant population center, is approximately 55 miles from the project via two-lane roads, and is therefore not an ideal housing center for project employees due to the 110 mile round trip commute. The towns of Amboy (6 miles) and Cadiz (8 miles) are within an optimal commute distance, but each at

present have only a few dozen residents at most and little or no housing opportunities. The town of Ludlow, 34 miles to the west, is little more than a freeway service stop with a few gas stations and a restaurant, and no housing opportunities. Newberry Springs, approximately 70 miles to the west, may be a housing center for the project due to its freeway accessibility.

Due to the remote location of the project site and lack of housing opportunities within a reasonable commuting distance, it is expected that there will be a demand for additional housing. The EIR shall address this topic for potentially significant impacts, to include an analysis of housing needs in relation to the County General Plan Housing Element.

b. The project may result in significant alterations to the growth rate and the population of the area. Preliminary 1990 Census figures for the Ludlow-Amboy-Cadiz corridor area along National Trails Highway indicate a total of 68 dwelling units with an estimated population of 124. A workforce of 134 at the project site with dependent spouses and families could have a significant impact on the growth rate and population of the area, even if only a small percentage settle in the local area. Assuming three (3) persons per employee relocate to the desert, this represents 402 new residents. There are potential growth inducing impacts which may be significant to the Amboy-Cadiz area.

A review of the Regional Growth Management Plan, 1989 by the Southern California Association of Governments (SCAG) indicates that more jobs are needed in the San Bernardino Desert sub-region in order to provide a better jobs-housing balance. The County General Plan also calls for the achievement of a balance between the employment base and housing supply, and the need to reduce long commutes (Housing Element, Housing Program 13-e, page III-54). The EIR shall address population distribution and density, growth rates, jobs-housing balance, growth inducing impacts in this remote location, and how the project relates to the Regional Growth Management Plan and County General Plan on these issues.

	Yes	Maybe	No
20. **Public Services.** Will the proposed project result in significant impacts related to a need for new or altered governmental services in:			
a. Fire protection?	___	X	___
b. Police protection?	___	X	___
c. Schools?	___	X	___
d. Parks or other recreational facilities?	___	X	___
e. Maintenance of public facilities, including roads?	___	X	___
f. Other governmental services?	___	X	___

SUBSTANTIATION:

a. The project site is a considerable distance from the nearest fire station that could respond to a fire or other emergency (Wonder Valley, approximately 45 miles; Twentynine Palms, approximately 55 miles; Newberry Springs, approximately 65 miles). The applicant will be required to provide sufficient water and storage to meet fire-flow standards. It is proposed to train operations personnel in fire protection procedures, and to have all necessary fire-fighting equipment on-site. A water tank of unspecified capacity is shown on the site plan. The County Fire Warden has indicated that due to the size and scope of the project and remote location, consideration shall be given to the creation of a public fire protection agency. The agricultural project proposed to the east may also be required to participate in the creation of a local fire protection agency. This issue shall be addressed in the EIR; contact Paul Miller, Fire Protection Planning, (714) 387-4212.

b. Access to the project site will be controlled by a three-stranded barbed wire fence in remote areas, and a six (6) foot chain link fence tipped with barbed wire in areas under operation. Lockable gates on all access roads and TV/video camera surveillance are proposed. No further details are on hand regarding on-site security and/or personnel. Additional information is needed on security operations and number of security personnel. The nearest County Sheriff facilities are at Twentynine Palms (55 miles). Pending input from the County Sheriff's office, this issue shall be addressed in the EIR for potentially significant impacts to police protection in the area.

c. The project site is within the Needles Unified School District. The district has existing schools at Amboy, 6 miles to the west, and Essex, 27 miles to the east. The Amboy school (K-8) at present has 22 students and one teacher. The Essex School (K-8) at present has 12 students and one teacher. The High School is in Needles, approximately 70 miles to the east. The project's 134 employees at full operation can reasonably be expected to generate 134 school age children within the Needles Unified School District and adjacent districts (Morongo Unified and Silver Valley Unified). The addition of 134 students in this remote location may result in potentially significant impacts to the School District(s) in the area, and should therefore be addressed in the EIR.

d. The proposed project may create a need for new recreational facilities or have a significant impact on existing recreational/open space resources in the area (refer to item 12b Recreation & Open Space). The introduction of 134 possible families in the area may result in a significant demand for park/recreation facilities based on a large increase relative to the area's existing population in an area lacking any parks. This issue shall be evaluated in the EIR.

e. National Trails Highway, Amboy Road and Kelbaker Road will be utilized for access of personnel, goods and services to the project site. These roads are in the County maintained road system, and are very lightly travelled at present. The impact of the project on these roads may be

significant, as increased traffic may result in increased wear and tear and maintenance costs to the County. This issue shall be addressed in the EIR for potentially significant impacts resulting form increased traffic (refer also to item 17a, Transportation & Circulation).

f. The project will place an additional demand for services on many County and other public sector agencies including but not limited to the Planning Department, Department of Environmental Health Services, Solid Waste Management Department, Fire Warden, Building and Safety Department, Transportation/Flood Control Department, Sheriff, Needles Unified School District, etc. The impact of the project to governmental services shall be defined in a Fiscal Impact Analysis per County General Plan policy LU-8 and form a part of the EIR which may be summarized in the EIR document. The Fiscal Impact Analysis shall demonstrate that the project will not become a fiscal liability to the County and ensure a balance between demand and availability of infrastructure and resources.

LAND USE

	Yes	Maybe	No
21. Will the proposed project result in significant impacts related to:			
a. A substantial alteration of the present or planned land use of an area? (Consider the Official Land Use Designation of the project site and surrounding property, as well as their Improvement Level designations on the General Plan Infrastructure Overlay and any relevant Resource Overlays.)	X	___	___

SUBSTANTIATION:

a. Development of the landfill complex, composting facility, rail unloading facilities, administrative and maintenance facilities, storage areas, visitors center, etc., will introduce a new use into the area that can be considered a substantial alteration of the present and planned uses in the Amboy/Cadiz/Bristol Dry Lake area. Very few details are given regarding the location, description, and operation of the proposed composting facility; the Land Use application states that it would occupy 100 acres on Section 9, north of the landfill. The project site is within a Resource Conservation (RC) General Plan Official Land Use District, which is intended for open space and limited rural development in remote areas of the County; the maximum housing density in the RC district is one dwelling unit per 40 acres. The site is within an area designated Improvement Level 5 (IL-5), i.e., an area planned for little or no development in remote areas with severe environmental and physical constraints or lack of resources.

The project site includes seven and one-half sections of land, the southern sections will be used for the development of the landfill. Four of the sections are owned by the ATSF (Section 5, 16, 17 and 21). One section owned by National Chloride Company (Section 16) is being

exchanged for a section owned by ATSF south of the project site. The remaining three sections are administered by the United States, Bureau of Land Management (Section 8, 15 and westerly one-half of 22); RAIL CYCLE is in the process of requesting a land exchange for these sections as well. Private lands fall under the jurisdiction of the County of San Bernardino and the public lands fall under the jurisdiction of the Bureau of Land Management (BLM).

Added by staff 3-15-91

A detailed land use evaluation shall be included in the EIR that <u>discusses the sequence in which the various permits/approvals must be obtained in order to establish the project, and</u> evaluates the project and its relationship to the following local and regional agencies and plans:

1. BLM and the California Desert Conservation Area Plan (CDCAP). The Land Use Application states that portions of the project site are designated Class M (moderate development) and Class L (limited development) in the CDCAP, and an amendment to the CDCAP will be necessary. The CDCAP amendment and proposed land exchange with BLM will also require an Environmental Impact Statement.

2. San Bernardino County and the County General Plan.

3. San Bernardino County and the Solid Waste Management Plan.

4. Southern California Association of Governments (SCAG) and Growth Management Plan.

5. South Coast Air Quality Management District and the Air Quality Management Plan.

6. San Bernardino County Air Pollution Control District.

7. Any other relevant agencies and their plans for the area.

The EIR shall also address the potential for significant land use conflicts, land use incompatibilities, and cumulative impacts of this project and other projects on a regional perspective. This would include but not be limited to:

1. Mineral extraction and mining uses in the area such as National Chloride (Calcum Chloride) and Leslie Salt (Sodium Chloride) to the south and west.

2. Agricultural uses, both existing and proposed, in the Cadiz area to the east (cadiz Valley Development Corp./Pacific Agriculture).

3. Recreational use of surrounding BLM lands in the area.

4. Towns and settlements in the area (Amboy, Saltus, Chambless, Cadiz, etc.) and project-related impacts.

5. The Broadwell and HVR proposed hazardous waste repositories in the Newberry Springs area.

6. The White Creek Enterprises/Vulcan Mine proposed the repository in the Kelso area.

7. The American Mine proposed gold mine project in the Amboy area.

	Yes	Maybe	No
22. MANDATORY FINDINGS OF SIGNIFICANCE			
a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below selfsustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	___	X	___
b. Does the project have the potential to achieve short-term, to the disadvantage of long-term, environmental goals? (A short-term impact on the environment is one which occurs in a relatively brief, definitive period of time while long-term impacts will endure well into the future.)	___	X	___
c. Does the project have impacts which are individually limited, but cumulatively considerable? (A project may impact on two or more separate resources where the impact on each resource is relatively small, but where the effect of the total of those impacts on the environment is significant.)	X	___	___
d. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	___	X	___

SUBSTANTIATION: The proposed Rail-Cycle intermodal rail-served unloading facility, sanitary landfill complex, and composting facility on 4,800 acres will introduce a new use into a remote desert environment which is relatively undisturbed at present. Little or no quantitative or scientific data is available on many site specific resources. This Initial Study identifies most of the site specific resource issues as topics that require further investigation before a final determination of significant impact can be rendered. In addition, the transporting, processing, and disposal of waste materials along rail lines and at the site pose potential hazards. The following issues shall be addressed in and EIR on the proposed project:

Geologic Hazards
Flood Hazards
Man-Made Fire Hazards
Wind and Erosion

Noise
Hazardous Materials
Biological Resources
Cultural and Paleontologic Resources
Air Quality
Water Supply and Water Quality
Open Space, Recreation, Scenic, and Visual Resources
Soils and Agriculture
Mineral Resources
Utilities/Infrastructure: Electrical Power Systems, Communications Systems, Water Systems, ~~and~~ Storm-water Drainage Systems, and Solid Waste Disposal Systems

Added by staff 3-15-91

Transportation and Circulation
Energy: Fuel Consumption
Housing, Demographics and Socioeconomics
Public Services
Land Use Considerations

Cumulative impacts of other projects in the region shall also be evaluate in the EIR.

III. **Discussion of Environmental Evaluation:** Please refer to the substantiatio discussion above.

IV. **Mitigation Measures to be included in project Conditions of Approval, Mitigation Monitoring Program:** Mitigation measures will be identified in th EIR and applied as conditions of approval as appropriate. In accordanc with AB 3180, a Mitigation Monitoring and Reporting Program shall be include in the EIR.

Initial Environmental Evaluation Prepared By:

12-27-90
Date revised 3-15-91

Asher Hartel
Signature Asher Hartel

On the basis of this initial evaluation:

The proposed project WOULD NOT have a significant effect on the environment (Mitigation Measures are included within the project's Conditions of Approval/Mitigation Monitoring Program), and a NEGATIVE DECLARATION should be prepared. | |

The proposed project MAY have a significant adverse effect on the environment, and an ENVIRONMENTAL IMPACT REPORT should be required. | X |

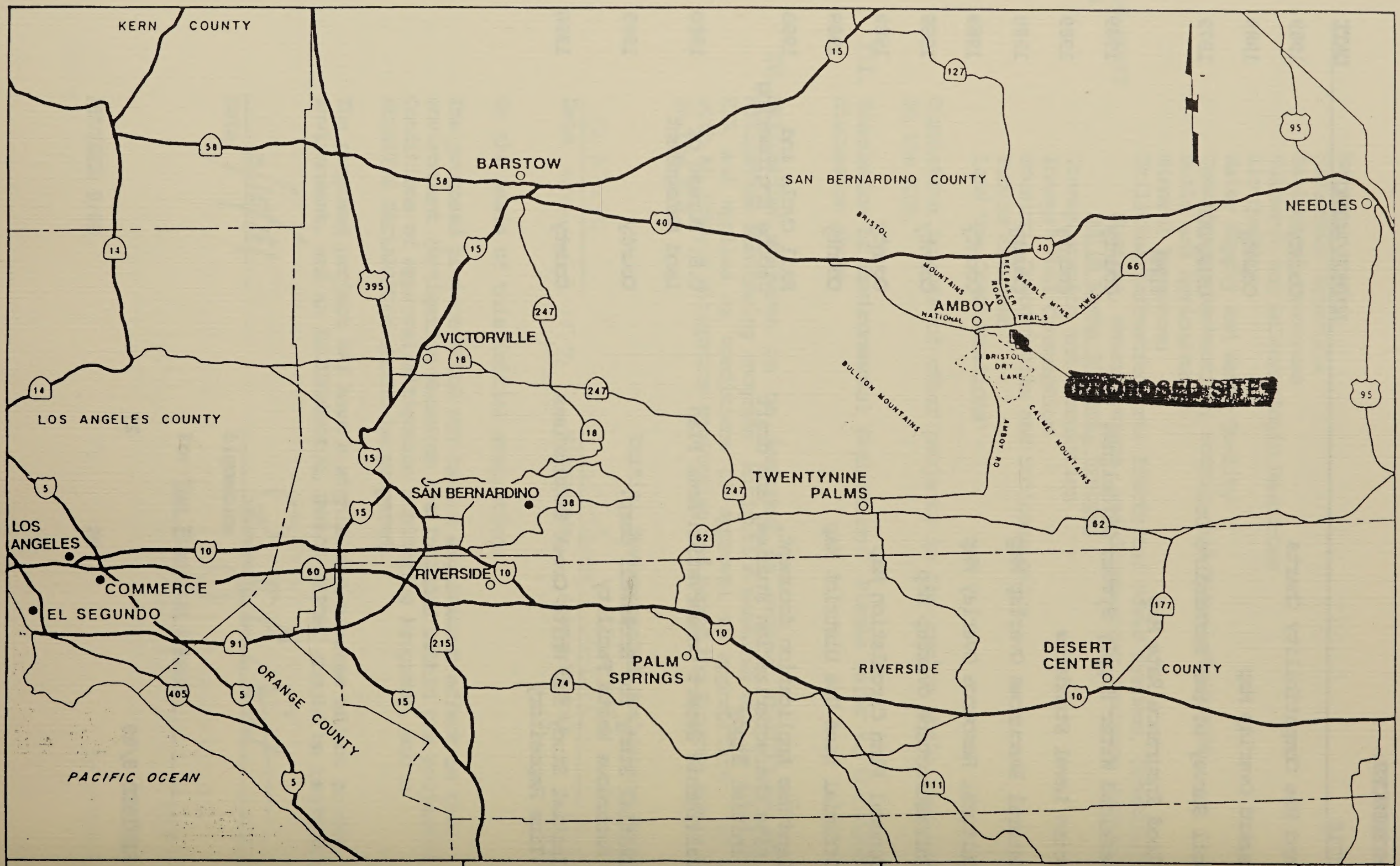
3/15/91
Date

Signature

For The Planning Agency

REFERENCES:

TITLE	AUTHOR/AGENCY	DATE
Land Use Compatibility Charts	County	1989
Hazard Overlap Map	County	1989
Soil Survey of San Bernardino Co.	USDA/SCS	1979
Flood Insurance Rate Map	FEMA	
Peakload Water Supply System Guidelines	County	1989
Noise Level Standards	County	1989
Natural Resources Overlap Map	County	1989
Cultural Resource Overlay Map	County	1989
Infrastructure Overlap Map	County	1989
General Plan Circulation Map	County	1989
Official Land Use District Map	County	1989
Land Use Application document, Site Characterization Studies, and draft Initial Study	Rail Cycle and Jacobs Engineering	1990
California Desert Conservation Area Plan	U.S. Bureau of Land Management	1980
Initial Study for Broadwell Corp. Hazardous Waste Facility	County	1989
Initial Study for White Creek Enterprises Tire Repository	County	1990



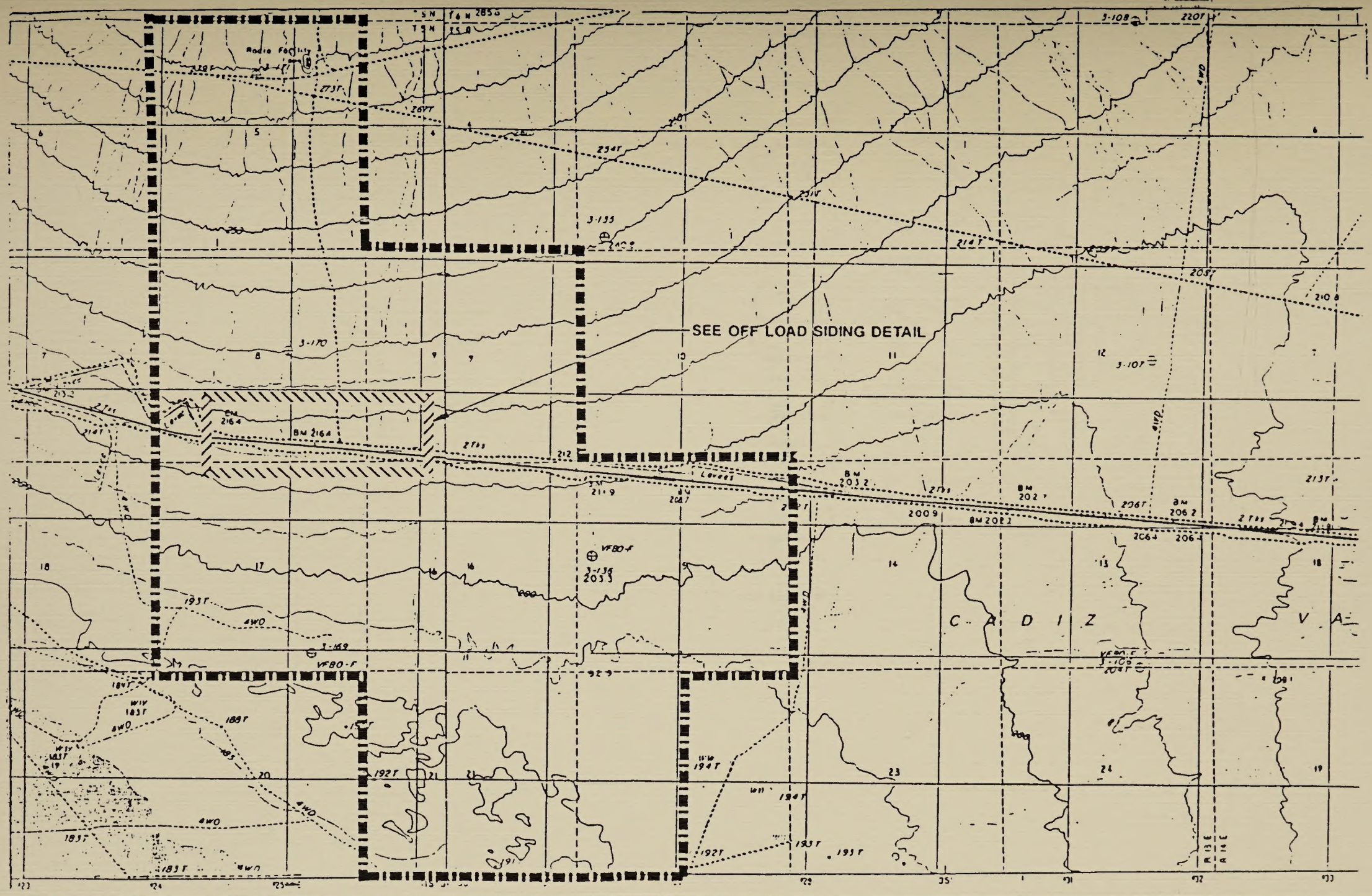
Waste Management of North America, Inc.

WESTERN REGION DESIGN GROUP

Santa Fe

VICINITY MAP

FIGURE 1



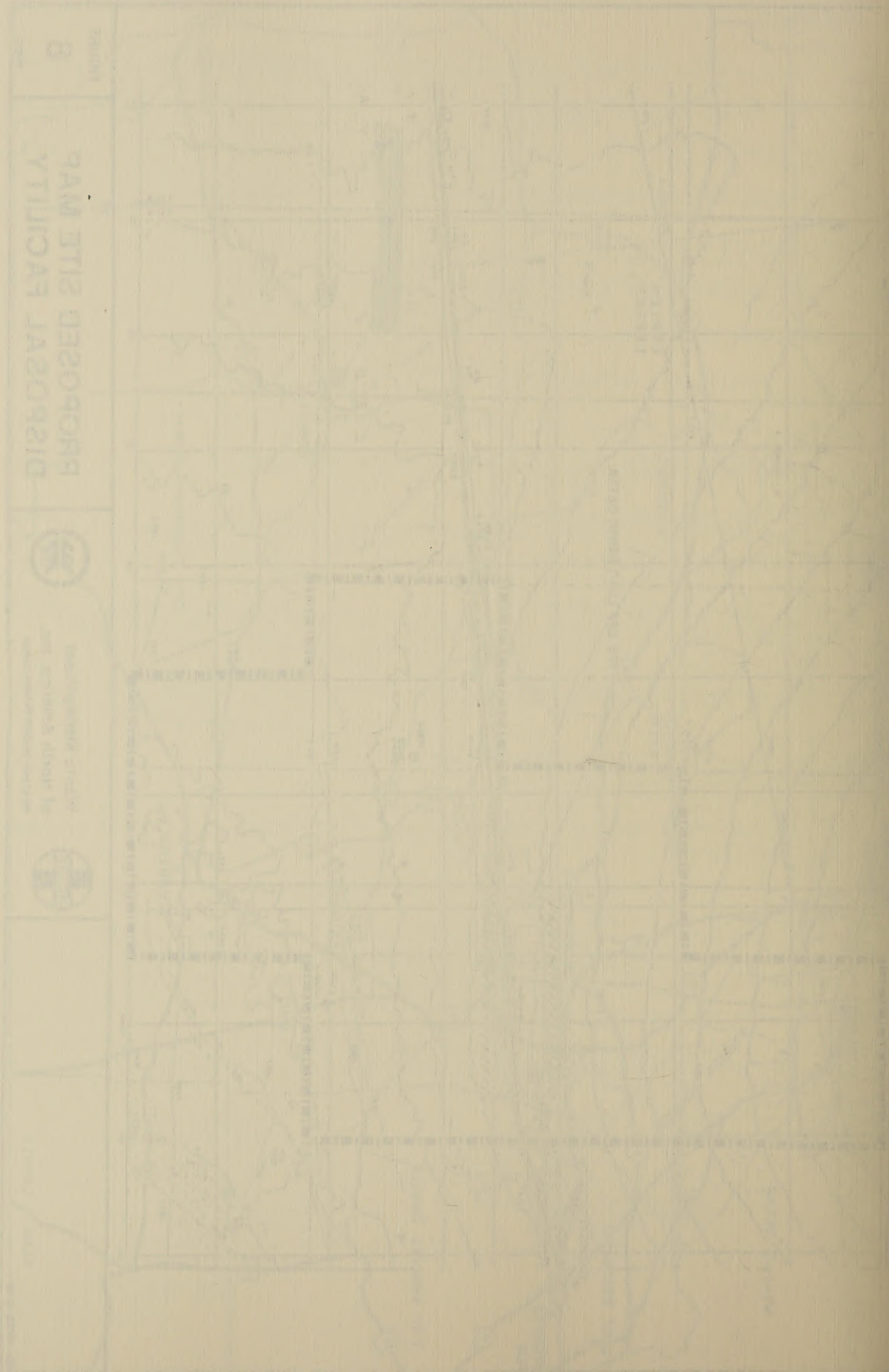
Waste Management of North America, Inc.
WESTERN REGION DESIGN GROUP

PROPOSED SITE MAP DISPOSAL FACILITY

FIGURE 8

WRDG

© RVSD 10-90



A.2 NOTICE OF INTENT

Minority health professionals tend to practice in underserved or socio-economically deprived areas in greater proportion than majority health professionals.

Questions regarding programmatic information should be directed to: Dr. Robert W. Beck, Program Officer, Division of Associated and Dental Health Professions, Bureau of Health Professions, Health Resources and Services Administration, Parklawn Building, room 8C–15, 5600 Fishers Lane, Rockville, MD 20857, Telephone: 301–443–6837.

The Catalog of Federal Domestic Assistance number for this program is 93.192. This program is not subject to the provisions of Executive Order 12372, Intergovernmental Review of Federal Programs (as implemented through 45 CFR part 100).

Dated: August 2, 1991.

Robert G. Harmon,

Administrator.

[FR Doc. 91–18912 Filed 8–7–91; 8:45 am]

BILLING CODE 4160–15–M

National Institutes of Health

National Institute of Deafness and Other Communication Disorders; Meeting of the Ad Hoc Voice and Voice Disorders Subcommittee of the National Deafness and Other Communication Disorders Advisory Board

Pursuant to Public Law 92–463, notice is hereby given of the meeting of the Ad Hoc Voice and Voice Disorders Subcommittee of the National Deafness and Other Communication Disorders Advisory Board on September 17, 1991. The meeting will take place from 8:30 a.m. to adjournment in Conference Room 8, Building 31, C-Wing, National Institutes of Health, 9000 Rockville Pike, Bethesda, Maryland 20892.

The meeting will be open to the public so that the Subcommittee may compare the research portfolio of the Institute to the National Strategic Research Plan, identify changes in the field since the plan was developed, recommend levels and areas of research activity, and suggest potential initiatives. Attendance by the public will be limited to space available.

Summaries of the Subcommittee meeting and a roster of members may be obtained from Mrs. Monica Davies, National Institute on Deafness and Other Communication Disorders, Building 31, room 3C08, National Institutes of Health, Bethesda, Maryland 20892, 301–402–1129, upon request.

(Catalog of Federal Domestic Assistance Program No. 13.173 Biological Research Related to Deafness and Other Communication Disorders

Dated: July 31, 1991.

Betty J. Beveridge,

Committee Management Officer, NIH.

[FR Doc. 91–18807 Filed 8–7–91; 8:45 am]

BILLING CODE 4140–01–M

National Institute of Deafness and Other Communication Disorders; Meeting of the Ad Hoc Hearing and Hearing Impairment Subcommittee of the National Deafness and Other Communication Disorders Advisory Board

Pursuant to Public Law 92–463, notice is hereby given of the meeting of the Ad Hoc Hearing and Hearing Impairment Subcommittee of the National Deafness and Other Communication Disorders Advisory Board on October 16, 1991. The meeting will take place from 8:30 a.m. to adjournment in room 3C07, Building 31, C–Wing, National Institutes of Health, 9000 Rockville Pike, Bethesda, Maryland 20892.

The meeting will be open to the public so that the Subcommittee may compare the research portfolio of the Institute to the National Strategic Research Plan, identify changes in the field since the Plan was developed, recommend levels and areas of research activity, and suggest potential initiatives. Attendance by the public will be limited to space available.

Summaries of the Subcommittee meeting and a roster of members may be obtained from Mrs. Monica Davies, National Institute on Deafness and Other Communication Disorders, Building 31, room 3C08, National Institutes of Health, Bethesda, Maryland 20892, 301–402–1129, upon request.

(Catalog of Federal Domestic Assistance Program No. 13.173 Biological Research Related to Deafness and Other Communication Disorders)

Dated: July 31, 1991.

Betty J. Beveridge,

Committee Management Officer, NIH.

[FR Doc. 91–18808 Filed 8–7–91; 8:45 am]

BILLING CODE 4140–01–M

National Institute of Child Health and Human Development; Meeting of the National Advisory Board on Medical Rehabilitation Research

Pursuant to Public Law 92–463, notice is hereby given of the meeting of the National Advisory Board on Medical Rehabilitation Research. National Institutes of Child Health and Human Development, September 12–13, 1991, Gaithersburg Marriott, 620 Perry Parkway, Gaithersburg, Maryland 20877.

The entire meeting will be open to the public from 9 a.m. on September 12 to adjournment on September 13. Attendance by the public will be limited to space available. The Board will review and assess Federal research priorities, activities, and findings regarding medical rehabilitation research and shall advise on the provisions of the statute-required comprehensive plan for the conduct and support of medical rehabilitation research.

Ms. Mary Plummer, Board Secretary, NICHD, Executive Plaza North, room 520, National Institutes of Health, Bethesda, Maryland 20892, Area Code 301, 496–1485, will provide substantive program information, a summary of the meeting and a roster of members. If vou have specific disability-related requirements, please call.

Dated: July 31, 1991.

Betty J. Beveridge,

Committee Management Officer, NIH

[FR Doc. 91–18809 Filed 8–7–91; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[CA–060–01–5440–10 B021]

Proposed Plan Amendment, Land Exchange and Right-of-Way for Bolo Station Landfill, San Bernardino County

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice of intent.

SUMMARY: Notice is hereby given that Bureau of Land Management and the County of San Bernardino will prepare a joint Federal-County Environmental Impact Statement/Report (EIS/EIR) for a proposed land exchange, right-of-way and plan amendment to the California Desert Conservation Area Plan for the Rail-Cycle, LP proposed Class III Bolo Station landfill disposal site.

Rail-Cycle, LP, a partnership of Waste Management of North America and Atchison, Topeka and Sante Fe Railroad Company, has filed an application to acquire through exchange two and one-half sections (1,500 acres) of public land. The parcels are located between Amboy and Cadiz, south of U.S. Route 66, about 35 miles north east of the City of Twentynine Palms and about 45 miles east of Ludlow. The proposed right-of-

way provides access from Route 66 to the landfill site. The parcels would be part of a 4,800 acre waste-by-rail landfill system. Refuse would be processed for recyclables at a Materials Recovery Facility (MRF) in Southern California. The residue would be packed in containers and carried by Sante Fe train to the Bolo Station site. Initially, Rail-Cycle expects to receive 3,000 tons of processed waste per day, transported by one train. Within five years, it is anticipated that the processed waste will increase to 21,000 tons per day, utilizing seven trains. The service life of the landfill would be 59 years at 21,000 tons per day and would have a total capacity of 364 million tons. At capacity, the site would occupy 2,100 acres and would be about 420 feet in height at its center. Presently, a MRF has been identified for the San Gabriel Valley. It is anticipated that other MRF's will be developed as demand occurs.

The site underlying the refuse would be lined and pollution control systems to be constructed include: groundwater monitoring wells, leachate collection and treatment, and gas control. Also, there will be facilities for composting of "green waste".

Since the proposed action is not consistent with the California Desert Plan guidelines for one of the three parcels, a plan amendment is necessary. A 90-day review of the draft EIS will be provided. The document will consider several issues, including air quality, minerals, water quality and wildlife.

Three public scoping meetings will be conducted to identify public concerns, issues, and viable alternative sites which should be addressed by the EIS. Date, time and location of the public meetings are:

August 27, 1991, 7 p.m.
Twentynine Palms Junior High School, Multipurpose Room, 5798 Utah Trail, Twentynine Palms, CA.
August 28, 1991, 7 p.m.
Holiday Inn, 1511 E. Main St., Barstow, CA.
August 29, 1991, 7 p.m.
Joshua Room, San Bernardino Government Center, 1st Floor, 385 N. Arrowhead Ave., San Bernardino, CA.

DATES: Written comments will be accepted, if received on or before September 9, 1991.

ADDRESSES: For further information contact Ken McMullen, Bureau of Land Management, Needles Resource Area, 101 W. Spikes Road, Needles, CA 92363.

Dated: August 2, 1991.

Alan Stein,

Acting District Manager.

[FR Doc. 91-18812 Filed 8-7-91; 8:45 am]

BILLING CODE 4310-40-M

[NV-020-4370-10]

Winnemucca District Advisory Council Meeting

SUMMARY: Notice is herey given in accordance with Public Law 92-463 that a meeting of the Winnemucca District Advisory Council will be held on Wednesday September 11, and Thursday September 12, 1991.

The meeting will begin at 8 a.m. in the conference room of the Bureau of Land Management Office at 705 East Fourth Street, Winnemucca, Nevada 89445.

The Agenda for the meeting will include:

1. An update on the National Conservation Area Proposal;
2. Review of our draft "interim" management plan for the Black Rock/High Rock area;
3. Review of the Little Owyhee Allotment Evaluation and draft proposal (involving livestock, wildlife, and wild horse issues).

In order to familiarize the council with the issues involved in the Little Owyhee Area, Wednesday, September 11th will be a tour of that area.

The meeting is open to the public. Interested persons may make oral statements to the Council at 10 a.m. on Thursday, September 12th, or file written statements for the Councils consideration. Anyone wishing to make an oral statement must notify the District Manager by Monday, September 9, 1991. Depending on the number of persons wishing to make oral statements, a per person time limit may be established by the District Manager.

Summary minutes of the Council Meeting will be maintained in the District Office and will be available for public inspection (during regular business hours) within 30 days following the meeting.

Dated: July 30, 1991.

Robert J. Neary,

Acting District Manager.

[FR Doc. 91-18831 Filed 8-7-91; 8:45 am]

BILLING CODE 4310-84-M

[AZ-020-01-5410-10]

Conveyance of Mineral Interests Applications

Notice is hereby given that pursuant to section 209 of the Federal Land Policy and Management Act of October 21, 1976, 43 U.S.C. 1719(b), the following applications have been filed for the conveyance of certain Federally-owned mineral interests within each accompanying land description:

Gila and Salt River Meridian, Ariz

AZA-11970

T. 5 N., R. 2 E.,
Sec. 13.
T. 5 N., R. 3 E.,
Sec. 27.

AZA-13979

T. 10 S., R. 7 E.,
Secs. 1, 9, 12, 13, 26, and 27.
T. 10 S., R. 8 E.,
Secs. 5 and 11.
T. 10 S., R. 9 E.,
Secs. 5 and 6.

AZA-17364

T. 4 N., R. 3 E.,
Secs. 3 and 10.
T. 5 N., R. 3 E.,
Secs. 33 and 34.

AZA-19070

T. 8 N., R 5 W.,
Secs. 7, 8, and 17 to 21, incl.

AZA-19074

T. 9 N., R. 5 W.,
Secs. 1, 11, 15, and 22.

AZA-19081

T. 22 N., R. 16 W.,
Sec. 22.

AZA-19175

T. 7 N., R. 5 W.,
Secs. 9, 17, 18, and 20.

AZA-20613

T. 7 N., R. 1 W.,
Sec. 6.
T. 7 N., R. 2 W.,
Sec. 1.

AZA-21174

T. 7 N., R. 5 W.,
Sec. 15.

AZA-21222

T. 10 N., R. 5 W.,
Secs. 3, 9, and 15.
T. 11 N., R. 5 W.,
Secs. 23, 26, 27, 33, 34, and 35.
T. 9 N., R. 6 W.,
Secs. 12, 13, 14 and 24.

AZA-21807

T. 14 N., R. 9 W.,
Secs. 10 and 11.

AZA-21968

T. 6 N., R. 4 E.,
Sec. 15.

AZA-22078

T. 11 N., R. 5 W.,
Secs. 27 and 28.

AZA-22103

T. 6 N., R. 4 E.,
Sec. 24.

AZA-22112

T. 7 N., R. 5 W.,
Sec. 3.
T. 8 N., R. 5 W.,
Sec. 34.

AZA-22303

T. 8 N., R. 5 W.,
Sec. 30

A.3 COMMENTS ON NOTICE OF PREPARATION

PLANNING DEPARTMENT

385 North Arrowhead Avenue • San Bernardino, CA 92415-0180 • (714) 387-4091
Fax No. • (714) 387-3223

COUNTY OF SAN BERNARDINO
ENVIRONMENTAL MANAGEMENT GR(

SHARON W. HIGHTOWER
Director of Planning

TRANSMITTAL

TO: Bob Mason, Env. Solutions
Ken McMullen, Needles BLM
[redacted]

FROM: Randy Scott, Sr. Planner
Planning Department
385 No. Arrowhead Ave., 3rd Fl.
San Bndo. CA 92415-0182

ENCL NO.	DATE	DESCRIPTION	REV.	PAGES
	10/22/91	Responses to referral memos and NOP comments* (Listed on attached sheet)		

*PLEASE NOTE: All comments received to date. Nothing received to date from the San Bernardino & Barstow Public Scoping Meetings.

Copies:

County	ES	WMNA/JE	BLM
Aileen Deardorf	Bob Mason	Phil Beautrow	Doug Romoli
Mike Williams		Garth Morgan	Ken McMullen
Phil Smith		Sandra Alaron-Lopez	

COMMENTS ON RAIL CYCLE PROJECT

Letter From	Date
San Bernardino County Museum	9-11-90
Sierra Club, San Gorgonio Chapter	9-12-90
Archaeological Information Center, Museum	9-12-90
City of 29 Palms	10-19-90
Department of Transportation	10-29-90
Archaeological Information Center, Museum	11-6-90
San Bernardino County Museum	12-31-90
City of El Segundo	1-3-91
Department of Transportation	2-26-91
Fire Warden Department, S.B. County	3-27-91
Solid Waste Mgmt. Department, S.B. County	4-29-91
San Bernardino County Museum	5-5-91
Building & Safety Department (Geologist)	5-23-91
ADH Associates, Inc.	5-28-91
Morris A. Balderman, Consulting Geologist	6-28-91
ADH Associates, Inc.	8-26-91 (2 letters)
U.S. BLM, Needles	8-26-91
Leslie Salt Co.	8-27-91
San Bernardino County Museum, Earth Sciences	8-29-91
Calif. Reg. Wtr. Quality Control Board	8-30-91
Department of Fish and Game	9-3-91
City of 29 Palms	9-4-91
U.S. BLM, Needles	9-5-91
City of San Bernardino	9-6-91
Calif. Reg. Wtr. Quality Control Board	9-13-91
U.S. Dept of Agric, Forest Service, Fontana	9-16-91
City of Victorville	9-16-91
County of Orange	9-25-91
Calif. Air Resources Board	10-11-91

PROJECT NOTICE

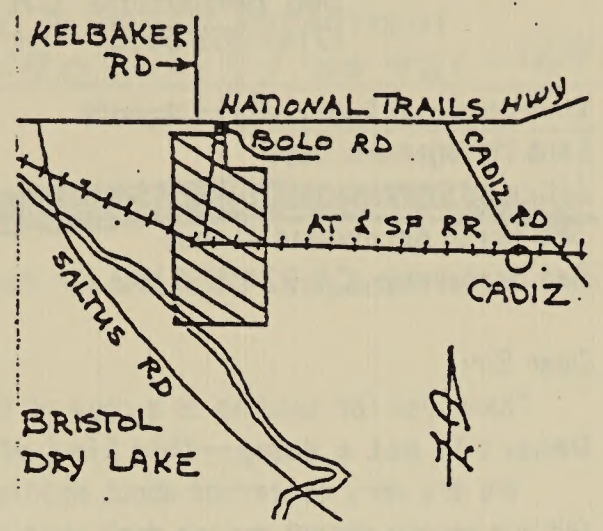
Notice Dated: August 30, 1990

ATTENTION: PROPERTY OWNERS. THE DEVELOPMENT PROPOSAL LISTED BELOW HAS BEEN FILED WITH THE COUNTY OFFICE OF PLANNING. YOU ARE INVITED TO COMMENT BECAUSE YOUR PROPERTY IS NEAR THE PROPOSED PROJECT.

DATES ID: [redacted]745DSS900069741CUP01YD6741CF1
COMMUNITY :CADIZ WEST
FILE/INDX :B)CUP/90-0015/DS921-169N

APPLICANT :RAIL-CYCLE JOINT VENTURE
PROPOSAL :B) CONDITIONAL USE PERMIT TO ESTABLISH AN INTERMODAL RAIL-SERVED UNLOADING FACILITY & SANITARY LANDFILL COMPLEX TO TRANSPORT & DISPOSE OF NON-HAZARDOUS WASTE ON 4,480 ACRES
LOCATION :BOLO RD, BOTH SIDES AND AT & SF RAILROAD, BOTH SIDES, APPROX. 6 MILES WEST OF CADIZ
REP(S') :BEAUTROW, PHIL

VICINITY MAP



YOUR COMMENTS MUST BE RECEIVED BY THIS OFFICE NO LATER THAN SEPTEMBER 14, 1990. COMMENTS RECEIVED AFTER THAT DATE MAY NOT BE CONSIDERED IN THE DECISION. PLEASE REFER TO THIS PROJECT BY THE D.A.T.E.S. NUMBER INDICATED ABOVE. IF YOU HAVE NO COMMENT, NO REPLY IS NECESSARY.

STATE LAW REQUIRES THAT THE PROPOSED ENVIRONMENTAL DETERMINATION BE MADE BY SEPTEMBER 19, 1990 THE PLANNING AGENCY IS SCHEDULED TO MAKE A DECISION REGARDING THIS DEVELOPMENT PROPOSAL ON OCTOBER 18, 1990.

PLEASE CHECK (__) IF YOU WANT TO BE NOTIFIED OF THE PROJECT DECISION.
COMMENTS:

The documents fail to adequately address nonrenewable paleontologic resources. The statement on page 2 of the Executive Summary does not constitute an adequate paleontolc resource assessment or even an adequate summary of an assessment. The assessment must include: (a) literature and records search; (b) field survey by a qualified vertebrate paleontologist; and (c) a paleontologic resource impact mitigation program.

90 SEP 14 AM 10:05

Dr. Allan D. Griesemer — 9/11/90 — County Museums
SIGNATURE — DATE — AGENCY

Environmental Public Works Agency - Land Management Dept. - Office of Planning Mtn/Desert So.
385 N. Arrowhead Ave. San Bernardino CA., 92415 - 0182 Phone (714) 387-4155

ALL DECISIONS ARE SUBJECT TO AN APPEAL PERIOD OF TEN (10) CALENDAR DAYS AFTER AN ACTION IS TAKEN.
NOTE: IF YOU CHALLENGE THIS APPLICATION OR ACTION IN COURT YOU MAY BE LIMITED TO RAISING ONLY THOSE ISSUES YOU OR SOMEONE ELSE RAISED AT THE PUBLIC HEARING OR IN WRITTEN CORRESPONDENCE.

NOTE TO UTILITY COMPANIES: THIS IS FOR YOUR INFORMATION. REPLY IS NECESSARY UNLESS YOU HAVE EXISTING R/W ACROSS SUBJECT PROPERTY.
SPECIAL NOTE REGARDING SUBDIVISIONS CREATING FIVE OR MORE LOTS: SPECIAL WRITTEN REQUESTS MAY BE MADE PRIOR TO PUBLIC HEARING REVIEW OF SUBDIVISION APPLICATIONS IN WHICH FIVE OR MORE LOTS WILL BE CREATED.

Sierra Club
San Gorgonio Chapter

Serving Riverside and San Bernardino Counties
Tahquitz Group • Los Serranos Group
San Bernardino Mtns. Group • Mojave Group
568 N. Mountain View Ave., Suite 130
San Bernardino, CA 92401
(714) 381-5015

90 SEP 12 AM 9:45

Environmental Public Works Agency
Land Management Dept
Office of Planning-Mtn/Desert South
385 North Arrowhead Avenue
San Bernardino, CA 92415-0182

Dear Sir: 11 Sep 1990

Thank you for sending us a copy of the Rail Cycle Land Use Application, Bolo Station Facilities. **The Desert is not a dump--this kind of thinking must be stopped.**

We are very concerned about additional dumps in our desert. Already there are five proposed dumps for our county desert and we don't need any more until certain conditions are met.

1. Rail Cycle has yet to come up with a way to prevent ravens at their proposed landfill. Ravens are perhaps the number one problem in tortoise mortality in our eastern desert. Ravens can fly some 30 miles a day and there is crucial tortoise habitat within 30 miles of Rail Cycle's proposed dump. Rail Cycle proposes nets to contain ravens. Nets will get torn apart in our desert winds. What other birds will get trapped in these nets? Ravens will have a detrimental affect on our proposed Mojave National Park and in the existing East Mojave National Scenic Area.

2. San Bernardino County already has 11 (eleven) sanitary landfills out of compliance with state and federal regulations. That's an unnacceptable average when 11/19 of our county dumps are out of compliance. All of the out of compliance dumps are in the desert. The county cannot possibly process any more dump applications until it cleans up its own act.

3. Rail Cycling claims to be in the recycling business. But Rail Cycle will highgrade--the recyling profits will come in Los Angeles County and San Bernardino County desert is just a dumping ground. This is unacceptable. Rail Cycle says at most it will recycle 40%. If you are not recycling over 51%, you are not recycling.

4. We are very concerned about BRC--Below Regulatory Concern--dumping low level radioactive waste into solid waste dumps. We know that US Ecology is a disreputable company and we must demand that the county enforce strictly that no BRC waste be dumped. How can we desert residents possibly expect the county to follow safety regulations when 11 dumps are already out of compliance?

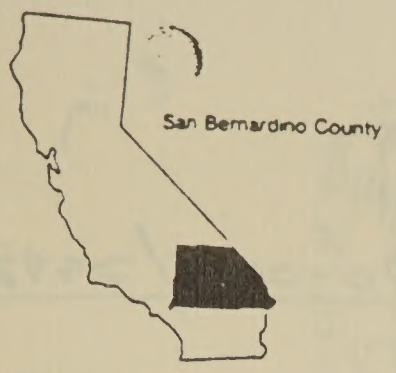
The whole solid waste process is out of compliance in San Bernardino County. The only possible solution is for the County Solid Waste Department to stop taking applications until it gets its act together. How many years will it take?

Sincerely,

Peter Burk

Peter Burk
PO Box 106
Barstow, CA 92312

CALIFORNIA
ARCHAEOLOGICAL
INVENTORY



ARCHAEOLOGICAL INFORMATION CENTER
San Bernardino County Museum
2024 Orange Tree Lane
Redlands, California 92374
(714) 792-1497

CULTURAL RESOURCE REVIEW
FOR THE COUNTY OF SAN BERNARDINO PLANNING DEPARTMENT

Planning Number: GPA/90-0014 / CUP/90-0015 / DS 921-169N
Acres: 4480 Miles:

Cultural Resources

___ No cultural resources are known to exist within or adjacent to the project area.

Cultural resources are known to exist:

X Within the project area.

___ Adjacent to the project area.

Comments: NUMEROUS PREHISTORIC AND HISTORIC ARCHAEOLOGICAL RESOURCES

Previous Surveys for Cultural Resources

___ No previous surveys for cultural resources have been conducted of the project area.

Previous field surveys for cultural resources ~~have been~~ ARE BEING conducted of:

X The entire project area.

___ A portion of the project area.

___ A portion of the area adjacent to the project area.

For purposes of resource inventory, evaluation of site significance and evaluation of site integrity, previous reports of cultural resources within the project area appear to be:

___ Adequate.

X Inadequate.

Comments: NO TECHNICAL REPORT HAS YET BEEN ISSUED FOR THIS PROJECT.

Planning Number: GPA/90-0014/Cur/90-0015/DS921-169N

Potential for the Presence of Cultural Resources

Based upon available information, the potential for the presence of cultural resources within the project area is:

___ Low ___ Moderate _X_ High ___ Unknown

Comments: _____

_____

_____

Recommendations (relative to CEQA guidelines)

Cultural resource determination:

___ Negative declaration is recommended.

_X_ An environmental impact review is recommended to establish resource significance and integrity of known resources and/or resources identified from a field survey, and to propose appropriate mitigation measures (see below).

A field reconnaissance/survey for cultural resources:

_X_ Is recommended (see Referral List of Cultural Resource Consultants).

___ Is not recommended.

Prior to initiation of a field survey, a records check for previously reported cultural resources and/or cultural reports on file at the San Bernardino County Archaeological Information Center:

_X_ Is recommended (see Information Center Announcement).

___ Is not recommended, due to the lack of information.

The submission of a cultural resource management report is recommended (following guidelines for Archaeological Resource Management Reports prepared by the California Office of Historic Preservation, Preservation Planning Bulletin 4(a), December 1989) to:

_X_ Document the field reconnaissance/survey.

_X_ Evaluate resource significance and integrity of known resources and/or resources identified from a field survey.

_X_ Propose additional investigations if required, evaluate project impacts, and propose measures to mitigate potential adverse effects.

Comments: _____

_____

_____

Center Coordinator — Date: 9/12/90

CITY OFFICES
6136 ADOBE ROAD
P.O. BOX 995
TWENTYNINE PALMS, CA 92277
(619) 367-6799
(619) 367-4890 (FAX)

COUNCIL MEMBER
Lester W. Krushat, Mayor
Christopher J. Dobler, Mayor Pro Tem
Charles W. "Chuck" Bell
Jeffrey B. Dunn
Frederick A. "Fred" Libby

CITY MANAGER
Gene Haroldsen

October 19, 1990

LAND MANAGEMENT DIVISION
385 North Arrowhead Avenue
San Bernardino, CA 92415-0180

Gentlepersons:

Re: Proposed Landfill Operation, Amboy; Waste Management of North America.

Please acknowledge the City of Twentynine Palms interest in the proposed Landfill Operation in the Amboy area wherein Los Angeles County proposes to ship its waste for processing.

On October 16, 1990, the City of Twentynine Palms Planning Commission, acting as the Environmental Review Committee, directed staff to officially request copies of any environmental documents prepared for this project as the Planning Commission may wish to respond to the proposal and/or discuss the impacts.

Also, please inform me if there are any charges for this concern.

Very truly yours,

William H. Gutgesell

William H. Gutgesell
Community Development Director

90 OCT 22 AM 8:13

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY GEORGE DEUKMEJIAN, Gover

DEPARTMENT OF TRANSPORTATION
DISTRICT 8, P.O. BOX 231
SAN BERNARDINO, CALIFORNIA 92402
TDD (714) 383-4609

90 NOV -2 PM 2:07

October 29, 1990

08-SBd-40-78.17

Your Reference:
GPA 90-0014/DS 921-169N
Dates ID: 745DSS90006741
GPA/CUP01/06741CF1

EPWA/Land Management Department
Office of Planning
Attention: Mountain/Desert Team
385 North Arrowhead Avenue
San Bernardino, CA 92415

DEVELOPMENT REVIEW

Thank you for the opportunity to review the proposed GPA 90-0014/DS921-169N located 15 miles south of highway (Route 40) between Bold Road and AT&SF railroad.

This proposal is considerably removed from an existing or proposed state highway.

We have no specific comment on this proposal.

If additional information is desired, please call Ms. Christine Ahn of our Development Review Section at (714) 383-4671.

TIM CHOWDHURY
District Development
Review Engineer

CALIFORNIA
ARCHAEOLOGICAL
INVENTORY

ARCHAEOLOGICAL INFORMATION CENTER
San Bernardino County Museum
2024 Orange Tree Lane
Redlands, California 92374
(714) 792-1497

CULTURAL RESOURCE REVIEW
FOR THE COUNTY OF SAN BERNARDINO PLANNING DEPARTMENT

Planning Number: Rail-Cycle Joint Venture CUP/90-15/DS 921-
Acres: 4,480 Miles: _____

Cultural Resources

___ No cultural resources are known to exist within or adjacent to the project area.

Cultural resources are known to exist:

X Within the project area.

___ Adjacent to the project area.

Comments: NUMEROUS PREHISTORIC & HISTORIC ARCHAEOLOGICAL SITES

Previous Surveys for Cultural Resources

___ No previous surveys for cultural resources have been conducted of the project area.

Previous field surveys for cultural resources have been conducted of:

___ The entire project area.

X A portion of the project area.

___ A portion of the area adjacent to the project area.

For purposes of resource inventory, evaluation of site significance and evaluation of site integrity, previous reports of cultural resources within the project area appear to be:

___ Adequate.

X Inadequate.

Comments: NOTE: STUDY CURRENTLY UNDERWAY

Planning Number: RAIL-CYCLE JOINT VENTURE

Potential for the Presence of Cultural Resources

Based upon available information, the potential for the presence of cultural resources within the project area is:

___ Low ___ Moderate X High ___ Unknown

Comments: _____

Recommendations (relative to CEQA guidelines)

Cultural resource determination:

___ Negative declaration is recommended.

X An environmental impact review is recommended to establish resource significance and integrity of known resources and/or resources identified from a field survey, and to propose appropriate mitigation measures (see below).

A field reconnaissance/survey for cultural resources:

X Is recommended (see Referral List of Cultural Resource Consultants).

___ Is not recommended.

Prior to initiation of a field survey, a records check for previously reported cultural resources and/or cultural reports on file at the San Bernardino County Archaeological Information Center:

X Is recommended (see Information Center Announcement).

___ Is not recommended, due to the lack of information.

The submission of a cultural resource management report is recommended (following guidelines for Archaeological Resource Management Reports prepared by the California Office of Historic Preservation, Preservation Planning Bulletin 4(a), December 1989) to:

X Document the field reconnaissance/survey.

X Evaluate resource significance and integrity of known resources and/or resources identified from a field survey.

X Propose additional investigations if required, evaluate project impacts, and propose measures to mitigate potential adverse effects.

Comments: Cultural resource investigation presently being conducted by Leech and Associates; Awaiting the results from this study.

Lisa A. Tom
Center Coordinator

11/6/90
Date

RECOMMENDED CULTURAL RESOURCE SCOPE OF WORK FOR THE PROFESSIONAL CONSULTANT
SAN BERNARDINO COUNTY PLANNING DEPARTMENT

Planning Number: Rail Cycle Joint Venture

Archival Review

X Conduct a records check at the San Bernardino County Archaeological Information Center.

___ Conduct an archival search for information on historic resources. Pertinent records might include original General Land Office plats and surveyors' fieldnotes on file at the County of San Bernardino Office of Surveyor, and property ownership records on file with the County of San Bernardino Assessor and the Bureau of Land Management, Riverside office.

Field Reconnaissance/Survey and Resource Evaluation

X Conduct a complete field survey for prehistoric and historic cultural resources older than 45 years in age. If resources are encountered, evaluate them for their significance, their depth, lateral extent and integrity of cultural remains, as appropriate (see below). For all resources identified, complete appropriate California Office of Historic Preservation site, structure and isolate record forms. Prior to the completion of the survey report, submit two copies of completed records to the San Bernardino County Archaeological Information Center for assignment of appropriate State and County record numbers. These numbers should appear in the final report.

X Resources previously reported (and new resources) need to be evaluated for significance, following appropriate state and federal regulations and guidelines.

X For potentially significant archaeological resources, probe, core or auger deposits to document their depth, lateral extent and integrity. For potentiallly significant historic structures, evaluate the general integrity of architectural and landscape elements.

Cultural Resource Report

X Complete a final report of the investigations and evaluations performed (following guidelines for Archaeological Resource Management Reports prepared by the California Office of Historic Preservation, Preservation Plannino Bulletin 4(a), December 1989). One copy of this report is to be filed with the San Bernardino County Archaeological Information Center.

Lynn A. Rose
Center Coordinator
San Bernardino County Archaeological Information Center

11/6/90
Date

SAN BERNARDINO COUNTY MUSEUM

2024 Orange Tree Lane • Redlands, CA 92374 • (714) 798-8570 • 422-1610

COUNTY OF SAN BE
GENERAL SERVICE A

DR. ALLAN D. GR
Director

December 31, 1990

90 JAN -4 PM 1:34

Asher Hartel, Mountain/Desert Planning Team
Planning Department
385 N. Arrowhead Ave., 3rd Floor
San Bernardino, CA 92415-0182

re: **RAIL-CYCLE CUP/89-0043/DS921-169N, ADDENDUM NO. 2**

The Plan of Development for the Rail-Cycle project fails to consider nonrenewable paleontologic resources in Cadiz Valley. The project needs to have a paleontologic resource assessment by a vertebrate paleontologist whose qualifications and performance is recognized as acceptable to the County of San Bernardino. Following the assessment, the vertebrate paleontologist must develop a site-specific program to mitigate impacts to paleontologic resources. This program should include at minimum: (1) monitoring of excavation by a qualified paleontologic monitor; (2) preparation of recovered specimens, including sediment processing for small vertebrate fossils; (3) curation of specimens into an established repository; and (4) a report of findings with complete specimen inventory.

Sincerely,

Dr. Allan D. Griesemer
Museums Director

ADG:RER/jr

City of El Segundo

KENDRA MORRIES
DIRECTOR OF PLANNING

January 3, 1991

County of San Bernardino
Environmental Public Works Agency
Land Management Department
Office of Planning
County Government Center
385 North Arrowhead Avenue, 3rd Floor
San Bernardino, CA 92415-0120

Attn: Asher Hartel, Planner III

91 JAN -8 PM 3:41

Dear Mr. Hartel:

I am in receipt of the 3-ring notebook, Addendum No. 2, for RAIL-CYCLE/CUP 89-0043/ DS921-169N sent by your office. I also received in November, 1990, the RAILCYCLE Land Use Application binder.

I would like to point out that both documents contain references to two Materials Recovery Facilities (MRFs) that "will be build in the cities of El Segundo and Commerce". The documents also indicate that permitting will start in December of 1990, and that presentations have been made to the respective city councils.

I find these references and statements misleading at best. No such facility has been approved by the City Council of El Segundo, nor are there pending applications on file with this city. In addition to land use applications, I also anticipate that such a facility would require extensive environmental documentation, pursuant to CEQA. While it is correct that a presentation was made to the El Segundo City Council, it is important to note that it was an informal presentation, not a public hearing. In addition, at the conclusion of the presentation, it is my understanding that the City Council expressed strong opposition to the concept.

This information may or may not be germane to the applications pending with your office. It is important, however, to the City of El Segundo, that you be aware of our objections to the misleading language contained in the documents.

City of El Segundo
Planning Department
350 Main Street
El Segundo, California 90245-0989
(213) 322-4570 Ext. 282 FAX: (213) 322-7137

Thank you for including us on your distribution list now and in the future. If you have any questions, please feel free to contact me directly.

Sincerely,

Kendra Morries

Kendra Morries
Director of Planning

cc: *Ronald E. Cano, City Manager*
Laurie B. Jester, Senior Planner

ATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY PETE WILSON, Governo

DEPARTMENT OF TRANSPORTATION
STRICT 8, P.O. BOX 231
AN BERNARDINO, CALIFORNIA 92402
D (714) 383-4609

February 26, 1991 08-SBd-Var

Mr. Asher Hartel
City of San Bernardino
300 North "D" Street
San Bernardino, CA 92410

Dear Mr. Hartel:

Rail-Cycle-Conditional Use Permit 89-0043
For the Bolo Station Facility

The Bolo Station Facility does not appear to have any significant impacts on Caltrans facilities.

We are concerned, however, that the proposal's projected long-term rail traffic could adversely affect the planned scheduling of commuter rail vehicles or the planned design of right of way improvements required to accommodate total anticipated rail traffic. We are also concerned that additional planned Materials Recovery Facilities (MRFs) could potentially produce localized environmental impacts upon planned commuter rail station locations.

It is our understanding that a copy of the development plan "Rail-Cycle Land Use Application Bolo Station Facilities" has been sent to the appropriate authorities, noted below, planning the development of commuter rail services in Southern California.

Should you have any questions regarding our response, you may call Tom Meyers at (714) 383-6908.

Very truly yours,

Original Signed By Harvey Sawyer

HARVEY J. SAWYER
Chief, Transportation Planning
Branch B

TM:ldb/jll

redi-letter carbonless 29486 TRIP

TO Asher Hartell
Planning
Robert Tobin

FROM Jim Rankin
Fire Protection Planning

SUBJECT Rail Cycle Project DS 921-1691 DATE 3/27/91

MESSAGE The concerns I have about this project is
private location. the Closest Fire Warden Fire Station
Harvard sta 46. This could lead to slow response time. Emergency
Vehicles to Come from Bastian. With no emergency Services
(Fire Station) Close. an injured person will have a long
wait for basic care, also there will be no small fires due to
response time.

SIGNED Jim Rankin

REPLY

Fire Warden
Comments to
referral.

9 MAR 33 AM 9:00

SIGNED

DATE / /

REORM. 45 472

SEND PARTS 1 AND 3 INTACT -
PART 3 WILL BE RETURNED WITH REPLY.

POLY PAK (50 SETS) 4P47

INTEROFFICE MEMO

DATE April 29, 1991 PHONE 387-0125

FROM **KENNETH KAZ**, Environmental Specialist
Solid Waste Management/Operations Division

TO **ASHER HARTEL**, Mtn/Desert Team
Planning Department

1853
County of San Bernardino

SUBJECT **REVIEW OF RAIL CYCLE JOINT VENTURES' INITIAL STUDY ENVIRONMENTAL CHECKLIST FORM**

After reviewing the Intial Study Environmental Review Checklist Form provided by Rail Cycle Joint Venture, I have nothing to add or comment on at this point in time.

Any areas in which I may have concerns are going to be addressed in the Environmental Impact Report (EIR).

I would like to receive a copy of the EIR when it comes out so that I may review any areas in question.

KK:jh

cc: Reuben E. Amamilo, Assoc. Planner, SWM

91 MAY -1 PM 2:13

AN BERNARDINO COUNTY MUSEUM

4 Orange Tree Lane • Redlands, CA 92374 • (714) 798-8570 • 422-1610

COUNTY OF SAN BERNARDI
GENERAL SERVICES AGENC

DR. ALLAN D. GRIESEMEF
Director

May 5, 1991

91 MAY -7 AM 9:20

Asher Hartel, Planner
Mountain/South Desert Environmental Team
San Bernardino County Planning Department
385 N. Arrowhead
San Bernardino, CA 92415-0180

re: RAIL-CYCLE PROJECT: PALEONTOLOGIC RESOURCES

Nonrenewable paleontologic resources must be considered for this project. Documents received to date by this office do not reflect this concern, which must be addressed in the joing EIR/EIS.

Sincerely,

Dr. Allan D. Griesemer
Museums Director

ADG:RER/jr

SAN BERNARDINO COUNTY
INTER-OFFICE MEMO

DATE May 23, 1991 PHONE 387-4245

FROM WESSLY A. REEDER, County Geologist
Building and Safety Department

TO ASHER HARTEL
Planning Department

SUBJECT PROPOSED RAIL-CYCLE PROJECT NEAR AMBOY

Although proposed landfills do not normally fall under the purview of the Building and Safety Department, review of the Rail-Cycle Land Use Application Document suggests that our involvement may be warranted.

As you are aware, the final phases of the proposed landfill operation will include construction of substantial slopes. Our initial concerns regarding this project are the stability of constructed slopes, erosion control and mitigation of geologic hazards.

We recommend that prior to project approval, detailed slope stability analysis be conducted to include surficial stability of cap materials, gross stability of slopes and seismic stability (dynamic analysis).

Erosion control may also become a key issue. We are concerned with erosion mitigation and long term maintenance of erosion control devices.

Although, the site is currently not within a San Bernardino County Geologic Hazard Overlay District, we are in the process of designating Geologic Hazard Overlays for all dry lakes within San Bernardino County because of potential adverse conditions such as subsidence, desiccation cracking, liquefaction, expansive or collapsible soils and high alkalinity, We anticipate that Bristol Dry Lake will be included within a Geologic Hazard Overlay District by the time this project reaches the DRC stage.

WAR:ao

cc: Ron Andrews

rail.cycle.project.wr

MORRIS A. BALDERMAN/CONSULTING GEOLOGIST
PO BOX 1871 - SAN JUAN CAPISTRANO, CA 92693 - 714/240-2396 - FAX 240-8425

June 28, 1991

JUL 1991

Ms. Barbara Ransom
Environmental Manager
Leslie Salt Company
7220 Central Avenue
Newark, CA 94560

Preliminary Geotechnical Evaluation
Potential Impact to Leslie Salt Amboy Facility
from Proposed Rail*Cycle Project
(Reference Purchase/Work Order 19328)

Dear Ms. Ransom:

This evaluation was performed following your request and authorization. The general scope of this work was described in my cost estimate dated April 19, 1991 and in your letter dated April 23, 1991. The purpose of this work has been to provide a preliminary geotechnical evaluation of potential effects to the Leslie Salt Amboy facility from the proposed Rail*Cycle project, particularly construction and operation of the large landfill proposed to be adjacent to Leslie Salt's existing brine production wells. This evaluation has been based on reviews and interpretations of available reports and other information; it has not included new site exploration.

Results of the evaluation are presented in this letter, beginning with a summary of the work performed and brief descriptions of the Leslie Salt Amboy facility and the proposed Rail*Cycle project. Geologic setting of the site area then is described, based on the information reviewed for this work. Following this background information, potential impacts are discussed and recommendations are made regarding additional information that would be needed to assess these impacts in greater depth. Two drawings are attached. Figure 1 is a location map using reduced copies of the U.S. Geological Survey quadrangle maps as a base. This map shows locations of the Amboy facility production wells and other wells and borings referenced in this letter. It also shows the proposed location of the Rail*Cycle landfill. Figure 2 is a northeast-trending cross section through the the area of the production wells and the adjoining part of the proposed landfill. Locations of wells and general subsurface geologic information are included but no attempt was made to depict or correlate specific geologic units.

Work Performed:
The largest part of this evaluation has involved review and interpretation of available reports and documents. Much of the information that was reviewed was provided by you, including: general information about the Leslie Salt Amboy facility, records from previous work at the facility by Geothermal Surveys, Inc. (GSI), and reports from hydrogeologic assessments performed by IT Corporation in the Saltus area. Information provided regarding the Rail*Cycle project included the October 1990 land-use application, draft Phase I characterization reports prepared by Jacobs Engineering, and draft logs from wells and piezometers drilled earlier this year by Jacobs Engineering for Rail*Cycle.

Additional information was obtained from reviews of published reports and contacts with the involved agencies. I contacted Mr. Rick Gundry of the BLM and obtained geologic information about the project area from the BLM office in Riverside. Updated descriptions of the Rail*Cycle project were obtained from Mr. Asher Hartel of the County of San Bernardino Planning Department, in San Bernardino. Copies of this updated information were sent to you on May 22.

I went to the field on May 21 to view the Leslie Salt Amboy facility and the planned location of the Rail*Cycle facilities. Mr. Ricardo Choza, the Plant Manager, showed me around the area and described the plant operations. Additional information regarding the Amboy facility was obtained in a telephone conversation with Mr. Lyndon Jones, the former Plant Manager.

Description of Leslie Salt Amboy Facility:
The Leslie Salt Amboy facility occupies several hundred acres on the north side of Bristol Dry Lake. It produces concentrated brines, chiefly from solar evaporation of brine pumped from three wells in the northeast quarter of Section 19 and the northwest quarter of Section 20, Township 5 North, Range 13 East (EW-3, EW-4, and EW-5, Figure 1). The main product of this process is calcium chloride. The brines of Bristol Dry Lake are unique in containing high concentrations of calcium chloride; nearby Cadiz Dry Lake is the only other lake in the region reported to have brines of similar composition.

Claims for calcium chloride have been located in this area since 1908 and the mineral has been produced since 1910. The original claims in this area were taken over in 1921 by the California Rock Salt Company, which subsequently became the California Salt Company. The Leslie Salt Company bought half

interest in the California Salt Company in 1938 and bought out the remainder in 1958. The three producing wells (EW-3, EW-4, and EW-5) reportedly were drilled in the 1970's and the present production system has been operating since about 1981.

Wells EW-3, EW-4, and EW-5 reportedly are about 300 feet deep and produce brine from about 270 feet depth. The wells are located near the margin of the dry lake bed and have proven most suitable for brine production. Test wells also were drilled at other locations but reportedly did not produce sufficient brine. Although this area has been worked for many years, the factors that determine occurrence and production of the brine do not appear to be well defined.

Proposed Rail*Cycle Project:

The Rail*Cycle project proposes to transport solid waste by rail from the greater Los Angeles area to a large landfill that would be located between the railroad tracks and Bristol Dry Lake (Figure 1). This landfill is planned to occupy 2100 acres in Sections 15, 16, 17, 21, and 22 and to have a total capacity of about 607 million cubic yards. The maximum height of the proposed landfill would be about 350 feet above the present ground surface.

The landfill is planned to receive waste in unit trains at an initial rate of 0.9 million tons per year. By the fifth year of operation, receipts are planned to increase to 6.6 million tons per year. The facility is planned to operate for 60 to 100 years before reaching its design capacity. The project description also mentions possibility for expansion to additional lands if further capacity is needed.

In addition to the waste handling, the project is planned to involve 218 million cubic yards of earthwork for excavation, cover material, and perimeter berms. Some significant excavation could be performed outside the planned landfill area. The landfill is proposed to be underlain by a two-foot layer of compacted soil having permeability of 1×10^{-7} cm/sec and the final cover is to include one foot of soil with permeability of 1×10^{-6} cm/sec. For the planned 2100-acre landfill, these layers would require on the order of 10 million cubic yards of clayey soils. These soils are not expected to be present in the area proposed for the landfill and geotechnical investigations are planned by Rail*Cycle to locate suitable sources. The closest likely source for this volume of clayey soils would be in the Bristol Dry Lake bed.

Geologic Setting:

Information on the general geologic setting of the area was obtained chiefly from published reports. The subsurface alluvial and lake deposits in the area of the proposed Rail*Cycle landfill and the three wells are most important for this evaluation. Information regarding these materials was derived from the logs of previous drilling in the area published by various sources, the logs by GSI of drilling for the Leslie Salt Amboy facility, and the logs of wells and piezometers drilled for the Rail*Cycle project.

The Amboy facility and the proposed Rail*Cycle landfill are located on the north side of Bristol Dry Lake, a broad playa in a closed drainage basin. This area is in the eastern part of the Mojave Desert natural province of California, which is considered a subdivision of the Basin and Range geomorphic province. In general, this region is characterized by fault-bounded mountain ranges of crystalline bedrock and intervening alluviated valleys, commonly containing closed drainage basins. Bristol Dry Lake is thought to be within a northwest-trending structural trough that also includes Cadiz and Danby dry lakes, to the southeast.

Bedrock exposed in the Bristol Mountains, within about two miles north of the lake bed, consists mainly of Precambrian granitic rocks along with Paleozoic metamorphic and sedimentary units and a small amount of Tertiary volcanic rock. Bristol Dry Lake is bounded on the west by volcanic rocks associated with Amboy Crater, about five miles west of Saltus. Volcanic activity at Amboy Crater is thought to be less than about 6000 years old and basaltic lava overlies the lake deposits.

Based on surface topography, the three brine production wells and the proposed Rail*Cycle landfill are in the transition area between the lake beds of Bristol Dry Lake and the alluvial sediments derived from the Bristol Mountains on the north. Boring logs indicate a similar transition in the uppermost few hundred feet of subsurface geology. The logs of borings EW-1, EW-2, and EW-3 (from GSI) report mainly clay and silt with lesser amounts of sand to 300 feet depth. GSI interpreted resistivity surveys to show similar materials to about 600 feet depth in that area. Previous drilling by the U.S. Geological Survey reported interbedded clay and salt to depths to about 1000 feet at several locations on the lake bed. Two of these borings (Bassett et al, #1 and BR-2) are in this area and their approximate locations are shown on Figure 1. Rail*Cycle borings NC-1 and NC-2 were drilled in Sections 29 and 33, south of the planned landfill (these are not plotted on Figure 1 because the draft logs do not specify the actual boring locations). These logs also report

encountering mainly silt and clay to depths of 200 and 246 feet. The NC-1 and NC-2 logs also describe zones of "caliche" up to tens of feet thick. However, it seems unlikely that such thick caliche zones would occur in this environment and the intervals may well be beds of evaporite salts, such as were reported by the U.S. Geological Survey from the previous drilling.

Logs from the Rail*Cycle borings in the planned landfill area provide descriptions of soils to maximum depths of about 200 feet. These show predominantly clay and silt in the southwestern part of the proposed landfill area, at MW-5, MW-6, MW-7, P-15, and PC-2. Grain size of the soils increases to the northeast, becoming predominantly sand with some gravel on the north side of the railroad. The depth to bedrock was not determined by the drilling in the proposed landfill area. The top of bedrock is likely to be hundreds of feet deeper than the Rail*Cycle borings and is likely to be irregular, reflecting the buried topography of the adjacent Bristol Mountains. Although the Rail*Cycle drilling found coarse grained alluvium in the northern part of the proposed landfill area, lake sediments, including clays, silts, brine zones, and possible salt layers, potentially could be present at greater depth. The California Salt No. 2 well (approximate location shown on Figure 1) reportedly encountered lake sediments to about 1080 feet depth and did not reach bedrock at a total depth of about 1300 feet.

The logs from the Rail*Cycle borings indicate consistency of the subsurface soils by records of blow counts from driving soils samples and results of laboratory density tests on selected samples. These also show a marked change from southwest to northeast. The sandy soils in the northeastern part of the planned landfill area typically showed high blow counts and dry densities of more than 100 pounds per cubic foot (pcf), indicating that they are relatively well consolidated. The fine grained soils in the southwest part of the planned landfill area commonly had relatively low dry densities of less than 90 pcf and low blow counts were reported for a number of samples. (As most of the samples were driven using a downhole hammer, blow counts could be increased by possible presence and viscosity of fluid in the hole. In this situation, high blow counts could be inaccurate but low blow counts typically would indicate presence of relatively soft soils.) These results indicate that the clays and silts in the southwestern part of the planned landfill area are not well consolidated.

Ground-water flow conditions and variations in brine concentrations have not been determined completely for the basin as a whole or in the area of the planned landfill and the Amboy facility production wells. The actual ground-water flow conditions in this area are likely to be complex and

would be influenced by a number of diverse factors, including variations in subsurface geology and density variations in the brines.

In the Saltus area, wells installed by IT Corporation indicated a hydraulic gradient outward from the center of th... lake bed toward its margin. As the hydraulic gradient in the alluvium surrounding the lake bed would be toward the lake, this configuration would require presence of a hydraulic trough along the edge of the playa.

Some previous exploration indicates that the greatest brine concentrations occur at relatively shallow depths. Resistivity surveys in the area of EW-1 and EW-3 were interpreted by GSI to indicate the greatest salinity at depths of about 200 feet, with the ground water becoming less saline below that depth. If this interpretation is correct, there could be substantial potential for vertical ground-water movements due to density differences in the brines.

Depth to ground water in a number of "sample tubes" in Sections 18, 20, and 28 was measured by the Amboy facility operators during June 1990. These measurements indicated a generally southward gradient with a depression in the area of the pumping wells. The measurements do not appear to indicate a trough along the playa margin, as suggested by the IT wells near Saltus, but are not conclusive in this regard. The information provided by Rail*Cycle includes ground-water elevations measured in their wells on April 22, 1991, also essentially indicating depth to the uppermost ground water. These show a general gradient to the southwest with a possible depression near the pumping wells. However, it is not possible to evaluate effects of the pumping wells from the Rail*Cycle data because of the locations of their monitoring wells.

Although Rail*Cycle has indicated that they plan to model effects of the pumping wells on the uppermost ground water, they do not appear to have sufficient information to model this reliably. In particular, there is no information regarding relationships between the uppermost ground water monitored by the Rail*Cycle wells and the deeper brine layers at the pumping wells. There is no stratigraphic information between the bottom of their MW-5 (123 feet deep) and the depth of the pumping wells (about 300 feet deep). There also is no information on the variations in hydraulic heads and gradients at different depths. (Rail*Cycle has two piezometer clusters, PC-1 and PC-2, that apparently were installed to investigate head variations with depth; both are about one to two miles from the pumping wells. The logs indicate these piezometers were installed as two 2-inch wells in a single borehole, a configuration that is difficult to

seal properly and usually results in interconnection of the two screened intervals.)

Potential Effects:
There are several ways in which the proposed Rail*Cycle landfill potentially could affect the Leslie Salt Amboy facility. The most important geotechnical effects appear to be potential for leachate from the proposed landfill to contaminate the underlying brine zones and the potential for construction of the landfill to alter hydrogeologic conditions in the area of the pumping wells; these are discussed further in the following paragraphs. Development of the 10-million cubic yard borrow area needed to provide clay for the landfill liner and cover is another activity that potentially could affect the Amboy facility. However, these effects cannot be evaluated because they would depend on the location and configuration of the borrow area, which have not been determined. Airborne transport of dust and other materials is another potential effect that should be mentioned, although it is not geotechnical in nature. The planned 218 million cubic yards of earthwork and the handling of 607 million tons of waste materials can be expected to generate some substantial airborne particulates. Evaluations of local wind conditions would be needed to determine whether this material could be transported to the area of the salt evaporators in quantities that could be of concern.

Brine contamination: As the proposed Rail*Cycle landfill would be located generally upgradient of the brine wells, the brine potentially could be contaminated if the landfill were to leak. The probability of such leakage is expected to be low as the landfill is proposed to be constructed with a leachate management system, high density polyethylene liner, and clay liner. In addition, leachate generation should be very low in the arid climate of the Amboy area. However, there would be some finite probability that leaks could occur, particularly if the liners were to be damaged by settlement or other movement of the underlying soils. Because of the planned size and extent of this landfill, it would be very difficult or impossible to remedy any leaks if they were to occur after large parts of the fill had been placed. It also would be impossible to evaluate how leachate might migrate from the landfill to the brine zone, until hydrogeology of the area is characterized reliably. Overall, there appears to be a very low probability that the brine would be contaminated by leakage from the landfill but if such leakage were to occur, the contamination probably could not be remediated.

how long do these last? See ADH letter 4 pages →

Changes in Hydrogeology: Construction of the proposed extensive landfill potentially could change local

hydrogeologic conditions in ways that are not completely understood. In addition, potential effects on the brine wells cannot be predicted because the factors that determine occurrence and production of the brine are not well defined. The potential effects from the proposed landfill are discussed generally here but extensive site exploration and geotechnical analyses would be needed for a quantitative evaluation.

Construction of the landfill potentially could affect water levels in the area because of the extensive areas that would be excavated and lined. The nature of this effect is uncertain and it probably would be very minor if considered over the basin as a whole. However, the three brine wells they are within a few hundred feet of the proposed landfill and potentially could be affected significantly. Alterations in water levels, hydraulic gradients, or concentration of the brine could affect use of these wells for brine production.

Consolidation of silt and clay beds underlying the proposed landfill potentially could have a greater effect on geohydrologic conditions. Consolidation effects are likely to be substantial at the proposed Rail*Cycle landfill because of its height and area, and because poorly consolidated soils are present in the subsurface. The landfill is proposed to be up to 350 feet high and would impose a large load on the underlying foundation soils. This would be a generally uniform load over a 2100-acre area and would induce stresses to depths of hundreds of feet below the present ground surface. This increased overburden pressure can be expected to cause consolidation of the relatively soft clays and silts reported from the drilling in the southwestern part of the proposed landfill area, near the brine production wells. Of course, this consolidation also could occur in soils below the depths drilled by Rail*Cycle, probably to below the depth of the brine wells. Large scale consolidation of the soils adjacent to and generally upgradient of the brine wells potentially could influence characteristics of the brine and production rates. However, the nature of these potential effects is uncertain and may be difficult to predict reliably, even with extensive exploration and analyses.

Recommendations:

As noted at various points above, additional information would be needed for a reliable evaluation of potential effects on the Leslie Salt Amboy facility from the Rail*Cycle landfill. These effects could be significant because the proposed large landfill would be very close to the three wells that are the main source of brine for the Amboy facility. Construction of the proposed large landfill potentially could affect water levels, hydraulic gradients,

brine characteristics, production rates, and other parameters. The nature of the effects cannot be predicted at present because hydrogeologic conditions in the area are not well understood and the potential changes are difficult to quantify. Rail*Cycle reportedly is developing a computer model of the local ground-water regime in order to project water levels at the landfill but they do not appear to have sufficient information for reliable modeling.

The additional field investigations that would be needed would include:

1. Sufficient drilling and logging, and other exploration, in the landfill areas upgradient of the brine production wells to reliably characterize potential ground-water migration pathways from the proposed landfill to the wells.

2. Drilling, sampling, and detailed logging of a number of borings to the maximum depth that would be influenced by the overburden load from the proposed landfill, or to bedrock, if bedrock is shallower.

3. Installation of wells at various depth intervals and monitoring to determine lateral and vertical variations in water levels, hydraulic gradients, and brine characteristics.

Field and laboratory testing also would be needed to measure hydraulic conductivities, consolidation characteristics, and other parameters for the various stratigraphic units underlying the area of the proposed landfill and the adjacent brine wells.

Results of these additional field investigations and laboratory testing would be needed for input to hydrogeologic models of the area. The required modeling would be unusually complex as it would need to account for: variations in brine composition and the related density gradients; pumping from the brine production wells; changes in overburden pressures during excavation, construction, and filling of the proposed landfill cells; drainage from the consolidating soil layers; and possible other factors. Modeling of this type would be needed to evaluate potential effects on the brine production wells from the proposed landfill. However, it may not be possible to reliably predict how construction of the proposed large landfill could affect the adjacent brine wells, even after extensive investigations and evaluations.

These types of information also would be needed for Rail*Cycle to demonstrate compliance with the State siting requirements in 23 CAC Subchapter 15. In particular, it would be necessary for Rail*Cycle to demonstrate that wastes

will be a minimum of five feet above the highest anticipated ground-water elevation, that the underlying foundation soils would not experience settlement that could damage containment systems, and that the proposed landfill would not impair beneficial uses of the underlying ground water. Because of these requirements, the modeling described above would be needed for Rail*Cycle to determine the maximum water levels that would be anticipated if brine pumping were discontinued and to evaluate whether continued pumping could contribute to excessive settlement of the foundation soils under the landfill. The additional detailed characterizations also would be needed to demonstrate that the proposed landfill would not impair the beneficial uses of the water being extracted from your existing wells. Accordingly, these recommendations are my opinion of the investigations that should be needed for siting of the Rail*Cycle landfill.

The foregoing evaluations and interpretations are based on limited document reviews and included reviews of draft materials that may be subject to revision. If substantial revisions are made or new information becomes available, these interpretations may need to be changed accordingly.

I have appreciated this opportunity to be of service. Don't hesitate to call with any questions.

Sincerely,

Morris A. Balderman

Morris A. Balderman

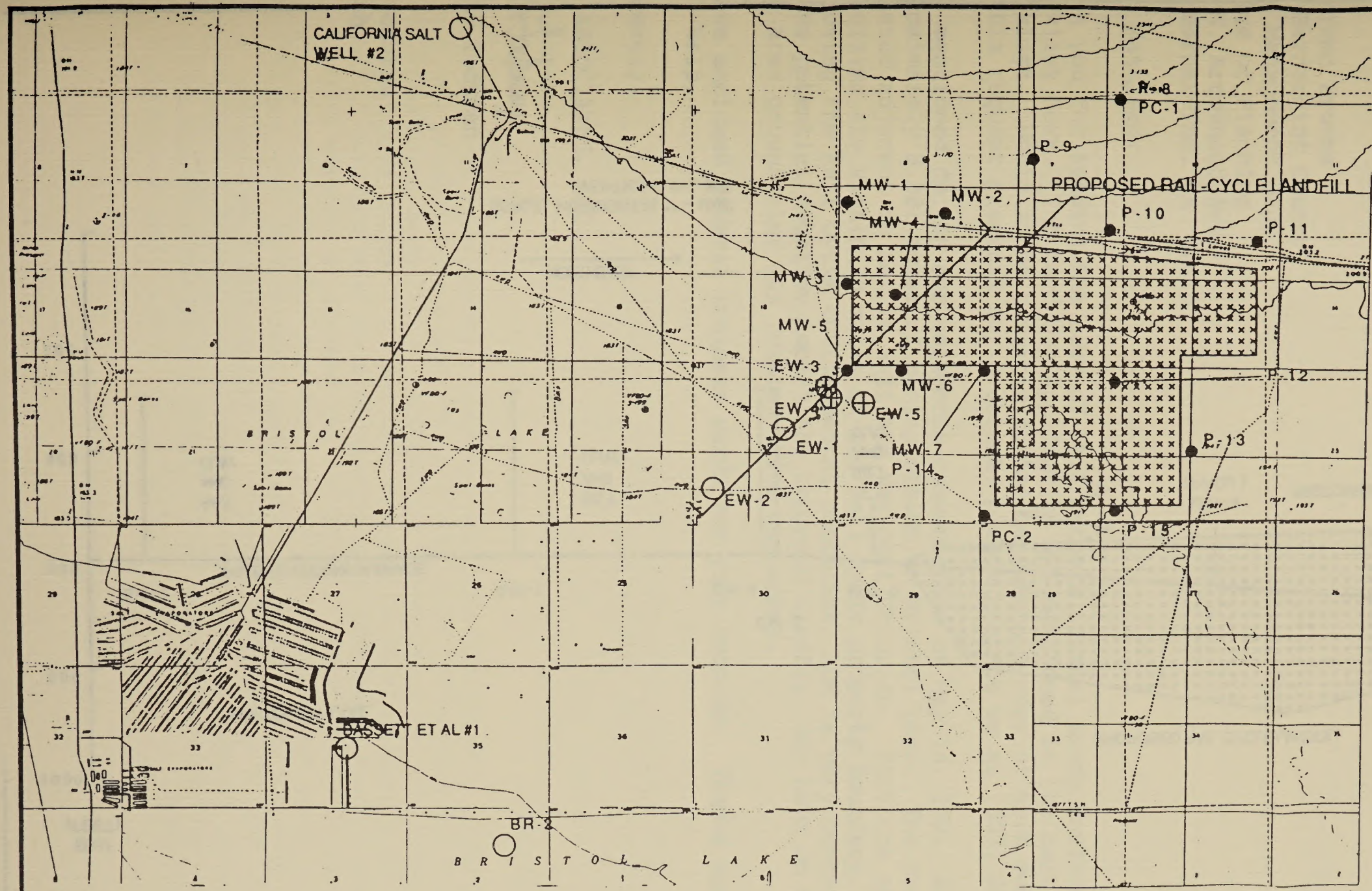


FIGURE 1
LOCATION MAP

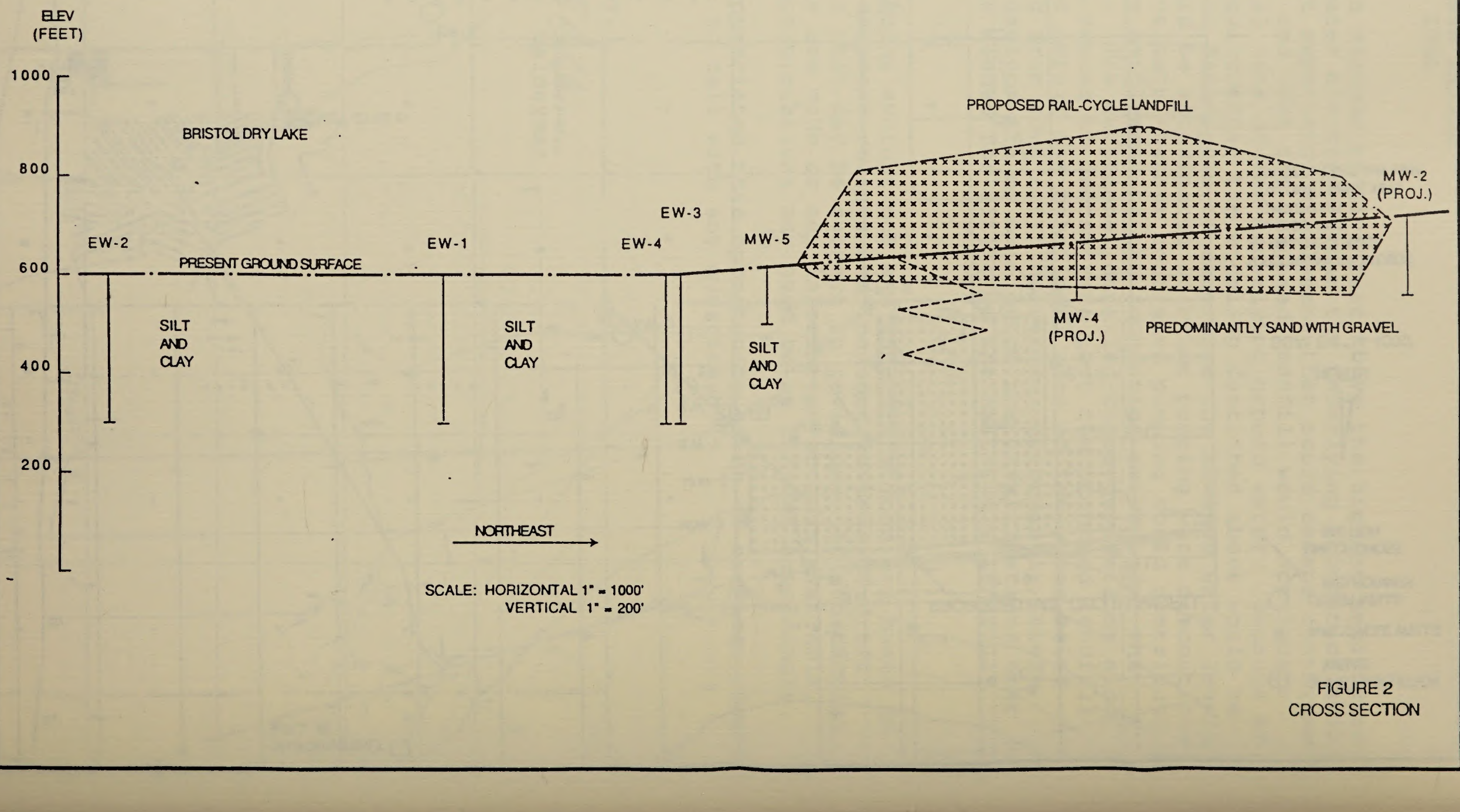


FIGURE 2
CROSS SECTION

ADH ASSOCIATES, INC.

3421 South Ammons Street
Building 29-3
Lakewood, Colorado 80227
(303) 986-5517

91 MAY 30 PM 2:28

May 28, 1991

Kathleen Browne
San Bernardino County
Land Management Dept.
Office of Planning
385 N. Arrowhead Ave.
San Bernardino, CA 92415

Dear Kathleen:

Thank you for sending the copy of Rail Cycle's Initial Study Environmental Checklist Form. The Land Use Application was mentioned in the text of the checklist. Would it be possible for me to obtain a copy of this document? If this request presents any problems, please contact me at (303) 986-5517.

As I mentioned during our telephone conversation of May 14, 1991, ADH controls approximately 3,381 acres of mining claims on Bristol Lake. The claims are situated adjacent to Leslie Salt and National Chloride. Portions of the ADH claims are within 1½ miles of the Rail Cycle property boundary. After reviewing the Rail Cycle environmental checklist, ADH is very concerned as to the potential negative impact the proposed landfill may have on the Bristol Lake area groundwater and related brine resources.

I have enclosed several business cards for your records. Thanks again for your help.

Sincerely,

ADH ASSOCIATES, INC.

Keith Tockman

Keith Tockman

Enclosures
KT/sh

ADH ASSOCIATES, INC.

3421 South Ammons Street
Building 29-3
Lakewood, Colorado 80227
(303) 986-5517

July 5, 1991

Dr. Garth Morgan
Rail Cycle
5770 South Eastern Avenue
Los Angeles, CA 90040

Dear Garth:

I appreciate having had the opportunity to meet with you and Sandra Alarcon-Lopez at Jacobs Engineering's Pasadena offices on June 27, 1991 to discuss the Rail Cycle Project. As was mentioned during our conversation, ADH is a small private corporation that is currently developing the calcium chloride resources at Bristol Lake on mining claims adjacent to the proposed Rail Cycle site. While the magnitude and economic significance of the proposed landfill is certainly understood, ADH is most concerned with the potential impact Rail Cycle may have on the Bristol Lake mining activities. The issues which need to be technically addressed are as follows:

1. **Liner Leakage:** Waste Management will undoubtedly use the best available technology in designing the composite liner system. Unfortunately, liner integrity is not foolproof as been documented in numerous literature and site studies, including Matrecon (1988), Brown et al (1987), and Geoservices (1987). Despite the most advanced design and construction practices, numerous causes for liner leakage often occur, such as seam failure, punctures, holes, tears, stress fractures, gas pockets ("whale-backs"), subsidence, creep, differential settling, differential hydrostatic pressure, chemical and biological reactions, shear displacement, inadequate subgrade compaction and finishing, etc. Failure of the liner, for any of these reasons, could lead to environmental damage. As you pointed out in our discussions, failed liners are generally inaccessible due to landfill cover and therefore are not repairable.

2. **Groundwater:** The monitor well and piezometer information you provided was reviewed and groundwater flow from the Rail Cycle site towards the southwest and south was confirmed. Furthermore, significant drawdown due to Leslie's pumping is observable in MW-5 and to a lesser extent in MW-6. These factors prove both flow towards Bristol Lake and also hydrologic communication of the aquifers. Therefore, any leakage or release from the landfill would migrate towards the dry lake and could conceivably chemically alter or even contaminate the mineralized brines thus jeopardizing the adjacent mining operations. Finally, if Leslie ceases pumping or reduces pumping rates, the resulting decrease in the cone of depression could cause vertical hydrostatic uplift in the southwestern portion of the landfill site.

3) Recharge: The Bristol Lake playa is recharged via surface runoff and regional groundwater flow. You indicated that the Rail Cycle drainage/diversion channel would divert rainwater, surface runoff, and floodwaters to the south. This barrier would effectively block surface recharge to Bristol Lake from the northeast. Groundwater recharge to Bristol Lake could also be reduced due to excessive pumping of the proposed Rail Cycle support wells. A reduction in recharge may also result from capillary mounding which can occur beneath landfill and surface impoundents.

4) Land Use: Amendments to the BLM's California Desert Conservation Area Plan and the San Bernardino County General Plan will be required prior to development of Rail Cycle. Both plans address the need to preserve and protect mineral resources for beneficial use. Due to the potential loss of mineral production at Bristol Lake, amendments to these policies do not seem consistent with the original intent of the BLM and County plans. Furthermore, much of the Rail Cycle site is situated within a BLM Class L (Limited Use) area which specifically does not allow new non-hazardous waste disposal sites. The adjoining mining properties at Bristol Lake are classified as Class I (Intensive Use). Discussions with the BLM indicate that the land exchange process must also address the potential loss of mineral resources on the proposed tracts and also adjacent mineral properties.

I have discussed the matters outlined above with Doug Romoli and Rick Gundry (BLM/Riverside), Dave McIlnay (BLM/Sacramento), and Kathleen Browne (San Bernardino Land Management Dept.). Hopefully, these issues can be resolved and development of our respective projects can proceed compatibly. However, as I mentioned during our meeting, ADH anticipates having to drill monitor wells on the eastern portion of the Sun Claims to insure the integrity of the mineralized brines.

I will be in contact within several weeks as other questions arise. In the meantime, please do not hesitate to call if you have any comments or questions.

Sincerely,

ADH ASSOCIATES, INC.

Keith Tockman

Attachment

cc: D. McIlnay (BLM/Sacramento)
D. Romoli (BLM/Riverside)
K. Browne (San Bernardino County)
P. Beautrow (Rail Cycle Santa Barbara)

REFERENCES

Brown, K.W., Thomas, J.C., Lyton, R.L., Jayawickrama, P., and Bahrt, S.C., 1987, Quantification of Leak Rates through Holes in Landfill Liners: USEPA 600/2-87/062.

Geoservices Inc. Consulting Engineers, 1987, Background Document on Bottom Liner Performance in Double-Lined Landfills and Surface Impoundments: USEPA 530-SW-87-013.

Matrecon, Inc., 1988, Lining of Waste Containment and Other Impoundment Facilities: USEPA 600/2-88/052.

ADH ASSOCIATES, INC.

3421 South Ammons Street
Building 29-3
Lakewood, Colorado 80227
(303) 986-5517

91 JUL 12 PM 1:39

July 8, 1991

Kathleen Browne
San Bernardino County Land Management Dept.
385 N. Arrowhead Ave.
San Bernardino, CA 92415

Dear Kathleen:

Thanks again for taking the time to meet with me on June 26, 1991 to discuss the Rail Cycle Project as it may relate to ADH's adjacent claims at Bristol Lake. Since that time, I have also met with Garth Morgan (Rail Cycle/Waste Management) and Doug Romoli (BLM/Riverside) to discuss various issues related to the proposed landfill.

A copy of a July 5, 1991 letter to Garth Morgan briefly outlining ADH's concerns with the landfill is enclosed for your information and inclusion into the project file. Please review the correspondence as time permits and do not hesitate to call if you have any questions.

Sincerely,

ADH ASSOCIATES, INC.

Keith Tockman

Enclosure

ADH ASSOCIATES, INC.

3421 South Ammons Street
Building 29-3
Lakewood, Colorado 80227
(303) 986-5517

91 SEP -3 PM 1:44

August 26, 1991

Kathleen Browne
San Bernardino County Planning Dept.
385 N. Arrowhead Ave.
San Bernardino, CA 92415-0182

Dear Kathleen:

Enclosed please find a letter outlining ADH's response to your request for information regarding the Rail Cycle proposal.

Also, I never have received copies of the Rail Cycle pre-EIR/EIS documents or the Leslie Salt/National Chloride mining plans which I discussed with you and Andrew Rush on June 26, 1991. If you get the chance, could you check on the status of this information and give me a call at the number shown above.

Sincerely,

ADH ASSOCIATES, INC.

Keith Tockman

Enclosure

ADH ASSOCIATES, INC.

3421 South Ammons Street
Building 29-3
Lakewood, Colorado 80227
(303) 986-5517

August 26, 1991

Kathleen Browne
San Bernardino County Planning Dept.
385 N. Arrowhead Ave.
San Bernardino, CA 92415-0182

Dear Kathleen:

I received your request for environmental information which ADH believes should be addressed in the Rail Cycle EIR/EIS. As has been discussed in meetings and correspondence with the Bureau of Land Management, Rail Cycle/ Waste Management, and your office, ADH is developing mining claims adjacent to the proposed Rail Cycle site and is concerned with the potential impact the landfill may have on Bristol Lake mining activities. As outlined in previous correspondence, ADH's primary concerns are as follows:

1. **Liner Leakage:** Liner integrity is not foolproof as has been documented in numerous literature and site studies including Matrecon (1988), Brown et al (1987), and Geoservices (1987). Despite the most advanced design and construction practices, numerous causes for liner leakage often occur, such as seam failure, punctures, holes, tears, stress fractures, gas pockets, subsidence, creep, differential settling, differential hydrostatic pressure, chemical and biological reactions, shear displacement, inadequate subgrade compaction and finishing, etc. Failure of the liner, for any one or more of these reasons, could lead to leakage and compromise the groundwater quality. Furthermore, failed liners are generally inaccessible due to landfill cover and therefore not repairable.

2. **Groundwater:** Monitor well and piezometer information indicate flow from the Rail Cycle site towards the southwest and south. Furthermore, significant drawdown due to Leslie's pumping is observable in Rail Cycle monitor well MW-5 and to a lesser extent in MW-6. These factors prove both flow towards Bristol Lake and also hydrologic communication of the aquifers. Therefore, any leakage or release from the landfill would migrate towards the dry lake and could possibly chemically alter or even contaminate the mineralized brines and jeopardize the adjacent mining operations. Finally, if Leslie ceases pumping or reduces pumping rates, the resulting decrease in the cone of depression could cause vertical hydrostatic uplift in the southwestern portion of the landfill site.

3. **Recharge:** The Bristol Lake playa is recharged via surface runoff and regional groundwater flow. The Rail Cycle drainage/diversion channel is apparently designed to divert rainwater, surface runoff, and floodwaters

to the south. This barrier would effectively block surface recharge to Bristol Lake from the northeast. Groundwater recharge could also be reduced due to excessive pumping of Rail Cycle support wells. A reduction in recharge may also result from capillary mounding which can occur beneath landfill and surface impoundments.

4. Land Use: Amendments to the BLM's California Desert Conservation Area Plan and the San Bernardino County General Plan will be required prior to development of Rail Cycle. Both plans address the need to preserve mineral resources for future beneficial use. Due to the potential loss of mineral production at Bristol Lake, amendments to these policies do not seem consistent with the intent of the BLM and County plans. Much of the Rail Cycle site is situated within a BLM Class L (Limited Use) area which specifically does not allow new non-hazardous waste disposal facilities. The adjoining mining properties are classified as Class I (Intensive Use). Discussions with the BLM indicate that the land exchange process should address the potential loss of mineral resources both on the proposed tract and also the adjacent mineral properties.

As mentioned above, these concerns have previously been formally expressed to the BLM, San Bernardino County Planning Department, and Rail Cycle/Waste Management. Hopefully these issues will be addressed as part of the EIR/EIS process.

Sincerely,

ADH ASSOCIATES, INC.

Keith Tockman

Keith Tockman

Attachment

REFERENCES

Brown, K.W., Thomas, J.C., Lyton, R.L., Jayawickrama, P., and Bahrt, S.C., 1987, Quantification of Leak Rates through Holes in Landfill Liners: USEPA 600/2-87/062.

Geoservices Inc. Consulting Engineers, 1987, Background Document on Bottom Liner Performance in Double-Lined Landfills and Surface Impoundments: USEPA 530-SW-87-013.

Matrecon, Inc., 1988, Lining of Waste Containment and Other Impoundments Facilities: USEPA 600/2-88/052.

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
NEEDLES RESOURCE AREA OFFICE
101 WEST SPIKE'S ROAD
P.O.BOX 888
NEEDLES, CALIFORNIA 92363-0888
(619) 326-3896

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:

1780
CA069.7

AUG 26 1991

Mr. Robert Mason
Senior Project Manager
21 Technology Drive
Irvine, CA 92718

Dear Mr. Mason:

I am enclosing the review comments on the project description and alternative analysis for the Rail Cycle - Bolo Station Landfill. Some of the comments may be redundant due to the fact of reviewing the draf in sections rather than as a whole document. In the future, it may be best to hold the various sections until the document is more complete before the review is initiated. This may reduce the size of the document and the amount of time spent on review.

In reviewing the proposed action, other issues needing to be analyzed/addressed surfaced. Some of the comments deal strictly with required NEPA format or policy, others with possible gaps in informatin and analysis.

Please send all correspondence to Ken McMullen as Doug Romoli has turnd the project over to him. Doug will be kept informed as determined by the CDD office. If you have any questions regarding these comments, please contact Ken McMullen.

Sincerely,

RICHARD E. FAGAN

Richard E. Fagan
Area Manager, Needles

Enclosure

cc: Ms. Kathleen Browne
Planner, Environmental Team
Land Management Department
County of San Bernardino
385 North Arrowhead Ave.
San Bernardino, California 92415-0180

Draft Review of Rail Cycle Proposed Action

Pg. 3-3, 2.: typo "environmental" sb "environment"; the correct term for UPA is "Unusual Plant Assemblage".

Pg. 3-6, 3.2.1 : Should this section be moved up to 3.1.5.?
3.2.1.1: I think the wording in the second paragraph should be changed to a more positive and beneficial statement. As written, it may indicate that the desert is considered a dumping ground. This will inflame some local residents. Especially the last part of the statement where it reads "... minimize problems related to land use compatibility...". I think it should be mentioned here that the landfill may help to fill a void in the desert area and reduce the number of illegal dumps and littering, etc...

Pg. 3-8, 3, third sentence : This will <u>not</u> be the case, as evidenced by Eagle Mountain and Rail Cycle, to name just two, so I find it misleading. Please discuss **real** need and limit hypothetical scenarios to pertinent issues. This will reduce the level of confusion for someone wanting just the issues related to the proposal. This statement may help to show the need by explaining the amount of waste generated today and projections through 1995. Are you saying there is currently 5000 tons of waste not being buried per day? (compare #3 and #4)

Pg. 3-8, 4: Is this 40,000 total for <u>all</u> class III, or just the 10 major sites?

Pg. 3-9, 2: This whole paragraph is redundant, is it necessary? Isn't it already covered in the sections 3.2, 1 and 2?

Pg. 3-11, 2: Same comment, it is redundant.

Pg. 3-11, 3.2.3.1.1: Will fencing of the project area occur in phase one? It is not mentioned in any of the phases. I think it should be noted here that the entire _____ acres will be fenced off to public access. A discussion of the type of fence material and if tortoise fencing will be required should also be included; Maybe under the section entitled "Construction," as requested by Doug Romoli earlier in the process.

Pg. 3-14, 3.2.3.2.5.: What are the non-potable uses of the water? Where are they discussed. What about the residue from the containers? Where will it go? Will it be addressed under the "Water" section?

Pg. 3-15, 3.2.3.3.2: Is the soil stockpile location shown on a map? Are there plans to treat the soil, to sustain soil organisms, over the storage period? What will be the average length of time the soil will be stockpiled?

Pg. 3-15, 3.2.3.3.3: How will the visual effects of the 420 foot high, terraced "hill" affect the Dunes view shed and points west and north of the site?

Pg. 3-18, 4: change "... resistant local.." to "... tolerant.." Any watering planned to assist in plant establishment? What about control of grazers (rodents, etc...), during plant establishment.

Pg. 3-18; 3.2.3.5.1.2.: Are these acres of disturbance figured into th values provided in section 3.2.3.1.1.?

Pg. 3-21, 3: How will the leachate level be monitored? By whom?

" 3.2.3.5.4.2: Water from the collection sumps are to be treated with "approved" methods. Where are these methods discussed? What are by products of the treatment, and how, if necessary, will they be disposed of?

" 3.2.3.5.5.1: Should this be mentioned in section 3.2.3?

" 3.2.3.5.5.2: The type of lighting, and mitigation measures used to reduce night time affects, should be addressed here. The mitigation should follow the requirements established for the Viceroy Gold project.

Pg. 3-22, 3.2.3.5.6.2.: Who will determine the "earliest" opportunity to correct deficiencies, the operator or inspector?

" 3.2.3.5.7: Are these acres of disturbance figured into the values provided in section 3.2.3.1.1.?

" 3.2.3.5.8.1: Who will monitor the leachate in the riser pipes, the operator or the inspector?

Pg. 3-23, 3.2.3.5.10.2: I think this paragraph needs to be softened as pesticide applications have the potential to add additional concerns on their use, and possible affects to non-target species. In addition, the BLM has strict criteria as to the typ and use of pesticides on the public lands.

" 3.2.3.5.10.5: What will be the affect of the device(s) used to reduce the presence of birds on the areas adjacent to the landfill? Since the Cadiz Dunes are in close proximity, loud devices could decrease the "wilderness" value or general feeling of "solitude" associated with the use of the dunes and adjacent areas. What is planned to mitigate that affect?

Pg. 3-24, 3.2.4.1: This paragraph is redundant.

Pg. 3-26, 3.2.4.3.3: The poor water quality of the non-potable water used for the composting facility, in itself can cause problems due to its salt content. This may negatively affect composting operations.

" 3.2.4.4.1: Are these acres of disturbance figured into the values provided in section 3.2.3.1.1.?

" 3.2.4.4.3: Please check these figures. I estimate, based on th values provided, 14,400 tons/month (4 weeks) of green waste. Tha

is 21,200 tons/6 weeks. In three months the capacity of the composting station will be reached. Is that correct? If the composting process takes longer than six weeks, what will happen to the excess green waste?

g. 3-27, 6 and 7: With avg. temperatures of 105 to 110 degrees F, what will happen to the fermentation process? What is the projected use of the composted material? What are the markets?

g. 3-28, 6: Construction needs to be addressed as an individual section, as requested by Doug Romoli, because most impacts to resources will occur during this phase. Please incorporate as many mitigation measures as possible into this section.

g. 3-30 and 3-31: If the MFR's are not to be addressed in the document (see section 3.2.5), why is there a section devoted to them? Can this entire section be moved up to section 3.2.5., shortened, and eliminated from further discussion? As part of the action, how are we not going to address this aspect? The success of the entire recycling program, landfill and composting operations rely on the work conducted at these facilities. Maybe more discussion is required on this topic initially.

g. 3-31, 5: This paragraph is redundant.

Draft Review of Rail Cycle proposed Alternatives

Pg. 1 thru 3: All this is redundant background material and may not be necessary for the analysis of the alternatives for site selection.

Pg. 3, 3: This is the "meat" of the analysis, it should be up front.

Pg. 4, Last sentence of criteria: Again, in reading this as written, it may lead readers to feel that the desert is viewed as the dumping ground for all of Los Angeles' waste products. The local population may use that as a point of focus and be against the project for just that reason. The Ward Valley EIR is an example of the feelings local people have about the desert, you may want to take a look at the recent news releases.

Further, the action <u>is not</u> compatible with the existing land uses. The purpose of amending the Calif. Desert Plan is to change the BLM land classification so the project is compatible with the designated land use for the area. The placement of the landfill will never be compatible with the existing land use (wildlife habitat, recreation and visual aesthetics), until long after the site has been reclaimed.

Also, who is determining that the future use of the area will be for land uses such as the landfill? This is the meaning I derive from the last part of that sentence. The Cadiz Dunes is considered an important aspect of the desert environment and is an area unique to that valley. The dunes are listed as part of S-21 Senate Bill that designates areas for wilderness classification. Impacts to that system, from changing the land use designation, could become an issue.

Pg. 5, 4.1.1: Why was the desert region the only place considered in the regional alternative? Why not the coastal foothills? Why not lands on the Forest Service? Why not in Los Angeles? These are the questions I am getting on the phone, so maybe they can be addressed in this analysis.

Pg. 5, 4.1.5, paragraph 1: How confident is Rail Cycle that all the MRF's will become a reality? I would like to see an analysis of the need for the project given approval for <u>all</u> ongoing landfill projects. This seems to be more realistic than having all the sites rejected as mentioned in the preferred alternative.

Secondly, I feel the development of Eagle Mountain Landfill should be considered and discussed, at least in the "No Action" alternative. If Eagle Mtn. and others are also permitted, what impacts to Rail Cycle might occur? How would the reduction in waste affect the need for the project, land exchange, project size, water demands, etc....

" 4.1.5, para. 6: This action does not conform to the CDCA Plan for land use, so the statement is not entirely true.

. 7, 4.2.2. para. 1: The tortoise is not listed as "Endangered." It is listed as "Threatened"

. 8, 4.2.3: What went into the "evaluation" and selection of the Bolo Station over the other 4 alternative sites? When will this information be available?

. 9, 4.2.4: Include acreage figures. In discussing the reduction in waste volumes, make sure that the alternatives do not fall into a category that excluded one of the regional sites. What changes in the requirements of the landfill are expected when looking at a landfill life of 50 years? Will it change the height of the final hill, acreage used, benefits and drawbacks, economics?

ble 1, Pg. 1, Eagle Mountain: Neither the desert tortoise nor the bighorn sheep are listed as "Endangered." The tortoise is a "threatened" specie, the bighorn is a BLM sensitive specie.

" Same comment for the Dunn and Ore Grande on page 2.

eneral Notes:

corporating mitigation measures into the proposed action will reduce e need to put them in the "mitigation" section of the document.

did not see a discussion of the justification the BLM used to change e CDCA Plan, Land Use Classification. Is this discussed in other rts of the document?

may be helpful to hold onto the partially completed sections until l the necessary information/data is available. This will reduce the me required for review of the document.

time frames are too stringent, which is indicated by the quick rnaround time required for review of these documents, we should sit wn and develop a more realistic schedule.

Leslie Salt Co.
A CARGILL CO.

7200 CENTRAL AVENUE
NEWARK, CA 94560 • (415) 797-1820

August 27, 1991

Mr. Garth Morgan, Ph.D
Sr. Special Projects Engineer
Rail*Cycle
5770 South Eastern Avenue
Los Angeles, California 90040

Ms. Julie Meyer
CA Regional Water Quality Control Board
Colorado River Basin Region
73-271 Highway 111 - Suite 21
Palm Desert, California 92260

Mr. Gerald E. Hillier
U.S. Department of the Interior
Bureau of Land Management
California Desert District
1695 Spruce Street
Riverside, California 92597

✓Mr. Asher Hartel
Associate Planner
Planning Department
385 N. Arrowhead Avenue
3rd Floor
San Bernardino, California 92415-0182

91 AUG 29 PM 1:27

I am the Environmental Manager of Leslie Salt Co. writing in reference to the proposed Rail*Cycle project. During our previous discussions with Rail*Cycle and BLM, we have raised concerns regarding the adverse impact of the Rail*Cycle project on the continued viability of Leslie's extraction of calcium chloride at its Amboy facility. To date, Leslie's concerns have not been addressed.

Because of the proximity of the landfill to our brine wells and brine source, Leslie retained Mr. Morris Balderman, a consulting geologist with expertise in landfill siting, to evaluate the Rail*Cycle project's impact on our facility. The results and conclusions of Mr. Balderman's evaluation are enclosed and summarized below.

C:\WS2000\BNR\0822.SBC

The potential impact from the Rail*Cycle landfill could be significant because the large landfill would be very close to the three wells that are the main source brine for the Amboy facility. Construction of a large landfill potentially could affect water levels, hydrologic gradients, brine characteristics, production rates and other parameters. The geotechnical evaluation did lead to recommendations for additional work necessary to assess these above impacts.

1. Sufficient drilling and logging, and other exploration in the landfill areas upgradient of the brine production wells to reliably characterize potential groundwater migration pathways from the proposed landfill to the wells.

2. Drilling, sampling, and a detailed logging of a number of borings to the maximum depth that would be influenced by the overburden load from the proposed landfill or to bedrock, if bedrock is shallower.

3. Installation of wells at various depth intervals and monitoring to determine lateral and vertical variations in water levels, hydraulic gradients, and brine characteristics.

4. Field and laboratory testing for input to the hydrogeologic modeling required to determine these impacts.

We expect Rail*Cycle will want to act on these recommendation as soon as possible and communicate with us the plans for implementation of these recommendations and then share the results of these with all involved.

We would be happy to sit down and discuss Mr. Balderman's evaluations at any time. Should you have any other questions, please don't hesitate to call.

Sincerely,

Barbara N. Ransom
Environmental Affairs Manager

BNR/tb

cc: Mr. Morris Balderman

C:\WS2000\BNR\0822.SBC

SAN BERNARDINO COUNTY MUSEUM

COUNTY OF SAN BERNARDINO
GENERAL SERVICES AGENCY

2024 Orange Tree Lane • Redlands, CA 92374 • (714) 798-8570 • 422-1610

DR. ALLAN D. GRIESER
Director

August 29, 1991

San Bernardino County Planning Department
Attn: Kathleen Browne
385 N. Arrowhead Ave.
San Bernardino, CA 92415-0182

re: **REVIEW OF SCOPING DOCUMENT FOR THE RAIL-CYCLE BOLO STATION LANDFILL**

The scoping document mentioned above is correct. Non-renewable paleontologic resources must be considered in the EIR. A qualified vertebrate paleontologist must conduct a records search and field assessment in order to develop a paleontologic resource impact mitigation program which includes, but is not limited to: 1) monitoring of excavation and salvage of fossils and fossiliferous sediments; 2) preparation of sediments to a point of identification, and processing of matrix to recover fossils; 3) identification and curation of recovered specimens; 4) a report of findings with an itemized inventory of specimens.

Sincerely,

Scott Springer

Scott Springer,
Site Records Manager, Earth Sciences

AUG 30 AM 9:24

ST[illegible] OF CALIFORNIA
C[illegible]LIFORNIA REGIONAL WA[illegible]ER QUALITY CONTROL BOAR[illegible]
C[illegible]LORADO RIVER BASIN • REGION 7
7[illegible]71 HIGHWAY 111, SUITE 21
P[illegible]M DESERT, CALIFORNIA 92260
Ph[illegible]e: (619) 346-7491

PETE WILSON, Governor

Enclosure

AUG 3 0 1991

Valley Reclamation Company
P.O. Box 39
Sun Valley, CA 91352

Attn: Dr. Garth R. Morgan, Senior Special Projects Engineer

RE: Proposed Bolo Station Landfill Facility - Ground Water Monitoring Report (First Round)

We have received your report entitled "Ground Water Monitoring Report (First Round) and Vertical Mineral Quality Assessment Study - Bolo Station Facilities". The report was prepared on behalf of Rail Cycle in order to establish a baseline ground water quality for the proposed Class III landfill at Amboy.

In order to properly evaluate the data submitted to date, you are requested to submit the following documents:

1. A Report of Waste Discharge (ROWD) with appropriate filing fees. Enclosed please find an application for a ROWD and a filing fee schedule.

2. A complete workplan for hydrogeologic characterization of the site. Approval of this workplan by the Regional Board Executive Officer will be necessary before background water quality data will be deemed satisfactory.

Review of the monitoring data submitted to date indicates that the monitoring system appears to be inadequate to fulfill the requirements of Article 5, Chapter 15, Division 3, Title 23 of the California Code of Regulations. A workplan which contains all the information in Article 5, of Chapter 15 must be submitted in order to evaluate the proposed background water quality monitoring work at the subject facility.

In order to aid you in the preparation of the workplan for ground water characterization, we are providing the following comments for your consideration:

1. Site Geology and Stratigraphy:

   a. A delineation of the geological boundaries of the uppermost aquifer should be performed in order to adequately characterize the water quality in said aquifer. Review of submitted well logs indicates that the monitoring wells were installed with screens spanning several geological formations up to 140 feet below the ground water table. Delineation of all caliche and

evaporite layers on properly scaled cross sections should be included.

b. A sufficient number of monitoring points should be installed at appropriate locations and depths to yield ground water samples from all other affected aquifers. Zone(s) of highest hydraulic conductivity in each aquifer should be determined.

c. Geological cross sections, drawn to an appropriate scale, and showing all the different lateral soil layers underneath the site should be submitted in order to develop an understanding of the ground water regime and determine the appropriate locations of the ground water monitoring points. Continuity of geologic strata and water bearing formation across the site needs to be established.

d. A determination of the ground water vertical gradient should be made. The use of short screen length wells at different depths in the same general area is recommended.

e. A three-dimensional flow net should be constructed to explain all ground water flow paths in the top 60 feet of the saturated soils. Zones of high and low flow transmissivity should be delineated. A determination of the highest anticipated ground water level should be made.

2. Unsaturated Zone Monitoring:

a. The unsaturated zone monitoring system should be in accordance with Subsection 2550.(7) (d) of Chapter 15.

b. A sufficient number of background monitoring points established at appropriate locations and depth to yield soil-pore liquid samples or measurements should be constructed.

3. Monitoring Well Construction:

a. The design specifications for each monitoring well should be submitted for review. Each well should be designed, installed and developed in accordance with Section 2550.7 (b) of said Chapter 15.

b. The sampling interval of each monitoring well should be appropriately screened and fitted with an appropriate filter pack to enable collection of representative ground water samples. The rationale for the type and design of the filter pack used in the construction of all monitoring wells should be provided.

c. All lithologic logs of the ground water monitoring system should be prepared by a qualified California professional. Documentation of proper qualification of the professional involved in the construction and preparation of logs for the monitoring wells should be provided. All monitoring wells and all other borings should be logged during drilling under the direct supervision of a registered geologist.

4. Sampling Plan:

a. A rigorous quality control plan and quality assurance QC/QA program should be established and documented.

b. The QC/QA program should include as a minimum the following:

i. Collection and analyses of field trip blanks, equipment blanks, proper decontamination procedures for sampling equipment, and proper calibration of field testing equipment.

ii. Documentation of the QC/QA procedures performed by the laboratory to ensure the validity of the analyses.

iii. Procedures for decontamination of drilling tools and well construction materials.

c. Samples analyses should be conducted by a laboratory certified by the State Department of Health Services to conduct hazardous waste analyses.

Please note that the above is a partial list of actions which need to be included in the workplan for proper subsurface characterization of the unsaturated zone and ground water at the subject facility.

Should you have any questions concerning the subject matter, please call Adnan Abdalla at (619) 346-7491.

Phil Gruenberg
PHIL GRUENBERG
Executive Officer

AA/ci

Enclosure

File Ref: Working, Amboy Project

DEPARTMENT OF FISH AND GAME
330 Golden Shore, Suite 50
Long Beach, California 90802
(213) 590-5113

91 SEP -5 AM 9:13

September 3, 1991

Ms. Kathleen Browne
Planner, Environmental Team
Planning Department
County of San Bernardino
Environmental Management Group
385 North Arrowhead Avenue
San Bernardino, CA 92415-0182

Dear Ms. Browne:

Notice of Preparation - Draft Environmental Impact Report/ Statement for the Rail-Cycle, Limited Partnership's Bolo Station Landfill

To enable our staff to adequately review and comment on subject project, we recommend the following information be included in the Draft Environmental Impact Report:

1. A complete assessment of flora and fauna within and adjacent to the project area, with particular emphasis upon identifying endangered, threatened and locally unique species and sensitive and critical habitats.

2. A discussion of direct, indirect, and cumulative impacts expected to adversely affect biological resources, with specific measures to offset such impacts.

3. A discussion of potential adverse impacts from any increased runoff, sedimentation, soil erosion, and/or urban pollutants on streams and watercourses on or near the project site, with mitigation measures proposed to alleviate such impacts. Stream buffer areas and maintenance in their natural condition through non-structural flood control methods should also be considered in order to continue their high value as wildlife corridors.

More generally, there should be discussion of alternatives to not only minimize adverse impacts to wildlife, but to include direct benefit to wildlife and wildlife habitat. Those discussions should consider the Department of Fish and Game's policy that there should be no net loss of wetland acreage or habitat values. We oppose projects which do not provide adequate mitigation for such losses.

Diversion, obstruction of the natural flow, or changes in the bed, channel, or bank of any river, stream, or lake will require notification to the Department of Fish and Game as called for in the Fish and Game Code. Notification should be made after the project is approved by the lead agency.

Thank you for the opportunity to review and comment on this project. If you have any questions, please contact Kim McKee at (213) 590-5137.

Sincerely,

R. E. Mallfor

Fred Worthley
Regional Manager
Region 5

cc: Office of Planning & Research

DEPARTMENT OF FISH AND GAME
330 Golden Shore, Suite 50
Long Beach, CA 90802
(213) 590-5113

91 OCT 11 PM 1:55

October 9, 1991

Ms. Kathleen Brown
County of San Bernardino
Planning Department
385 North Arrowhead Avenue
San Bernardino, California 92415-0182

Dear Ms. Brown:

Notice of Preparation of a Draft Environmental Impact Report for the Rail Cycle, Limited Partnership's Bolo Station Landfill SCH 91092020

To enable our staff to adequately review and comment on subject project, we recommend the following information be included in the Draft Environmental Impact Report:

1. A complete assessment of flora and fauna within and adjacent to the project area, with particular emphasis upon identifying sensitive and critical habitats.

2. A discussion of direct, indirect, and cumulative impacts expected to adversely affect biological resources, with specific measures to offset such impacts.

3. A discussion of potential adverse impacts from any increased runoff, sedimentation, soil erosion, and/or urban pollutants on streams and watercourses on or near the project site, with mitigation measures proposed to alleviate such impacts. Stream buffer areas and maintenance of their natural condition through non-structural flood control methods should also be considered in order to continue their high value as wildlife corridors.

More generally, there should be discussion of alternatives to not only minimize adverse impacts to wildlife but to include direct benefit to wildlife and wildlife habitat. Those discussions should consider the Department of Fish and Game's policy that there should be no net loss of wetland acreage or habitat values. We oppose projects which do not provide adequate mitigation for such losses.

Diversion, obstruction of the natural flow, or changes in the bed, channel, or bank of any river, stream, or lake will require notification to the Department of Fish and Game as called for in the Fish and Game Code. Notification should be made after the project is approved by the lead agency.

Thank you for the opportunity to review and comment on this project. If you have any questions, please contact Mr. Kris Lal of our Environmental Services staff at (213) 590-5137.

Sincerely,

Fred Worthley

Fred Worthley
Regional Manager
Region 5

cc: Office of Planning & Research

CITY OFFICES:
6136 ADOBE ROAD
P.O. BOX 995
TWENTYNINE PALMS, CA 92277
(619) 367-6799
(619) 367-4890(FAX)

COUNCIL MEMBER
Christopher J. Dobler, May
Fred Libby, Mayor Pro Te
Charles W."Chuck" Bell
Jeffrey B. Dunn
Lester W. Krushat

CITY MANAGER
Gene Haroldsen

September 4, 1991

Ms. Kathleen Browne, Planner
County of San Bernardino
Planning Department
Environmental Management Group
385 North Arrowhead Avenue
San Bernardino, CA 92515-4091

91 SEP -6 AM 9:11

Dear Ms. Browne:

Re: Notice of Preparation (NOP), EIR/EIS Rail-Cycle, Bolo Station Landfill.

The Planning Commission of the City of Twentynine Palms, sitting as the Environmental Review Committee of the City, on September 3, 1991, took public input on the proposed NOP for the above referenced project. After discussion, the Commission directed staff to notify the County of its environmental concerns associated with this proposal. The specific subjects are as follows:

1) The Commission has deep concerns over the potential impact of the project on the ground water. The proposed site is located over a significant resource and the project has significant opportunity to contaminate a future resource. This aspect should be analyzed in detail in the EIR/EIS for the project. The project could also have an impact on run-off and flood waters during the tropical storms; this aspect also needs to be analyzed in detail.

2) The Commission also requests that the impacts on transportation other than rail be analyzed. It is believed that the use may attract business that will require driving trucks through the Twentynine Palms community, since the areas to the south of the project are not served or traversed by railroad.

3) The Commission also is interested in the impact of the project on the existing landfills; i.e. will the proposed use cause the existing landfills to close early?

4) There should also be an analysis of the impacts of the proposal on existing and future surrounding land uses. There is an existing and planned expansion of a large agricultural activity in the Cadiz area; this use will have a heavy dependency on an uncontaminated source of ground water. There are also salt plants to the west of the proposed site. The establishment of the use may set a precedent and promote future noxious uses in the general area. There will also be a need to provide lower income housing in the general area for workers at the project (growth inducing).

5) The Commission, finally, suggested that the EIR/EIS

should fully research alternative means of processing the trash, including processing it at the source. A major concern over this project is that it reinforces the cavalier attitude of the leaders of the urban areas of using the hinterlands to bring in resources that it needs, such as water, and dumping things it does not want; i.e. prisons and trash. Hence, the prospects of requiring the perpetrators of the problem contribute, geographically, to the solution is a strong felt opinion of the citizens of this area.

Please provide the City of Twentynine Palms a courtesy copy of the Request for Proposal (RFP) for the preparation of the EIR/EIS and a copy of the Draft EIR/EIS when it is distributed for comments.

The City of Twentynine Palms appreciates the opportunity to provide input on this most dynamic and significant project. If you have any questions of us or I can be of further service, please contact my office.

Very truly yours,

William H. Gutgesell

William H. Gutgesell
Community Development Director

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
NEEDLES RESOURCE AREA OFFICE
101 WEST SPIKE'S ROAD
P.O.BOX 888
NEEDLES, CALIFORNIA 92363-0888
(619) 326-3896

IN REPLY REFER TO

17
CA069.

SEP 05 1991

Mr. Robert Mason
Senior Project Manager
21 Technology Drive
Irvine, CA 92718

Dear Mr. Mason:

I am enclosing the public comments from the scoping meetings, held Aug. 27-29, 1991, on the proposed Rail Cycle - Bolo Station Landfill project The comments have been arranged into four main areas of concern:

1. Project Site Location
2. Impacts and Alternatives
3. Operation/Inspection/Compliance
4. Coverage/Media

I suggest all parties get together and discuss what alternatives to the proposed action need to be addressed and analyzed, and those that need to be addressed but not analyzed in detail. This meeting could also cover those areas requiring review following the draft comment period, and any changes to the time schedule previously adopted. We can set th schedule so that I can anticipate the time frames necessary to comply with the NEPA process. This will reduce the chances of undue delay(s) in the Draft EIR/EIS review.

If you have any concerns or questions, please contact Ken McMullen at the above number.

Sincerely,

For Richard E. Fagan
Area Manager, Needles

COMMENTS FOR 29 PALMS MEETING

I. Project Site Location Concerns (PSL)

Why was the desert chosen for this waste depository? The trash should be kept where it is generated - in Los Angeles. This will force LA, etc...to practice recycling, etc...

Why is the BLM considering changing the land use classification to allow the project? Wasn't the CDCA Plan developed to maintain the desert as it is? The land use should not be changed.

What is driving the BLM to change the land use classification?

Will this landfill affect designation of the East Mojave National Scenic Area?

Will the desert be considered the dumping ground for all of So. California?

If Eagle Mountain goes into affect, why do we need Bolo Station? Doesn't Eagle Mountain apply to this project?

II. Impacts and Alternatives (I/A)

What are other alternatives to this project? What about other countries? Newer technologies? What is Europe using?

What will the local desert communities get as benefits from this project? What will be fees and cost of permits (in addition to fees) paid to local governments.

Better Recycling could substantially reduce the need for Bolo Station. Look at Morongo Valley where 90% of all trash is recycled.

What are the impacts to wildlife and the desert tortoise in particular? (coyote, fox, rodents, rabbits, bobcat...) {mountain lion and big horn sheep}

The trash will attract ravens and other birds (scrub jay) that will pose threats to the tortoise, what are those impacts? How they will be mitigated? Consider wind and flooding.

What are impacts and precautions to be taken to protect the aquifer/water quality, etc.. What about flooding of the project site? Water table impacts, to the 1000 gal/min well north of Hwy 62 near Amboy? This will affect local use of that well.

Is there a Wetlands Alteration permit required for this action?

This method of landfill construction and waste disposal is outdated and not as preferred as newer technologies. Why can't new technologies be used to eliminate the need for this landfill?

What are potential impacts to the farming at Pacific Ag.?

What are potential liability concerns - will the local area be hit for the bill?

How will climate affect fill material, leaching, composting?

How will this project and Eagle Mountain impact (socio-economic) local/existing dumps/landfills?

III. Operation/Inspection/Compliance (OIC)

Liner quality needs to be addressed in the EIR. It doesn't last 50-60 years as described. What will be the affects of acids, etc. (generated from the waste) on the liner?

What is methane generation? How will methane/methanol be used/removed?

The past working history of Waste Management of North America Inc. is not acceptable (see attached info.)

How long will the landfill be monitored/maintained following final closure?

What is bond amount for this project, and will it be sufficient to cover all costs?

How can the operation protect against hazardous or toxic materials being shipped and buried in the landfill? Where will it be stored (on site) if found in the waste? How can it be detected in the waste "log"?

Will trash from outside of California be accepted at the landfill? If so, how will this be inspected for Haz-Mat/toxics, etc.. How will it be delivered (trucks?)? Will they help pay road maintenance costs, etc.. What is projected increase in traffic (ADTs) on access roads (Hwy 66; 62; etc.)

Department of Health Services and San Bernardino County cannot manage or control the existing problems of "out of compliance" landfills/dumps. How will this be improved? What safety measures will be developed for trucks, railcars, MRF's, etc..

Will the site expand beyond the projected 4,000 acres given the overall amount of land/acreage available.

The Broadwell Lake Haz. Mat. site/operation is <u>less</u> hazardous than this proposed action. How can this landfill be considered?

IV. Coverage/Media (C/M)

How will total public involvement be ensured? Will there be a technical review team (of "experts") established?

The timing of these meetings should be improved to prevent conflicts with local meetings (council meetings, etc.).

News media notices of the meeting were poor. Better notice should be given in the future.

Sierra Club is opposed to this project (official response).

CITY OF

San Bernardino

DEPARTMENT OF PLANNING AND BUILDING SERVICES
AL BOUGHEY, AICP
DIRECTOR

91 SEP 11 P

September 6,1991

County of San Bernardino
Planning Department
Attn: Ms. Kathleen Browne
385 North Arrowhead Avenue
San Bernardino, CA 92415-0180

Subject: Notice of Preparation of an EIS/EIR for the Bolo Station Landfill

Dear Ms. Browne:

Thank you for the opportunity to review the subject document and to submit comments.

The City of San Bernardino has a concern with impacts caused by the potential increase in rail traffic through the City. We would like to see the EIR address any impacts to circulation/congestion near at-grade crossings and any noise impacts on properties adjacent to the rail lines.

Sincerely,

Valerie C. Ross
Valerie C. Ross
Senior Planner

cc: Gene Klatt, Assistant City Engineer

300 NORTH "D" STREET, SAN BERNARDINO, CALIFORNIA 92418-0001 (714) 384-5071/5057

PRIDE IN PROGRESS

ATE OF CALIFORNIA
PETE WILSON, Governor

ALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
OLORADO RIVER BASIN • REGION 7
3-271 HIGHWAY 111, SUITE 21
ALM DESERT, CALIFORNIA 92260
hone: (619) 346-7491

SEP 13 1991

SEP 16 AM 9:30

CERTIFIED MAIL P 881 150 987

County of San Bernardino
Planning Department
385 North Arrowhead Avenue
San Bernardino, CA 92415

Attn: Kathleen Browne

RE: Notice of Preparation of an Environmental Impact Report (EIR)/Environmental Statement (EIS) For The Proposed Bolo Station Landfill

The subject notice of preparation (NOP) of the EIR/EIS for the proposed Bolo Station landfill was received in this office. Enclosed please find a copy of our August 30, 1991 letter to the proponents of the subject project listing some of the specific requirements which need to be submitted to this office in order to evaluate the suitability of the proposed site for the disposal of non-hazardous solid waste as defined in Chapter 15, Division 3, Title 23 of the California Code of Regulations. The following are general environmental informational items which should be included in the EIR/EIS:

1. The analysis of the impact of the project on the geology of the site should include a discussion of the site geologic setting, stratigraphy, seismicity, surficial soils, erosion, and slope stability.

2. The analysis of the impact of the project on the hydrologic setting of the site should include a detailed discussion of the surface and ground water quality in the vicinity of the site.

3. An analysis of the impact of the project on the unsaturated zone underneath the site should be conducted.

4. A discussion of the mitigation measures to be implemented to mitigate the potential impacts of the project on the site characteristic stated in items 1, 2, and 3 should follow these items in the EIR/EIS.

If you have any questions concerning the subject matter, please contact Adnan Abdalla at (619) 346-7491.

PHIL GRUENBERG
Executive Officer

Enclosure

AA/ci

cc: (with enclosure) Gerald Hillier, Bureau of Land Management
Charlene Herbst, SWRCB, Sacramento
(w/o enclosure) Garth Morgan, Valley Reclamation Company

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
San Bernardino National Forest
Star Route, Box 100
Fontana, CA 92336-9704

1560
AT&SFRR Trash Train

September 16, 1991

Kathleen Browne
Planning Department
385 N. Arrowhead Ave.
San Bernardino, CA 92415-0182

91 SEP 18 AM 7:03

RE: Bobo Station Landfill NOP of EIR/EIS
DATES ID: 745DSS90006741GPA/CUP01/06741CF1

Dear Ms. Browne:

Thank you for the opportunity to comment on the Bolo Station project.

My only concern with the project is the potential significant visual impact from trash flying out of the rail haul cars as the trains travel through the Forest in the Cajon Pass Utility Corridor.

The 1988 San Bernardino National Forest Land and Resource Management Plan calls for Visual Quality Objectives of Partial Retention over the great majority of the haul route in the Pass, and for Retention in some other smaller areas along the tracks. The Plan is the final product of a 10-year effort of environmental analysis and heavy public input, and represents, in part, the publics' direction for how the Forest Service is to manage activities in Cajon Pass for at least the next decade.

Retention directs that management activities not be visually evidient upon the land. Partial Retention directs that management activities remain visually subordinate to dominant land characteristics.

Obviously, trains hauling trash with litter and debris flying out of the cars and landing along the right-of-way area, would have a significant impact on the visual quality of Cajon Pass.

Therefore I ask for the following mitigation:

1. All railroad trash hauling cars be required to be closed or covered in a manner secure enough to prevent any debris, regardless of size or material, from leaving the cars as they pass through the National Forest; and

2. If such debris is scattered from a trash hauling train, the railroad or proponents should be required to--
   a) notify the Cajon District Ranger in a timely manner of the incident (Lytle Creek Ranger Station, 714-887-2576, or if no

such contact is completed, the 24-hour Forest Dispatcher at 383-5651), and

b) provide for the timely pickup of all such debris to the satisfaction of the Forest Officer In Charge of the Incident.

I ask that I be notified if such mitigation is not included in the Draft EIR/EIS, and if said requirements are not made a part of any preliminary or final Conditions of Approval or otherwise provided for in any preliminary or final instruments authorizing this project.

Sincerely,

Gary A. Carney

for Elliott Graham
District Ranger

TY OF
VICTORVILLE

619-245-3411
FAX 619-245-7243

14343 Civic Drive
Victorville, California 92392-2399

September 16, 1991

SEP 20 AM 11:24

Ms. Kathleen Browne
Planner, Environmental Team
385 North Arrowhead Avenue
San Bernardino, CA 92415-0180

Dear Ms. Browne:

Thank you for the opportunity to comment on the initial study for the Bolo Station Landfill Notice of Preparation. Item 15/16 (Utilities/Infrastructure), should be identified as a potentially significant impact. The proposal will result in significant impacts related to a need for new systems and substantial alterations to the following utilities: f. Solid Waste and Disposal.

Need for New Systems

The Bolo Station landfill is part of an integrated waste management system, including material recovery facilities/transfer stations (MRFs) and composting facilities. Construction of MRFs and composting facilities will be necessary if California communities are to achieve State-mandated solid waste diversion mandates. The proposed Rail Cycle system should be scrutinized in the EIR, in order to adequately assess the project. Construction of the MRFs and composting facilities, while not limited to locations within the unincorporated San Bernardino County, are part of the project and need to be considered.

The Bolo Station landfill will depend on receiving the non-recyclable and non-compostable waste entering the system, and that waste needs to be characterized by assessing the types and quantities of waste to be diverted. The impact of State-mandated diversion on the Bolo Station landfill, and the corollary impact of the Rail Cycle system on local diversion activities, are appropriate issues for the EIR.

The EIR project alternative analysis should focus on alternative technologies, as well as locations, to the Rail Cycle system. There are a range of non-landfill alternatives to the non-recycled and non-composted waste stream. These alternatives may include increased recycling and composting; enhanced source reduction; transformation technologies including gasification, pyrolosis and refuse-derived fuel. There also are likely to be alternatives to the Rail Cycle system components--such as alternative composting

techniques (windrow/in-vessel) and recycling techniques (mechanical/manual systems).

The fiscal impacts and technological reliability of both the alternative systems and the proposed system are especially significant in the EIR preparation.

Substantial Alterations

Utilization of Bolo Station landfill will cause significant fiscal impacts on existing landfills in San Bernardino County. Preliminary fee estimates for Rail Cycle indicate that the total system, including recycling, composting, and disposal, will be nearly the same cost to use as the County's current landfills only. Therefore, many current County landfill users will likely change. Loss of revenue to the County system will exacerbate problems in closing that system, and should be assessed as a fiscal impact in the EIR.

One possible mitigation is to use the County's "host fee" revenues to close the current landfill system. Closing the current system, and foregoing planned expansion, substantially alters current plans.

Sincerely,

Terry E. Caldwell

Terry E. Caldwell
Mayor

TEC/cs

264.41/railcycle.tec

Agua Mansa
Residents.

COUNTY OF ORANGE

ENVIRONMENTAL MANAGEMENT AGENCY

MICHAEL M. RUANE
DIRECTOR, EMA

JOHN W. SIBLEY
CHIEF DEPUTY DIRECTOR, EMA

12 CIVIC CENTER PLAZA
SANTA ANA, CALIFORNIA

MAILING ADDRESS:
P.O. BOX 4048
SANTA ANA, CA 92702-4048

TELEPHONE:
(714) 834-5302
FAX # 834-2395

SEP 2 5 1991

FILE NCL 91-122

SEP 26 PM 3:44

Ms. Kathleen Browne
Planning Department
385 North Arrowhead Avenue
San Bernardino, CA 92415-0182

SUBJECT: NOP for the Rail Cycle, Limited Partnership Bolo Station Landfill

Dear Ms. Browne:

Thank you for the opportunity to respond to the above referenced item. The County of Orange has no comment at this time. However, we would appreciate being informed of any further developments.

If you have any questions or need to contact us, please call Kari Rigoni at (714) 834-2109.

Very truly yours,

Joan S. Golding, Program Manager
Regional Coordination Office

By Melinda Stewart for
Kari A. Rigoni, Sr. Planner

CH:rmPL02-011/1266
1092316390718

STATE OF CALIFORNIA
PETE WILSON, Gover

AIR RESOURCES BOARD
1102 Q STREET
P.O. BOX 2815
SACRAMENTO, CA 95812

October 11, 1991

Kathleen Browne
County of San Bernardino
Planning Department
385 No. Arrowhead Avenue
San Bernardino, CA 92415-0182

Dear Ms. Browne:

Notice of Preparation of a Draft EIR/EIS for the Rail-Cycle, Limited Partnership's Bolo Station Landfill (SCH# 91092020)

We have reviewed the San Bernardino County Planning Department's Notice of Preparation of a draft Environmental Impact Report/Draft Environmental Impact Statement (EIR/EIS) for the Rail Cycle, Limited Partnership's Bolo Station Landfill. The Notice of Preparation states that the proposed project will result in significant impacts on air quality. To enable adequate analysis of potential air quality impacts, we recommend that the draft EIR/EIS contain the following information:

1. A description of the facility, including:

   a. Types and quantities of wastes to be handled;
   b. Technical information on storage, recycling, treatment, and disposal operations;
   c. Characterization of the landfill gas, and any fuels to be used in the proposed project;
   d. Capacity and acceptance rate for the proposed sanitary landfill; and
   e. Expected date of start-up.

2. A description of the existing environmental setting at the proposed project site and adjacent areas including:

   a. Location;
   b. Meteorology and topography;
   c. Current background and onsite air quality, including information on ambient air concentrations of criteria and noncriteria pollutants;
   d. Population distribution and the proximity of sensitive populations (e.g., residential areas, schools, hospitals);
   e. Existing sources of air pollution in the vicinity of the proposed project; and

f. Identification of environmental pathways capable of bioaccumulating emissions.

3. An analysis of the potential air quality impacts due to proposed project activities including:
   a. Construction of the project;
   b. Vehicular traffic;
   c. Operation of the sanitary landfill;
   d. Transportation, storage, handling, recycling, or disposal of non-hazardous wastes; and
   e. Accidental releases.

This analysis should include both criteria air pollutants for which ambient air quality standards exist and noncriteria air pollutants from the landfill. The analysis should also include estimates of average and highest controlled and uncontrolled emission rates of criteria and noncriteria air pollutants, and the basis for the assumptions and calculations used to determine these estimates.

4. A complete health risk assessment for noncriteria pollutants. The methods and pollutants to be considered should be based on the recommendations of the local air pollution control district, Air Resources Board, and State Office of Environmental Health Hazard Assessment. Guidance for including air pathways may be found in the California Air Pollution Control Officers Association (CAPCOA) Air Toxics "Hot Spot" Program Risk Assessment Guidelines prepared by CAPCOA, the Air Resources Board, and the Office of Environmental Health Hazard Assessment (January 1991).

5. A description of mitigation measures to minimize emissions. This discussion should include control equipment, process control, and other technical measures to reduce emissions of criteria and noncriteria air pollutants.

6. A description of similar emission sources proposed in California and the control requirements applicable to these sources.

7. Identification and description of all applicable federal, state, and local air pollution control regulations, and measures to comply with these regulations.

8. A description of alternatives to the proposed project and associated emissions of these alternatives.

We would also like to point out that the local air pollution control district may have jurisdiction over air impacts of any proposed project and should have the opportunity to comment on material contained in the draft EIR/EIS. In the case of this proposed facility, both the South Coast AQMD and the San Bernardino County APCD should have an opportunity to comment.

We hope that a thorough discussion of the items listed in this letter will provide a better understanding of the air quality aspects of the

proposed project and contribute to an effective EIR/EIS process. Thank you for the opportunity to participate in the preparation of this draft EIR/EIS. If you have questions regarding our comments or if we can be of further assistance, please contact Jim Behrmann, Manager of the Toxics Program Support Section at (916) 322-8273.

Sincerely,

Genevieve Shiroma

Genevieve Shiroma, Chief
Toxic Air Contaminant
Identification Branch

cc: Charles Fryxell, San Bernardino APCD
James Lents, South Coast AQMD
Russell Colliau, OPR

CALIFORNIA INTEGRATED WASTE MANAGEMENT BOARD
1020 Ninth Street, Suite 100
Sacramento, California 95814

September 20, 1991

Kathleen Browne, Planner
County of San Bernardino Planning Dept.
385 No. Arrowhead Avenue
San Bernardino, CA 92415-0182

Subject: Notice of Preparation (NOP) for an Environmental Impact Report/Environmental Impact Statement (EIR/EIS) to construct and operate the Bolo Station Landfill, San Bernardino County.

Dear Ms. Brown:

California Integrated Waste Management Board (CIWMB) staff have reviewed the document cited above.

Project Description

The County of San Bernardino Planning Department (SBPD) will be coordinating with the Bureau of Land Management (BLM) in the preparation of an EIR/EIS for the project cited above. SBPD will be the Lead Agency in preparing the EIR/EIS with the BLM conducting the public scoping meetings in connection with the preparation of the EIS pursuant to the National Environmental Policy Act (NEPA).

The project consists of a General Plan Amendment and Conditional Use Permit through the County of San Bernardino and a Land Exchange, Right-of-Way, and California Desert Plan Amendment with the BLM. The applicant, Rail-Cycle, L.P., a partnership of Waste Management of North America and Atchison, Topeka and Santa Fe Railroad Company, is proposing to construct and operate a rail-served Class III sanitary landfill complex to dispose of non-hazardous waste on 4,800 acres with a life expectancy of 60-100 years. The project site is located in the Mojave Desert between the communities of Amboy and Cadiz directly adjacent to the Bristol Dry Lake in Sections 8, 15, and the west half of 22. Major components of the proposal include material recovery facilities/transfer stations (MRFs), rail transport, off-loading station, waste disposal area, and composting facilities.

The system is to provide service to the Southern California Region transporting seven (7) trains per day with 3,000 tons per train at full operation.

The project as proposed consists of the following facilities:

1. Visitor's center with paved parking area.

2. Administrative and maintenance facilities, to include an office building, parking areas, a maintenance building, and fueling area.

3. Rail unloading facilities, container maintenance and storage areas, four new rail spurs to be added to existing rail lines.

4. Leachate collection/containment system and evaporation ponds; gas collection system.

5. Water storage and distribution for dust abatement and fire protection; potable water supply.

6. Storm water drainage and treatment facilities.

7. The landfill complex; a Class III landfill with an estimated capacity of 385 million cubic yards and a service life of approximately 66-100 years depending on the rate of loading; approximately 1,900 acres will be utilized for the landfill, which will consist of a phased series of 20 acre cells in a proposed excavation of 100 feet in depth and an increase in the surface elevation of the site by up to approximately 420 feet.

8. Composting facility for green waste.

9. Bolo Road (existing dirt road on site) to be paved and serve as the access road.

CIWMB staff ask that the following comments be addressed:

<u>Cumulative Impacts</u>

It is important that the EIR/EIS address the cumulative impacts resulting from the individual and combined proposed facilities as well as those incremental impacts resulting from the project.

Following is a list of concerns, beyond those described in the NOP, which should also be addressed in the EIR/EIS:

* Total maximum daily tonnages, included with the average daily municipal solid waste (MSW) tonnages, projected up to the landfill closure date.

* Cumulative impacts of overburden pressure on leachate and landfill gas production. Including, but not limited to, the impact upon the groundwater table.

* Complete discussion of lift design and structural integrity within the landfill, and related impact on site life.

* Location and depths of proposed LFG and groundwater monitoring wells and collection systems, as well as the testing criterion and schedule.

* Vadose zone contamination monitoring and control systems/methods, design, location, testing criterion and schedule.

* Current water quality assessment data.

* Surface water quality monitoring program testing results and findings.

* Hydraulic conductivity (cm/sec) of underlying soils as well as soils designated as liner and final cover.

* Potential impacts to the groundwater resource area(s) discussed in detail.

* A contingency plan in the event that monitoring detects soil contamination.

* A full description of the household hazardous waste collection program, load checking and material recovery, health and safety, and the associated impacts and mitigations thereof including the design of the collection facility and the location.

* A description of the landfill equipment and fire protection equipment.

* Frequency of seismic activity as well as a range of most probable earthquake (MPE) magnitudes.

* Identification of surface runoff, creeks, rivers and/or diversion channels in areas adjacent to the landfill. Location and permeability of any proposed diversion berm(s) which redirect flow away from/around the landfill.

* Complete description of the materials recovery operations and on-site storage of materials separated from the waste stream for recycling.

* Complete description of the off-loading station and operating procedures.

* Complete description of the composting operations including on-site storage of materials, materials to be composted and testing of product materials for contamination and non-hazardous certification.

* Odor and dust control contingency plans.

* List the proposed hygienic facilities on site as well as first aid equipment accessibility and employee training as well as provisions for the permanent water supply.

* Time frame for project implementation.

* Description of the site security including fencing, gates and access roads located on a map,

California Environmental Quality Act (CEQA) compliance is required for projects associated with the establishment and operation of a Solid Waste Facility (SWF).

In order that the CIWMB staff may review a proper EIR/EIS, the potential environmental impacts must be identified clearly in the environmental assessment and offer mitigating measures included in the project to avoid potentially significant effects as well as identification of significant environmental impacts which cannot be mitigated.

CIWMB staff recommends that the EIR/EIS be a self supporting document containing all information and data to support project suppositions and declarations. The EIR/EIS should include, but not be limited to, all pertinent Report of Disposal Site Information (RDSI), Water Quality Monitoring Report, final grading and drainage plans, Master Plan of drainage, revegetation/landscape plan, geotechnical stability analysis, engineering plans, and traffic studies associated with ingress and egress. CIWMB staff also requests that the EIR/EIS address the hazardous waste screening program designed to prevent the acceptance of hazardous materials at the site as well as the number of employees designated as load checkers, provisions for storage of hazardous waste on site, required permits for collection and storage, and a description of the employee training program.

Enclosed are Disposal Facility, Material Recovery Facility and Composting Facility EIR Checklists for your reference.

CIWMB staff requests the preceding information pursuant to Public Resources Code (PRC), Chapter 5, Section 21160, which states:

> Whenever any person applies to any public agency for a lease, permit, license, certificate, or other entitlement for use, the public agency may require that person to submit data and information which may be necessary to enable the public agency to determine whether the proposed project may have a significant effect on the environment or to prepare an environmental impact report.

CIWMB staff appreciates the opportunity to comment on this project in the early planning phases. If you have any questions regarding these comments please contact me at (916) 322-1391.

Sincerely,

John Loane

John Loane, Waste Management Specialist
Facility Review Branch, Permitting and Compliance Division

Enclosures

cc. State Clearinghouse

APPENDIX B
LIST OF PERMITS/APPROVALS REQUIRED

APPENDIX B

LIST OF PERMITS/APPROVALS REQUIRED

PERMIT/APPROVAL	APPROVING AUTHORITY	PURPOSE
FEDERAL		
Environmental Impact Statement	BLM	Environmental compliance.
Biological Opinion/Section 7 Consultation	USFWS	Compliance with ESA.
Amendment of California Desert Conservation Area Plan	BLM	Amendment of plan to allow exchange of lands.
STATE OF CALIFORNIA		
Waste Discharge Requirements	RWQCB	Surface and ground water quality control.
Solid Waste Facilities Permit	CIWMB	Concurrent with Issuance of Permit by SBCDEHS.
COUNTY OF SAN BERNARDINO		
Environmental Impact Report	County Planning Department	Environmental compliance.
Amendment of County General Plan	County Board of Supervisors	Amendment of plan to allow a solid waste disposal facility.
Conditional Use Permit	County Planning Department	Land use permit to allow a solid waste disposal facility.
Solid Waste Facilities Permit	SBCDEHS	Operating requirement for the solid waste disposal facility.
Site Approval	County Planning Department	Consistency with planning/zoning.
Grading Plan Approval	County Department of Building and Safety	Compliance with appropriate codes and standards.
Building Plan Approval	County Department of Building and Safety	Compliance with appropriate codes and standards.
Building Permits	County Department of Building and Safety	Fire safety, building safety, compliance with appropriate codes and standards.
Water System Permit	SBCDEHS	Supply, storage, and distribution. System design and water quality.
Sewage Disposal System Permit	SBCDEHS	Location, design, percolation rates for septic tanks and underground leaching fields.
Water Well Permit and Inspection	SBCDEHS	System design and water quality.
Authority to Construct	SBCAPCD	Air pollution source location and control.
Permit to Operate	SBCAPCD	Air pollution emissions, monitoring and reporting.

91-109 (11/12/92/mg)

APPENDIX C
COMPUTERIZED FAULT AND EARTHQUAKE DATA

C.1 FAULTING AND SEISMICITY TERMINOLOGY

C.1 FAULTING AND SEISMICITY TERMINOLOGY

1. A fault is a fracture or zone of closely associated fractures along which rocks on one side have been displaced with respect to those on the opposite side. Most faults result from repeated displacements, which may have occurred suddenly or by slow creep. A fault zone is a zone of related faults which are most often braided and subparallel, but may also be branching and divergent.

2. Seismicity relates to earthquake activity within a particular area. Ground shaking is the physical movement of the land surface due to earthquakes. When there is sudden movement along a fault or a fault break, the accumulated strain energy is released as seismic waves that travel outward in all directions from the earthquake focus. (The commonly used term "epicenter" refers to the point on the earth's surface directly above the focus of an earthquake.) These waves make up the ground shaking component of an earthquake.

3. Two separate indexes, or scales, are commonly used in the United States to describe seismic or earthquake disturbances. The size or energy release of earthquakes is measured by a magnitude scale (Richter). The qualitative rating of the degree of earthquake shaking, based upon feeling and visual observation, is indicated by an intensity scale (Mercali).

4. Measurement of the radiated energy released by an earthquake was originally proposed by Richter in 1932. This method assigns a number to the calculated energy release known as magnitude (M), and can rank earthquakes and compare them to one another. By this method, an earthquake is rated independently of the place of observation. The Richter Scale is logarithmic, and is not limited, either at top or bottom. Each magnitude step on the scale represents an increase of 10 times in measured wave amplitude of the earthquake, and 30 times the amount of energy released as seismic waves. An earthquake of M2.0 is about the smallest earthquake that can be felt by human beings.

5. The index used to measure earthquake intensity (as opposed to energy release or magnitude) is the modified Mercali Intensity Scale, with intensity scales ranging from I to XII (with I being for earthquakes barely perceptible by human beings and XII for "the ultimate catastrophe"). The scale, presented in Table C.1, is a reflection of the physical effects of earthquakes. Only a rough correlation exists between the magnitude of an earthquake and the intensity, as the latter is dependent on the distance from the earthquake epicenter.

6. Earthquake magnitudes generated by faulting are related to the size (length) and type of fault displacement. With few exceptions, the longer a fault is, the greater the magnitude earthquake it can generate. Short-length faults are capable of producing only minor earthquakes. Often, short-length faults develop as sympathetic movements related to a major earthquake on a significant nearby fault.

7. Intensity of ground shaking during an earthquake depends in large part on geologic foundation conditions (i.e., the thickness and physical properties of the materials comprising the upper several hundred feet of the affected area). The potential for impacts due to ground shaking is related to the stratigraphy, grain size, density, and degree of saturation of the subsurface soils, as well as the intensity of ground shaking.

TABLE C.1

MODIFIED MERCALI INTENSITY SCALE

PEAK HORIZONTAL ACCELERATION (g)	MODIFIED MERCALI INTENSITY[1]	
1.0	XII	Damage total or nearly total.
	XI	
	X	Major damage, such as collapse of weak buildings and cracking of strong buildings.
	IX	
	VIII	Moderate damage, such as fractures of weak walls and toppled chimneys.
0.1	VII	
	VI	Some structural damage, such as cracks in walls and chimneys.
	V	Felt by most people; objects disturbed; no structural damage.
	IV	
0.01	III	Felt indoors by some people; no damage.
	II	Not generally felt by people.
	I	

91-109 (7/9/92/cm)

[1] For a more detailed description of intensity ratings, please refer to one of the following: Hays, 1980; and Richter, 1958.

C.2 ESTIMATION OF PEAK HORIZONTAL ACCELERATION FROM DIGITIZED CALIFORNIA FAULTS BOLO STATION SITE

DATE: Friday, October 2, 1992

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*          E Q S E A R C H           *
*                                    *
*             Ver. 2.00              *
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(Estimation of Peak Horizontal Acceleration
From California Earthquake Catalogs)

SEARCH PERFORMED FOR: ENVIRONMENTAL SOLUTIONS

JOB NUMBER: 91-109

JOB NAME: RAIL CYCLE (BOLO STATION)

SITE COORDINATES:
LATITUDE: 34.529 N
LONGITUDE: 115.633 W

TYPE OF SEARCH: RADIUS
SEARCH RADIUS: 100 mi

SEARCH MAGNITUDES: 4.0 TO 9.0

SEARCH DATES: 1800 TO 1992

ATTENUATION RELATION: 6) Joyner & Boore (1982) Horiz. - Random

UNCERTAINTY (M=Mean, S=Mean+1-Sigma): M

SCOND: 0

FAULT TYPE ASSUMED (DS=Reverse, SS=Strike-Slip): DS

COMPUTE PEAK HORIZONTAL ACCELERATION

EARTHQUAKE-DATA FILE USED: ALLQUAKE.DAT

TIME PERIOD OF EXPOSURE FOR STATISTICAL COMPARISON: 150 years

SOURCE OF DEPTH VALUES (A=Attenuation File, E=Earthquake Catalog): A

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (GMT) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
T-A	34.170	117.320	12/ 2/1859	2210 0.0	8.0	4.30	0.003	-	99 [160]
T-A	33.500	115.820	5/ 0/1868	0 0 0.0	8.0	6.30	0.013	III	72 [116]
T-A	34.080	117.250	10/ 7/1869	0 0 0.0	8.0	4.30	0.003	I	97 [157]
DMG	34.100	116.700	2/ 7/1889	520 0.0	8.0	5.30	0.009	III	68 [109]
DMG	33.400	116.300	2/ 9/1890	12 6 0.0	8.0	6.30	0.009	III	87 [140]
DMG	33.200	116.200	5/28/1892	1115 0.0	8.0	6.30	0.008	II	97 [157]
DMG	33.800	117.000	12/25/1899	1225 0.0	8.0	6.60	0.010	III	93 [150]
MGI	34.100	117.300	12/27/1901	11 0 0.0	8.0	4.60	0.003	I	100 [160]
MGI	34.100	117.300	7/15/1905	2041 0.0	8.0	5.30	0.004	I	100 [160]
DMG	34.200	117.100	9/20/1907	154 0.0	8.0	6.00	0.008	III	87 [139]
MGI	33.250	115.500	12/27/1910	1715 0.0	8.0	4.60	0.004	I	89 [143]
DMG	33.800	116.700	8/11/1911	1820 0.0	8.0	4.00	0.003	I	79 [127]
DMG	33.800	116.700	8/11/1911	2340 0.0	8.0	4.50	0.004	I	79 [127]
MGI	34.100	117.300	11/22/1911	257 0.0	8.0	4.00	0.002	-	100 [160]
MGI	34.200	117.300	4/13/1913	1045 0.0	8.0	4.00	0.002	-	98 [157]
MGI	34.200	116.900	10/10/1915	5 6 0.0	8.0	4.00	0.004	I	76 [122]
MGI	34.300	116.900	12/ 1/1915	14 5 0.0	8.0	4.00	0.004	I	74 [119]
DMG	34.700	117.000	7/16/1916	1150 0.0	8.0	4.50	0.004	I	79 [126]
DMG	34.700	117.000	7/16/1916	1230 0.0	8.0	4.00	0.003	I	79 [126]
DMG	33.500	116.500	9/30/1916	211 0.0	8.0	5.00	0.005	II	87 [139]
MGI	33.500	116.000	9/30/1916	425 0.0	8.0	4.00	0.004	I	74 [119]
MGI	33.500	116.800	11/26/1916	17 5 0.0	8.0	4.00	0.002	-	98 [157]
MGI	33.500	116.800	5/31/1917	435 0.0	8.0	4.00	0.002	-	98 [157]
MGI	33.500	116.800	6/ 2/1917	435 0.0	8.0	4.00	0.002	-	98 [157]
MGI	33.700	116.200	8/12/1917	11 0 0.0	8.0	4.00	0.005	I	66 [106]
MGI	33.750	116.250	11/19/1917	1730 0.0	8.0	4.00	0.005	II	64 [104]
MGI	33.500	116.800	3/30/1918	16 5 0.0	8.0	4.60	0.003	I	98 [157]
DMG	33.750	117.000	4/21/1918	223225.0	8.0	6.80	0.010	III	95 [153]
MGI	33.800	116.900	4/23/1918	1415 0.0	8.0	4.00	0.003	I	88 [142]
MGI	33.800	116.900	4/29/1918	2 0 0.0	8.0	4.00	0.003	I	88 [142]
MGI	33.100	115.500	5/11/1918	8 5 0.0	8.0	4.60	0.003	I	99 [159]
DMG	33.750	117.000	6/ 6/1918	2232 0.0	8.0	5.00	0.004	I	95 [153]
MGI	33.800	116.900	6/14/1918	1024 0.0	8.0	4.00	0.003	I	88 [142]
DMG	33.400	116.500	10/11/1918	4 0 0.0	8.0	4.00	0.002	-	92 [149]
MGI	33.800	116.900	12/18/1920	1726 0.0	8.0	4.00	0.003	I	88 [142]
MGI	34.100	117.200	4/23/1923	2113 0.0	8.0	4.00	0.002	-	94 [152]
DMG	34.000	117.000	6/30/1923	022 0.0	8.0	4.50	0.004	I	86 [139]
DMG	34.000	117.250	7/23/1923	73026.0	8.0	6.25	0.007	II	99 [160]
DMG	34.000	116.000	4/ 3/1926	20 8 0.0	8.0	5.50	0.020	IV	42 [68]
DMG	34.000	116.000	9/ 5/1928	1442 0.0	8.0	5.00	0.015	IV	42 [68]
DMG	34.830	116.520	9/26/1929	20 022.7	8.0	5.10	0.011	III	54 [88]
DMG	34.180	116.920	1/16/1930	02433.9	8.0	5.20	0.007	II	77 [124]
DMG	34.180	116.920	1/16/1930	034 3.6	8.0	5.10	0.006	II	77 [124]
DMG	33.200	116.300	5/12/1930	414 0.0	8.0	4.00	0.002	-	99 [160]
DMG	34.100	117.300	2/16/1931	1327 0.0	8.0	4.00	0.002	-	100 [160]
DMG	34.350	116.280	4/27/1931	23 758.6	8.0	4.00	0.010	III	39 [63]
DMG	33.800	116.600	9/10/1931	436 0.0	8.0	4.00	0.004	I	75 [120]
DMG	34.417	116.850	2/11/1932	231120.0	8.0	4.00	0.004	I	70 [112]
DMG	34.933	116.883	4/27/1932	233518.3	8.0	4.00	0.004	I	76 [123]
DMG	34.850	116.583	7/30/1932	71359.7	8.0	4.50	0.007	II	58 [94]
DMG	34.000	117.250	11/ 1/1932	445 0.0	8.0	4.00	0.002	-	99 [160]
DMG	33.917	116.750	1/25/1933	1444 0.0	8.0	4.00	0.004	I	77 [123]
DMG	33.500	115.500	5/19/1933	162638.0	8.0	4.30	0.005	II	71 [115]
DMG	33.333	116.300	8/ 5/1933	2331 0.0	8.0	4.40	0.003	I	91 [146]

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (GMT) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	33.333	116.300	8/ 6/1933	332 0.0	8.0	4.70	0.004	I	91 [146]
DMG	34.083	116.467	1/26/1934	1844 0.0	8.0	4.00	0.006	II	57 [91]
DMG	33.467	116.633	2/20/1934	1035 0.0	8.0	4.00	0.002	-	93 [150]
DMG	35.083	116.233	4/13/1934	1055 0.0	8.0	4.00	0.007	II	51 [82]
DMG	34.100	116.800	10/24/1935	1448 7.6	8.0	5.10	0.007	II	73 [117]
DMG	34.100	116.883	10/24/1935	1451 0.0	8.0	4.50	0.005	I	77 [124]
DMG	34.100	116.883	10/24/1935	1452 0.0	8.0	4.50	0.005	I	77 [124]
DMG	34.100	116.883	10/24/1935	1527 0.0	8.0	4.00	0.003	I	77 [124]
DMG	33.167	115.500	12/20/1935	745 0.0	8.0	5.00	0.004	I	94 [152]
DMG	33.333	115.500	1/ 2/1936	354 0.0	8.0	4.00	0.003	I	83 [133]
DMG	33.133	116.083	5/ 7/1936	1147 0.0	8.0	4.50	0.003	I	100 [161]
DMG	33.783	116.283	3/ 4/1937	16 4 0.0	8.0	4.00	0.005	II	64 [102]
DMG	33.408	116.261	3/25/1937	1649 1.8	8.0	6.00	0.008	III	85 [137]
DMG	33.426	116.421	3/25/1937	20 4 8.3	8.0	4.00	0.003	I	89 [142]
DMG	33.368	116.444	3/25/1937	232026.7	8.0	4.00	0.002	-	93 [149]
DMG	33.467	116.583	3/26/1937	2124 0.0	8.0	4.00	0.003	-	91 [147]
DMG	33.467	116.583	3/27/1937	528 0.0	8.0	4.00	0.003	-	91 [147]
DMG	33.467	116.583	3/27/1937	742 0.0	8.0	4.50	0.003	I	91 [147]
DMG	33.420	116.490	3/29/1937	17 316.8	8.0	4.00	0.003	-	91 [146]
DMG	34.578	116.603	6/ 1/1937	154144.3	8.0	4.00	0.006	II	55 [89]
DMG	33.167	116.167	11/16/1937	1057 0.0	8.0	4.00	0.002	-	99 [159]
DMG	33.467	116.583	1/ 4/1938	029 0.0	8.0	4.50	0.003	I	91 [147]
DMG	34.050	116.433	2/ 8/1938	739 0.0	8.0	4.00	0.006	II	56 [91]
DMG	34.174	116.257	2/15/1938	74539.8	8.0	4.50	0.011	III	43 [70]
DMG	34.750	116.467	3/31/1938	17 3 0.0	8.0	4.00	0.007	II	50 [80]
DMG	34.133	116.950	6/10/1938	1440 0.0	8.0	4.00	0.003	I	80 [129]
DMG	33.383	115.600	6/29/1938	1040 0.0	8.0	4.00	0.003	I	79 [127]
DMG	33.933	116.750	8/ 6/1938	228 0.0	8.0	4.00	0.004	I	76 [122]
DMG	34.846	116.143	8/18/1938	73945.4	8.0	4.50	0.014	IV	36 [58]
DMG	34.043	117.228	4/ 3/1939	25044.7	8.0	4.00	0.002	-	97 [156]
DMG	33.467	116.433	5/12/1939	1925 2.2	8.0	4.50	0.004	I	86 [139]
DMG	33.383	115.600	12/31/1939	151243.0	8.0	4.00	0.003	I	79 [127]
DMG	33.300	116.300	1/ 4/1940	8 711.0	8.0	4.00	0.002	-	93 [150]
DMG	34.017	117.050	2/19/1940	12 655.7	8.0	4.60	0.004	I	88 [142]
DMG	33.133	116.083	2/28/1940	1728 7.0	8.0	4.50	0.003	I	100 [161]
DMG	34.083	116.300	5/18/1940	5 358.5	8.0	5.40	0.015	IV	49 [79]
DMG	34.067	116.333	5/18/1940	55120.2	8.0	5.20	0.013	III	51 [82]
DMG	34.067	116.317	5/18/1940	6 430.6	8.0	4.60	0.009	III	50 [81]
DMG	34.067	116.333	5/18/1940	72132.7	8.0	5.00	0.011	III	51 [82]
DMG	34.050	116.283	5/18/1940	134719.0	8.0	4.50	0.009	III	50 [80]
DMG	34.050	116.283	5/19/1940	226 2.0	8.0	4.50	0.009	III	50 [80]
DMG	34.050	116.283	5/19/1940	22730.0	8.0	4.50	0.009	III	50 [80]
DMG	34.050	116.283	5/19/1940	35145.0	8.0	4.00	0.007	II	50 [80]
DMG	34.050	116.283	5/19/1940	193941.0	8.0	4.00	0.007	II	50 [80]
DMG	34.050	116.283	5/22/1940	63137.0	8.0	4.00	0.007	II	50 [80]
DMG	34.050	116.283	5/22/1940	1410 5.0	8.0	4.00	0.007	II	50 [80]
DMG	34.050	116.283	5/27/1940	32727.0	8.0	4.00	0.007	II	50 [80]
DMG	34.083	116.333	6/ 1/1940	527 1.2	8.0	4.70	0.010	III	50 [81]
DMG	34.050	116.283	6/ 1/1940	55646.0	8.0	4.00	0.007	II	50 [80]
DMG	34.100	116.333	6/ 1/1940	65428.0	8.0	4.30	0.008	III	50 [80]
DMG	34.083	116.333	6/ 2/1940	61310.2	8.0	4.50	0.009	III	50 [81]
DMG	34.000	116.317	6/ 6/1940	222115.1	8.0	4.30	0.007	II	53 [86]
DMG	33.267	116.400	6/ 6/1940	2321 4.0	8.0	4.00	0.002	-	98 [157]
DMG	34.050	116.283	6/ 6/1940	234849.0	8.0	4.00	0.007	II	50 [80]
DMG	34.017	116.367	6/ 6/1940	235637.2	8.0	4.40	0.008	II	55 [88]
DMG	34.050	116.283	6/ 8/1940	171032.0	8.0	4.00	0.007	II	50 [80]

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (GMT) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	34.033	116.317	6/11/1940	195118.1	8.0	4.40	0.008	III	52 [84
DMG	34.050	116.283	6/14/1940	215850.0	8.0	4.00	0.007	II	50 [80
DMG	34.050	116.283	6/24/1940	163936.0	8.0	4.00	0.007	II	50 [80
DMG	33.167	115.983	7/21/1940	836 3.0	8.0	4.40	0.003	I	96 [155
DMG	34.050	116.283	8/ 1/1940	193140.0	8.0	4.00	0.007	II	50 [80
DMG	34.050	116.283	8/ 4/1940	181520.0	8.0	4.00	0.007	II	50 [80
DMG	33.133	116.083	10/ 6/1940	181953.0	8.0	4.00	0.002	-	100 [161
DMG	33.133	116.083	10/16/1940	175213.0	8.0	4.00	0.002	-	100 [161
DMG	33.500	116.483	2/23/1941	183614.0	8.0	4.50	0.004	I	86 [139
DMG	34.400	116.917	1/25/1942	215133.0	8.0	4.00	0.004	I	74 [119
DMG	34.400	116.917	2/ 1/1942	151555.0	8.0	4.00	0.004	I	74 [119
DMG	34.400	116.917	2/ 1/1942	151828.0	8.0	4.50	0.005	II	74 [119
DMG	34.400	116.917	2/ 1/1942	16 334.0	8.0	4.50	0.005	II	74 [119
DMG	34.333	117.000	2/27/1942	1 853.0	8.0	4.00	0.003	I	79 [127
DMG	34.083	116.467	3/ 1/1942	104631.0	8.0	4.00	0.006	II	57 [91
DMG	34.000	115.750	3/ 3/1942	1 324.0	8.0	5.00	0.018	IV	37 [60
DMG	34.000	115.750	3/ 4/1942	11 212.0	8.0	4.00	0.011	III	37 [60
DMG	33.200	116.233	4/ 5/1942	92039.0	8.0	4.00	0.002	-	98 [158
DMG	33.950	116.733	4/26/1942	151023.0	8.0	4.00	0.004	I	74 [120
DMG	34.450	116.783	5/22/1942	151829.0	8.0	4.00	0.005	II	66 [106
DMG	33.333	116.233	6/ 9/1942	5 633.0	8.0	4.00	0.003	I	89 [144
DMG	33.233	115.833	6/14/1942	213623.0	8.0	4.00	0.003	-	90 [145
DMG	33.233	115.833	6/14/1942	222549.0	8.0	4.00	0.003	-	90 [145
DMG	33.233	115.833	6/24/1942	235240.0	8.0	4.00	0.003	-	90 [145
DMG	34.300	116.417	8/ 7/1942	11533.0	8.0	4.50	0.010	III	47 [76
DMG	34.300	116.417	8/ 7/1942	12358.0	8.0	4.00	0.008	II	47 [76
DMG	34.300	116.417	8/ 7/1942	15314.0	8.0	4.00	0.008	II	47 [76
DMG	34.117	116.750	8/22/1942	125913.0	8.0	4.00	0.004	I	70 [112
DMG	34.350	116.283	9/20/1942	161414.0	8.0	4.00	0.010	III	39 [63
DMG	33.533	116.633	9/21/1942	7 754.0	8.0	4.00	0.003	I	89 [144
DMG	33.233	115.717	10/22/1942	15038.0	8.0	5.50	0.006	II	90 [144
DMG	33.233	115.717	10/26/1942	3 215.0	8.0	4.50	0.003	I	90 [144
DMG	33.233	115.717	10/26/1942	34316.0	8.0	4.00	0.003	I	90 [144
DMG	33.233	115.717	10/26/1942	615 4.0	8.0	4.50	0.003	I	90 [144
DMG	34.617	116.000	11/ 9/1942	203425.0	8.0	4.50	0.027	V	22 [35
DMG	33.200	115.600	11/12/1942	175612.0	8.0	4.00	0.003	-	92 [148
DMG	33.417	116.417	1/ 2/1943	141118.0	8.0	4.50	0.003	I	89 [143
DMG	33.333	116.100	6/12/1943	192141.0	8.0	4.00	0.003	I	87 [140
DMG	34.267	116.967	8/29/1943	34513.0	8.0	5.50	0.007	II	78 [126
DMG	34.267	116.967	8/29/1943	35754.0	8.0	4.00	0.003	I	78 [126
DMG	34.267	116.967	8/29/1943	51630.0	8.0	4.00	0.003	I	78 [126
DMG	34.333	116.883	10/14/1943	142844.0	8.0	4.50	0.005	II	72 [117
DMG	34.350	116.867	10/15/1943	1650 1.0	8.0	4.50	0.005	II	71 [115
DMG	33.783	116.200	10/31/1943	131210.0	8.0	4.50	0.007	II	61 [98
DMG	33.917	116.700	11/17/1943	112841.0	8.0	4.50	0.005	II	74 [119
DMG	34.333	115.800	12/22/1943	155028.0	8.0	5.50	0.063	VI	17 [27
DMG	34.000	116.383	5/ 5/1944	134715.0	8.0	4.00	0.006	II	56 [91
DMG	34.014	116.771	6/10/1944	111150.5	8.0	4.50	0.005	II	74 [119
DMG	33.973	116.769	6/10/1944	111531.9	8.0	4.00	0.004	I	75 [121
DMG	33.976	116.721	6/12/1944	104534.7	8.0	5.10	0.007	II	73 [117
DMG	33.994	116.712	6/12/1944	111636.0	8.0	5.30	0.008	II	72 [116
DMG	33.981	116.702	6/12/1944	222119.5	8.0	4.20	0.004	I	72 [116
DMG	34.000	116.700	8/25/1944	73025.0	8.0	4.20	0.004	I	71 [114
DMG	33.317	116.067	9/ 4/1944	125528.0	8.0	4.10	0.003	I	87 [140
DMG	33.283	116.183	10/26/1944	225410.0	8.0	4.20	0.003	I	92 [147
DMG	33.933	116.750	10/28/1944	183016.0	8.0	4.40	0.004	I	76 [122

ILE ODE	LAT. NORTH	LONG. WEST	DATE	TIME (GMT) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
MG	34.250	116.167	3/20/1945	2155 7.0	8.0	5.00	0.019	IV	36 [58]
MG	34.283	116.183	3/29/1945	4 417.0	8.0	4.20	0.012	III	36 [57]
MG	34.433	116.983	4/18/1945	458 2.0	8.0	4.30	0.004	I	77 [124]
MG	33.217	116.133	8/15/1945	175624.0	8.0	5.70	0.006	II	95 [153]
MG	33.967	116.800	9/ 7/1945	153424.0	8.0	4.30	0.004	I	77 [124]
MG	33.867	115.700	4/28/1946	173123.0	8.0	4.40	0.010	III	46 [74]
MG	33.917	115.700	6/ 4/1946	12 524.0	8.0	4.80	0.014	III	42 [68]
MG	34.533	115.983	7/18/1946	142758.0	8.0	5.60	0.054	VI	20 [32]
MG	33.917	116.250	8/15/1946	19 1 8.0	8.0	4.00	0.006	II	55 [89]
MG	33.233	115.700	8/30/1946	111645.0	8.0	4.60	0.004	I	90 [144]
MG	33.950	116.850	9/28/1946	719 9.0	8.0	5.00	0.005	II	80 [129]
MG	34.983	116.550	4/10/1947	1558 6.0	8.0	6.20	0.017	IV	61 [98]
MG	34.967	116.550	4/10/1947	16 3 0.0	8.0	5.10	0.009	III	60 [97]
MG	34.933	116.517	4/10/1947	171218.0	8.0	4.40	0.007	II	57 [92]
MG	34.967	116.550	4/10/1947	1713 0.0	8.0	4.30	0.006	II	60 [97]
MG	34.950	116.533	4/10/1947	171822.0	8.0	5.00	0.009	III	59 [95]
MG	34.967	116.550	4/10/1947	182759.0	8.0	4.30	0.006	II	60 [97]
MG	34.933	116.517	4/10/1947	222723.0	8.0	4.20	0.006	II	57 [92]
MG	34.950	116.533	4/11/1947	2 711.0	8.0	4.10	0.006	II	59 [95]
MG	34.933	116.517	4/11/1947	33210.0	8.0	4.30	0.007	II	57 [92]
MG	34.967	116.550	4/11/1947	747 0.0	8.0	5.00	0.009	III	60 [97]
MG	34.933	116.517	4/11/1947	184340.0	8.0	4.10	0.006	II	57 [92]
MG	34.933	116.517	4/12/1947	18 434.0	8.0	4.00	0.006	II	57 [92]
MG	34.933	116.517	4/12/1947	234852.0	8.0	4.20	0.006	II	57 [92]
MG	34.967	116.550	4/19/1947	229 9.0	8.0	4.70	0.008	II	60 [97]
MG	34.933	116.517	4/21/1947	191529.0	8.0	4.40	0.007	II	57 [92]
MG	34.933	116.550	5/ 4/1947	25039.0	8.0	4.00	0.005	II	59 [95]
MG	34.233	116.333	5/11/1947	5 620.0	8.0	4.90	0.013	III	45 [72]
MG	34.933	116.517	5/22/1947	439 0.0	8.0	4.00	0.006	II	57 [92]
MG	34.017	116.500	7/24/1947	221046.0	8.0	5.50	0.011	III	61 [98]
MG	34.017	116.500	7/24/1947	225341.0	8.0	4.30	0.006	II	61 [98]
MG	34.017	116.500	7/24/1947	225426.0	8.0	4.90	0.008	III	61 [98]
MG	34.017	116.500	7/25/1947	04631.0	8.0	5.00	0.009	III	61 [98]
MG	34.017	116.500	7/25/1947	15647.0	8.0	4.60	0.007	II	61 [98]
MG	34.017	116.500	7/25/1947	51752.0	8.0	4.30	0.006	II	61 [98]
MG	34.017	116.500	7/25/1947	61949.0	8.0	5.20	0.010	III	61 [98]
MG	34.017	116.500	7/25/1947	75730.0	8.0	4.20	0.006	II	61 [98]
MG	34.017	116.500	7/25/1947	161453.0	8.0	4.50	0.007	II	61 [98]
MG	34.017	116.500	7/26/1947	12415.0	8.0	4.20	0.006	II	61 [98]
MG	34.017	116.500	7/26/1947	24941.0	8.0	5.10	0.009	III	61 [98]
MG	34.017	116.500	7/26/1947	23 425.0	8.0	4.50	0.007	II	61 [98]
MG	34.017	116.500	7/26/1947	231351.0	8.0	4.10	0.005	II	61 [98]
MG	34.017	116.500	7/29/1947	163615.0	8.0	4.20	0.006	II	61 [98]
MG	34.017	116.500	7/30/1947	52217.0	8.0	4.20	0.006	II	61 [98]
MG	35.000	117.000	8/ 1/1947	154230.0	8.0	4.00	0.003	I	84 [135]
MG	34.017	116.500	8/ 1/1947	17 137.0	8.0	4.10	0.005	II	61 [98]
MG	34.017	116.500	8/ 8/1947	64745.0	8.0	4.00	0.005	II	61 [98]
MG	35.037	116.940	8/13/1947	20 9 0.1	8.0	4.30	0.004	I	82 [132]
MG	34.400	116.417	11/10/1947	22255.0	8.0	4.50	0.010	III	46 [73]
MG	34.983	116.550	11/17/1947	14 710.0	8.0	4.30	0.006	II	61 [98]
MG	34.967	116.933	12/30/1947	191914.0	8.0	4.00	0.003	I	80 [128]
MG	35.033	116.867	11/10/1948	235613.0	8.0	4.10	0.004	I	78 [126]
MG	33.933	116.383	12/ 4/1948	234317.0	8.0	6.50	0.020	IV	59 [96]
MG	33.933	116.367	12/ 5/1948	0 721.0	8.0	4.90	0.009	III	59 [95]
MG	33.933	116.350	12/ 5/1948	04032.0	8.0	4.40	0.007	II	58 [93]
MG	33.967	116.433	12/ 5/1948	04235.0	8.0	4.60	0.007	II	60 [96]

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (GMT) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	34.000	116.467	12/ 5/1948	05057.0	8.0	4.40	0.007	II	60 [97
DMG	34.000	116.467	12/ 6/1948	246 8.0	8.0	4.30	0.006	II	60 [97
DMG	33.933	116.400	12/10/1948	204257.0	8.0	4.40	0.007	II	60 [97
DMG	33.967	116.450	12/11/1948	161220.0	8.0	4.50	0.007	II	61 [98
DMG	34.950	116.950	12/18/1948	234517.0	8.0	4.40	0.004	I	80 [129
DMG	34.000	116.050	12/27/1948	1119 4.0	8.0	4.00	0.009	III	44 [70
DMG	33.483	116.700	12/28/1948	125341.0	8.0	4.00	0.002	-	95 [152
DMG	34.967	116.550	1/ 3/1949	134340.0	8.0	4.80	0.008	III	60 [97
DMG	33.283	116.033	3/16/1949	18 027.0	8.0	4.00	0.003	I	89 [143
DMG	35.156	117.004	3/20/1949	193449.7	8.0	4.40	0.003	I	89 [143
DMG	33.283	116.350	4/13/1949	75336.0	8.0	4.10	0.002	-	95 [153
DMG	34.017	115.767	5/ 2/1949	112458.0	8.0	4.60	0.015	IV	36 [58
DMG	34.017	115.683	5/ 2/1949	112547.0	8.0	5.90	0.031	V	35 [57
DMG	34.017	115.683	5/ 2/1949	143521.0	8.0	4.20	0.013	III	35 [57
DMG	34.017	115.683	5/ 2/1949	1841 3.0	8.0	4.20	0.013	III	35 [57
DMG	34.017	115.683	5/ 6/1949	326 6.0	8.0	4.10	0.012	III	35 [57
DMG	34.017	115.683	5/10/1949	4 633.0	8.0	4.70	0.016	IV	35 [57
DMG	34.017	115.683	5/22/1949	232127.0	8.0	4.00	0.011	III	35 [57
DMG	34.017	115.683	5/25/1949	173146.0	8.0	4.50	0.015	IV	35 [57
DMG	34.883	116.667	9/20/1949	41411.0	8.0	4.10	0.005	II	64 [102
DMG	33.959	116.651	9/23/1949	214440.1	8.0	4.00	0.004	I	70 [113
DMG	33.850	115.850	10/13/1949	42040.0	8.0	4.00	0.007	II	48 [78
DMG	33.963	116.425	1/13/1950	5 719.4	8.0	4.10	0.006	II	60 [96
DMG	33.117	115.567	7/27/1950	954 0.0	8.0	4.10	0.002	-	98 [157
DMG	33.117	115.567	7/27/1950	112926.0	8.0	4.80	0.003	I	98 [157
DMG	33.117	115.567	7/27/1950	12 2 0.0	8.0	4.20	0.002	-	98 [157
DMG	33.117	115.567	7/27/1950	2251 0.0	8.0	4.50	0.003	I	98 [157
DMG	33.117	115.567	7/28/1950	325 0.0	8.0	4.70	0.003	I	98 [157
DMG	33.117	115.567	7/28/1950	1624 0.0	8.0	4.00	0.002	-	98 [157
DMG	33.117	115.567	7/28/1950	1727 0.0	8.0	4.70	0.003	I	98 [157
DMG	33.117	115.567	7/28/1950	1730 0.0	8.0	4.10	0.002	-	98 [157
DMG	33.117	115.567	7/28/1950	175048.0	8.0	5.40	0.005	II	98 [157
DMG	33.117	115.567	7/28/1950	175812.0	8.0	4.80	0.003	I	98 [157
DMG	33.117	115.567	7/28/1950	1817 0.0	8.0	4.20	0.002	-	98 [157
DMG	33.117	115.567	7/28/1950	1840 0.0	8.0	4.00	0.002	-	98 [157
DMG	33.117	115.567	7/28/1950	1949 0.0	8.0	4.20	0.002	-	98 [157
DMG	33.117	115.567	7/28/1950	2113 0.0	8.0	4.10	0.002	-	98 [157
DMG	33.117	115.567	7/29/1950	017 0.0	8.0	4.50	0.003	I	98 [157
DMG	33.117	115.567	7/29/1950	143632.0	8.0	5.50	0.005	II	98 [157
DMG	33.117	115.567	7/29/1950	15 9 0.0	8.0	4.50	0.003	I	98 [157
DMG	33.117	115.567	7/29/1950	1714 0.0	8.0	4.30	0.003	-	98 [157
DMG	33.117	115.567	7/29/1950	1843 0.0	8.0	4.70	0.003	I	98 [157
DMG	33.117	115.567	8/ 1/1950	83720.0	8.0	4.70	0.003	I	98 [157
DMG	34.317	116.800	8/12/1950	21717.0	8.0	4.30	0.005	II	68 [110
DMG	33.117	115.567	8/14/1950	1916 0.0	8.0	4.70	0.003	I	98 [157
DMG	34.307	116.835	8/28/1950	194526.4	8.0	4.20	0.005	I	70 [113
DMG	34.967	116.817	8/30/1950	1659 4.0	8.0	4.20	0.004	I	74 [119
DMG	33.650	116.750	9/ 5/1950	191956.0	8.0	4.80	0.004	I	88 [142
DMG	33.417	116.567	12/22/1950	2 536.0	8.0	4.00	0.002	-	94 [151
DMG	33.200	116.117	12/28/1950	52211.0	8.0	4.20	0.003	-	96 [154
DMG	33.483	116.500	2/15/1951	104759.0	8.0	4.80	0.004	I	88 [141
DMG	33.483	116.500	2/15/1951	104957.0	8.0	4.80	0.004	I	88 [141
DMG	33.283	116.033	3/29/1951	233929.0	8.0	4.40	0.003	I	89 [143
DMG	33.267	115.667	8/10/1951	1130 8.0	8.0	4.40	0.003	I	87 [140
DMG	33.200	116.000	8/15/1951	1227 9.0	8.0	4.00	0.002	-	94 [152
DMG	34.167	116.983	10/16/1951	1241 5.0	8.0	4.00	0.003	I	81 [130

ILE ODE	LAT. NORTH	LONG. WEST	DATE	TIME (GMT) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
MG	33.100	115.400	12/ 5/1951	155314.0	8.0	4.50	0.003	I	100 [160]
MG	33.958	116.346	1/ 8/1952	63427.4	8.0	4.40	0.007	II	57 [91]
MG	33.283	115.917	3/28/1952	11622.0	8.0	4.20	0.003	I	88 [141]
MG	33.400	116.567	2/ 4/1953	43616.0	8.0	4.30	0.003	I	95 [152]
MG	34.050	115.633	9/11/1953	205046.0	8.0	4.20	0.014	IV	33 [53]
MG	34.954	116.961	10/ 1/1953	193516.2	8.0	4.10	0.003	I	81 [130]
MG	33.267	116.100	1/ 4/1954	233152.0	8.0	4.20	0.003	I	91 [147]
MG	33.333	116.433	2/12/1954	94428.0	8.0	4.50	0.003	I	94 [152]
MG	33.283	116.183	3/19/1954	95429.0	8.0	6.20	0.008	III	92 [147]
MG	33.283	116.183	3/19/1954	95556.0	8.0	5.00	0.004	I	92 [147]
MG	33.283	116.183	3/19/1954	957 7.0	8.0	4.60	0.003	I	92 [147]
MG	33.283	116.183	3/19/1954	95748.0	8.0	4.00	0.003	-	92 [147]
MG	33.283	116.183	3/19/1954	10 139.0	8.0	4.20	0.003	I	92 [147]
MG	33.283	116.183	3/19/1954	101522.0	8.0	4.50	0.003	I	92 [147]
MG	33.283	116.183	3/19/1954	101957.0	8.0	4.50	0.003	I	92 [147]
MG	33.283	116.183	3/19/1954	102117.0	8.0	5.50	0.006	II	92 [147]
MG	33.283	116.183	3/19/1954	102610.0	8.0	4.00	0.003	-	92 [147]
MG	33.283	116.183	3/19/1954	13 8 4.0	8.0	4.30	0.003	I	92 [147]
MG	33.283	116.183	3/19/1954	14 057.0	8.0	4.10	0.003	I	92 [147]
MG	33.283	116.183	3/19/1954	143750.0	8.0	4.00	0.003	-	92 [147]
MG	33.283	116.183	3/20/1954	41919.0	8.0	4.90	0.004	I	92 [147]
MG	33.283	116.183	3/20/1954	6 353.0	8.0	4.30	0.003	I	92 [147]
MG	33.283	116.183	3/23/1954	41450.0	8.0	5.10	0.005	I	92 [147]
MG	33.283	116.183	4/ 4/1954	42920.0	8.0	4.10	0.003	I	92 [147]
MG	34.029	116.787	4/30/1954	03623.9	8.0	4.20	0.004	I	74 [120]
MG	34.033	115.550	10/30/1954	2 243.0	8.0	4.60	0.016	IV	35 [56]
MG	33.817	115.467	1/28/1955	121020.0	8.0	4.30	0.008	III	50 [81]
MG	33.450	116.683	4/25/1955	25515.0	8.0	4.00	0.002	-	96 [154]
MG	33.167	115.767	5/10/1955	43840.0	8.0	4.30	0.003	I	94 [152]
MG	33.133	115.400	6/15/1955	173557.0	8.0	4.00	0.002	-	97 [157]
MG	34.405	116.667	7/ 2/1955	162938.5	8.0	4.20	0.006	II	59 [96]
MG	34.306	116.759	3/16/1956	202933.6	8.0	4.80	0.007	II	66 [106]
MG	34.250	116.770	3/16/1956	203344.3	8.0	4.00	0.004	I	68 [109]
MG	34.264	116.755	3/16/1956	203613.6	8.0	4.00	0.004	I	66 [107]
MG	34.336	116.742	3/16/1956	233456.4	8.0	4.40	0.006	II	65 [104]
MG	34.299	116.784	3/18/1956	24217.3	8.0	4.40	0.005	II	67 [109]
MG	34.229	116.795	5/11/1956	163050.5	8.0	4.70	0.006	II	69 [112]
MG	33.745	115.997	9/ 1/1956	55752.8	8.0	4.00	0.006	II	58 [93]
MG	33.771	116.050	9/ 2/1956	24637.0	8.0	4.20	0.006	II	58 [93]
MG	33.534	116.561	9/23/1956	112441.9	8.0	4.30	0.003	I	87 [140]
MG	33.985	116.340	2/ 1/1957	75215.4	8.0	4.60	0.008	III	55 [89]
MG	33.745	115.948	4/ 2/1957	42247.4	8.0	4.10	0.006	II	57 [92]
MG	33.216	115.808	4/25/1957	215738.7	8.0	5.20	0.005	II	91 [147]
MG	33.100	115.900	4/25/1957	22 5 0.0	8.0	4.20	0.002	-	100 [161]
MG	33.183	115.850	4/25/1957	222148.0	8.0	4.20	0.003	I	94 [151]
MG	33.183	115.850	4/25/1957	222412.0	8.0	5.10	0.004	I	94 [151]
MG	33.100	115.900	4/25/1957	2248 0.0	8.0	4.10	0.002	-	100 [161]
MG	33.100	115.900	4/25/1957	2249 0.0	8.0	4.20	0.002	-	100 [161]
MG	33.231	116.004	5/26/1957	155933.6	8.0	5.00	0.004	I	92 [148]
MG	34.067	116.432	12/ 4/1957	25144.0	8.0	4.30	0.007	II	56 [90]
MG	34.180	116.191	12/12/1957	8 0 7.2	8.0	4.40	0.012	III	40 [64]
MG	34.976	116.996	11/ 7/1958	1738 3.7	8.0	4.10	0.003	I	83 [134]
MG	33.880	116.437	4/17/1959	1619 0.2	8.0	4.20	0.005	II	64 [103]
MG	33.488	116.777	6/12/1959	11 313.0	8.0	4.00	0.002	-	97 [156]
MG	33.968	116.882	6/27/1959	162211.1	8.0	4.00	0.003	I	81 [131]
MG	33.950	115.667	8/ 4/1959	182522.0	8.0	4.10	0.010	III	40 [64]

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (GMT) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	34.065	116.574	8/26/1959	53250.2	8.0	4.30	0.006	II	63 [101
DMG	35.147	117.131	7/ 1/1960	221344.6	8.0	4.50	0.003	I	95 [153
DMG	33.267	115.933	12/30/1960	214025.0	8.0	4.00	0.003	I	89 [143
DMG	33.240	116.036	4/28/1961	63021.2	8.0	4.20	0.003	I	92 [148
DMG	33.814	116.028	5/28/1961	125946.7	8.0	4.40	0.008	II	54 [87
DMG	33.333	116.236	10/ 5/1962	1529 2.6	8.0	4.10	0.003	I	90 [144
DMG	34.325	116.865	10/29/1962	24253.9	8.0	4.80	0.006	II	72 [115
DMG	34.337	116.909	11/30/1962	2351 5.5	8.0	4.30	0.004	I	74 [119
DMG	34.324	116.885	12/ 1/1962	03548.8	8.0	4.30	0.004	I	73 [117
DMG	34.325	116.875	12/ 2/1962	04138.4	8.0	4.40	0.005	II	72 [116
DMG	34.154	116.210	7/30/1963	63457.3	8.0	4.70	0.013	III	42 [67
DMG	34.157	116.194	8/22/1963	43355.9	8.0	4.40	0.011	III	41 [66
DMG	33.710	116.925	9/23/1963	144152.6	8.0	5.00	0.004	I	93 [150
DMG	35.388	116.761	10/25/1963	15 523.0	8.0	4.00	0.003	I	87 [140
DMG	33.284	115.735	10/27/1963	145023.4	8.0	4.00	0.003	I	86 [139
DMG	33.200	115.633	10/27/1963	145245.2	8.0	4.10	0.003	I	92 [148
DMG	33.356	115.388	10/27/1963	145654.3	8.0	4.10	0.003	I	82 [132
DMG	33.131	115.611	10/27/1963	181250.7	8.0	4.20	0.003	-	97 [155
DMG	33.175	115.764	10/28/1963	81417.1	8.0	4.00	0.002	-	94 [151
DMG	34.381	116.474	1/ 6/1964	234712.8	8.0	4.50	0.009	III	49 [79
DMG	33.898	116.569	11/17/1964	145228.2	8.0	4.00	0.004	I	69 [111
DMG	33.288	116.018	7/27/1965	14 441.4	8.0	4.30	0.003	I	88 [142
DMG	33.278	116.085	8/26/1965	125351.0	8.0	4.20	0.003	I	90 [145
DMG	33.233	116.086	8/26/1965	133814.0	8.0	4.50	0.003	I	93 [150
DMG	34.712	116.503	9/25/1965	174344.1	8.0	5.20	0.013	III	51 [82
DMG	34.711	116.476	9/25/1965	1748 2.4	8.0	4.90	0.011	III	50 [80
DMG	34.711	116.027	9/26/1965	7 0 1.7	8.0	5.00	0.029	V	26 [41
DMG	33.976	116.775	10/17/1965	94519.0	8.0	4.90	0.006	II	76 [122
DMG	33.279	116.249	1/ 7/1966	191023.0	8.0	4.00	0.002	-	93 [150
DMG	33.291	116.317	3/19/1966	142156.0	8.0	4.00	0.002	-	94 [151
DMG	33.506	116.585	5/21/1967	144234.4	8.0	4.70	0.004	I	89 [144
DMG	33.508	116.631	8/11/1967	05711.4	8.0	4.10	0.003	I	91 [146
DMG	34.052	116.121	3/28/1968	212133.4	8.0	4.00	0.009	III	43 [69
DMG	33.190	116.129	4/ 9/1968	22859.1	8.0	6.40	0.008	III	97 [156
DMG	33.167	116.117	4/ 9/1968	233 9.0	8.0	4.30	0.003	-	98 [158
DMG	33.167	116.117	4/ 9/1968	23930.0	8.0	4.40	0.003	I	98 [158
DMG	33.235	116.266	4/ 9/1968	93833.0	8.0	4.00	0.002	-	96 [155
DMG	33.315	116.305	4/ 9/1968	1831 3.8	8.0	4.70	0.004	I	92 [148
DMG	33.237	116.190	4/14/1968	125558.7	8.0	4.30	0.003	I	95 [152
DMG	34.320	116.925	4/18/1968	174213.4	8.0	4.00	0.004	I	75 [121
DMG	33.310	116.224	5/22/1968	132655.4	8.0	4.40	0.003	I	91 [146
DMG	33.887	116.040	1/23/1969	23 1 1.0	8.0	4.80	0.011	III	50 [81
DMG	33.826	115.985	1/25/1969	3 0 4.0	8.0	4.10	0.007	II	53 [85
DMG	33.343	116.346	4/28/1969	232042.9	8.0	5.80	0.007	II	92 [147
DMG	33.349	116.188	5/19/1969	144033.0	8.0	4.50	0.004	I	87 [141
DMG	34.316	115.729	12/14/1970	191419.4	8.0	4.00	0.030	V	16 [25
DMG	33.501	116.429	2/23/1971	0 739.2	8.0	4.20	0.003	I	84 [136
DMG	34.312	116.879	1/31/1972	155 4.2	8.0	4.00	0.004	I	73 [117
DMG	34.436	116.834	7/14/1973	8 020.1	8.0	4.80	0.006	II	69 [110
DMG	34.516	116.451	4/ 5/1974	104250.7	8.0	4.10	0.008	III	47 [75
DMG	34.626	116.347	7/30/1974	739 7.1	8.0	4.40	0.011	III	41 [66
DMG	34.634	116.341	7/30/1974	83653.6	8.0	4.30	0.011	III	41 [66
PAS	34.401	116.641	2/10/1975	125117.6	8.0	4.40	0.007	II	58 [93
PAS	34.516	116.495	6/ 1/1975	13849.2	8.0	5.20	0.014	III	49 [79
PAS	33.520	116.558	8/ 2/1975	014 7.7	8.0	4.70	0.004	I	87 [141
PAS	34.022	116.426	8/14/1975	8 849.8	8.0	4.00	0.006	II	57 [92

LE DE	LAT. NORTH	LONG. WEST	DATE	TIME (GMT) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
S	34.304	116.341	11/15/1975	61327.6	8.0	4.60	0.012	III	43 [70]
S	34.290	116.322	12/14/1975	181620.1	8.0	4.70	0.013	III	43 [69]
S	33.117	115.615	4/26/1976	64637.5	8.0	4.00	0.002	-	97 [157]
S	33.484	116.513	8/11/1976	152455.5	8.0	4.30	0.003	I	88 [142]
S	33.123	115.596	11/ 4/1976	54820.9	8.0	4.20	0.003	-	97 [156]
S	33.118	115.595	11/ 4/1976	62110.7	8.0	4.10	0.002	-	97 [157]
S	33.118	115.590	11/ 4/1976	635 3.5	8.0	4.10	0.002	-	97 [157]
S	33.103	115.621	11/ 4/1976	1139 8.4	8.0	4.10	0.002	-	98 [158]
S	33.109	115.619	11/ 4/1976	114940.4	8.0	4.10	0.002	-	98 [158]
S	33.103	115.622	11/ 4/1976	133127.7	8.0	4.20	0.002	-	98 [158]
S	33.117	115.595	11/ 4/1976	141250.2	8.0	4.40	0.003	I	98 [157]
S	34.198	116.959	4/ 1/1978	105227.4	8.0	4.00	0.003	I	79 [127]
S	33.420	116.698	6/ 5/1978	16 3 3.9	8.0	4.40	0.003	I	98 [158]
S	34.151	116.972	11/20/1978	655 9.5	8.0	4.30	0.004	I	81 [130]
S	33.458	116.434	2/12/1979	44842.3	8.0	4.20	0.003	I	87 [140]
S	34.309	116.440	3/15/1979	201749.9	8.0	4.90	0.012	III	48 [78]
S	34.327	116.445	3/15/1979	21 716.5	8.0	5.20	0.014	IV	48 [78]
S	34.348	116.453	3/15/1979	213425.6	8.0	4.50	0.010	III	48 [78]
S	34.330	116.443	3/15/1979	23 758.2	8.0	4.80	0.011	III	48 [77]
S	34.329	116.398	3/16/1979	173659.1	8.0	4.00	0.008	III	46 [74]
S	34.230	116.363	3/18/1979	2253 2.7	8.0	4.20	0.009	III	46 [75]
S	34.302	116.499	3/31/1979	016 8.6	8.0	4.20	0.007	II	52 [83]
S	33.094	115.655	6/13/1979	194645.9	8.0	4.10	0.002	-	99 [159]
S	34.246	116.901	6/29/1979	55320.5	8.0	4.60	0.005	II	75 [120]
S	34.243	116.896	6/30/1979	03411.6	8.0	4.90	0.006	II	75 [120]
S	34.249	116.900	6/30/1979	7 353.0	8.0	4.50	0.005	II	75 [120]
S	34.257	116.435	7/13/1979	226 3.5	8.0	4.00	0.007	II	49 [80]
S	33.701	116.837	8/22/1979	2 136.3	8.0	4.10	0.003	I	89 [144]
S	33.501	116.513	2/25/1980	104738.5	8.0	5.50	0.006	II	87 [140]
S	33.110	115.627	4/25/1981	21155.3	8.0	4.10	0.002	-	98 [158]
S	33.099	115.630	4/26/1981	12 557.4	8.0	4.00	0.002	-	99 [159]
S	33.098	115.632	4/26/1981	12 928.4	8.0	5.70	0.005	II	99 [159]
S	33.558	116.667	6/15/1982	234921.3	8.0	4.80	0.004	I	89 [144]
S	33.198	115.535	7/13/1983	211648.3	8.0	4.00	0.002	-	92 [148]
S	33.136	116.071	2/29/1984	2 731.7	8.0	4.30	0.003	-	99 [160]
S	34.382	116.613	6/11/1984	222110.4	8.0	4.00	0.006	II	57 [91]
S	33.976	116.713	8/ 6/1984	81436.6	8.0	4.30	0.005	I	73 [117]
S	33.460	116.370	9/ 7/1984	175730.3	8.0	4.10	0.003	I	85 [137]
S	33.985	116.402	2/15/1985	232626.6	8.0	4.00	0.006	II	58 [93]
S	34.422	116.542	7/18/1985	14 525.8	8.0	4.20	0.007	II	52 [84]
S	34.322	116.815	8/29/1985	759 8.7	8.0	4.10	0.004	I	69 [111]
S	34.023	117.245	10/ 2/1985	234412.4	8.0	4.80	0.003	I	98 [158]
S	34.116	116.030	2/17/1986	21233.5	8.0	4.00	0.011	III	36 [59]
S	33.998	116.606	7/ 8/1986	92044.5	8.0	5.60	0.010	III	67 [107]
S	34.031	116.657	7/ 8/1986	92412.8	8.0	4.40	0.005	II	68 [109]
S	33.967	116.617	7/ 8/1986	102240.6	8.0	4.40	0.005	II	68 [110]
S	33.967	116.617	7/ 8/1986	155526.2	8.0	4.00	0.004	I	68 [110]
S	33.987	116.569	7/ 9/1986	01232.1	8.0	4.40	0.006	II	65 [105]
S	33.989	116.649	7/17/1986	203515.0	8.0	4.00	0.004	I	69 [111]
S	33.991	116.649	7/17/1986	215445.2	8.0	4.40	0.005	II	69 [111]
S	33.953	116.572	10/15/1986	22847.8	8.0	4.70	0.006	II	67 [107]
S	33.133	115.873	11/24/1987	133355.8	8.0	4.00	0.002	-	97 [157]
S	33.483	116.438	7/ 2/1988	02658.2	8.0	4.00	0.003	I	86 [138]
S	33.979	116.681	12/16/1988	553 5.0	8.0	4.80	0.006	II	71 [114]
S	33.182	115.599	3/ 6/1989	221647.6	8.0	4.30	0.003	I	93 [150]
S	33.181	115.611	3/ 7/1989	02458.2	8.0	4.10	0.003	-	93 [150]

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (GMT) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
PAS	33.182	115.594	3/ 7/1989	74344.1	8.0	4.20	0.003	I	93 [150
GSP	34.600	116.840	6/ 4/1989	213358.1	8.0	4.50	0.005	II	69 [111
GSP	33.650	116.740	12/ 2/1989	231647.8	8.0	4.20	0.003	I	88 [141
GSP	33.730	116.020	12/18/1989	062704.5	8.0	4.20	0.006	II	59 [96
GSP	33.510	116.450	2/18/1990	155259.9	8.0	4.10	0.003	I	84 [136
GSP	33.250	116.050	8/31/1990	033800.0	8.0	4.20	0.003	I	91 [147
GSP	34.910	116.580	6/29/1991	175352.0	8.0	4.00	0.005	II	60 [96
GSP	33.210	115.970	7/19/1991	024136.8	8.0	4.00	0.002	-	93 [150
GSP	33.890	116.160	10/12/1991	143932.0	8.0	4.00	0.006	II	53 [86
GSP	34.180	117.020	12/ 4/1991	081703.5	8.0	4.00	0.003	I	83 [133
PDP	33.957	116.317	4/23/1992	022529.9	8.0	4.60	0.008	III	56 [89
PDP	33.943	116.332	4/23/1992	045022.0	8.0	6.10	0.017	IV	57 [91
PDG	34.004	116.334	4/23/1992	051009.1	8.0	4.60	0.009	III	54 [87
PDG	33.943	116.325	4/23/1992	052316.2	8.0	4.00	0.006	II	57 [91
PDP	33.943	116.312	4/23/1992	133557.5	8.0	4.10	0.006	II	56 [90
PDP	33.970	116.292	4/23/1992	185603.0	8.0	4.40	0.008	II	54 [87
PDP	33.946	116.379	4/24/1992	123605.7	8.0	4.10	0.006	II	59 [94
PDP	33.917	116.330	4/26/1992	062608.0	8.0	4.20	0.006	II	58 [93
PDP	34.050	116.335	4/26/1992	172138.0	8.0	4.30	0.008	II	52 [84
PDP	33.933	116.302	4/27/1992	031119.3	8.0	4.20	0.007	II	56 [90
PDP	33.990	116.287	5/ 2/1992	124641.4	8.0	4.10	0.007	II	53 [85
PDP	33.940	116.341	5/ 4/1992	011602.6	8.0	4.00	0.006	II	57 [92
PDP	33.942	116.304	5/ 4/1992	161949.7	8.0	4.80	0.009	III	56 [90
PDP	33.943	116.315	5/ 6/1992	023843.3	8.0	4.50	0.008	II	56 [90
PDG	33.982	116.260	5/12/1992	023111.0	8.0	4.00	0.007	II	52 [84
PDP	33.957	116.338	5/18/1992	154417.9	8.0	4.90	0.009	III	56 [91
PDP	34.175	116.350	6/11/1992	002419.2	8.0	4.30	0.009	III	48 [77
PDN	34.180	116.512	6/28/1992	115735.3	8.0	7.50	0.038	V	56 [89
PDP	34.139	116.431	6/28/1992	123640.6	8.0	5.10	0.011	III	53 [85
PDP	34.341	116.529	6/28/1992	124053.5	8.0	5.20	0.012	III	53 [85
PDP	34.237	116.811	6/28/1992	125730.8	8.0	4.00	0.004	I	70 [113
PDP	34.414	116.461	6/28/1992	131050.5	8.0	5.20	0.014	IV	48 [77
PDP	34.180	116.396	6/28/1992	132605.0	8.0	4.90	0.011	III	50 [80
PDP	34.125	116.424	6/28/1992	135045.8	8.0	4.70	0.009	III	53 [85
PDP	34.102	116.649	6/28/1992	140928.7	8.0	4.10	0.005	II	65 [105
PDP	34.080	116.438	6/28/1992	143907.1	8.0	4.10	0.006	II	55 [89
PDP	34.163	116.855	6/28/1992	144321.0	8.0	5.30	0.007	II	74 [119
PDP	34.163	116.827	6/28/1992	150451.5	8.0	4.40	0.005	II	73 [117
PDN	34.203	116.827	6/28/1992	150530.7	8.0	6.60	0.016	IV	72 [115
PDP	34.208	116.759	6/28/1992	152429.4	8.0	4.50	0.006	II	68 [109
PDP	34.030	116.379	6/28/1992	160115.2	8.0	4.10	0.006	II	55 [88
PDP	34.054	116.371	6/28/1992	160954.0	8.0	4.10	0.007	II	53 [86
PDP	34.207	116.757	6/28/1992	161719.2	8.0	4.10	0.005	II	68 [109
PDP	34.588	116.623	6/28/1992	163210.2	8.0	4.10	0.006	II	56 [91
PDP	34.178	116.922	6/28/1992	170131.9	8.0	4.70	0.005	II	77 [125
PDP	34.208	116.929	6/28/1992	170556.3	8.0	4.60	0.005	II	77 [124
PDP	34.294	116.453	6/28/1992	173121.5	8.0	4.10	0.007	II	49 [80
PDP	34.183	116.802	6/28/1992	192637.6	8.0	4.00	0.004	I	71 [114
PDP	34.085	116.417	6/28/1992	211316.0	8.0	4.60	0.008	III	54 [87
PDP	34.163	116.450	6/28/1992	224822.0	8.0	4.10	0.007	II	53 [85
PDG	34.501	116.627	6/29/1992	015807.6	8.0	4.10	0.006	II	57 [91
PDP	34.239	116.443	6/29/1992	030156.4	8.0	4.20	0.008	II	50 [81
PDP	35.362	116.800	6/29/1992	033626.8	8.0	4.00	0.003	I	88 [141
PDP	34.988	117.213	6/29/1992	041642.0	8.0	4.00	0.002	-	95 [153
PDG	34.156	116.372	6/29/1992	103657.7	8.0	4.00	0.007	II	49 [79
PDP	34.106	116.402	6/29/1992	140837.7	8.0	4.90	0.010	III	53 [85

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (GMT) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
PDP	34.108	116.404	6/29/1992	141338.8	8.0	5.40	0.014	III	53 [85]
PDP	34.120	116.998	6/29/1992	144126.0	8.0	4.40	0.004	I	83 [133]
PDP	33.876	116.267	6/29/1992	160142.8	8.0	5.20	0.011	III	58 [93]
PDP	34.250	116.719	6/29/1992	164141.9	8.0	4.90	0.007	II	65 [104]
PDP	34.127	116.397	6/30/1992	000608.5	8.0	4.10	0.007	II	52 [83]
PDP	34.004	116.361	6/30/1992	143811.6	8.0	4.80	0.009	III	55 [89]
PDP	34.171	116.409	6/30/1992	151905.0	8.0	4.00	0.007	II	51 [82]
PDP	34.644	116.656	6/30/1992	172629.7	8.0	4.30	0.006	II	59 [94]
PDP	34.643	116.653	6/30/1992	200025.4	8.0	4.10	0.006	II	59 [94]
PDP	34.130	116.734	6/30/1992	212254.4	8.0	4.70	0.006	II	69 [110]
PDP	34.085	116.989	6/30/1992	214900.3	8.0	4.20	0.003	I	83 [134]
PDP	34.097	116.382	7/ 1/1992	070149.2	8.0	4.30	0.008	II	52 [84]
PDP	34.332	116.462	7/ 1/1992	074029.9	8.0	5.20	0.014	III	49 [79]
PDP	34.971	116.937	7/ 1/1992	102947.8	8.0	4.20	0.004	I	80 [129]
PDP	34.973	116.936	7/ 1/1992	103252.3	8.0	4.10	0.003	I	80 [129]
PDP	34.274	116.692	7/ 1/1992	170715.1	8.0	4.20	0.005	II	63 [101]
PDP	34.275	116.730	7/ 1/1992	204617.8	8.0	4.20	0.005	II	65 [104]
PDP	34.281	116.731	7/ 1/1992	205356.8	8.0	4.00	0.005	II	65 [104]
PDP	35.030	116.968	7/ 5/1992	105543.3	8.0	4.60	0.004	I	83 [134]
PDP	34.298	116.804	7/ 5/1992	200303.1	8.0	4.00	0.004	I	69 [110]
PDP	34.583	116.319	7/ 5/1992	211827.1	8.0	5.50	0.022	IV	39 [63]
PDP	34.583	116.304	7/ 5/1992	223345.5	8.0	4.30	0.012	III	38 [62]
PDP	34.092	116.369	7/ 6/1992	120059.2	8.0	4.40	0.008	III	52 [83]
PDP	34.082	116.378	7/ 6/1992	194137.9	8.0	4.30	0.008	II	53 [85]
PDG	34.069	116.382	7/ 7/1992	082103.1	8.0	4.00	0.006	II	53 [86]
PDG	34.342	116.467	7/ 7/1992	220928.3	8.0	4.10	0.008	II	49 [79]
PDP	34.576	116.336	7/ 8/1992	022311.3	8.0	4.70	0.014	IV	40 [65]
PDP	34.605	116.351	7/ 8/1992	080538.7	8.0	4.10	0.010	III	41 [66]
PDP	34.239	116.837	7/ 9/1992	014357.6	8.0	5.30	0.008	II	71 [115]
PDP	34.232	116.846	7/10/1992	012940.0	8.0	4.10	0.004	I	72 [116]
PDP	34.971	116.939	7/20/1992	044801.5	8.0	4.40	0.004	I	80 [129]
PDP	34.992	116.948	7/20/1992	131319.4	8.0	4.50	0.004	I	81 [131]
PDP	33.902	116.284	7/24/1992	181436.2	8.0	4.70	0.008	III	57 [92]
PDP	33.937	116.306	7/25/1992	043160.0	8.0	4.70	0.008	III	56 [90]
PDP	34.112	116.415	7/28/1992	182703.9	8.0	4.30	0.007	II	53 [85]

****

-END OF SEARCH- 537 RECORDS FOUND

COMPUTER TIME REQUIRED FOR EARTHQUAKE SEARCH: 7.0 minutes

MAXIMUM SITE ACCELERATION DURING TIME PERIOD 1800 TO 1992: 0.063g

MAXIMUM SITE INTENSITY (MM) DURING TIME PERIOD 1800 TO 1992: VI

MAXIMUM MAGNITUDE ENCOUNTERED IN SEARCH: 7.50

NEAREST HISTORICAL EARTHQUAKE WAS ABOUT 16 MILES AWAY FROM SITE.

NUMBER OF YEARS REPRESENTED BY SEARCH: 193 years

RESULTS OF PROBABILITY ANALYSES

TIME PERIOD OF SEARCH: 1800 TO 1992
LENGTH OF SEARCH TIME: 193 years
ATTENUATION RELATION: 6) Joyner & Boore (1982) Horiz. - Random
*** TIME PERIOD OF EXPOSURE FOR PROBABILITY: 150 years

PROBABILITY OF EXCEEDANCE FOR ACCELERATION

ACC. g	NO.OF TIMES EXCED	AVE. OCCUR. #/yr	RECURR. INTERV. years	COMPUTED PROBABILITY OF EXCEEDANCE in 0.5 yr	in 1 yr	in 10 yr	in 50 yr	in 75 yr	in 100 yr	in *** yr
0.01	67	0.347	2.881	0.1593	0.2933	0.9689	1.0000	1.0000	1.0000	1.0000
0.02	9	0.047	21.444	0.0230	0.0456	0.3727	0.9029	0.9697	0.9906	0.9991
0.03	4	0.021	48.250	0.0103	0.0205	0.1872	0.6452	0.7887	0.8741	0.9553
0.04	2	0.010	96.500	0.0052	0.0103	0.0984	0.4044	0.5403	0.6452	0.7887
0.05	2	0.010	96.500	0.0052	0.0103	0.0984	0.4044	0.5403	0.6452	0.7887
0.06	1	0.005	193.000	0.0026	0.0052	0.0505	0.2282	0.3220	0.4044	0.5403

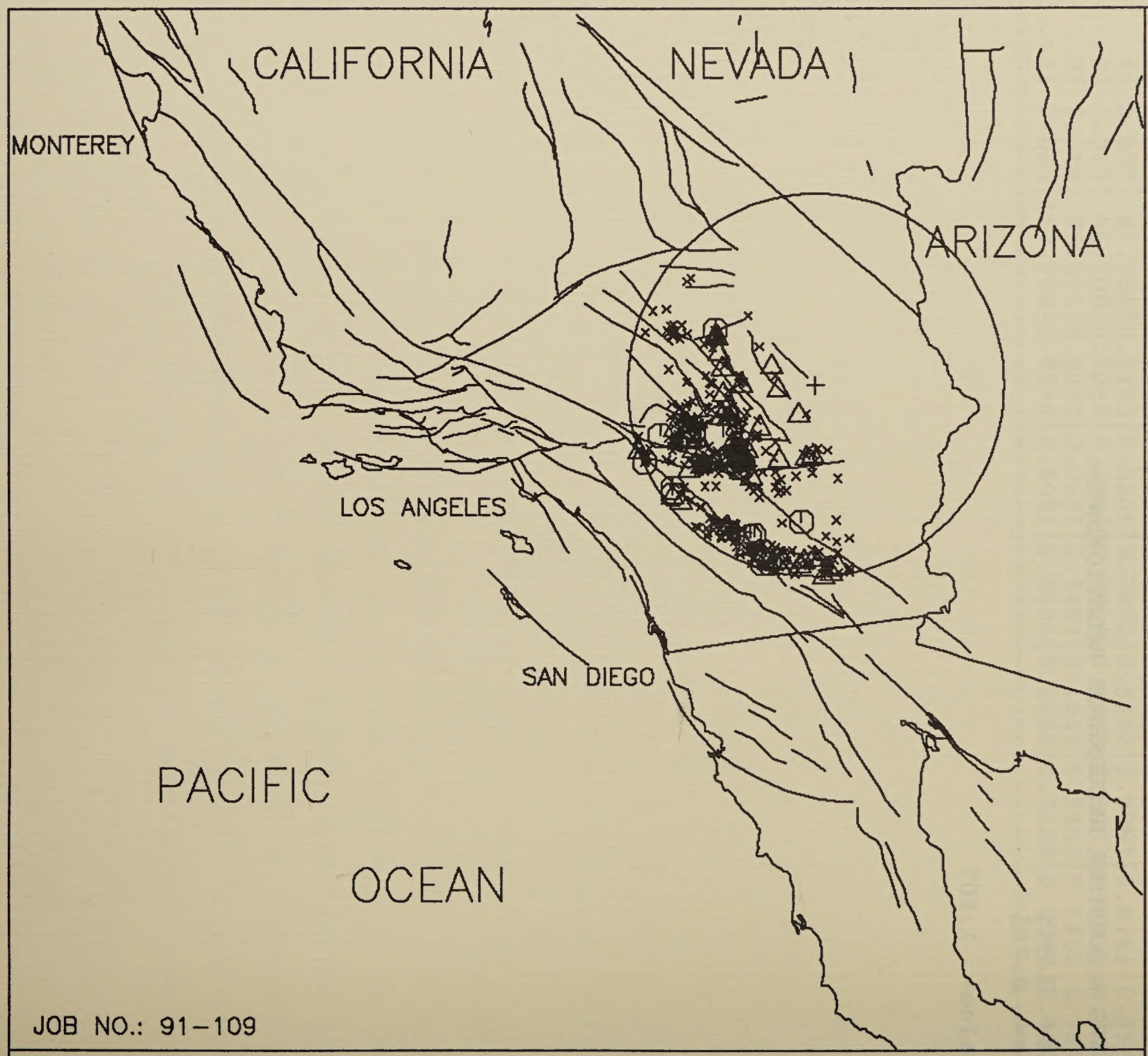
PROBABILITY OF EXCEEDANCE FOR MAGNITUDE

MAG.	NO.OF TIMES EXCED	AVE. OCCUR. #/yr	RECURR. INTERV. years	COMPUTED PROBABILITY OF EXCEEDANCE in 0.5 yr	in 1 yr	in 10 yr	in 50 yr	in 75 yr	in 100 yr	in *** yr
4.00	537	2.782	0.359	0.7512	0.9381	1.0000	1.0000	1.0000	1.0000	1.0000
4.50	196	1.016	0.985	0.3982	0.6378	1.0000	1.0000	1.0000	1.0000	1.0000
5.00	73	0.378	2.644	0.1723	0.3149	0.9772	1.0000	1.0000	1.0000	1.0000
5.50	30	0.155	6.433	0.0748	0.1440	0.7887	0.9996	1.0000	1.0000	1.0000
6.00	15	0.078	12.867	0.0381	0.0748	0.5403	0.9795	0.9971	0.9996	1.0000
6.50	5	0.026	38.600	0.0129	0.0256	0.2282	0.7262	0.8567	0.9250	0.9795
7.00	1	0.005	193.000	0.0026	0.0052	0.0505	0.2282	0.3220	0.4044	0.5403
7.50	1	0.005	193.000	0.0026	0.0052	0.0505	0.2282	0.3220	0.4044	0.5403

GUTENBERG & RICHTER RECURRENCE RELATIONSHIP:

a-value= 3.545
b-value= 0.785

beta-value= 1.807



N

0 50 100

SCALE
(Miles)

EXPLANATION

M = 8.0 +

M = 7.0–7.9

M = 6.0–6.9

M = 5.0–5.9

M = 4.0–4.9

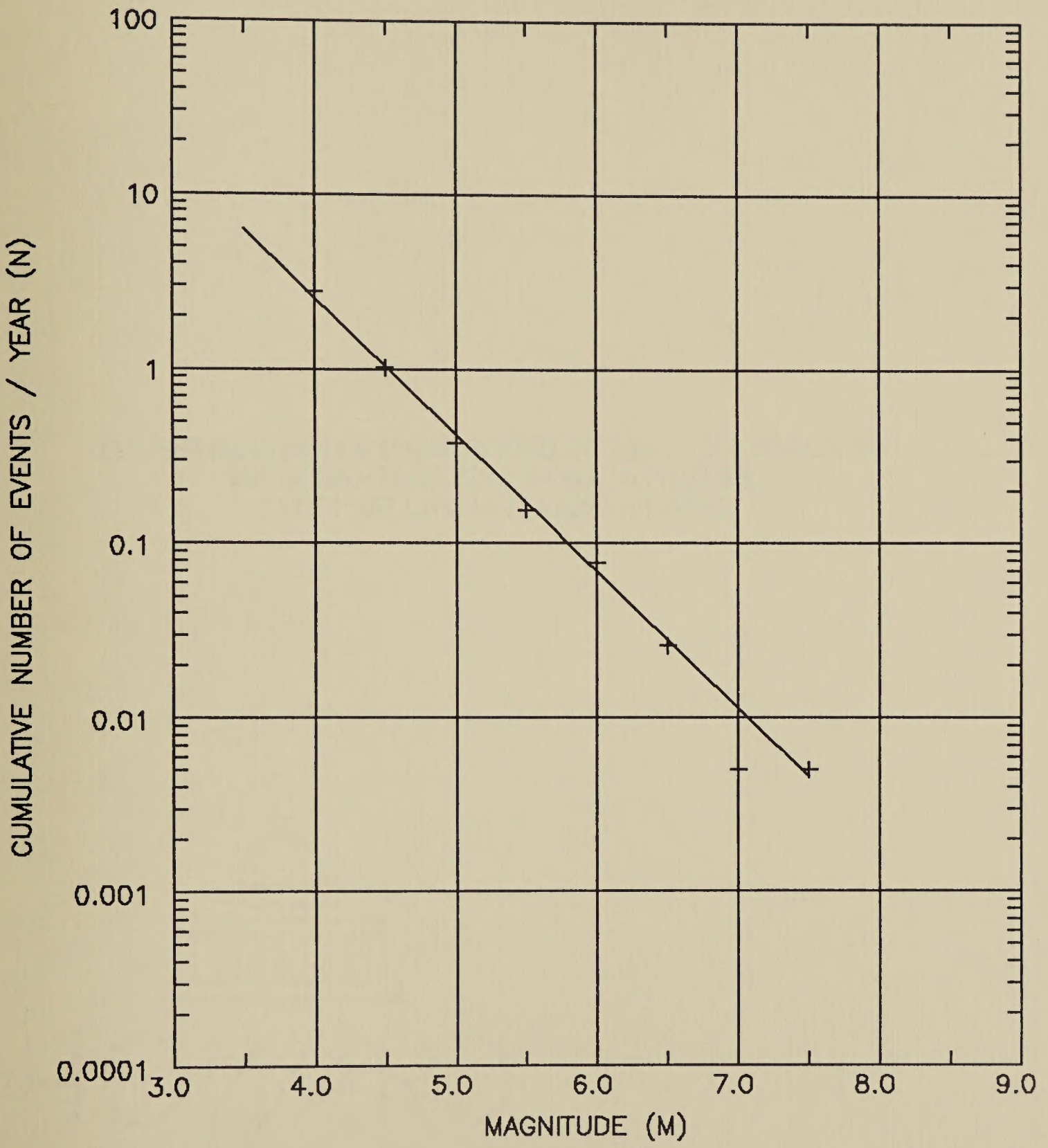
SITE LOCATION (+):

Latitude – 34.5290 N
Longitude – 115.6330 W

JOB NO.: 91–109

HISTORICAL EARTHQUAKES 1800 TO 1992

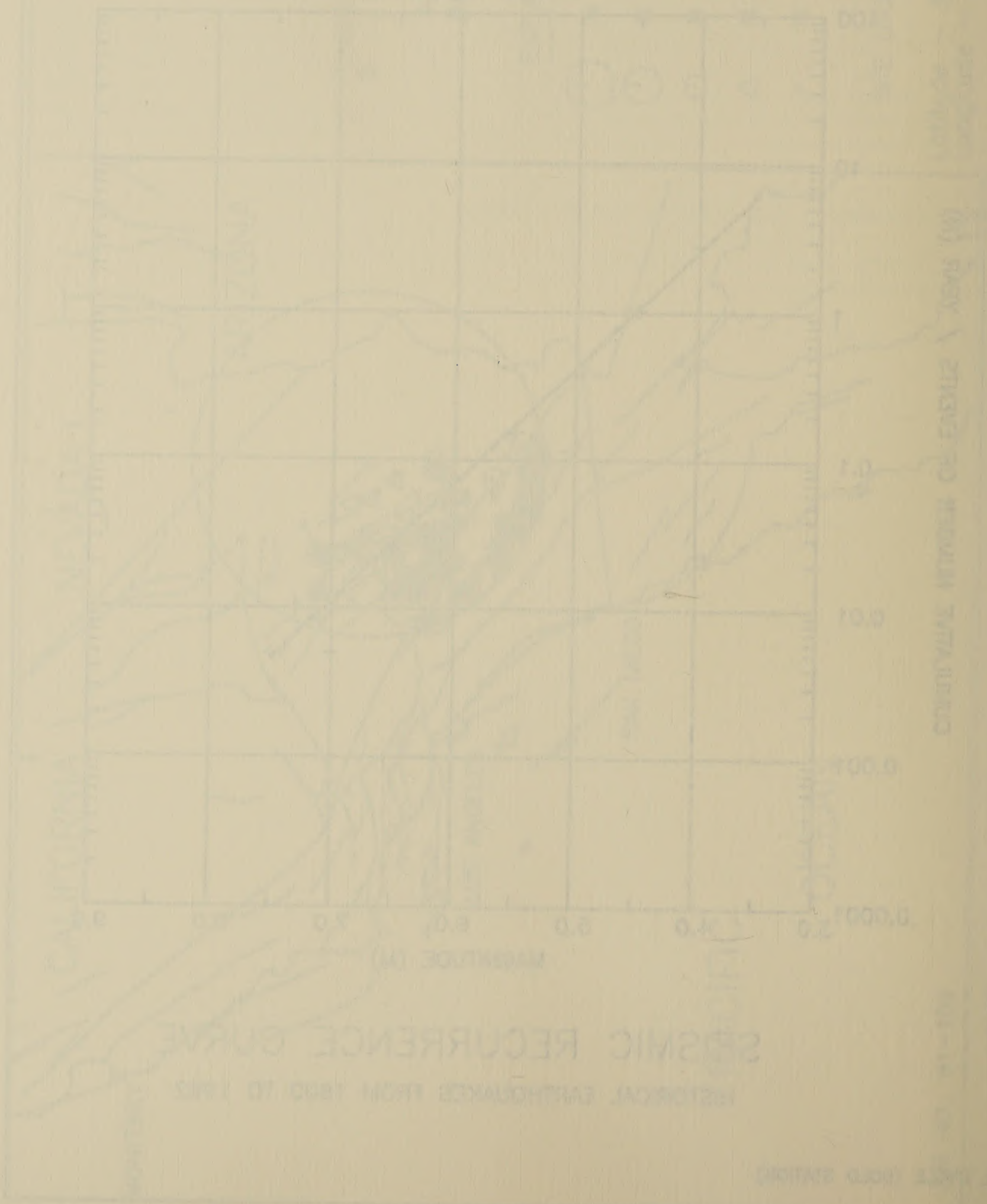
LOG N = 3.545 − 0.785M



SEISMIC RECURRENCE CURVE

HISTORICAL EARTHQUAKES FROM 1800 TO 1992

RAIL CYCLE (BOLO STATION)



C.3 ESTIMATION OF PEAK HORIZONTAL ACCELERATION FROM DIGITIZED CALIFORNIA FAULTS CADIZ VALLEY ALTERNATIVE SITE

DATE: Friday, October 2, 1992

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**************************************
*                                    *
*          E Q S E A R C H           *
*                                    *
*             Ver. 2.00              *
*                                    *
*                                    *
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(Estimation of Peak Horizontal Acceleration
From California Earthquake Catalogs)

SEARCH PERFORMED FOR: ENVIRONMENTAL SOLUTIONS

JOB NUMBER: 91-109

JOB NAME: RAIL CYCLE (CADIZ VALLEY)

SITE COORDINATES:
LATITUDE: 34.442 N
LONGITUDE: 115.421 W

TYPE OF SEARCH: RADIUS
SEARCH RADIUS: 100 mi

SEARCH MAGNITUDES: 4.0 TO 9.0

SEARCH DATES: 1800 TO 1992

ATTENUATION RELATION: 6) Joyner & Boore (1982) Horiz. - Random

UNCERTAINTY (M=Mean, S=Mean+1-Sigma): M

SCOND: 0

FAULT TYPE ASSUMED (DS=Reverse, SS=Strike-Slip): DS

COMPUTE PEAK HORIZONTAL ACCELERATION

EARTHQUAKE-DATA FILE USED: ALLQUAKE.DAT

TIME PERIOD OF EXPOSURE FOR STATISTICAL COMPARISON: 150 years

SOURCE OF DEPTH VALUES (A=Attenuation File, E=Earthquake Catalog): A

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (GMT) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANC mi [km
T-A	33.500	115.820	5/ 0/1868	0 0 0.0	8.0	6.30	0.014	IV	69 [11
DMG	34.100	116.700	2/ 7/1889	520 0.0	8.0	5.30	0.007	II	77 [12
DMG	33.400	116.300	2/ 9/1890	12 6 0.0	8.0	6.30	0.009	III	88 [14
DMG	33.200	116.200	5/28/1892	1115 0.0	8.0	6.30	0.008	II	97 [15
DMG	34.200	117.100	9/20/1907	154 0.0	8.0	6.00	0.006	II	97 [15
MGI	33.000	115.500	3/23/1908	1357 0.0	8.0	4.60	0.003	I	100 [16
MGI	33.250	115.500	12/27/1910	1715 0.0	8.0	4.60	0.004	I	82 [13
DMG	33.800	116.700	8/11/1911	1820 0.0	8.0	4.00	0.003	I	85 [13
DMG	33.800	116.700	8/11/1911	2340 0.0	8.0	4.50	0.004	I	85 [13
MGI	33.000	115.500	4/28/1915	310 0.0	8.0	4.00	0.002	-	100 [16
MGI	33.000	115.500	4/30/1915	820 0.0	8.0	4.00	0.002	-	100 [16
MGI	34.200	116.900	10/10/1915	5 6 0.0	8.0	4.00	0.003	I	86 [13
MGI	34.300	116.900	12/ 1/1915	14 5 0.0	8.0	4.00	0.003	I	85 [13
DMG	34.700	117.000	7/16/1916	1150 0.0	8.0	4.50	0.003	I	92 [14
DMG	34.700	117.000	7/16/1916	1230 0.0	8.0	4.00	0.003	-	92 [14
DMG	33.500	116.500	9/30/1916	211 0.0	8.0	5.00	0.004	I	90 [14
MGI	33.500	116.000	9/30/1916	425 0.0	8.0	4.00	0.004	I	73 [11
MGI	33.000	115.500	5/27/1917	930 0.0	8.0	4.00	0.002	-	100 [16
MGI	33.000	115.500	5/31/1917	210 0.0	8.0	4.60	0.003	I	100 [16
MGI	33.700	116.200	8/12/1917	11 0 0.0	8.0	4.00	0.004	I	68 [10
MGI	33.750	116.250	11/19/1917	1730 0.0	8.0	4.00	0.004	I	67 [10
DMG	33.000	115.500	12/20/1917	825 0.0	8.0	4.00	0.002	-	100 [16
MGI	33.800	116.900	4/23/1918	1415 0.0	8.0	4.00	0.002	-	95 [15
MGI	33.800	116.900	4/29/1918	2 0 0.0	8.0	4.00	0.002	-	95 [15
MGI	33.100	115.500	5/11/1918	8 5 0.0	8.0	4.60	0.003	I	93 [14
MGI	33.800	116.900	6/14/1918	1024 0.0	8.0	4.00	0.002	-	95 [15
DMG	33.400	116.500	10/11/1918	4 0 0.0	8.0	4.00	0.002	-	95 [15
MGI	33.800	116.900	12/18/1920	1726 0.0	8.0	4.00	0.002	-	95 [15
MGI	33.000	115.500	12/20/1920	529 0.0	8.0	4.00	0.002	-	100 [16
DMG	33.000	115.500	12/20/1920	1447 0.0	8.0	4.50	0.003	I	100 [16
DMG	33.000	115.500	12/21/1920	1452 0.0	8.0	4.50	0.003	I	100 [16
DMG	34.000	117.000	6/30/1923	022 0.0	8.0	4.50	0.003	I	95 [15
T-A	33.000	115.500	10/23/1924	739 0.0	8.0	4.30	0.003	-	100 [16
MGI	33.000	115.500	10/24/1924	739 0.0	8.0	4.60	0.003	I	100 [16
MGI	33.000	115.500	8/31/1925	1 7 0.0	8.0	4.00	0.002	-	100 [16
DMG	34.000	116.000	4/ 3/1926	20 8 0.0	8.0	5.50	0.018	IV	45 [72
DMG	34.000	116.000	9/ 5/1928	1442 0.0	8.0	5.00	0.014	IV	45 [72
DMG	34.830	116.520	9/26/1929	20 022.7	8.0	5.10	0.008	II	68 [10
DMG	34.180	116.920	1/16/1930	02433.9	8.0	5.20	0.005	II	87 [14
DMG	34.180	116.920	1/16/1930	034 3.6	8.0	5.10	0.005	II	87 [14
DMG	33.000	115.500	2/26/1930	230 0.0	8.0	5.00	0.004	I	100 [16
DMG	33.000	115.500	3/ 1/1930	23 5 0.0	8.0	4.50	0.003	I	100 [16
DMG	33.000	115.500	3/ 1/1930	2344 0.0	8.0	4.50	0.003	I	100 [16
DMG	33.000	115.500	3/ 2/1930	150 0.0	8.0	4.50	0.003	I	100 [16
DMG	33.200	116.300	5/12/1930	414 0.0	8.0	4.00	0.002	-	99 [16
DMG	34.350	116.280	4/27/1931	23 758.6	8.0	4.00	0.007	II	49 [79
DMG	33.800	116.600	9/10/1931	436 0.0	8.0	4.00	0.003	I	81 [13
DMG	34.417	116.850	2/11/1932	231120.0	8.0	4.00	0.003	I	81 [13
DMG	34.933	116.883	4/27/1932	233518.3	8.0	4.00	0.003	I	90 [14
DMG	34.850	116.583	7/30/1932	71359.7	8.0	4.50	0.005	II	72 [11
DMG	33.917	116.750	1/25/1933	1444 0.0	8.0	4.00	0.003	I	84 [13
DMG	33.500	115.500	5/19/1933	162638.0	8.0	4.30	0.005	II	65 [10
DMG	33.333	116.300	8/ 5/1933	2331 0.0	8.0	4.40	0.003	I	92 [14
DMG	33.333	116.300	8/ 6/1933	332 0.0	8.0	4.70	0.004	I	92 [14

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (GMT) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	33.000	115.500	10/30/1933	1059 0.0	8.0	4.20	0.002	-	100 [160]
DMG	34.083	116.467	1/26/1934	1844 0.0	8.0	4.00	0.005	II	65 [104]
DMG	33.467	116.633	2/20/1934	1035 0.0	8.0	4.00	0.002	-	97 [156]
DMG	33.083	115.983	3/ 2/1934	2130 0.0	8.0	4.50	0.003	I	99 [160]
DMG	35.083	116.233	4/13/1934	1055 0.0	8.0	4.00	0.005	II	64 [103]
DMG	34.100	116.800	10/24/1935	1448 7.6	8.0	5.10	0.006	II	82 [132]
DMG	34.100	116.883	10/24/1935	1451 0.0	8.0	4.50	0.004	I	87 [140]
DMG	34.100	116.883	10/24/1935	1452 0.0	8.0	4.50	0.004	I	87 [140]
DMG	34.100	116.883	10/24/1935	1527 0.0	8.0	4.00	0.003	I	87 [140]
DMG	33.167	115.500	12/20/1935	745 0.0	8.0	5.00	0.005	II	88 [142]
DMG	33.333	115.500	1/ 2/1936	354 0.0	8.0	4.00	0.003	I	77 [123]
DMG	33.133	116.083	5/ 7/1936	1147 0.0	8.0	4.50	0.003	I	98 [158]
DMG	33.783	116.283	3/ 4/1937	16 4 0.0	8.0	4.00	0.004	I	67 [108]
DMG	33.408	116.261	3/25/1937	1649 1.8	8.0	6.00	0.008	III	86 [139]
DMG	33.426	116.421	3/25/1937	20 4 8.3	8.0	4.00	0.003	-	91 [146]
DMG	33.368	116.444	3/25/1937	232026.7	8.0	4.00	0.002	-	95 [152]
DMG	33.467	116.583	3/26/1937	2124 0.0	8.0	4.00	0.002	-	95 [152]
DMG	33.467	116.583	3/27/1937	528 0.0	8.0	4.00	0.002	-	95 [152]
DMG	33.467	116.583	3/27/1937	742 0.0	8.0	4.50	0.003	I	95 [152]
DMG	33.420	116.490	3/29/1937	17 316.8	8.0	4.00	0.002	-	93 [150]
DMG	34.578	116.603	6/ 1/1937	154144.3	8.0	4.00	0.004	I	68 [109]
DMG	33.167	116.167	11/16/1937	1057 0.0	8.0	4.00	0.002	-	98 [158]
DMG	33.083	115.983	12/15/1937	958 0.0	8.0	4.00	0.002	-	99 [160]
DMG	33.467	116.583	1/ 4/1938	029 0.0	8.0	4.50	0.003	I	95 [152]
DMG	34.050	116.433	2/ 8/1938	739 0.0	8.0	4.00	0.005	II	64 [103]
DMG	34.174	116.257	2/15/1938	74539.8	8.0	4.50	0.009	III	51 [82]
DMG	34.750	116.467	3/31/1938	17 3 0.0	8.0	4.00	0.005	II	63 [102]
DMG	34.133	116.950	6/10/1938	1440 0.0	8.0	4.00	0.003	I	90 [145]
DMG	33.383	115.600	6/29/1938	1040 0.0	8.0	4.00	0.004	I	74 [119]
DMG	33.933	116.750	8/ 6/1938	228 0.0	8.0	4.00	0.003	I	84 [135]
DMG	34.846	116.143	8/18/1938	73945.4	8.0	4.50	0.009	III	50 [80]
DMG	33.083	115.983	12/10/1938	312 0.0	8.0	4.00	0.002	-	99 [160]
DMG	33.467	116.433	5/12/1939	1925 2.2	8.0	4.50	0.003	I	89 [143]
DMG	33.383	115.600	12/31/1939	151243.0	8.0	4.00	0.004	I	74 [119]
DMG	33.300	116.300	1/ 4/1940	8 711.0	8.0	4.00	0.002	-	94 [151]
DMG	34.017	117.050	2/19/1940	12 655.7	8.0	4.60	0.003	I	98 [157]
DMG	33.133	116.083	2/28/1940	1728 7.0	8.0	4.50	0.003	I	98 [158]
DMG	34.083	116.300	5/18/1940	5 358.5	8.0	5.40	0.012	III	56 [90]
DMG	34.067	116.333	5/18/1940	55120.2	8.0	5.20	0.010	III	58 [94]
DMG	34.067	116.317	5/18/1940	6 430.6	8.0	4.60	0.008	II	57 [92]
DMG	34.067	116.333	5/18/1940	72132.7	8.0	5.00	0.009	III	58 [94]
DMG	34.050	116.283	5/18/1940	134719.0	8.0	4.50	0.008	II	56 [90]
DMG	34.050	116.283	5/19/1940	226 2.0	8.0	4.50	0.008	II	56 [90]
DMG	34.050	116.283	5/19/1940	22730.0	8.0	4.50	0.008	II	56 [90]
DMG	34.050	116.283	5/19/1940	35145.0	8.0	4.00	0.006	II	56 [90]
DMG	34.050	116.283	5/19/1940	193941.0	8.0	4.00	0.006	II	56 [90]
DMG	34.050	116.283	5/22/1940	63137.0	8.0	4.00	0.006	II	56 [90]
DMG	34.050	116.283	5/22/1940	1410 5.0	8.0	4.00	0.006	II	56 [90]
DMG	34.050	116.283	5/27/1940	32727.0	8.0	4.00	0.006	II	56 [90]
DMG	34.083	116.333	6/ 1/1940	527 1.2	8.0	4.70	0.008	III	58 [93]
DMG	34.050	116.283	6/ 1/1940	55646.0	8.0	4.00	0.006	II	56 [90]
DMG	34.100	116.333	6/ 1/1940	65428.0	8.0	4.30	0.007	II	57 [92]
DMG	34.083	116.333	6/ 2/1940	61310.2	8.0	4.50	0.007	II	58 [93]
DMG	34.000	116.317	6/ 6/1940	222115.1	8.0	4.30	0.006	II	60 [96]
DMG	33.267	116.400	6/ 6/1940	2321 4.0	8.0	4.00	0.002	-	99 [159]
DMG	34.050	116.283	6/ 6/1940	234849.0	8.0	4.00	0.006	II	56 [90]

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (GMT) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	34.017	116.367	6/ 6/1940	235637.2	8.0	4.40	0.006	II	61 [9
DMG	34.050	116.283	6/ 8/1940	171032.0	8.0	4.00	0.006	II	56 [9
DMG	34.033	116.317	6/11/1940	195118.1	8.0	4.40	0.007	II	58 [9
DMG	34.050	116.283	6/14/1940	215850.0	8.0	4.00	0.006	II	56 [9
DMG	34.050	116.283	6/24/1940	163936.0	8.0	4.00	0.006	II	56 [9
DMG	33.083	115.983	7/13/1940	163923.0	8.0	4.00	0.002	-	99 [16
DMG	33.083	115.983	7/14/1940	0 144.0	8.0	4.00	0.002	-	99 [16
DMG	33.167	115.983	7/21/1940	836 3.0	8.0	4.40	0.003	I	94 [15
DMG	34.050	116.283	8/ 1/1940	193140.0	8.0	4.00	0.006	II	56 [9
DMG	34.050	116.283	8/ 4/1940	181520.0	8.0	4.00	0.006	II	56 [9
DMG	33.133	116.083	10/ 6/1940	181953.0	8.0	4.00	0.002	-	98 [15
DMG	33.133	116.083	10/16/1940	175213.0	8.0	4.00	0.002	-	98 [15
DMG	33.500	116.483	2/23/1941	183614.0	8.0	4.50	0.003	I	89 [14
DMG	34.400	116.917	1/25/1942	215133.0	8.0	4.00	0.003	I	85 [13
DMG	34.400	116.917	2/ 1/1942	151555.0	8.0	4.00	0.003	I	85 [13
DMG	34.400	116.917	2/ 1/1942	151828.0	8.0	4.50	0.004	I	85 [13
DMG	34.400	116.917	2/ 1/1942	16 334.0	8.0	4.50	0.004	I	85 [13
DMG	34.333	117.000	2/27/1942	1 853.0	8.0	4.00	0.003	-	90 [14
DMG	34.083	116.467	3/ 1/1942	104631.0	8.0	4.00	0.005	II	65 [10
DMG	34.000	115.750	3/ 3/1942	1 324.0	8.0	5.00	0.019	IV	36 [5
DMG	34.000	115.750	3/ 4/1942	11 212.0	8.0	4.00	0.011	III	36 [5
DMG	33.200	116.233	4/ 5/1942	92039.0	8.0	4.00	0.002	-	98 [15
DMG	33.950	116.733	4/26/1942	151023.0	8.0	4.00	0.003	I	82 [13
DMG	34.450	116.783	5/22/1942	151829.0	8.0	4.00	0.003	I	78 [12
DMG	33.333	116.233	6/ 9/1942	5 633.0	8.0	4.00	0.003	I	90 [14
DMG	33.233	115.833	6/14/1942	213623.0	8.0	4.00	0.003	I	87 [14
DMG	33.233	115.833	6/14/1942	222549.0	8.0	4.00	0.003	I	87 [14
DMG	33.233	115.833	6/24/1942	235240.0	8.0	4.00	0.003	I	87 [14
DMG	34.300	116.417	8/ 7/1942	11533.0	8.0	4.50	0.007	II	58 [9
DMG	34.300	116.417	8/ 7/1942	12358.0	8.0	4.00	0.006	II	58 [9
DMG	34.300	116.417	8/ 7/1942	15314.0	8.0	4.00	0.006	II	58 [9
DMG	34.117	116.750	8/22/1942	125913.0	8.0	4.00	0.003	I	79 [12
DMG	34.350	116.283	9/20/1942	161414.0	8.0	4.00	0.007	II	50 [8
DMG	33.533	116.633	9/21/1942	7 754.0	8.0	4.00	0.002	-	94 [15
DMG	33.233	115.717	10/22/1942	15038.0	8.0	5.50	0.006	II	85 [13
DMG	33.233	115.717	10/26/1942	3 215.0	8.0	4.50	0.004	I	85 [13
DMG	33.233	115.717	10/26/1942	34316.0	8.0	4.00	0.003	I	85 [13
DMG	33.233	115.717	10/26/1942	615 4.0	8.0	4.50	0.004	I	85 [13
DMG	34.617	116.000	11/ 9/1942	203425.0	8.0	4.50	0.015	IV	35 [5
DMG	33.200	115.600	11/12/1942	175612.0	8.0	4.00	0.003	I	86 [13
DMG	33.417	116.417	1/ 2/1943	141118.0	8.0	4.50	0.003	I	91 [14
DMG	33.333	116.100	6/12/1943	192141.0	8.0	4.00	0.003	I	86 [13
DMG	33.117	116.117	6/18/1943	161546.0	8.0	4.50	0.003	I	100 [16
DMG	34.267	116.967	8/29/1943	34513.0	8.0	5.50	0.006	II	89 [14
DMG	34.267	116.967	8/29/1943	35754.0	8.0	4.00	0.003	I	89 [14
DMG	34.267	116.967	8/29/1943	51630.0	8.0	4.00	0.003	I	89 [14
DMG	34.333	116.883	10/14/1943	142844.0	8.0	4.50	0.004	I	84 [13
DMG	34.350	116.867	10/15/1943	1650 1.0	8.0	4.50	0.004	I	83 [13
DMG	33.783	116.200	10/31/1943	131210.0	8.0	4.50	0.006	II	64 [10
DMG	33.917	116.700	11/17/1943	112841.0	8.0	4.50	0.004	I	82 [13
DMG	34.333	115.800	12/22/1943	155028.0	8.0	5.50	0.043	VI	23 [3
DMG	34.000	116.383	5/ 5/1944	134715.0	8.0	4.00	0.005	II	63 [10
DMG	34.014	116.771	6/10/1944	111150.5	8.0	4.50	0.004	I	83 [13
DMG	33.973	116.769	6/10/1944	111531.9	8.0	4.00	0.003	I	84 [13
DMG	33.976	116.721	6/12/1944	104534.7	8.0	5.10	0.006	II	81 [13
DMG	33.994	116.712	6/12/1944	111636.0	8.0	5.30	0.006	II	80 [12

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (GMT) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	33.981	116.702	6/12/1944	222119.5	8.0	4.20	0.004	I	80 [128]
DMG	34.000	116.700	8/25/1944	73025.0	8.0	4.20	0.004	I	79 [127]
DMG	33.317	116.067	9/ 4/1944	125528.0	8.0	4.10	0.003	I	86 [138]
DMG	33.283	116.183	10/26/1944	225410.0	8.0	4.20	0.003	I	91 [147]
DMG	33.933	116:750	10/28/1944	183016.0	8.0	4.40	0.004	I	84 [135]
DMG	34.250	116.167	3/20/1945	2155 7.0	8.0	5.00	0.014	IV	45 [72]
DMG	34.283	116.183	3/29/1945	4 417.0	8.0	4.20	0.009	III	45 [72]
DMG	34.433	116.983	4/18/1945	458 2.0	8.0	4.30	0.003	I	89 [143]
DMG	33.217	116.133	8/15/1945	175624.0	8.0	5.70	0.006	II	94 [151]
DMG	33.967	116.800	9/ 7/1945	153424.0	8.0	4.30	0.003	I	85 [137]
DMG	33.867	115.700	4/28/1946	173123.0	8.0	4.40	0.011	III	43 [69]
DMG	33.917	115.700	6/ 4/1946	12 524.0	8.0	4.80	0.015	IV	40 [64]
DMG	34.533	115.983	7/18/1946	142758.0	8.0	5.60	0.030	V	33 [52]
DMG	33.917	116.250	8/15/1946	19 1 8.0	8.0	4.00	0.005	II	60 [96]
DMG	33.233	115.700	8/30/1946	111645.0	8.0	4.60	0.004	I	85 [137]
DMG	33.950	116.850	9/28/1946	719 9.0	8.0	5.00	0.005	II	88 [142]
DMG	34.983	116.550	4/10/1947	1558 6.0	8.0	6.20	0.012	III	74 [119]
DMG	34.967	116.550	4/10/1947	16 3 0.0	8.0	5.10	0.007	II	74 [118]
DMG	34.933	116.517	4/10/1947	171218.0	8.0	4.40	0.005	II	71 [114]
DMG	34.967	116.550	4/10/1947	1713 0.0	8.0	4.30	0.004	I	74 [118]
DMG	34.950	116.533	4/10/1947	171822.0	8.0	5.00	0.007	II	72 [116]
DMG	34.967	116.550	4/10/1947	182759.0	8.0	4.30	0.004	I	74 [118]
DMG	34.933	116.517	4/10/1947	222723.0	8.0	4.20	0.004	I	71 [114]
DMG	34.950	116.533	4/11/1947	2 711.0	8.0	4.10	0.004	I	72 [116]
DMG	34.933	116.517	4/11/1947	33210.0	8.0	4.30	0.005	II	71 [114]
DMG	34.967	116.550	4/11/1947	747 0.0	8.0	5.00	0.006	II	74 [118]
DMG	34.933	116.517	4/11/1947	184340.0	8.0	4.10	0.004	I	71 [114]
DMG	34.933	116.517	4/12/1947	18 434.0	8.0	4.00	0.004	I	71 [114]
DMG	34.933	116.517	4/12/1947	234852.0	8.0	4.20	0.004	I	71 [114]
DMG	34.967	116.550	4/19/1947	229 9.0	8.0	4.70	0.005	II	74 [118]
DMG	34.933	116.517	4/21/1947	191529.0	8.0	4.40	0.005	II	71 [114]
DMG	34.933	116.550	5/ 4/1947	25039.0	8.0	4.00	0.004	I	73 [117]
DMG	34.233	116.333	5/11/1947	5 620.0	8.0	4.90	0.010	III	54 [87]
DMG	34.933	116.517	5/22/1947	439 0.0	8.0	4.00	0.004	I	71 [114]
DMG	34.017	116.500	7/24/1947	221046.0	8.0	5.50	0.009	III	68 [110]
DMG	34.017	116.500	7/24/1947	225341.0	8.0	4.30	0.005	II	68 [110]
DMG	34.017	116.500	7/24/1947	225426.0	8.0	4.90	0.007	II	68 [110]
DMG	34.017	116.500	7/25/1947	04631.0	8.0	5.00	0.007	II	68 [110]
DMG	34.017	116.500	7/25/1947	15647.0	8.0	4.60	0.006	II	68 [110]
DMG	34.017	116.500	7/25/1947	51752.0	8.0	4.30	0.005	II	68 [110]
DMG	34.017	116.500	7/25/1947	61949.0	8.0	5.20	0.008	III	68 [110]
DMG	34.017	116.500	7/25/1947	75730.0	8.0	4.20	0.005	II	68 [110]
DMG	34.017	116.500	7/25/1947	161453.0	8.0	4.50	0.006	II	68 [110]
DMG	34.017	116.500	7/26/1947	12415.0	8.0	4.20	0.005	II	68 [110]
DMG	34.017	116.500	7/26/1947	24941.0	8.0	5.10	0.008	II	68 [110]
DMG	34.017	116.500	7/26/1947	23 425.0	8.0	4.50	0.006	II	68 [110]
DMG	34.017	116.500	7/26/1947	231351.0	8.0	4.10	0.005	I	68 [110]
DMG	34.017	116.500	7/29/1947	163615.0	8.0	4.20	0.005	II	68 [110]
DMG	34.017	116.500	7/30/1947	52217.0	8.0	4.20	0.005	II	68 [110]
DMG	35.000	117.000	8/ 1/1947	154230.0	8.0	4.00	0.002	-	98 [157]
DMG	34.017	116.500	8/ 1/1947	17 137.0	8.0	4.10	0.005	I	68 [110]
DMG	34.017	116.500	8/ 8/1947	64745.0	8.0	4.00	0.004	I	68 [110]
DMG	35.037	116.940	8/13/1947	20 9 0.1	8.0	4.30	0.003	I	95 [154]
DMG	34.400	116.417	11/10/1947	22255.0	8.0	4.50	0.007	II	57 [91]
DMG	34.983	116.550	11/17/1947	14 710.0	8.0	4.30	0.004	I	74 [119]
DMG	34.967	116.933	12/30/1947	191914.0	8.0	4.00	0.002	-	93 [150]

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (GMT) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	35.033	116.867	11/10/1948	235613.0	8.0	4.10	0.003	I	92 [147
DMG	33.933	116.383	12/ 4/1948	234317.0	8.0	6.50	0.017	IV	65 [105
DMG	33.933	116.367	12/ 5/1948	0 721.0	8.0	4.90	0.008	II	64 [104
DMG	33.933	116.350	12/ 5/1948	04032.0	8.0	4.40	0.006	II	64 [102
DMG	33.967	116.433	12/ 5/1948	04235.0	8.0	4.60	0.006	II	66 [107
DMG	34.000	116.467	12/ 5/1948	05057.0	8.0	4.40	0.005	II	67 [108
DMG	34.000	116.467	12/ 6/1948	246 8.0	8.0	4.30	0.005	II	67 [108
DMG	33.933	116.400	12/10/1948	204257.0	8.0	4.40	0.006	II	66 [106
DMG	33.967	116.450	12/11/1948	161220.0	8.0	4.50	0.006	II	67 [108
DMG	34.950	116.950	12/18/1948	234517.0	8.0	4.40	0.003	I	94 [151
DMG	34.000	116.050	12/27/1948	1119 4.0	8.0	4.00	0.008	II	47 [76
DMG	33.483	116.700	12/28/1948	125341.0	8.0	4.00	0.002	-	99 [159
DMG	34.967	116.550	1/ 3/1949	134340.0	8.0	4.80	0.006	II	74 [118
DMG	33.283	116.033	3/16/1949	18 027.0	8.0	4.00	0.003	I	87 [141
DMG	33.283	116.350	4/13/1949	75336.0	8.0	4.10	0.002	-	96 [155
DMG	34.017	115.767	5/ 2/1949	112458.0	8.0	4.60	0.016	IV	35 [57
DMG	34.017	115.683	5/ 2/1949	112547.0	8.0	5.90	0.034	V	33 [53
DMG	34.017	115.683	5/ 2/1949	143521.0	8.0	4.20	0.014	IV	33 [53
DMG	34.017	115.683	5/ 2/1949	1841 3.0	8.0	4.20	0.014	IV	33 [53
DMG	34.017	115.683	5/ 6/1949	326 6.0	8.0	4.10	0.013	III	33 [53
DMG	34.017	115.683	5/10/1949	4 633.0	8.0	4.70	0.018	IV	33 [53
DMG	34.017	115.683	5/22/1949	232127.0	8.0	4.00	0.012	III	33 [53
DMG	34.017	115.683	5/25/1949	173146.0	8.0	4.50	0.016	IV	33 [53
DMG	34.883	116.667	9/20/1949	41411.0	8.0	4.10	0.004	I	77 [124
DMG	33.959	116.651	9/23/1949	214440.1	8.0	4.00	0.003	I	78 [125
DMG	33.850	115.850	10/13/1949	42040.0	8.0	4.00	0.007	II	48 [77
DMG	33.963	116.425	1/13/1950	5 719.4	8.0	4.10	0.005	II	66 [107
DMG	33.117	115.567	7/27/1950	954 0.0	8.0	4.10	0.003	I	92 [148
DMG	33.117	115.567	7/27/1950	112926.0	8.0	4.80	0.004	I	92 [148
DMG	33.117	115.567	7/27/1950	12 2 0.0	8.0	4.20	0.003	I	92 [148
DMG	33.117	115.567	7/27/1950	2251 0.0	8.0	4.50	0.003	I	92 [148
DMG	33.117	115.567	7/28/1950	325 0.0	8.0	4.70	0.004	I	92 [148
DMG	33.117	115.567	7/28/1950	1624 0.0	8.0	4.00	0.003	-	92 [148
DMG	33.117	115.567	7/28/1950	1727 0.0	8.0	4.70	0.004	I	92 [148
DMG	33.117	115.567	7/28/1950	1730 0.0	8.0	4.10	0.003	I	92 [148
DMG	33.117	115.567	7/28/1950	175048.0	8.0	5.40	0.005	II	92 [148
DMG	33.117	115.567	7/28/1950	175812.0	8.0	4.80	0.004	I	92 [148
DMG	33.117	115.567	7/28/1950	1817 0.0	8.0	4.20	0.003	I	92 [148
DMG	33.117	115.567	7/28/1950	1840 0.0	8.0	4.00	0.003	-	92 [148
DMG	33.117	115.567	7/28/1950	1949 0.0	8.0	4.20	0.003	I	92 [148
DMG	33.117	115.567	7/28/1950	2113 0.0	8.0	4.10	0.003	I	92 [148
DMG	33.117	115.567	7/29/1950	017 0.0	8.0	4.50	0.003	I	92 [148
DMG	33.117	115.567	7/29/1950	143632.0	8.0	5.50	0.006	II	92 [148
DMG	33.117	115.567	7/29/1950	15 9 0.0	8.0	4.50	0.003	I	92 [148
DMG	33.117	115.567	7/29/1950	1714 0.0	8.0	4.30	0.003	I	92 [148
DMG	33.117	115.567	7/29/1950	1843 0.0	8.0	4.70	0.004	I	92 [148
DMG	33.117	115.567	8/ 1/1950	83720.0	8.0	4.70	0.004	I	92 [148
DMG	34.317	116.800	8/12/1950	21717.0	8.0	4.30	0.004	I	79 [127
DMG	33.117	115.567	8/14/1950	1916 0.0	8.0	4.70	0.004	I	92 [148
DMG	34.307	116.835	8/28/1950	194526.4	8.0	4.20	0.004	I	81 [131
DMG	34.967	116.817	8/30/1950	1659 4.0	8.0	4.20	0.003	I	87 [140
DMG	33.650	116.750	9/ 5/1950	191956.0	8.0	4.80	0.004	I	94 [151
DMG	33.417	116.567	12/22/1950	2 536.0	8.0	4.00	0.002	-	97 [155
DMG	33.200	116.117	12/28/1950	52211.0	8.0	4.20	0.003	I	95 [152
DMG	33.483	116.500	2/15/1951	104759.0	8.0	4.80	0.004	I	91 [146
DMG	33.483	116.500	2/15/1951	104957.0	8.0	4.80	0.004	I	91 [146

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (GMT) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
OMG	33.283	116.033	3/29/1951	233929.0	8.0	4.40	0.003	I	87 [141]
OMG	33.267	115.667	8/10/1951	1130 8.0	8.0	4.40	0.004	I	82 [133]
OMG	33.200	116.000	8/15/1951	1227 9.0	8.0	4.00	0.003	-	92 [148]
OMG	34.167	116.983	10/16/1951	1241 5.0	8.0	4.00	0.003	-	91 [147]
OMG	33.100	115.400	12/ 5/1951	155314.0	8.0	4.50	0.003	I	93 [149]
OMG	33.958	116.346	1/ 8/1952	63427.4	8.0	4.40	0.006	II	63 [101]
OMG	33.283	115.917	3/28/1952	11622.0	8.0	4.20	0.003	I	85 [137]
OMG	33.400	116.567	2/ 4/1953	43616.0	8.0	4.30	0.003	I	97 [157]
OMG	34.050	115.633	9/11/1953	205046.0	8.0	4.20	0.016	IV	30 [48]
OMG	34.954	116.961	10/ 1/1953	193516.2	8.0	4.10	0.003	-	94 [152]
OMG	33.267	116.100	1/ 4/1954	233152.0	8.0	4.20	0.003	I	90 [145]
OMG	33.333	116.433	2/12/1954	94428.0	8.0	4.50	0.003	I	96 [155]
OMG	33.283	116.183	3/19/1954	95429.0	8.0	6.20	0.008	III	91 [147]
OMG	33.283	116.183	3/19/1954	95556.0	8.0	5.00	0.004	I	91 [147]
OMG	33.283	116.183	3/19/1954	957 7.0	8.0	4.60	0.004	I	91 [147]
OMG	33.283	116.183	3/19/1954	95748.0	8.0	4.00	0.003	-	91 [147]
OMG	33.283	116.183	3/19/1954	10 139.0	8.0	4.20	0.003	I	91 [147]
OMG	33.283	116.183	3/19/1954	101522.0	8.0	4.50	0.003	I	91 [147]
OMG	33.283	116.183	3/19/1954	101957.0	8.0	4.50	0.003	I	91 [147]
OMG	33.283	116.183	3/19/1954	102117.0	8.0	5.50	0.006	II	91 [147]
OMG	33.283	116.183	3/19/1954	102610.0	8.0	4.00	0.003	-	91 [147]
OMG	33.283	116.183	3/19/1954	13 8 4.0	8.0	4.30	0.003	I	91 [147]
OMG	33.283	116.183	3/19/1954	14 057.0	8.0	4.10	0.003	I	91 [147]
OMG	33.283	116.183	3/19/1954	143750.0	8.0	4.00	0.003	-	91 [147]
OMG	33.283	116.183	3/20/1954	41919.0	8.0	4.90	0.004	I	91 [147]
OMG	33.283	116.183	3/20/1954	6 353.0	8.0	4.30	0.003	I	91 [147]
OMG	33.283	116.183	3/23/1954	41450.0	8.0	5.10	0.005	II	91 [147]
OMG	33.283	116.183	4/ 4/1954	42920.0	8.0	4.10	0.003	I	91 [147]
MG	34.029	116.787	4/30/1954	03623.9	8.0	4.20	0.003	I	83 [134]
MG	34.033	115.550	10/30/1954	2 243.0	8.0	4.60	0.020	IV	29 [47]
MG	33.817	115.467	1/28/1955	121020.0	8.0	4.30	0.010	III	43 [70]
MG	33.450	116.683	4/25/1955	25515.0	8.0	4.00	0.002	-	100 [160]
MG	33.167	115.767	5/10/1955	43840.0	8.0	4.30	0.003	I	90 [145]
MG	33.133	115.400	6/15/1955	173557.0	8.0	4.00	0.003	-	90 [145]
MG	34.405	116.667	7/ 2/1955	162938.5	8.0	4.20	0.004	I	71 [114]
MG	33.000	115.533	10/25/1955	174942.0	8.0	4.30	0.003	-	100 [161]
MG	33.000	115.500	12/17/1955	51721.0	8.0	4.30	0.003	-	100 [160]
MG	33.000	115.500	12/17/1955	6 729.0	8.0	5.40	0.004	I	100 [160]
MG	33.000	115.500	12/17/1955	61736.0	8.0	4.10	0.002	-	100 [160]
MG	33.000	115.500	12/17/1955	652 3.0	8.0	4.60	0.003	I	100 [160]
MG	33.000	115.500	12/17/1955	19 543.0	8.0	4.30	0.003	-	100 [160]
MG	34.306	116.759	3/16/1956	202933.6	8.0	4.80	0.005	II	77 [124]
MG	34.250	116.770	3/16/1956	203344.3	8.0	4.00	0.003	I	78 [126]
MG	34.264	116.755	3/16/1956	203613.6	8.0	4.00	0.003	I	77 [124]
MG	34.336	116.742	3/16/1956	233456.4	8.0	4.40	0.004	I	76 [122]
MG	34.299	116.784	3/18/1956	24217.3	8.0	4.40	0.004	I	78 [126]
MG	34.229	116.795	5/11/1956	163050.5	8.0	4.70	0.005	II	80 [128]
MG	33.745	115.997	9/ 1/1956	55752.8	8.0	4.00	0.006	II	58 [94]
MG	33.771	116.050	9/ 2/1956	24637.0	8.0	4.20	0.006	II	59 [94]
MG	33.534	116.561	9/23/1956	112441.9	8.0	4.30	0.003	I	90 [146]
MG	33.985	116.340	2/ 1/1957	75215.4	8.0	4.60	0.007	II	61 [99]
MG	33.745	115.948	4/ 2/1957	42247.4	8.0	4.10	0.006	II	57 [91]
MG	33.216	115.808	4/25/1957	215738.7	8.0	5.20	0.005	II	88 [141]
MG	33.100	115.900	4/25/1957	22 5 0.0	8.0	4.20	0.003	-	97 [156]
MG	33.183	115.850	4/25/1957	222148.0	8.0	4.20	0.003	I	90 [145]
MG	33.183	115.850	4/25/1957	222412.0	8.0	5.10	0.005	II	90 [145]

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (GMT) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	33.100	115.900	4/25/1957	2248 0.0	8.0	4.10	0.002	-	97 [156
DMG	33.100	115.900	4/25/1957	2249 0.0	8.0	4.20	0.003	-	97 [156
DMG	33.231	116.004	5/26/1957	155933.6	8.0	5.00	0.004	I	90 [145
DMG	34.067	116.432	12/ 4/1957	25144.0	8.0	4.30	0.006	II	63 [102
DMG	34.180	116.191	12/12/1957	8 0 7.2	8.0	4.40	0.009	III	47 [76
DMG	34.976	116.996	11/ 7/1958	1738 3.7	8.0	4.10	0.002	-	97 [156
DMG	33.880	116.437	4/17/1959	1619 0.2	8.0	4.20	0.005	II	70 [112
DMG	33.968	116.882	6/27/1959	162211.1	8.0	4.00	0.003	I	90 [144
DMG	33.950	115.667	8/ 4/1959	182522.0	8.0	4.10	0.011	III	37 [59
DMG	34.065	116.574	8/26/1959	53250.2	8.0	4.30	0.005	II	71 [114
DMG	33.267	115.933	12/30/1960	214025.0	8.0	4.00	0.003	I	86 [139
DMG	33.240	116.036	4/28/1961	63021.2	8.0	4.20	0.003	I	90 [145
DMG	33.814	116.028	5/28/1961	125946.7	8.0	4.40	0.007	II	56 [89
DMG	33.333	116.236	10/ 5/1962	1529 2.6	8.0	4.10	0.003	I	90 [144
DMG	34.325	116.865	10/29/1962	24253.9	8.0	4.80	0.005	II	83 [133
DMG	34.337	116.909	11/30/1962	2351 5.5	8.0	4.30	0.003	I	85 [137
DMG	34.324	116.885	12/ 1/1962	03548.8	8.0	4.30	0.003	I	84 [135
DMG	34.325	116.875	12/ 2/1962	04138.4	8.0	4.40	0.004	I	83 [134
DMG	33.027	115.681	5/23/1963	1553 1.8	8.0	4.80	0.003	I	99 [159
DMG	34.154	116.210	7/30/1963	63457.3	8.0	4.70	0.010	III	49 [79
DMG	34.157	116.194	8/22/1963	43355.9	8.0	4.40	0.009	III	48 [78
DMG	33.710	116.925	9/23/1963	144152.6	8.0	5.00	0.004	I	100 [161
DMG	33.284	115.735	10/27/1963	145023.4	8.0	4.00	0.003	I	82 [132
DMG	33.200	115.633	10/27/1963	145245.2	8.0	4.10	0.003	I	87 [139
DMG	33.356	115.388	10/27/1963	145654.3	8.0	4.10	0.004	I	75 [121
DMG	33.131	115.611	10/27/1963	181250.7	8.0	4.20	0.003	I	91 [147
DMG	33.175	115.764	10/28/1963	81417.1	8.0	4.00	0.003	I	90 [144
DMG	34.381	116.474	1/ 6/1964	234712.8	8.0	4.50	0.007	II	60 [97
DMG	33.053	115.855	10/ 5/1964	12455.5	8.0	4.40	0.003	I	99 [159
DMG	33.898	116.569	11/17/1964	145228.2	8.0	4.00	0.004	I	76 [122
DMG	33.012	115.592	4/11/1965	04646.1	8.0	4.10	0.002	-	99 [160
DMG	33.056	115.620	6/16/1965	242 6.1	8.0	4.40	0.003	I	96 [155
DMG	33.037	115.584	6/17/1965	73020.9	8.0	4.30	0.003	I	97 [157
DMG	33.008	115.660	6/17/1965	74013.5	8.0	4.10	0.002	-	100 [161
DMG	33.019	115.573	6/17/1965	743 5.0	8.0	4.20	0.002	-	99 [159
DMG	33.288	116.018	7/27/1965	14 441.4	8.0	4.30	0.003	I	87 [140
DMG	33.278	116.085	8/26/1965	125351.0	8.0	4.20	0.003	I	89 [143
DMG	33.233	116.086	8/26/1965	133814.0	8.0	4.50	0.003	I	92 [148
DMG	34.712	116.503	9/25/1965	174344.1	8.0	5.20	0.009	III	64 [103
DMG	34.711	116.476	9/25/1965	1748 2.4	8.0	4.90	0.008	II	63 [101
DMG	34.711	116.027	9/26/1965	7 0 1.7	8.0	5.00	0.017	IV	39 [63
DMG	33.976	116.775	10/17/1965	94519.0	8.0	4.90	0.005	II	84 [135
DMG	33.279	116.249	1/ 7/1966	191023.0	8.0	4.00	0.002	-	93 [150
DMG	33.291	116.317	3/19/1966	142156.0	8.0	4.00	0.002	-	95 [152
DMG	33.506	116.585	5/21/1967	144234.4	8.0	4.70	0.004	I	93 [149
DMG	33.508	116.631	8/11/1967	05711.4	8.0	4.10	0.002	-	95 [152
DMG	34.052	116.121	3/28/1968	212133.4	8.0	4.00	0.007	II	48 [78
DMG	33.190	116.129	4/ 9/1968	22859.1	8.0	6.40	0.008	III	96 [154
DMG	33.167	116.117	4/ 9/1968	233 9.0	8.0	4.30	0.003	I	97 [156
DMG	33.167	116.117	4/ 9/1968	23930.0	8.0	4.40	0.003	I	97 [156
DMG	33.113	116.037	4/ 9/1968	3 353.5	8.0	5.20	0.004	I	98 [158
DMG	33.104	116.036	4/ 9/1968	34810.3	8.0	4.70	0.003	I	99 [159
DMG	33.107	116.007	4/ 9/1968	8 038.5	8.0	4.00	0.002	-	98 [158
DMG	33.235	116.266	4/ 9/1968	93833.0	8.0	4.00	0.002	-	96 [155
DMG	33.103	116.061	4/ 9/1968	111754.5	8.0	4.00	0.002	-	99 [160
DMG	33.315	116.305	4/ 9/1968	1831 3.8	8.0	4.70	0.004	I	93 [149

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (GMT) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	33.237	116.190	4/14/1968	125558.7	8.0	4.30	0.003	I	94 [152]
DMG	34.320	116.925	4/18/1968	174213.4	8.0	4.00	0.003	I	86 [139]
DMG	33.310	116.224	5/22/1968	132655.4	8.0	4.40	0.003	I	91 [146]
DMG	33.045	115.863	12/17/1968	225351.2	8.0	4.70	0.003	I	100 [161]
DMG	33.887	116.040	1/23/1969	23 1 1.0	8.0	4.80	0.010	III	52 [84]
DMG	33.826	115.985	1/25/1969	3 0 4.0	8.0	4.10	0.007	II	53 [86]
DMG	33.343	116.346	4/28/1969	232042.9	8.0	5.80	0.006	II	93 [149]
DMG	33.349	116.188	5/19/1969	144033.0	8.0	4.50	0.004	I	87 [141]
DMG	34.316	115.729	12/14/1970	191419.4	8.0	4.00	0.023	IV	20 [32]
DMG	33.501	116.429	2/23/1971	0 739.2	8.0	4.20	0.003	I	87 [140]
DMG	33.033	115.821	9/30/1971	224611.3	8.0	5.10	0.004	I	100 [161]
DMG	34.312	116.879	1/31/1972	155 4.2	8.0	4.00	0.003	I	84 [134]
DMG	34.436	116.834	7/14/1973	8 020.1	8.0	4.80	0.005	II	80 [129]
DMG	34.516	116.451	4/ 5/1974	104250.7	8.0	4.10	0.006	II	59 [95]
DMG	34.626	116.347	7/30/1974	739 7.1	8.0	4.40	0.008	II	54 [87]
DMG	34.634	116.341	7/30/1974	83653.6	8.0	4.30	0.007	II	54 [87]
PAS	34.401	116.641	2/10/1975	125117.6	8.0	4.40	0.005	II	70 [112]
PAS	34.516	116.495	6/ 1/1975	13849.2	8.0	5.20	0.010	III	61 [99]
PAS	33.520	116.558	8/ 2/1975	014 7.7	8.0	4.70	0.004	I	91 [147]
PAS	34.022	116.426	8/14/1975	8 849.8	8.0	4.00	0.005	II	64 [103]
PAS	34.304	116.341	11/15/1975	61327.6	8.0	4.60	0.009	III	53 [86]
PAS	34.290	116.322	12/14/1975	181620.1	8.0	4.70	0.009	III	52 [84]
PAS	33.117	115.615	4/26/1976	64637.5	8.0	4.00	0.002	-	92 [148]
PAS	33.484	116.513	8/11/1976	152455.5	8.0	4.30	0.003	I	91 [146]
PAS	33.123	115.596	11/ 4/1976	54820.9	8.0	4.20	0.003	I	92 [147]
PAS	33.118	115.595	11/ 4/1976	62110.7	8.0	4.10	0.003	I	92 [148]
PAS	33.118	115.590	11/ 4/1976	635 3.5	8.0	4.10	0.003	I	92 [148]
PAS	33.103	115.621	11/ 4/1976	1139 8.4	8.0	4.10	0.003	-	93 [150]
PAS	33.109	115.619	11/ 4/1976	114940.4	8.0	4.10	0.003	-	93 [149]
PAS	33.103	115.622	11/ 4/1976	133127.7	8.0	4.20	0.003	I	93 [150]
PAS	33.117	115.595	11/ 4/1976	141250.2	8.0	4.40	0.003	I	92 [148]
PAS	34.198	116.959	4/ 1/1978	105227.4	8.0	4.00	0.003	I	89 [144]
PAS	34.151	116.972	11/20/1978	655 9.5	8.0	4.30	0.003	I	91 [146]
PAS	33.458	116.434	2/12/1979	44842.3	8.0	4.20	0.003	I	89 [144]
PAS	34.309	116.440	3/15/1979	201749.9	8.0	4.90	0.009	III	59 [95]
PAS	34.327	116.445	3/15/1979	21 716.5	8.0	5.20	0.010	III	59 [95]
PAS	34.348	116.453	3/15/1979	213425.6	8.0	4.50	0.007	II	59 [95]
PAS	34.330	116.443	3/15/1979	23 758.2	8.0	4.80	0.008	III	59 [95]
PAS	34.329	116.398	3/16/1979	173659.1	8.0	4.00	0.006	II	56 [90]
PAS	34.230	116.363	3/18/1979	2253 2.7	8.0	4.20	0.007	II	56 [90]
PAS	34.302	116.499	3/31/1979	016 8.6	8.0	4.20	0.006	II	62 [100]
PAS	33.094	115.655	6/13/1979	194645.9	8.0	4.10	0.003	-	94 [151]
PAS	34.246	116.901	6/29/1979	55320.5	8.0	4.60	0.004	I	85 [138]
PAS	34.243	116.896	6/30/1979	03411.6	8.0	4.90	0.005	II	85 [137]
PAS	34.249	116.900	6/30/1979	7 353.0	8.0	4.50	0.004	I	85 [137]
PAS	34.257	116.435	7/13/1979	226 3.5	8.0	4.00	0.005	II	59 [95]
PAS	33.701	116.837	8/22/1979	2 136.3	8.0	4.10	0.002	-	96 [154]
PAS	33.003	115.514	10/16/1979	65522.9	8.0	4.60	0.003	I	100 [160]
PAS	33.014	115.555	10/16/1979	65842.8	8.0	5.50	0.005	II	99 [159]
PAS	33.001	115.576	10/16/1979	74947.2	8.0	4.00	0.002	-	100 [161]
PAS	33.026	115.504	10/16/1979	15 0 2.7	8.0	4.00	0.002	-	98 [158]
PAS	33.019	115.504	10/16/1979	231632.3	8.0	4.90	0.004	I	98 [158]
PAS	33.046	115.490	10/17/1979	224534.3	8.0	4.50	0.003	I	96 [155]
PAS	33.501	116.513	2/25/1980	104738.5	8.0	5.50	0.006	II	90 [145]
PAS	33.110	115.627	4/25/1981	21155.3	8.0	4.10	0.003	-	93 [149]
PAS	33.099	115.630	4/26/1981	12 557.4	8.0	4.00	0.002	-	94 [150]

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (GMT) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
PAS	33.098	115.632	4/26/1981	12 928.4	8.0	5.70	0.006	II	94 [151
PAS	33.079	115.680	4/26/1981	124043.4	8.0	4.20	0.003	-	95 [153
PAS	33.558	116.667	6/15/1982	234921.3	8.0	4.80	0.004	I	94 [151
PAS	33.198	115.535	7/13/1983	211648.3	8.0	4.00	0.003	I	86 [139
PAS	33.136	116.071	2/29/1984	2 731.7	8.0	4.30	0.003	-	98 [157
PAS	34.382	116.613	6/11/1984	222110.4	8.0	4.00	0.004	I	68 [109
PAS	33.976	116.713	8/ 6/1984	81436.6	8.0	4.30	0.004	I	80 [130
PAS	33.460	116.370	9/ 7/1984	175730.3	8.0	4.10	0.003	I	87 [140
PAS	33.985	116.402	2/15/1985	232626.6	8.0	4.00	0.005	II	64 [103
PAS	34.422	116.542	7/18/1985	14 525.8	8.0	4.20	0.005	II	64 [103
PAS	34.322	116.815	8/29/1985	759 8.7	8.0	4.10	0.003	I	80 [129
PAS	34.116	116.030	2/17/1986	21233.5	8.0	4.00	0.009	III	41 [67
PAS	33.998	116.606	7/ 8/1986	92044.5	8.0	5.60	0.009	III	74 [120
PAS	34.031	116.657	7/ 8/1986	92412.8	8.0	4.40	0.004	I	76 [122
PAS	33.967	116.617	7/ 8/1986	102240.6	8.0	4.40	0.004	I	76 [122
PAS	33.967	116.617	7/ 8/1986	155526.2	8.0	4.00	0.004	I	76 [122
PAS	33.987	116.569	7/ 9/1986	01232.1	8.0	4.40	0.005	II	73 [117
PAS	33.989	116.649	7/17/1986	203515.0	8.0	4.00	0.003	I	77 [124
PAS	33.991	116.649	7/17/1986	215445.2	8.0	4.40	0.004	I	77 [123
PAS	33.953	116.572	10/15/1986	22847.8	8.0	4.70	0.005	II	74 [119
PAS	33.067	115.781	11/24/1987	13248.1	8.0	4.20	0.003	-	97 [156
PAS	33.072	115.782	11/24/1987	153 3.2	8.0	4.00	0.002	-	97 [156
PAS	33.082	115.775	11/24/1987	15414.5	8.0	5.80	0.006	II	96 [155
PAS	33.036	115.820	11/24/1987	21435.5	8.0	4.50	0.003	I	100 [161
PAS	33.048	115.798	11/24/1987	21523.2	8.0	4.80	0.003	I	99 [159
PAS	33.050	115.800	11/24/1987	21647.2	8.0	4.00	0.002	-	99 [159
PAS	33.033	115.814	11/24/1987	22159.6	8.0	4.00	0.002	-	100 [161
PAS	33.040	115.812	11/24/1987	253 0.7	8.0	4.70	0.003	I	99 [160
PAS	33.133	115.873	11/24/1987	133355.8	8.0	4.00	0.002	-	94 [151
PAS	33.047	115.808	11/24/1987	143629.9	8.0	4.00	0.002	-	99 [159
PAS	33.483	116.438	7/ 2/1988	02658.2	8.0	4.00	0.003	I	88 [142
PAS	33.979	116.681	12/16/1988	553 5.0	8.0	4.80	0.005	II	79 [127
PAS	33.182	115.599	3/ 6/1989	221647.6	8.0	4.30	0.003	I	88 [141
PAS	33.181	115.611	3/ 7/1989	02458.2	8.0	4.10	0.003	I	88 [141
PAS	33.182	115.594	3/ 7/1989	74344.1	8.0	4.20	0.003	I	88 [141
GSP	33.030	115.580	3/24/1989	231648.0	8.0	4.00	0.002	-	98 [158
GSP	34.600	116.840	6/ 4/1989	213358.1	8.0	4.50	0.004	I	81 [131
GSP	33.650	116.740	12/ 2/1989	231647.8	8.0	4.20	0.003	I	93 [150
GSP	33.730	116.020	12/18/1989	062704.5	8.0	4.20	0.006	II	60 [96
GSP	33.510	116.450	2/18/1990	155259.9	8.0	4.10	0.003	I	87 [140
GSP	33.250	116.050	8/31/1990	033800.0	8.0	4.20	0.003	I	90 [145
GSP	34.910	116.580	6/29/1991	175352.0	8.0	4.00	0.004	I	73 [118
GSP	33.210	115.970	7/19/1991	024136.8	8.0	4.00	0.003	-	91 [146
GSP	33.890	116.160	10/12/1991	143932.0	8.0	4.00	0.006	II	57 [92
GSP	34.180	117.020	12/ 4/1991	081703.5	8.0	4.00	0.002	-	93 [150
PDP	33.957	116.317	4/23/1992	022529.9	8.0	4.60	0.007	II	61 [98
PDP	33.943	116.332	4/23/1992	045022.0	8.0	6.10	0.015	IV	62 [100
PDG	34.004	116.334	4/23/1992	051009.1	8.0	4.60	0.007	II	60 [97
PDG	33.943	116.325	4/23/1992	052316.2	8.0	4.00	0.005	II	62 [100
PDP	33.943	116.312	4/23/1992	133557.5	8.0	4.10	0.005	II	61 [99
PDP	33.970	116.292	4/23/1992	185603.0	8.0	4.40	0.007	II	59 [96
PDP	33.946	116.379	4/24/1992	123605.7	8.0	4.10	0.005	II	65 [104
PDP	33.917	116.330	4/26/1992	062608.0	8.0	4.20	0.005	II	63 [102
PDP	34.050	116.335	4/26/1992	172138.0	8.0	4.30	0.006	II	59 [95
PDP	33.933	116.302	4/27/1992	031119.3	8.0	4.20	0.006	II	61 [99
PDP	33.990	116.287	5/ 2/1992	124641.4	8.0	4.10	0.006	II	58 [94

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (GMT) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
PDP	33.940	116.341	5/ 4/1992	011602.6	8.0	4.00	0.005	II	63 [101]
PDP	33.942	116.304	5/ 4/1992	161949.7	8.0	4.80	0.008	II	61 [98]
PDP	33.943	116.315	5/ 6/1992	023843.3	8.0	4.50	0.007	II	62 [99]
PDG	33.982	116.260	5/12/1992	023111.0	8.0	4.00	0.006	II	57 [93]
PDP	33.957	116.338	5/18/1992	154417.9	8.0	4.90	0.008	III	62 [100]
PDP	34.175	116.350	6/11/1992	002419.2	8.0	4.30	0.007	II	56 [90]
PDN	34.180	116.512	6/28/1992	115735.3	8.0	7.50	0.030	V	65 [104]
PDP	34.139	116.431	6/28/1992	123640.6	8.0	5.10	0.009	III	61 [99]
PDP	34.341	116.529	6/28/1992	124053.5	8.0	5.20	0.009	III	64 [102]
PDP	34.237	116.811	6/28/1992	125730.8	8.0	4.00	0.003	I	81 [130]
PDP	34.414	116.461	6/28/1992	131050.5	8.0	5.20	0.010	III	59 [95]
PDP	34.180	116.396	6/28/1992	132605.0	8.0	4.90	0.009	III	58 [94]
PDP	34.125	116.424	6/28/1992	135045.8	8.0	4.70	0.007	II	61 [99]
PDP	34.102	116.649	6/28/1992	140928.7	8.0	4.10	0.004	I	74 [119]
PDP	34.080	116.438	6/28/1992	143907.1	8.0	4.10	0.005	II	63 [102]
PDP	34.163	116.855	6/28/1992	144321.0	8.0	5.30	0.006	II	84 [135]
PDP	34.163	116.827	6/28/1992	150451.5	8.0	4.40	0.004	I	82 [133]
PDN	34.203	116.827	6/28/1992	150530.7	8.0	6.60	0.012	III	82 [132]
PDP	34.208	116.759	6/28/1992	152429.4	8.0	4.50	0.004	I	78 [126]
PDP	34.030	116.379	6/28/1992	160115.2	8.0	4.10	0.005	II	62 [99]
PDP	34.054	116.371	6/28/1992	160954.0	8.0	4.10	0.005	II	60 [97]
PDP	34.207	116.757	6/28/1992	161719.2	8.0	4.10	0.004	I	78 [125]
PDP	34.588	116.623	6/28/1992	163210.2	8.0	4.10	0.004	I	69 [111]
PDP	34.178	116.922	6/28/1992	170131.9	8.0	4.70	0.004	I	88 [141]
PDP	34.208	116.929	6/28/1992	170556.3	8.0	4.60	0.004	I	87 [141]
PDP	34.294	116.453	6/28/1992	173121.5	8.0	4.10	0.006	II	60 [96]
PDP	34.183	116.802	6/28/1992	192637.6	8.0	4.00	0.003	I	81 [130]
PDP	34.085	116.417	6/28/1992	211316.0	8.0	4.60	0.007	II	62 [100]
PDP	34.163	116.450	6/28/1992	224822.0	8.0	4.10	0.005	II	62 [99]
PDG	34.501	116.627	6/29/1992	015807.6	8.0	4.10	0.004	I	69 [111]
PDP	34.239	116.443	6/29/1992	030156.4	8.0	4.20	0.006	II	60 [96]
PDG	34.156	116.372	6/29/1992	103657.7	8.0	4.00	0.006	II	58 [93]
PDP	34.106	116.402	6/29/1992	140837.7	8.0	4.90	0.008	III	61 [98]
PDP	34.108	116.404	6/29/1992	141338.8	8.0	5.40	0.011	III	61 [98]
PDP	34.120	116.998	6/29/1992	144126.0	8.0	4.40	0.003	I	93 [149]
PDP	33.876	116.267	6/29/1992	160142.8	8.0	5.20	0.009	III	62 [100]
PDP	34.250	116.719	6/29/1992	164141.9	8.0	4.90	0.006	II	75 [121]
PDP	34.127	116.397	6/30/1992	000608.5	8.0	4.10	0.006	II	60 [96]
PDP	34.004	116.361	6/30/1992	143811.6	8.0	4.80	0.008	II	62 [99]
PDP	34.171	116.409	6/30/1992	151905.0	8.0	4.00	0.005	II	59 [96]
PDP	34.644	116.656	6/30/1992	172629.7	8.0	4.30	0.005	II	72 [115]
PDP	34.643	116.653	6/30/1992	200025.4	8.0	4.10	0.004	I	71 [115]
PDP	34.130	116.734	6/30/1992	212254.4	8.0	4.70	0.005	II	78 [125]
PDP	34.085	116.989	6/30/1992	214900.3	8.0	4.20	0.003	I	93 [149]
PDP	34.097	116.382	7/ 1/1992	070149.2	8.0	4.30	0.006	II	60 [96]
PDP	34.332	116.462	7/ 1/1992	074029.9	8.0	5.20	0.010	III	60 [96]
PDP	34.971	116.937	7/ 1/1992	102947.8	8.0	4.20	0.003	I	93 [150]
PDP	34.973	116.936	7/ 1/1992	103252.3	8.0	4.10	0.003	-	93 [150]
PDP	34.274	116.692	7/ 1/1992	170715.1	8.0	4.20	0.004	I	73 [118]
PDP	34.275	116.730	7/ 1/1992	204617.8	8.0	4.20	0.004	I	75 [122]
PDP	34.281	116.731	7/ 1/1992	205356.8	8.0	4.00	0.004	I	75 [121]
PDP	35.030	116.968	7/ 5/1992	105543.3	8.0	4.60	0.003	I	97 [156]
PDP	34.298	116.804	7/ 5/1992	200303.1	8.0	4.00	0.003	I	79 [128]
PDP	34.583	116.319	7/ 5/1992	211827.1	8.0	5.50	0.015	IV	52 [84]
PDP	34.583	116.304	7/ 5/1992	223345.5	8.0	4.30	0.008	II	51 [82]
PDP	34.092	116.369	7/ 6/1992	120059.2	8.0	4.40	0.007	II	59 [95]

PDP	34.082	116.378	7/ 6/1992	194137.9	8.0	4.30	0.006	II	60	[9
PDG	34.069	116.382	7/ 7/1992	082103.1	8.0	4.00	0.005	II	61	[9
PDG	34.342	116.467	7/ 7/1992	220928.3	8.0	4.10	0.006	II	60	[9
PDP	34.576	116.336	7/ 8/1992	022311.3	8.0	4.70	0.009	III	53	[8
PDP	34.605	116.351	7/ 8/1992	080538.7	8.0	4.10	0.007	II	54	[8
PDP	34.239	116.837	7/ 9/1992	014357.6	8.0	5.30	0.006	II	82	[13
PDP	34.232	116.846	7/10/1992	012940.0	8.0	4.10	0.003	I	83	[13
PDP	34.971	116.939	7/20/1992	044801.5	8.0	4.40	0.003	I	94	[15
PDP	34.992	116.948	7/20/1992	131319.4	8.0	4.50	0.003	I	95	[15
PDP	33.902	116.284	7/24/1992	181436.2	8.0	4.70	0.007	II	62	[9
PDP	33.937	116.306	7/25/1992	043160.0	8.0	4.70	0.007	II	61	[9
PDP	34.112	116.415	7/28/1992	182703.9	8.0	4.30	0.006	II	61	[9

****

-END OF SEARCH- 570 RECORDS FOUND

COMPUTER TIME REQUIRED FOR EARTHQUAKE SEARCH: 8.0 minutes

MAXIMUM SITE ACCELERATION DURING TIME PERIOD 1800 TO 1992: 0.043g

MAXIMUM SITE INTENSITY (MM) DURING TIME PERIOD 1800 TO 1992: VI

MAXIMUM MAGNITUDE ENCOUNTERED IN SEARCH: 7.50

NEAREST HISTORICAL EARTHQUAKE WAS ABOUT 20 MILES AWAY FROM SITE.

NUMBER OF YEARS REPRESENTED BY SEARCH: 193 years

RESULTS OF PROBABILITY ANALYSES

TIME PERIOD OF SEARCH: 1800 TO 1992
LENGTH OF SEARCH TIME: 193 years
ATTENUATION RELATION: 6) Joyner & Boore (1982) Horiz. - Random
*** TIME PERIOD OF EXPOSURE FOR PROBABILITY: 150 years

PROBABILITY OF EXCEEDANCE FOR ACCELERATION

ACC. g	NO.OF TIMES EXCED	AVE. OCCUR. #/yr	RECURR. INTERV. years	COMPUTED PROBABILITY OF EXCEEDANCE in 0.5 yr	in 1 yr	in 10 yr	in 50 yr	in 75 yr	in 100 yr	in *** yr
0.01	40	0.207	4.825	0.0984	0.1872	0.8741	1.0000	1.0000	1.0000	1.0000
0.02	6	0.031	32.167	0.0154	0.0306	0.2672	0.7887	0.9029	0.9553	0.9906
0.03	2	0.010	96.500	0.0052	0.0103	0.0984	0.4044	0.5403	0.6452	0.7887
0.04	1	0.005	193.000	0.0026	0.0052	0.0505	0.2282	0.3220	0.4044	0.5403

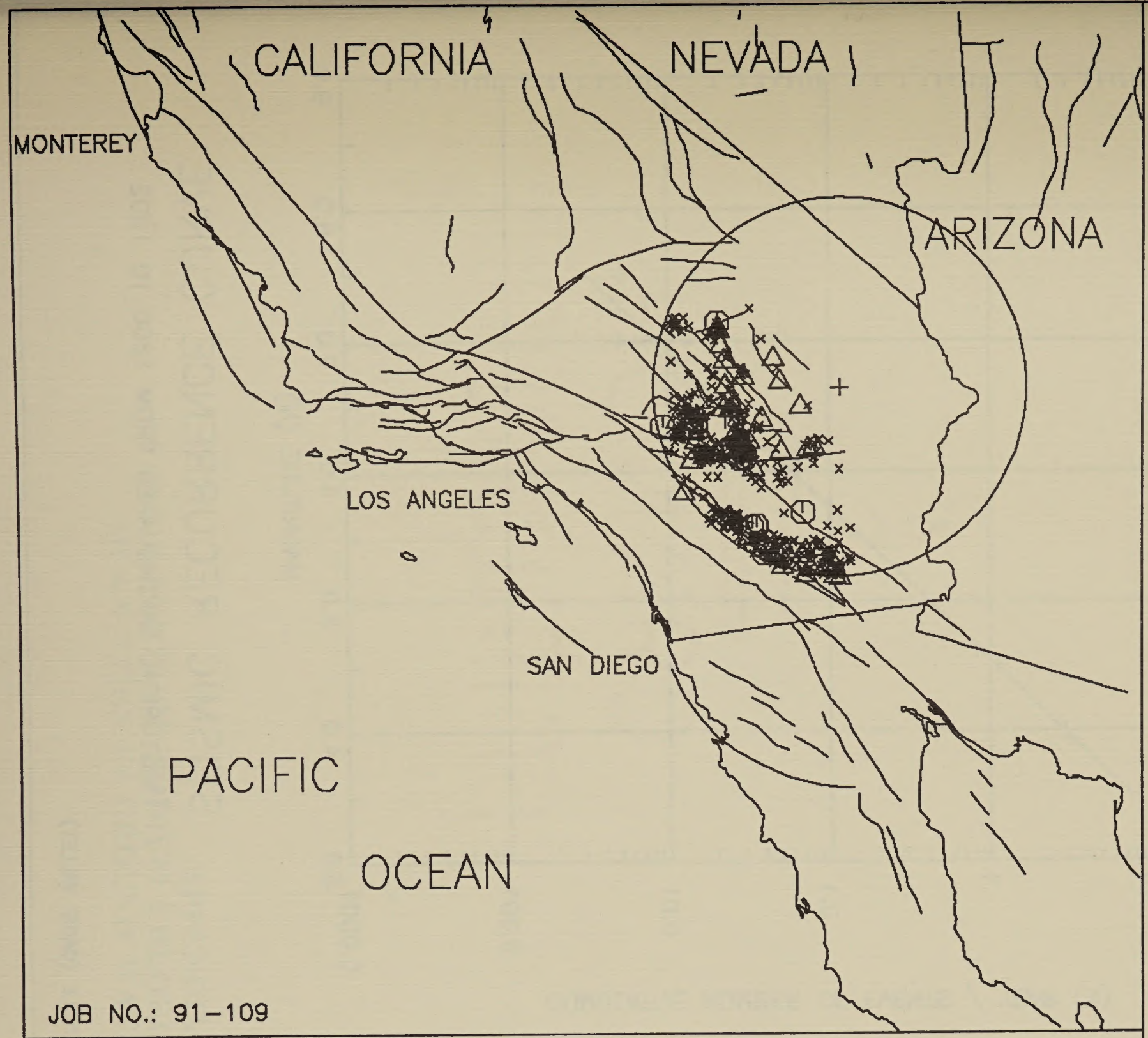
PROBABILITY OF EXCEEDANCE FOR MAGNITUDE

MAG.	NO.OF TIMES EXCED	AVE. OCCUR. #/yr	RECURR. INTERV. years	COMPUTED PROBABILITY OF EXCEEDANCE in 0.5 yr	in 1 yr	in 10 yr	in 50 yr	in 75 yr	in 100 yr	in *** yr
4.00	570	2.953	0.339	0.7716	0.9478	1.0000	1.0000	1.0000	1.0000	1.0000
4.50	213	1.104	0.906	0.4241	0.6683	1.0000	1.0000	1.0000	1.0000	1.0000
5.00	74	0.383	2.608	0.1745	0.3185	0.9784	1.0000	1.0000	1.0000	1.0000
5.50	29	0.150	6.655	0.0724	0.1395	0.7774	0.9995	1.0000	1.0000	1.0000
6.00	12	0.062	16.083	0.0306	0.0603	0.4630	0.9553	0.9906	0.9980	0.9999
6.50	3	0.016	64.333	0.0077	0.0154	0.1440	0.5403	0.6883	0.7887	0.9029
7.00	1	0.005	193.000	0.0026	0.0052	0.0505	0.2282	0.3220	0.4044	0.5403
7.50	1	0.005	193.000	0.0026	0.0052	0.0505	0.2282	0.3220	0.4044	0.5403

GUTENBERG & RICHTER RECURRENCE RELATIONSHIP:

a-value= 3.833
b-value= 0.844

beta-value= 1.943



N

0 50 100

SCALE
(Miles)

EXPLANATION

M = 8.0 +

M = 7.0–7.9

M = 6.0–6.9

M = 5.0–5.9

× M = 4.0–4.9

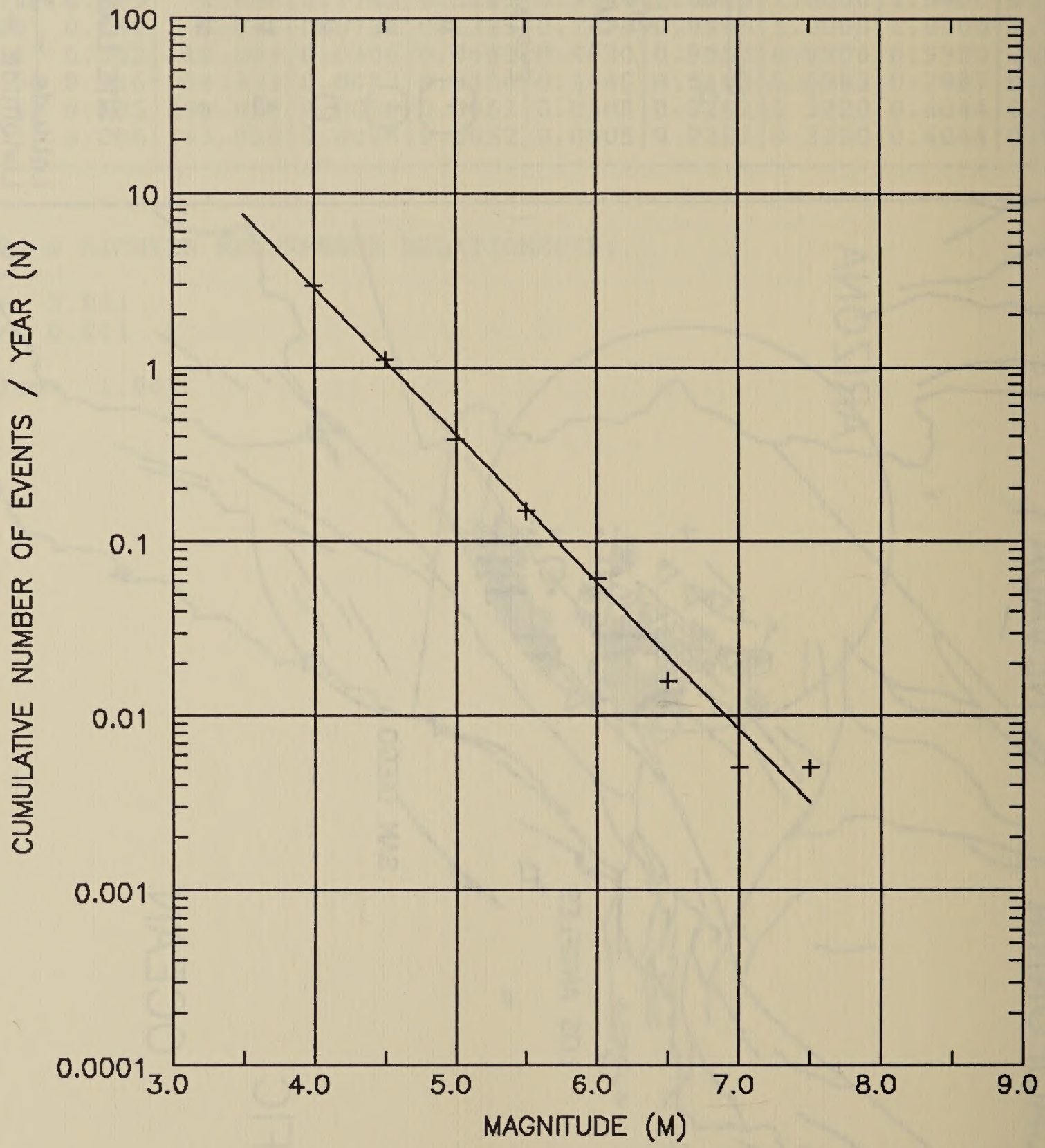
SITE LOCATION (+):

Latitude – 34.4420 N
Longitude – 115.4210 W

JOB NO.: 91–109

HISTORICAL EARTHQUAKES 1800 TO 1992

LOG N = 3.833 − 0.844M



SEISMIC RECURRENCE CURVE

HISTORICAL EARTHQUAKES FROM 1800 TO 1992

RAIL CYCLE (CADIZ VALLEY)

APPENDIX D
CALCULATION OF SODIUM CHLORIDE QUANTITIES IN GROUND WATER

APPENDIX D

CALCULATION OF SODIUM CHLORIDE QUANTITIES IN GROUND WATER

1. In February 1991, ground water samples were collected at various depths from two onsite wells (MW-7 and P-15) during borehole drilling. Upon reaching the desired sampling depth, drilling was halted and ground water allowed to rise in the dual tube drill casing until sufficient volume had accumulated to sample. This method allowed samples from each depth to be collected prior to mixing with water from other depths. These samples were then analyzed for inorganic constituents to characterize mineral concentration gradients with depth. Laboratory analyses for selected constituents are provided in Table D.1. As indicated in Table D.1, mineral concentrations increase exponentially with depth. The concentrations at the 200-foot depth were used to determine whether economic quantities of sodium chloride were present in the ground water underlying the site.

2. BLM guidelines have established threshold criteria of 26,000 mg/L as the economic concentrations of sodium chloride. Since the laboratory analyses do not directly measure sodium chloride or calcium chloride, several assumptions have been made for the purpose of calculating the concentration of sodium chloride:
   - Since calcium has a stronger attraction for chloride than does sodium, it is assumed that all available calcium bonds with available chloride.
   - Remaining chloride is then available to bond with sodium.
   - Other chemical bonding occurs after these two reactions.

   While these assumptions oversimplify the mass balance reactions which occur in reality, they yield a rough estimate of the concentrations present, which, when coupled with the knowledge that concentrations increase exponentially with depth, provides a reasonable indicator of whether sodium chloride concentrations meet the BLM guidelines.

3. Calculations are provided below for data collected from Well P-15. Similar calculations could be applied to data from Well MW-7. Concentrations are calculated as follows:
   - Constants used:

Constituent	Abbreviation	Molecular Weight (g/mol)
Calcium	Ca	40.08
Sodium	Na	22.99
Chloride	Cl	35.45
Calcium chloride	$CaCl_2$	110.98
Sodium chloride	NaCl	58.44

- Equations:

  1 mol Ca + 2 mol Cl = 1 mol $CaCl_2$

  1 mol Na + 1 mol Cl = 1 mol NaCl

  $$\frac{\text{mol}}{\text{L}}\text{ Ca} = (\text{mg/L Ca})\left(\frac{\text{g}}{1{,}000\text{ mg}}\right)\left(\frac{1}{\text{molecular wt. Ca}}\right)$$

  $$\text{mg/L } CaCl_2 = \left(\frac{\text{mol}}{\text{L}}\text{ } CaCl_2\right)(\text{molecular wt. } CaCl_2)\left(\frac{1{,}000\text{ mg}}{\text{g}}\right)$$

- Calculate moles of Ca, Cl, and Na available:
  - Calcium: $(4{,}747\text{ mg/L Ca})\left(\frac{\text{g}}{1{,}000\text{ mg}}\right)\left(\frac{\text{mol Ca}}{40.08\text{ g}}\right) = 0.1184\text{ mol/L Ca}$
  - Chloride: $(25{,}097\text{ mg/L Cl})\left(\frac{\text{g}}{1{,}000}\right)\left(\frac{\text{mol Cl}}{35.45\text{ g}}\right) = 0.708\text{ mol/L Cl}$
  - Sodium: $(14{,}000\text{ mg/L Na})\left(\frac{\text{g}}{1{,}000}\right)\left(\frac{\text{mol Na}}{22.99}\right) = 0.609\text{ mol/L Na}$

- Calculate quantity of $CaCl_2$ created:

  0.1184 mol/L Ca + (2) (0.1184) mol/L Cl = 0.1184 mol/L $CaCl_2$

  $$= (0.1184\text{ mol/L } CaCl_2)\left(\frac{110.98\text{ g}}{\text{mol } CaCl_2}\right)\left(\frac{1{,}000\text{ mg}}{\text{g}}\right)$$

  $$= 13{,}140\text{ mg/L } CaCl_2$$

- Determine remaining moles Cl available to combine with Na:

  0.708 mol/L Cl - (2) (0.1184) mol/L Cl = 0.4712 mol/L Cl

- Calculate NaCl created:

  0.6090 mol/L Na + 0.4712 mol/L Cl

  = 0.4712 mol/L NaCl + 0.1378 mol/L Na

  $$= (0.4712\text{ mol/L NaCl})\left(\frac{58.44\text{ g}}{\text{mol NaCl}}\right)\left(\frac{1{,}000\text{ mg}}{\text{g}}\right)$$

  $$+ (0.1378\text{ mol/L Na})\left(\frac{22.99\text{ g}}{\text{mol Na}}\right)\left(\frac{1{,}000\text{ mg}}{\text{g}}\right)$$

  = 27,537 mg/L NaCl + 3,168 mg/L Na.

4. Since 27,537 mg/L NaCl exceeds the threshold criteria of 26,000 mg/L NaCl, this water qualifies as an economic source of sodium chloride. Similarly, the concentrations of calcium chloride and sodium chloride in MW-7 are calculated as 16,347 mg/L and 26,690 mg/L, respectively.

TABLE D.1

SELECTED MINERAL CONCENTRATIONS

CONSTITUENTS	CONCENTRATION (mg/L)					
	60-Foot Depth	90-Foot Depth	120-Foot Depth	150-Foot Depth	180-Foot Depth	200-Foot Depth
MONITORING WELL MW-7						
• Calcium	85.5	144	688	827	3,300	5,902
• Chloride	537	1,013	3,517	4,673	20,952	29,758
• Sodium	267	366	1,260	1,770	6,180	10,500
PIEZOMETER P-15						
• Calcium	47.3	121	718	2,150	3,810	4,747
• Chloride	198	447	2,981	10,123	16,876	25,097
• Sodium	121	181	716	3,120	7,080	14,000

91-109 (11/12/92/mg)

APPENDIX E
U.S. ARMY CORPS OF ENGINEERS LETTER

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2711
LOS ANGELES, CALIFORNIA 90053-2325

March 17, 1992

MAR 19 1992

REPLY TO
ATTENTION OF

Office of the Chief
Regulatory Branch

Rail Cycle
Attn: Garth R. Morgan
5770 South Eastern Avenue
Los Angeles, California 90040

Dear Dr. Morgan:

Reference is made to your visit of March 12, 1992 (No. 92-271-KC) during which you inquired as to whether or not a Section 404 permit is required from the U.S. Army Corps of Engineers to construct and operate the Bolo Station Landfill in the Mojave Desert near the town of Amboy, San Bernardino County, California.

Based on the information furnished in your during your visit (referenced above), we have determined that your proposed project does not discharge dredged or fill material into a water of the United States or an adjacent wetland. Therefore, the project as described is not subject to our jurisdiction under Section 404 of the Clean Water Act and no Section 404 permit is required from our office.

Your visit was appreciated. Please feel free to pick up you aerial photographs at any time. If you have any questions please contact Kitty Connolly of my staff at (213) 894-5606.

Sincerely,

Jonathan R. Freedman

Jonathan R. Freedman
Chief, South Coast Section

APPENDIX F
GROUND WATER CONSTITUENTS OF CONCERN

APPENDIX F

1. EPA has established a list of indicator parameters which are considered reliable indicators of the occurrence of ground water contamination from municipal solid waste landfills. The list, included as Table F.1, was prepared based on data collected from landfills across the nation. It includes 47 VOCs and 15 metals. Rules established by EPA under 40 CFR, Part 258, require that landfill operators in the detection monitoring stage analyze ground water samples at least semi-annually for this list of constituents.

TABLE F.1

Appendix I to this Part 258—Constituents for Detection Monitoring [1]

Common name [2]	CAS RN [3]
Inorganic Constituents:	
(1) Antimony	(Total)
(2) Arsenic	(Total)
(3) Barium	(Total)
(4) Beryllium	(Total)
(5) Cadmium	(Total)
(6) Chromium	(Total)
(7) Cobalt	(Total)
(8) Copper	(Total)
(9) Lead	(Total)
(10) Nickel	(Total)
(11) Selenium	(Total)
(12) Silver	(Total)
(13) Thallium	(Total)
(14) Vanadium	(Total)
(15) Zinc	(Total)
Organic Constituents:	
(16) Acetone	67-64-1
(17) Acrylonitrile	107-13-1
(18) Benzene	71-43-2
(19) Bromochloromethane	74-97-5
(20) Bromodichloromethane	75-27-4
(21) Bromoform; Tribromomethane	75-25-2
(22) Carbon disulfide	75-15-0
(23) Carbon tetrachloride	56-23-5
(24) Chlorobenzene	108-90-7
(25) Chloroethane; Ethyl chloride	75-00-3
(26) Chloroform; Trichloromethane	67-66-3
(27) Dibromochloromethane; Chlorodibromomethane	124-48-1
(28) 1,2-Dibromo-3-chloropropane; DBCP	96-12-8
(29) 1,2-Dibromoethane; Ethylene dibromide; EDB	106-93-4
(30) o-Dichlorobenzene; 1,2-Dichlorobenzene	95-50-1
(31) p-Dichlorobenzene; 1,4-Dichlorobenzene	106-46-7
(32) trans-1,4-Dichloro-2-butene	110-57-6
(33) 1,1-Dichloroethane; Ethylidene chloride	75-34-3
(34) 1,2-Dichloroethane; Ethylene dichloride	107-06-2
(35) 1,1-Dichloroethylene; 1,1-Dichloroethene; Vinylidene chloride	75-35-4
(36) cis-1,2-Dichloroethylene; cis-1,2-Dichloroethene	156-59-2
(37) trans-1,2-Dichloroethylene; trans-1,2-Dichloroethene	156-60-5
(38) 1,2-Dichloropropane; Propylene dichloride	78-87-5
(39) cis-1,3-Dichloropropene	10061-01-5
(40) trans-1,3-Dichloropropene	10061-02-6
(41) Ethylbenzene	100-41-4
(42) 2-Hexanone; Methyl butyl ketone	591-78-6
(43) Methyl bromide; Bromomethane	74-83-9
(44) Methyl chloride; Chloromethane	74-87-3
(45) Methylene bromide; Dibromomethane	74-95-3
(46) Methylene chloride; Dichloromethane	75-09-2
(47) Methyl ethyl ketone; MEK; 2-Butanone	78-93-3
(48) Methyl iodide; Iodomethane	74-88-4
(49) 4-Methyl-2-pentanone; Methyl isobutyl ketone	108-10-1
(50) Styrene	100-42-5
(51) 1,1,1,2-Tetrachloroethane	630-20-6
(52) 1,1,2,2-Tetrachloroethane	79-34-5
(53) Tetrachloroethylene; Tetrachloroethene; Perchloroethylene	127-18-4
(54) Toluene	108-88-3
(55) 1,1,1-Trichloroethane; Methylchloroform	71-55-6
(56) 1,1,2-Trichloroethane	79-00-5
(57) Trichloroethylene; Trichloroethene	79-01-6
(58) Trichlorofluoromethane; CFC-11	75-69-4
(59) 1,2,3-Trichloropropane	96-18-4
(60) Vinyl acetate	108-05-4
(61) Vinyl chloride	75-01-4
(62) Xylenes	1330-20-7

[1] This list contains 47 volatile organics for which possible analytical procedures provided in EPA Report SW-846 "Test Methods for Evaluating Solid Waste," third edition, November 1986, as revised December 1987, includes Method 8260. and 15 metals for which SW-846 provides either Method 6010 or a method from the 7000 series of methods.

[2] Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

[3] Chemical Abstracts Service registry number. Where "Total" is entered, all species in the ground water that contain this element are included.

Reference : 40 CFR, Part 258, Appendix I.

APPENDIX G
VEGETATION AND WILDLIFE SPECIES LISTS

TABLE G.1

PLANT SPECIES
BOLO STATION SITE[1]

SCIENTIFIC NAME	COMMON NAME	HABIT
Amaranthaceae		
Tidestromia oblongifolia	Arizona honey-sweet	Perennial
Asteraceae		
Ambrosia dumosa	Bursage, burrobush	Shrub
Baileya pauciradiata	Lax flower	Annual
Chaenactis carphoclinia	Pebble pincushion	Annual
Chaenactis fremontii	Fremont's pincushion	Annual
Dicoria canescens	Dicoria	Shrub
Encelia farinosa	Brittlebush	Shrub
Encelia virginensis ssp. *actoni*	Encelia	Shrub
Filago depressa	Dwarf filago	Annual
Geraea canescens	Desert sunflower	Annual
Hymenoclea salsola var. *salsola*	Cheesebush	Shrub
Lessingia lemmonii var. *lemmonii*		Annual
Malacothrix glabrata	Desert dandelion	Annual
Monoptilon bellioides	Desert star	Annual
Palafoxia linearis var. *linearis*	Spanish needles	Annual
Pectis papposa	Cinch weed	Annual
Psathyrotes ramosissima		Perennial/annual
Rafinesquia neomexicana	Desert chicory	Annual
Stephanomeria exigua	Small wirelettuce	Annual
Stephanomeria pauciflora var. *pauciflora*	Desert straw	Annual
Boraginaceae		
Amsinckia tessellata	Checkered fiddleneck	Annual
Coldenia plicata		Perennial
Cryptantha angustifolia	Narrow-leaved forget-me-not	Annual
Cryptantha barbigera		Annual
Cryptantha maritima	White-haired forget-me-not	Annual
Cryptantha micrantha ssp. *micrantha*	Purple-rooted forget-me-not	Annual
Cryptantha nevadensis var. *nevadensis*	Nevada forget-me-not	Annual
Cryptantha pterocarva	Wing-nutted forget-me-not	Annual
Pectocarya heterocarpa	Chuckwalla pectocarya	Annual
Pectocarya platycarpa	Broad-nutted comb-bur	Annual
Brassicaceae		
Brassica tournefortii[2]	Tournefort's mustard	Annual
Lepidium lasiocarpum	Lepidium	Annual
Sisymbrium irio[2]	London rocket	Annual
Cactaceae		
Opuntia echinocarpa	Silver cholla	Perennial
Opuntia ramosissima	Pencil cholla	Perennial

(1) Ecological Research Services, 1992b; Nomenclature follows Munz, 1974.
(2) Naturalized introduction.

TABLE G.1

PLANT SPECIES
BOLO STATION SITE[1]
(Continued)

SCIENTIFIC NAME	COMMON NAME	HABIT
Chenopodiaceae		
Atriplex canescens	Four-winged saltbush	Shrub
Atriplex polycarpa	Allscale saltbush	Shrub
Salsola australis[2]	Russian thistle	Annual
Salsola paulsenii[2]	Russian thistle	Annual
Suaeda torreyana var. *ramosissima*	Iodine bush	Shrub
Cucurbitaceae		
Cucurbita palmata	Coyote melon	Perennial
Euphorbiaceae		
Euphorbia micromera	Desert spurge	Annual
Euphorbia polycarpa var. *polycarpa*	Golondrina	Perennial
Euphorbia polycarpa var. *hirtella*	Sandmat	Perennial
Euphorbia setiloba	Yuma spurge	Annual
Fabaceae		
Dalea mollissima	Downy dalea	Perennial
Lupinus arizonicus	Arizona lupine	Annual
Hydrophyllaceae		
Nama demissum	Purplemat	Annual
Krameriaceae		
Krameria grayi	White ratany	Shrub/hemaparasite
Liliaceae		
Hesperocallis undulata	Desert lily	Perennial
Loasaceae		
Mentzelia albicaulis	White-stemmed blazing star	Annual
Malvaceae		
Eremalche exilis		Annual
Eremalche rotundifolia	Desert fivespot	Annual
Mimosaceae		
Acacia greggii var. *arizonica*	Catclaw acacia	Shrub
Nyctaginaceae		
Allionia incarnata	Windmills	Perennial/annual
Onagraceae		
Camissonia boothii ssp. *condensata*	Bottle cleaner	Annual
Camissonia claviformis ssp. *aurantiaca*	Brown-eyed primrose	Annual
Oenothera deltoides	Triangle evening primrose	Annual

(1) Ecological Research Services, 1992b; Nomenclature follows Munz, 1974.
(2) Naturalized introduction.

TABLE G.1

PLANT SPECIES
BOLO STATION SITE[1]
(Continued)

SCIENTIFIC NAME	COMMON NAME	HABIT
Orobanchaceae		
Orobanche ludoviciana var. *cooperi*	Cooper's broom-rape	Perennial/parasite
Papaveraceae		
Eschscholzia minutiflora	Pygmy poppy	Annual
Plantaginaceae		
Plantago insularis ssp. *fastigiata*[2]	Wooly plantain	Annual
Poaceae		
Aristida adscensionis	Six-week threeawn	Annual
Bouteloua aristidoides	Needle grama	Annual
Bouteloua barbata	Six-weeks grama	Annual
Erioneuron barbatus	Fluff grass	Perennial
Erioneuron pulchellum	Fluff grass	Perennial
Schismus barbatus[2]		Annual
Sporobolus airoides	Dropseed	Perennial
Polemoniaceae		
Eriastrum sparsiflorum	Few-flowered eriastrum	Annual
Langloisia punctata	Spotted langloisia	Annual
Langloisia schottii	Schott's langloisia	Annual
Polygonaceae		
Chorizanthe brevicornu	Brittle spine flower	Annual
Chorizanthe rigida	Rigid spine flower	Annual
Eriogonum inflatum ssp. *inflatum*	Desert trumpet	Perennial
Eriogonum trichopes	Hairy-footed buckwheat	Annual
Resedaceae		
Oligomeris linifolia	Slender oligomeris	Annual
Solanaceae		
Datura meteloides	Jimson weed	Perennial
Zygophyllaceae		
Larrea tridentata	Creosote bush	Shrub

91-109 (10/9/92/pjh)

(1) Ecological Research Services, 1992b; Nomenclature follows Munz, 1974.
(2) Naturalized introduction.

TABLE G.2

PLANT SPECIES OBSERVED DURING DESERT TORTOISE SURVEYS CADIZ VALLEY ALTERNATIVE SITE[1]

SCIENTIFIC NAME	COMMON NAME
Asclepiadeaceae	
Sarcostemma hirtellum	
Asclepias subculata	
Asteraceae	
Ambrosia dumosa	Bursage, burrobush
Bebbia juncea	
Chaenactis sp.	Pincushion
Encelia farinosa	Brittlebush
Encelia virginensis	
Hymenoclea salsola	Hopsage, cheesebush
Peucephyllum pauciflora	
Psathyrotes schatti	
Boraginaceae	
Cryptantha sp.	Forget-me-not
Amsinckia tessellata	Checkered fiddleneck
Cactaceae	
Echinocactus polycephalus	Hedgehog barrel cactus
Ferocactus acanthodes	Barrel cactus
Mammillariatet rancistra	Fishhook cactus
Opuntia echinocarpa	
Opuntia basilaris	Beavertail prickly pear
Opuntia ramosissima	Branched pencil cholla
Chenopodiaceae	
Atriplex polycarpa	Allscale
Chorizanthe brevicornu	
Chorizanthe rigida	
Suaeda torreyana	Iodine bush
Cruciferae	
Descurainia pinnata	Pinnate tanseymustard
Streptanthella longirostris	Long-beaked streptanthella
Euphorbiaceae	
Euphorbia albomarginato	White margin spurge
Ditaxis sp.	
Stillingia paucidentata	Stillingia
Fabaceae	
Acacia greggii	
Dalea spinosa	Smoke tree
Lupinus sp	Lupine

(1) Ecological Research Services, 1992e. Nomenclature follows Munz, 1974.

TABLE G.2

PLANT SPECIES OBSERVED DURING DESERT TORTOISE SURVEYS CADIZ VALLEY ALTERNATIVE SITE[1]

SCIENTIFIC NAME	COMMON NAME
Hydrophyllaceae	
Phacelia sp.	Phacelia
Krameriaceae	
Krameria parvifolia	Ratany
Loasaceae	
Mentzelia sp.	Blazing star
Menthaceae	
Hyptis emoryi	
Nyctaginaceae	
Allionia incarnata	Windmills
Onagraceae	
Camissonia sp.	Primrose
Oenothera deltoides	Triangle evening primrose
Orobanchaceae	
Orobanche ludoviciana	Broom-rape
Plantaginaceae	
Plantago insularis	Plantain
Poaceae	
Boeuteloua sp.	Grama grass
Erioneuron pulchellum	Fluff grass
Festuca sp.	
Hilaria rigida	Big galleta grass
Schismus arabicus	Arabian schismus
Polemoniaceae	
Langloisia sp.	Langloisia
Polygonaceae	
Eriogonum inflatum	Desert trumpet
Eriogonum spp.	Buckwheat
Solanaceae	
Physalis sp.	
Zygophyllaceae	
Larrea tridentata	Creosote bush

91-109 (10/9/92/pjh)

(1) Ecological Research Services, 1992e. Nomenclature follows Munz, 1974.

TABLE G.3

PLANT SPECIES
PIUTE VALLEY OFFERED LANDS SITE [1]

SCIENTIFIC NAME	COMMON NAME
Agavaceae	
Yucca schidigera	Mojave yucca
Amaranthaceae	
Amaranthus sp.	Amaranth
Asteraceae	
Acamptopappus sphaerocephalus	Ragless goldenhead
Ambrosia dumosa	Bursage
Baileya multiradiata	Desert marigold
Hymenoclea salsola	Cheesebush
Pectis papposa	Cinch weed
Stephanomeria pauciflora [2]	Desert straw
Xylorhiza tortifolia	Xlorhiza
Boraginaceae	
Amsinckia tessellata	Checkered fiddleneck
Cactaceae	
Echinocactus polycephalus	Cottontop cactus
Echinocereus engelmannii	Hedgehog cactus
Ferocactus acanthodes	Barrel cactus
Mammillaria (probably *tetrancistra*)	Fishhook cactus
Opuntia acanthocarpa	Buckhorn cholla
Opuntia basilaris	Beavertail cactus
Opuntia ramosissima	Pencil cactus
Cruciferae	
Descurainia pinnata	Pinnate tansey-mustard
Streptanthella longirostris	Long-beaked streptanthella
Ephedraceae	
Ephedra nevadensis	Mormon tea
Euphorbiaceae	
Euphorbia albomarginato	White margin spurge
Stillingia paucidentata	Stillingia
Fabaceae	
Acacia greggii	Catclaw acacia
Lotus tomentellus	Desert dearvetch
Lupinus sp. [2]	Lupine
Geraniaceae	
Erodium cicutarium	Storksbill
Hydrophyllaceae	
Phacelia sp.	Phacelia
Krameriaceae	
Krameria parvifolia	Little-leaf ratany

(1) Ecological Resource Services, 1992a. Nomenclature follows Munz, 1974.
(2) Annual.

TABLE G.3

PLANT SPECIES
PIUTE VALLEY OFFERED LANDS SITE (1)
(Continued)

SCIENTIFIC NAME	COMMON NAME
Labiatae	
Salazaria mexicana	Bladder sage
Salvia carduacea	Thistle sage
Loasaceae	
Mentzelia sp.	Blazing star
Malvaceae	
Sphaeralcea ambigua	Desert globemallow
Nyctaginaceae	
Allionia incarnata	Windmills
Plantaginaceae	
Plantago insularis	Wooly plantain
Poacea	
Boeuteloua sp. (2)	Grama grass
Erioneuron pulchellum	Fluff grass
Hilaria rigida	Big galleta grass
Schismus arabicus	Arabian schismus
Polemoniaceae	
Eriastrum diffusum	Diffuse eriastrum
Polygonaceae	
Chorizanthe brevicornu	Brittle spine flower
Chorizanthe rigida	Rigid spine Flower
Eriogonum fasciculatum	California buckwheat
Eriogonum inflatum	Desert trumpet
Eriogonum spp. (2)	Buckwheat
Rosaceae	
Prunus fasciculata	Desert almond
Zygophyllaceae	
Larrea tridentata	Creosote bush

91-109 (11/12/92/mg)

(1) Ecological Resource Services, 1992a. Nomenclature follows Munz, 1974.
(2) Annual.

TABLE G.4

REPTILES KNOWN AND EXPECTED IN THE VICINITY OF THE BOLO STATION AND CADIZ VALLEY ALTERNATIVE SITES[1]

SCIENTIFIC NAME	COMMON NAME
Boidae	
Lichanura trivirgata	Rosy boa[2]
Colubridae	
Arizona elegans	Glossy snake[2]
Chionactis occipitalis	Western shovel-nosed snake[3]
Hypsiglena torquata	Night snake[2]
Masticophis flagellum	Coachwhip[2]
Phyllorhynchus decurtatus	Spotted leaf-nosed snake[2]
Pituophis melanoleucus	Gopher snake[2]
Rhinocheilus lecontei	Long-nosed snake[2]
Salvadora hexalepis	Western patch-nosed snake[3]
Gekkonidae	
Coleonyx variegatus	Banded gecko[2]
Iguanidae	
Callisaurus draconoides	Zebra-tailed lizard[3]
Crotophytus insularis	Desert collared lizard[2]
Dipsosaurus dorsalis	Desert iguana[3]
Gambelia wizlizenii	Leopard lizard[3]
Phrynosoma platyrhinos	Desert horned lizard[3]
Sauromalus obesus	Chuckwalla[2]
Sceloporus magister	Desert spiny lizard[2]
Uma scoparia	Mojave fringe-toed lizard[3]
Urosaurus graciosus	Long-tailed brush lizard[2]
Uta stansburiana	Side-blotched lizard[3]
Telidae	
Cnemidophotus tigris	Western whiptail[2]
Viperidae	
Crotalus cerastes	Sidewinder[3]
Crotalus scutulatus	Mojave rattlesnake[2]
Gopherus aggassizi	Desert tortoise[3]

91-109 (11/12/92/mg)

(1) Ecological Research Services, 1990; 1991; 1992d; 1992e.
(2) Expected on known range and habitat preference.
(3) Actual observation onsite.

TABLE G.5

BIRDS KNOWN AND EXPECTED IN THE VICINITY OF THE BOLO STATION AND CADIZ VALLEY ALTERNATIVE SITES[1]

SCIENTIFIC NAME	COMMON NAME	OCCURRENCE AND OBSERVATION[2]
Accipitridae	**Hawks and Eagles**	
Aguila chrysaetos	Golden eagle	R[4]
Buteo jamaicensis	Red-tailed hawk	R[3][4][5]
Circus cyaneus	Northern harrier	M[5]
Alaudidae	**Larks**	
Eremophila alpestris	Horned lark	W[3]
Caprimulgidae	**Nightjars**	
Chordeiles acutipennis	Lesser nighthawk	S[3]
Phalaenoptilus nuttallii	Common poorwill	S[6]
Cathartidae	**Vultures**	
Cathartes aura	Turkey vulture	M[3][4]
Columbidae	**Pigeons**	
Columbia livia	Rock dove	R[4]
Zenaida macroura	Mourning dove	R[3][4]
Corvidae	**Jays, Crows, and Allies**	
Corvus corax	Common raven	R[3][4][5]
Cuculidae	**Cuckoos**	
Geococcyx californianus	Greater roadrunner	R[3]
Emberizidae	**Warblers, Sparrows, and others**	
Amphispiza belli	Sage sparrow	R[4]
Amphispiza bilineata	Black-throated sparrow	R[5]
Dendroica coronata	Yellow-rumped warbler	R[4][5]
Dendroica petechia	Yellow warble	W[3][4][5]
Euphagus cyanocephalus	Brewer's blackbird	M[3]
Icterus galbula	Northern oriole	W[3][4]
Spizella breweri	Brewer's sparrow	M[3]
Spizella passerina	Chipping sparrow	M[3][5]
Wilsonia pushilla	Wilson's warble	M[5]
Zonotrichia leucophrys	White-crowned sparrow	M[3]
		W[5]
Falconidae	**Falcons**	
Falco mexicanus	Prairie falcon	R[3][4]
Falco sparverius	American kestrel	R[3][4][5]
Fringillidae	**Finches**	
Carpodacus mexicanus	House finch	R[3][5]
Hirundinidae	**Swallows**	
Tachycineta thalassina	Violet-green swallow	M[5]
Hirundo pyrrhonota	Cliff swallow	M[5]
Hirundo rustica	Barn swallow	M[5]

(1) Ecological Research Services, 1990; 1991; 1992d; 1992c.
(2) M = Migrant; R = Permanent Resident; S = Summer Resident; W = Winter Resident.
(3) Observed during 1990 survey.
(4) Observed during winter 1991 survey.
(5) Observed during spring 1991 survey.
(6) Expected but not seen.

TABLE G.5

BIRDS KNOWN AND EXPECTED IN THE VICINITY OF THE BOLO STATION AND CADIZ VALLEY ALTERNATIVE SITES[1] (Continued)

SCIENTIFIC NAME	COMMON NAME	OCCURRENCE AND OBSERVATION[2]
Laniidae	**Shrikes**	
Lanius ludovicianus	Loggerhead shrike	R [3][4]
Mimidae	**Mimic Thushes**	
Mimus polyglottos	Northern mockingbird	R[3]
Oreoscoptes montanus	Sage thrasher	M[5]
Toxostoma lecontei	Le Conte's thrasher	R[3]
Motacillidae	**Larks**	
Eremophila alpestris	Horned lark	W[4][5]
Muscicapidae	**Kinglets and Thrushes**	
Polioptila melanura	Black-tailed gnatcatcher	R[3][5]
Regulus calendula	Ruby-crowned kinglet	R[4]
Paridae	**Titmice**	
Auriparus flaviceps	Verdin	R[5]
Passeridae	**Weavers**	
Passer domesticus	House sparrow	R[4]
Picidae	**Woodpeckers**	
Colaptes auratus	Northern flicker	R[4]
Ptilogonatidae	**Flycatchers**	
Phainopepla nitens	Phainopepla	S[3]
Strigidae	**Owls**	
Asio otus	Long-eared owl	W[4]
Bubo virginianus	Great horned owl	R[6]
Sturnidae	**Starlings**	
Sturnus vulgaris	European starling	R[4]
Trochilidae	**Hummingbirds**	
Calypte costae	Costa's hummingbird	S[6]
Troglodytidae	**Wrens**	
Salpinctes obsoletus	Rock wren	R[3]
Thryomanes bewickii	Bewick's wren	R[3]
Tyrannidae	**Tyrant Flycatchers**	
Empidonax sp.	Empid flycatcher	M[5]
Empidonax wrightii	Gray flycatcher	M[3]
Myiarchus cinerascens	Ash-throated flycatcher	S[3]
Sayornis saya	Say's phoebe	R[4]
Tyrannis verticalis	Western flycatcher	M[5]

91-109 (11/12/92/mg)

(1) Ecological Research Services, 1990; 1991; 1992.
(2) M = Migrant; R = Permanent Resident; S = Summer Resident; W = Winter Resident.
(3) Observed during 1990 survey.
(4) Observed during winter 1991 survey.
(5) Observed during spring 1991 survey.
(6) Expected but not seen.

TABLE G.6

MAMMALS KNOWN AND EXPECTED IN THE VICINITY OF THE BOLO STATION AND CADIZ VALLEY ALTERNATIVE SITES[1]

SCIENTIFIC NAME	COMMON NAME
Canidae	
Canis latrans	Coyote[2]
Vulpes macrotis macrotis	Kit fox[2]
Cricetidae	
Neotoma lepida	Cactus mouse[3]
Onychomys torridus	Deer mouse[3]
Peromyscus eremicus	Desert woodrat[3]
Peromyscus maniculatus	South grasshopper mouse[3]
Equidae	
Equus asinus	Burro[3]
Feilidae	
Felis rufus	Bobcat[3]
Heteromyidae	
Dipodomys deserti	Desert kangaroo rat[2]
Dipodomys merriami	Merriam's kangaroo rat[2]
Perognathus longimembris	Little pocket mouse[3]
Perognathus penicillatus	Desert pocket mouse[3]
Perognathus formosus	Longtail pocket mouse[3]
Leporidae	
Lepus californicus	Black-tailed jackrabbit[2]
Sylvilagus audubonii	Audubon's cottontail[3]
Molossidae	
Tadarida brasiliensis	Mexican freetail bat[3]
Sciuridae	
Ammospermophilus leucurus	Antelope ground squirrel[3]
Spermophilus tereticaudus	Round-tailed ground squirrel[2]
Vespertilionidae	
Antrozous pallidus	California myotis[3]
Eptesicus fuscus	Western pipistrel[2]
Lasiurus cinereus	Big brown bat[3]
Myotis californicus	Hoary bat[3]
Pipistrellus hesperus	Pallid bat[3]
Ovis canadensis nelsoni	Nelson's bighorn sheep[3]

91-109 (11/12/92/mg)

(1) Ecological Research Services, 1990; 1991d; 1992e.
(2) Actual observation onsite.
(3) Based on known range and habitat preference.

APPENDIX H
AIR QUALITY CONSTRUCTION AND VEHICLE EMISSION IMPACTS

TABLE H.1
BOLO OFFLOADING FACILITY PHASE I CONSTRUCTION EMISSIONS

EMISSION SOURCE	AVERAGE NUMBER	LOAD POWER RATING (HP)	LOAD FACTOR (%)	OPERATING TIME			WORST HOUR ACTIVITY (MAXIMUM MONTH)		WORST DAY ACTIVITY (MAXIMUM MONTH)		EMISSION FACTORS					UNITS	RHC/THC
				hrs/day	days/week	weeks	NUMBER	DURATION	NUMBER	DURATION	THC	NOx	SO2	CO	PM10		RATIO
-Light Trucks	10	102	55%	8	5	39	22	1	22	8	1.10	5.00	0.19	14.40	0.10	g/bhp-hr	1.00
-Heavy Trucks	17	300	55%	8	5	30	49	1	49	8	1.00	6.90	0.22	8.50	0.40	g/bhp-hr	0.95
-Worktrain (2 Locomotives)	2	IDLE	IDLE	8	5	6	2	1	2	8	213.00	1292.00	89.00	600.00	46.00	g/hour	1.00
-Pile Driver	1	300	55%	8	5	4	1	1	1	8	1.00	6.90	0.22	8.50	0.40	g/bhp-hr	0.95
-Front End Loader	2	300	55%	8	5	6	4	1	4	8	1.00	6.90	0.22	8.50	0.40	g/bhp-hr	0.95
-Dozer	5	520	55%	8	5	13	6	1	6	8	1.00	6.90	0.22	8.50	0.40	g/bhp-hr	0.95
-Elevating Scraper	9	250	55%	8	5	13	9	1	9	8	1.00	6.90	0.22	8.50	0.40	g/bhp-hr	0.95
-Compactor	4	125	55%	8	5	17	8	1	8	8	1.06	14.27	0.22	6.72	0.78	g/bhp-hr	1.00
-Aggregate Spreader	3	150	55%	8	5	13	3	1	3	8	0.36	7.14	0.22	1.54	0.63	g/bhp-hr	1.00
-Motorgrader	3	150	55%	8	5	17	3	1	3	8	0.36	7.14	0.22	1.54	0.63	g/bhp-hr	1.00
-Backhoe	1	150	55%	8	5	9	2	1	2	8	1.76	11.91	0.22	7.34	1.27	g/bhp-hr	1.00
-Paving Machine (47K Tons Total)	1	102	55%	8	5	4	1	1	1	8	0.99	11.18	0.22	5.19	0.90	g/bhp-hr	1.00
-Batch Plant (11K Toos Total)	92 Ton	NA	100%	8	5	3	92 Ton	1	92 Ton	8	0.028	0.036	0.064	0.038	0.014	lb/too	1.00
-Speedswing	2	150	55%	8	5	26	5	1	5	8	1.76	11.91	0.22	7.34	1.27	g/bhp-hr	1.00
-Compressor	2	102	55%	8	5	22	3	1	3	8	0.99	11.18	0.22	5.19	0.90	g/bhp-hr	1.00
-Liner	1	150	55%	8	5	9	1	1	1	8	1.76	11.91	0.22	7.34	1.27	g/bhp-hr	1.00
-Tamper	1	150	55%	8	5	9	1	1	1	8	1.76	11.91	0.22	7.34	1.27	g/bhp-hr	1.00
-Ballast Regulator	1	150	55%	8	5	9	1	1	1	8	1.76	11.91	0.22	7.34	1.27	g/bhp-hr	1.00
-Anchor Applicator	1	150	55%	8	5	13	1	1	1	8	1.76	11.91	0.22	7.34	1.27	g/bhp-hr	1.00
-Spiking Machine	1	150	55%	8	5	13	1	1	1	8	1.76	11.91	0.22	7.34	1.27	g/bhp-hr	1.00
-PM10 (80 ACRES TOTAL)	17/Day			8	5	17			17						0.60	t/acre-month	1.00

EMISSION SOURCE	MAXIMUM HOURLY (LBS/HOUR)		WORST DAY EMISSION (LBS/DAY)					TOTAL EMISSION (TONS)				
(FUEL TYPE)	NOx	CO	RHC	NOx	SO2	CO	PM10	RHC	NOx	SO2	CO	PM10
-Light Trucks	13.60	39.18	23.94	108.84	4.14	313.45	2.18	1.06	4.82	0.18	13.89	0.10
-Heavy Trucks	122.99	151.51	135.47	983.91	31.37	1212.06	57.04	3.52	25.60	0.82	31.54	1.48
-Worktrain	5.70	2.65	7.51	45.57	3.14	21.16	1.62	0.11	0.68	0.05	0.32	0.02
-Pile Driver	2.51	3.09	2.76	20.08	0.64	24.74	1.16	0.03	0.20	0.01	0.25	0.01
-Front End Loader	10.04	12.37	11.06	80.32	2.56	98.94	4.66	0.08	0.60	0.02	0.74	0.03
-Dozer	26.10	32.16	28.75	208.83	6.66	257.25	12.11	0.78	5.66	0.18	6.97	0.33
-Elevating Scraper	18.82	23.19	20.73	150.60	4.80	185.52	8.73	0.67	4.89	0.16	6.03	0.28
-Compactor	17.30	8.15	10.28	138.42	2.13	65.19	7.57	0.22	2.94	0.05	1.39	0.16
-Aggregate Spreader	3.90	0.84	1.57	31.17	0.96	6.72	2.75	0.05	1.01	0.03	0.22	0.09
-Motorgrader	3.90	0.84	1.57	31.17	0.96	6.72	2.75	0.07	1.32	0.04	0.29	0.12
-Backhoe	4.33	2.67	5.12	34.66	0.64	21.36	3.70	0.06	0.39	0.01	0.24	0.04
-Paving Machine	1.38	0.64	0.98	11.06	0.22	5.14	0.89	0.01	0.11	0.00	0.05	0.01
-Batch Plant	3.31	3.50	20.61	26.50	47.10	27.97	10.08	0.15	0.20	0.35	0.21	0.08
-Speedswing	10.83	6.68	12.80	86.65	1.60	53.40	9.24	0.33	2.25	0.04	1.39	0.24
-Compressor	4.15	1.93	2.94	33.19	0.65	15.41	2.67	0.11	1.22	0.02	0.56	0.10
-Liner	2.17	1.34	2.56	17.33	0.32	10.68	1.85	0.06	0.39	0.01	0.24	0.04
-Tamper	2.17	1.34	2.56	17.33	0.32	10.68	1.85	0.06	0.39	0.01	0.24	0.04
-Ballast Regulator	2.17	1.34	2.56	17.33	0.32	10.68	1.85	0.06	0.39	0.01	0.24	0.04
-Anchor Applicator	2.17	1.34	2.56	17.33	0.32	10.68	1.85	0.08	0.56	0.01	0.35	0.06
-Spiking Machine	2.17	1.34	2.56	17.33	0.32	10.68	1.85	0.08	0.56	0.01	0.35	0.06
-PM10 (80 ACRES TOTAL)							941.54					40.02
TOTAL CONSTRUCTION	259.70	296.05	298.92	2077.61	109.18	2368.44	1077.92	7.60	54.21	2.00	65.49	43.35

Notes:

Equipment numbers shown are average monthly peak values for months used.

The number of weeks are based on the number of months scheduled and not on weekly schedule except locomotives.

Weeks for Locomotives are based on actual schedule weeks.

Railway equipment emission factors were assumed based on equivalency to similar construction equipment.

Batch Plant particulate emission factor assumes 95% control due to a baghouse.

50 percent PM10 fraction assumed for disturbed areas.

TABLE H.2
BOLO OFFLOADING FACILITY PHASE II CONSTRUCTION EMISSIONS

EMISSION SOURCE	AVERAGE NUMBER	LOAD POWER RATING (HP)	LOAD FACTOR (%)	OPERATING TIME			WORST HOUR ACTIVITY (MAXIMUM MONTH)		WORST DAY ACTIVITY (MAXIMUM MONTH)		EMISSION FACTORS					UNITS	RHC/THC RATIO
				hrs/day	days/week	weeks	NUMBER	DURATION	NUMBER	DURATION	THC	NOx	SO2	CO	PM10		
-Light Trucks	10	102	55%	8	5	30	17	1	17	8	1.10	5.00	0.19	14.40	0.10	g/bhp-hr	1.00
-Heavy Trucks	11	300	55%	8	5	30	30	1	30	8	1.00	6.90	0.22	8.50	0.40	g/bhp-hr	0.95
-Worktrain (2 Locomotives)	2	IDLE	IDLE	8	5	4	2	1	2	8	213.00	1292.00	89.00	600.00	46.00	g/hour	1.00
-Pile Driver	0	300	55%	8	5	0	0	1	0	8	1.00	6.90	0.22	8.50	0.40	g/bhp-hr	0.95
-Front End Loader	1	300	55%	8	5	13	2	1	2	8	1.00	6.90	0.22	8.50	0.40	g/bhp-hr	0.95
-Dozer	0	520	55%	8	5	0	0	1	0	8	1.00	6.90	0.22	8.50	0.40	g/bhp-hr	0.95
-Elevating Scraper	0	250	55%	8	5	0	0	1	0	8	1.00	6.90	0.22	8.50	0.40	g/bhp-hr	0.95
-Compactor	2	125	55%	8	5	13	2	1	2	8	1.06	14.27	0.22	6.72	0.78	g/bhp-hr	1.00
-Aggregate Spreader	2	150	55%	8	5	4	2	1	2	8	0.36	7.14	0.22	1.54	0.63	g/bhp-hr	1.00
-Motorgrader	2	150	55%	8	5	8	2	1	2	8	0.36	7.14	0.22	1.54	0.63	g/bhp-hr	1.00
-Backhoe	1	150	55%	8	5	9	2	1	2	8	1.76	11.91	0.22	7.34	1.27	g/bhp-hr	1.00
-Paving Machine (35K Tons Total)	1	102	55%	8	5	4	1	1	1	8	0.99	11.18	0.22	5.19	0.90	g/bhp-hr	1.00
-Batch Plant (9K Tons Total)	75 Ton	NA	100%	8	5	3	75 Ton	1	75 Ton	8	0.028	0.036	0.064	0.038	0.014	lb/ton	1.00
-Speedswing	3	150	55%	8	5	13	3	1	3	8	1.76	11.91	0.22	7.34	1.27	g/bhp-hr	1.00
-Compressor	2	102	55%	8	5	13	3	1	3	8	0.99	11.18	0.22	5.19	0.90	g/bhp-hr	1.00
-Liner	1	150	55%	8	5	9	1	1	1	8	1.76	11.91	0.22	7.34	1.27	g/bhp-hr	1.00
-Tamper	1	150	55%	8	5	9	1	1	1	8	1.76	11.91	0.22	7.34	1.27	g/bhp-hr	1.00
-Ballast Regulator	1	150	55%	8	5	9	1	1	1	8	1.76	11.91	0.22	7.34	1.27	g/bhp-hr	1.00
-Anchor Applicator	1	150	55%	8	5	4	1	1	1	8	1.76	11.91	0.22	7.34	1.27	g/bhp-hr	1.00
-Spiking Machine	1	150	55%	8	5	4	1	1	1	8	1.76	11.91	0.22	7.34	1.27	g/bhp-hr	1.00
-PM10 (130 ACRES TOTAL)	17/Day			8	5	17			17						0.60	t/acre-month	1.00

EMISSION SOURCE	MAXIMUM HOURLY (LBS/HOUR)		WORST DAY EMISSION (LBS/DAY)					TOTAL EMISSION (TONS)				
(FUEL TYPE)	NOx	CO	RHC	NOx	SO2	CO	PM10	RHC	NOx	SO2	CO	PM10
-Light Trucks	10.51	30.28	18.50	84.10	3.20	242.21	1.68	0.82	3.71	0.14	10.69	0.07
-Heavy Trucks	75.30	92.76	82.94	602.39	19.21	742.08	34.92	2.28	16.57	0.53	20.41	0.96
-Worktrain	5.70	2.65	7.51	45.57	3.14	21.16	1.62	0.08	0.46	0.03	0.21	0.02
-Pile Driver	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-Front End Loader	5.02	6.18	5.53	40.16	1.28	49.47	2.33	0.09	0.65	0.02	0.80	0.04
-Dozer	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-Elevating Scraper	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-Compactor	4.33	2.04	2.57	34.61	0.53	16.30	1.89	0.08	1.12	0.02	0.53	0.06
-Aggregate Spreader	2.60	0.56	1.05	20.78	0.64	4.48	1.83	0.01	0.21	0.01	0.04	0.02
-Motorgrader	2.60	0.56	1.05	20.78	0.64	4.48	1.83	0.02	0.42	0.01	0.09	0.04
-Backhoe	4.33	2.67	5.12	34.66	0.64	21.36	3.70	0.06	0.39	0.01	0.24	0.04
-Paving Machine	1.38	0.64	0.98	11.06	0.22	5.14	0.89	0.01	0.11	0.00	0.05	0.01
-Batch Plant	2.70	2.85	16.80	21.60	38.40	22.80	8.22	0.13	0.16	0.29	0.17	0.06
-Speedswing	6.50	4.01	7.68	51.99	0.96	32.04	5.54	0.25	1.69	0.03	1.04	0.18
-Compressor	4.15	1.93	2.94	33.19	0.65	15.41	2.67	0.06	0.72	0.01	0.33	0.06
-Liner	2.17	1.34	2.56	17.33	0.32	10.68	1.85	0.06	0.39	0.01	0.24	0.04
-Tamper	2.17	1.34	2.56	17.33	0.32	10.68	1.85	0.06	0.39	0.01	0.24	0.04
-Ballast Regulator	2.17	1.34	2.56	17.33	0.32	10.68	1.85	0.06	0.39	0.01	0.24	0.04
-Anchor Applicator	2.17	1.34	2.56	17.33	0.32	10.68	1.85	0.03	0.17	0.00	0.11	0.02
-Spiking Machine	2.17	1.34	2.56	17.33	0.32	10.68	1.85	0.03	0.17	0.00	0.11	0.02
-PM10 (130 ACRES TOTAL)							941.54					40.02
TOTAL CONSTRUCTION	135.94	153.79	165.48	1087.54	71.11	1230.33	1017.91	4.11	27.72	1.13	35.55	41.73

Notes:

Equipment numbers shown are average monthly peak values for months used.

The number of weeks are based on the number of months scheduled and not on weekly schedule except locomotives.

Weeks for Locomotives are based on actual schedule weeks.

Railway equipment emission factors were assumed based on equivalency to similar construction equipment.

Batch Plant particulate emission factor assumes 95% control due to a baghouse.

50 percent PM10 fraction assumed for disturbed areas.

EMFAC7PC EMISSION FACTORS
VERSION :EMFAC7D ...11/88

YEAR : 1990 TEMPERATURE : 60
PERCENT VMT COLD : 30.0 PERCENT VMT HOT : 10.0

PM10 Percent Exhaust : 99.1 Tire Wear : 40.0
Sulfur Content Leaded :450.0 ppm Unleaded :200.0 ppm
Sulfur Content Diesel :0.280 %

GRAMS PER MILE

Speed	TOG	CO	NOX
30 MPH	1.81	21.00	1.92

Idle Emission Factors

TOG	0.25	Gr/Min	Fuel Use	20.1 MPG
CO	2.70	Gr/Min	PM10	0.201 GR/MILE
NOx	0.18	Gr/Min	Sox	0.211 Gr/Mile

EMFAC7PC EMISSION FACTORS
VERSION :EMFAC7D ...11/88

YEAR : 1995 TEMPERATURE : 60
PERCENT VMT COLD : 30.0 PERCENT VMT HOT : 10.0

PM10 Percent Exhaust : 99.1 Tire Wear : 40.0
Sulfur Content Leaded :450.0 ppm Unleaded :200.0 ppm
Sulfur Content Diesel :0.280 %

GRAMS PER MILE

Speed	TOG	CO	NOX
30 MPH	1.33	16.78	1.63

Idle Emission Factors

TOG	0.18	Gr/Min	Fuel Use	22.3 MPG
CO	1.72	Gr/Min	PM10	0.167 GR/MILE
NOx	0.16	Gr/Min	Sox	0.191 Gr/Mile

EMFAC7PC EMISSION FACTORS
VERSION :EMFAC7D ...11/88

YEAR : 2000 TEMPERATURE : 60
PERCENT VMT COLD : 30.0 PERCENT VMT HOT : 10.0

PM10 Percent Exhaust : 99.1 Tire Wear : 40.0
Sulfur Content Leaded :450.0 ppm Unleaded :200.0 ppm
Sulfur Content Diesel :0.280 %

GRAMS PER MILE

Speed	TOG	CO	NOX
30 MPH	1.11	14.87	1.52

Idle Emission Factors

TOG	0.15	Gr/Min	Fuel Use	24.3	MPG
CO	1.28	Gr/Min	PM10	0.147	GR/MILE
NOx	0.15	Gr/Min	Sox	0.175	Gr/Mile

REPORT FOR FILE : EXIST

1. Site Variables

U=	1.0 M/S	ZO=	100.0 CM
BRG=	0.0 DEGREES	VD=	0.0 CM/S
CLASS=	F STABILITY	VS=	0.0 CM/S
MIXH=	500.0 M	AMB=	0.0 PPM
SIGTH=	10.0 DEGREES	TEMP=	15.0 DEGREE (C)

2. Link Description

LINK DESCRIPTION	*	LINK COORDINATES (M) X1	Y1	X2	Y2	* TYPE	VPH	EF (G/MI)	H (M)	W (M
A. Rialto EB		0	400	0	0	IN	323	21.0	0.0	12
B. Rialto WB		10	0	10	400	IN	323	21.0	0.0	12

LINK	*	MIXW L (M)	R (M)	STPL (M)	DCLT (SEC)	ACCT (SEC)	SPD (MPH)	NCYC	NDLA	VPHO	EFI (G/MIN)	IDT1 (SEC)	ID2 (S
A.		0	0	197	6.5	9.1	30	81	9	323	2.7	%196.0	%
B.		0	0	197	6.5	9.1	30	81	9	323	2.7	%196.0	%

3. Receptor Coordinates

		X	Y	Z
RECEPTOR	1	250	-50	1.3
RECEPTOR	2	225	-25	1.3
RECEPTOR	3	225	35	1.3
RECEPTOR	4	250	60	1.3
RECEPTOR	5	150	-50	1.3
RECEPTOR	6	175	-25	1.3
RECEPTOR	7	175	35	1.3
RECEPTOR	8	150	60	1.3

REPORT FOR FILE : 3K_CUM

1. Site Variables

U=	1.0 M/S	ZO=	100.0 CM
BRG=	0.0 DEGREES	VD=	0.0 CM/S
CLASS=	F STABILITY	VS=	0.0 CM/S
MIXH=	500.0 M	AMB=	0.0 PPM
SIGTH=	10.0 DEGREES	TEMP=	15.0 DEGREE (C)

2. Link Description

LINK DESCRIPTION	*	LINK COORDINATES (M) X1	Y1	X2	Y2	* TYPE	VPH	EF (G/MI)	H (M)	W (M)
. Rialto EB		0	400	0	0	IN	360	16.8	0.0	12.6
. Rialto WB		10	0	10	400	IN	360	16.8	0.0	12.6

LINK	*	MIXW L (M)	R (M)	STPL (M)	DCLT (SEC)	ACCT (SEC)	SPD (MPH)	NCYC	NDLA	VPHO	EFI (G/MIN)	IDT1 (SEC)	IDT2 (SEC)
A.		0	0	197	6.5	9.1	30	60	10	360	1.7	%196.0	%196
B.		0	0	197	6.5	9.1	30	60	10	360	1.7	%196.0	%196

3. Receptor Coordinates

		X	Y	Z
RECEPTOR	1	250	-50	1.3
RECEPTOR	2	225	-25	1.3
RECEPTOR	3	225	35	1.3
RECEPTOR	4	250	60	1.3
RECEPTOR	5	150	-50	1.3
RECEPTOR	6	175	-25	1.3
RECEPTOR	7	175	35	1.3
RECEPTOR	8	150	60	1.3

REPORT FOR FILE : 21K_CUM

1. Site Variables

U=	1.0 M/S	ZO=	100.0 CM
BRG=	0.0 DEGREES	VD=	0.0 CM/S
CLASS=	F STABILITY	VS=	0.0 CM/S
MIXH=	500.0 M	AMB=	0.0 PPM
SIGTH=	10.0 DEGREES	TEMP=	15.0 DEGREE (C)

2. Link Description

LINK DESCRIPTION	*	LINK COORDINATES (M) X1	Y1	X2	Y2	* TYPE	VPH	EF (G/MI)	H (M)	W (M
A. Rialto EB		0	400	0	0	IN	501	14.9	0.0	12
B. Rialto WB		10	0	10	400	IN	501	14.9	0.0	12

LINK	*	MIXW L (M)	R (M)	STPL (M)	DCLT (SEC)	ACCT (SEC)	SPD (MPH)	NCYC	NDLA	VPHO	EFI (G/MIN)	IDT1 (SEC)	ID2 (S
A.		0	0	197	6.5	9.1	30	63	14	501	1.3	%196.0	%9
B.		0	0	197	6.5	9.1	30	63	14	501	1.3	%196.0	%9

3. Receptor Coordinates

		X	Y	Z
RECEPTOR	1	250	-50	1.3
RECEPTOR	2	225	-25	1.3
RECEPTOR	3	225	35	1.3
RECEPTOR	4	250	60	1.3
RECEPTOR	5	150	-50	1.3
RECEPTOR	6	175	-25	1.3
RECEPTOR	7	175	35	1.3
RECEPTOR	8	150	60	1.3

MODEL RESULTS FOR FILE EXIST

RECEPTOR	* PRED CONC (PPM)	*WIND * BRG *(DEG)*	COCN/LINK (PPM) A	B
RECPT 1	* 0.1	* 315 *	0.1	0.1
RECPT 2	* 0.2	* 315 *	0.1	0.1
RECPT 3	* 0.2	* 306 *	0.1	0.1
RECPT 4	* 0.1	* 299 *	0.1	0.1
RECPT 5	* 0.2	* 329 *	0.1	0.1
RECPT 6	* 0.2	* 322 *	0.1	0.1
RECPT 7	* 0.2	* 313 *	0.1	0.1
RECPT 8	* 0.2	* 314 *	0.1	0.1

MODEL RESULTS FOR FILE 3K_CUM

RECEPTOR	PRED CONC (PPM)	WIND BRG (DEG)	COCN/LINK (PPM) A	B
RECPT 1	0.1	315	0.1	0.1
RECPT 2	0.2	315	0.1	0.1
RECPT 3	0.2	306	0.1	0.1
RECPT 4	0.1	299	0.1	0.1
RECPT 5	0.2	329	0.1	0.1
RECPT 6	0.2	322	0.1	0.1
RECPT 7	0.2	313	0.1	0.1
RECPT 8	0.2	314	0.1	0.1

MODEL RESULTS FOR FILE 21K_CUM

RECEPTOR	* PRED CONC (PPM)	*WIND * BRG (DEG)	COCN/LINK (PPM) A	B
RECPT 1	0.2	315	0.1	0.1
RECPT 2	0.2	315	0.1	0.1
RECPT 3	0.2	308	0.1	0.1
RECPT 4	0.2	301	0.1	0.1
RECPT 5	0.2	329	0.1	0.1
RECPT 6	0.2	322	0.1	0.1
RECPT 7	0.2	315	0.1	0.1
RECPT 8	0.2	315	0.1	0.1

APPENDIX I
TRANSPORTATION CALCULATIONS

APPENDIX I

TRANSPORTATION CALCULATIONS

1. To support conclusions provided in Sections 4.12 and 4.13 detailed calculations were performed to determine current and potential delay times and Hazard Index values at railroad grade crossings. These calculations were performed using computer spreadsheet models and have been included in this appendix to support the values used in Sections 4.12 and 4.13. A brief summary of the items included in this appendix is listed below:

   - **Table I.1, Railroad Crossing Inventory, San Bernardino County** - This table includes an inventory of public railroad crossings which could be potentially affected by the proposed action. Also included on the table are PUC crossing numbers, crossing/signal type, number of accidents from February 1982 through February 1992, average daily traffic, eastbound and westbound maximum authorized speed, and freight train speed and average and maximum number of trains per day. Some of these values were used as part of the calculations to determine crossing delay time and hazard index values.

   - **Tables I.2 to I.6, Hazard Index Calculations** - These tables contain factors used to calculate individual hazard index values for each affected at-grade railroad crossing. The hazard index values were calculated using the formula:

     Hazard Index = ADT x Number of Trains x K/1000
     K = Warning Signal Coefficient

Crossing Type[1]	K
1R	1.0
8	0.33
9	0.13
9A	0.13

   - **Tables I.7 to I.11, Vehicle Delay Times** - These tables contain calculations performed to determine vehicle delay times at railroad grade crossings. Delay time is calculated as follows:

     $$\text{Delay Time} = TG^2 \times (8/2) \times (1-q/d)/60$$

     Where:

     Delay Time = Total hours of vehicle delay.
     TG = Length of time crossing is blocked by the train, minutes.
     q = Vehicle arrival rate, vehicles/minute.
     d = Vehicle arrival rate, vehicles/minute.

   - **Figures I.1 to I.4** - These figures depict examples of railroad crossing signals referred to in Tables I.1 through I.6.

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[1] Refer to Figures I.1 to I.4 for corresponding figures depicting the type of crossing protection.

TABLE I.1

RAILROAD CROSSING INVENTORY
SAN BERNARDINO COUNTY

STREET NAME	PUC CROSSING NO.(1)	CROSSING/ SIGNAL TYPE(2)	NUMBER OF ACCIDENTS(3)	AVERAGE DAILY VEHICLE TRAFFIC(1)	EASTBOUND TRAINS(3)(4)			WESTBOUND TRAINS(3)(4)		
					Maximum Authorized Speed (mph)	Average No. of Trains	Maximum No. of Trains	Maximum Authorized Speed (mph)	Average No. of Trains	Maximum No. of Trains
BOLO STATION TO BARSTOW										
Saltus Rd.	2-658.3	1-R	1	62	70	18	26	70	19	28
National Trails Hwy.	2-662.0	9	1	345	70	18	26	70	19	28
National Trails Hwy.	2-691.0	9	0	234	70	18	26	70	19	28
Bagdad Chase Rd.	2-693.3	1-R	0	50	65	18	26	65	19	28
National Trails Hwy.	2-705.0	9	0	116	70	18	26	70	19	28
I-40	2-707.1-A	Overpass	--							
Newberry Rd.	2-724.8	9	1	680	70	18	26	70	19	28
Mt. View Rd.	2-725.9	9	0	163	70	18	26	70	19	28
Mineola Rd.	2-731.0	9	0	211	70	18	26	70	19	28
Hidden Springs Rd.	2-733.0	9	0	300	70	18	26	70	19	28
Daggett Yermo Rd.	2-737.85	9	0	2,100	70	31	46	70	29	44
I-15	2-744.6-B	Underpass	--							
Yucca St.	2-745.2-A	Overpass	--							
First St.	2-746.5-A	Overpass	--							
BARSTOW TO SAN BERNARDINO/KERN COUNTY LINE										
Agate Rd.	2-749.6-A	Underpass	--		45	9	12	45	8	12
St. Hwy. 58	2-753.2	9-A	1	7,900	70	9	12	70	8	12
Mt. View Rd.	2-755.2	9	1	46	70	9	12	70	8	12
Hinkley Rd.	2-756.4	9	0	600	70	9	12	70	8	12
Almeda St.	2-757.1	1-R	0	81	70	9	12	70	8	12

(1) Information provided by California Public Utilities Commission.
(2) See Figures I.1 to I.4 for description of signals.
(3) February 1982 through February 1992.
(4) Information compiled by data and timetables provided by ATSF.

TABLE I.1

RAILROAD CROSSING INVENTORY
SAN BERNARDINO COUNTY

STREET NAME	PUC CROSSING NO.(1)	CROSSING/ SIGNAL TYPE(2)	NUMBER OF ACCIDENTS(3)	AVERAGE DAILY VEHICLE TRAFFIC(1)	EASTBOUND TRAINS(3)(4)			WESTBOUND TRAINS(3)(4)		
					Maximum Authorized Speed (mph)	Average No. of Trains	Maximum No. of Trains	Maximum Authorized Speed (mph)	Average No. of Trains	Maximum No. of Trains
BARSTOW TO SAN BERNARDINO/KERN COUNTY LINE (Cont'd)										
Harper Lake Rd.	2-764.6	1-R	3	80	70	9	12	70	8	12
U.S. Hwy. 395	2-777.7	9-A	1	2,450	70	9	12	70	8	12
St. Hwy. 58	2-780.3	9	1	5,400	70	9	12	70	8	12
BARSTOW TO VICTORVILLE										
Citrine Rd.	2-4.3-B	Underpass	--							
Lenwood Rd.	2-5.7	9	0	3,370	70	26	41	70	24	37
Oak Grove Rd.	2-9.4	1-R	1	NA	70	26	41	70	24	37
Hinkley Rd.	2-10.6	9	0	300	70	26	41	70	24	37
Indian Trail Rd.	2-17.3	9	0	100	70	26	41	70	24	37
Vista St.	2-22.0	9	1	980	70	26	41	70	24	37
Turner Rd.	2-25.1	1-R	0	30	70	26	41	70	24	37
North Bryman Rd.	2-26.1	1-R	0	100	70	26	41	70	24	37
South Bryman Rd.	2-27.6	1-R	1	200	70	26	41	70	24	37
Robinson Ranch Rd.	2-28.6	1-R	1	100	70	26	41	70	24	37
National Trails Hwy.	2-30.6-B	Underpass	--							
First St.	2-31.9	9	3	1,000	55	26	41	55	24	37
I-15	2-36.0-A	Overpass	--							
Sixth St.	2-36.6	9	1	4,000	45	26	41	45	24	37
Stoddard Rd.	2-37.1-A	Overpass	--							
Bear Valley Cutoff	2-41.6-A	Overpass	--							
Main St.	2-45.3-A	Overpass	--							
Baldy Mesa Rd.	2-59.9-B	Underpass	--							
I-15	2-60.1-A	Overpass	--							
Hwy. 138	2-60.9-A	Overpass	--							

(1) Information provided by California Public Utilities Commission.
(2) See Figures I.1 to I.4 for description of signals.
(3) February 1982 through February 1992.
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TABLE I.1

RAILROAD CROSSING INVENTORY
SAN BERNARDINO COUNTY

STREET NAME	PUC CROSSING NO.(1)	CROSSING/ SIGNAL TYPE(2)	NUMBER OF ACCIDENTS(3)	AVERAGE DAILY VEHICLE TRAFFIC(1)	EASTBOUND TRAINS(3)(4)			WESTBOUND TRAINS(3)(4)		
					Maximum Authorized Speed (mph)	Average No. of Trains	Maximum No. of Trains	Maximum Authorized Speed (mph)	Average No. of Trains	Maximum No. of Trains
VICTORVILLE TO SAN BERNARDINO										
Swarthout Canyon Rd.	2-64.6	9	1	100	35	26	41	35	24	37
I-15	2-70.4-A	Overpass	--							
Devore Rd.	2-71.0	9	0	610	40	26	41	35	24	37
Palm Ave.	2-74.0	9	0	1,322	70	26	41	35	24	37
St. College Pkwy.	2-76.6	9	5	9,428	70	26	41	35	24	37
27th St.	2-78.3-A	Overpass	--							
Highland Ave.	2-78.6-A	Overpass	--							
Massachusetts Ave.	2-79.0-A	Overpass	--							
16th St.	2-79.4-A	Overpass	--							
Baseline	2-79.9-A	Overpass	--							
9th St.	2-80.2-A	Overpass	--							
5th St.	2-80.75-A	Overpass	--							
SAN BERNARDINO TO SAN BERNARDINO/LOS ANGELES COUNTY LINE										
Mr. Vernon Ave.	2-81.6-A	Overpass	--							
Rancho Ave.	2-82.6	9	0	9,900	30	<1	5	30	5	9
Rialto Ave.	2-83.4	9	0	8,000	30	<1	5	30	5	9
Pepper Ave.	2-83.9	9-A	2	8,800	30	<1	5	30	5	9
Eucalyptus Ave.	2-84.2	9	0	2,000	30	<1	5	30	5	9
Acacia St.	2-84.4	9	0	3,000	30	<1	5	30	5	9
Sycamore Ave.	2-84.7	9	1	1,800	30	<1	5	30	5	9
Riverside Ave.	2-84.8	9	0	12,000	30	<1	5	30	5	9
Willow Ave.	2-85.2	9	0	2,000	30	<1	5	30	5	9
Lilac Ave.	2-85.4	9	0	1,700	55	<1	5	55	5	9
Cactus Ave.	2-85.7	9	0	2,970	55	<1	5	55	5	9
Cedar Ave.	2-86.4	8, 9	0	1,200	55	<1	5	55	5	9

(1) Information provided by California Public Utilities Commission.
(2) See Figures I.1 to I.4 for description of signals.
(3) February 1982 through February 1992.
(4) Information compiled by data and timetables provided by ATSF.

TABLE I.1

RAILROAD CROSSING INVENTORY
SAN BERNARDINO COUNTY

STREET NAME	PUC CROSSING NO.(1)	CROSSING/ SIGNAL TYPE(2)	NUMBER OF ACCIDENTS(3)	AVERAGE DAILY VEHICLE TRAFFIC(1)	EASTBOUND TRAINS(3)(4)			WESTBOUND TRAINS(3)(4)		
					Maximum Authorized Speed (mph)	Average No. of Trains	Maximum No. of Trains	Maximum Authorized Speed (mph)	Average No. of Trains	Maximum No. of Trains
SAN BERNARDINO TO SAN BERNARDINO/LOS ANGELES COUNTY LINE (Cont'd)										
Locust Ave.	2-87.2	9	0	3,100	55	<1	5	55	5	9
Alder Ave.	2-87.7	9	0	5,100	55	<1	5	55	5	9
Palmetto Ave.	2-88.2	9	0	3,000	55	<1	5	55	5	9
Mongo Ave.	2-88.5	9	0	4,600	50	<1	5	50	5	9
Sierra Ave.	2-88.7	8, 9	1	15,800	50	<1	5	50	5	9
Juniper Ave.	2-88.9	9	0	5,200	50	<1	5	50	5	9
Citrus Ave.	2-89.7	9	1	4,600	55	<1	5	55	5	9
Beach Ave.	2-90.7	9	1	1,700	55	<1	5	55	5	9
Cherry Ave.	2-91.71-A	Overpass	--							
Etiwanda Ave.	2-93.7	9	4	4,820	55	<1	5	55	5	9
I-15	2-94.9-A	Overpass	--							
Rochester Ave.	2-95.0	9	0	700	55	<1	5	55	5	9
Haven Ave.	2-96.7	9	1	8,200	55	<1	5	55	5	9
Turner Ave.	2-97.2	9	0	600	55	<1	5	55	5	9
Archibald Ave.	2-97.7	9	0	9,000	55	<1	5	55	5	9
Hellman Ave.	2-98.2	9	0	1,000	55	<1	5	55	5	9
Vineyard Ave.	2-98.7	9	0	9,000	55	<1	5	55	5	9
Baker Ave.	2-99.2	9	0	1,800	55	<1	5	55	5	9
Grove Ave.	2-99.7	9-A	4	9,900	55	<1	5	55	5	9
Campus Ave.	2-100.5	9	0	6,400	55	<1	5	55	5	9
Sultana Ave.	2-100.8	9	0	2,500	55	<1	5	55	5	9
Euclid Ave.	2-101.0	9	0	30,000	55	<1	5	55	5	9
San Antonio Ave.	2-101.6	9	0	6,910	55	<1	5	55	5	9
Mountain Ave.	2-102.1	8, 9	2	14,600	55	<1	5	55	5	9
Benson Ave.	2-102.7	9	1	3,600	55	<1	5	55	5	9

(1) Information provided by California Public Utilities Commission.
(2) See Figures I.1 to I.4 for description of signals.
(3) February 1982 through February 1992.
(4) Information compiled by data and timetables provided by ATSF.

TABLE I.1

RAILROAD CROSSING INVENTORY
SAN BERNARDINO COUNTY

STREET NAME	PUC CROSSING NO.(1)	CROSSING/ SIGNAL TYPE(2)	NUMBER OF ACCIDENTS(3)	AVERAGE DAILY VEHICLE TRAFFIC(1)	EASTBOUND TRAINS(3)(4)			WESTBOUND TRAINS(3)(4)		
					Maximum Authorized Speed (mph)	Average No. of Trains	Maximum No. of Trains	Maximum Authorized Speed (mph)	Average No. of Trains	Maximum No. of Trains
SAN BERNARDINO TO SAN BERNARDINO/LOS ANGELES COUNTY LINE (Cont'd)										
Central Ave.	2-103.2	9	1	12,000	55	<1	5	55	5	9
Claremont Ave.	2-104.18	9	0	2,952	55	<1	5	55	5	9
College Ave.	2-104.7	9	0	1,817	55	<1	5	55	5	9
Indian Hill Blvd.	2-104.9	8, 9	0	9,500	55	<1	5	55	5	9
SAN BERNARDINO TO SAN BERNARDINO/RIVERSIDE COUNTY LINE										
Rialto Ave. Overpass	2B-0.7-A	Overpass	--							
Rialto Ave.	2B-0.7	9	1	12,900	20	25	39	20	19	32
Walnut St.	2B-1.0	9	1	500	20	25	39	20	19	32
Mill St. (Old)	2B-1.3	9		1,000	20	25	39	20	19	32
Mill St. Overpass	2B-1.3-A	Overpass	--							
Laurel St.	2B-2.1	9	3	1,600	30	25	39	30	19	32
Olive St.	2B-2.4	9	0	1,900	30	25	39	30	19	32
C St.	2B-2.6-B	Underpass	--							
E St.	2B-2.8	9	0	500	30	25	39	30	19	32
H St.	2B-3.0	9	1	1,600	30	25	39	30	19	32
Valley Blvd.	2B-3.1	9	3	7,500	30	25	39	30	19	32
I-10 Fwy.	2B-3.2-A	Overpass	--							
N St.	2B-3.5-B	Underpass	--							
La Cadena Dr.	2B-3.8-B	Underpass	--							
Fogg St.	2B-4.1-B	Underpass	--							
Terrace Ave.	2B-4.8-B	Underpass	--							
Barton Rd.	2B-5.4-A	Overpass	--							
I-215/91 Fwy.	2B-5.9-B	Underpass	--							
Main St.	2B-6.4	1-R, 9	3	3,490	55	25	39	55	19	32

91-109 (3/31/92/dvd)

(1) Information provided by California Public Utilities Commission.
(2) See Figures I.1 to I.4 for description of signals.
(3) February 1982 through February 1992.
(4) Information compiled by data and timetables provided by ATSF.

TABLE I.2
HAZARD INDEX CALCULATIONS
EXISTING 1991 CONDITIONS

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	EAST SPEED(mph)	AVG. NO. OF TRAINS	WEST SPEED(mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX
BOLO STATION TO BARSTOW								
Saltus Rd.	1-R	62	70	18	70	19	1.00	2.3
National Trails Hwy.	9	345	70	18	70	19	0.13	1.7
National Trails Hwy.	9	234	70	18	70	19	0.13	1.1
Bagdad Chase Rd.	1-R	50	65	18	65	19	1.00	1.9
National Trails Hwy.	9	116	70	18	70	19	0.13	0.6
Newberry Rd.	9	680	70	18	70	19	0.13	3.3
Mt. View Rd.	9	163	70	18	70	19	0.13	0.8
Mineola Rd.	9	211	70	18	70	19	0.13	1.0
Hidden Springs Rd.	9	300	70	18	70	19	0.13	1.4
Daggett Yermo Rd.	9	2,100	70	31	70	29	0.13	16.4
Average:								3.1
BARSTOW TO SAN BERNARDINO/KERN COUNTY LINE								
St. Hwy. 58	9-A	7,900	70	9	70	8	0.13	17.5
Mt. View Rd.	9	46	70	9	70	8	0.13	0.1
Hinkley Rd.	9	600	70	9	70	8	0.13	1.3
Almeda St.	1-R	81	70	9	70	8	1.00	1.4
Harper Lake Rd.	1-R	80	70	9	70	8	1.00	1.4
U.S. Hwy. 395	9-A	2,450	70	9	70	8	0.13	5.4
St. Hwy. 58	9	5,400	70	9	70	8	0.13	11.9
Average:								5.3
BARSTOW TO VICTORVILLE								
Lenwood Rd.	9	3,370	70	26	70	24	0.13	21.9
Oak Grove Rd.	1-R	NA	70	26	70	24	1.00	0.0
Hinkley Rd.	9	300	70	26	70	24	0.13	2.0
Indian Trail Rd.	9	100	70	26	70	24	0.13	0.7
Vista St.	9	980	70	26	70	24	0.13	6.4
Turner Rd.	1-R	30	70	26	70	24	1.00	1.5
North Bryman Rd.	1-R	100	70	26	70	24	1.00	5.0
South Bryman Rd.	1-R	200	70	26	70	24	1.00	10.0
Robinson Ranch Rd.	1-R	100	70	26	70	24	1.00	5.0

TABLE I.2
HAZARD INDEX CALCULATIONS
EXISTING 1991 CONDITIONS

First St.	9	1,000	55	26	55	24	0.13	6.5
Sixth St.	9	4,000	45	26	45	24	0.13	26.0
Average:								6.3
VICTORVILLE TO SAN BERNARDINO								
Swarthout Canyon Rd.	9	100	35	26	35	24	0.13	0.7
Devore Rd.	9	610	40	26	35	24	0.13	4.0
Palm Ave.	9	1,322	70	26	35	24	0.13	8.6
St. College Pkwy.	9	9,428	70	26	35	24	0.13	61.3
Average:								14.8
SAN BERNARDINO TO SAN BERNARDINO/LOS ANGELES COUNTY LINE								
Rancho Ave.	9	9,900	30	1	30	5	0.13	7.7
Rialto Ave.	9	8,000	30	1	30	5	0.13	6.2
Pepper Ave.	9-A	8,800	30	1	30	5	0.13	6.9
Eucalyptus Ave.	9	2,000	30	1	30	5	0.13	1.6
Acacia St.	9	3,000	30	1	30	5	0.13	2.3
Sycamore Ave.	9	1,800	30	1	30	5	0.13	1.4
Riverside Ave.	9	12,000	30	1	30	5	0.13	9.4
Willow Ave.	9	2,000	30	1	30	5	0.13	1.6
Lilac Ave.	9	1,700	55	1	55	5	0.13	1.3
Cactus Ave.	9	2,970	55	1	55	5	0.13	2.3
Cedar Ave.	8, 9	1,200	55	1	55	5	0.23	1.7
Locust Ave.	9	3,100	55	1	55	5	0.13	2.4
Alder Ave.	9	5,100	55	1	55	5	0.13	4.0
Palmetto Ave.	9	3,000	55	1	55	5	0.13	2.3
Mongo Ave.	9	4,600	50	1	50	5	0.13	3.6
Sierra Ave.	8, 9	15,800	50	1	50	5	0.23	21.8
Juniper Ave.	9	5,200	50	1	50	5	0.13	4.1
Citrus Ave.	9	4,600	55	1	55	5	0.13	3.6
Beach Ave.	9	1,700	55	1	55	5	0.13	1.3
Etiwanda Ave.	9	4,820	55	1	55	5	0.13	3.8
Rochester Ave.	9	700	55	1	55	5	0.13	0.5
Haven Ave.	9	8,200	55	1	55	5	0.13	6.4
Turner Ave.	9	600	55	1	55	5	0.13	0.5
Archibald Ave.	9	9,000	55	1	55	5	0.13	7.0
Hellman Ave.	9	1,000	55	1	55	5	0.13	0.8

TABLE I.2
HAZARD INDEX CALCULATIONS
EXISTING 1991 CONDITIONS

Vineyard Ave.	9	9,000	55	1	55	5	0.13	7.0
Baker Ave.	9	1,800	55	1	55	5	0.13	1.4
Grove Ave.	9-A	9,900	55	1	55	5	0.13	7.7
Campus Ave.	9	6,400	55	1	55	5	0.13	5.0
Sultana Ave.	9	2,500	55	1	55	5	0.13	2.0
Euclid Ave.	9	30,000	55	1	55	5	0.13	23.4
San Antonio Ave.	9	6,910	55	1	55	5	0.13	5.4
Mountain Ave.	8, 9	14,600	55	1	55	5	0.23	20.1
Benson Ave.	9	3,600	55	1	55	5	0.13	2.8
Central Ave.	9	12,000	55	1	55	5	0.13	9.4
Claremont Ave.	9	2,952	55	1	55	5	0.13	2.3
College Ave.	9	1,817	55	1	55	5	0.13	1.4
Indian Hill Blvd.	8, 9	9,500	55	1	55	5	0.23	13.1
Average:								8.5
SAN BERNARDINO TO SAN BERNARDINO/RIVERSIDE COUNTY LINE								
Rialto Ave.	9	12,900	20	25	20	19	0.13	73.8
Walnut St.	9	500	20	25	20	19	0.13	2.9
Mill St. (Old)	9	1,000	20	25	20	19	0.13	5.7
Laurel St.	9	1,600	30	25	30	19	0.13	9.2
Olive St.	9	1,900	30	25	30	19	0.13	10.9
E St.	9	500	30	25	30	19	0.13	2.9
H St.	9	1,600	30	25	30	19	0.13	9.2
Valley Blvd.	9	7,500	30	25	30	19	0.13	42.9
Main St.	1-R, 9	3,490	55	25	55	19	0.13	20.0
Average:								19.7

TABLE I.3
HAZARD INDEX CALCULATIONS
3,000 TON PER DAY CONDITIONS

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	EAST SPEED(mph)	AVG. NO. OF TRAINS	WEST SPEED(mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX
BOLO STATION TO BARSTOW								
Saltus Rd.	1-R	69	70	19	70	20	1.00	2.7
National Trails Hwy.	9	385	70	19	70	20	0.13	2.0
National Trails Hwy.	9	261	70	19	70	20	0.13	1.3
Bagdad Chase Rd.	1-R	56	65	19	65	20	1.00	2.2
National Trails Hwy.	9	130	70	19	70	20	0.13	0.7
Newberry Rd.	9	759	70	19	70	20	0.13	3.9
Mt. View Rd.	9	182	70	19	70	20	0.13	0.9
Mineola Rd.	9	236	70	19	70	20	0.13	1.2
Hidden Springs Rd.	9	335	70	19	70	20	0.13	1.7
Daggett Yermo Rd.	9	2,345	70	32	70	30	0.13	18.9
Average:								3.6
BARSTOW TO SAN BERNARDINO/KERN COUNTY LINE								
St. Hwy. 58	9-A	8,823	70	9	70	8	0.13	19.5
Mt. View Rd.	9	51	70	9	70	8	0.13	0.1
Hinkley Rd.	9	670	70	9	70	8	0.13	1.5
Almeda St.	1-R	90	70	9	70	8	1.00	1.5
Harper Lake Rd.	1-R	89	70	9	70	8	1.00	1.5
U.S. Hwy. 395	9-A	2,736	70	9	70	8	0.13	6.0
St. Hwy. 58	9	6,031	70	9	70	8	0.13	13.3
Average:								5.9
BARSTOW TO VICTORVILLE								
Lenwood Rd.	9	3,764	70	27	70	25	0.13	25.4
Oak Grove Rd.	1-R	NA	70	27	70	25	1.00	0.0
Hinkley Rd.	9	335	70	27	70	25	0.13	2.3
Indian Trail Rd.	9	112	70	27	70	25	0.13	0.8
Vista St.	9	1,094	70	27	70	25	0.13	7.4
Turner Rd.	1-R	34	70	27	70	25	1.00	1.7
North Bryman Rd.	1-R	112	70	27	70	25	1.00	5.8
South Bryman Rd.	1-R	223	70	27	70	25	1.00	11.6
Robinson Ranch Rd.	1-R	112	70	27	70	25	1.00	5.8

TABLE I.3
HAZARD INDEX CALCULATIONS
3,000 TON PER DAY CONDITIONS

First St.	9	1,117	55	27	55	25	0.13	7.5
Sixth St.	9	4,467	45	27	45	25	0.13	30.2
Average:								7.3
VICTORVILLE TO SAN BERNARDINO								
Swarthout Canyon Rd.	9	112	35	27	35	25	0.13	0.8
Devore Rd.	9	681	40	27	35	25	0.13	4.6
Palm Ave.	9	1,476	70	27	35	25	0.13	10.0
St. College Pkwy.	9	10,529	70	27	35	25	0.13	71.2
Average:								17.2
SAN BERNARDINO TO SAN BERNARDINO/LOS ANGELES COUNTY LINE								
Rancho Ave.	9	11,056	30	1	30	5	0.13	8.6
Rialto Ave.	9	8,934	30	1	30	5	0.13	7.0
Pepper Ave.	9-A	9,828	30	1	30	5	0.13	7.7
Eucalyptus Ave.	9	2,234	30	1	30	5	0.13	1.7
Acacia St.	9	3,350	30	1	30	5	0.13	2.6
Sycamore Ave.	9	2,010	30	1	30	5	0.13	1.6
Riverside Ave.	9	13,402	30	1	30	5	0.13	10.5
Willow Ave.	9	2,234	30	1	30	5	0.13	1.7
Lilac Ave.	9	1,899	55	1	55	5	0.13	1.5
Cactus Ave.	9	3,317	55	1	55	5	0.13	2.6
Cedar Ave.	8, 9	1,340	55	1	55	5	0.23	1.8
Locust Ave.	9	3,462	55	1	55	5	0.13	2.7
Alder Ave.	9	5,696	55	1	55	5	0.13	4.4
Palmetto Ave.	9	3,350	55	1	55	5	0.13	2.6
Mongo Ave.	9	5,137	50	1	50	5	0.13	4.0
Sierra Ave.	8, 9	17,645	50	1	50	5	0.23	24.4
Juniper Ave.	9	5,807	50	1	50	5	0.13	4.5
Citrus Ave.	9	5,137	55	1	55	5	0.13	4.0
Beach Ave.	9	1,899	55	1	55	5	0.13	1.5
Etiwanda Ave.	9	5,383	55	1	55	5	0.13	4.2
Rochester Ave.	9	782	55	1	55	5	0.13	0.6
Haven Ave.	9	9,158	55	1	55	5	0.13	7.1
Turner Ave.	9	670	55	1	55	5	0.13	0.5
Archibald Ave.	9	10,051	55	1	55	5	0.13	7.8
Hellman Ave.	9	1,117	55	1	55	5	0.13	0.9

TABLE I.3
HAZARD INDEX CALCULATIONS
3,000 TON PER DAY CONDITIONS

Vineyard Ave.	9	10,051	55	1	55	5	0.13	7.8
Baker Ave.	9	2,010	55	1	55	5	0.13	1.6
Grove Ave.	9-A	11,056	55	1	55	5	0.13	8.6
Campus Ave.	9	7,148	55	1	55	5	0.13	5.6
Sultana Ave.	9	2,792	55	1	55	5	0.13	2.2
Euclid Ave.	9	33,504	55	1	55	5	0.13	26.1
San Antonio Ave.	9	7,717	55	1	55	5	0.13	6.0
Mountain Ave.	8, 9	16,305	55	1	55	5	0.23	22.5
Benson Ave.	9	4,020	55	1	55	5	0.13	3.1
Central Ave.	9	13,402	55	1	55	5	0.13	10.5
Claremont Ave.	9	3,297	55	1	55	5	0.13	2.6
College Ave.	9	2,029	55	1	55	5	0.13	1.6
Indian Hill Blvd.	8, 9	10,610	55	1	55	5	0.23	14.6
Average:								9.5
SAN BERNARDINO TO SAN BERNARDINO/RIVERSIDE COUNTY LINE								
Rialto Ave.	9	14,407	20	26	20	20	0.13	86.2
Walnut St.	9	558	20	26	20	20	0.13	3.3
Mill St. (Old)	9	1,117	20	26	20	20	0.13	6.7
Laurel St.	9	1,787	30	26	30	20	0.13	10.7
Olive St.	9	2,122	30	26	30	20	0.13	12.7
E St.	9	558	30	26	30	20	0.13	3.3
H St.	9	1,787	30	26	30	20	0.13	10.7
Valley Blvd.	9	8,376	30	26	30	20	0.13	50.1
Main St.	1-R, 9	3,898	55	26	55	20	0.13	23.3
Average:								23.0

TABLE I.4
HAZARD INDEX CALCULATIONS
21,000 TON PER DAY CONDITIONS

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	EAST SPEED(mph)	AVG. NO. OF TRAINS	WEST SPEED(mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX
BOLO STATION TO BARSTOW								
Saltus Rd.	1-R	96	70	25	70	26	1.00	4.9
National Trails Hwy.	9	536	70	25	70	26	0.13	3.6
National Trails Hwy.	9	364	70	25	70	26	0.13	2.4
Bagdad Chase Rd.	1-R	78	65	25	65	26	1.00	4.0
National Trails Hwy.	9	180	70	25	70	26	0.13	1.2
Newberry Rd.	9	1,057	70	25	70	26	0.13	7.0
Mt. View Rd.	9	253	70	25	70	26	0.13	1.7
Mineola Rd.	9	328	70	25	70	26	0.13	2.2
Hidden Springs Rd.	9	466	70	25	70	26	0.13	3.1
Daggett Yermo Rd.	9	3,265	70	38	70	36	0.13	31.4
Average:		6,625						6.2
BARSTOW TO SAN BERNARDINO/KERN COUNTY LINE								
St. Hwy. 58	9-A	12,284	70	10	70	9	0.13	30.3
Mt. View Rd.	9	72	70	10	70	9	0.13	0.2
Hinkley Rd.	9	933	70	10	70	9	0.13	2.3
Almeda St.	1-R	126	70	10	70	9	1.00	2.4
Harper Lake Rd.	1-R	124	70	10	70	9	1.00	2.4
U.S. Hwy. 395	9-A	3,810	70	10	70	9	0.13	9.4
St. Hwy. 58	9	8,396	70	10	70	9	0.13	20.7
Average:		25,744						9.2
BARSTOW TO VICTORVILLE								
Lenwood Rd.	9	5,240	70	32	70	30	0.13	42.2
Oak Grove Rd.	1-R	NA	70	32	70	30	1.00	0.0
Hinkley Rd.	9	466	70	32	70	30	0.13	3.8
Indian Trail Rd.	9	155	70	32	70	30	0.13	1.3
Vista St.	9	1,524	70	32	70	30	0.13	12.3
Turner Rd.	1-R	47	70	32	70	30	1.00	2.9
North Bryman Rd.	1-R	155	70	32	70	30	1.00	9.6
South Bryman Rd.	1-R	311	70	32	70	30	1.00	19.3
Robinson Ranch Rd.	1-R	155	70	32	70	30	1.00	9.6

TABLE I.4
HAZARD INDEX CALCULATIONS
21,000 TON PER DAY CONDITIONS

First St.	9	1,555	55	32	55	30	0.13	12.5
Sixth St.	9	6,220	45	32	45	30	0.13	50.1
Average:		15,829					-	12.1
VICTORVILLE TO SAN BERNARDINO								
Swarthout Canyon Rd.	9	155	35	31	35	29	0.13	1.2
Devore Rd.	9	948	40	31	35	29	0.13	7.4
Palm Ave.	9	2,056	70	31	35	29	0.13	16.0
St. College Pkwy.	9	14,660	70	31	35	29	0.13	114.3
Average:		17,819						27.9
SAN BERNARDINO TO SAN BERNARDINO/LOS ANGELES COUNTY LINE								
Rancho Ave.	9	15,394	30	3	30	7	0.13	20.0
Rialto Ave.	9	12,439	30	3	30	7	0.13	16.2
Pepper Ave.	9-A	13,683	30	3	30	7	0.13	17.8
Eucalyptus Ave.	9	3,110	30	3	30	7	0.13	4.0
Acacia St.	9	4,665	30	3	30	7	0.13	6.1
Sycamore Ave.	9	2,799	30	3	30	7	0.13	3.6
Riverside Ave.	9	18,659	30	3	30	7	0.13	24.3
Willow Ave.	9	3,110	30	3	30	7	0.13	4.0
Lilac Ave.	9	2,643	55	3	55	7	0.13	3.4
Cactus Ave.	9	4,618	55	3	55	7	0.13	6.0
Cedar Ave.	8, 9	1,866	55	3	55	7	0.23	4.3
Locust Ave.	9	4,820	55	3	55	7	0.13	6.3
Alder Ave.	9	7,930	55	3	55	7	0.13	10.3
Palmetto Ave.	9	4,665	55	3	55	7	0.13	6.1
Mongo Ave.	9	7,153	50	3	50	7	0.13	9.3
Sierra Ave.	8, 9	24,567	50	3	50	7	0.23	56.5
Juniper Ave.	9	8,085	50	3	50	7	0.13	10.5
Citrus Ave.	9	7,153	55	3	55	7	0.13	9.3
Beach Ave.	9	2,643	55	3	55	7	0.13	3.4
Etiwanda Ave.	9	7,495	55	3	55	7	0.13	9.7
Rochester Ave.	9	1,088	55	3	55	7	0.13	1.4
Haven Ave.	9	12,750	55	3	55	7	0.13	16.6
Turner Ave.	9	933	55	3	55	7	0.13	1.2
Archibald Ave.	9	13,994	55	3	55	7	0.13	18.2
Hellman Ave.	9	1,555	55	3	55	7	0.13	2.0

TABLE I.4
HAZARD INDEX CALCULATIONS
21,000 TON PER DAY CONDITIONS

Vineyard Ave.	9	13,994	55	3	55	7	0.13	18.2
Baker Ave.	9	2,799	55	3	55	7	0.13	3.6
Grove Ave.	9-A	15,394	55	3	55	7	0.13	20.0
Campus Ave.	9	9,951	55	3	55	7	0.13	12.9
Sultana Ave.	9	3,887	55	3	55	7	0.13	5.1
Euclid Ave.	9	46,647	55	3	55	7	0.13	60.6
San Antonio Ave.	9	10,744	55	3	55	7	0.13	14.0
Mountain Ave.	8, 9	22,702	55	3	55	7	0.23	52.2
Benson Ave.	9	5,598	55	3	55	7	0.13	7.3
Central Ave.	9	18,659	55	3	55	7	0.13	24.3
Claremont Ave.	9	4,590	55	3	55	7	0.13	6.0
College Ave.	9	2,825	55	3	55	7	0.13	3.7
Indian Hill Blvd.	8, 9	14,772	55	3	55	7	0.23	34.0
Average:		360,378						22.0
SAN BERNARDINO TO SAN BERNARDINO/RIVERSIDE COUNTY LINE								
Rialto Ave.	9	20,058	20	27	20	21	0.13	125.2
Walnut St.	9	777	20	27	20	21	0.13	4.9
Mill St. (Old)	9	1,555	20	27	20	21	0.13	9.7
Laurel St.	9	2,488	30	27	30	21	0.13	15.5
Olive St.	9	2,954	30	27	30	21	0.13	18.4
E St.	9	777	30	27	30	21	0.13	4.9
H St.	9	2,488	30	27	30	21	0.13	15.5
Valley Blvd.	9	11,662	30	27	30	21	0.13	72.8
Main St.	1-R, 9	5,427	55	27	55	21	0.13	33.9
Average:								33.4

TABLE I.5
HAZARD INDEX CALCULATIONS
REDUCED OPERATIONS ALTERNATIVE

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	EAST SPEED(mph)	AVG. NO. OF TRAINS	WEST SPEED(mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX
BOLO STATION TO BARSTOW								
Saltus Rd.	1-R	96	70	21	70	22	1.00	4.1
National Trails Hwy.	9	536	70	21	70	22	0.13	3.0
National Trails Hwy.	9	364	70	21	70	22	0.13	2.0
Bagdad Chase Rd.	1-R	78	65	21	65	22	1.00	3.3
National Trails Hwy.	9	180	70	21	70	22	0.13	1.0
Newberry Rd.	9	1,057	70	21	70	22	0.13	5.9
Mt. View Rd.	9	253	70	21	70	22	0.13	1.4
Mineola Rd.	9	328	70	21	70	22	0.13	1.8
Hidden Springs Rd.	9	466	70	21	70	22	0.13	2.6
Daggett Yermo Rd.	9	3,265	70	34	70	32	0.13	28.0
Average:		6,625						5.3
BARSTOW TO SAN BERNARDINO/KERN COUNTY LINE								
St. Hwy. 58	9-A	12,284	70	9	70	8	0.13	27.1
Mt. View Rd.	9	72	70	9	70	8	0.13	0.2
Hinkley Rd.	9	933	70	9	70	8	0.13	2.1
Almeda St.	1-R	126	70	9	70	8	1.00	2.1
Harper Lake Rd.	1-R	124	70	9	70	8	1.00	2.1
U.S. Hwy. 395	9-A	3,810	70	9	70	8	0.13	8.4
St. Hwy. 58	9	8,396	70	9	70	8	0.13	18.6
Average:		25,744						8.2
BARSTOW TO VICTORVILLE								
Lenwood Rd.	9	5,240	70	29	70	27	0.13	38.1
Oak Grove Rd.	1-R	NA	70	29	70	27	1.00	0.0
Hinkley Rd.	9	466	70	29	70	27	0.13	3.4
Indian Trail Rd.	9	155	70	29	70	27	0.13	1.1
Vista St.	9	1,524	70	29	70	27	0.13	11.1
Turner Rd.	1-R	47	70	29	70	27	1.00	2.6
North Bryman Rd.	1-R	155	70	29	70	27	1.00	8.7
South Bryman Rd.	1-R	311	70	29	70	27	1.00	17.4
Robinson Ranch Rd.	1-R	155	70	29	70	27	1.00	8.7

TABLE I.5
HAZARD INDEX CALCULATIONS
REDUCED OPERATIONS ALTERNATIVE

First St.	9	1,555	55	29	55	27	0.13	11.3
Sixth St.	9	6,220	45	29	45	27	0.13	45.3
Average:		15,829						11.0
VICTORVILLE TO SAN BERNARDINO								
Swarthout Canyon Rd.	9	155	35	29	35	27	0.13	1.1
Devore Rd.	9	948	40	29	35	27	0.13	6.9
Palm Ave.	9	2,056	70	29	35	27	0.13	15.0
St. College Pkwy.	9	14,660	70	29	35	27	0.13	106.7
Average:		17,819						25.8
SAN BERNARDINO TO SAN BERNARDINO/LOS ANGELES COUNTY LINE								
Rancho Ave.	9	15,394	30	2	30	6	0.13	16.0
Rialto Ave.	9	12,439	30	2	30	6	0.13	12.9
Pepper Ave.	9-A	13,683	30	2	30	6	0.13	14.2
Eucalyptus Ave.	9	3,110	30	2	30	6	0.13	3.2
Acacia St.	9	4,665	30	2	30	6	0.13	4.9
Sycamore Ave.	9	2,799	30	2	30	6	0.13	2.9
Riverside Ave.	9	18,659	30	2	30	6	0.13	19.4
Willow Ave.	9	3,110	30	2	30	6	0.13	3.2
Lilac Ave.	9	2,643	55	2	55	6	0.13	2.7
Cactus Ave.	9	4,618	55	2	55	6	0.13	4.8
Cedar Ave.	8, 9	1,866	55	2	55	6	0.23	3.4
Locust Ave.	9	4,820	55	2	55	6	0.13	5.0
Alder Ave.	9	7,930	55	2	55	6	0.13	8.2
Palmetto Ave.	9	4,665	55	2	55	6	0.13	4.9
Mongo Ave.	9	7,153	50	2	50	6	0.13	7.4
Sierra Ave.	8, 9	24,567	50	2	50	6	0.23	45.2
Juniper Ave.	9	8,085	50	2	50	6	0.13	8.4
Citrus Ave.	9	7,153	55	2	55	6	0.13	7.4
Beach Ave.	9	2,643	55	2	55	6	0.13	2.7
Etiwanda Ave.	9	7,495	55	2	55	6	0.13	7.8
Rochester Ave.	9	1,088	55	2	55	6	0.13	1.1
Haven Ave.	9	12,750	55	2	55	6	0.13	13.3
Turner Ave.	9	933	55	2	55	6	0.13	1.0
Archibald Ave.	9	13,994	55	2	55	6	0.13	14.6
Hellman Ave.	9	1,555	55	2	55	6	0.13	1.6

TABLE I.5
HAZARD INDEX CALCULATIONS
REDUCED OPERATIONS ALTERNATIVE

Vineyard Ave.	9	13,994	55	2	55	6	0.13	14.6
Baker Ave.	9	2,799	55	2	55	6	0.13	2.9
Grove Ave.	9-A	15,394	55	2	55	6	0.13	16.0
Campus Ave.	9	9,951	55	2	55	6	0.13	10.3
Sultana Ave.	9	3,887	55	2	55	6	0.13	4.0
Euclid Ave.	9	46,647	55	2	55	6	0.13	48.5
San Antonio Ave.	9	10,744	55	2	55	6	0.13	11.2
Mountain Ave.	8, 9	22,702	55	2	55	6	0.23	41.8
Benson Ave.	9	5,598	55	2	55	6	0.13	5.8
Central Ave.	9	18,659	55	2	55	6	0.13	19.4
Claremont Ave.	9	4,590	55	2	55	6	0.13	4.8
College Ave.	9	2,825	55	2	55	6	0.13	2.9
Indian Hill Blvd.	8, 9	14,772	55	2	55	6	0.23	27.2
Average:		360,378						17.6
SAN BERNARDINO TO SAN BERNARDINO/RIVERSIDE COUNTY LINE								
Rialto Ave.	9	20,058	20	27	20	21	0.13	125.2
Walnut St.	9	777	20	27	20	21	0.13	4.9
Mill St. (Old)	9	1,555	20	27	20	21	0.13	9.7
Laurel St.	9	2,488	30	27	30	21	0.13	15.5
Olive St.	9	2,954	30	27	30	21	0.13	18.4
E St.	9	777	30	27	30	21	0.13	4.9
H St.	9	2,488	30	27	30	21	0.13	15.5
Valley Blvd.	9	11,662	30	27	30	21	0.13	72.8
Main St.	1-R, 9	5,427	55	27	55	21	0.13	33.9
Average:								33.4

TABLE I.6
HAZARD INDEX CALCULATIONS
NO ACTION ALTERNATIVE

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	EAST SPEED(mph)	AVG. NO. OF TRAINS	WEST SPEED(mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX
BOLO STATION TO BARSTOW								
Saltus Rd.	1-R	96	70	18	70	19	1.00	3.6
National Trails Hwy.	9	536	70	18	70	19	0.13	2.6
National Trails Hwy.	9	364	70	18	70	19	0.13	1.8
Bagdad Chase Rd.	1-R	78	65	18	65	19	1.00	2.9
National Trails Hwy.	9	180	70	18	70	19	0.13	0.9
Newberry Rd.	9	1,057	70	18	70	19	0.13	5.1
Mt. View Rd.	9	253	70	18	70	19	0.13	1.2
Mineola Rd.	9	328	70	18	70	19	0.13	1.6
Hidden Springs Rd.	9	466	70	18	70	19	0.13	2.2
Daggett Yermo Rd.	9	3,265	70	31	70	29	0.13	25.5
Average:		6,625						4.7
BARSTOW TO SAN BERNARDINO/KERN COUNTY LINE								
St. Hwy. 58	9-A	12,284	70	9	70	8	0.13	27.1
Mt. View Rd.	9	72	70	9	70	8	0.13	0.2
Hinkley Rd.	9	933	70	9	70	8	0.13	2.1
Almeda St.	1-R	126	70	9	70	8	1.00	2.1
Harper Lake Rd.	1-R	124	70	9	70	8	1.00	2.1
U.S. Hwy. 395	9-A	3,810	70	9	70	8	0.13	8.4
St. Hwy. 58	9	8,396	70	9	70	8	0.13	18.6
Average:		25,744						8.2
BARSTOW TO VICTORVILLE								
Lenwood Rd.	9	5,240	70	26	70	24	0.13	34.1
Oak Grove Rd.	1-R	NA	70	26	70	24	1.00	0.0
Hinkley Rd.	9	466	70	26	70	24	0.13	3.0
Indian Trail Rd.	9	155	70	26	70	24	0.13	1.0
Vista St.	9	1,524	70	26	70	24	0.13	9.9
Turner Rd.	1-R	47	70	26	70	24	1.00	2.3
North Bryman Rd.	1-R	155	70	26	70	24	1.00	7.8
South Bryman Rd.	1-R	311	70	26	70	24	1.00	15.5
Robinson Ranch Rd.	1-R	155	70	26	70	24	1.00	7.8

TABLE I.6
HAZARD INDEX CALCULATIONS
NO ACTION ALTERNATIVE

First St.	9	1,555	55	26	55	24	0.13	10.1
Sixth St.	9	6,220	45	26	45	24	0.13	40.4
Average:		15,829					-	9.8
VICTORVILLE TO SAN BERNARDINO								
Swarthout Canyon Rd.	9	155	35	26	35	24	0.13	1.0
Devore Rd.	9	948	40	26	35	24	0.13	6.2
Palm Ave.	9	2,056	70	26	35	24	0.13	13.4
St. College Pkwy.	9	14,660	70	26	35	24	0.13	95.3
Average:		17,819						23.0
SAN BERNARDINO TO SAN BERNARDINO/LOS ANGELES COUNTY LINE								
Rancho Ave.	9	15,394	30	1	30	5	0.13	12.0
Rialto Ave.	9	12,439	30	1	30	5	0.13	9.7
Pepper Ave.	9-A	13,683	30	1	30	5	0.13	10.7
Eucalyptus Ave.	9	3,110	30	1	30	5	0.13	2.4
Acacia St.	9	4,665	30	1	30	5	0.13	3.6
Sycamore Ave.	9	2,799	30	1	30	5	0.13	2.2
Riverside Ave.	9	18,659	30	1	30	5	0.13	14.6
Willow Ave.	9	3,110	30	1	30	5	0.13	2.4
Lilac Ave.	9	2,643	55	1	55	5	0.13	2.1
Cactus Ave.	9	4,618	55	1	55	5	0.13	3.6
Cedar Ave.	8, 9	1,866	55	1	55	5	0.23	2.6
Locust Ave.	9	4,820	55	1	55	5	0.13	3.8
Alder Ave.	9	7,930	55	1	55	5	0.13	6.2
Palmetto Ave.	9	4,665	55	1	55	5	0.13	3.6
Mongo Ave.	9	7,153	50	1	50	5	0.13	5.6
Sierra Ave.	8, 9	24,567	50	1	50	5	0.23	33.9
Juniper Ave.	9	8,085	50	1	50	5	0.13	6.3
Citrus Ave.	9	7,153	55	1	55	5	0.13	5.6
Beach Ave.	9	2,643	55	1	55	5	0.13	2.1
Etiwanda Ave.	9	7,495	55	1	55	5	0.13	5.8
Rochester Ave.	9	1,088	55	1	55	5	0.13	0.8
Haven Ave.	9	12,750	55	1	55	5	0.13	9.9
Turner Ave.	9	933	55	1	55	5	0.13	0.7
Archibald Ave.	9	13,994	55	1	55	5	0.13	10.9
Hellman Ave.	9	1,555	55	1	55	5	0.13	1.2

TABLE I.6
HAZARD INDEX CALCULATIONS
NO ACTION ALTERNATIVE

Vineyard Ave.	9	13,994	55	1	55	5	0.13	10.9
Baker Ave.	9	2,799	55	1	55	5	0.13	2.2
Grove Ave.	9-A	15,394	55	1	55	5	0.13	12.0
Campus Ave.	9	9,951	55	1	55	5	0.13	7.8
Sultana Ave.	9	3,887	55	1	55	5	0.13	3.0
Euclid Ave.	9	46,647	55	1	55	5	0.13	36.4
San Antonio Ave.	9	10,744	55	1	55	5	0.13	8.4
Mountain Ave.	8, 9	22,702	55	1	55	5	0.23	31.3
Benson Ave.	9	5,598	55	1	55	5	0.13	4.4
Central Ave.	9	18,659	55	1	55	5	0.13	14.6
Claremont Ave.	9	4,590	55	1	55	5	0.13	3.6
College Ave.	9	2,825	55	1	55	5	0.13	2.2
Indian Hill Blvd.	8, 9	14,772	55	1	55	5	0.23	20.4
Average:		360,378						13.2
SAN BERNARDINO TO SAN BERNARDINO/RIVERSIDE COUNTY LINE								
Rialto Ave.	9	20,058	20	25	20	19	0.13	114.7
Walnut St.	9	777	20	25	20	19	0.13	4.4
Mill St. (Old)	9	1,555	20	25	20	19	0.13	8.9
Laurel St.	9	2,488	30	25	30	19	0.13	14.2
Olive St.	9	2,954	30	25	30	19	0.13	16.9
E St.	9	777	30	25	30	19	0.13	4.4
H St.	9	2,488	30	25	30	19	0.13	14.2
Valley Blvd.	9	11,662	30	25	30	19	0.13	66.7
Main St.	1-R, 9	5,427	55	25	55	19	0.13	31.0
Average:								30.6

TABLE I.7
VEHICLE DELAY TIMES
EXISTING 1991 CONDITIONS

STREET NAME	ADT	NO. OF TRAINS PER DAY	GATE BLOCKAGE TIME (Min./Day)	VEHICULAR ARRIVAL RATE (Veh/Min)	VEHICULAR DEPARTURE RATE (Veh/Min)	VEHICLES IN QUEUE DURING BLOCKAGE PER DAY	NO. VEHICLES DELAYED PER DAY	TOTAL TIME DELAYED (Veh.-Hours/Day)	ELAPSED TIME (Min./Day)
BOLO STATION TO BARSTOW									
Saltus Rd.	62	37	35	0	25	0	0	- 0.00	35.00
National Trails Hwy.	345	37	35	0	25	0	0	0.00	35.00
National Trails Hwy.	234	37	35	0	25	0	0	0.00	35.00
Bagdad Chase Rd.	50	37	35	0	25	0	0	0.00	35.00
National Trails Hwy.	116	37	35	0	25	0	0	0.00	35.00
Newberry Rd.	680	37	35	1	25	35	36	9.80	46.00
Mt. View Rd.	163	37	35	0	25	0	0	0.00	35.00
Mineola Rd.	211	37	35	0	25	0	0	0.00	35.00
Hidden Springs Rd.	300	37	35	0	25	0	0	0.00	35.00
Daggett Yermo Rd.	2,100	60	56	2	25	112	122	48.09	109.00
Subotal:	4,261		371			147	158	57.89	435.00
BARSTOW TO SAN BERNARDINO/KERN COUNTY LINE									
St. Hwy. 58	7,900	17	16	7	25	112	156	10.75	33.00
Mt. View Rd.	46	17	16	0	25	0	0	0.00	16.00
Hinkley Rd.	600	17	16	1	25	16	17	2.05	19.00
Almeda St.	81	17	16	0	25	0	0	0.00	16.00
Harper Lake Rd.	80	17	16	0	25	0	0	0.00	16.00
U.S. Hwy. 395	2,450	17	16	2	25	32	35	3.93	21.00
St. Hwy. 58	5,400	17	16	5	25	80	100	8.53	29.00
Subotal:	16,557		112			240	308	25.26	150.00
BARSTOW TO VICTORVILLE									
Lenwood Rd.	3,370	50	47	3	25	141	160	48.60	102.00
Oak Grove Rd.	NA	50	47	0	25	0	0	0.00	47.00
Hinkley Rd.	300	50	47	0	25	0	0	0.00	47.00
Indian Trail Rd.	100	50	47	0	25	0	0	0.00	47.00
Vista St.	980	50	47	1	25	47	49	17.67	67.00
Turner Rd.	30	50	47	0	25	0	0	0.00	47.00
North Bryman Rd.	100	50	47	0	25	0	0	0.00	47.00
South Bryman Rd.	200	50	47	0	25	0	0	0.00	47.00
Robinson Ranch Rd.	100	50	47	0	25	0	0	0.00	47.00
First St.	1,000	50	51	1	25	51	53	20.81	74.00
Sixth St.	4,000	50	56	3	25	168	191	68.99	133.00
Subotal:	10,180		530			407	453	156.07	705.00
VICTORVILLE TO SAN BERNARDINO									
Swarthout Canyon Rd.	100	50	63	0	25	0	0	0.00	63.00
Devore Rd.	610	50	61	1	25	61	64	29.77	93.00
Palm Ave.	1,322	50	52	1	25	52	54	21.63	76.00
St. College Pkwy.	9,428	50	52	8	25	416	612	122.58	199.00
Subotal:	11,460		228			529	730	173.98	431.00
SAN BERNARDINO TO SAN BERNARDINO/LOS ANGELES COUNTY LINE									
Rancho Ave.	9,900	6	8	8	25	64	94	2.90	15.00
Rialto Ave.	8,000	6	8	7	25	56	78	2.69	14.00
Pepper Ave.	8,800	6	8	7	25	56	78	2.69	14.00

TABLE I.7
VEHICLE DELAY TIMES
EXISTING 1991 CONDITIONS

Eucalyptus Ave.	2,000	6	8	2	25	16	17	0.98	10.00
Acacia St.	3,000	6	8	3	25	24	27	1.41	10.00
Sycamore Ave.	1,800	6	8	2	25	16	17	0.98	10.00
Riverside Ave.	12,000	6	8	10	30	80	120	3.56	16.00
Willow Ave.	2,000	6	8	2	25	16	17	0.98	10.00
Lilac Ave.	1,700	6	6	1	25	6	6	0.29	7.00
Cactus Ave.	2,970	6	6	2	25	12	13	0.55	7.00
Cedar Ave.	1,200	6	6	1	25	6	6	0.29	7.00
Locust Ave.	3,100	6	6	3	25	18	20	0.79	8.00
Alder Ave.	5,100	6	6	4	25	24	29	1.01	8.00
Palmetto Ave.	3,000	6	6	3	25	18	20	0.79	8.00
Mongo Ave.	4,600	6	6	4	25	24	29	1.01	8.00
Sierra Ave.	15,800	6	6	13	35	78	124	2.45	12.00
Juniper Ave.	5,200	6	6	4	25	24	29	1.01	8.00
Citrus Ave.	4,600	6	6	4	25	24	29	1.01	8.00
Beach Ave.	1,700	6	6	1	25	6	6	0.29	7.00
Etiwanda Ave.	4,820	6	6	4	25	24	29	1.01	8.00
Rochester Ave.	700	6	6	1	25	6	6	0.29	7.00
Haven Ave.	8,200	6	6	7	25	42	58	1.51	10.00
Turner Ave.	600	6	6	1	25	6	6	0.29	7.00
Archibald Ave.	9,000	6	6	8	25	48	71	1.63	10.00
Hellman Ave.	1,000	6	6	1	25	6	6	0.29	7.00
Vineyard Ave.	9,000	6	6	8	25	48	71	1.63	10.00
Baker Ave.	1,800	6	6	2	25	12	13	0.55	7.00
Grove Ave.	9,900	6	6	8	25	48	71	1.63	10.00
Campus Ave.	6,400	6	6	5	25	30	38	1.20	9.00
Sultana Ave.	2,500	6	6	2	25	12	13	0.55	7.00
Euclid Ave.	30,000	6	6	25	70	150	233	4.82	14.00
San Antonio Ave.	6,910	6	6	6	25	36	47	1.37	9.00
Mountain Ave.	14,600	6	6	12	35	72	110	2.37	11.00
Benson Ave.	3,600	6	6	3	25	18	20	0.79	8.00
Central Ave.	12,000	6	6	10	30	60	90	2.00	11.00
Claremont Ave.	2,952	6	6	2	25	12	13	0.55	7.00
College Ave.	1,817	6	6	2	25	12	13	0.55	7.00
Indian Hill Blvd.	9,500	6	6	8	25	48	71	1.63	10.00
Subotal:	231,769		244			1,258	1,738	50.34	356.00
SAN BERNARDINO TO SAN BERNARDINO/RIVERSIDE COUNTY LINE									
Rialto Ave.	12,900	44	77	11	30	847	1337	344.21	466.00
Walnut St.	500	44	77	0	25	0	0	0.00	77.00
Mill St. (Old)	1,000	44	77	1	25	77	80	47.43	128.00
Laurel St.	1,600	44	60	1	25	60	63	28.80	91.00
Olive St.	1,900	44	60	2	25	120	130	55.20	120.00
E St.	500	44	60	0	25	0	0	0.00	60.00
H St.	1,600	44	60	1	25	60	63	28.80	91.00
Valley Blvd.	7,500	44	60	6	25	360	474	136.80	216.00
Main St.	3,490	44	45	3	25	135	153	44.55	96.00
Subotal:	30,990		576			1,659	2,300	685.79	1,345.00
Total	305,217		2,061			4,240	5,687	1,149.32	3,422.00

TABLE I.8
VECHILE DELAY TIMES
3,000 TON PER DAY CONDITIONS

STREET NAME	ADT	NO. OF TRAINS PER DAY	GATE BLOCKAGE TIME (Min./Day)	VEHICULAR ARRIVAL RATE (Veh/Min)	VEHICULAR DEPARTURE RATE (Veh/Min)	VEHICLES IN QUEUE DURING BLOCKAGE PER DAY	NO. VEHICLES DELAYED PER DAY	TOTAL TIME DELAYED (Veh.-Hours/Day)	ELAPSED TIME (Min./Day)
BOLO STATION TO BARSTOW									
Saltus Rd.	69	39	36	0	25	0	0	0.00	36.00
National Trails Hwy.	385	39	36	0	25	0	0	0.00	36.00
National Trails Hwy.	261	39	36	0	25	0	0	0.00	36.00
Bagdad Chase Rd.	56	39	37	0	25	0	0	0.00	37.00
National Trails Hwy.	130	39	36	0	25	0	0	0.00	36.00
Newberry Rd.	759	39	36	1	25	36	38	10.37	48.00
Mt. View Rd.	182	39	36	0	25	0	0	0.00	36.00
Mineola Rd.	236	39	36	0	25	0	0	0.00	36.00
Hidden Springs Rd.	335	39	36	0	25	0	0	0.00	36.00
Daggett Yermo Rd.	2,345	62	58	2	25	116	126	51.58	115.00
Subotal:	4,759		383			152	164	61.95	452.00
BARSTOW TO SAN BERNARDINO/KERN COUNTY LINE									
St. Hwy. 58	8,823	17	16	7	25	112	156	10.75	33.00
Mt. View Rd.	51	17	16	0	25	0	0	0.00	16.00
Hinkley Rd.	670	17	16	1	25	16	17	2.05	19.00
Almeda St.	90	17	16	0	25	0	0	0.00	16.00
Harper Lake Rd.	89	17	16	0	25	0	0	0.00	16.00
U.S. Hwy. 395	2,736	17	16	2	25	32	35	3.93	21.00
St. Hwy. 58	6,031	17	16	5	25	80	100	8.53	29.00
Subotal:	18,491		112			240	308	25.26	150.00
BARSTOW TO VICTORVILLE									
Lenwood Rd.	3,764	52	49	3	25	147	167	52.82	109.00
Oak Grove Rd.	NA	52	49	0	25	0	0	0.00	49.00
Hinkley Rd.	335	52	49	0	25	0	0	0.00	49.00
Indian Trail Rd.	112	52	49	0	25	0	0	0.00	49.00
Vista St.	1,094	52	49	1	25	49	51	19.21	70.00
Turner Rd.	34	52	49	0	25	0	0	0.00	49.00
North Bryman Rd.	112	52	49	0	25	0	0	0.00	49.00
South Bryman Rd.	223	52	49	0	25	0	0	0.00	49.00
Robinson Ranch Rd.	112	52	49	0	25	0	0	0.00	49.00
First St.	1,117	52	53	1	25	53	55	22.47	78.00
Sixth St.	4,467	52	58	4	25	232	276	94.19	163.00
Subotal:	11,369		552			481	549	188.69	763.00
VICTORVILLE TO SAN BERNARDINO									
Swarthout Canyon Rd.	112	52	66	0	25	0	0	0.00	66.00
Devore Rd.	681	52	63	1	25	63	66	31.75	97.00
Palm Ave.	1,476	52	54	1	25	54	56	23.33	80.00
St. College Pkwy.	10,529	52	54	9	25	486	759	139.97	224.00
Subotal:	12,799		237			603	881	195.05	467.00
SAN BERNARDINO TO SAN BERNARDINO/LOS ANGELES COUNTY LINE									
Rancho Ave.	11,056	6	8	9	25	72	113	3.07	16.00
Rialto Ave.	8,934	6	8	7	25	56	78	2.69	14.00
Pepper Ave.	9,828	6	8	8	25	64	94	2.90	15.00

TABLE I.8
VECHILE DELAY TIMES
3,000 TON PER DAY CONDITIONS

Eucalyptus Ave.	2,234	6	8	2	25	16	17	0.98	10.00
Acacia St.	3,350	6	8	3	25	24	27	1.41	10.00
Sycamore Ave.	2,010	6	8	2	25	16	17	0.98	10.00
Riverside Ave.	13,402	6	8	11	25	88	157	3.29	18.00
Willow Ave.	2,234	6	8	2	25	16	17	0.98	10.00
Lilac Ave.	1,899	6	6	2	25	12	13	0.55	7.00
Cactus Ave.	3,317	6	6	3	25	18	20	0.79	8.00
Cedar Ave.	1,340	6	6	1	25	6	6	0.29	7.00
Locust Ave.	3,462	6	6	3	25	18	20	0.79	8.00
Alder Ave.	5,696	6	6	5	25	30	38	1.20	9.00
Palmetto Ave.	3,350	6	6	3	25	18	20	0.79	8.00
Mongo Ave.	5,137	6	6	4	25	24	29	1.01	8.00
Sierra Ave.	17,645	6	6	15	25	90	225	1.80	17.00
Juniper Ave.	5,807	6	6	5	25	30	38	1.20	9.00
Citrus Ave.	5,137	6	6	4	25	24	29	1.01	8.00
Beach Ave.	1,899	6	6	2	25	12	13	0.55	7.00
Etiwanda Ave.	5,383	6	6	4	25	24	29	1.01	8.00
Rochester Ave.	782	6	6	1	25	6	6	0.29	7.00
Haven Ave.	9,158	6	6	8	25	48	71	1.63	10.00
Turner Ave.	670	6	6	1	25	6	6	0.29	7.00
Archibald Ave.	10,051	6	6	8	25	48	71	1.63	10.00
Hellman Ave.	1,117	6	6	1	25	6	6	0.29	7.00
Vineyard Ave.	10,051	6	6	8	25	48	71	1.63	10.00
Baker Ave.	2,010	6	6	2	25	12	13	0.55	7.00
Grove Ave.	11,056	6	6	9	25	54	84	1.73	11.00
Campus Ave.	7,148	6	6	6	25	36	47	1.37	9.00
Sultana Ave.	2,792	6	6	2	25	12	13	0.55	7.00
Euclid Ave.	33,504	6	6	28	50	168	382	3.70	17.00
San Antonio Ave.	7,717	6	6	6	25	36	47	1.37	9.00
Mountain Ave.	16,305	6	6	14	25	84	191	1.85	15.00
Benson Ave.	4,020	6	6	3	25	18	20	0.79	8.00
Central Ave.	13,402	6	6	11	25	66	118	1.85	13.00
Claremont Ave.	3,297	6	6	3	25	18	20	0.79	8.00
College Ave.	2,029	6	6	2	25	12	13	0.55	7.00
Indian Hill Blvd.	10,610	6	6	9	25	54	84	1.73	11.00
Subotal:	258,840		244			1,390	2,263	49.87	380.00
SAN BERNARDINO TO SAN BERNARDINO/RIVERSIDE COUNTY LINE									
Rialto Ave.	14,407	46	81	12	30	972	1620	393.66	529.00
Walnut St.	558	46	81	0	25	0	0	0.00	81.00
Mill St. (Old)	1,117	46	81	1	25	81	84	52.49	137.00
Laurel St.	1,787	46	63	1	25	63	66	31.75	97.00
Olive St.	2,122	46	63	2	25	126	137	60.86	129.00
E St.	558	46	63	0	25	0	0	0.00	63.00
H St.	1,787	46	63	1	25	63	66	31.75	97.00
Valley Blvd.	8,376	46	63	7	25	441	613	166.70	254.00
Main St.	3,898	46	47	3	25	141	160	48.60	102.00
Subotal:	34,610		605			1,887	2,746	785.81	1,489.00
Total	340,866		2,133			4,753	6,911	1,306.63	3,701.00

TABLE I.9
VEHICLE DELAY TIMES
21,000 TON PER DAY CONDITIONS

STREET NAME	ADT	NO. OF TRAINS PER DAY	GATE BLOCKAGE TIME (Min./Day)	VEHICULAR ARRIVAL RATE (Veh/Min)	VEHICULAR DEPARTURE RATE (Veh/Min)	VEHICLES IN QUEUE DURING BLOCKAGE PER DAY	NO. VEHICLES DELAYED PER DAY	TOTAL TIME DELAYED (Veh.-Hours/Day)	ELAPSED TIME (Min./Day)
BOLO STATION TO BARSTOW									
Saltus Rd.	96	51	48	0	25	0	0	0.00	48.00
National Trails Hwy.	536	51	48	0	25	0	0	0.00	48.00
National Trails Hwy.	364	51	48	0	25	0	0	0.00	48.00
Bagdad Chase Rd.	78	51	49	0	25	0	0	0.00	49.00
National Trails Hwy.	180	51	48	0	25	0	0	0.00	48.00
Newberry Rd.	1,057	51	48	1	25	48	50	18.43	68.00
Mt. View Rd.	253	51	48	0	25	0	0	0.00	48.00
Mineola Rd.	328	51	48	0	25	0	0	0.00	48.00
Hidden Springs Rd.	466	51	48	0	25	0	0	0.00	48.00
Daggett Yermo Rd.	3,265	74	69	3	25	207	235	104.74	183.00
Subotal:	6,625		502			255	285	123.17	636.00
BARSTOW TO SAN BERNARDINO/KERN COUNTY LINE									
St. Hwy. 58	12,284	19	18	10	25	180	300	16.20	46.00
Mt. View Rd.	72	19	18	0	25	0	0	0.00	18.00
Hinkley Rd.	933	19	18	1	25	18	19	2.59	21.00
Almeda St.	126	19	18	0	25	0	0	0.00	18.00
Harper Lake Rd.	124	19	18	0	25	0	0	0.00	18.00
U.S. Hwy. 395	3,810	19	18	3	25	54	61	7.13	28.00
St. Hwy. 58	8,396	19	18	7	25	126	175	13.61	39.00
Subotal:	25,744		126			378	555	39.53	188.00
BARSTOW TO VICTORVILLE									
Lenwood Rd.	5,240	62	58	4	25	232	276	94.19	163.00
Oak Grove Rd.	NA	62	58	0	25	0	0	0.00	58.00
Hinkley Rd.	466	62	58	0	25	0	0	0.00	58.00
Indian Trail Rd.	155	62	58	0	25	0	0	0.00	58.00
Vista St.	1,524	62	58	1	25	58	60	26.91	87.00
Turner Rd.	47	62	58	0	25	0	0	0.00	58.00
North Bryman Rd.	155	62	58	0	25	0	0	0.00	58.00
South Bryman Rd.	311	62	58	0	25	0	0	0.00	58.00
Robinson Ranch Rd.	155	62	58	0	25	0	0	0.00	58.00
First St.	1,555	62	63	1	25	63	66	31.75	97.00
Sixth St.	6,220	62	69	5	25	345	431	158.70	245.00
Subotal:	15,829		654			698	833	311.56	998.00
VICTORVILLE TO SAN BERNARDINO									
Swarthout Canyon Rd.	155	60	76	0	25	0	0	0.00	76.00
Devore Rd.	948	60	73	1	25	73	76	42.63	119.00
Palm Ave.	2,056	60	63	2	25	126	137	60.86	129.00
St. College Pkwy.	14,660	60	63	12	25	756	1454	206.39	328.00
Subotal:	17,819		275			955	1,667	309.88	652.00
SAN BERNARDINO TO SAN BERNARDINO/LOS ANGELES COUNTY LINE									
Rancho Ave.	15,394	10	14	13	25	182	379	10.19	39.00
Rialto Ave.	12,439	10	14	10	25	140	233	9.80	33.00
Pepper Ave.	13,683	10	14	11	25	154	275	10.06	35.00

TABLE I.9
VEHICLE DELAY TIMES
21,000 TON PER DAY CONDITIONS

Eucalyptus Ave.	3,110	10	14	3	25	42	48	4.31	20.00
Acacia St.	4,665	10	14	4	25	56	67	5.49	22.00
Sycamore Ave.	2,799	10	14	2	25	28	30	3.01	18.00
Riverside Ave.	18,659	10	14	16	30	224	480	12.20	42.00
Willow Ave.	3,110	10	14	3	25	42	48	4.31	20.00
Lilac Ave.	2,643	10	10	2	25	20	22	1.53	12.00
Cactus Ave.	4,618	10	10	4	25	40	48	2.80	15.00
Cedar Ave.	1,866	10	10	2	25	20	22	1.53	12.00
Locust Ave.	4,820	10	10	4	25	40	48	2.80	15.00
Alder Ave.	7,930	10	10	7	25	70	97	4.20	18.00
Palmetto Ave.	4,665	10	10	4	25	40	48	2.80	15.00
Mongo Ave.	7,153	10	11	6	25	66	87	4.60	19.00
Sierra Ave.	24,567	10	11	20	35	220	513	8.64	34.00
Juniper Ave.	8,085	10	11	7	25	77	107	5.08	20.00
Citrus Ave.	7,153	10	10	6	25	60	79	3.80	17.00
Beach Ave.	2,643	10	10	2	25	20	22	1.53	12.00
Etiwanda Ave.	7,495	10	10	6	25	60	79	3.80	17.00
Rochester Ave.	1,088	10	10	1	25	10	10	0.80	11.00
Haven Ave.	12,750	10	10	11	25	110	196	5.13	23.00
Turner Ave.	933	10	10	1	25	10	10	0.80	11.00
Archibald Ave.	13,994	10	10	12	25	120	231	5.20	24.00
Hellman Ave.	1,555	10	10	1	25	10	10	0.80	11.00
Vineyard Ave.	13,994	10	10	12	25	120	231	5.20	24.00
Baker Ave.	2,799	10	10	2	25	20	22	1.53	12.00
Grove Ave.	15,394	10	10	13	25	130	271	5.20	26.00
Campus Ave.	9,951	10	10	8	25	80	118	4.53	19.00
Sultana Ave.	3,887	10	10	3	25	30	34	2.20	14.00
Euclid Ave.	46,647	10	10	39	70	390	881	14.39	37.00
San Antonio Ave.	10,744	10	10	9	25	90	141	4.80	20.00
Mountain Ave.	22,702	10	10	19	35	190	416	7.24	29.00
Benson Ave.	5,598	10	10	5	25	50	63	3.33	16.00
Central Ave.	18,659	10	10	16	30	160	343	6.22	28.00
Claremont Ave.	4,590	10	10	4	25	40	48	2.80	15.00
College Ave.	2,825	10	10	2	25	20	22	1.53	12.00
Indian Hill Blvd.	14,772	10	10	12	25	120	231	5.20	24.00
Subotal:	360,378		415			3,301	6,010	179.41	791.00
SAN BERNARDINO TO SAN BERNARDINO/RIVERSIDE COUNTY LINE									
Rialto Ave.	20,058	48	84	17	30	1428	3295	433.16	627.00
Walnut St.	777	48	84	1	25	84	88	56.45	144.00
Mill St. (Old)	1,555	48	84	1	25	84	88	56.45	144.00
Laurel St.	2,488	48	66	2	25	132	143	66.79	139.00
Olive St.	2,954	48	66	2	25	132	143	66.79	139.00
E St.	777	48	66	1	25	66	69	34.85	104.00
H St.	2,488	48	66	2	25	132	143	66.79	139.00
Valley Blvd.	11,662	48	66	10	25	660	1100	217.80	328.00
Main St.	5,427	48	49	5	25	245	306	80.03	141.00
Subotal:	48,186		631			2,963	5,375	1,079.11	1,905.00
Total	474,582		2,603			8,550	14,725	2,042.66	5,170.00

TABLE 1.10
VEHICLE DELAY TIMES
REDUCED OPERATIONS ALTERNATIVE

STREET NAME	ADT	NO. OF TRAINS PER DAY	GATE BLOCKAGE TIME (Min./Day)	VEHICULAR ARRIVAL RATE (Veh/Min)	VEHICULAR DEPARTURE RATE (Veh/Min)	VEHICLES IN QUEUE DURING BLOCKAGE PER DAY	NO. VEHICLES DELAYED PER DAY	TOTAL TIME DELAYED (Veh.-Hours/Day)	ELAPSED TIME (Min./Day)
BOLO STATION TO BARSTOW									
Saltus Rd.	96	43	40	0	25	0	0	0.00	40.00
National Trails Hwy.	536	43	40	0	25	0	0	0.00	40.00
National Trails Hwy.	364	43	40	0	25	0	0	0.00	40.00
Bagdad Chase Rd.	78	43	41	0	25	0	0	0.00	41.00
National Trails Hwy.	180	43	40	0	25	0	0	0.00	40.00
Newberry Rd.	1,057	43	40	1	25	40	42	12.80	54.00
Mt. View Rd.	253	43	40	0	25	0	0	0.00	40.00
Mineola Rd.	328	43	40	0	25	0	0	0.00	40.00
Hidden Springs Rd.	466	43	40	0	25	0	0	0.00	40.00
Daggett Yermo Rd.	3,265	66	62	3	25	186	211	84.57	155.00
Subotal:	6,625		423			226	253	97.37	530.00
BARSTOW TO SAN BERNARDINO/KERN COUNTY LINE									
St. Hwy. 58	12,284	17	16	10	25	160	267	12.80	39.00
Mt. View Rd.	72	17	16	0	25	0	0	0.00	16.00
Hinkley Rd.	933	17	16	1	25	16	17	2.05	19.00
Almeda St.	126	17	16	0	25	0	0	0.00	16.00
Harper Lake Rd.	124	17	16	0	25	0	0	0.00	16.00
U.S. Hwy. 395	3,810	17	16	3	25	48	55	5.63	24.00
St. Hwy. 58	8,396	17	16	7	25	112	156	10.75	33.00
Subotal:	25,744		112			336	495	31.23	163.00
BARSTOW TO VICTORVILLE									
Lenwood Rd.	5,240	56	52	4	25	208	248	75.71	138.00
Oak Grove Rd.	NA	56	52	0	25	0	0	0.00	52.00
Hinkley Rd.	466	56	52	0	25	0	0	0.00	52.00
Indian Trail Rd.	155	56	52	0	25	0	0	0.00	52.00
Vista St.	1,524	56	52	1	25	52	54	21.63	76.00
Turner Rd.	47	56	52	0	25	0	0	0.00	52.00
North Bryman Rd.	155	56	52	0	25	0	0	0.00	52.00
South Bryman Rd.	311	56	52	0	25	0	0	0.00	52.00
Robinson Ranch Rd.	155	56	52	0	25	0	0	0.00	52.00
First St.	1,555	56	57	1	25	57	59	25.99	85.00
Sixth St.	6,220	56	63	5	25	315	394	132.30	211.00
Subotal:	15,829		588			632	755	255.64	874.00
VICTORVILLE TO SAN BERNARDINO									
Swarthout Canyon Rd.	155	56	71	0	25	0	0	0.00	71.00
Devore Rd.	948	56	68	1	25	68	71	36.99	108.00
Palm Ave.	2,056	56	58	2	25	116	126	51.58	115.00
St. College Pkwy.	14,660	56	58	12	25	696	1338	174.93	286.00
Subotal:	17,819		255			880	1,535	263.50	580.00
SAN BERNARDINO TO SAN BERNARDINO/LOS ANGELES COUNTY LINE									
Rancho Ave.	15,394	8	11	13	25	143	298	6.29	29.00
Rialto Ave.	12,439	8	11	10	25	110	183	6.05	24.00
Pepper Ave.	13,683	8	11	11	25	121	216	6.21	26.00

TABLE 1.10
VEHICLE DELAY TIMES
REDUCED OPERATIONS ALTERNATIVE

Eucalyptus Ave.	3,110	8	11	3	25	33	38	2.66	15.00
Acacia St.	4,665	8	11	4	25	44	52	3.39	16.00
Sycamore Ave.	2,799	8	11	2	25	22	24	1.86	14.00
Riverside Ave.	18,659	8	11	16	30	176	377	7.53	31.00
Willow Ave.	3,110	8	11	3	25	33	38	2.66	15.00
Lilac Ave.	2,643	8	8	2	25	16	17	0.98	10.00
Cactus Ave.	4,618	8	8	4	25	32	38	1.79	11.00
Cedar Ave.	1,866	8	8	2	25	16	17	0.98	10.00
Locust Ave.	4,820	8	8	4	25	32	38	1.79	11.00
Alder Ave.	7,930	8	8	7	25	56	78	2.69	14.00
Palmetto Ave.	4,665	8	8	4	25	32	38	1.79	11.00
Mongo Ave.	7,153	8	9	6	25	54	71	3.08	15.00
Sierra Ave.	24,567	8	9	20	35	180	420	5.79	27.00
Juniper Ave.	8,085	8	9	7	25	63	88	3.40	16.00
Citrus Ave.	7,153	8	8	6	25	48	63	2.43	13.00
Beach Ave.	2,643	8	8	2	25	16	17	0.98	10.00
Etiwanda Ave.	7,495	8	8	6	25	48	63	2.43	13.00
Rochester Ave.	1,088	8	8	1	25	8	8	0.51	9.00
Haven Ave.	12,750	8	8	11	25	88	157	3.29	18.00
Turner Ave.	933	8	8	1	25	8	8	0.51	9.00
Archibald Ave.	13,994	8	8	12	25	96	185	3.33	19.00
Hellman Ave.	1,555	8	8	1	25	8	8	0.51	9.00
Vineyard Ave.	13,994	8	8	12	25	96	185	3.33	19.00
Baker Ave.	2,799	8	8	2	25	16	17	0.98	10.00
Grove Ave.	15,394	8	8	13	25	104	217	3.33	20.00
Campus Ave.	9,951	8	8	8	25	64	94	2.90	15.00
Sultana Ave.	3,887	8	8	3	25	24	27	1.41	10.00
Euclid Ave.	46,647	8	8	39	70	312	705	9.21	27.00
San Antonio Ave.	10,744	8	8	9	25	72	113	3.07	16.00
Mountain Ave.	22,702	8	8	19	35	152	332	4.63	22.00
Benson Ave.	5,598	8	8	5	25	40	50	2.13	12.00
Central Ave.	18,659	8	8	16	30	128	274	3.98	21.00
Claremont Ave.	4,590	8	8	4	25	32	38	1.79	11.00
College Ave.	2,825	8	8	2	25	16	17	0.98	10.00
Indian Hill Blvd.	14,772	8	8	12	25	96	185	3.33	19.00
Subotal:	360,378		331			2,635	4,794	114.02	607.00
SAN BERNARDINO TO SAN BERNARDINO/RIVERSIDE COUNTY LINE									
Rialto Ave.	20,058	48	84	17	30	1428	3295	433.16	627.00
Walnut St.	777	48	84	1	25	84	88	56.45	144.00
Mill St. (Old)	1,555	48	84	1	25	84	88	56.45	144.00
Laurel St.	2,488	48	66	2	25	132	143	66.79	139.00
Olive St.	2,954	48	66	2	25	132	143	66.79	139.00
E St.	777	48	66	1	25	66	69	34.85	104.00
H St.	2,488	48	66	2	25	132	143	66.79	139.00
Valley Blvd.	11,662	48	66	10	25	660	1100	217.80	328.00
Main St.	5,427	48	49	5	25	245	306	80.03	141.00
Subotal:	48,186		631			2,963	5,375	1,079.11	1,905.00
Total	474,582		2,340			7,672	13,207	1,840.87	4,659.00

TABLE 1.11
VEHICLE DELAY TIMES
NO ACTION ALTERNATIVE

STREET NAME	ADT	NO. OF TRAINS PER DAY	GATE BLOCKAGE TIME (Min./Day)	VEHICULAR ARRIVAL RATE (Veh/Min)	VEHICULAR DEPARTURE RATE (Veh/Min)	VEHICLES IN QUEUE DURING BLOCKAGE PER DAY	NO. VEHICLES DELAYED PER DAY	TOTAL TIME DELAYED (Veh.-Hours/Day)	ELAPSED TIME (Min./Day)
BOLO STATION TO BARSTOW									
Saltus Rd.	96	37	35	0	25	0	0	0.00	35.00
National Trails Hwy.	536	37	35	0	25	0	0	0.00	35.00
National Trails Hwy.	364	37	35	0	25	0	0	0.00	35.00
Bagdad Chase Rd.	78	37	35	0	25	0	0	0.00	35.00
National Trails Hwy.	180	37	35	0	25	0	0	0.00	35.00
Newberry Rd.	1,057	37	35	1	25	35	36	9.80	46.00
Mt. View Rd.	253	37	35	0	25	0	0	0.00	35.00
Mineola Rd.	328	37	35	0	25	0	0	0.00	35.00
Hidden Springs Rd.	466	37	35	0	25	0	0	0.00	35.00
Daggett Yermo Rd.	3,265	60	56	3	25	168	191	68.99	133.00
Subotal:	6,625		371			203	227	78.79	459.00
BARSTOW TO SAN BERNARDINO/KERN COUNTY LINE									
St. Hwy. 58	12,284	17	16	10	25	160	267	12.80	39.00
Mt. View Rd.	72	17	16	0	25	0	0	0.00	16.00
Hinkley Rd.	933	17	16	1	25	16	17	2.05	19.00
Almeda St.	126	17	16	0	25	0	0	0.00	16.00
Harper Lake Rd.	124	17	16	0	25	0	0	0.00	16.00
U.S. Hwy. 395	3,810	17	16	3	25	48	55	5.63	24.00
St. Hwy. 58	8,396	17	16	7	25	112	156	10.75	33.00
Subotal:	25,744		112			336	495	31.23	163.00
BARSTOW TO VICTORVILLE									
Lenwood Rd.	5,240	50	47	4	25	188	224	61.85	118.00
Oak Grove Rd.	NA	50	47	0	25	0	0	0.00	47.00
Hinkley Rd.	466	50	47	0	25	0	0	0.00	47.00
Indian Trail Rd.	155	50	47	0	25	0	0	0.00	47.00
Vista St.	1,524	50	47	1	25	47	49	17.67	67.00
Turner Rd.	47	50	47	0	25	0	0	0.00	47.00
North Bryman Rd.	155	50	47	0	25	0	0	0.00	47.00
South Bryman Rd.	311	50	47	0	25	0	0	0.00	47.00
Robinson Ranch Rd.	155	50	47	0	25	0	0	0.00	47.00
First St.	1,555	50	51	1	25	51	53	20.81	74.00
Sixth St.	6,220	50	56	5	25	280	350	104.53	175.00
Subotal:	15,829		530			566	676	204.87	763.00
VICTORVILLE TO SAN BERNARDINO									
Swarthout Canyon Rd.	155	50	63	0	25	0	0	0.00	63.00
Devore Rd.	948	50	61	1	25	61	64	29.77	93.00
Palm Ave.	2,056	50	52	2	25	104	113	41.46	98.00
St. College Pkwy.	14,660	50	52	12	25	624	1200	140.61	241.00
Subotal:	17,819		228			789	1,377	211.84	495.00
SAN BERNARDINO TO SAN BERNARDINO/LOS ANGELES COUNTY LINE									
Rancho Ave.	15,394	6	8	13	25	104	217	3.33	20.00
Rialto Ave.	12,439	6	8	10	25	80	133	3.20	17.00
Pepper Ave.	13,683	6	8	11	25	88	157	3.29	18.00

TABLE I.11
VEHICLE DELAY TIMES
NO ACTION ALTERNATIVE

Eucalyptus Ave.	3,110	6	8	3	25	24	27	1.41	10.00
Acacia St.	4,665	6	8	4	25	32	38	1.79	11.00
Sycamore Ave.	2,799	6	8	2	25	16	17	0.98	10.00
Riverside Ave.	18,659	6	8	16	30	128	274	3.98	21.00
Willow Ave.	3,110	6	8	3	25	24	27	1.41	10.00
Lilac Ave.	2,643	6	6	2	25	12	13	0.55	7.00
Cactus Ave.	4,618	6	6	4	25	24	29	1.01	8.00
Cedar Ave.	1,866	6	6	2	25	12	13	0.55	7.00
Locust Ave.	4,820	6	6	4	25	24	29	1.01	8.00
Alder Ave.	7,930	6	6	7	25	42	58	1.51	10.00
Palmetto Ave.	4,665	6	6	4	25	24	29	1.01	8.00
Mongo Ave.	7,153	6	6	6	25	36	47	1.37	9.00
Sierra Ave.	24,567	6	6	20	35	120	280	2.57	17.00
Juniper Ave.	8,085	6	6	7	25	42	58	1.51	10.00
Citrus Ave.	7,153	6	6	6	25	36	47	1.37	9.00
Beach Ave.	2,643	6	6	2	25	12	13	0.55	7.00
Etiwanda Ave.	7,495	6	6	6	25	36	47	1.37	9.00
Rochester Ave.	1,088	6	6	1	25	6	6	0.29	7.00
Haven Ave.	12,750	6	6	11	25	66	118	1.85	13.00
Turner Ave.	933	6	6	1	25	6	6	0.29	7.00
Archibald Ave.	13,994	6	6	12	25	72	138	1.87	13.00
Hellman Ave.	1,555	6	6	1	25	6	6	0.29	7.00
Vineyard Ave.	13,994	6	6	12	25	72	138	1.87	13.00
Baker Ave.	2,799	6	6	2	25	12	13	0.55	7.00
Grove Ave.	15,394	6	6	13	25	78	163	1.87	14.00
Campus Ave.	9,951	6	6	8	25	48	71	1.63	10.00
Sultana Ave.	3,887	6	6	3	25	18	20	0.79	8.00
Euclid Ave.	46,647	6	6	39	70	234	528	5.18	19.00
San Antonio Ave.	10,744	6	6	9	25	54	84	1.73	11.00
Mountain Ave.	22,702	6	6	19	35	114	249	2.61	16.00
Benson Ave.	5,598	6	6	5	25	30	38	1.20	9.00
Central Ave.	18,659	6	6	16	30	96	206	2.24	15.00
Claremont Ave.	4,590	6	6	4	25	24	29	1.01	8.00
College Ave.	2,825	6	6	2	25	12	13	0.55	7.00
Indian Hill Blvd.	14,772	6	6	12	25	72	138	1.87	13.00
Subotal:	360,378		244			1,936	3,517	61.46	423.00
SAN BERNARDINO TO SAN BERNARDINO/RIVERSIDE COUNTY LINE									
Rialto Ave.	20,058	44	77	17	30	1309	3021	363.97	542.00
Walnut St.	777	44	77	1	25	77	80	47.43	128.00
Mill St. (Old)	1,555	44	77	1	25	77	80	47.43	128.00
Laurel St.	2,488	44	60	2	25	120	130	55.20	120.00
Olive St.	2,954	44	60	2	25	120	130	55.20	120.00
E St.	777	44	60	1	25	60	63	28.80	91.00
H St.	2,488	44	60	2	25	120	130	55.20	120.00
Valley Blvd.	11,662	44	60	10	25	600	1000	180.00	280.00
Main St.	5,427	44	45	5	25	225	281	67.50	124.00
Subotal:	48,186		576			2,708	4,915	900.74	1,653.00
Total	474,582		2,061			6,538	11,207	1,488.92	3,956.00

91-109elr/els-30 REV. 07/09/92

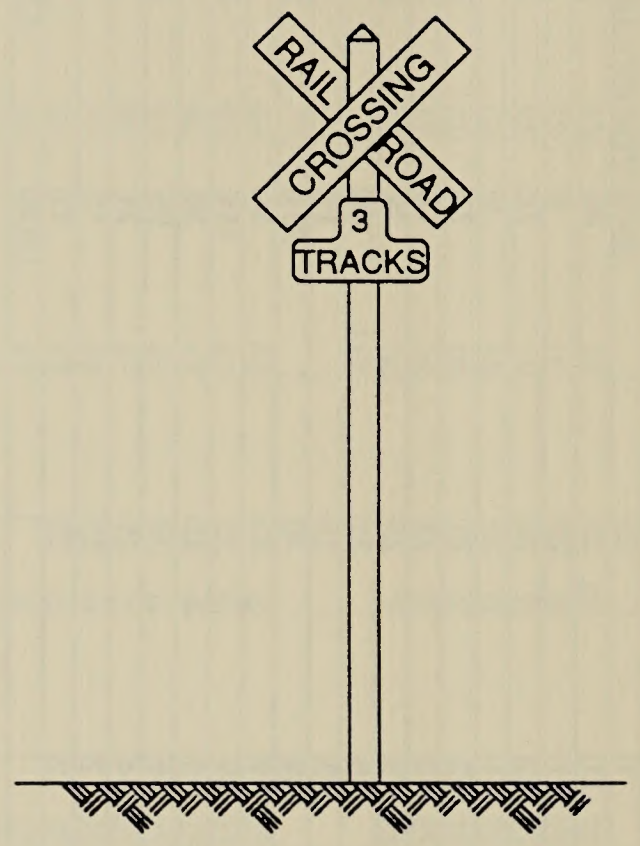

FIGURE I.1

STANDARD NO. 1-R
WARNING SIGNAL

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

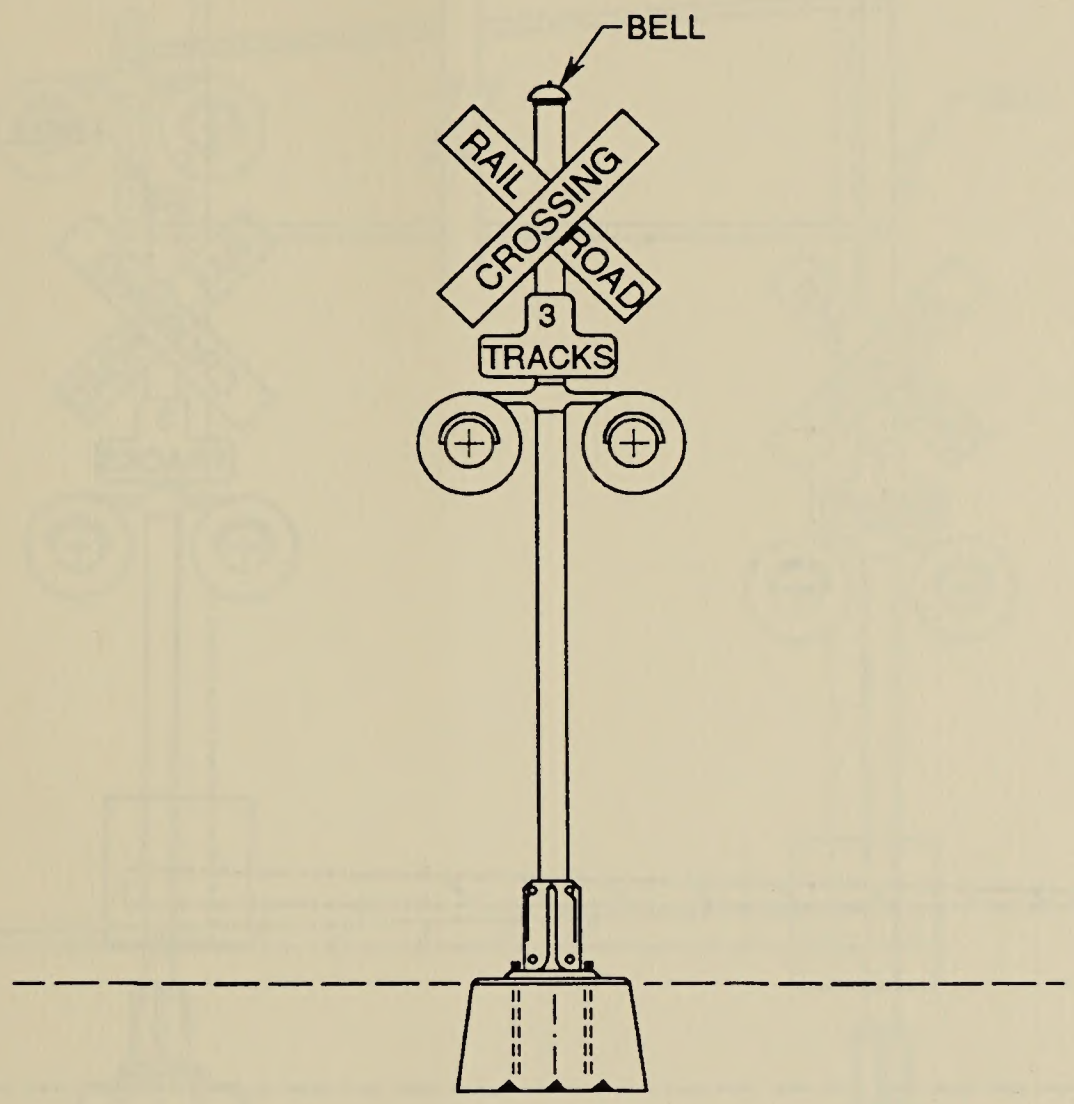

FIGURE I.2

STANDARD NO. 8
WARNING SIGNAL

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

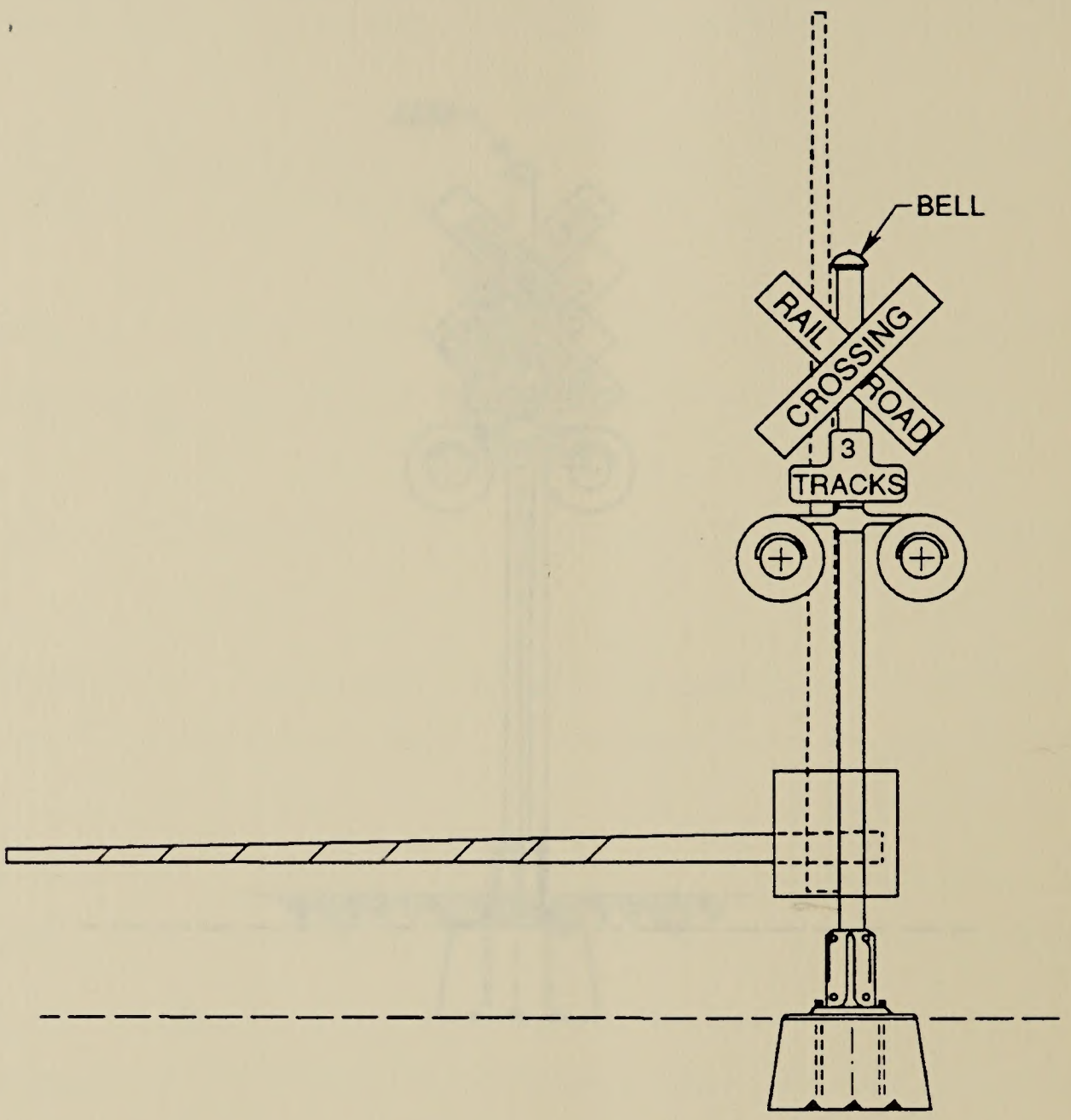

FIGURE I.3

STANDARD NO. 9
WARNING SIGNAL

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

91-10991R/81S-33 REV. 07/09/92

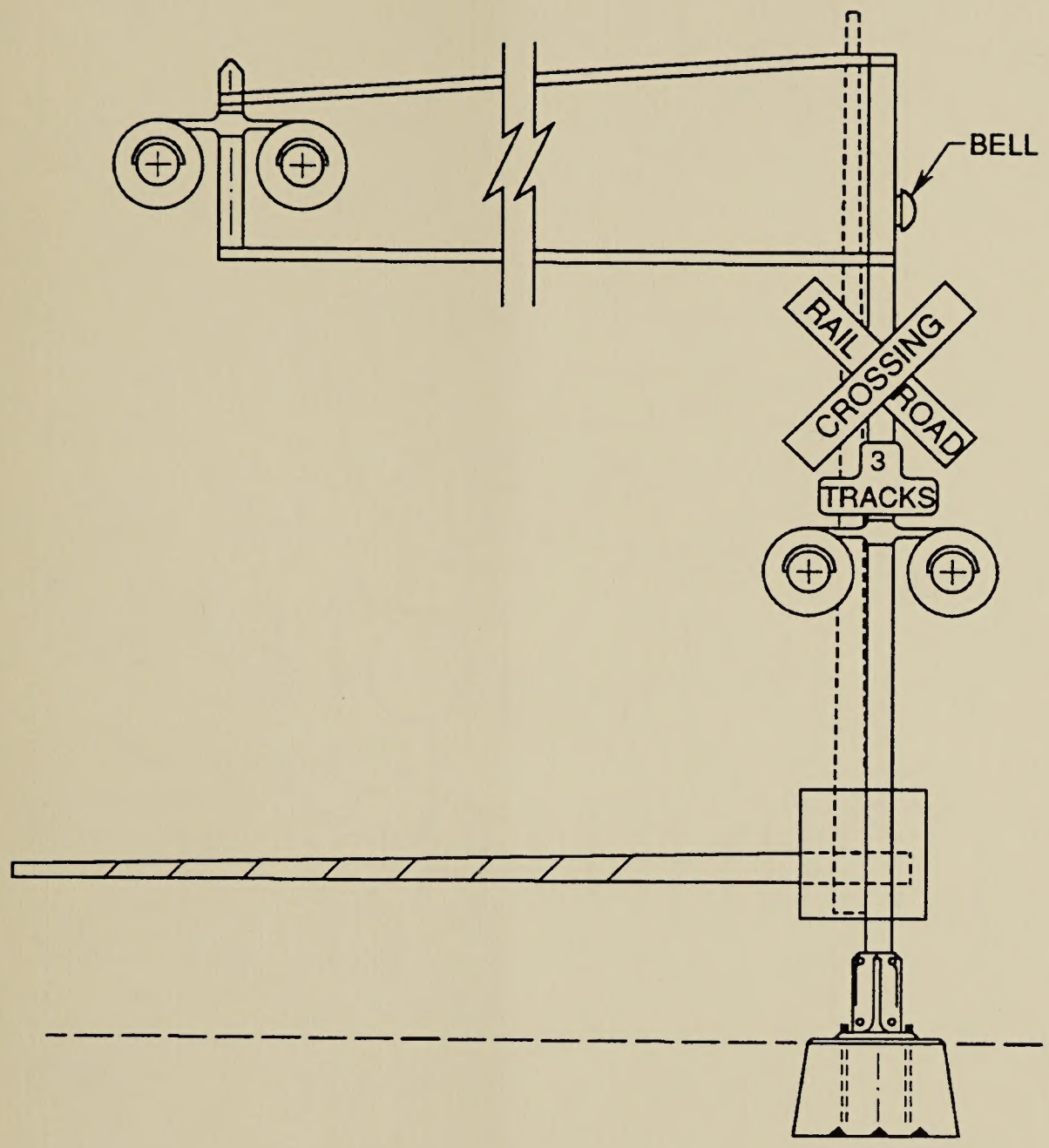

FIGURE I.4

STANDARD NO. 9-A
WARNING SIGNAL

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

APPENDIX J
NOISE CALCULATIONS

APPENDIX J

NOISE CALCULATIONS

1. To determine potential impacts caused by additional train noise, a computer spreadsheet model was used to develop Ldn levels at different distances from the railroad track centerline due to railroad line operations. This model was originally developed by Wyle Laboratories (1973) as part of a report jointly prepared for several railway companies.

2. The model will predict noise levels at varying distances from the track centerline when supplied with a few key variables. These include:

   - Train length (feet).
   - Train speed (miles per hour).
   - Percent grade of railroad tracks (if any).
   - Sound barrier factor (if any).
   - Number of locomotives.
   - Helper engines (if any).
   - Number of daytime and nighttime operations.

3. These factors are used to calculate separate SENEL values for the cars and locomotives as well as a cumulative SENEL for the whole train. Since the SENEL is only valid for a single event the Ldn levels are calculated applying the number of day and nighttime operations to the SENEL, where the nighttime operations are weighted by a factor of ten.

4. Each of the individual rail segments were evaluated for existing 1991 conditions, 3,000 and 21,000 tons per day scenarios and the Reduced Action Alternative. Results of the modeling analyses are shown in Tables J.1 through J.4.

TABLE J.1
CNEL WORKSHEET FOR LINE OPERATIONS
EXISTING 1991 CONDITIONS

Train Category Identification	L, feet (train length)	V, mph (train speed)	% grade	Barrier (if existing)	Distance to track, feet	(1) Pass-by Duration sec t=L/V	(2) C1 10 * log(t)	(3) Car SPL at 100' dB C2	(4) Car-distance attenuation α	(5) αbc Car barrier correction	(6) Car Noise Adjustment C3	(7) SENEL Noise (cars), dB C1+C2+C3-α-αbc	(8) Loco. SENEL at 100' C4, dB	(9) Loco. distance attenuation α	(10) αbe Loco. barrier correction	(11) Helper engine adjustment, C5	(12) SENEL (loco.), dB C4+C5-α-αbe	(13) SENEL (Train) dB	(14) n equiv. no. of daily operations	(15) Ldn contribution
1 Bolo Station/ Barstow	4,000	70		None	100'	38.9	15.9	87.0	0.0	0.0	0.0	102.9	96.0	0.0	0.0		96.0	103.7	145	75.9
					200'				4.0	0.0	0.0	98.9		4.0	0.0		92.0	99.7		71.9
					400'				10.0	0.0	0.0	92.9		10.0	0.0		86.0	93.7	d = 25	65.9
					800'				16.0	0.0	0.0	86.9		16.0	0.0		80.0	87.7	n = 12	59.9
					600'				14.0	0.0	0.0	88.9		12.0	0.0		84.0	90.1		62.3
					1200'				19.5	0.0	0.0	83.4		16.5	0.0		79.5	84.8		57.0
2 Barstow/ SB-Kern County Line	4,000	70		None	100'	38.9	15.9	87.0	0.0	0.0	0.0	102.9	96.0	0.0	0.0		96.0	103.7	62	72.2
					200'				4.0	0.0	0.0	98.9		4.0	0.0		92.0	99.7		68.2
					400'				10.0	0.0	0.0	92.9		10.0	0.0		86.0	93.7	d = 12	62.2
					800'				16.0	0.0	0.0	86.9		16.0	0.0		80.0	87.7	n = 5	56.2
					600'				14.0	0.0	0.0	88.9		12.0	0.0		84.0	90.1		58.6
					1200'				19.5	0.0	0.0	83.4		16.5	0.0		79.5	84.8		53.4
3 Barstow/ Victorville	4,000	70		None	100'	38.9	15.9	87.0	0.0	0.0	0.0	102.9	96.0	0.0	0.0		96.0	103.7	185	76.9
					200'				4.0	0.0	0.0	98.9		4.0	0.0		92.0	99.7		72.9
					400'				10.0	0.0	0.0	92.9		10.0	0.0		86.0	93.7	d = 35	66.9
					800'				16.0	0.0	0.0	86.9		16.0	0.0		80.0	87.7	n = 15	60.9
					600'				14.0	0.0	0.0	88.9		12.0	0.0		84.0	90.1		63.3
					1200'				19.5	0.0	0.0	83.4		16.5	0.0		79.5	84.8		58.1
4 Victorville/SB	4,000	55		None	100'	49.5	16.9	84.0	0.0	0.0	0.0	100.9	99.0	0.0	0.0	3.0	102.0	104.6	185	77.9
					200'				4.0	0.0	0.0	96.9		4.0	0.0		98.0	100.6		73.9
					400'				10.0	0.0	0.0	90.9		10.0	0.0		92.0	94.6	d = 35	67.9
					800'				16.0	0.0	0.0	84.9		16.0	0.0		86.0	88.6	n = 15	61.9
					600'				14.0	0.0	0.0	86.9		12.0	0.0		90.0	91.7		65.0
					1200'				19.5	0.0	0.0	81.4		16.5	0.0		85.5	86.9		60.2
5 SB/SB-LA County Line	4,000	55		None	100'	49.5	16.9	84.0	0.0	0.0	0.0	100.9	99.0	0.0	0.0		99.0	103.1	24	67.5
					200'				4.0	0.0	0.0	96.9		4.0	0.0		95.0	99.1		63.5
					400'				10.0	0.0	0.0	90.9		10.0	0.0		89.0	93.1	d = 4	57.5
					800'				16.0	0.0	0.0	84.9		16.0	0.0		83.0	87.1	n = 2	51.5
					600'				14.0	0.0	0.0	86.9		12.0	0.0		87.0	90.2		54.6
					1200'				19.5	0.0	0.0	81.4		16.5	0.0		82.5	85.1		49.5
6 SB/SB-Riv. County Line	4,000	30		None	100'	90.7	19.6	80.0	0.0	0.0	0.0	99.6	101.5	0.0	0.0		101.5	103.7	170	76.6
					200'				4.0	0.0	0.0	95.6		4.0	0.0		97.5	99.7		72.6
					400'				10.0	0.0	0.0	89.6		10.0	0.0		91.5	93.7	d = 30	66.6
					800'				16.0	0.0	0.0	83.6		16.0	0.0		85.5	87.7	n = 14	60.6
					600'				14.0	0.0	0.0	85.6		12.0	0.0		89.5	90.9		63.8
					1200'				19.5	0.0	0.0	80.1		16.5	0.0		85.0	86.2		59.1

TABLE J.2
CNEL WORKSHEET FOR LINE OPERATIONS
3,000 TPD CONDITIONS

Train Category Identification	L, feet (train length)	V, mph (train speed)	% grade	Barrier (if existing)	Distance to track, feet	(1) Pass-by Duration sec t=L/V	(2) C1 10 * log(t)	(3) Car SPL at 100' dB C2	(4) Car-distance attenuation α	(5) αbc Car barrier correction	(6) Car Noise Adjustment C3	(7) SENEL Noise (cars), dB C1+C2+C3-α-αbc	(8) Loco. SENEL at 100' C4, dB	(9) Loco. distance attenuation α	(10) αbe Loco. barrier correction	(11) Helper engine adjustment, C5	(12) SENEL (loco.), dB C4+C5-α-αbe	(13) SENEL (Train) dB	(14) n equiv. no. of daily operations	(15) Ldn contribution
1 Bolo Station/ Barstow	4,000	70		None	100'	38.9	15.9	87.0	0.0	0.0	0.0	102.9	96.0	0.0	0.0		96.0	103.7	165	76.4
					200'				4.0	0.0	0.0	98.9		4.0	0.0		92.0	99.7		72.4
					400'				10.0	0.0	0.0	92.9		10.0	0.0		86.0	93.7	d = 25	66.4
					800'				16.0	0.0	0.0	86.9		16.0	0.0		80.0	87.7	n = 14	60.4
					600'				14.0	0.0	0.0	88.9		12.0	0.0		84.0	90.1		62.8
					1200'				19.5	0.0	0.0	83.4		16.5	0.0		79.5	84.8		57.6
2 Barstow/ SB-Kern County Line	4,000	70		None	100'	38.9	15.9	87.0	0.0	0.0	0.0	102.9	96.0	0.0	0.0		96.0	103.7	62	72.2
					200'				4.0	0.0	0.0	98.9		4.0	0.0		92.0	99.7		68.2
					400'				10.0	0.0	0.0	92.9		10.0	0.0		86.0	93.7	d = 12	62.2
					800'				16.0	0.0	0.0	86.9		16.0	0.0		80.0	87.7	n = 5	56.2
					600'				14.0	0.0	0.0	88.9		12.0	0.0		84.0	90.1		58.6
					1200'				19.5	0.0	0.0	83.4		16.5	0.0		79.5	84.8		53.4
3 Barstow/ Victorville	4,000	70		None	100'	38.9	15.9	87.0	0.0	0.0	0.0	102.9	96.0	0.0	0.0		96.0	103.7	205	77.4
					200'				4.0	0.0	0.0	98.9		4.0	0.0		92.0	99.7		73.4
					400'				10.0	0.0	0.0	92.9		10.0	0.0		86.0	93.7	d = 35	67.4
					800'				16.0	0.0	0.0	86.9		16.0	0.0		80.0	87.7	n = 17	61.4
					600'				14.0	0.0	0.0	88.9		12.0	0.0		84.0	90.1		63.8
					1200'				19.5	0.0	0.0	83.4		16.5	0.0		79.5	84.8		58.5
4 Victorville/SB	4,000	55		None	100'	49.5	16.9	84.0	0.0	0.0	0.0	100.9	99.0	0.0	0.0	3.0	102.0	104.6	205	78.3
					200'				4.0	0.0	0.0	96.9		4.0	0.0		98.0	100.6		74.3
					400'				10.0	0.0	0.0	90.9		10.0	0.0		92.0	94.6	d = 35	68.3
					800'				16.0	0.0	0.0	84.9		16.0	0.0		86.0	88.6	n = 17	62.3
					600'				14.0	0.0	0.0	86.9		12.0	0.0		90.0	91.7		65.4
					1200'				19.5	0.0	0.0	81.4		16.5	0.0		85.5	86.9		60.6
5 SB/SB-LA County Line	4,000	55		None	100'	49.5	16.9	84.0	0.0	0.0	0.0	100.9	99.0	0.0	0.0		99.0	103.1	24	67.5
					200'				4.0	0.0	0.0	96.9		4.0	0.0		95.0	99.1		63.5
					400'				10.0	0.0	0.0	90.9		10.0	0.0		89.0	93.1	d = 4	57.5
					800'				16.0	0.0	0.0	84.9		16.0	0.0		83.0	87.1	n = 2	51.5
					600'				14.0	0.0	0.0	86.9		12.0	0.0		87.0	90.2		54.6
					1200'				19.5	0.0	0.0	81.4		16.5	0.0		82.5	85.1		49.5
6 SB/SB-Riv. County Line	4,000	30		None	100'	90.7	19.6	80.0	0.0	0.0	0.0	99.6	101.5	0.0	0.0		101.5	103.7	190	77.1
					200'				4.0	0.0	0.0	95.6		4.0	0.0		97.5	99.7		73.1
					400'				10.0	0.0	0.0	89.6		10.0	0.0		91.5	93.7	d = 30	67.1
					800'				16.0	0.0	0.0	83.6		16.0	0.0		85.5	87.7	n = 16	61.1
					600'				14.0	0.0	0.0	85.6		12.0	0.0		89.5	90.9		64.3
					1200'				19.5	0.0	0.0	80.1		16.5	0.0		85.0	86.2		59.5

TABLE J.3
CNEL WORKSHEET FOR LINE OPERATIONS
21,000 TPD CONDITIONS

Train Category Identification	L, feet (train length)	V, mph (train speed)	% grade	Barrier (if existing)	Distance to track, feet	(1) Pass-by Duration sec t=L/V	(2) C1 10 * log(t)	(3) Car SPL at 100' dB C2	(4) Car-distance attenuation α	(5) αbc Car barrier correction	(6) Car Noise Adjustment C3	(7) SENEL Noise (cars), dB C1+C2+C3-α-αbc	(8) Loco. SENEL at 100' C4, dB	(9) Loco. distance attenuation α	(10) αbe Loco. barrier correction	(11) Helper engine adjustment, C5	(12) SENEL (loco.), dB C4+C5-α-αbe	(13) SENEL (Train) dB	(14) n equiv. no. of daily operations	(15) Ldn contribution
1 Bolo Station/ Barstow	4,000	70		None	100'	38.9	15.9	87.0	0.0	0.0	0.0	102.9	96.0	0.0	0.0		96.0	103.7	285	78.8
					200'				4.0	0.0	0.0	98.9		4.0	0.0		92.0	99.7		74.8
					400'				10.0	0.0	0.0	92.9		10.0	0.0		86.0	93.7	d = 25	68.8
					800'				16.0	0.0	0.0	86.9		16.0	0.0		80.0	87.7	n = 26	62.8
					600'				14.0	0.0	0.0	88.9		12.0	0.0		84.0	90.1		65.2
					1200'				19.5	0.0	0.0	83.4		16.5	0.0		79.5	84.8		60.0
2 Barstow/ SB-Kern County Line	4,000	70		None	100'	38.9	15.9	87.0	0.0	0.0	0.0	102.9	96.0	0.0	0.0		96.0	103.7	82	73.4
					200'				4.0	0.0	0.0	98.9		4.0	0.0		92.0	99.7		69.4
					400'				10.0	0.0	0.0	92.9		10.0	0.0		86.0	93.7	d = 12	63.4
					800'				16.0	0.0	0.0	86.9		16.0	0.0		80.0	87.7	n = 7	57.4
					600'				14.0	0.0	0.0	88.9		12.0	0.0		84.0	90.1		59.8
					1200'				19.5	0.0	0.0	83.4		16.5	0.0		79.5	84.8		54.6
3 Barstow/ Victorville	4,000	70		None	100'	38.9	15.9	87.0	0.0	0.0	0.0	102.9	96.0	0.0	0.0		96.0	103.7	305	79.1
					200'				4.0	0.0	0.0	98.9		4.0	0.0		92.0	99.7		75.1
					400'				10.0	0.0	0.0	92.9		10.0	0.0		86.0	93.7	d = 35	69.1
					800'				16.0	0.0	0.0	86.9		16.0	0.0		80.0	87.7	n = 27	63.1
					600'				14.0	0.0	0.0	88.9		12.0	0.0		84.0	90.1		65.5
					1200'				19.5	0.0	0.0	83.4		16.5	0.0		79.5	84.8		60.3
4 Victorville/SB	4,000	55		None	100'	49.5	16.9	84.0	0.0	0.0	0.0	100.9	99.0	0.0	0.0	3.0	102.0	104.6	305	80.1
					200'				4.0	0.0	0.0	96.9		4.0	0.0		98.0	100.6		76.1
					400'				10.0	0.0	0.0	90.9		10.0	0.0		92.0	94.6	d = 35	70.1
					800'				16.0	0.0	0.0	84.9		16.0	0.0		86.0	88.6	n = 27	64.1
					600'				14.0	0.0	0.0	86.9		12.0	0.0		90.0	91.7		67.2
					1200'				19.5	0.0	0.0	81.4		16.5	0.0		85.5	86.9		62.3
5 SB/SB-LA County Line	4,000	55		None	100'	49.5	16.9	84.0	0.0	0.0	0.0	100.9	99.0	0.0	0.0		99.0	103.1	64	71.8
					200'				4.0	0.0	0.0	96.9		4.0	0.0		95.0	99.1		67.8
					400'				10.0	0.0	0.0	90.9		10.0	0.0		89.0	93.1	d = 4	61.8
					800'				16.0	0.0	0.0	84.9		16.0	0.0		83.0	87.1	n = 6	55.8
					600'				14.0	0.0	0.0	86.9		12.0	0.0		87.0	90.2		58.9
					1200'				19.5	0.0	0.0	81.4		16.5	0.0		82.5	85.1		53.8
6 SB/SB-Riv. County Line	4,000	30		None	100'	90.7	19.6	80.0	0.0	0.0	0.0	99.6	101.5	0.0	0.0		101.5	103.7	210	77.5
					200'				4.0	0.0	0.0	95.6		4.0	0.0		97.5	99.7		73.5
					400'				10.0	0.0	0.0	89.6		10.0	0.0		91.5	93.7	d = 30	67.5
					800'				16.0	0.0	0.0	83.6		16.0	0.0		85.5	87.7	n = 18	61.5
					600'				14.0	0.0	0.0	85.6		12.0	0.0		89.5	90.9		64.8
					1200'				19.5	0.0	0.0	80.1		16.5	0.0		85.0	86.2		60.0

TABLE J.4
CNEL WORKSHEET FOR LINE OPERATIONS
REDUCED OPERATIONS SCENARIO

Train Category Identification	L, feet (train length)	V, mph (train speed)	% grade	Barrier (if existing)	Distance to track, feet	(1) Pass-by Duration sec t=L/V	(2) C1 10 * log(t)	(3) Car SPL at 100' dB C2	(4) Car-distance attenuation α	(5) αbc Car barrier correction	(6) Car Noise Adjustment C3	(7) SENEL Noise (cars), dB C1+C2+C3-α-αbc	(8) Loco. SENEL at 100' C4, dB	(9) Loco. distance attenuation α	(10) αbe Loco. barrier correction	(11) Helper engine adjustment, C5	(12) SENEL (loco.), dB C4+C5-α-αbe	(13) SENEL (Train) dB	(14) n equiv. no. of daily operations	(15) Ldn contribution
1 Bolo Station/ Barstow	4,000	70		None	100'	38.9	15.9	87.0	0.0	0.0	0.0	102.9	96.0	0.0	0.0		96.0	103.7	205	77.4
					200'				4.0	0.0	0.0	98.9		4.0	0.0		92.0	99.7		73.4
					400'				10.0	0.0	0.0	92.9		10.0	0.0		86.0	93.7	d = 25	67.4
					800'				16.0	0.0	0.0	86.9		16.0	0.0		80.0	87.7	n = 18	61.4
					600'				14.0	0.0	0.0	88.9		12.0	0.0		84.0	90.1		63.8
					1200'				19.5	0.0	0.0	83.4		16.5	0.0		79.5	84.8		58.5
2 Barstow/ SB-Kern County Line	4,000	70		None	100'	38.9	15.9	87.0	0.0	0.0	0.0	102.9	96.0	0.0	0.0		96.0	103.7	62	72.2
					200'				4.0	0.0	0.0	98.9		4.0	0.0		92.0	99.7		68.2
					400'				10.0	0.0	0.0	92.9		10.0	0.0		86.0	93.7	d = 12	62.2
					800'				16.0	0.0	0.0	86.9		16.0	0.0		80.0	87.7	n = 5	56.2
					600'				14.0	0.0	0.0	88.9		12.0	0.0		84.0	90.1		58.6
					1200'				19.5	0.0	0.0	83.4		16.5	0.0		79.5	84.8		53.4
3 Barstow/ Victorville	4,000	70		None	100'	38.9	15.9	87.0	0.0	0.0	0.0	102.9	96.0	0.0	0.0		96.0	103.7	245	78.2
					200'				4.0	0.0	0.0	98.9		4.0	0.0		92.0	99.7		74.2
					400'				10.0	0.0	0.0	92.9		10.0	0.0		86.0	93.7	d = 35	68.2
					800'				16.0	0.0	0.0	86.9		16.0	0.0		80.0	87.7	n = 21	62.2
					600'				14.0	0.0	0.0	88.9		12.0	0.0		84.0	90.1		64.6
					1200'				19.5	0.0	0.0	83.4		16.5	0.0		79.5	84.8		59.3
4 Victorville/SB	4,000	55		None	100'	49.5	16.9	84.0	0.0	0.0	0.0	100.9	99.0	0.0	0.0	3.0	102.0	104.6	245	79.1
					200'				4.0	0.0	0.0	96.9		4.0	0.0		98.0	100.6		75.1
					400'				10.0	0.0	0.0	90.9		10.0	0.0		92.0	94.6	d = 35	69.1
					800'				16.0	0.0	0.0	84.9		16.0	0.0		86.0	88.6	n = 21	63.1
					600'				14.0	0.0	0.0	86.9		12.0	0.0		90.0	91.7		66.2
					1200'				19.5	0.0	0.0	81.4		16.5	0.0		85.5	86.9		61.4
5 SB/SB-LA County Line	4,000	55		None	100'	49.5	16.9	84.0	0.0	0.0	0.0	100.9	99.0	0.0	0.0		99.0	103.1	44	70.1
					200'				4.0	0.0	0.0	96.9		4.0	0.0		95.0	99.1		66.1
					400'				10.0	0.0	0.0	90.9		10.0	0.0		89.0	93.1	d = 4	60.1
					800'				16.0	0.0	0.0	84.9		16.0	0.0		83.0	87.1	n = 4	54.1
					600'				14.0	0.0	0.0	86.9		12.0	0.0		87.0	90.2		57.3
					1200'				19.5	0.0	0.0	81.4		16.5	0.0		82.5	85.1		52.1
6 SB/SB-Riv. County Line	4,000	30		None	100'	90.7	19.6	80.0	0.0	0.0	0.0	99.6	101.5	0.0	0.0		101.5	103.7	210	77.5
					200'				4.0	0.0	0.0	95.6		4.0	0.0		97.5	99.7		73.5
					400'				10.0	0.0	0.0	89.6		10.0	0.0		91.5	93.7	d = 30	67.5
					800'				16.0	0.0	0.0	83.6		16.0	0.0		85.5	87.7	n = 18	61.5
					600'				14.0	0.0	0.0	85.6		12.0	0.0		89.5	90.9		64.8
					1200'				19.5	0.0	0.0	80.1		16.5	0.0		85.0	86.2		60.0

APPENDIX K
CORRECTIVE ACTION INSURANCE POLICY

NATIONAL GUARANTY

INSURANCE

COMPANY

CORRECTIVE ACTION

INSURANCE POLICY

NATIONAL GUARANTY INSURANCE COMPANY
7 Burlington Square, Sixth Floor
Burlington, VT 05401

National Guaranty Insurance Company ("Company") agrees with the Insured named in the declarations made a part hereof, in consideration of payment of the premium and in reliance upon the statements in the application and declarations and subject to the limits of liability, exclusions, conditions and other terms of this policy:

I. INSURING AGREEMENT

To pay on behalf of the Insured to any authorized party only those reasonable and necessary expenses for which the Insured becomes legally obligated for corrective action at the solid waste facility designated in the declarations, where such corrective action has been made necessary by the applicable solid waste regulations or the facility permit and where claim for corrective action is first made during the effective policy period, and the Insured has failed to itself pay such expenses.

II. LIMITS OF LIABILITY

The Company's limit of liability shall not exceed the amount stated in Item 1 of the declarations for each coverage provided and for which premium has been paid.

Payment of premium shall be considered the payment of the total amount due in cash on or before the effective date of this policy. Further, this policy shall not take effect unless payment of premium has been actually received by the Company.

The limits of liability stated in the declarations shall be further limited to only those reasonable and necessary expenses for corrective action of the solid waste facility designated in the declarations.

If a claim is first made during the effective policy period, the limit of liability shall increase annually, beginning on the date the Company becomes obligated to make payments for corrective action, such annual increase being equivalent to the limit of liability, less any payments made, multiplied by an amount equivalent to either 85 percent of the most recent published investment rate for newly issued 26-week Treasury securities or of the equivalent coupon issue yield announced by the U.S. Treasury for newly issued 26-week Treasury securities.

Notwithstanding the effective date of this policy's term as stated in the declarations, the Company will maintain this policy in effect under certain conditions as set out in Section V Conditions, Cancellation and Non-Renewal. Any claim for corrective action expenses made during any such extension of the policy term shall be subject to a limit of liability stated in the declarations of this policy.

III. EXCLUSIONS

This policy does not apply to expenses, losses, liabilities of, or damages of any kind incurred by, accruing to, or alleged to be liabilities of the Insured in connection with corrective action by reason of:

1. Any criminal or civil penalties imposed by reason of the violation of any law or regulation;

2. Third-party claims for bodily injury or property damage of any nature arising or alleged to arise at any time from the premises, operations, closure, post-closure or corrective action of the solid waste facility;

3. Environmental impairment liability, whether sudden and accidental or gradual, before or after closure or post-closure, including any diminution or other interference with any other environmental right or amenity protected by law;

4. Closure or post-closure of any or all of the solid waste facility as described in the declarations.

IV. DEFINITIONS

BODILY INJURY: Bodily injury, sickness or disease, mental anguish and mental injury, or disability including care, loss of services or death resulting from any of the foregoing.

CLAIM: The occurrence of all of the following: Notice received by the Company within the effective dates of the policy that corrective action is necessary will commence within 120 days of such notice; actual commencement of corrective action.

CLEAN-UP COSTS: Expenses for the removal or neutralization of contaminants, irritants, or pollutants, or any of the conditions included in environmental impairment.

CLOSURE: Full permanent closing of a solid waste facility pursuant to a closure plan.

CLOSURE PLAN: The written closure plan, including all revisions, accepted by the regulatory body for the solid waste facility designated in the declarations.

CORRECTIVE ACTION: Activities required by permit or applicable law to contain and control contamination from a regulated activity at a permitted facility.

ENVIRONMENTAL IMPAIRMENT: The emission, discharge, dispersal, disposal, seepage, release or escape of any liquid, solid, gaseous or thermal irritant, contaminant or pollutant into or upon land, the atmosphere or any watercourse or body of water, including but not limited to the generation of smells, noises, vibration, light, electricity, radiation, changes in temperature or any other sensory phenomena.

SOLID WASTE FACILITY: The entire facility designated by legal description in the declarations which has been authorized by the regulatory body to engage in the treatment, storage or disposal of solid waste.

INSURED: The person or organization named in the declarations.

MOST RECENT PUBLISHED INVESTMENT RATE: The last published investment rate prior and closest in time to the date upon which the Company becomes obligated to make payment for corrective action; as to applicable annual increases as provided in Section II. Limits of Liability, the last published investment rate prior and closest in time to the anniversary of the date upon which the Company became obligated to make payment for corrective action.

POST-CLOSURE: The maintenance of a solid waste facility following closure, continuing for the period of time required by the regulatory body after the date of completing the closure.

POST-CLOSURE PLAN: The plan, including all revisions, accepted by the regulatory body for the solid waste facility designated in the declarations.

PROPERTY DAMAGE: (a) Physical injury to, or destruction of tangible property, including loss of use at any time resulting from the physical injury or destruction; (b) the loss of use of tangible property which has not been physically injured or destroyed; and (c) any injury to, impairment of or destruction of any intangible property or rights of any nature, whether related to tangible property or not.

REASONABLE AND NECESSARY EXPENSES: Those expenditures for corrective action, as coverage may be provided, approved in writing by the regulatory body and expended in accordance with the corrective action plan, or as otherwise justified and approved by the regulatory body for corrective action. Any payments to claims by or damages of third parties for bodily injury, property damage or environmental impairment relating in any way to closure, post-closure, or corrective action or to the premises or operation of the solid waste facility shall not be considered reasonable and necessary expenses.

REGULATORY BODY: The federal or state agency in charge of regulating the solid waste facility named in the declarations.

V. CONDITIONS

Premium: The premium for the coverages designated in the declarations shall be computed upon the basis stated in the declarations. Should this policy be terminated, cancelled or non-renewed for non-payment of premium, or for any other reason, the Insured shall have no right to any interest in any premiums paid prior to such termination. Should more than one coverage part be provided under this policy, it is an absolute condition of coverage under each part that the full amount of premium due be actually received by the Company for that coverage part to be effective.

The **Insured** shall maintain records of such information as is necessary for premium computation, and shall provide copies of such records to the Company at such times as the Company shall direct.

Inspection and Audit: The Company shall be permitted but not obligated to inspect the Insured's solid waste facility at any time. Neither the Company's right to make inspections nor the making thereof nor any report thereon shall constitute an undertaking, on behalf of or for the benefit of the Insured or others, to determine or warrant that such property or operations are safe or healthful or are in compliance with any law, rule or regulation.

The Company may examine and audit the Insured's books and records at any time during the policy period and extensions thereof, as far as they relate to the subject matter of this insurance, and within any corrective action for which coverage is provided whether or not this policy has expired at the time.

Action Against the Company: No action shall lie against the Company unless as a condition thereto, the Insured shall have fully complied with all the terms and conditions hereof, including full payment of premium due. In no event shall action lie against the Company by any party not a party to this contract, except that the regulatory body may bring action against the Company to the extent of its interest herein and subject to the terms and conditions hereof.

Assignment: This policy may not be assigned to a successive owner or operator of the solid waste facility without the consent of the Company, which shall not be unreasonably withheld, provided the Company shall have received 60 days prior written notice of such intent to assign.

Other Insurance: The insurance afforded by this policy is primary insurance. When this insurance is primary and the Insured has other insurance which is stated to be applicable to the loss on an excess or contingent basis, the amount of the Company's liability shall not be reduced by the existence of such other insurance.

When both this insurance and other insurance apply to the loss on the same basis, whether primary, excess or contingent, the Company shall not be liable under this policy for a greater proportion of the loss than that stated in the applicable contribution provision below:

A. Contribution by Equal Shares. If all of such other valid and collectible insurance provides for contribution by equal shares, the Company shall not be liable for a greater proportion of such loss than would be payable if each insurer contributes an equal share until the share of each insurer equals the lowest applicable limit of liability under any one policy or the full amount of the loss is paid, and with respect to any amount of loss not so paid the remaining insurers then continue to contribute equal shares of the remaining amount to the loss until each such insurer has paid its limit in full or the full amount of the loss is paid.

B. Contribution by Limits. If any of such other insurance does not provide for contribution by equal shares, the Company shall not be liable for a greater proportion of such loss than the applicable limit of liability under this Policy for such loss bears to the total applicable limit of liability of all valid and collectible insurance against such loss.

Regulatory Provisions: Any term or condition of this policy to which any federal or state administrative or regulatory provision applies shall be governed by those regulations or provisions in effect when a corrective action policy was first issued by the Company covering the solid waste facility.

Renewal: The coverage provided under this policy shall be renewed with a subsequent policy, issued by the Company at the expiration of the policy period stated in the declarations of this policy, in an amount at least equal to the limit of liability of this policy, subject to the cancellation provision below, and conditioned upon timely payment in full of the premium due on such subsequent policy prior to the expiration of this policy. The Company retains the right to maintain the limit of liability in any subsequent policy at the level of this policy.

Cancellation and Non-Renewal: This policy may be cancelled by the Insured by surrender thereof to the Company or any of its authorized agents, or after receiving written notice from the regulatory body, by mailing to the Company written notice stating when the cancellation shall be effective. If the Insured cancels, the return premium shall be computed in accordance with the customary short-rate table and procedure according to the Rule of 78s; provided, if claim is made prior to cancellation by the Insured, the premium shall be considered fully earned and therefore non-refundable in whole or in part.

The Company shall not cancel, terminate, or fail to renew the coverages provided herein except for failure to pay the premium. In the event of non-payment of premium for renewal, the Company may send written notice of intent to non-renew by certified mail to the Insured and the regulatory body. Such non-renewal shall be effective as of the expiration of the last policy period for which premium in full was paid, but only if premiums for the renewal policy are not paid in full before the expiration of 120 days beginning with the date of receipt of the non-renewal notice by both the regulatory body and the Insured. The return receipt shall be conclusive evidence as to receipt of notice of non-renewal. In the event of a claim for corrective action first made during the 120 day period, whether or not made during the policy effective dates, the limit of liability shall be that limit of liability listed in the declarations of this policy.

Further, the Company shall not cancel, terminate or fail to renew in the event that on or before the date of expiration of the policy or the date 120 days following notice of non-payment of premium as described above; (a) the regulatory body deems the solid waste facility abandoned; or (b) the permit is terminated, revoked, or a new permit is denied; or (c) corrective action is ordered by the regulatory body or a court; or (d) the Insured is named as a debtor in a voluntary or an involuntary proceeding under Title II (Bankruptcy) U.S. Code; or (e) the premium is paid.

Notwithstanding the above, the Company shall have the right to collect the premium due for renewal as of the expiration date stated in the declarations of this policy.

Insured's Duties in the Event of Claim:

a. In the event of the Insured's receipt of an order of corrective action by a regulatory body for any reason, the Insured shall provide the Company with immediate written notice of such order, as well as reasonably obtainable information with respect to the time, place and circumstances thereof.

b. The Insured shall immediately forward to the Company any demand or notice regarding corrective action received by the Insured or his representative.

c. The Insured shall cooperate with the Company and, upon the Company's request, assist in obtaining information relative to any claims made. The Insured shall not, except at his own cost, voluntarily make any payments, assume any obligations or incur any expense relating to corrective action without the Company's or the regulatory body's permission.

d. Any notices required by these conditions shall be sent to the Company at 7 Burlington Square, Sixth Floor, P.O. Box 530, Burlington, VT 05401.

Application and Declarations:

By acceptance of this policy, the Insured agrees that the statements in the application and the declarations are his agreements and representations and that they form a part of this policy, that this policy is issued in reliance upon the truth of such representations and that this policy embodies all agreements existing between the Insured and the Company or any of its agents, relating to this insurance.

Concealment, fraud:

In the event that, either before or after claim for corrective action is first made, the Insured has willfully concealed or misrepresented any material fact or circumstance concerning this insurance or the subject of it, including any claim for loss, or the interest of the Insured in it or in any case of any fraud or false swearing by the Insured relating to this insurance or its subject, then the Insured shall indemnify the Company in full for any and all loss, damage or expense which the Company sustains by reason of such actions by the Insured.

Changes:

Notices to any agent or broker or knowledge possessed by any agent, broker or by any other person shall not effect a waiver or a change in any part of this policy or estop the Company from asserting any right under the terms of this policy; nor shall the terms of this policy be waived or changed nor shall any privilege or permission affecting the insurance under this policy exist or be claimed by the Insured, except by endorsement issued to form a part of this policy.

Service of Suit:

It is agreed that in the event of the failure of the Company to pay any amount claimed to be due hereunder, the Company, at the request of the Insured, will submit to the jurisdiction of any court of competent jurisdiction within the United States of America and will comply with all requirements necessary to give such Court jurisdiction and all matters arising hereunder shall be determined in accordance with the law and practice of such Court. ,

It is further agreed that service of process in such suit may be made upon the Company's President, or his nominee, at 7 Burlington Square, Sixth Floor, Burlington, VT 05401, and that in any suit instituted against one of them upon this policy the Company will abide by the final decision of such Court or of any Appellate Court in the event of an appeal.

The above-named is authorized and directed to accept service of process on behalf of the Company in any such suit and/or upon the request of the Insured to give a written undertaking to the Insured that it or they will enter a general appearance upon this Company's behalf in the event such a suit shall be instituted.

Further, pursuant to any state, territory or district of the United States of America, which makes provisions therefor, the Company hereby designates the Superintendent, Commissioner or Director of Insurance or other Officer specified for that purpose in the statute or his successor or successors in office, as their true and lawful attorney upon whom may be served any lawful process in any action, suit or proceeding instituted by or on behalf of the Insured or any beneficiary hereunder arising out of this contract of insurance, and hereby designate the above-named as the person to whom the said Officer is authorized to mail such process or a true copy thereof.

THIS POLICY IS MADE AND ACCEPTED SUBJECT TO THE FOREGOING STIPULATIONS AND CONDITIONS AND TO THE EXCLUSIONS AND CONDITIONS WHICH ARE HEREBY SPECIALLY REFERRED TO AND MADE A PART OF THIS POLICY, together with such other provisions, agreements or conditions as may be endorsed hereon or added hereto.

IN WITNESS WHEREOF, National Guaranty Insurance Company has caused this policy to be signed by its President and Secretary, but this policy shall not be valid unless countersigned by a duly authorized representative.

BLM Library
Denver Federal Center
Bldg. 50, OC-521
P.O. Box 25047
Denver, CO 80225

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Denver Federal Center
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