CITY OF OXNARD
CALIFORNIA

May 30, 1980

PLANNING DEPARTMENT
GENE L. HOSFORD, DIRECTOR
305 WEST THIRD STREET
OXNARD, CALIFORNIA 93030
PHONE 486-4311, EXT. 230

To All Interested Parties:

Union Oil Company of California proposes to develop Outer Continental Shelf (OCS) oil and gas leases P-0202, P-0203 and P-0216 in the eastern Santa Barbara Channel, offshore of Ventura County, California. To develop these leases, Union proposes to install two offshore platforms and construct an onshore treating facility within the Mandalay Beach area of the City of Oxnard. One of the platforms (Gina) would be located approximately 4.5 miles southwest of Port Hueneme, and the other platform (Gilda) would be located 10 miles west of Oxnard.

Shortly after the project was formally announced, the City of Oxnard was asked to assume the role of "lead agency" by the State Office of Planning and Research (OPR) and take the principal responsibility for preparing the environmental documents required under the provisions of the California Environmental Quality Act of 1970 (CEQA), as amended. Assistance in carrying out this role was provided by a Steering Committee, established under a Memorandum of Understanding developed by OPR. Agencies represented on the Committee are: the State Lands Commission, State and Regional Coastal Commissions, County of Ventura, U.S. Army Corps of Engineers, and the United States Geological Survey (USGS). USGS is the federal agency responsible for preparing an Environmental Assessment to determine whether or not the project will have a significant effect on the environment, under the provisions of the National Environmental Policy Act of 1969 (NEPA). The enclosed document has been designed to fulfill this latter requirement.

As a means of serving the public interest, the Steering Committee agreed to prepare a joint environmental study to avoid duplication in staff efforts, share expertise, and promote intergovernmental coordination at the local, State and federal levels. The enclosed document, entitled "Draft Environmental Impact Report/Environmental Assessment, Union Oil Company Platform Gina and Platform Gilda Project", is currently being circulated for review under the applicable provisions of

State and federal law. Written comments should be submitted to Ralph J. Steele, Project Coordinator, by July 14, 1980, at the following address:

Planning Department
City of Oxnard
305 West Third Street
Oxnard, California 93030

A public hearing has been scheduled before the City of Oxnard Planning Commission to receive written and oral comments concerning the adequacy of the draft EIR/EA and the environmental effects of the proposed project. This hearing has been scheduled for June 26, 1980, at 7:30 p.m., at the Oxnard City Council Chambers, located at 305 West Third Street, Oxnard, California.

Responses to comments on the draft EIR submitted prior to the above date or presented at the public hearings will be included in the final EIR/EA.

Thank you for your interest and cooperation in completing the review of the draft EIR/EA.

Gene L Hosford

Gene L. Hosford, AICP
Planning Director
City of Oxnard

RJS:afm

Enclosure

ENVIRONMENTAL IMPACT REPORT / ENVIRONMENTAL ASSESSMENT

UNION OIL COMPANY

PLATFORM GILDA AND PLATFORM GINA PROJECT

LEASES OCS P-0202 AND P-0216

OFFSHORE VENTURA COUNTY, CALIFORNIA

VOLUME I

Prepared by:

City of Oxnard
305 West Third Street
Oxnard, California
93030
EIR 78-19

United States Geological Survey
Pacific OCS Region
Department of the Interior
1340 West Sixth Street
Los Angeles, California
90017

With Technical Assistance Provided Under the Direction of:

Dames & Moore
125 East Victoria
Santa Barbara, California
93101

May, 1980

LIST OF COMMON MEASUREMENT UNIT ABBREVIATIONS

^{o}API	degrees Baume; American Petroleum Institute scale
^{o}C	degrees Centigrade
^{o}F	degrees Fahrenheit
ADT	average daily traffic
B/D	barrels per day
bbl	barrels
BOPD	barrels of oil per day
Btu	British Thermal unit
cm	centimeters
cm^2	square centimeter
cm^3	cubic centimeters (also cc)
dB	decibels
ft	ft
ft^2	square feet
ft^3	cubic feet
g	gravitational acceleration
gpm	gallons per minute
ha	hectare
hm^3	cubic hectometers
hr	hour
kg	kilograms
km	kilometers
km^2	square kilometers
kPa	kilopascals
kts	knots
KVA	kilovolt-ampere
L	liters
lb	pound
L_d	daytime sound level
L_{dn}	day-night sound level
L_{eq}	equivalent sound level
L_n	nighttime sound level

LIST OF COMMON MEASUREMENT UNIT ABBREVIATIONS (Concluded)

μg	micrograms
μmho	micromhos
m	meters
M	thousand
mg	milligram
mgd	million gallons per day
mi	miles
mi^2	square miles
ml	milliliters
MLLW	mean lower low water
mm	millimeters
MM	million
MSL	mean sea level
m^2	square meters
m^3	cubic meters
ppb	parts per billion
ppm	parts per million
ppmv	parts per million by volume
ppt	parts per thousand
psf	pounds per square foot
psia	pounds per square inch absolute
psig	pounds per square inch gauge
PST	Pacific Standard Time
SCF	standard cubic feet

VOLUME I

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1.0 INTRODUCTION

Union Oil Company proposes to develop federal Outer Continental Shelf (OCS) leases in the Hueneme Field and Santa Clara Unit offshore of Ventura County, California. The Hueneme Field leases are located about 4.5 miles (7.2 km) west-southwest of Port Hueneme, and the Santa Clara Unit lease is approximately 10 miles (16 km) west of Oxnard. The proposed project, designated the Platform Gina and Platform Gilda Project, would include two production platforms (Gina in the Hueneme Field, Gilda in the Santa Clara Unit), pipelines to shore, an onshore treating facility, and product crude oil/natural gas pipelines onshore that would connect the treating facility to existing distribution systems. A complete project description is provided in Section 3.0 and Appendix A.

Because the proposed project involves federal, state, and local jurisdictions, this document has been prepared as a combined Environmental Impact Report (EIR) and Environmental Assessment (EA) to accommodate State of California and federal requirements. The EIR/EA reflects compliance with the California Environmental Quality Act (CEQA) of 1970, as amended, and the National Environmental Policy Act (NEPA) of 1969. A Memorandum of Understanding (MOU) was prepared in connection with the proposed project to coordinate federal, state, and local efforts in preparing the EIR/EA. Parties to the MOU (designated the Steering Committee) include the City of Oxnard, U.S. Geological Survey, U.S. Army Corps of Engineers, State Lands Commission, California Coastal Commission, and the County of Ventura. The City of Oxnard was designated lead agency under CEQA by the Governor's Office of Planning and Research.

Information concerning the baseline environmental setting for onshore and offshore project areas (Section 12.0) is presented in Volume II of this EIR/EA. Volume I provides an Executive Summary (Section 2.0), project description information (Section 3.0), an analysis of potential environmental impacts (Section 4.0), and related technical integration sections that fulfill environmental report requirements under CEQA and NEPA. Technical materials needed to complete U.S. Geological Survey EA document preparation requirements are included as Appendix B.3.

The most current revisions affecting procedural implementation of the provisions of CEQA and NEPA emphasize the need for a detailed evaluation of alternatives. The Final Revised Work Program (September 30, 1979) prepared in consultation with over 30 regulatory agencies to guide completion of the EIR/EA reflects this consideration. The work program resulted in the identification and need for equivalent evaluation in the EIR/EA of three primary alternatives to the proposed project (designated the proposed Mandalay configuration): East Mandalay alternative configuration; Union Oil Marine Terminal alternative configuration; Ormond Beach alternative configuration. These alternative project configurations are based on different sites for the onshore treating facility and resultant changes in onshore (and in the Ormond Beach case, offshore) pipeline system routings. In the case of the Ormond Beach alternative configuration, two possible onshore pipeline system routings were considered: an urban route (Option A) and a rural route (Option B). Detailed analyses of the potential environmental impacts for each of the configurations (proposed and alternatives) are provided in Section 4.0. A comparative analysis of the proposed and alternative configurations is presented in Section 7.0.

Other subjects were also identified as requiring emphasis in the EIR/EA. These are addressed in Sections 4.0 and 7.0 of the document and include:

- Oil Spill Movement Analysis
- Platform Structural Design
- Marine Safety
- Secondary Alternatives
- Consolidation
- Coastal Act Considerations
- Energy Balance Analysis

This EIR/EA is based on studies conducted by scientists and engineers who are experts in their respective fields. Studies included detailed marine geophysical surveys; field reconnaissance (onshore and offshore); literature reviews; and, discussions with officials of pertinent federal, state, and local agencies. Dames & Moore was the principal consultant in the preparation of this EIA/EA; other persons and organizations consulted are listed in Section 11.0.

Lead Agencies:

City of Oxnard
Planning Department
305 West Third Street
Oxnard, California 93030

United States Geological Survey
Department of the Interior
1340 West Sixth Street
Los Angeles, California 90017

Applicant:

Union Oil Company
Southern California District
2323 Knoll Drive
Ventura, California 93003

2.0 EXECUTIVE SUMMARY

2.1 PROJECT DESCRIPTION

2.1.1 Project Elements

Union Oil Company of California (Union) proposes to develop Outer Continental Shelf (OCS) oil and gas leases OCS P-0202, OCS P-0203, and OCS P-0216 in the eastern Santa Barbara Channel, offshore California. The major elements of the proposed project are:

- two offshore drilling and production platforms, Gina and Gilda, located approximately 4.5 miles (7.2 km) west-southwest of Port Hueneme and 10 miles (16 km) west of Oxnard, California, respectively.
- two offshore pipeline systems (one for each platform) to convey produced crude oil/water/natural gas to an onshore treating facility, and to return produced water to the platforms for injection.
- an onshore treating facility where produced water and natural gas would be separated from the crude oil.
- an onshore pipeline system to convey the product crude oil and product natural gas to existing oil and gas distribution systems within the Oxnard/Ventura area.

Union's primary objective in the proposed project is to produce crude oil and natural gas for sale and receive an equitable return on their invested capital. They also believe that this project is consistent with the objectives of the National Energy Plan in reducing American dependence on foreign oil and vulnerability to supply interruptions.

2.1.2 Proposed and Alternative Project Configurations

2.1.2.1 Proposed Mandalay Configuration

As proposed by Union, the onshore treating facility would be located on a 1.8-acre (0.73-ha) parcel of land located immediately south of and adjacent to the Southern California Edison Company (SCE) Mandalay Generating Station in Oxnard. The offshore pipeline systems and power cables for Platforms Gina and Gilda would extend from the platforms to a landfall point adjacent to the proposed Mandalay onshore treating facility. The proposed product crude oil pipeline would proceed east from the site and then extend northward along the east side of Harbor Boulevard to the Union Oil Marine Terminal at Ventura Harbor. At the marine terminal, the crude oil would directly enter Union's existing pipeline system for transport to Los Angeles area refineries. Natural gas from the onshore treating facility would be piped to an existing natural gas pipeline distribution system, having a tie-in point immediately east of the proposed onshore treating facility site across Harbor Boulevard. This configuration is shown on Figure 3.0-2 in Section 3.0.

2.1.2.2 Primary Alternative Configurations

The City of Oxnard has identified three primary alternative locations for the onshore treating facility site. These are designated the East Mandalay, Union Oil Marine Terminal, and Ormond Beach alternatives. Emplacement of the onshore treating facility at any of the alternative sites would require alterations in the proposed alignment of the offshore and/or onshore pipeline systems. However, the locations of the two platforms would be identical for the proposed Mandalay configuration and the three primary alternatives. Therefore, the greatest differences between the proposed and alternative configurations would result from the construction requirements. There would be no differences between the possible configurations during the drilling phase because all activities would take place at the platforms. There would be slight differences between the possible configurations during the production phase.

2.1.2.2.1 East Mandalay Alternative Configuration

The East Mandalay alternative onshore treating facility site is located across Harbor Boulevard from the Mandalay Generating Station, southeast of an existing SCE substation, and north of the Edison Canal. The onshore pipeline corridor would follow the same route as that for the proposed Mandalay configuration, except for a short additional segment extending from Harbor

Boulevard to the site. However, portions of the corridor from Mandalay Beach to the site would be wider than for the proposed configuration to accommodate a greater number of pipelines. Tie-in points for the product crude oil and natural gas lines would be the same as for the proposed Mandalay configuration.

The platform locations and offshore pipeline corridors for the East Mandalay alternative would be identical to those for the proposed Mandalay configuration. This configuration is shown on Figure 3.0-3 in Section 3.0.

2.1.2.2.2 Union Oil Marine Terminal Alternative Configuration

The Union Oil Marine Terminal alternative site is located within Union's existing facility at the Ventura Marina. This alternative configuration would utilize the same onshore pipeline corridor route as the proposed Mandalay configuration. However, this corridor would be substantially wider to accommodate the five pipelines to/from Platforms Gina and Gilda and would require a direct crossing of the Santa Clara River. In addition, this alternative would require installation of a pumping-heating-compression station (booster station) near the landfall point at Mandalay Beach. Product crude oil and natural gas would directly enter existing pipeline distribution systems near the marine terminal.

The platform locations and offshore pipeline corridors for the Union Oil Marine Terminal alternative would be identical to those for the proposed project configuration. This configuration is shown on Figure 3.0-4 in Section 3.0.

2.1.2.2.3 Ormond Beach Alternative Configuration

The Ormond Beach alternative site is located on Perkins Road inland from Ormond Beach and south of Hueneme Road. The Ormond Beach alternative site would require two onshore pipeline corridors. The first would accommodate the two pipelines to/from Platform Gina and would extend along the coast from a landfall point at Silver Strand Beach to the onshore treating facility. A second corridor would be required to link the treating facility with points in the Mandalay Beach and Ventura Marina areas. This corridor would contain the three pipelines to/from Platform Gilda and the product crude oil and natural gas lines. The City of Oxnard has identified two alternative routes for this corridor (Option A and Option B). Option A follows Ventura Road, Channel Islands Boulevard, and Harbor Boulevard. Option B follows Pleasant Valley Road, Rice Road, Gonzales Road, and Harbor Boulevard.

Selection of the Option A pipeline corridor would necessitate two booster stations while the Option B pipeline corridor would require three booster stations. Tie-in points for the product crude oil and natural gas lines would be the same as for the proposed Mandalay configuration.

The platform locations associated with the Ormond Beach alternative would be identical to those for the proposed Mandalay configuration. However, the Platform Gina offshore pipeline corridor would be different. The offshore pipelines associated with Platform Gina would be emplaced in a corridor extending from the platform to a landfall point at Silver Strand Beach. The power cable for Platform Gina would be installed in a corridor identical to that for the proposed Mandalay configuration. The offshore pipeline corridor associated with Platform Gilda would be the same as for the proposed Mandalay configuration. The Option A and Option B variations of this configuration are shown on Figures 3.0-5 and 3.0-6, respectively, in Section 3.0.

2.1.3 Construction

The principal components of both Platform Gina and Platform Gilda would be fabricated outside Ventura County and transported to the sites. Each jacket would be launched from a barge and lowered to the ocean floor, and pilings would be driven and welded to each of the jacket legs. Once the decks had been secured in place, drilling and production equipment, support facilities, and safety and protection systems would be installed and finish work completed.

The offshore portions of the pipelines extending between each of the two platforms and the onshore treating facility would be fabricated in sections onshore. As sections are completed, they would be pulled offshore using a barge and a tugboat. From MLLW to a water depth of 20 feet (6 m), the pipelines would be buried. From a water depth of 20 feet (6 m) to the platforms, they would rest unanchored on the ocean bottom. The power cables would be emplaced in the same corridor as the pipelines to each platform. (A separate corridor for the power cable would be necessary for the Ormond Beach alternative configuration.)

After surveying, the onshore site would be cleared and graded. Upon completion of grading, foundations would be poured. Major components of the treating facility would be manufactured offsite, trucked to the location, and placed on the prepared foundations. Valves, fittings, and other connecting hardware would be installed and the facility would be electrically wired. Areas within the site would be surfaced and landscaping would be provided in conformance with applicable regulatory requirements. The right-of-way would be cleared and graded and debris would be disposed of at an approved dumpsite. Pipeline construction activities would include ditching, stringing the pipe, bending pipe for changes in direction, cleaning, welding, inspection, coating, lowering the pipe into the ditch, hydrostatic testing, backfilling, and cleanup.

2.1.4 Drilling

At Platform Gina, Union plans to recover hydrocarbon fluids from the Hueneme sand of the Miocene Rincon Formation and the Oligocene Sespe Formation. Reservoir simulation studies and other tests indicate that six crude oil producing wells and six water injector wells would maximize recovery from the producing zones. Union would submit final detailed drilling plans to the U.S. Geological Survey (USGS) for approval prior to commencing drilling operations.

At Platform Gilda, Union plans to recover hydrocarbon fluids from the Pliocene Repetto and the Miocene Monterey formations. Hydrocarbon accumulations in these two formations would be recovered through separate drilling programs. Studies of the Repetto Formation indicate that maximum recovery would be achieved by drilling 40 crude oil production wells on approximately 20-acre (8-ha) spacing. In addition, computer modeling showed that although some peripheral water injection would be advantageous, full pressure maintenance could reduce recovery. Initial development drilling would be done on approximately 40-acre (16-ha) spacing, with the earliest wells designed to delineate the field and yield more complete geological and production data. Wells would be drilled as required to inject produced water back into the formation.

Since currently available data concerning the Monterey Formation are limited, no significant determination of reservoir characteristics and performance has been made. For this reason, further test drilling from Platform Gilda would be required to evaluate and optimize development of this formation. Test drilling of the Monterey Formation would be performed as an extension of the Repetto Formation production well drilling program. A minimum of three test wells would be drilled. Should Union determine during test drilling that sufficient recoverable reserves exist in the Monterey Formation, as many as 30 wells could be drilled on 40-acre (16-ha) spacing to develop the producing zone(s). Treated produced gas probably would be injected to maintain reservoir pressure. There are currently no plans to inject produced water.

2.1.5 Production

Union estimates that Platform Gina would produce 15.5° to 16.0° API crude oil with a gas: oil ratio of approximately 200. Peak oil production is estimated to be 6,450 barrels of oil per day (BOPD) (1,025 m^3/day). Ultimate estimated recovery would be 9.5 million barrels (1.5 million m^3) of oil and 1.7 billion SCF (48 million m^3) of gas during the field lifetime of 18 years. The fluid produced at Platform Gina would be a mixture of crude oil, natural gas, and water. This fluid would be pumped from the formations and sent directly via an offshore pipeline to the onshore treating facility. For the first three years, seawater would be injected into producing formations to maintain reservoir pressure. After this time, sufficient produced water would be available for this purpose and seawater injection would be discontinued.

At Platform Gilda, the initial production rate from the Repetto Formation would be approximately 400 BOPD (64 m^3/day) of 16° to 20° oil per well with a gas:oil ratio of approximately 400 SCF/bbl. The peak production rate from the Repetto Formation is expected to be approximately 18,000 BOPD (2,880 m^3/day). The ultimate estimated recovery in 20 years from the Repetto Formation is estimated by Union to be 43 million barrels (6.9 million m^3) of crude oil and 40 billion SCF (1.1 billion m^3) of natural gas. Peak oil recovery rates from the Monterey Formation have been estimated by Union to be approximately 8,000 bbl/day (1,280 m^3/day) with a gas:oil ratio of approximately 1,000 SCF/bbl. Ultimate oil and natural gas recovery estimates from the Monterey Formation have not been made.

The fluid from the wellheads on Platform Gilda would first flow to a header system linking all of the wells associated with either Repetto or Monterey production. Each header system would be connected to a separator unit for initial separation of the natural gas from the crude oil/water stream. The crude oil/water streams leaving the separator units would flow to a shipping surge tank. Produced crude oil/water from the Repetto and Monterey formations would be commingled in the surge tank, and then pumped via the offshore pipeline to the onshore treating facility. After about 5 years of production, the water content of produced fluids from the Repetto Formation would be sufficiently high to require gross oil/water separation at the platform. Produced water would be treated and injected into the Repetto Formation. The natural gas produced from the Repetto Formation would be dehydrated and sent to the onshore treating facility through the offshore pipeline. Produced gas from the Monterey Formation may be reinjected into the formation. Union has indicated that this might be desirable to achieve maximum hydrocarbon recovery. If the gas contains H_2S, additional facilities would be installed on the platform to remove it.

The function of the onshore treating facility would be to separate the fluids produced at Platforms Gina and Gilda into crude oil, natural gas, and water streams. A three-phase separator would split the produced fluids into these three streams. The oil stream would flow to a heater treater, where heat is used to further separate water from the crude oil. The resultant oil stream would then flow to a free water knock out vessel for further heating and additional oil/water separation. The separated crude oil and gas would be sent to customers via onshore pipeline systems. The separated water would be sent back to the platforms via the offshore pipeline system return water pipelines.

The purpose of the onshore pipelines is to convey the product crude oil and natural gas between the onshore treating facility and the existing distribution systems in the Oxnard-Ventura area. For the purposes of this EIR/EA, the portions of the pipelines to/from both platforms from MLLW to the treating facility were considered part of the onshore pipeline system.

2.1.6 Safety Procedures

The proposed project includes several provisions designed to minimize the possiblity of personal harm or environmental damage occurring. Among these are:

- U.S. Coast Guard-approved navigation aids;
- Fire detection and suppression equipment;
- Red Cross first aid training and certification for all platform operating personnel;
- Well drilling and casing programs (including blowout prevention equipment), subject to USGS approval;
- Various detection and alarm systems connected to a centrally controlled, automatic shutdown system; and,
- Oil spill and hydrogen sulfide contingency plans, subject to USGS approval.

2.1.7 Project Termination and Abandonment

Upon cessation of production from Platforms Gina and Gilda, all wells would be plugged and abandoned in conformance with USGS regulations. Such activities would not be commenced prior to obtaining approval from the USGS. All equipment would be removed from the platforms. The jackets and decks would be dismantled and transported to shore for disposal, salvage, or reuse. All obstructions would be removed from the ocean floor. The offshore pipelines would be purged and abandoned in place.

Assuming it could not be utilized with other projects existing at the time, the onshore treating facility would be dismantled. Equipment would be salvaged or reused to the extent possible. Union would restore and revegetate the site in accordance with applicable regulations in effect at that time. Onshore pipelines would be purged and abandoned in place unless regulations existing at the time required their removal.

2.2 ENVIRONMENTAL CONSEQUENCES

Detailed discussions of the potential environmental impacts that would result from implementation of the proposed Mandalay configuration or the primary alternatives are provided in Section 4.0. A comparative analysis of the impacts associated with the possible project configurations can be found in Section 7.2. The following sections provide a summarization of the principal findings from these analyses.

2.2.1 Proposed Mandalay Configuration

Potential environmental impacts that would result from construction activities for the proposed Mandalay configuration are summarized in Table 2.0-1. These impacts are generally minor in magnitude and of low significance. Three exceptions that may be of moderate significance and are typical impacts associated with construction-type activities include: (1) sound level increases generated by use of equipment, vehicles, boats, and human activity; (2) visual effects on offsite viewers near areas where construction is occurring; and, (3) increased dollars generated for the local economy, local governments, and the State of California.

Table 2.0-2 provides a summary of potential impacts that would occur during the drilling phase. These impacts are generally expected to be of minor magnitude and low significance, except as indicated below:

TABLE 2.0-1

POTENTIAL CONSTRUCTION IMPACTS - PROPOSED MANDALAY CONFIGURATION

Environmental Factor	Nature of Impact	Significance[1]
GEOTECHNICAL (Section 4.1)	1. Localized minor alteration of topography and bathymetry.	L
	2. Localized minor disturbance of soils.	L
	3. Localized minor disturbance of sediments in beach/nearshore areas.	L
	4. Consumptive use of fresh water (0.6 acre-feet).	L
AIR QUALITY (Section 4.2.1)	1. Minor increases offshore and onshore in emissions of nitrogen oxides, sulfur dioxide, carbon monoxide, total hydrocarbons, and particulate matter.	L
ACOUSTICS (Section 4.2.2)	1. Localized sound level increases at offshore and onshore locations.	L-M
OCEANOGRAPHY (Section 4.3)	1. Localized minor increases in water column turbidity.	L
	2. Localized minor alteration of ocean water quality resulting from discharges of treated sanitary wastes (5.7 bbl/day), brine wastewater (12,250 bbl total), and seawater used for hydrostatic testing (16,700 bbl).	L
MARINE BIOLOGY (Section 4.4)	1. Temporary disturbance of sedimentary habitat (320,000 ft^2) and associated marine organisms.	L
	2. Elimination of sedimentary habitat (210,000 ft^2) and associated marine organisms.	L
	3. Localized minor alteration of phytoplankton productivity.	L
	4. Entrainment of zooplankton (6,500 lbs).	L
	5. Temporary loss of commercial fishing area (4.7 mi^2).	L
TERRESTRIAL BIOLOGY (Section 4.5)	1. Removal of vegetation and temporary or permanent loss of following habitat: foredune (2.3 acres); dune scrub (8.7 acres); ruderal (6.6 acres); and, urban (0.4 acres).	L
	2. Displacement, or elimination, of individuals of animal species associated with the disturbed habitats.	L
LAND USE (Section 4.6)	1. Temporary interference with local land uses.	L
	2. Minor temporary interference with recreational activities.	L
	3. Temporary visual intrusion affecting offsite viewers.	L-M
	4. Short-term increased traffic volumes on the local road system.	L
SOCIOECONOMICS (Section 4.7)	1. Negligible to minor increased demand for transient housing, services, and utilities.	L
	2. Minor increase in employment opportunities.	L
	3. Increased sales and use tax revenues accruing to local governments ($106,900) and the State of California ($534,000).	L-M
	4. New taxable retail sales ($10.69 million) in Ventura County.	L
CULTURAL RESOURCES (Section 4.8)	1. Possible disturbance of an onshore ethnographic site (basketry materials) and three potential offshore shipwreck locations.	L

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[1] L = Low
M = Moderate

TABLE 2.0-2

POTENTIAL DRILLING IMPACTS - PROPOSED MANDALAY CONFIGURATION

Environmental Factor	Nature of Impact	Significance[1]
GEOTECHNICAL (Section 4.1)	1. Minor alteration of seafloor topography resulting from formation of cuttings mounds at the two platforms.	L
	2. Consumptive use of fresh water (44.1 acre-feet over the 4.5-year drilling period).	L-M
AIR QUALITY (Section 4.2.1)	1. Minor increases in emissions of nitrogen oxides, sulfur dioxide, carbon monoxide, total hydrocarbons, and particulate matter.	L
ACOUSTICS (Section 4.2.2)	1. Localized sound level increases at the two platforms.	L
OCEANOGRAPHY (Section 4.3)	1. Localized minor increases in water column turbidity.	
	2. Localized minor alteration of ocean water quality resulting from discharges of treated sanitary wastes (32.4 bbl/day).	L
MARINE BIOLOGY (Section 4.4)	1. Increase in biomass and species diversity near platforms.	L-M
	2. Elimination of sedimentary habitat (83,000 ft^2) and associated marine organisms beneath cuttings mounds near platforms.	L
	3. Localized minor alteration of phytoplankton productivity.	L
	4. Possible effects on marine mammals from presence of platforms, increased noise, and human activity.	L
TERRESTRIAL BIOLOGY (Section 4.5)	No impacts anticipated	
LAND USE (Section 4.6)	1. Visual intrusion of two platforms.	L-M
	2. Minor increses in traffic volumes on the local road system.	L
SOCIOECONOMICS (Section 4.7)	1. Negligible to minor increased demand for transient housing, services, and utilities.	L
	2. Negligible increase in employment opportunities.	L
	3. Increased sales and use tax revenues accruing to local governments ($885,000) and the State of California ($4.425 million).	M
	4. New taxable retail sales ($88.5 million) in Ventura County.	M
CULTURAL RESOURCES (Section 4.8)	No impacts anticipated	
ACCIDENTS	1. Accidental oil spills could have effects on various environmental resources and uses. The magnitude of effects would depend on spill size, location, time of year, and other variables, and could range from negligible to major.	L-H

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[1] L = Low
M = Moderate
H = High

- Consumptive use of fresh water may have a low to moderate effect on regional water supplies.

- The presence of the platforms as artificial substrate would result in local increases in biomass and species diversity for marine biota, which could be a beneficial effect of low to moderate significance.

- Platform Gina would be visible from numerous coastal vantage points and could have a moderately significant visual impact.

- Increased sales and use tax revenues accruing to local governments and the State of California, as well as new taxable retail sales in Ventura County, would have a moderate beneficial economic impact.

Potential environmental impacts that would result during the production phase are summarized in Table 2.0-3. These impacts are generally considered to be minor in magnitude and low in significance. Possible exceptions to the latter include:

- Localized sound level increases onshore that may be of low to moderate significance.

- Local increases in biomass and species diversity offshore near the platforms and pipelines that could be a beneficial impact of low to moderate significance.

- Platform Gina would be visible from numerous coastal vantage points and could have a moderately significant visual impact.

Accidental crude oil spills could potentially occur during the drilling or production phases. Areas that could be affected by spills would depend on the spill source location, volume of oil released, meteorological conditions, oceanographic conditions, and other factors (see Section 4.9.3 and Appendix B.2). Effects on environmental resources and uses could range from negligible to high in significance.

2.2.2 Primary Alternative Configurations

Should either the East Mandalay, Union Oil Marine Terminal, or Ormond Beach (Option A or Option B) alternative configurations be selected, potential environmental impacts would result from the same types of activities and would

TABLE 2.0-3

POTENTIAL PRODUCTION IMPACTS - PROPOSED MANDALAY CONFIGURATION

Environmental Factor	Nature of Impact	Significance[1]
GEOTECHNICAL (Section 4.1)	1. Depletion of nonrenewable resources (52.5 million bbl of oil; 41.7 billion SCF of natural gas.)	L
	2. Consumptive use of fresh water (9.4 acre-feet over the 20-year production period).	L
AIR QUALITY (Section 4.2.1)	1. Minor increases offshore and onshore in emissions of nitrogen oxides, sulfur dioxide, carbon monoxide, total hydrocarbons, and particulate matter.	L
ACOUSTICS (Section 4.2.2)	1. Localized sound level increases at offshore and onshore locations.	L-M
OCEANOGRAPHY (Section 4.3)	1. Localized minor alteration of ocean water quality resulting from treated sanitary waste discharges (3.6 bbl/day) and leaching of metals from sacrifical anodes.	L
	2. Negligible water temperature alteration caused by heat dissipation from offshore pipelines.	L
MARINE BIOLOGY (Section 4.4)	1. Increased biomass and species diversity related to new substrate (platforms, pipelines, cutting mounds).	L-M
	2. Localized minor alteration of phytoplankton productivity.	L
	3. Entrainment of zooplankton (1,300 lbs/day) for 3-year period at Platform Gina related to seawater intake for reservoir pressure maintenance program.	L
	4. Loss of potential commercial fishing area (0.6 mi^2).	L
	5. Possible effects on marine mammals from presence of platforms, increased noise, and human activity.	L
TERRESTRIAL BIOLOGY (Section 4.5)	1. Negligible secondary effects related to increased noise and air pollutant emissions.	L
LAND USE (Section 4.6)	1. Commitment of land to industrial use.	L
	2. Visual intrusion of onshore treating facility and two platforms.	L-M
	3. Negligible increases in traffic volumes on the local road system.	L
SOCIOECONOMICS (Section 4.7)	1. Negligible to minor increased demand on housing, services, and utilities.	L
	2. Negligible increase in employment opportunities.	L
	3. New property tax revenues (first year estimated at $99,700).	L
	4. Sales and use tax revenues accruing annually to local governments ($25,400) and the State of California ($127,000).	L
	5. New taxable retail sales ($2.54 million annually) in Ventura County.	L
	6. New royalty payments to U.S. government (total estimated at $232.8 million).	L
CULTURAL RESOURCES (Section 4.8)	No impacts anticipated.	
ACCIDENTS	1. Accidental oil, gas, or produced water spills could have effects on various environmental resources and uses. The magnitude of effects would depend on spill size, location, time of year, and other variables, and could range from negligible to major.	L-H

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[1] L = Low
M = Moderate
H = High

generally be of the same nature as those discussed in Section 2.2.1 for the proposed Mandalay configuration. The alternative configurations differ from the proposed configuration principally with respect to potential impacts that would result from construction activities. Table 2.0-4 provides a summary of potential construction phase impacts for each of the alternative configurations. Drilling activities would only involve the offshore platforms; consequently, the potential impacts would be identical for the proposed and each of the alternative configurations (see Table 2.0-2). Some differences in potential impacts between the possible configurations would occur during the production phase. The effects of possible accidental crude oil spills would be the same for all of the configurations (see Section 2.2.1 and Tables 2.0-2 and 2.0-3). In the sections that follow, key differences in potential construction and production impacts between each alternative and the proposed Mandalay configuration are summarized.

2.2.2.1 East Mandalay Alternative Configuration

During construction, the principal difference between this alternative and the proposed configuration is that about 1.5 acres (0.6 ha) more terrestrial biological habitat (principally foredunes and dune scrub) would be temporarily disturbed with related displacement, or elimination, of associated animals.

There would be slightly greater visual intrusion effects during production related to the location of the onshore treating facility. About $3,700 in additional estimated first year property tax revenues would also occur.

Total energy required for implementation of the East Mandalay alternative configuration would be the same as for the proposed configuration.

2.2.2.2 Union Oil Marine Terminal Alternative Configuration

During construction the principal differences between this alternative and the proposed configuration would be:

- Consumptive use of 0.5 acre-feet (616 m^3) more fresh water.
- Temporary disturbance of 13.4 acres (5.4 ha) more of terrestrial biological habitat (including riparian and agricultural) and displacement, or elimination, of associated animals.

TABLE 2.0-4

POTENTIAL CONSTRUCTION IMPACTS - PROPOSED MANDALAY AND PRIMARY ALTERNATIVE CONFIGURATIONS

		Magnitude/Significance[2]				
Environmental Factor	Nature of Impact	Mandalay	East Mandalay	Union Oil Marine Terminal	Ormond Beach Option A	Ormond Beach Option B
GEOTECHNICAL (Section 4.1)	1. Localized alteration of topography and bathymetry.	Minor/L	Minor/L	Minor/L	Minor/L	Minor/L
	2. Localized disturbance of soils					
	(a) Agricultural (acres)	--	--	5.1/L	1.0/L	33.9/L-M
	(b) Nonagricultural	Minor/L	Minor/L	Minor/L	Minor/L	Minor/L
	3. Localized disturbance of sediments in beach/nearshore areas.	Minor/L	Minor/L	Minor/L	Minor/L	Minor/L
	4. Consumptive use of fresh water (acre-feet).	0.6/L	0.6/L	1.1/L	2.6/L	4.2/L
AIR QUALITY (Section 4.2.1)	1. Offshore and onshore increases in emissions of nitrogen oxides, sulfur dioxide, carbon monoxide, total hydrocarbons, and particulate matter.	Minor/L	Minor/L	Minor/L	Minor/L	Minor/L
ACOUSTICS (Section 4.2.2)	1. Localized sound level increases at offshore and onshore locations.	Minor-Moderate/L-M	Minor-Moderate/L-M	Minor-Moderate/L-M	Moderate/M	Moderate/M
OCEANOGRAPHY (Section 4.3)	1. Localized increases in water column turbidity.	Minor/L	Minor/L	Minor/L	Minor/L	Minor/L
	2. Localized alteration of ocean water quality from discharges of:					
	(a) treated sanitary wastes (bbl/day)	5.7/L	5.7/L	5.7/L	5.7/L	5.7/L
	(b) brine wastewater (bbl)	12,250/L	12,250/L	12,250/L	12,250/L	12,250/L
	(c) seawater used for hydrostatic testing (bbl)	16,700/L	16,700/L	16,700/L	15,100/L	15,100/L
MARINE BIOLOGY (Section 4.4)	1. Temporary disturbance of sedimentary habitat and associated organisms (ft^2)	320,000/L	320,000/L	320,000/L	375,000/L	375,000/L
	2. Elimination of sedimentary habitat and associated organisms (ft^2)	210,000/L	210,000/L	210,000/L	195,000/L	195,000/L
	3. Localized alteration of phytoplankton productivity.	Minor/L	Minor/L	Minor/L	Minor/L	Minor/L
	4. Entrainment of zooplankton (lbs).	6,500/L	6,500/L	6,500/L	6,000/L	6,000/L
	5. Temporary loss of commercial fishing area (mi^2).	4.7/L	4.7/L	4.7/L	6.0/L	6.0/L
TERRESTRIAL BIOLOGY (Section 4.5)	1. Removal of vegetation and temporary or permanent loss of following habitat:					
	(a) foredune (acres)	2.3/L	1.0/L	1.4/L	12.8/L	12.8/L
	(b) dune scrub (acres)	8.7/L-M	11.5/L-M	10.8/L-M	14.1/L-M	9.1/L-M
	(c) riparian (acres)	--	--	3.6/L-M	--	--
	(d) ruderal (acres)	6.6/L	6.6/L	7.6/L	13.2/L	38.8/L
	(e) agricultural (acres)	--	--	5.1/L	1.0/L	33.9/L-M
	(f) urban (acres)	0.4/L	0.4/L	2.9/L	35.6/L	26.3/L

TABLE 2.0-4 (Concluded)

		Magnitude/Significance[2]				
Environmental Factor	Nature of Impact	Mandalay	East Mandalay	Union Oil Marine Terminal	Ormond Beach Option A	Ormond Beach Option B
TERRESTRIAL BIOLOGY (cont.)	2. Displacement, or elimination, of individuals of animal species associated with the disturbed habitats.	Minor/L	Minor/L	Minor/L	Minor/L	Minor/L
LAND USE (Section 4.6)	1. Temporary interference with local land uses.	Minor/L	Minor/L	Minor/L	Moderate/M	Moderate/M
	2. Temporary interference with recreational activities.	Minor/L	Minor/L	Minor/L	Moderate/M	Moderate/M
	3. Temporary visual intrusion affecting offsite viewers.	Minor-Moderate/L-M	Minor-Moderate/L-M	Minor-Moderate/L-M	Moderate/M	Moderate/M
	4. Short-term increased traffic volumes on the local road system.	Minor/L	Minor/L	Minor/L	Minor-Moderate/L-M	Minor-Moderate/L-M
SOCIOECONOMICS (Section 4.7)	1. Increased demand for transient housing, services, and utilities.	Minor/L	Minor/L	Minor/L	Minor/L	Minor/L
	2. Increase in employment opportunities.	Minor/L	Minor/L	Minor/L	Minor/L	Minor/L
	3. Increased sales and use tax revenues accruing to:					
	(a) local governments	$106,900/L-M	$106,900/L-M	$167,300/M	$171,700/M	$177,700/M
	(b) State of California	$534,000/L-M	$534,000/L-M	$836,500/M	$858,500/M	$888,500/M
	4. New taxable retail sales in Ventura County.	$10.69 million/L	$10.69 million/L	$16.73 million/M	$17.2 million/M	$17.8 million/M
CULTURAL RESOURCES (Section 4.8)	1. Possible disturbance of:					
	(a) historic archaeological sites (number of sites)	--	--	--	1/L	1/L
	(b) prehistoric archaeological sites (number of sites)	--	--	--	4/M-H	4/M-H
	(c) historic landmarks (number of sites)	--	--	--	2/M-H	1/M-H
	(d) potential offshore shipwreck locations (number of sites)	3/M-H	3/M-H	3/M-H	8/M-H	8/M-H
	(e) ethnographic sites (number of sites)	1/L	1/L	1/L	1/L	1/L

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[1] Significance abbreviations:
L = Low
M = Moderate
H = High

- About \$362,900 more sales and use tax revenues to local governments and the State of California due to higher project costs.
- About \$6.04 million more in new taxable retail sales in Ventura County.

The principal differences during the production phase would be:

- Slightly greater air pollutant emissions related to the need for a booster station.
- Additional visual intrusion because of the need for an onshore treating facility and booster station.
- About \$151,700 in additional first year property tax revenues.
- Approximately \$28,800 per year more sales and use tax revenues to local governments and the State of California.
- About \$0.48 million more in new taxable retail sales in Ventura County.

Total energy required for implementation of the Union Oil Marine Terminal alternative configuration would be 30 percent higher than for the proposed configuration.

2.2.2.3 Ormond Beach Alternative Configuration (Option A)

During construction, the principal differences between this alternative and the proposed configuration would be:

- Consumptive use of 2.0 acre-feet (2,462 m^3) more fresh water.
- Increased sound levels occurring at more noise-sensitive locations (e.g., residential and recreational areas).
- About 1,600 bbl less seawater needed for hydrostatic testing of offshore pipelines.
- Approximately 15,000 ft^2 (1,395 m^2) less sedimentary habitat and associated organisms eliminated offshore.
- About 1.3 m^2 (3.4 km^2) more potential commercial fishing area temporarily lost.
- Temporary disturbance of 58.8 acres (23.8 ha) more terrestrial biological habitat (including foredunes, dune scrub, and agricultural) and displacement, or elimination, of associated animals.

- Temporary interference with recretional land use in the vicinities of Mandalay, Silver Strand, and Port Hueneme City beaches; and, commercial and residential land uses and traffic along Hueneme Road, Ventura Road, Channel Islands Boulevard, and Harbor Boulevard.

- Temporary interference with commercial and industrial land use in the vicinity of Port Hueneme.

- Higher traffic volumes on the local road system.

- About $389,300 more sales and use tax revenues to local governments and the State of California due to higher project costs.

- About $6.51 million more in new taxable retail sales in Ventura County.

- Possible disturbance of 13 more confirmed or potential cultural resources sites.

The principal differences during the production phase would be:

- Slightly greater air pollutant emissions related to the need for two booster stations.

- Additional visual intrusion because of the need for an onshore treating facility and two booster stations (Mandalay and Silver Strand beaches).

- Industrial intrusion into a relatively high beach use area (Silver Strand Beach).

- About $237,600 in additional first year property tax revenues.

- Approximately $35,400 per year more sales and use tax revenues to local governments and the State of California.

- About $0.59 million more in new taxable retail sales in Ventura County.

Total energy required for implementation of the Ormond Beach Option A alternative configuration would be 63 percent higher than for the proposed configuration.

2.2.2.3 Ormond Beach Alternative Configuration (Option B)

During construction, the principal differences between this alternative and the proposed configuration would be:

- Consumptive use of 3.6 acre-feet (4,440 m^3) more fresh water.

- Disturbance of 34 acres (13.8 ha) of agricultural soils.

- Increased sound levels occurring at more noise-sensitive locations (e.g., residential and recreational areas).

- About 1,600 bbl less seawater needed for hydrostatic testing of offshore pipelines.

- Approximately 15,000 ft^2 (1,395 m^2) less sedimentary habitat and associated organisms eliminated offshore.

- About 1.3 m^2 (3.4 km^2) more potential commercial fishing area temporarily lost.

- Temporary disturbance of 102.9 acres (41.7 ha) more terrestrial biological habitat (including foredune, dune scrub, and agricultural) and displacement, or elimination, of associated animals.

- Temporary interference with recreational land use in the vicinities of Mandalay, Silver Strand, and Port Hueneme City beaches; and, commercial, agricultural, and residential land uses and traffic along Hueneme Road, Pleasant Valley Road, Rice Road, Gonzales Road, and Harbor Boulevard.

- Temporary interference with commercial and industrial land use in the vicinity of Port Hueneme.

- Higher traffic volumes on the local road system.

- About $425,300 more sales and use tax revenues to local governments and the State of California due to higher project costs.

- About $7.11 million more in new taxable retail sales in Ventura County.

- Possible disturbance of 12 more confirmed or potential cultural resources sites.

The principal differences during the production phase would be:

- Slightly greater air pollutant emissions related to the need for three booster stations.

- Additional visual intrusion because of the need for an onshore treating facility and three booster stations (Mandalay Beach, Silver Strand Beach, and Rice Road/Gonzales Road intersection).

- Industrial intrusion into a relatively high beach use area (Silver Strand Beach).

- About $298,600 in additional first year property tax revenues.

- Approximately $52,800 per year more sales and use tax revenues to local governments and the State of California.

- About $0.88 million more in new taxable retail sales in Ventura County.

Total energy required for implementation of the Ormond Beach Option B alternative configuration would be 96 percent higher than for the proposed configuration.

2.2.3 Comparison of Proposed Mandalay and Primary Alternative Configurations

The preceding sections have outlined the principal differences in potential environmental impacts between the proposed Mandalay configuration and the primary alternatives. Emphasis was placed on those environmental considerations that provide a basis for differentiating between possible configurations during each project phase.

Either the proposed Mandalay or alternative East Mandalay configurations would have the least potential adverse environmental impacts. No substantial differences between these two configurations are apparent. The Union Oil Marine Terminal alternative exhibits a greater potential for adverse impacts, because of the more extensive construction requirements and higher total energy consumption related to the onshore pipelines and booster station. The Ormond Beach alternative configuration (Option A or B) shows the greatest potential for adverse impacts. It would involve the most extensive areas for onshore construction, longest duration of construction activities, and highest total energy consumption. The Option B configuration generally appears less desirable than Option A because of the more extensive onshore area that would be adversely affected.

2.3 MITIGATION OF ENVIRONMENTAL CONSEQUENCES

The proposed Platform Gina and Platform Gilda Project would be subject to applicable regulations of several federal, state, and local agencies. Compliance by Union with the conditions of required permits and strict enforcement of regulations by the agencies involved would help ensure that the magnitude and significance of potential environmental impacts were reduced to the lowest levels possible. Additional mitigative measures (see Section 5.0 for full details) would include (unless otherwise indicated, these measures would apply equally to the proposed and alternative project configurations):

- Consumptive use of fresh water should be reduced by reuse of hydrostatic test water.
- Evaluation of possible earthquake ground motion, surface fault rupture, liquefaction/differential settlement, and subsurface natural gas accumulations should be completed prior to finalization of engineering design.
- The findings and recommendations of the various geotechnical engineering studies reports should be incorporated in final engineering design.
- Use of water sprays (during construction), and specially designed burners on heater treaters and booster station heaters, a vapor compression system, and regular maintenance and inspection programs (during production) would be used to minimize emissions of air pollutants.
- All revegetation onshore should be accomplished using native or introduced species, as appropriate.
- Riparian habitat should be allowed to revegetate naturally (Union Oil Marine Terminal alternative configuration).
- Final pipeline alignment through the Port Hueneme area should be selected so as to minimize disruption of port activities (Ormond Beach alternative configuration--Options A and B).
- Confirmed, or potential, archaeological sites should be avoided. If avoidance is not possible, the detailed mitigative measures outlined in Section 5.8.1 should be implemented.
- Energy use should be reduced by appropriate selection, design, and operation of proposed facilities and equipment.
- All mitigative measures recommended by the U.S. Coast Guard concerning navigational safety should be implemented (Section 4.9.1).
- Consultation with local agencies (e.g., police and fire departments) regarding special requirements for project design.

2.4 PROJECT ALTERNATIVES

2.4.1 No Project

Under this alternative, existing environmental conditions in the project area would be maintained and potential adverse impacts on the environment associated with implementation of the proposed project would not occur. However, selection of this alternative would not be consistent with current national energy policies which are directed toward increased development of domestic oil reserves to reduce U. S. dependence on foreign imports.

2.4.2 Primary Alternatives

Information concerning the primary alternatives to the proposed project is provided in Sections 2.2.2 and 2.2.3.

2.4.3 Secondary Alternatives

Several secondary alternatives to the proposed project were identified by regulatory agencies involved in the development of the Work Program that was used as a guide for preparation of this EIR/EA. Studies regarding the engineering and economic feasibility of these alternatives have been conducted by Union and various consulting firms (Section 7.3). The specific alternatives involved include the following:

Alternative Number	Description
1	Pipeline the produced fluids to Platform A and then to the existing Mobil-Rincon onshore facility.
2	Pipeline the produced fluids to a subsea location and connect into the Dos Cuadras pipeline for transport to the existing Mobil-Rincon onshore facility.
3	Pipeline the produced fluids directly to the existing Mobil-Rincon onshore facility.
4	Pipeline the produced fluids to Platform Grace and then to the existing Chevron-Carpinteria onshore facility.
5	Use of subsea wellheads.
6	Offshore treating and tanker loading at platform.
7	Use of semisubmersible drillships.

The studies that were conducted indicate that implementation of Alternatives 1, 2, 3, or 4 would require construction of a third offshore platform to accommodate additional treating equipment. Initial treating offshore is considered necessary to facilitate transport of the produced fluids over the greater distances involved (compared to the proposed project). After the fluids were transported to the onshore treating facility (either Mobil-Rincon or Chevron-Carpinteria), the product crude oil would then be sent south via pipeline to the Union Oil Marine Terminal at Ventura Marina for tie-in to the Torrey pipeline system. These alternatives are technically feasible. However, Union has indicated that the costs associated with their implementation would be prohibitive, given the estimated volume of crude oil and natural gas reserves for the proposed project.

The use of subsea wellheads for Alternative 5 would still require that Platforms Gina and Gilda be constructed to facilitate collection and transport of the produced fluids to shore. This alternative would add facilities and costs to the proposed project without any apparent benefit.

Alternative 6 would require a third platform for treating equipment and offshore storage of crude oil, tanker shipment of product crude oil, and reinjection of natural gas rather than sending it to customers. This alternative is considered less desirable than the proposed project because of: (1) increased material, construction, and production costs; (2) increased atmospheric emissions; (3) increased tanker traffic in the Santa Barbara Channel; and, (4) increased potential for accidental oil spills and associated effects.

Alternative 7 would involve the use of semisubmersible drillships rather than the two fixed platforms. The use of drillships requires a mooring system to maintain position during motion caused by waves, currents, and winds. This motion causes unavoidable flexing, resulting in fatigue of the risers (pipelines conducting produced fluids) and increased potential for accidental oil spills. In addition, the use of drillships would probably require use of subsea completions. These problems are avoided through the use of fixed platforms. For these reasons, this alternative is considered less desirable than the proposed project.

3.0 PROJECT DESCRIPTION

3.1 OVERVIEW

3.1.1 Introduction

Union Oil Company of California (hereinafter Union) proposes to develop Outer Continental Shelf (OCS) oil and gas leases OCS P-0202, OCS P-0203, and OCS P-0216 in the eastern Santa Barbara Channel, offshore California. The major elements of the proposed project would consist of:

- two offshore drilling and production platforms, named Gina and Gilda, located approximately 4.5 miles (7.2 km) west-southwest of Port Hueneme and 10 miles (16 km) west of Oxnard, California, respectively.

- two offshore pipeline systems (one for each platform) to convey produced crude oil/water/natural gas to an onshore treating facility, and to return produced water to the platforms for injection.

- an onshore treating facility which would separate the produced water and natural gas from the crude oil.

- an onshore pipeline system which would convey the product crude oil and product natural gas to existing oil and gas distribution systems within the Oxnard/Ventura area.

As proposed by Union, Platform Gina would be set in water approximately 95 feet deep (29 m) mean lower low water (MLLW) to produce oil and gas from leases OCS P-0202 and OCS P-0203. Platform Gilda would be set in water approximately 210 feet deep (64 m) MLLW to produce oil and gas from lease OCS P-0216. The onshore treating facility would be located on a 1.8-acre (0.73-ha) parcel of land located immediately south of and adjacent to the existing Southern California Edison Company (SCE) Mandalay Generating Station in Oxnard. An offshore pipeline system and a power cable for Platform Gina would extend approximately 6.5 miles (10.5 km) northeast from the platform to connect with the proposed Mandalay onshore treating facility. The offshore pipeline system and power cable from Platform Gilda would extend approximately 10 miles (16 km) in an easterly direction to connect with the onshore treating facility.

Natural gas from the onshore treating facility would be delivered to existing SCE or Pacific Gas & Electric Company (PG&E) natural gas pipeline distribution systems, both having tie-in points immediately east of the proposed onshore treating facility site across Harbor Boulevard. The proposed product crude oil pipeline would proceed east from the site, cross under Harbor Boulevard, and then extend approximately 2.6 miles (4.2 km) northward (within a right-of-way on the east side of Harbor Boulevard) to the Union Oil Marine Terminal at Ventura Harbor. At the marine terminal, the crude oil would directly enter Union's existing pipeline system for transport to Los Angeles area refineries. The crude oil from this project could flow to the existing crude oil storage tanks at the marine terminal in an emergency.

Union estimates that the proven reserves of this project are approximately 52 million barrels (8.3 million m^3) of crude oil and 42 billion cubic feet (1.2 billion m^3) of natural gas. Recovery of these reserves would take place over a period of approximately 20 years. The peak production rates from the proven reserves have been estimated to be approximately 20,000 barrels (3,180 m^3) of crude oil per day and approximately 15 million cubic feet (430,000 m^3) of natural gas per day.

The City of Oxnard has identified three primary alternative locations for the onshore treating facility site. These are designated the East Mandalay, Union Oil Marine Terminal, and Ormond Beach alternatives. Emplacement of the onshore treating facility at any of the alternative sites would require alterations in the proposed alignment of the offshore and/or onshore pipeline systems. However, the locations of the two platforms would be identical for the proposed project configuration and the three primary alternatives. The geographic and spatial relationships between the platforms, offshore pipeline systems, onshore pipeline systems, and proposed and alternative onshore treating facility sites are discussed in Section 3.1.3.

The City of Oxnard requires that Union's proposed project and the three primary alternative configurations be addressed at an equivalent level of detail in the EIR/EA. In addition, the U.S. Geological Survey requires that the Platform Gina and Platform Gilda portions of the project be addressed separately. For these reasons, this project description has been organized to facilitate an understanding of the individual project elements (platforms, offshore pipelines, onshore treating facility, and onshore pipelines), as well as the changes in total project characteristics which would be associated with a change in the location of the onshore treating facility site.

3.1.2 Objectives

The following objectives have been established by the Department of the Interior for the comprehensive management of OCS minerals:

(1) The orderly development of marine mineral resources to meet the energy demands of the nation.

(2) The protection of the marine and coastal environment.

(3) The receipt of a fair return for leased mineral resources.

In order to meet the nation's demand for oil and gas, the OCS Lands Act empowers the Secretary of the Interior to grant OCS leases to the highest qualified bidder(s) on the basis of sealed competitive bids. Union and Mobil Oil acquired the rights to develop leases OCS P-0202 and P-0203 in the April, 1968 federal lease sale for a bonus of $6,579,000. Mobil assigned their interest to Union in October, 1978.

Union obtained the rights to develop lease OCS P-0216 in the April, 1968 federal lease sale for a bonus of $12,176,000. This lease is part of the

Santa Clara Unit. The Santa Clara Unit was established in March, 1973 and consists of leases OCS P-0204, -0205, -0208, -0209, -0210, -0215, -0216, and -0217. Chevron U.S.A. Inc. is the operator of the unit and obtained approval from the U.S. Geological Survey to develop leases OCS P-0215, -0216, and -0217 in July, 1977. In August, 1979, Union obtained an agreement with Chevron to develop its 100 percent working interest in lease OCS P-0216. For these reasons, Chevron is the operator of the unit and Union is the designated agent for all operations conducted on lease OCS P-0216.

Union's primary objective in the proposed project is to develop leases OCS P-0202, -0203, and -0216 to produce crude oil and natural gas for sale and receive an equitable return on their invested capital. They also believe that this project is consistent with the objectives of the National Energy Plan (The National Energy Plan, Executive Office of the President, Energy Policy and Planning, 1977) in reducing American dependence on foreign oil and vulnerability to supply interruptions.

3.1.3 Location

The regional setting of the proposed project configuration and the three primary alternatives is depicted on Figure 3.1-1.

3.1.3.1 Proposed Mandalay Project Configuration

Platform Gina would be located offshore approximately 4.5 miles (7.2 km) west-southwest of Port Hueneme on federal lease OCS P-0202 (Lambert Grid Coordinates: X = 1,084,062; Y = 723,005). Water depth at the site is approximately 95 feet (29 m) MLLW. The Platform Gina Mandalay offshore pipeline corridor would extend approximately 5.4 miles (8.7 km) north from the platform to a point where it would bend toward the northeast to approach shore nearly perpendicularly. The distance from the bend in the corridor to the landfall point south of the SCE Mandalay Generating Station would be

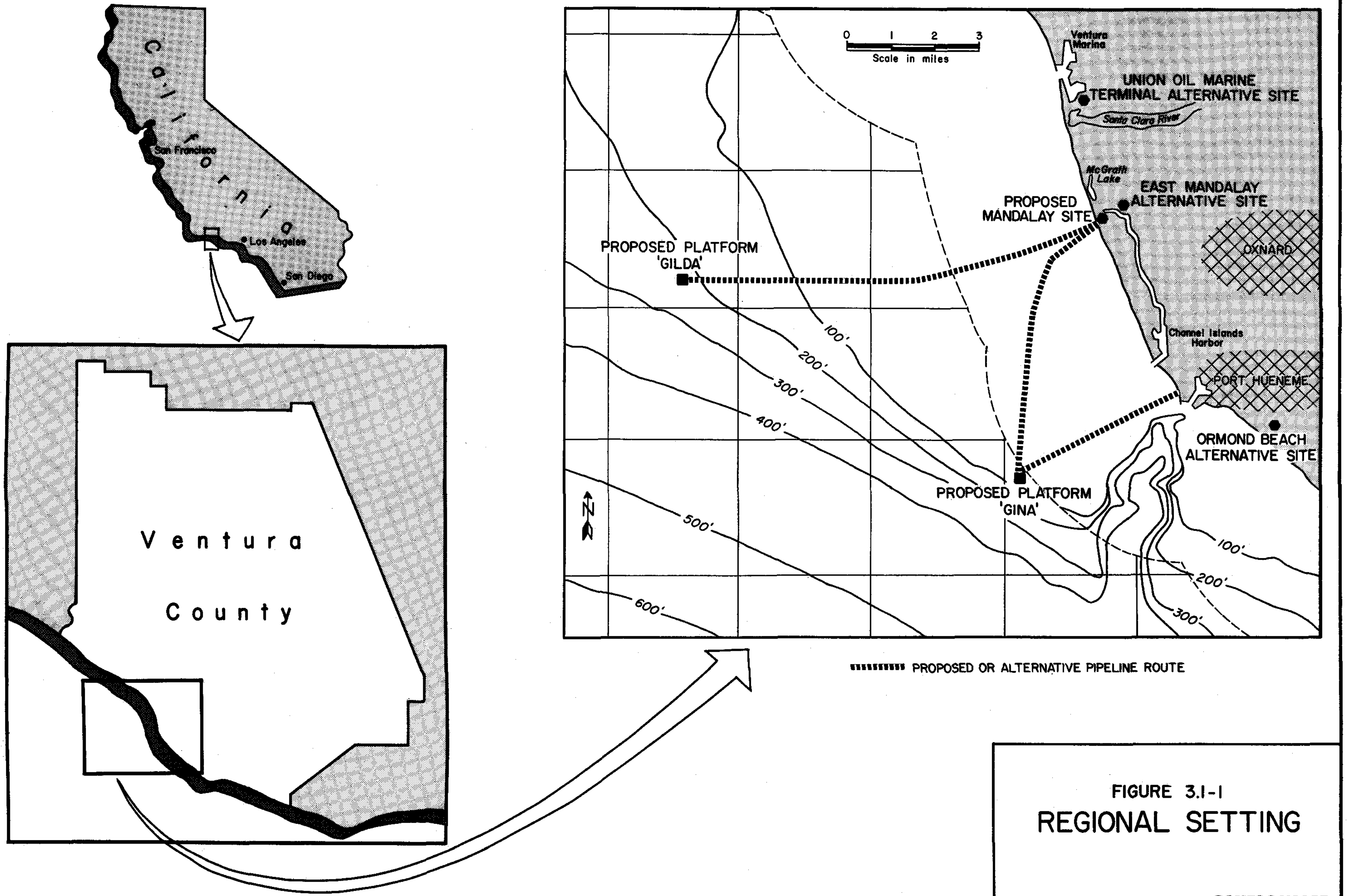

FIGURE 3.1-1

REGIONAL SETTING

DAMES & MOORE

approximately 1.1 miles (1.8 km). The power cable and both offshore pipelines to/from Platform Gina would be installed in this corridor.

Platform Gilda would be located offshore approximately 10 miles (16 km) west of the City of Oxnard on federal lease OCS P-0216 (Lambert Grid Coordinates: X = 1,041,760; Y = 747,980). Water depth at the platform site is approximately 210 feet (64 m) MLLW. The Platform Gilda offshore pipeline corridor would extend eastward from the platform to the landfall point slightly south of the Mandalay Generating Station. The total length of this corridor would be about 10 miles (16 km). The power cable and all offshore pipelines to/from Platform Gilda would be installed in this corridor. The easternmost (shoreward) segment of this corridor (approximately 1.1 miles (1.8 km)) would coincide with the shoreward segment of the offshore pipeline corridor associated with Platform Gina.

Union proposes to locate the onshore treating facility on a 200 x 400-foot (61 x 122-m) parcel of land (1.8 acres, 0.73 ha) adjoining the southwestern portion of the Mandalay Generating Station. Title to this parcel is held by Ventura County. The proposed site would require an approximately 460-foot (140-m)-long onshore pipeline corridor extending from the landfall point at Mandalay Beach to the onshore treating facility. The power cable and two pipelines to/from Platform Gina and the power cable and three pipelines to/from Platform Gilda would be emplaced in this corridor. In addition, the site would require an approximately 2.9-mile (4.7-km)-long corridor for a pipeline to transport the product crude oil to a connection point with an existing pipeline distribution system located at the Union Oil Marine Terminal at Ventura Harbor. Product natural gas would be piped to an existing pipeline distribution system on the east side of Harbor Boulevard near the Mandalay Generating Station, utilizing approximately 0.3 mile (0.5 km) of the same corridor as the product oil pipeline.

The geographic relationship of the major project elements for the proposed Mandalay project configuration is depicted on Figure 3.1-2.

3.1.3.2 Primary Alternative Configurations

3.1.3.2.1 East Mandalay Alternative Configuration

The East Mandalay alternative onshore treating facility site is located across Harbor Boulevard from the Mandalay Generating Station. The site is approximately 150 feet (46 m) southeast of an existing SCE substation, north of the Edison Canal. The East Mandalay alternative site would require an approximately 1,750-foot (533-m)-long onshore pipeline corridor extending from the landfall point at Mandalay Beach to the treating facility. The five pipelines to/from Platforms Gina and Gilda would be emplaced in this corridor. In addition, the site would require an approximately 2.6-mile (4.2-km)-long corridor for a pipeline to transport product crude oil to a connection point with an existing pipeline distribution system located at the Union Oil Marine Terminal. Product natural gas would be piped to a nearby pipeline distribution system utilizing approximately 0.1 mile (0.2 km) of the same corridor as the product oil pipeline.

The platform locations and offshore pipeline corridors for the East Mandalay alternative would be identical to those for the proposed project configuration (see Section 3.1.3.1).

The locations of the major project elements for the East Mandalay alternative configuration are illustrated on Figure 3.1-3.

3.1.3.2.2 Union Oil Marine Terminal Alternative Configuration

The Union Oil Marine Terminal alternative site is located within Union's existing facility at the Ventura Marina. This alternative site would require an approximately 3.0-mile (4.8-km)-long onshore pipeline corridor extending from the landfall point at Mandalay Beach to the onshore treating facility. This corridor would contain the five pipelines to/from Platforms

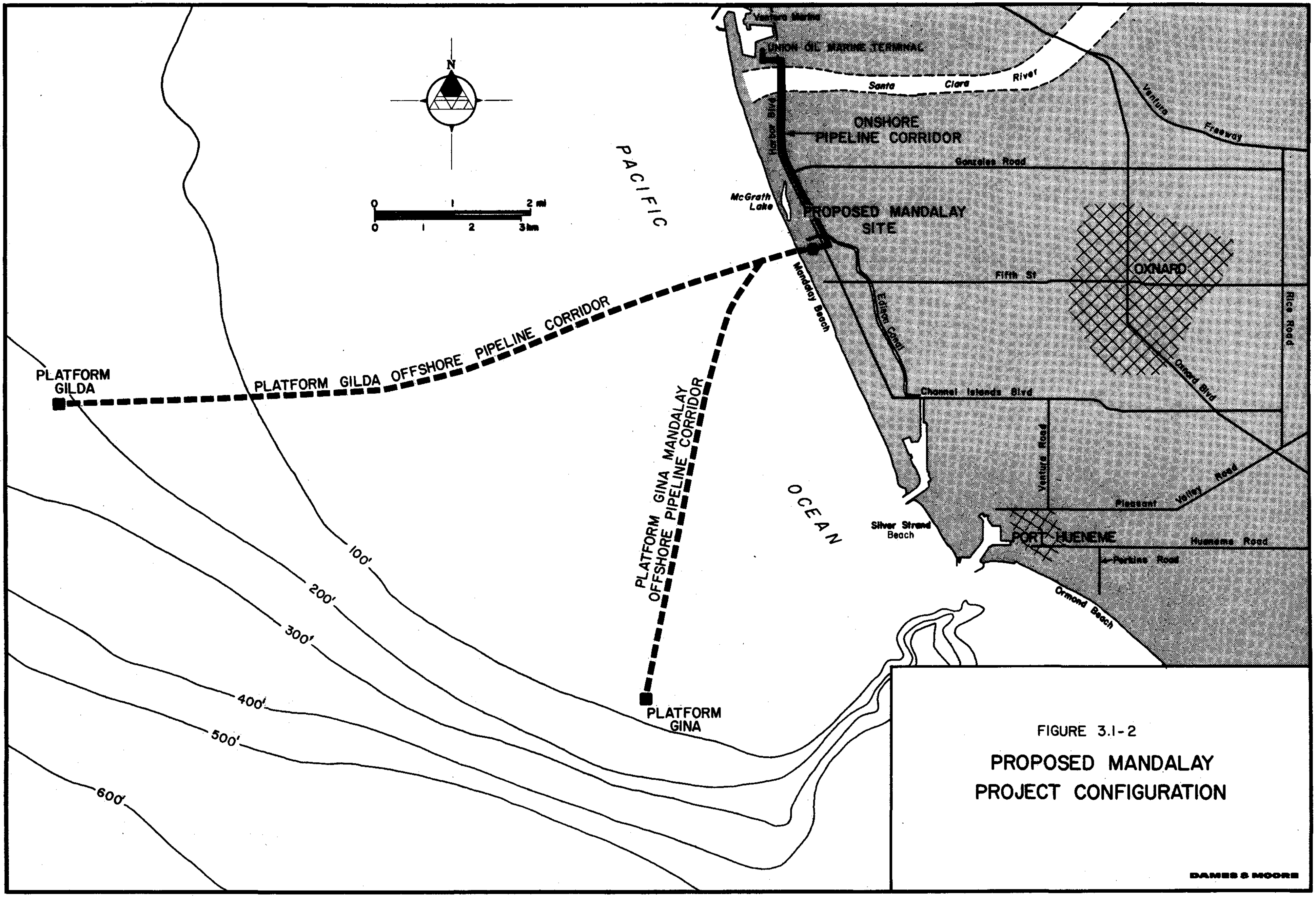

FIGURE 3.1-2

PROPOSED MANDALAY PROJECT CONFIGURATION

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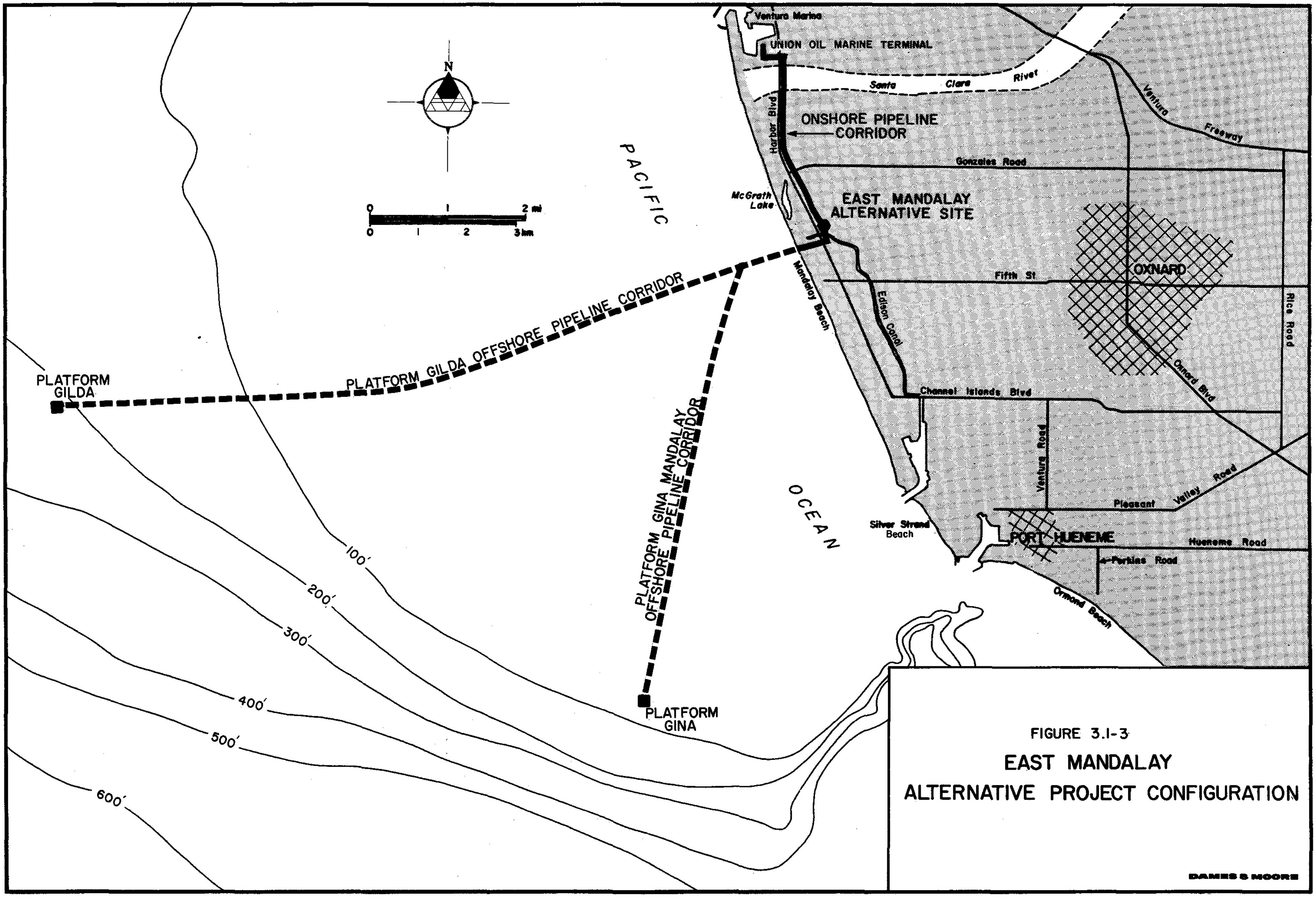

FIGURE 3.1-3

EAST MANDALAY ALTERNATIVE PROJECT CONFIGURATION

Gina and Gilda. In addition, this alternative would require the installation of a pumping-heating-compression station (booster station) near the landfall point at Mandalay Beach. This booster station would provide the additional energy required to send the produced fluids from both platforms to the marine terminal. Product crude oil and natural gas would directly enter existing pipeline distribution systems near the marine terminal.

The platform locations and offshore pipeline corridors for the Union Oil Marine Terminal alternative would be identical to those for the proposed project configuration (see Section 3.1.3.1).

The geographic relationship of the major project elements for the Union Oil Marine Terminal alternative configuration is depicted on Figure 3.1-4.

3.1.3.2.3 Ormond Beach Alternative Configuration

The Ormond Beach alternative site is located on Perkins Road approximately 0.2 mile (0.3 km) inland from Ormond Beach and 0.4 (0.6 km) south of Hueneme Road. The Ormond Beach alternative site would require two onshore pipeline corridors. The first would accommodate the two pipelines to/from Platform Gina. This corridor would be approximately 2.5 miles (4.0 km) long and would extend along the coast from a landfall point at Silver Strand Beach to the onshore treating facility. A second corridor would be required to link the treating facility with points in the Mandalay Beach and Ventura Harbor areas. This corridor would contain the three pipelines to/from Platform Gilda and the product crude oil and natural gas lines. The City of Oxnard has identified two alternative routes for this corridor (Option A and Option B) which are shown on Figure 3.1-5. The approximate onshore pipeline corridor lengths for Options A and B are 10.2 miles (16.3 km) and 17.0 miles (27.2 km), respectively.

The selection of the Ormond Beach alternative would require the installation of booster stations similar to that required for the Union Oil Marine Terminal alternative. The selection of Option A pipeline corridor would require two booster stations while the Option B pipeline corridor would require three booster stations. These booster stations would supply the additional energy required to send the produced fluids from the platforms to the onshore treating facility and to send the product crude oil to the marine terminal.

The platform locations associated with the Ormond Beach alternative would be identical to those for the proposed Mandalay project configuration (see Section 3.1.3.1). However, the Platform Gina offshore pipeline corridor would change if the Ormond Beach alternative configuration was implemented.

The offshore pipelines associated with Platform Gina would be emplaced in a corridor extending east-northeast from the platform to a landfall point at Silver Strand Beach if the Ormond Beach alternative was selected. The length of this corridor would be approximately 4 miles (6.4 km). The submerged cable supplying power and communications for Platform Gina would be installed utilizing a corridor identical to the proposed Mandalay offshore pipeline corridor (see Section 3.1.3.1). This corridor extends approximately 6.5 miles (10.5 km) to the northeast, reaching shore at a location slightly south of the SCE Mandalay Generating Station.

For the Ormond Beach alternative, the offshore pipeline corridor associated with Platform Gilda would be the same as for the proposed Mandalay project configuration.

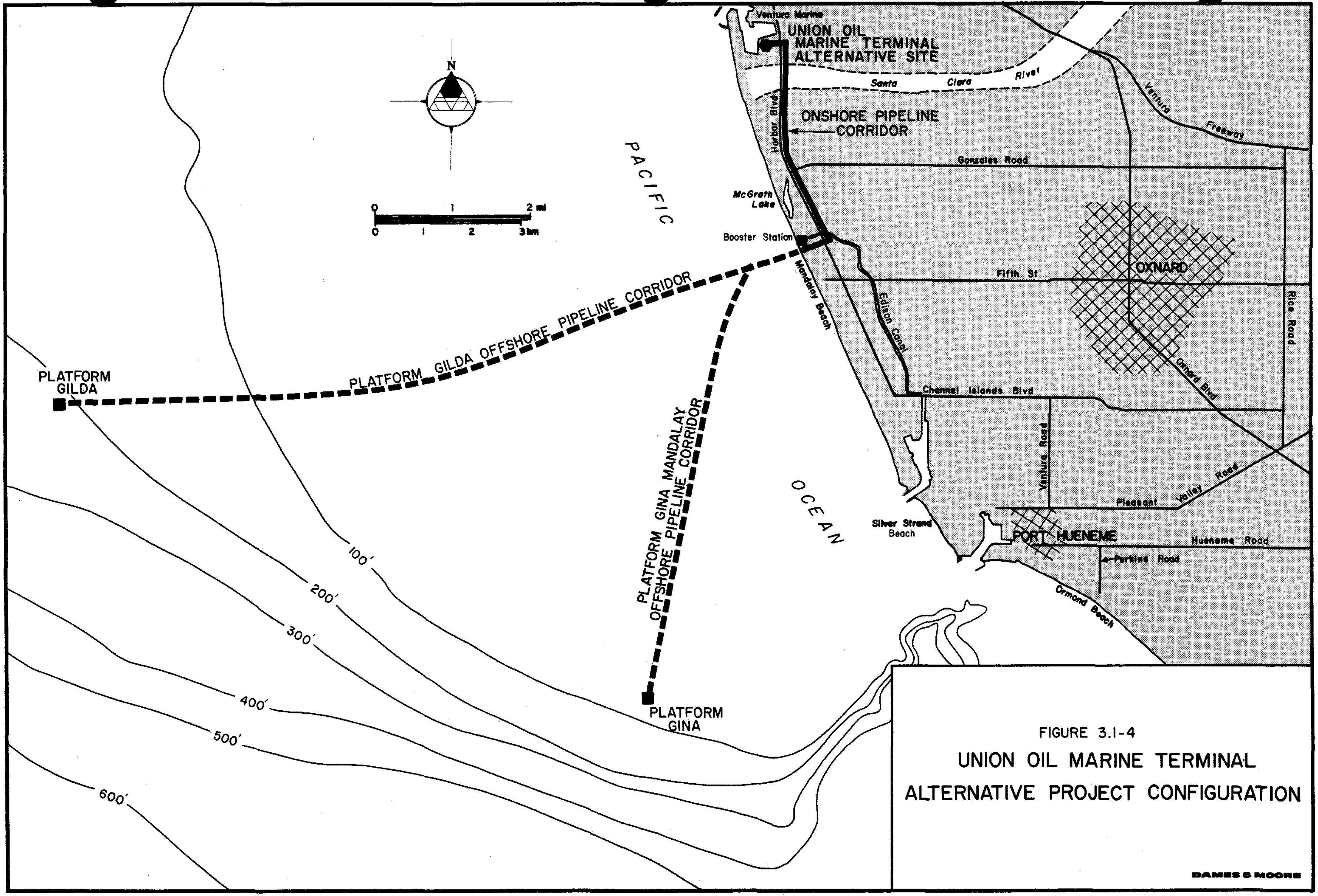

FIGURE 3.1-4

UNION OIL MARINE TERMINAL ALTERNATIVE PROJECT CONFIGURATION

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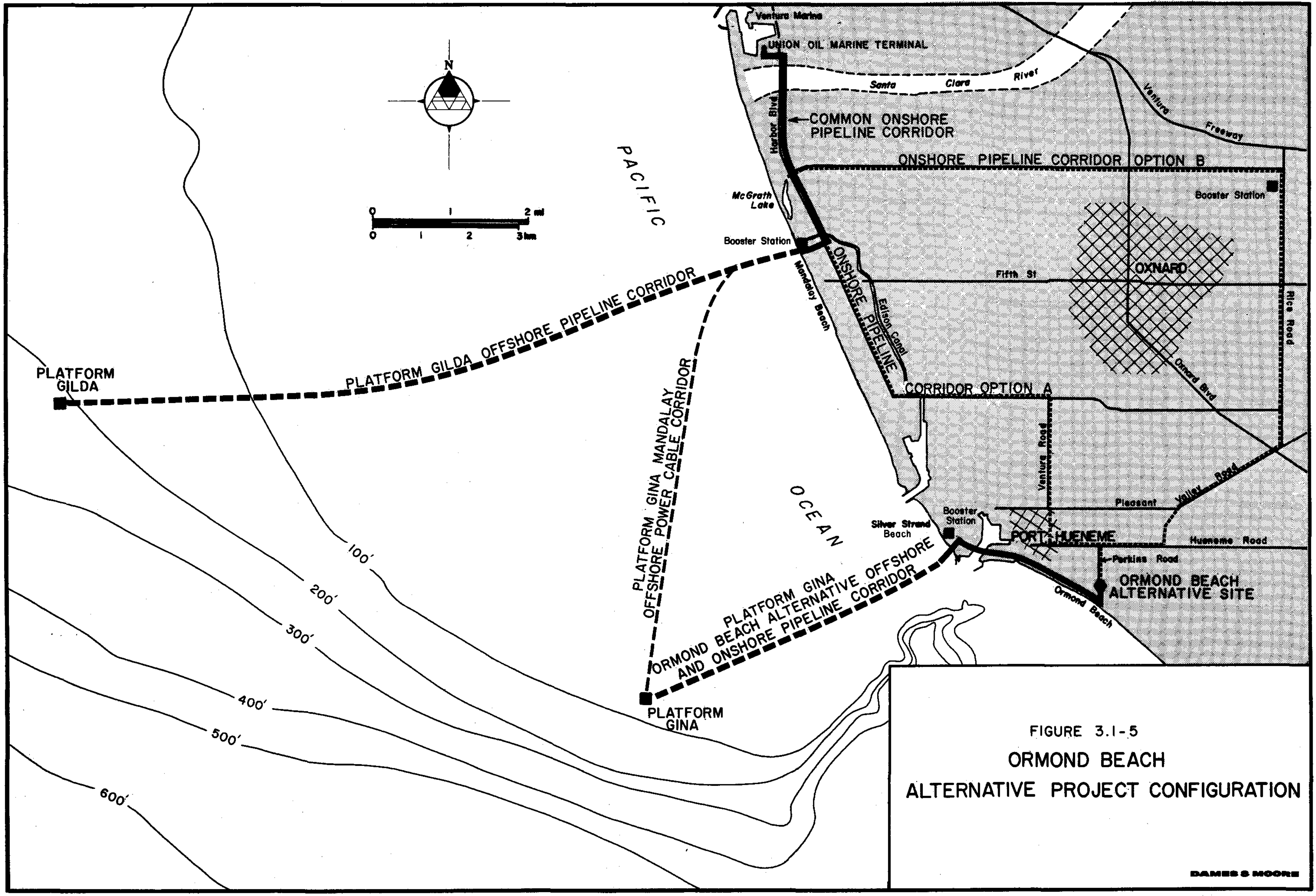

FIGURE 3.1-5

ORMOND BEACH

ALTERNATIVE PROJECT CONFIGURATION

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3.2 PROJECT FACILITIES

3.2.1 Platforms

3.2.1.1 Proposed Mandalay Project Configuration

3.2.1.1.1 Platform Gina

Platform Gina would be a six-pile steel structure designed for the accomplishment of the following tasks:

- Drill the required production and injection wells;
- Test and measure the produced fluids and pump them to shore;
- Inject produced water and/or cleaned, treated seawater into the producing formations for reservoir pressure maintenance.

A schematic drawing of Platform Gina is shown on Figure 3.2-1.

Platform Gina would contain 15 well-slots. Union indicates that these slots would be used to drill six producing and six injection wells into the Hueneme sand and Sespe Formation. The use of the other three well-slots has not been determined. The facilities necessary to drill the wells and transport the produced fluids to shore would be installed on Platform Gina's drilling deck, production deck, and subdeck.

The facilities on Platform Gina include well drilling, crude oil production and water injection equipment, living quarters for eight people, a heliport, and two boat landings. Electrical power at Platform Gina would be provided via a submerged electric power cable from onshore. An equipment list and design specifications for this platform are given in Appendix A, Tables A-1 and A-2. Equipment layout is shown on Figure A-1.

All travel between the platform and the shore would be by diesel-powered boats or helicopter. Helicopter travel would occur on an infrequent basis. The same crew and supply boats would service both Platform Gina and Platform Gilda.

3.2.1.1.2 Platform Gilda

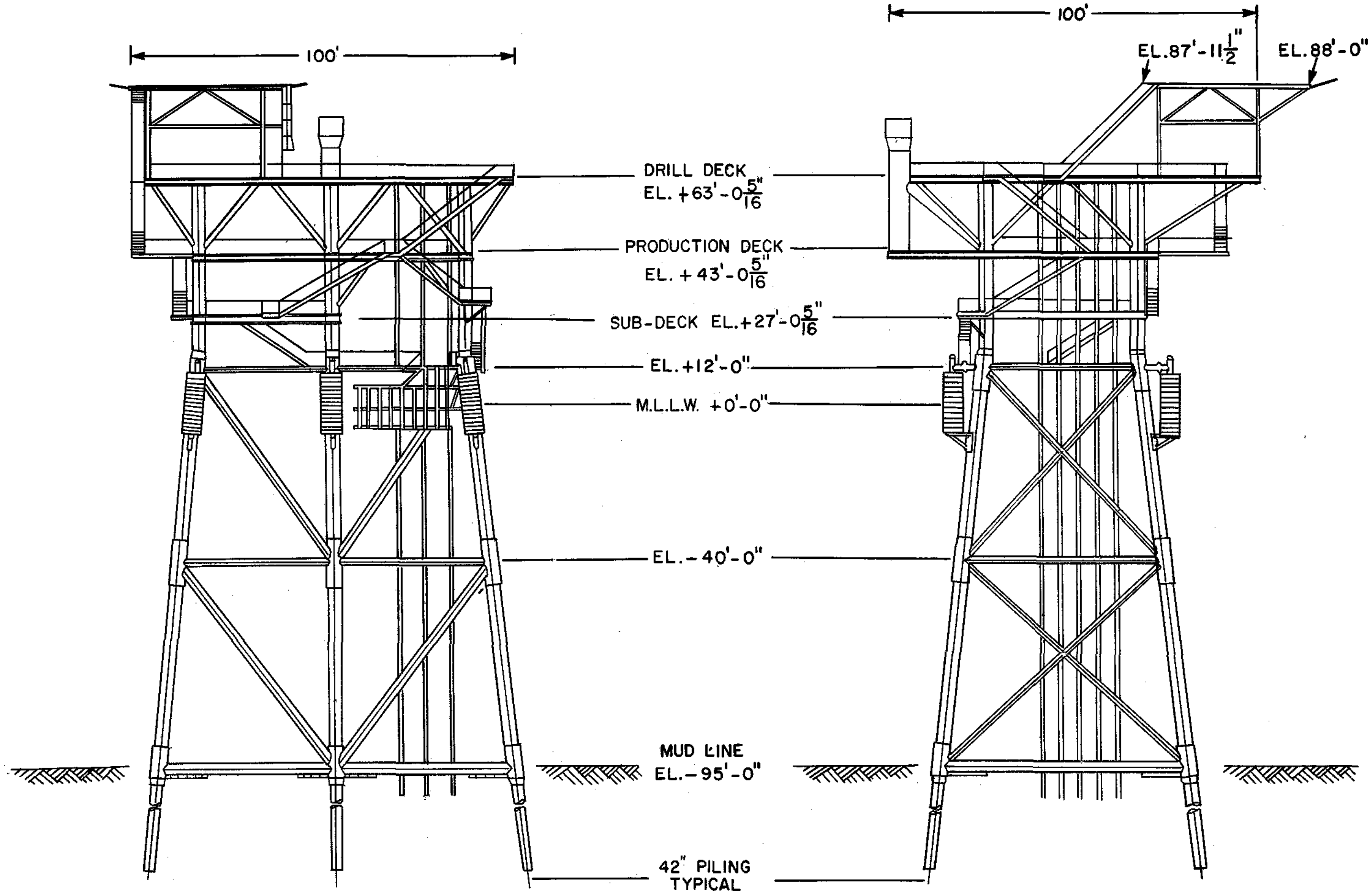
Platform Gilda would be a 12-leg template-type steel structure designed for the accomplishment of the following tasks:

- Drill the required production and injection wells to develop the Repetto Formation.
- Drill test wells to evaluate the quantities and properties of natural gas and oil within the Monterey Formation.
- Drill the required production and injection wells to develop the Monterey Formation if commercially feasible production rates are indicated by the test drilling program.
- Separate the produced natural gas from the produced crude oil and water.
- Test, measure, and transport the produced crude oil, water, and natural gas onshore.
- Separate the water from the produced fluids if required.
- Measure and inject produced water into the producing formations if required.
- Remove hydrogen sulfide (H_2S) present in produced natural gas from the Monterey Formation if required.
- Measure and inject natural gas produced from the Monterey Formation.
- Produce the injected gas after liquid production is depleted.

A schematic drawing of Platform Gilda is shown on Figure 3.2-2.

Platform Gilda would contain 90 well-slots. Union has indicated that 50 of the slots would be used for wells drilled into the Repetto Formation (40 production and 10 injection), while 30 would be reserved for development of the Monterey Formation. The remaining 10 well slots on the platform would be made available for use by Chevron in developing hydrocarbon accumulations on their adjacent lease to the east (OCS P-0215), if desired.

The necessary well drilling and production equipment would be installed on Platform Gilda's drilling deck, production deck, and subdeck. These facilities include the well drilling, crude oil production, natural gas separation



SOUTH ELEVATION
LOOKING NORTH

WEST ELEVATION
LOOKING EAST

FIGURE 3.2-1
SCHEMATIC DRAWING
OF PLATFORM GINA

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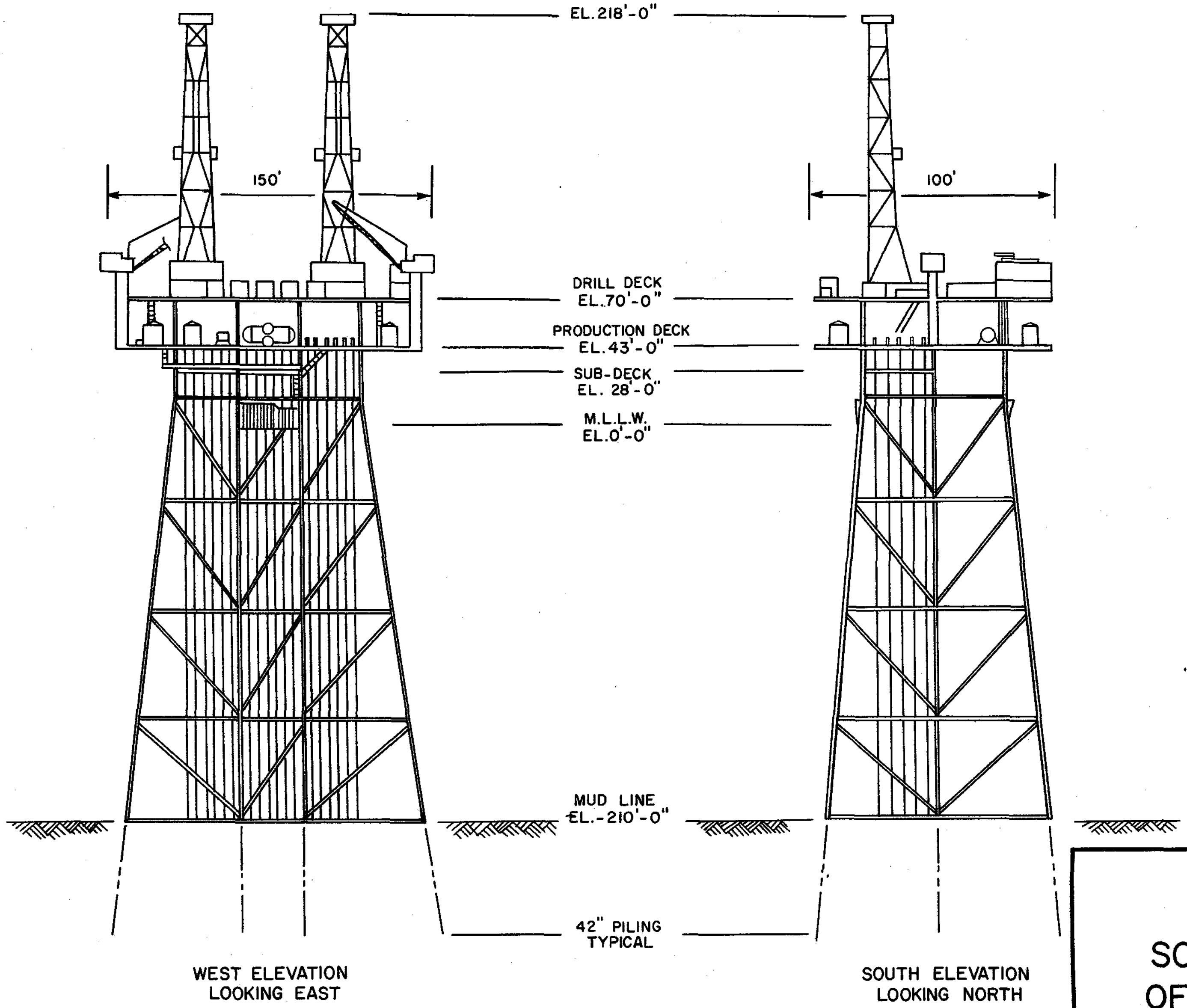

FIGURE 3.2-2

SCHEMATIC DRAWING OF PLATFORM GILDA

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and water injection equipment; living quarters for 20 people, a heliport, and boat landings. Electrical power at Platform Gilda would be provided via a submerged electric power cable from onshore. An equipment list and design specifications for this platform are given in Appendix A, Tables A-3 and A-4. Equipment layout is shown on Figures A-2, A-3, and A-4.

All travel between the platform and the shore would be by diesel-powered boats or helicopter. Helicopter travel would occur on an infrequent basis. The same crew and supply boats would service both Platform Gilda and Platform Gina.

The following information summarizes the major differences between the facilities associated with Platforms Gina and Gilda:

- Platform Gilda is physically larger than Platform Gina;
- Natural gas would be separated from the produced fluids on Platform Gilda. This separation would not occur on Platform Gina;
- Platform Gilda may have facilities to accomplish the following tasks:
    - --separate the water from the produced fluids if required as a result of the increased water content of the produced fluid during the project lifetime.
    - --remove the H_2S that may be present in the natural gas produced from the Monterey Formation.
    - --inject the treated natural gas back into the Monterey Formation.
    - --produce the injected gas after liquid production is depleted.

3.2.1.2 Primary Alternative Configurations

The selection of either the East Mandalay, Union Oil Marine Terminal, or Ormond Beach site for the onshore treating facility would not result in major changes in design or operation of either Platform Gina or Platform Gilda.

3.2.2 Offshore Pipelines and Power Cables

This project would require the installation of five offshore pipelines. For Platform Gina, one crude oil/water/natural gas mixture pipeline to shore and one return injection water pipeline would be required. For Platform Gilda, one produced crude oil/water mixture pipeline to shore, one produced natural gas pipeline to shore, and one return injection water pipeline would be required. Separate submerged power cables would run between each platform and shore. The design specifications for these pipelines are given in Appendix A.

The differences between the offshore pipelines for the proposed project configuration and the primary alternatives relate to pipeline corridor routing and length. These differences are outlined in Section 3.1.3 and in Table 3.2-1.

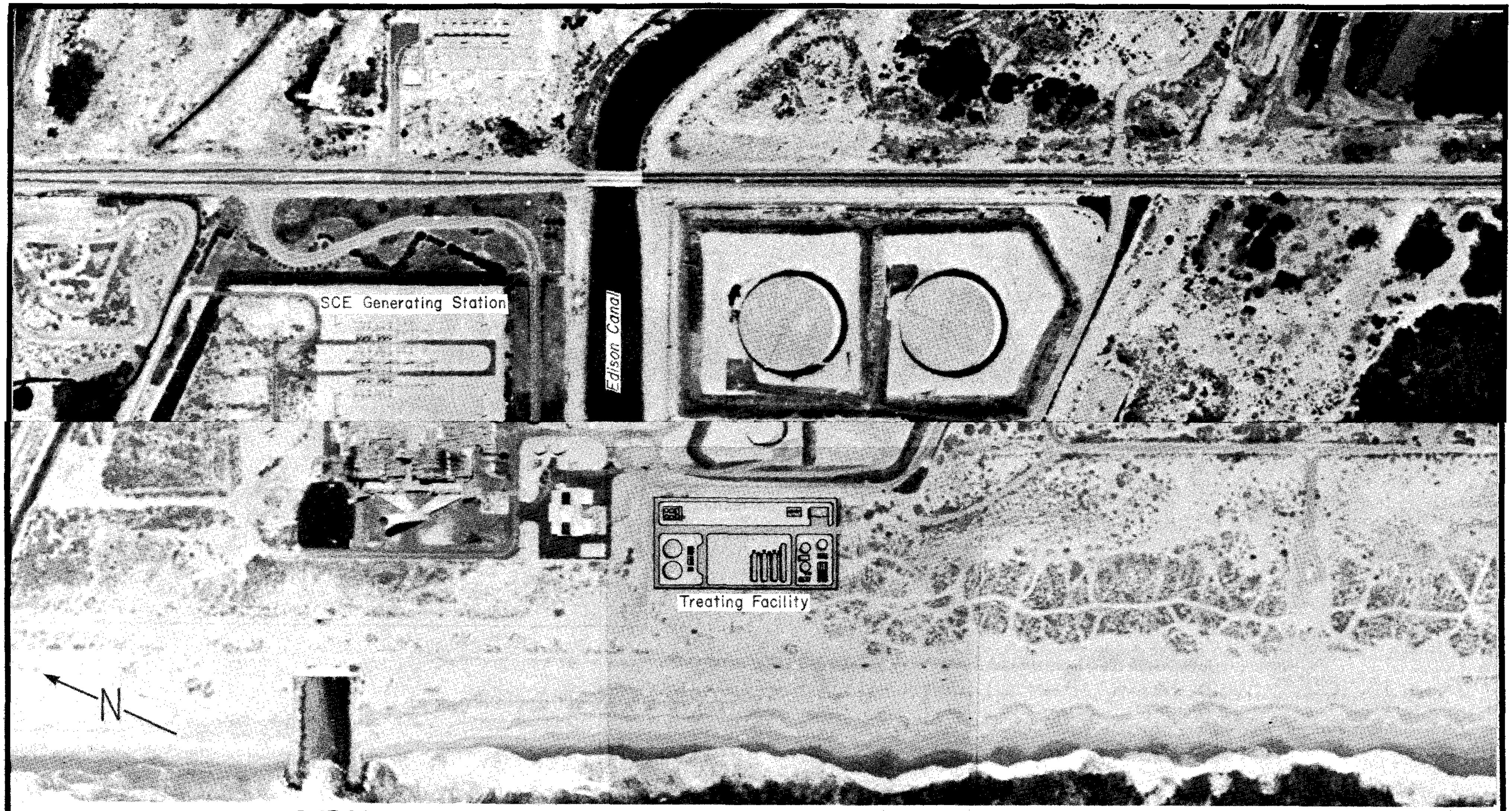
3.2.3 Onshore Treating Facility

The purpose of the onshore treating facility would be to separate the produced fluids from Platforms Gina and Gilda into crude oil, natural gas, and produced water streams. The separated crude oil and natural gas would be transported to customers via onshore pipeline systems. After treatment, the separated produced water would be returned to the platforms via the offshore pipeline systems for injection into the producing formations.

3.2.3.1 Proposed Mandalay Project Configuration

An artist's conception of the onshore treating facility located at the proposed Mandalay site (Appendix A, Figure A-5) is shown on Figure 3.2-3 and 3.2-4. The facility would be surrounded by a 10-foot (3-m)-high block wall on the south and west sides.. The north and east sides would have chain link fencing. The entire facility would be landscaped as required by Ventura County and/or the City of Oxnard.

A list of processing equipment to be used at the onshore treating facility and the proposed plot plan are included in Appendix A, Table A-5 and Figure A-6. All equipment would be installed in a concrete pit approximately



SUBSEQUENT TO CONSTRUCTION OF PROPOSED TREATING FACILITY

FIGURE 3.2-3

AERIAL VIEW OF THE PROPOSED MANDALAY SITE

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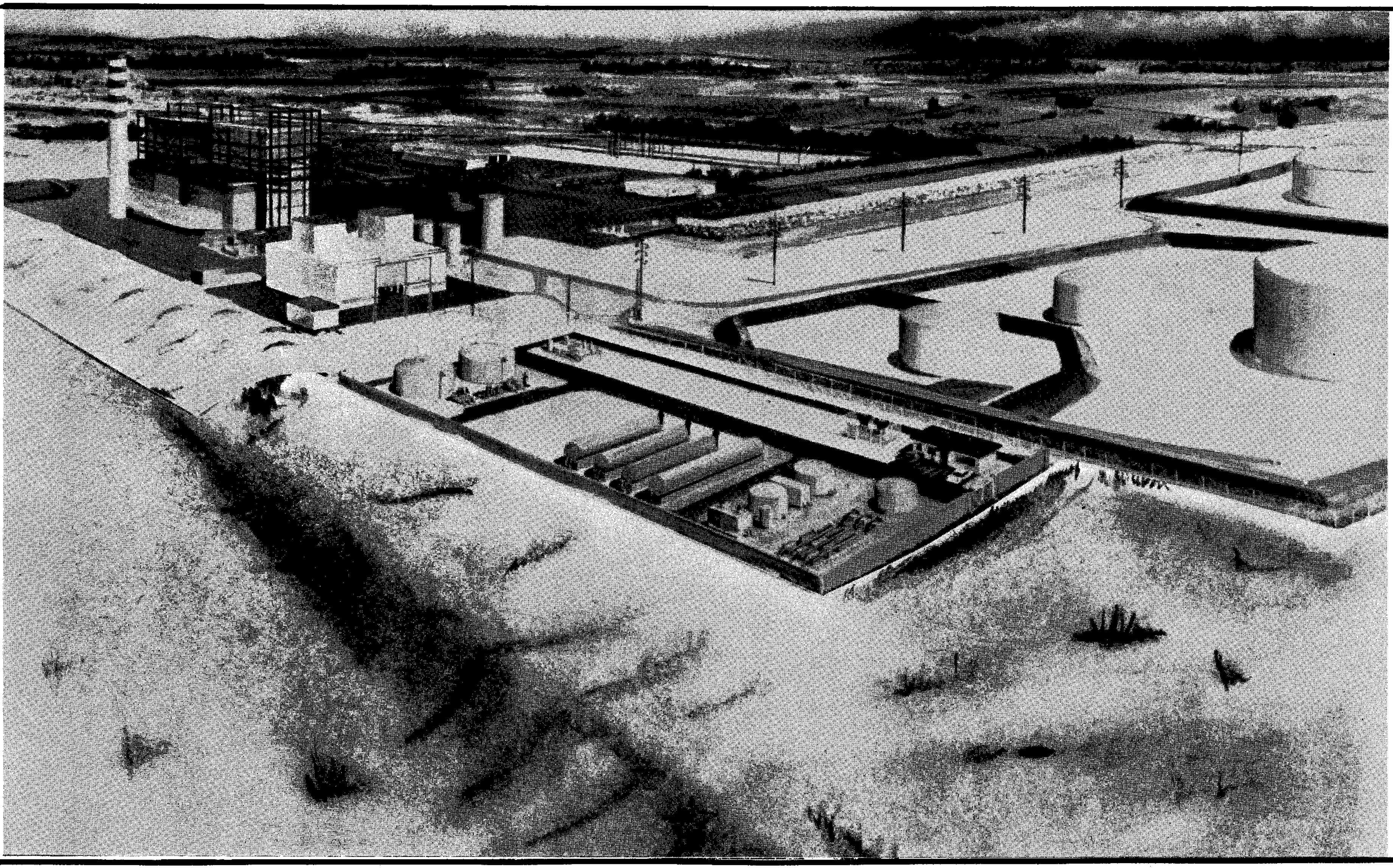

FIGURE 3.2-4

ARTIST'S CONCEPTION OF PROPOSED TREATING FACILITY

NOTE: VIEW IS TOWARD NORTHEAST

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TABLE 3.2-1

ONSHORE AND OFFSHORE PIPELINE LENGTHS, MILES

	Mandalay Site		East Mandalay Site		Union Oil Marine Terminal Site		Ormond Beach Site (Option A)		Ormond Beach Site (Option B)	
	Offshore Portion	Onshore Portion	Offshore Portion	Onshore Portion	Offshore Portion	Onshore Portion	Offshore Portion	Onshore Portion	Offshore Portion	Onshore Portion
I. OIL-CONTAINING PIPELINES:										
A. Incoming oil/water/gas pipeline from Platform Gina	6.5	0.1	6.5	0.4	6.5	3.0	4.0	2.5	4.0	2.5
B. Incoming oil/water pipeline from Platform Gilda	9.9	0.1	9.9	0.4	9.9	3.0	9.9	7.5	9.9	14.6
C. Product oil pipeline from the onshore site to the Union Oil Marine Terminal	0	2.9	0	2.6	0	0	0	9.9	0	15.2
SUBTOTAL I - OIL LINES	16.4	3.1	16.4	3.4	16.4	6.0	13.9	19.9	13.9	32.3
II. RETURN WATER LINES:										
A. Return water line to Platform Gina	6.5	0.1	6.5	0.4	6.5	3.0	4.0	2.5	4.0	2.5
B. Return water line to Platform Gilda	9.9	0.1	9.9	0.4	9.9	3.0	9.9	7.5	9.9	14.8
SUBTOTAL II - RETURN WATER LINES	16.4	0.2	16.4	0.8	16.4	6.0	13.9	10.0	13.9	17.3
III. GAS PIPELINES:										
A. Incoming gas pipeline from Platform Gilda	9.9	0.1	9.9	0.4	9.9	3.0	9.9	7.5	9.9	14.8
B. Product gas pipeline	0	0.3	0	0	0	0	0	7.3	0	14.4
SUBTOTAL III - GAS PIPELINES	9.9	0.4	9.9	0.4	9.9	3.0	9.9	14.8	9.9	29.2
TOTAL LENGTHS (SUBTOTALS I + II + III)	42.7	3.7	42.7	4.6	42.7	15.0	37.7	44.7	37.7	78.8

12 to 18 inches (30 to 45 cm) deep. This pit would be sized to contain the volume of all the vessels in the pit in the event of an accidental spill.

3.2.3.2 Primary Alternative Configurations

Selection of any of the alternative configurations would not change the design or operation of the onshore treating facility. The facility equipment list given in Appendix A, Table A-5 would be equally applicable to each of the alternatives. The proposed plot plan shown in Appendix A may have to be altered to reflect local site size constraints.

3.2.4 Onshore Pipelines

The following onshore pipelines are required for this project:

Group 1: pipelines to/from both platforms from the MLLW level to the onshore treating facility;

Group 2: product pipelines from the onshore treating facility to existing distribution systems.

Design specifications for all onshore pipelines are given in Appendix A, Table A-6.

The product crude oil would be pumped to the Los Angeles area through the existing Torrey pipeline. The connection point to this pipeline closest to the proposed Mandalay site is at the Union Oil Marine Terminal. For this reason, the product crude oil would be pumped to the marine terminal for shipment through the existing Torrey pipeline system.

The currently available excess capacity in the Torrey pipeline system is approximately 10,000 barrels of oil per day (BOPD) (1,590 m^3/day). The anticipated peak incremental flow of oil through the Torrey pipeline system attributable to the proposed Platform Gina and Platform Gilda Project (excluding production from the Monterey Formation) would be approximately 20,000 BOPD (3,180 m^3/day). Although peak production rates from the Monterey Formation are still speculative, Union believes that they could approach 8,000 BOPD (1,272 m^3/day), further increasing the estimated peak volume of oil produced by this project to 28,000 BOPD (4,450 m^3/day). Should, after normal declines are considered, the excess capacity of the Torrey pipeline system be exceeded, this capacity might have to be expanded. Expansion of the Torrey pipeline system would be a separate project.

A portion of the natural gas produced by the proposed Platform Gina and Platform Gilda Project would be sold. The most likely gas purchasers are SCE and/or PG&E, both of whom have existing gas pipeline distribution systems paralleling the eastern edge of Harbor Boulevard in the vicinity of the proposed Mandalay onshore treating facility site. At this time, Union has not concluded a natural gas sales agreement with any purchaser.

3.2.4.1 Proposed Mandalay Configuration

The following onshore pipelines would be required for the proposed project:

Group 1: one oil/water/natural gas mixture pipeline from Platform Gina
one return water pipeline to Platform Gina
one oil/water mixture pipeline from Platform Gilda
one natural gas pipeline from Platform Gilda
one return water pipeline to Platform Gilda

Group 2: one product crude oil pipeline
one product natural gas pipeline

3.2.4.2 Primary Alternative Configurations

The differences between the onshore pipelines for the proposed project configuration and the primary alternatives relate to pipeline corridor routing and length. These differences are outlined in Section 3.1.3 and Table 3.2-1.

3.2.4.2.1 East Mandalay Alternative Configuration

None of the discussions relating to the design and operation of the proposed onshore pipeline system would differ significantly with the selection of the East Mandalay alternative configuration.

3.2.4.2.2 Union Oil Marine Terminal Alternative Configuration

Selection of the Union Oil Marine Terminal alternative would require the installation of a pumping-heating-compression facility (booster station) near the shoreward extension of the pipelines to/from Platform Gina and Platform Gilda. The booster station would require approximately 0.7 acre (0.3 ha) of land. The produced oil/water streams from both platforms would be heated at the booster station to reduce their viscosity and thereby facilitate the pumping of these streams the remaining 2.9 miles (4.7 km) to the Union Oil Marine Terminal. Natural gas separated during heating would be compressed and either injected into the Platform Gilda incoming natural gas pipeline or used as fuel in the booster station heater. The equipment list and plot plan for the booster station are given in Appendix A, Table A-7 and Figure A-7.

3.2.4.2.3 Ormond Beach Alternative Configuration

Selection of the Ormond Beach alternative Option A onshore pipeline corridor would require the installation of two booster stations similar to that needed by the Union Oil Marine Terminal alternative. One booster station would be installed at the shoreward extension of the pipelines from Platform Gina (at Silver Strand Beach) and the other would be installed at the shoreward extension of the pipelines from Platform Gilda (at Mandalay Beach). Both of these stations would be needed to facilitate the pumping of the produced streams to the Ormond Beach site. An additional booster station would be required if the Option B onshore pipeline corridor were selected. The booster station plot plan and equipment list shown in Appendix A are applicable to each of the booster stations proposed for the Ormond Beach alternative configuration.

3.3 CONSTRUCTION

3.3.1 Platforms

3.3.1.1 Proposed Mandalay Project Configuration

Construction Procedures: The principal components of both Platform Gina and Platform Gilda are the jacket, the piling, and the decks. These components for each platform would be fabricated in a suitable shipyard outside Ventura County and transported to the sites. Each jacket would be launched from a specially constructed launch barge and lowered to the ocean floor by controlled flooding, utilizing equipment aboard a derrick barge for partial support and final positioning of each structure. The piling would then be driven to the design depth through each of the jacket legs, the jacket leveled, and the piling welded to each of the jacket legs. The production deck sections and the subdeck would then be secured in place above the piling. Following installation of the production deck, major production and support equipment components would be placed on the deck for future installation. The drilling deck would then be set in place above the production deck. Once the decks had been secured in place, drilling and production equipment, support facilities, and safety and protection systems would be installed and finish work completed. During construction, all marine traffic would be restricted from an exclusion zone surrounding each platform site. The limits of this zone would be established by the U.S. Coast Guard.

Union anticipates that the majority of the construction labor force for both platforms would be hired through local labor unions drawing on workers from the Ventura, Santa Barbara, and Los Angeles areas' labor pools. The estimated skills breakdown of the platform construction labor force is shown in Appendix A, Table A-8.

The erection of Platform Gina would require approximately 2 calendar weeks. Work would be conducted 7 days per week, 24 hours per day, in two 12-hour shifts per day (noon and midnight). Approximately 80 workers would be involved, 40 in each shift. Workers' living quarters would be provided on the derrick barge. The crew boat would make two trips per day (noon and midnight) for transfer of personnel. However, it is expected that most of the workers would elect to remain on the barge for the duration of the construction period.

Erection of Platform Gilda would commence immediately after the erection of Platform Gina. The same work crews and work shifts would be used. The erection of Platform Gilda would require approximately 5 calendar weeks. The timing of the construction of both platforms is shown on Figure 3.3-1.

Materials needed for the construction of Platform Gina and Platform Gilda are listed in Table 3.3-1. Union anticipates that one truck trip per day would be necessary to deliver supplies and materials to the port of operations (Port Hueneme) for all crew boats, supply boats, and support vessels during Platform Gina construction. The construction of Platform Gilda would require an average of two truck trips per day (three trips per day peak) for the delivery of supplies to Port Hueneme. When necessary, helicopter deliveries would be made to each platform from the Oxnard Airport. Union estimates that supply boat trips from Port Hueneme to both platforms would average one per day during the period of platform construction. Equipment required for construction of all project facilities is listed in Appendix A, Table A-9.

All electrical power required during platform construction (approximately 500 KVA) would be satisfied using a diesel generator located on the derrick barge. All potable water required during platform construction (approximately 1,000 BBL/day) would be obtained using the desalination units located on the derrick barge.

Union has estimated that construction labor costs for Platform Gina would be approximately $2 million (1979 dollars) and purchased materials and services costs would be approximately $7 million (1979 dollars). The cost of construction labor for Platform Gilda would be approximately $5 million (1979 dollars) and purchased materials and services would be $20 million (1979 dollars). Approximately 25 percent of the purchased materials and services for both platforms would be from Ventura County contractors and vendors.

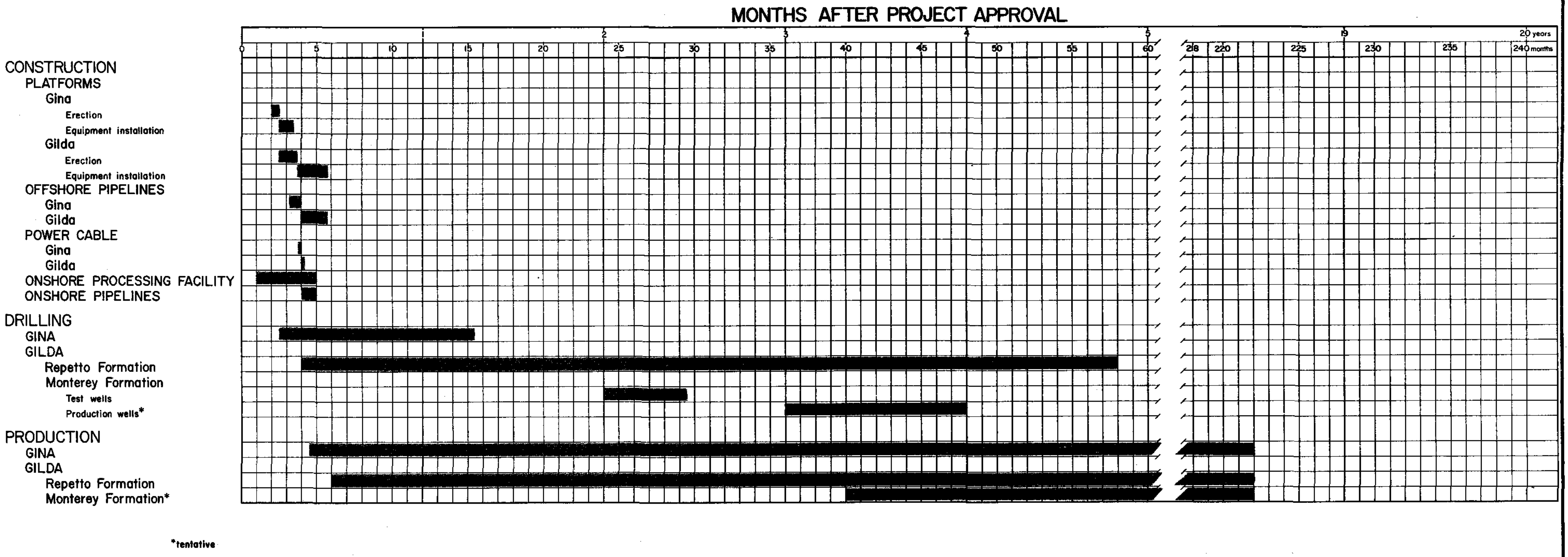

FIGURE 3.3-1

PROJECT SCHEDULE —
PROPOSED MANDALAY
CONFIGURATION

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TABLE 3.3-1

PROPOSED PROJECT MATERIAL REQUIREMENTS - CONSTRUCTION

	Project Element					
			Offshore Pipelines and Power Cable			
Material	Platform Gina	Platform Gilda	Platform Gina	Platform Gilda	Onshore Treating Facility	Onshore Pipelines
Steel, tons	1235	5800	-	-	510	-
Pipe, tons	-[a]	-[a]	1300	3700	-[a]	190
Power cable, tons	-	-	160	340	-	-
Concrete, yd^3	-	-	-	-	600	-
Lumber, board feet	-	-	-	-	3700	-
Reinforcing steel	-	-	-	-	300	-
Welding rod, tons	2.5	6.2	1.5	10	0.5	0.5
Oxygen, tanks	20	50	10	10	3	5
Acetylene, tanks	20	50	10	10	3	5
Diesel fuel, 10^3 gallons	28	70	16	16	0.5	0.2
Lubricating oil, BBl	30	200	-[a]	-[a]	0.2	-
Potable water, BBl	14000	35000	25	60	100	-[a]

---

[a] minimal quantities

Environmental Characteristics: Atmospheric emissions occurring during the construction of each platform would result from the use of various types of diesel-powered equipment, boats, supply trucks, and employee transportation. The atmospheric emissions that would be associated with platform construction are summarized in Table 3.3-2.

The construction of each platform would result in the generation of the wastewater and solid waste streams shown in Table 3.3-3. The sanitary sewage generated during platform construction would be treated in a small, packaged sewage treatment unit. A typical unit for this purpose is the Microphor Marine Sanitation Unit. This unit aerobically treats the sewage before it is chlorinated and discharged to the ocean. The Microphor Unit has been certified for use offshore by the U.S. Coast Guard. The derrick barge and platforms would have separate sanitary sewage treatment units.

All other liquid wastes and general refuse generated during the construction of the platforms would be collected and sent onshore using the crew or supply boats. Once onshore, these wastes would be disposed of at an approved dumpsite.

3.3.1.2 Primary Alternative Configurations

Implemention of any of the primary alternatives to the proposed project configuration would involve no changes in the Platform Gina or Platform Gilda construction characteristics.

3.3.2 Offshore Pipelines and Power Cables

3.3.2.1 Proposed Mandalay Project Configuration

Construction Procedures: The offshore portions of the pipelines extending between each of the two platforms and the proposed Mandalay onshore treating facility would be installed by the pull method. The pipelines would be fabricated in approximately 300-foot (91-m)-long sections at a 400 x 800-foot (122 x 244-m) marshalling area immediately south of the proposed site. All welding would be performed in conformance with the American Petroleum Institute (API) Standard 1104 and each weld would be radiographically

TABLE 3.3-2

PROPOSED PROJECT ESTIMATED ATMOSPHERIC EMISSIONS - CONSTRUCTION

	Pollutant Emission Rate, Pounds/Day[a]				
Project Element	SO_2	NOx (as NO_2)	CO	Particulates	Total Hydrocarbons
Platform Gina	69.6	1054	270	72.0	88.9
Platform Gilda	69.8	1056	268	72.2	88.7
Offshore Pipelines					
Platform Gina	43.7	595	222	34.5	51.0
Platform Gilda	42.8	590	220	34.5	50.4
Onshore Treating Facility	4.8	20.2	66.8	30.5	7.9
Onshore Pipelines	1.1	15.1	43.4	13.1	5.1

---

[a] These average daily emissions occur during the individual project element construction period.

TABLE 3.3-3

PROPOSED PROJECT WASTE WATER AND SOLID WASTE GENERATION - CONSTRUCTION

	Effluent Streams			
Project Element	Sanitary Sewage, gallons/day	Hydrostatic Test Water, gallons	General Refuse, pounds/day	Other Liquid Wastes,[a] gallon/day
Platform Gina	240	(b)	145	30
Platform Gilda	240	(b)	145	30
Offshore Pipelines Platform Gina	(c)	180,000	200	(b)
Platform Gilda	(c)	523,000	200	(b)
Onshore Treating Facility	(c)	126,000	(b)	(b)
Onshore Pipelines	(c)	50,000	(b)	(b)

(a) Miscellaneous liquid wastes; i.e., paints, solvents, etc.
(b) Minimal amounts anticipated.
(c) Sanitary sewage contained in chemical toilets.

inspected. As sections are completed, they would be pulled offshore (utilizing a barge and a tugboat) from the marshalling area along a corridor 40 feet (12 m) in width. Buoyancy would be added to reduce frictional drag on the pipeline and minimize the pulling force required. The offshore construction right-of-way width would be about 40 feet (12 m). During installation, marine traffic would be restricted from the vicinity of the ongoing activities.

From MLLW to a water depth of 20 feet (6 m), the pipelines would be buried by divers who would jet the sand from beneath the pipelines, allowing them to sink. As the pipelines sink, most of the sand would settle back into place over them. From a water depth of 20 feet (6 m) to the platforms, the pipelines would rest unanchored on the ocean bottom.

The pipelines would be hydrostatically tested after installation with seawater at a pressure at least 50 percent higher than the maximum operating pressure. Disposal of used test water would be in compliance with the conditions of a NPDES permit issued by either the Environmental Protection Agency (EPA) (for discharge in federal waters) or the California Regional Water Quality Control Board (CRWQCB) (for discharge in state waters).

The power cables offshore from MLLW would be emplaced in the same corridor as the pipelines to each platform. Based on previous experience, Union expects that the cable would bury itself.

Fabrication and installation of the two offshore pipelines and power cable for Platform Gina is expected to take approximately 3 calendar weeks. Work would be conducted 7 days per week, 24 hours per day, in two 12-hour shifts per day. Approximately 44 workers would be involved, 22 in each shift (see Appendix A, Table A-8 for labor force skills distribution).

Fabrication and installation of the three offshore pipelines and power cable for Platform Gilda would take place immediately after similar activities related to Platform Gina are completed. The same work crews would be used and the same work shifts would be maintained. Offshore pipeline and power cable construction for Platform Gilda would take approximately 7 calendar weeks. The overall construction schedule is shown on Figure 3.3-1.

Materials required for the construction of the Platform Gina and Platform Gilda offshore pipelines and power cables are summarized in Table 3.3-1. Union anticipates that the Platform Gina offshore pipelines and power cable construction would require approximately two truck trips per day (45 total trips) for the delivery of supplies and materials to the construction area. Union anticipates that the Platform Gilda offshore pipelines and power cable construction would require an average of three truck trips per day (approximately 150 total trips) for delivery of supplies and materials to the construction area.

Payroll associated with the installation of the offshore pipeline system and power cable for Platform Gina would amount to approximately $500,000 (1979 dollars), with an additional $1 million expended for purchased materials and services. Construction payroll for the installation of the Platform Gilda offshore pipelines and power cable would total approximately $3 million (1979 dollars), with an additional $3 million expended for purchased materials and services. Approximately 10 percent of the purchased materials and services would be procured from Ventura County contractors and vendors.

Environmental Characteristics: Construction of the offshore pipelines and power cables would result in atmospheric emissions from the tugboat, various diesel-powered equipment operating on the barge and at the onshore construction area, supply trucks and employee transportation. The atmospheric emissions that would be associated with offshore pipeline and power cable construction are shown in Table 3.3-2.

The wastewater effluents and solid wastes that would be generated during the construction of the offshore pipelines and power cables, including hydrostatic test waters, are summarized in Table 3.3-3. Sanitary sewage would be treated on the tugboat and barge using chemical toilets. The general refuse generated during offshore pipeline and power cable construction would be sent onshore using the tugboats. This material would be disposed of at an approved onshore dumpsite.

3.3.2.2 Primary Alternative Configurations

Offshore pipeline fabrication and installation, and power cable installation would be the same for the East Mandalay and Union Oil Marine Terminal alternatives as was previously discussed for the proposed project configuration (Section 3.3.2.1). Should the Ormond Beach alternative be selected, a different corridor would be utilized for the offshore pipelines extending between Platform Gina and shore (see Section 3.1.3.2.3). There would be no change involved with the Platform Gina power cable or the offshore pipelines associated with Platform Gilda.

Implementation of the Platform Gina Ormond Beach alternative offshore pipeline corridor would necessitate the establishment of a second onshore fabrication site near the proposed landfall point at Silver Strand Beach. Fabrication and installation methods would be the same as those described for the proposed project. However, Union anticipates that these activities would probably not be conducted concurrently with those for the Platform Gilda pipelines and since the onshore fabrication area is highly congested, fabrication and installation would take approximately 9 rather than 3 calendar weeks to complete. Overall, selection of the Ormond Beach alternative would result in the following net changes in the Platform Gina offshore pipeline and power cable construction phase characteristics relative to the proposed project:

- Duration of offshore pipeline construction: increased by 6 calendar weeks
- Purchased materials and services: increased by 700% (1979 dollars)
- Truck deliveries: increased by 100 shipments

3.3.3 Onshore Treating Facility

3.3.3.1 Proposed Mandalay Project Configuration

Construction Procedures: After surveying, the onshore site would be cleared and graded. Union plans to set all tanks and vessels in an 18- to 24-inch (45- to 60-cm)-deep pit to decrease visibility of the facility and to contain any liquids that might be accidentally released. This pit would be formed by redistribution of earth within the site area. No import of fill or export of spoil material is expected. Major components would be moved directly onto prepared foundations; supplies and equipment would be marshalled within the site; and, all worker vehicles would be parked within the site.

Upon completion of grading, foundations would be poured and a 10-foot (3-m)-high block wall would be erected along the south and west sides of the site. A chain link fence would be erected along the north and east sides. Major components of the treating facility would be manufactured offsite and trucked to the location (probably from the Los Angeles, Ventura, or Port Hueneme areas). These units would be placed on the prepared foundations. The valves, fittings, and other connecting hardware would be installed and the facility then would be electrically wired. Areas within the site would be surfaced with asphalt, concrete, or gravel, and landscaping would be provided in conformance with Ventura County and/or the City of Oxnard requirements. The existing Chevron service road at the Mandalay site would be utilized for site access during construction. All construction and installation would be conducted in conformance with applicable local, state, and federal codes and regulations.

Installation of the onshore treating facility is expected to require 16 calendar weeks. Work would be conducted 7 days per week, in one 12-hour shift per day beginning at approximately 0630. Approximately 100 workers would be involved, with a probable maximum of 40 onsite at one time. The labor force skills distribution for construction and installation is given in Appendix A, Table A-8. The proposed timing of onshore treating facility construction is depicted on Figure 3.3-1.

Estimated sources and quantities of construction materials are listed in Table 3.3-1. Union expects that 100 truck trips would be required to transport supplies and materials to the site (1 trip per day average, 10 trips per day peak).

Electrical power during construction of the onshore treating facility (approximately 100 KVA) would be obtained from SCE or by using a portable diesel-powered generator. Potable water (approximately 50 gallons/day) would be obtained from a private bottled water distributor. Portable sanitary facilities (chemical toilets) would be provided by a private contractor.

The cost of construction labor for the onshore treating facility would be approximately $2.8 million (1979 dollars). An additional $3 million would be expended for purchased materials and services, approximately 60 percent of which would accrue to contractors and vendors within Ventura County.

<u>Environmental Characteristics</u>: Atmospheric emissions occurring during the construction of the onshore treating facility would result from the use of various types of diesel-powered equipment, supply trucks, and employee transportation. The atmospheric emissions that would be associated with the facility construction are summarized in Table 3.3-2.

The wastewater and solid waste streams that would be generated during the onshore treating facility construction are summarized in Table 3.3-3.

Sanitary wastes generated during onshore treating facility construction would be collected in portable chemical toilets. At regular intervals, the contents would be emptied and trucked to an approved offsite disposal facility by a licensed contractor.

All contaminated storm water would be contained on the site and would be sent to an approved dumpsite for disposal. Uncontaminated storm water would be routed to natural drainage. About 3,000 barrels (BBL) of hydrostatic test water would be required. The source of this water would be the local water district. The used water would be discharged in accordance with CRWQCB requirements or trucked away to an approved disposal facility.

The only solid waste generated during the treating facility construction would be general refuse. This waste would be collected and sent by truck to an approved dumpsite for disposal.

3.3.3.2 Primary Alternative Configurations

Should one of the three primary alternative sites be chosen for the onshore treating facility, construction and installation procedures would be the same as those described for the proposed Mandalay site. The East Mandalay alternative may require the construction of a short access road whereas the Union Oil Marine Terminal and Ormond Beach alternative sites could be reached via existing access roads.

Union estimates that materials, manpower requirements, and costs for the three primary alternative sites would be approximately the same as for development of the proposed Mandalay site.

3.3.4 Onshore Pipelines and Power Cables

3.3.4.1 Proposed Mandalay Project Configuration

Construction Procedures: The onshore pipelines are classified in two groups. The first group (Group 1) would extend from the MLLW level to the onshore treating facility and the second group (Group 2) would extend from the onshore treating facility to the existing crude oil and natural gas distribution systems. The power cable would be emplaced in the corridor with the Group 1 pipelines. Onshore pipeline length and right-of-way data are contained in Table 3.3-4.

TABLE 3.3-4

ONSHORE PIPELINE RIGHT-OF-WAY

	Number of Pipelines	Pipeline Corridor length, miles	Right-of-Way, feet	
			Construction	Permanent
Proposed Mandalay Project Configuration				
• MLLW to onshore treating facility	5	0.1	50	30
• Onshore treating facility to existing natural gas tie-in point	2	0.3	30	20
• Existing natural gas tie-in point to marine terminal	1	2.6	20	10
East Mandalay Alternative				
• MLLW to existing natural gas tie-in point	5	0.4	50	30
• Existing natural gas tie-in point to onshore treating facility	7	0.1	60	30
• Existing natural gas tie-in point to marine terminal	1	2.6	20	10
Union Marine Terminal Alternative				
• MLLW to onshore treating facility	5	3.0	50	30
Ormond Beach Alternative - Option A				
• MLLW (Mandalay Beach) to Harbor Blvd.	3	0.3	30	20
• Harbor Blvd. to onshore treating facility	5	7.2	50	30
• Harbor Blvd. to existing natural gas tie-in point	2	0.1	30	20
• Existing natural gas tie-in point to marine terminal	1	2.6	20	10
• MLLW (Silver Strand Beach) to onshore treating facility	2	2.5	30	20
Ormond Beach Alternative - Option B				
• MLLW (Mandalay) to the existing natural gas tie-in point	3	0.4	30	20
• Existing natural gas tie-in point to the Gonzales Road	4	0.8	40	30
• Gonzales Road to onshore treating facility	5	13.4	50	30
• Gonzales Road to marine terminal	1	1.8	20	10
• MLLW (Silver Strand Beach) to onshore treating facility	2	2.5	30	20

From the onshore treating facility to MLLW, the Group 1 pipelines would be buried, using a tractor or backhoe, to a minimum depth of 3 feet (1 m) below the winter beach surface. This would ensure that seasonal exposure of the pipelines did not occur due to the action of winter storm waves.

The power cable to each platform would be buried from the metering station to MLLW at a minimum depth of 6 feet (1.8 m) below the winter beach surface. These cable segments would be covered by a 6-inch (15-cm) thickness of red concrete for protection.

The Group 2 pipelines would be constructed using the following procedures. The right-of-way would be cleared and graded and debris would be disposed of at an approved dumpsite. Surveyors would then stake the centerline of the pipeline. Pipeline construction activities would include ditching, stringing the pipe, bending pipe for changes in direction, cleaning, welding, inspection, coating, lowering the pipe into the ditch, hydrostatic testing, backfilling, and cleanup.

Pipeline trenches would be approximately 3 feet (1 m) wide and 4 feet (1.3 m) deep. Excavations would be accomplished primarily with a ditching machine or a backhoe, as conditions permit. Material excavated during ditching would be stockpiled temporarily alongside the trench on the right-of-way. Boring would be utilized at major road crossings. When crossing the Santa Clara River, the pipeline would be attached to the existing Harbor Boulevard bridge. Normal drainage routes would be kept open during ditching operations.

Individual 40- to 60-foot (12.2- to 18.3-m) lengths of pipe would be strung along the right-of-way, parallel to the centerline. The pipes would be arranged in a manner which would prevent any interference with normal movements through the right-of-way.

The pipeline would conform to the terrain and bottom of the ditch with uninterrupted support. All pipe bends would be made in the field, with the exception of special bends predesigned for use in specific areas. Prior to welding, pipe joints would be swabbed clean of internal contamination. All welding would be conducted in accordance with API requirements and all welds would be radiographically inspected. After completion of welding, the pipeline would be coated to prevent corrosion.

Before the pipeline is lowered into place, the trench would be cleared of any extraneous material, such as rocks and roots, that might damage the pipeline. The pipeline would be lowered into the trench with the use of slings to avoid pressure damage to the coating. Cathodic protection systems would be emplaced after pipeline installation is complete.

Backfilling would follow the lowering-in of pipe as closely as possible. Backfilling material would contain an excess of soil to prevent damage to the pipe coating. After the ditch has been filled to the appropriate level, the fill would be compacted and the ground surface restored to a condition as near as is practicable to that which existed prior to disturbance.

The pipelines would be hydrostatically tested at a pressure of at least 150 percent of the maximum operating pressure. This water would be obtained from Union's existing water supply system at the Union Oil Marine Terminal. Disposal of used test water would be in accordance with applicable regulatory requirements. It is currently anticipated that test water would be discharged into the City of Ventura sewer system.

All pipeline construction would be conducted in accordance with accepted industry standards and all applicable local, state, and federal requirements.

Construction of the onshore pipelines is expected to take 4 calendar weeks. Work would be conducted 5 days per week, in one 10-hour shift per day beginning at approximately 0630. Approximately 35 workers would be involved. The labor skills force distribution is given in Appendix A, Table A-8. Timing of construction activities is shown on Figure 3.3-1.

Quantities of pipe and other construction materials related to onshore pipeline installation are listed in Table 3.3-1. Approximately 50 truck deliveries would be required to transport these materials to the jobsite (2 trips per day average, 4 trips per day peak).

The cost of construction labor for the installation of the onshore pipeline system would be approximately $100,000 (1979 dollars). An additional $400,000 (1979 dollars) would be expended for purchased materials and services, approximately 50 percent of which would accrue to Ventura County contractors and vendors.

Environmental Characteristics: Construction of the onshore pipelines would result in atmospheric emissions from various pieces of diesel-powered equipment, supply trucks, and employee transportation. The atmospheric emissions that would be associated with construction of the onshore pipelines are summarized in Table 3.3-2.

Wastewater and solid waste disposal data are summarized in Table 3.3-3. The only wastewater stream generated during the onshore pipeline construction would be the fresh water used for hydrostatic testing. This water would be discharged into the City of Ventura sewer system which would send this wastewater to the Ventura County Sanitation District treatment plant. All sewage generated during onshore pipeline construction would be collected in chemical toilets. Solid waste generated during onshore pipeline construction would consist of general refuse and vegetative debris. This waste would be sent to an approved dumpsite for disposal.

3.3.4.2 Primary Alternative Configurations

3.3.4.2.1 East Mandalay Alternative Configuration

Onshore pipeline construction would be essentially the same as described above for the proposed Mandalay project configuration should the East Mandalay alternative be chosen.

3.3.4.2.2 Union Oil Marine Terminal Alternative Configuration

The pipeline construction and permanent right-of-way widths would have to be increased to accommodate a greater number of pipelines (see Table 3.3-4) if the Union Oil Marine Terminal alternative were selected. In addition, it would not be possible to attach all the pipelines to the Harbor Boulevard bridge across the Santa Clara River. Therefore, the river crossing would have to be accomplished by trenching across the riverbed. Trenching would be performed within dewatered sections of a sheet pile barrier that would be moved sequentially across the river. The pipelines would be buried approximately 20 feet (6 m) below the surface of the riverbed. Seventy additional construction workers would be required for a 3-month period for construction of this alternative. Fifty of these workers would be needed to make the pipeline river crossing. Twenty of these workers would be needed to construct the required booster station. Otherwise, all construction procedures would be similar to those described for the proposed Mandalay site.

3.3.4.2.3 Ormond Beach Alternative Configuration

The two Platform Gina pipelines from MLLW to the onshore treating facility site would have to cross the entrance to Port Hueneme if the Ormond Beach alternative site were selected. Union indicates that a clamshell dredge would be utilized to dig a trench in the harbor bottom. The pipelines would then be welded together and pulled into the trench. In addition, the construction and permanent right-of-way widths would have to be increased between the site and the Mandalay Beach area for both Options A and B to accommodate the greater number of pipelines (see Table 3.3-4).

The selection of the Ormond Beach alternative Option A pipeline corridor would require an additional 140 construction workers. Eighty of these workers would be needed for 3 months to construct the two booster stations. The onshore pipeline construction would require an additional 60 workers for a 5-month period.

The Option B pipeline corridor would require an additional 160 construction workers. Eighty of these workers would be needed for 5 months to construct the three booster stations. The onshore pipeline construction would require 80 additional workers for an additional 6 months.

3.4 DRILLING

3.4.1 Proposed Mandalay Project Configuration

3.4.1.1 Platform Gina

Drilling Procedures: Union plans to recover hydrocarbon fluids from the Hueneme sand (of the Miocene Rincon Formation) and the Oligocene Sespe Formation. Due to the narrow stratigraphic interval between the two geologic units, all wells would produce from both zones. Reservoir simulation studies and other tests were conducted by Union to determine a strategy for the most efficient development of the two producing zones. Results of these tests indicate that a waterflood program would be necessary to maximize recovery. Careful regulation of reservoir pressure in the Hueneme zone would also be required to maximize combined production from the Hueneme and Sespe zones. Final computer modeling has indicated that a development well pattern consisting of six crude oil producing wells and six water injector wells would maximize recovery from the producing zones. Average bottom depths are expected to be 5,450 feet (1,660 m) for the production wells and 5,750 feet (1,750 m) for the injection wells. Average time to drill and complete each well is estimated to be 27 days. A rig capable of drilling to depths of 12,000 feet (3,660 m) with 4.5-inch (11.4-cm) drill pipe would be used. Additional equipment associated with drilling operations would include a cementing unit and two 1,050 ft^3 (29.7 m^3) capacity cement storage tanks.

Drilling procedures would be in accordance with all applicable requirements, including the Code of Federal Regulations and OCS Orders 2, 5, and 6. Union would submit final detailed plans to the U.S. Geological Survey for approval prior to commencing drilling operations. These plans would outline all drilling activities including well casing and cementing, blowout prevention (see Section 3.6), and the drilling mud program. If appropriate, the U.S. Geological Survey Pacific Area Oil and Gas Supervisor would issue a set of field drilling rules. These rules would be reviewed by the Supervisor at least once each year and changed as necessary to ensure that all wells would be drilled in a manner which would protect the natural resources of the OCS and result in the maximum economic recovery of the mineral resources.

Well schematics and the procedures currently proposed by Union for drilling of production and injection wells are shown in Appendix A, Tables A-10 and A-11, Figures A-8 and A-9.

Drilling crews on Platform Gina would work 8-hour shifts (3 shifts per day) and would be transported by crew boat from Port Hueneme. The crew boat would make 3 round trips per day. Each shift would contain 10 to 15 workers. Supply boats would deliver necessary items on an as-needed basis from Port Hueneme. The materials and supplies required for Platform Gina drilling are summarized in Table 3.4-1. Union estimates that approximately 15 supply boat trips per month would be required. The timing of the drilling program for Platform Gina is shown on Figure 3.3-1. Drilling from Platform Gina will occur for approximately 13 months.

Electrical power requirements during drilling on Platform Gina (approximately 1,500 KVA) would be satisfied using the submerged power cable. Potable water requirements (approximately 100 bbl/day, 16 m^3/day) would be satisfied using water purchased from a commercial supplier and transported to the platform using the supply boat.

Labor costs during the drilling program are estimated to be approximately $2 million (1979 dollars). An additional $11 million (1979 dollars) would be expended for purchased materials and services, approximately 90 percent of which would accrue to Ventura County contractors and vendors.

Environmental Characteristics: Atmospheric emissions associated with well drilling on Platform Gina would result from the operation of various diesel-powered equipment, boats, supply trucks, and employee transportation. The emissions that would occur during drilling on Gina are summarized in Table 3.4-2.

The wastewater and solid wastes that would be generated during drilling on Platform Gina are summarized in Table 3.4-3. The drilling wastes would consist of cuttings and salt water based drilling muds. The return mud would be treated in high speed, dual-screen shale-shakers, desanders, desilters, and a

TABLE 3.4-1

PROPOSED PROJECT ESTIMATED MATERIAL REQUIREMENTS - DRILLING

	Project Element	
Material	Platform Gina	Platform Gilda
Diesel fuel, BBL/day	1	2
Lubricating oil, BBL/day	1	1
Cement, ft^3/well	3000	4400
Drilling mud, ft^3/well	8000	10000
Drilling bits, per well	15	20
Potable water, BBL/day	100	200

TABLE 3.4-2

PROPOSED PROJECT ESTIMATED ATMOSPHERIC EMISSIONS - DRILLING

	Pollutant Emission Rate, pounds/day				
Project Element	SO_2	NO_x (as NO_2)	CO	Particulates	Total Hydrocarbons
Platform Gina	90.4	136	90.7	16.5	18.1
Platform Gilda	208	285	134	35.8	31.9

TABLE 3.4-3

PROPOSED PROJECT ESTIMATED WASTEWATER AND SOLID WASTE GENERATION - DRILLING

Project Element	Effluent Streams		
	Sanitary Sewage, gallons/day	Drilling Cuttings, BBL/day	General Refuse, pounds/day
Platform Gina	360	24	200
Platform Gilda	1000	48	400

degasser before reuse. The separated cuttings (approximately 24 bbl/day, 3.8 m^3/day) would be washed with seawater to remove oil and grease and would be discharged to the ocean. If insufficiently cleaned cuttings are produced, these cuttings would first be transported by boat or barge to Port Hueneme, then transported by truck to a Class I disposal site. Some drilling mud is periodically discharged into the ocean. All ocean discharges would be in accordance with the NPDES permit. All other wastewater and solid wastes would be treated and disposed of using the method outlined in Section 3.3.1.1.

3.4.1.2 Platform Gilda

Union plans to recover hydrocarbon fluids from the Pliocene Repetto and the Miocene Monterey formations. Hydrocarbon accumulations in these two formations would be recovered through separate drilling programs.

The equipment associated with well drilling on Platform Gilda would include two drilling rigs. One rig would be capable of drilling to a depth of 12,000 feet (3,360 m) using 4.5-inch (11.4-cm) drill pipe, and the other would be capable of drilling to a depth of 20,000 feet (6,100 m) using 4.5-inch (11.4-cm) drill pipe. The 12,000-foot (3,360-m) capacity rig would be purchased by Union for use on either Platform Gilda or Platform Gina. The 20,000-foot (6,100-m) rig would be leased from a drilling contractor and would be removed from Platform Gilda at the end of the drilling program. Each rig would have a separate drilling mud system, including mud tanks, mixing pumps, and hoppers. Additional equipment associated with drilling operations would include a cementing unit and four 1,050 ft^3 (29.7 m^3) capacity cement storage tanks.

3.4.1.2.1 Repetto Formation

Drilling Procedures: The Repetto Formation contains two main producing zones. Computer modeling was used to simulate various development schemes to optimize development of these reservoirs. These modeling studies indicate that maximum recovery would be achieved by drilling 40 crude oil production wells on approximately 20-acre (8-ha) spacing. In addition, modeling showed that although some peripheral water injection would be advantageous, full pressure maintenance could reduce recovery. Should the wells initially produce at greater rates than expected, fewer wells on greater spacing would be required. For this reason, initial development drilling would be done on approximately 40-acre (16-ha) spacing, with the earliest wells designed to delineate the field and yield more complete geological and production data. Injection wells would be drilled as required to inject produced water back into the formation. Additional water injection schemes would be analyzed after observing early field performance.

Average bottom depths for the wells are expected to be 6,700 feet (2,040 m). Maximum measured well depth is anticipated to be approximately 11,000 feet (3,350 m). Average time to drill and complete each well is expected to be 35 days. Both drilling rigs would be utilized simultaneously. Because of the unconsolidated nature of the Repetto sands, gravel-packed completions would be necessary for both injectors and producers. The gravel-packed interval would cover all of the Repetto producing zones, and all hydrocarbons produced from the Repetto Formation would be commingled in each well.

Drilling procedures on Platform Gilda would be similar to those used on Platform Gina. The requirements for the drilling program are specified in Section 3.4.1.1. Procedures currently proposed by Union for drilling of production and injection wells are shown in Appendix A, Table A-12. Typical well schematic diagrams are also shown in Appendix A, Figure A-10.

Drilling crews would work 8-hour shifts (3 shifts per day) and would be transported by crew boat from Port Hueneme. The crew boat would make 3 round trips per day. Day shifts would contain 20 to 25 workers and night shifts 16 to 21 workers. Supply boats would deliver necessary materials and supplies from Port Hueneme on an as-needed basis. Union estimates that approximately 15 supply boat round trips per month would be required. The timing of the drilling program for Platform Gilda is shown on Figure 3.3-1. Drilling into the Repetto Formation would occur for approximately 54 months.

Electrical requirements during drilling into the Repetto Formation (approximately 3,500 KVA) would be satisfied using the submerged power cable. Potable water requirments (approximately 200 bbl/day, 32 m^3/day) would be satisfied using water purchased from a commercial supplier and transported to the platform using the supply boat.

Labor costs during the Repetto Formation drilling phase are estimated by Union to total approximately $16 million (1979 dollars). An additional $80 million (1979 dollars) would be expended for purchased materials and services, approximately 90 percent of which would accrue to local contractors and vendors within Ventura County.

Environmental Characteristics: Atmospheric emissions associated with well drilling on Platform Gilda would result from the operation of various diesel-powered equipment, boats, supply trucks, and employee transportation. The emissions that would occur during Repetto Formation production well drilling from Platform Gilda are summarized in Table 3.4-2.

The wastewater and solid wastes that would be generated during Repetto Formation production well drilling from Platform Gilda are summarized in Table 3.4-3. The nature and disposition of these wastes, including drill cuttings and mud, would be the same as those described for Platform Gina (see Section 3.4.1.1).

3.4.1.2.2 Monterey Formation

Drilling Procedures: Fractured zones within the Monterey Formation on lease OCS P-0216 have yielded measurable quantities of hydrocarbon fluids during limited testing. Since currently available data are limited, no significant determination of reservoir characteristics and performance has been made. For this reason, further test drilling from Platform Gilda would be required to evaluate and optimize development of this formation.

Test drilling of the Monterey Formation would be performed as an extension of the Repetto Formation production well drilling program. The same labor force, drilling equipment, and support facilities would be utilized. Union indicates that a minimum of three test wells would be drilled. Additional drilling would be contingent upon the discovery of commercially recoverable quantities of hydrocarbon fluids within the Monterey Formation underlying lease OCS P-0216.

The average time to drill each test well is expected to be 45 days. If commercially developable accumulations of hydrocarbons are discovered during drilling, the test well would be placed in production. Otherwise, the well would be plugged and abandoned in conformance with U.S. Geological Survey regulations.

Should Union determine during test drilling that sufficient recoverable reserves exist in the Monterey Formation, the following drilling program would be implemented.

As many as 30 wells could be drilled on 40-acre (16-ha) spacing to develop the Monterey producing zone(s). Treated produced gas probably would be injected to maintain reservoir pressure. There are currently no plans to inject produced water. Average bottom depths are expected to be 9,700 feet (2,955 m) vertical depth. Maximum measured well depth is anticipated to be approximately 16,000 feet (4,875 m).

Drilling procedures would be in accordance with all applicable requirements, and would be subject to U.S. Geological Survey approval as described previously for the Platform Gina and Platform Gilda Repetto Formation development programs. Procedures currently proposed by Union for drilling of production and injection wells are listed in Appendix A, Table A-13. A schematic diagram of a typical completed production or injection well is also shown in Appendix A, Figure A-11.

The drilling crew used for the Monterey Formation drilling would be the same crew that would be used for the Repetto Formation drilling. This work force is described in Section 3.4.1.2.1. The test drilling program into the Monterey Formation would require approximately 6 months. If production drilling is shown feasible, this effort would require an additional 12 months. The timing of the Monterey drilling program is shown on Figure 3.3-1.

Consumable supplies needed for Monterey drilling are summarized in Table 3.4-1. Supply boats would deliver necessary materials and supplies from Port Hueneme on an as-needed basis. Union estimates that approximately 15 boat trips per month would be required.

Electrical requirements during Monterey Formation drilling (approximately 2,000 KVA) would be satisified using the submerged power cable. Potable water requirements (approximately 200 bbl/day, 32 m^3/day) would be satisfied using water purchased from a commercial supplier and transported to the platform using the supply boat.

Labor costs during the Monterey formation drilling phase are still speculative, but are estimated by Union to total approximately $1.5 million per well (1979 dollars). Up to an additional $3 million (1979 dollars) could be expended for purchased materials and services, approximately 20 percent of which would accrue to local contractors and vendors within Ventura County.

Environmental Characteristics: Atmospheric emissions that would be associated with well drilling in the Monterey Formation result from the operation of various diesel-powered equipment, boats, supply trucks, and employee transportation. The emissions that would occur during Monterey Formation drilling from Platform Gilda are summarized in Table 3.4-2.

The wastewater and solid wastes that would be generated during Monterey Formation drilling from Platform Gilda are summarized in Table 3.4-3. The nature and disposition of these wastes would be the same as described for Platform Gina (refer to Section 3.4.1.1).

3.4.2 Primary Alternative Configuration

The selection of any of the primary alternative configurations would not change the drilling program on Platform Gina or Platform Gilda.

3.5 PRODUCTION

3.5.1 Platforms

3.5.1.1 Proposed Mandalay Project Configuration

3.5.1.1.1 Platform Gina

General Characteristics: Union proposes to develop oil and gas from the Hueneme sand and Sespe Formation underlying leases OCS P-0202 and OCS P-0203 using six production and six injection wells drilled from Platform Gina. Exploratory drilling has indicated that the Hueneme sand would produce 15.4° API crude oil with a gas:oil ratio of approximately 87 standard cubic feet per barrel (SCF/bbl). Exploratory drilling has indicated that the Sespe Formation would produce 14.1° API crude oil with a gas:oil ratio of approximately 152 SCF/bbl.

Overall, Union estimates that Platform Gina would produce 15.5° to 16.0° API crude oil with a gas:oil ratio of approximately 200. Peak oil production from both producing zones is estimated to be 6,450 barrels of oil per day (BOPD), with over 90 percent of this rate from the Hueneme sand. Ultimate estimated recovery would be 9.5 million bbl (1.5 million m^3) of oil and 1.7 billion SCF (48 million m^3) of gas during the field lifetime of 18 years. The expected oil, gas, and water production rates from the Hueneme sand and Sespe Formation over the lifetime of the project are shown on Figure 3.5-1. Hueneme sand oil and gas compositions are shown in Appendix A, Tables A-14 and A-15.

Union anticipates that two full-time production personnel per shift would be required to operate Platform Gina on a 24-hour per day basis. Three shifts per day are planned. In addition to permanent operating personnel, Union expects that up to 15 persons would be used approximately 1 month each year to service the wells. Workers would be transported to Platform Gina on the crew boat. Supply boat trips would be made on an as-needed basis. Port Hueneme would serve as the operations center for all vessel movements related to Platform Gina production and maintenance.

Materials needed during production on Platform Gina are summarized in Table 3.5-1. Electrical power required during production on Platform Gina (approximately 500 KVA) would be satisfied using the submerged power cable. Potable water requirements (approximately 100 gallons/day, 380 L/day) would be supplied using a commercial supplier and transported to the platform using the supply boat.

Union estimates that the total labor costs over the lifetime of the production phase would be approximately $1.7 million (1979 dollars). An additional $9.3 million would be expended for purchased materials and services. Approximately 60 percent of the latter would accrue to local vendors and contractors within Ventura County. The value of Platform Gina upon completion would be $12 million (1979 dollars).

Process Flow: The fluid produced at Platform Gina would be a mixture of crude oil, natural gas, and water. This fluid would be pumped from the formations using submersible electric pumps and sent directly via pipeline to the onshore treating facility without separation or treatment at the platform. Union indicates that because of the physical properties of the oil, the gas must be kept in the fluid state to reduce the viscosity of the mixture and thereby reduce the energy required to pump the liquid onshore. The natural gas is kept in solution by maintaining the fluid pressure at a level above the fluid bubble point. The bubble point of the Platform Gina fluid is approximately 2,050 psia at 140°F (14,135 kPa at 60°C). For this reason, the fluid pumps on Platform Gina would maintain the fluid pressure at approximately 2,100 psia (14,480 kPa).

The producing reservoir pressure would be maintained by injecting water into the formations. Water injection would begin immediately. The injection rates would be maintained at 1,250 bbl/day (200 m^3/day) per well (7,500 bbl/day (1,200 m^3/day) total water injection rate). This injection rate would maintain a pressure of 2,140 psia (14,755 kPa) in the Hueneme sand and 2,250 psia (15,515 kPa) in the Sespe formation.

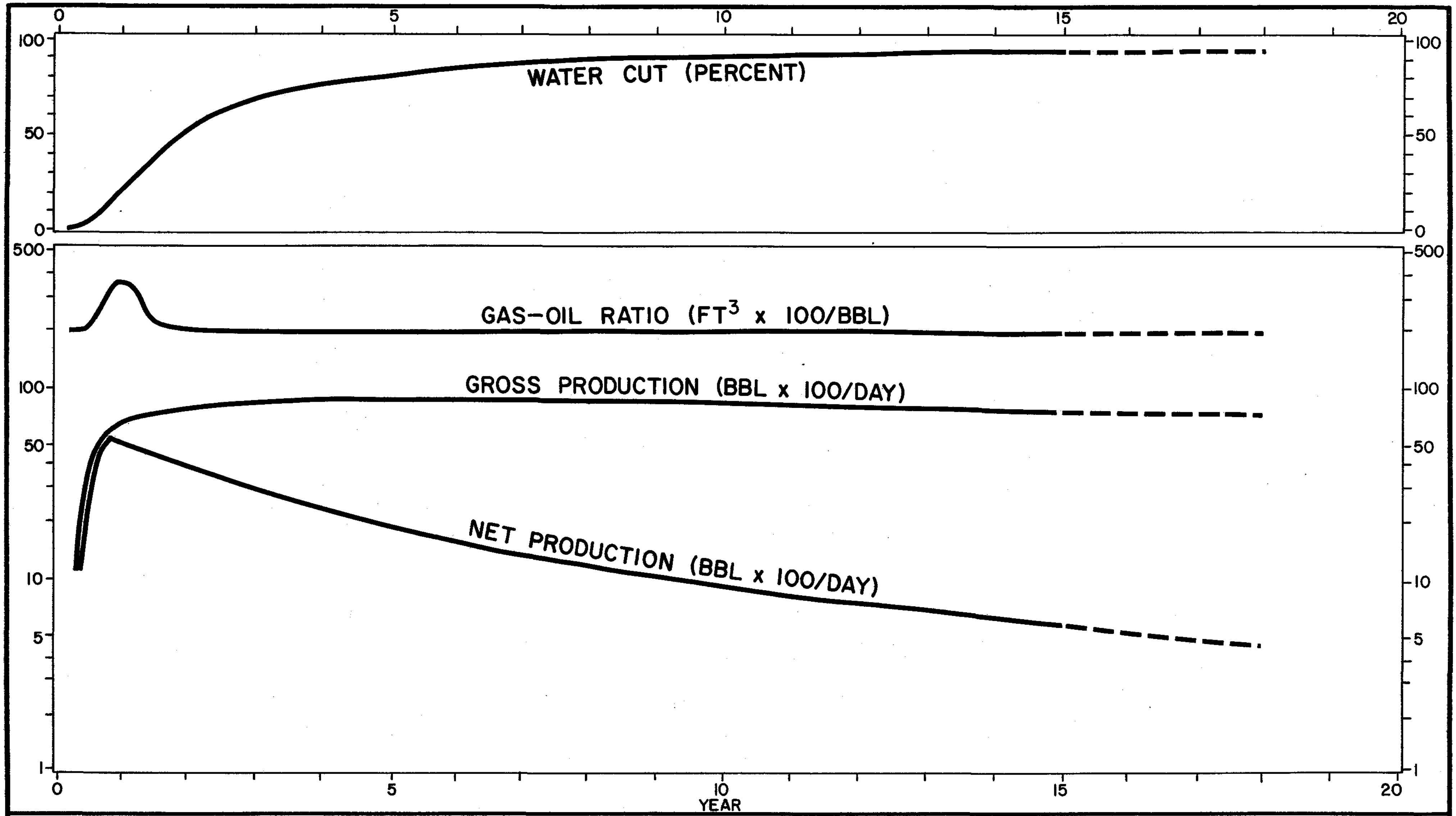

FIGURE 3.5-1

ANTICIPATED PRODUCTION SCHEDULE FOR PLATFORM GINA

REFERENCE: MODIFIED FROM UNION OIL COMPANY DRAWING

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TABLE 3.5-1

PROPOSED PROJECT ESTIMATED MATERIALS REQUIREMENTS - PRODUCTION

	Project Element		
Material	Platform Gina	Platform Gilda	Onshore Treating Facility
Diesel fuel, gallons/year	10000	20000	(a)
Potable water, gallons/day	100	400	2
Natural gas, 10^3 SCF/day	(a)	400 (b) (c)	770 (d)

(a) None required

(b) Required for production from the Monterey Formation

(c) Supplied by Platform Gilda production

(d) Supplied by Platform Gina and Platform Gilda production

The primary source of injection water would be the water separated from the produced fluid. This produced water separated from both the Platform Gina and Platform Gilda fluids at the onshore treating facility would be pumped to the platform. In addition to injecting produced water, Platform Gina would be equipped with facilities to inject seawater into the formations. Initial seawater injection rates would be approximately 7,500 bbl/day (1,200 m^3/day) of water.

The seawater intake would consist of a 12-3/4-inch (32-cm) outside-diameter (OD) pipe attached to the platform with the intake at a level approximately 70 feet (21.4 m) below the water surface (MLLW). The intake pipe would have twenty-eight 0.25-inch (0.625-cm)-wide by 6-inch (15-cm)-long slots to prevent the entrainment of large marine organisms. The seawater would flow through sand filters and then through a vacuum deaerator for oxygen removal. The residual oxygen in the seawater would then be chemically removed using an oxygen scavenger prior to injection of the water into the producing formation. Oxygen removal is necessary for corrosion control.

The need for the seawater intake/injection system would diminish through the life of the project due to the increased water production at Platform Gina and Platform Gilda. Initially, the combined water production rate from Platforms Gina and Gilda would not satisfy the water injection requirements of Platform Gina. During this period, additional water injection required would be accomplished using seawater.

The total amount of produced water would increase over the life of the project. After approximately 3 years of production at Platform Gina and 3 years of production at Platform Gilda, the produced water volume would be sufficient to eliminate the need for the seawater system. Excess produced water would then be reinjected into the Repetto Formation at Platform Gilda.

Environmental Characteristics: Atmospheric emissions during production operations on Platform Gina would result from the use of various diesel-powered equipment as well as from miscellaneous pump and valve seal fugitive hydrocarbon emissions, boats, supply trucks, and employee transportation. The estimated emission rates that would occur during production on Platform Gina are summarized in Table 3.5-2.

The wastewater effluents and solid waste streams that would be generated during production on Platform Gina are summarized in Table 3.5-3. Deck drainage that is contaminated with oil would be contained on the platform. This contaminated water stream would be pumped via the oil/water/gas pipeline to the onshore treating facility. The oily water stream would then be treated in the onshore oil/water separation equipment.

The sanitary sewage generated on the platform would be treated in a Microphor Marine Sanitation Device or its equivalent. This device treats the sewage with an aerobic process, then chlorinates the effluent before it would be relayed into the ocean through a pipe whose discharge point would be located at -80 feet (-24.4 m) MLLW. The Microphor Unit is certified by the U.S. Coast Guard. Any solids leaving this unit would be sent to shore by boat and disposed of at an approved dumpsite.

Produced water would be pumped to shore with the produced oil and gas. After separation and treatment at the onshore treating facility (see Section 3.5.3.1), the produced water would be pumped back to the platform for injection into the producing zones.

General refuse generated during production would be packaged in appropriate containers and transported to shore on the crew boat for eventual disposal at an approved onshore dump site.

3.5.1.1.2 Platform Gilda

General Characteristics: Union proposes to develop oil and gas from the Repetto Formation and, potentially, the Monterey Formation underlying lease OCS P-0216. Fifty of the well slots on Platform Gilda would be used to develop the petroleum fluids from the Repetto Formation, whereas 30 well

TABLE 3.5-2

PROPOSED PROJECT ESTIMATED ATMOSPHERIC EMISSIONS - PRODUCTION

Project Element	Pollutant Emission Rate, pounds/day				
	SO_2	NO_x (as NO_2)	CO	Particulates	Total Hydrocarbons
Platform Gina	31.6	63.2	20.6	5.5	7.9
Platform Gilda					
Repetto Formation production	120.2	17.4	39.6	19.5	165
Repetto plus Monterey Formation production	121	391	85.6	25.1	238
Onshore Treating Facility	29.2	101.6	16.9	13.0	148.9

TABLE 3.5-3

PROPOSED PROJECT WASTEWATER AND SOLID WASTE GENERATION - PRODUCTION

	Effluent Streams			
Project Element	Deck Drainage, gallons/day	Sanitary Sewage, gallons/day	Produced Water, gallons/day	General Refuse, pounds/day
Platform Gina	50	50	2000(a)	10
Platform Gilda	100	100	0(a)	10
Onshore Treating Facility	(b)	(c)	70(d)	(c)

(a) Initial volume

(b) Minimal amounts anticipated.

(c) Sanitary sewage collected in chemical toilets.

(d) Sand, sludge and untreatable oil collected (approximately 50 BBl/month).

slots would be reserved for potential development of oil and gas from the Monterey Formation. The Monterey Formation production potential and reservoir characteristics would be established using an initial test program.

Exploratory drilling has indicated that the expected initial production rate from the Repetto Formation would be approximately 400 BOPD (64 m^3/day) per well with a gas:oil ratio of approximately 400 SCF/bbl. The peak production rate from the Repetto Formation is expected to be approximately 18,000 BOPD (2,880 m^3/day). The ultimate estimated recovery in 20 years from the Repetto Formation is estimated by Union to be 43 million bbl (6.9 million m^3) of crude oil and 40 billion SCF (1.1 billion m^3) of natural gas. Analyses of oil and gas samples from the Repetto Formation are shown in Appendix A, Tables A-16 and A-17. The expected oil, gas, and water production rates from the Repetto Formation over the lifetime of the project are shown on Figure 3.5-2. The combined oil, gas and water production rates from both Platforms Gina and Gilda are shown on Figure 3.5-3.

Peak oil recovery rates from the Monterey Formation have been estimated by Union to be approximately 8,000 bbl/day (1,280 m^3/day) with a gas:oil ratio of approximately 1,000 SCF/bbl. Ultimate oil and natural gas recovery estimates from the Monterey Formation have not been made. Conventional and sidewall core samples taken from this formation indicate that the extent of rock fracturing varies areally, but no distinct pattern has developed on this lease (OCS P-0216). The exact number of wells to be drilled into the Monterey Formation cannot be determined at this time because the extent of this fracture system is not known. Union estimates that a maximum of 30 wells on 40-acre (16-ha) spacing could be drilled to fully develop this reservoir. The development of the Monterey Formation could increase the life of Platform Gilda and the onshore treating facility by 5 years.

Production operations on Platform Gilda would be performed on a 24-hour per day basis utilizing three 8-hour work shifts. Two production personnel and one foreman would be needed per shift. In addition, approximately

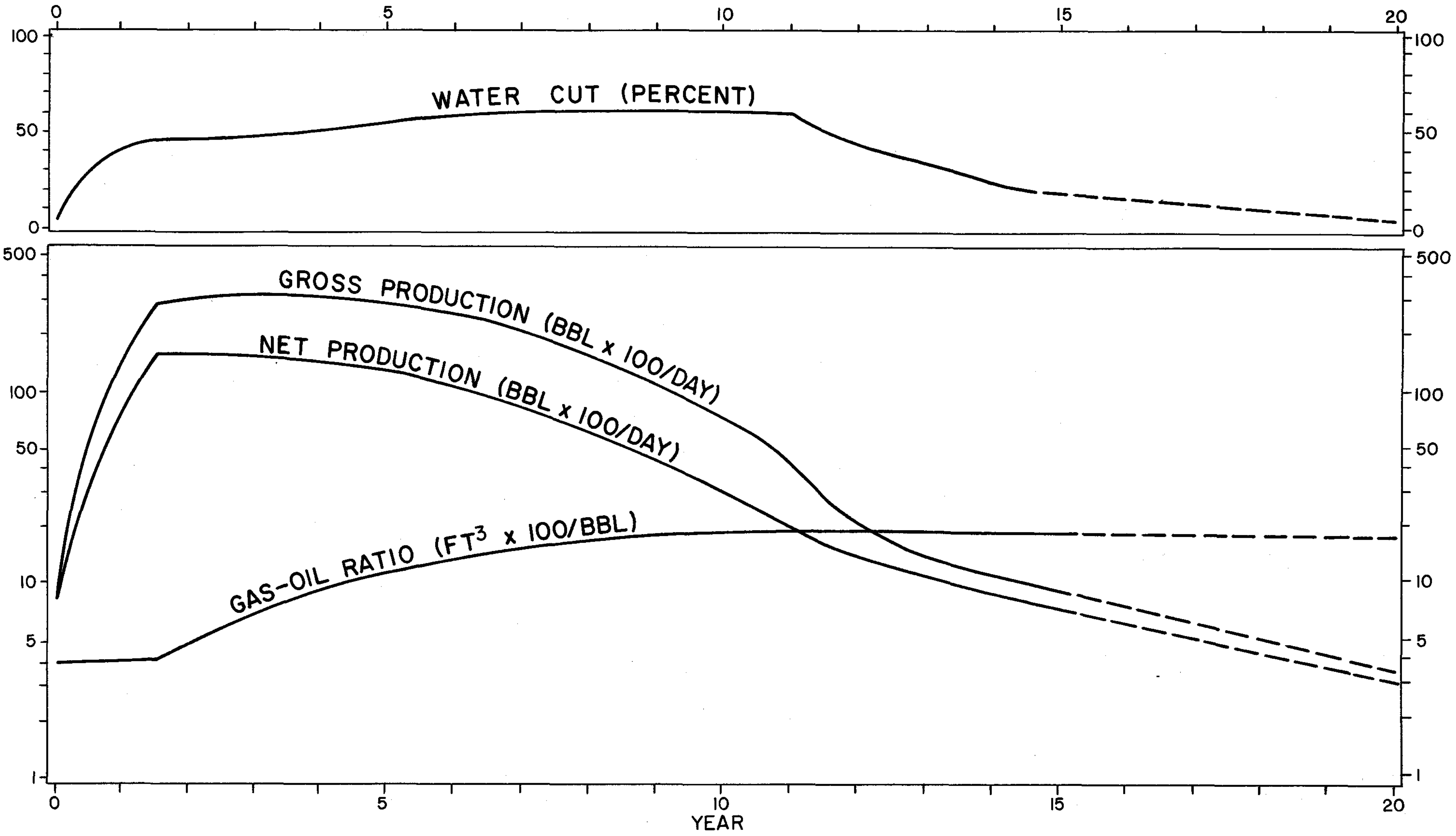

FIGURE 3.5-2

ANTICIPATED PRODUCTION SCHEDULE FOR PLATFORM GILDA — REPETTO FORMATION

REFERENCE: MODIFIED FROM UNION OIL COMPANY DRAWING

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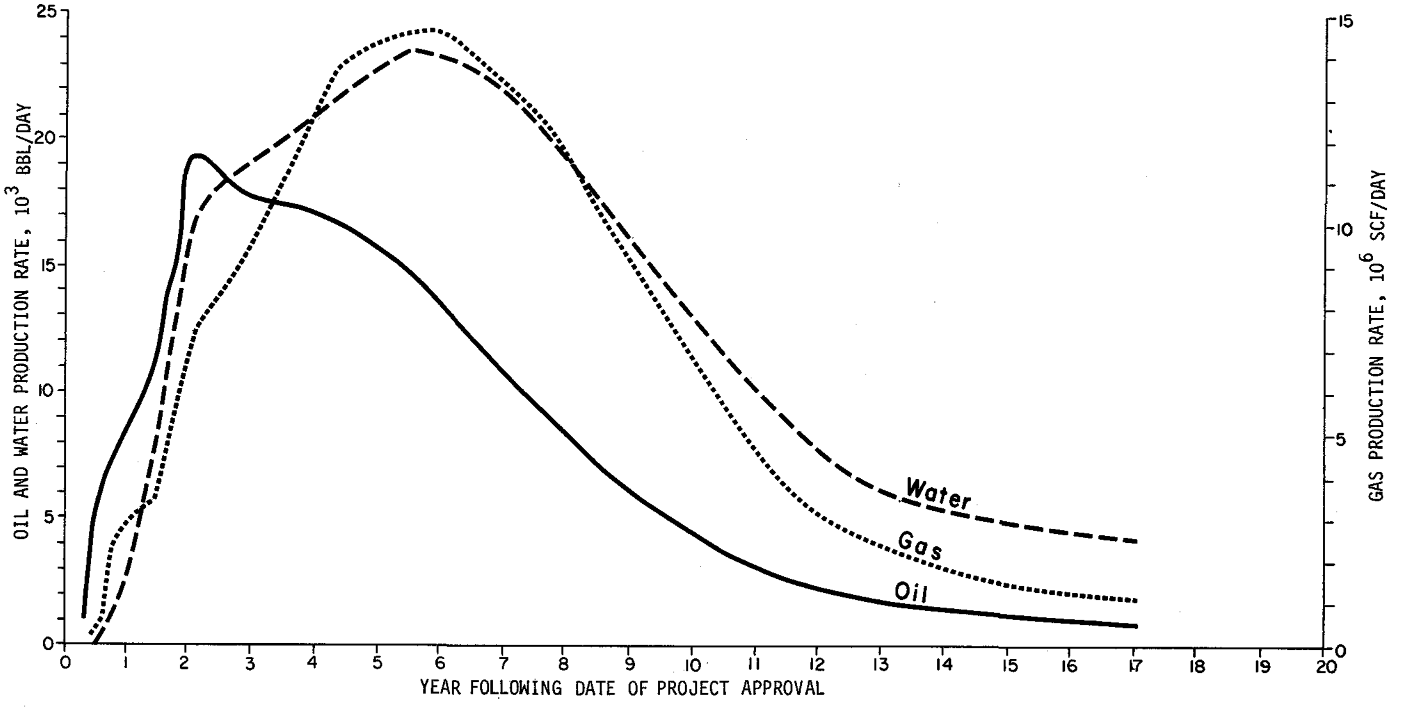

FIGURE 3.5-3

COMBINED OIL, GAS, AND WATER PRODUCTION SCHEDULE FOR THE PROPOSED PLATFORM GINA AND PLATFORM GILDA PROJECT

NOTE: POTENTIAL PRODUCTION FROM THE MONTEREY FORMATION IS NOT INCLUDED IN THE PRODUCTION CURVES.

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15 persons would be used on an irregular basis for servicing the wells. Personnel would be transported to and from the platform on a daily basis by a crew boat operating out of Port Hueneme. Materials required during production on Platform Gilda are summarized in Table 3.5-1.

Electrical power required during production on Platform Gilda (approximately 2,000 KVA) would be satisfied using the submerged power cable. Potable water requirements (approximately 10 bbl/day, 1.6 m^3/day) would be supplied by a commercial supplier and transported to the platform using the supply boat.

The cost of labor over the 20-year production lifetime of Platform Gilda would total approximately $16.3 million (1979 dollars). An additional $85 million would be expended for purchased materials and services, of which approximately 40 percent would be spent within Ventura County. These estimates include costs associated with potential production from the Monterey formation. The value of Platform Gilda upon completion would be $30 million (1979 dollars).

Process Flow: The fluid from the wellheads on Platform Gilda would first flow to a header system linking all of the wells associated with either Repetto or Monterey production. Each header system would be connected to the test separator and the gross separator. The test separator would be used to measure the production rates of individual wells and the gross separator would be used for the production separation of the natural gas from the crude oil/water stream. The crude oil/water/natural gas fluid from the Monterey Formation would be treated in a separate gas separation unit. The process flow on Platform Gilda is shown in Appendix A, Figure A-12.

The crude oil/water stream leaving either the test or gross separator would flow to the shipping surge tank. Produced crude oil/water from the Repetto and Monterey formations would be commingled in the surge tank. The shipping pumps would transfer the oil/water stream from the surge tank via the pipeline to the onshore treating facility after passing through a transfer meter.

The water content of the produced fluids from the Repetto Formation is anticipated to increase over the life of the project. Union estimates that the water content would reach 20 percent by 1985 based on the current development schedule. Union would leave space on Platform Gilda for the possible future addition of a free water knock out (FWKO) vessel and an induced gas flotation (IGF) unit.

The FWKO would result in a gross oil/water separation occurring on the platform. The separated water would then flow to the IGF unit where its oil content would be further reduced. The oil leaving this system would flow to the surge tank where it would be pumped onshore for further treatment. The separated water leaving this system would be injected into the producing formation.

The natural gas produced at the platform would be dehydrated and then sent to the onshore treating facility. The gas would flow from the various well annuli and from the test separator, gross separator, and shipping tank. The collected gas would then be compressed and dehydrated. The gas treatment would be accomplished using a gas scrubber and a refrigeration-type dehydration unit. The processed gas would then be transmitted to the onshore facility.

Additional processing of the produced natural gas would be required if hydrogen sulfide (H_2S) is present. Tests of Monterey Formation natural gas from an adjacent OCS lease show H_2S concentrations varying from 0 to 3,000 ppmv. If present, H_2S would be removed using the Stretford process. This process produces a high purity elemental sulfur product. Sulfur produced on Platform Gilda would be transported to shore by boat for sale. A process flow diagram of the Stretford process is shown in Appendix A, Figure A-13.

All produced gas from the Monterey Formation may be injected into the formation using two natural gas-fired turbine compressors. The current platform design shows space for the possible future installation of these compressors. The natural gas fuel used in these units would be either Repetto or treated Monterey gas. Union has indicated that gas injection into the Monterey Formation might be desirable to achieve maximum hydrocarbon recovery.

The major difference between the process flow on Platform Gilda and that on Platform Gina is the natural gas separation on Platform Gilda. The natural gas is not separated on Platform Gina because its presence greatly reduces the fluid viscosity and, therefore, greatly reduces the power required to pump the Gina fluid to the onshore site. The produced fluid at Platform Gilda has a lower viscosity than the Platform Gina fluid and therefore requires less pumping pressure. The separated natural gas and resulting oil/water stream would flow to the onshore treating facility in separate pipelines from Platform Gilda.

Environmental Characteristics: Atmospheric emissions during production on Platform Gilda would result from the use of various diesel-powered equipment and miscellaneous pump, valve, and tank seal fugitive hydrocarbon emissions, boats, supply trucks, and employee transportation. In addition, the development of the Monterey Formation may require the use of two natural gas-fired turbine compressors. The atmospheric emissions associated with this equipment are summarized in Table 3.5-2.

The wastewater effluents and solid waste streams that would be generated during production on Platform Gilda are summarized in Table 3.5-3. The nature and disposition of these waste materials, except for produced water, would be the same as those described for Platform Gina (Section 3.5.1.1.1). All produced water from Platform Gilda, after treatment at the onshore facility, would be used for injection at Platform Gina until the combined total from both platforms equals approximately 7,500 bbl/day (1,193 m^3). After this volume has been reached, operation of the seawater intake system on Platform

Gina would be discontinued, and the excess produced water from Platform Gilda would be injected into the Repetto Formation.

3.5.1.2 Primary Alternative Configurations

The selection of any of the primary alternatives to the proposed project configuration would not result in major changes in the design or operation of either Platform Gina or Platform Gilda.

3.5.2 Offshore Pipelines

3.5.2.1 Proposed Mandalay Project Configuration

3.5.2.1.1 Platform Gina

The following offshore pipeline peak flow rates would result from production on Platform Gina:

10.75-inch OD oil line	7,500 bbl/day (1,200 m^3/day) crude oil/water/natural gas mixture
6.625-inch OD water line	7,500 bbl/day (1,200 m^3/day) water

The fluid flow would be volumetrically monitored to provide for early detection of possible leaks or ruptures. The U.S. Geological Survey requires surveillance of the pipeline route at least once every 7 days. Union would perform the surveillance using people on the crew boat.

The value of the offshore pipelines from Platform Gina upon completion would be $2 million (1979 dollars). About $100,000 (1979 dollars) in labor and $500,000 (1979 dollars) for purchased materials and services would be required for maintenance of the offshore pipeline system from Platform Gina during the project lifetime. Approximately 40 percent of the purchased materials and services would accrue to local vendors and contractors within Ventura County.

The skin temperature of the oil pipeline leaving the platform would be approximately 130°F (54°C). The skin temperature of this pipeline is expected to decrease to ambient seawater levels within approximately 1,000 feet (305 m) of the platform.

3.5.2.1.2 Platform Gilda

The peak flow rates through the offshore pipeline system associated with Platform Gilda would be as follows:

12.75-inch OD oil line	28,000 bbl/day (4,480 m^3/day) oil/water mixture
10.75-inch OD gas line	19 MMSCF/day (0.54 million m^3/day) natural gas
6.625-inch OD reinjection water line	15,000 bbl/day (2,400 m^3/day) water

The flow of fluids would be volumetrically monitored and the pipeline periodically inspected as described for Platform Gina (Section 3.5.2.1.1).

The value of the offshore pipelines from Platform Gilda upon completion would be $4 million (1979 dollars). Union estimates that $400,000 (1979 dollars) in labor and $1.6 million (1979 dollars) for purchased materials and services would be required for maintenance of the offshore pipeline system from Platform Gilda during the project lifetime. Approximately 40 percent of purchased materials and services would be procured from Ventura County contractors and vendors.

The skin temperature of the oil pipeline leaving the platform would be about 130°F (54°C). It is expected that the skin temperature of this pipeline would decline to ambient seawater temperature within approximately 1,000 feet (305 m) of the platform.

3.5.2.2 Primary Alternative Configurations

Details given above for the proposed offshore pipeline system are generally applicable to the three primary alternative project configurations. The selection of the Ormond Beach alternative would result in an offshore pipeline corridor to/from the onshore treating facility and Platform Gina that is 2.5 miles shorter.

3.5.3 Onshore Treating Facility

3.5.3.1 Proposed Mandalay Project Configuration

General Characteristics: The function of the onshore treating facility would be to separate the fluids produced at platforms Gina and Gilda into crude oil, natural gas, and water streams. The separated crude oil and gas would be sent to customers via onshore pipeline systems. The separated water would be sent back to the platforms via the offshore pipeline system return water pipelines.

The onshore treating facility is being designed to operate essentially unattended. Union personnel would periodically visit the site. Union estimates that the maintenance labor cost would approach $2 million (1979 dollars) over the lifetime of the facility. The cost for purchased materials and services would amount to about $4 million (1979 dollars) over a period of approximately 20 years. Almost all of the latter would accrue to Ventura County contractors and vendors. The value of the onshore treating facility upon completion would be about $6 million (1979 dollars).

Electrical power requirements during the operation of the onshore treating facility (approximately 500 KVA) would be satisfied using power purchased from SCE. Natural gas requirements (approximately 280 million SCF/year, 7.9 million m^3/year) would be satisfied using treated produced gas. Potable water for maintenance personnel would be purchased on an as-needed basis from a local supplier.

Process Flow: A process flow diagram of the proposed onshore treating plant is shown in Appendix A, Figure A-14. The oil/water entering the facility would flow through one of two pig receivers. One pig receiver would serve the 12.75-inch pipeline from Platform Gilda and the other would serve the 10.75-inch pipeline from Platform Gina. (Pigs are small, solid objects used to clean the inside of the pipeline. They are designed to have a diameter approximately equal to the inside diameter of the pipe. They are inserted into the pipe at the platform and are pushed by the pumping oil to the onshore pig receivers. When they pass through the pipeline, they scrape its interior clean.)

The fluids leaving the pig receivers would be sent to a three-phase separator. This separator would split the fluid into three streams, one containing primarily natural gas, one containing water, and one containing primarily oil. The oil stream leaving this unit flows to a heater treater where heat is used to break the oil/water emulsion contained in this stream. The heat required would be provided by the combustion of natural gas produced from the platforms.

The oil stream entering the heater treater first passes to the economizer section where the hot (approximately 800°F, 427°C) combustion gases are used to preheat the oil. After preheating in the economizer, the oil flows to a FWKO where the water present in the fluid is separated from the oil. The oil stream from this unit enters the radiant section of the heater treater for further heating and additional oil/water separation. The separated oil flows to a shipping tank and then through the Lease Automatic Custody Transfer (LACT) unit before it is sent to the onshore pipeline distribution system.

The water separated from the oil at the onshore site would be collected in the wash tank and subsequently treated in an IGF cell. The primary purpose of the IGF unit is to reduce the oil content of the water. In the IGF unit, small natural gas bubbles are mixed with the oily water stream. The gas bubbles promote oil/water separation by assisting the oil particles present to rise to the surface and separate from the water. The separated oil collected from both the IGF unit and the wash tank would be treated in either a small heater treater or sent to the main treating system. Separated water would be pumped back to the platforms for injection into the producing formations.

Natural gas from the Platform Gilda pipeline and from the onshore processing vessels would be gathered, dehydrated and compressed to pipeline pressure. All onshore processing vessels would vent into this gas system. The dehydration of this gas is necssary to meet the pipeline specifications of the gas. These specifications are shown in Appendix A, Table A-18. The process used for gas dehydration would involve a freon refrigeration cycle to cool the gas until the water present condenses and separates. The water removed from the gas would be sent to the wash tank. Hydrocarbons separated in a gas scrubber would be sent to the oil storage tank where they would mix with the produced oil prior to shipment.

Environmental Characteristics: Atmospheric emissions during the operation of the onshore treating facility would be primarily the result of natural gas combustion in the equipment used to separate the crude oil from produced water and employee transportation. The emissions associated with operation of the onshore treating facility are summarized in Table 3.5-2.

Any sanitary wastes at the onshore treating facility site would be collected in portable chemical toilets. The contents would be emptied at regular intervals by a licensed subcontractor, and the contents disposed of by methods approved by local regulatory agencies.

Any general refuse generated during the operation of the onshore treating facility would be collected in suitable containers and periodically hauled to an appropriate onshore disposal facility by a local waste disposal service.

Approximately 50 barrels (8 m^3) per month of sand, sludge, and untreatable oil would be collected in the vacuum-sealed sump at the onshore treating facility site. Each month, the contents of the sump would be pumped into a vacuum-sealed tank truck for transport to and disposal at a Class I disposal facility. Wastewater and solid waste streams generated during operation of the onshore treating facility are summarized in Table 3.5-3.

3.5.3.2 Primary Alternative Configurations

The description of the onshore treating facility presented in Section 3.5.3.1 is equally applicable to the three primary alternative sites (East Mandalay, Union Oil Marine Terminal, and Ormond Beach).

3.5.4 Onshore Pipelines

The purpose of the proposed onshore pipelines is to convey the produced fluids both between the onshore treating facility and the MLLW level (to/from both platforms) and the product crude oil and natural gas to existing distribution systems in the Ventura County area.

3.5.4.1 Proposed Mandalay Project Configuration

The onshore pipeline system would be buried and would require minimal maintenance over the production phase of the project. The pipeline corridors would be visually inspected at regular intervals, and the lines subjected to pressure and cathodic protection tests as required by federal and state regulations.

Union estimates that onshore pipeline maintenance labor costs over the life of the project would be approximately $100,000 (1979 dollars). A like amount would be expended over the production lifetime of the project for purchased materials and services. The value of the onshore pipelines (oil and gas) upon completion would be approximately $0.5 million (1979 dollars).

3.5.4.2 Primary Alternative Configurations

Maintenance procedures for the onshore pipeline systems associated with the East Mandalay, Union Oil Marine Terminal, and Ormond Beach alternatives would be the same as those described for the proposed project configuration. The principal differences in the systems would be related to differences in the locations of the onshore pipeline corridors (see Section 3.1.3) and pipeline lengths (see Table 3.2-1).

The selection of the Union Oil Marine Terminal or Ormond Beach alternative would require that the onshore pipeline system include booster stations to provide the additional energy necessary to pump the produced fluids the additional distances involved. The onshore pipeline system changes resulting from the selection of either of these alternatives are summarized in Table 3.5-4.

TABLE 3.5-4

ALTERNATIVE ONSHORE PIPELINE SYSTEMS

Onshore Characteristic	Onshore Treating Facility Site Mandalay	East Mandalay	Union Oil Marine Terminal	Ormond Beach Option A	Option B
Pipeline length, miles	3.7	4.6	15.0	44.7	79.0
Electrical Energy Requirements, KVA	500	500	820	1470	2090
Number of Booster Stations Required	None	None	1	2	3
Fuel Required, Million BTU/HR	36	36	54	72	90
Value on Completion, Million dollars	0.5	0.5	15.5	24.6	30.7

3.6 SAFETY PROCEDURES AND PRACTICES

3.6.1 Process Control

Overall safe operation of this project would be accomplished using the following types of control equipment:

- High/Low temperature sensors (alarms and shutdown)
- High/Low pressure sensors (alarms and shutdown)
- High/Low liquid level sensors (alarms and shutdown)
- Pressure safety valves
- Vibration sensors (alarms and shutdown)
- Combustable gas detectors (alarms and shutdown)
- Flame detectors (alarm and shutdown)

All of these safety shutdown devices would be connected to central control panels on the platforms. If a malfunction were to occur, an alarm would be sounded. The platform would be shutdown if the malfunction could not be immediately corrected. Shutdown of the platforms would be accomplished by closing the surface-controlled subsurface safety valves and surface-controlled surface safety valves. The platforms are capable of shutting down completely in 15 seconds.

The pipelines leaving the platforms would be equipped with automatic shutdown valves, flow safety valves, and high and low pressure sensors. Volume sensors connected to a computer would initiate automatic pipeline shutdown if 15-minute or 2-hour integrated flow rates deviated by more than a preset threshold valve. Abnormal pressure sensor readings could also initiate closure of the shutdown valves. The shutdown valves would be capable of closing within approximately 20 seconds of the receipt of an activation signal.

In addition to these controls Platform Gilda would be equipped with an emergency vent system. The emergency vent system would consist of a gas scrubber and a vent stack. The gas scrubber would be a mechanical separation device that would allow entrained liquids to separate from the vented gas. The gas vent stack would allow the collected vapors to vent to the atmosphere during a malfunction or emergency. This stack would be equipped with electric pilots to ignite the vented gasses.

3.6.2 Fire Protection

Fire detection and suppression equipment is provided as an integral part of the proposed platform design. Firewater used on both platforms would be seawater. The firewater system would be supplied with an electric-powered firewater pump. Backup to this system would be supplied using a diesel-powered firewater pump. This system would supply firewater through various hose reels and monitors located on the platforms. In addition, firewater deluge systems would be used in all well rooms and at critical locations on the production deck. These firewater systems would be supplemented using portable chemical fire extinguishers in enclosed areas.

Fire protection at the onshore treating facility would be accomplished using a system similar to the platforms' firewater systems. Firewater would be supplied by an electric-power pump with a diesel-power backup. This system would supply firewater from either a firewater storage tank or the local water district pipeline to various hose reels and monitors. In addition, portable chemical fire extinguishers would be available for use in enclosed areas.

3.6.3 Hydrogen Sulfide Exposure

The hydrogen sulfide (H_2S) exposure plans are outlined in the contingency plans for each platform. These plans have been filed by Union and are available to interested parties at the U.S. Geological Survey and City of Oxnard offices. The plans list the potential hazards related to H_2S exposure and procedures to be implemented in the event of H_2S appearing on the platform. The platforms would be equipped with H_2S monitors that would sound alarms if H_2S concentrations in excess of 10 ppm occur in the ambient air around either platform.

3.6.4 Oil Spills

The oil spill prevention and containment plans are outlined in the Oil Spill Contingency Plan. This plan has been filed by Union and is available to interested parties at the U.S. Geological Survey and City of Oxnard offices. This plan includes a description of the oil spill plans for many onshore operations in Ventura, Santa Barbara, and Los Angeles counties and all Union offshore operations. This plan was updated by Union to reflect the addition of this project to Union's operations. This plan describes the procedures that would be implemented in the event of an oil spill, as well as oil spill containment equipment to be maintained at each platform.

3.6.5 Navigation Aids

Union presently intends to paint Platform Gina and Platform Gilda white to increase the platforms' visibility to ocean vessels in accordance with the requirements of regulatory agencies. In addition, both platforms would be equipped with navigation lights and fog horns. The U.S. Coast Guard would establish a permanent 1,650-foot (500-m)-radius exclusion zone around both Platform Gina and Platform Gilda.

3.6.6 Blowout Prevention

Well control would be maintained through a variety of interrelated systems. The primary means of well control is the weighted column of drilling fluid (mud) in the hole. The weight of this column serves to control formation pressures and to prevent formation fluids from entering the well bore. The well casing is the secondary means of well control since, when casing is run and cemented through a formation, that formation is isolated from the well bore and from other formations. The blowout prevention system is the third means of well control and is designed to be used should the other systems fail. Each of these systems would be subject to U.S. Geological Survey approval and regulation.

3.6.6.1 Platform Gina

During drilling from Platform Gina, a sufficient weight of drilling mud would be maintained to control the well. Mud volumes would be closely monitored using a pit volume totalizer system, an incremental flow rate indicator, a pit level indicator, and a fill-up measurement system. These systems would be equipped with visual sensors and audible alarms to indicate the occurrence of any upset condition.

Before drilling below the 16-inch (40.6-cm) surface casing, a 20-inch (50.8-cm) annular blowout preventor would be installed. Before drilling below the 13.375-inch (34-cm) intermediate casing, the blowout prevention system would include four remotely controlled, hydraulically operated blowout preventors. Two would be equipped with pipe rams, one with blind rams, and one would be an annular type. The blowout prevention and riser system would have a rated working pressure of 3,000 psig (20,685 kPa). This pressure exceeds the maximum anticipated surface pressure.

The blowout prevention system would also include:

1. An hydraulic actuating system that provides sufficient accumulator capacity to repeatedly operate the blowout preventors.
2. Side outlets to provide for kill and choke lines.
3. Choke and kill lines, a choke manifold, and a fill-up line.
4. A top kelly cock installed below the swivel, and another at the bottom of the kelly that can be run through the blowout preventors.
5. An inside blowout preventor and a full opening drill string safety valve in the open position, which would be maintained on the rig floor at all times while drilling is being conducted.

The blowout prevention system would be pressure tested when the equipment is installed, before drilling out after each string of casing is set, at least once each week while drilling operations are being conducted, and following repairs that require disconnecting a pressure seal in the assembly.

3.6.6.2 Platform Gilda

Two drilling rigs would be utilized on Platform Gilda--a 12,000-foot (3,660 m) rig and a 20,000-foot (6,100 m) rig. A separate mud system would be provided for each rig. The two mud systems would be interconnected for emergency conditions, but would be separated by closed valves during normal use. Mud volumes would be closely monitored using a pit volume totalizer system, an incremental flow rate indicator, a pit level indicator, and a fill-up measurement system. These systems would be equipped with sensors for visual monitoring and audible alarms to indicate the occurrence of upset conditions should they occur. The following systems would be utilized on each of the two drilling rigs:

12,000-foot (3,660 m) rig (Repetto Formation wells)--Before drilling below the 20-inch (50.8-cm) conductor casing, a 500 psi (3,450 kPa) working pressure diversion system would be installed. The diverter system would be equipped with automatic, remotely controlled valves designed to open prior to shutting in the well.

Before drilling below the 16-inch (40.6-cm) surface casing, the blowout prevention system would include four remotely controlled, hydraulically operated blowout preventors. Two would be equipped with pipe rams, one with blind rams, and the fourth would be an annular type. The blowout preventor and riser assembly would have a rated working pressure of 3,000 psig (20,685 kPa). This pressure exceeds the maximum anticipated surface pressure.

20,000-foot (6,100 m) rig (Repetto Formation and Monterey Formation wells)--Before drilling below the 24-inch (61-cm) conductor casing, a 500 psig (3,450 kPa) working pressure diversion system would be installed. The diverter system would be equipped with automatic, remotely controlled valves designed to open prior to shutting in the well.

Before drilling below the 20-inch (50.8-cm) surface casing, the blowout prevention system would include three remotely controlled, hydraulically operated blowout preventors. One would be equipped with pipe rams, one with blind rams and one would be an annular type. The blowout preventor and riser assembly would have a rated working pressure of 2,000 psig (13,790 kPa), which exceeds the maximum anticipated surface pressure.

Before drilling below the 13.375-inch (34-cm) intermediate casing, the blowout prevention system would include four remotely controlled, hydraulically operated blowout preventors. Two would be equipped with pipe rams, one with blind rams, and one would be an annular type. The blowout prevention and riser assembly would have a rated working pressure of 5,000 psig (34,475 kPa). This pressure exceeds the maximum anticipated surface pressure.

Blowout prevention systems for both of the two rigs would include:

1. An hydraulic actuating system that provides sufficient accumulator capacity to repeatedly operate the blowout preventors.
2. Side outlets to provide for kill and choke lines.
3. Choke and kill lines, a choke manifold, and a fill-up line.
4. A top kelly cock installed below the swivel, and another at the bottom of the kelly that can be run through the blowout preventors.
5. An inside blowout preventor and a full opening drill string safety valve in the open position, which would be maintained on the rig floor at all times while drilling is being conducted.

The blowout prevention system would be pressure tested when the equipment is installed, before drilling out after each string of casing is set, at least once each week while drilling operations are being conducted, and following repairs that require disconnecting a pressure seal in the assembly.

3.6.7 Personnel Safety

Platform Gina and Platform Gilda are designed to provide protection to platform operating personnel from possible earthquake and severe weather events. In addition, the fire and spill detection and containment facilities to be installed at both platforms would protect operating personnel as well as platform equipment and the environment.

All of Union's platform operating personnel receive Red Cross first aid training and certification. This is done to ensure that trained individuals are always available to administer first aid in the event of an accident or injury at the platform. In addition, each individual will have assigned responsibilities in the event of a serious personnel accident or injury to ensure that the injured person receives prompt medical attention. Crew boats would never be more than 60 minutes from the platforms, so that an injured person could be picked up by a crew boat and transferred to an ambulance within a maximum of 120 minutes. In addition, should the need arise, an injured person could also be transferred to a local hospital by helicopter.

3.7 PROJECT TERMINATION AND ABANDONMENT

3.7.1 Platform Gina and Offshore Pipelines

Upon cessation of production from Platform Gina, all wells would be plugged and abandoned. Cement plugs would be set to confine fluids in their parent formations to prevent them from intermingling or flowing to the surface. During plugging operations, well control equipment would remain in use. Casings would be cut off at least 5 feet (1.5 m) below the mud line and all obstructions removed from the ocean floor.

Plugging and abandonment operations must be in conformance with U.S. Geological Survey regulations and such activities would not be commenced prior to obtaining approval from the U.S. Geological Survey. These regulations identify acceptable alternate abandonment procedures for various well conditions and specify tests to ensure that formations are isolated and that wells are left in a safe condition.

All equipment would be removed from the platform. The decks would be dismantled and transported to shore for disposal, salvage, or reuse. Jacket legs and pilings would be cut off below the mud line. The jacket would be cut into sections and transported to shore for disposal, salvage, or reuse. All obstructions would be removed from the ocean floor. The offshore pipelines would be purged and abandoned in place.

3.7.2 Platform Gilda and Offshore Pipelines

Abandonment procedures for Platform Gilda and associated offshore pipelines would be the same as those discussed above for Platform Gina.

3.7.3 Onshore Treating Facility and Onshore Pipelines

Assuming it could not be utilized with other projects existing at the time, the onshore treating facility would be dismantled. Equipment would be salvaged or reused to the extent possible. The foundations would be broken up and all refuse would be hauled away for disposal at an approved dump site.

Union would then restore and revegetate the site in accordance with County of Ventura or other applicable agency regulations in effect at that time. Onshore pipelines would be purged and abandoned in place unless regulations existing at the time required their removal. In that case, the pipelines would be excavated, dismantled, and the individual segments hauled away for salvage or reuse.

3.8 PERMITS AND APPROVALS

3.8.1 Memorandum of Understanding

The proposed Union Platform Gina and Platform Gilda Project requires permits and environmental approvals from a large number of federal, state, and local regulatory agencies before the project can be implemented. In addition, various portions of the project are subject to environmental review under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). The State of California's Office of Planning and Research (OPR), acting in cooperation with other agencies, determined that a joint Environmental Impact Report/Environmental Assessment (EIR/EA) should be prepared for the project to expedite the regulatory approval process, minimize duplicative environmental reviews by the various agencies, and better serve the public interest by producing a more efficient environmental review process. The objective is to produce a single environmental document that would contain all of the information needed for timely federal, state, and local action on the approval or denial of the discretionary permits.

A Memorandum of Understanding (MOU) was prepared in connection with the proposed project to coordinate federal, state, and local efforts in the preparation of the EIR/EA. The parties to the MOU, who constitute the Steering Committee for the proposed project EIR/EA, include the City of Oxnard (as lead agency), U.S. Geological Survey, U.S. Army Corps of Engineers, State Lands Commission, California Coastal Commission, and the County of Ventura. The purpose of the MOU is to ensure cooperation and joint control of the development of the EIR/EA by members of the Steering Committee.

The Platform Gina part of the proposed project would be in a "Field", while Platform Gilda would be in a "Unit". Lease and operations management procedures for a "Field" versus a "Unit" are completely separate and distinct with respect to decision-making actions required by the U.S. Geological Survey. The U.S. Geological Survey has indicated that a single environmental document can be used for the proposed Platform Gina and Platform Gilda Project, as long as the assessments of the impacts of activities associated with the two platforms involved are clearly distinguishable from each other in the report. After completion of the EIR/EA, the U.S. Geological Survey would be required to process permits for the two platforms separately.

To ensure that meaningful information is provided in the EIR/EA, federal, state, and local regulatory agencies were consulted during the preparation of the EIR/EA work program. The intent was to identify their specific interests concerning the proposed project and obtain their inputs to defining an appropriate scope of work for EIR/EA preparation. The individuals in the different agencies who were contacted are listed in Table 3.8-1.

3.8.2 Permits and Approvals Required for Project Implementation

Union proposes to apply for, obtain, and comply with all permits, certificates, licenses, and approvals required for the proposed Platform Gina and Platform Gilda Project. Table 3.8-2 lists permits and regulatory approvals that are currently known or likely to be needed for project implementation, including a description of the issuing agency and the corresponding enabling legislation and/or statutory authority for each permit.

TABLE 3.8-1

AGENCIES CONTACTED DURING PREPARATION OF THE EIR/EA

Agency	Individuals
City of Oxnard (1) (2)	Gene Hosford Richard Floch Ralph Steele Larry Walrod Bob Fitch Don Hineser
U.S. Geological Survey (1)	Ed Kreppert Keith Yenne Tom Dunaway
U.S. Army Corps of Engineers (1)	Richard Surynt
State Lands Commission (1)	Dwight Sanders
California Coastal Commission (1)	Mari Gottdiener
Regional Coastal Commission	Stephen Stanley
County of Ventura (1)(3)	Jeff Walker Mel Willis Ginny Morton Bill Lockard John Turner Bill Hayden Bill Frank Doug Hitchingham Terry Gilday John Crowley Heinz Ribi Karl Krause Scott Johnson Jim Rouge
U.S. Environmental Protection Agency	Betty Jankus Jim Zenner
U.S. Coast Guard	Captain D. Taub Lt. Robin Wendt Lt. Jan Terveen
City of San Buenaventura	Andy Meyer
Local Agency Formation Commission	Bob Braitman

TABLE 3.8-1 (Continued)

Agency	Individuals
California Department of Fish & Game	Rolf Mall Bruce Eliason Dick Nitsos
California Department of Boating and Waterways	Marty Mercado Bill Felts Carol August
State Office of Historic Preservation	Bill Siedel Henry Bass Jeff Bingham
California Department of Parks and Recreation	James Tryner Rob Auman
California Department of Conservation	Suzanne Butterfield
California Division of Oil and Gas	Bob Reid
California Division of Mines and Geology	Jerry Treiman Lynn Jones
California Department of Transportation, Division of Aeronautics	Burd Miller
California Air Resources Board:	
Energy Project Evaluation Section	Don Kobberlein Tony Wong George Lew
Planning Section	Don McElfresh Richard DeCuir
Modeling Section	Andrew Ranzieri
California Regional Water Quality	Raymond Hertel Lou Schinazi
State Water Resources Control Board	John Huddleson
Bureau of Land Management	Tye Roy
Office of Planning and Research	Ron Bass

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(1) Signatories to the Memorandum of Understanding.
(2) Designated Lead Agency under the California Environmental Quality Act of 1970, as amended.
(3) Planning Department represents County of Ventury in Memorandum of Understanding.

TABLE 3.8-2

MAJOR LOCAL, STATE, & FEDERAL PERMITS AND APPROVALS FOR THE PLATFORM GINA AND PLATFORM GILDA PROJECT

Reviewing Agency	Permit, Lease or Approval Required	Authority Source or Enabling Legislation	Applicable Project Comment
City of Oxnard Planning Department	Amendment to General Plan	California State Government Code Title 7, Chap. 3; Section 65300	Mandalay Site, East Mandalay Site
	Special Use Permit(1)	California State Government Code Title 7, Chap. 4; Section 65800 City of Oxnard Municipal Code Chapter 34-146	Mandalay Site, East Mandalay Site Ormond Beach Site
	Zone Change Application(1)	California State Government Code Title 7, Chap. 4; Section 65800	Mandalay Site
	Parcel Map(1)	State of California Subdivision Map Act City of Oxnard Municipal Code Chapter 27	Mandalay Site, East Mandalay Site Ormond Beach Site
City of San Buenaventura Planning	Amendment to General Plan	California State Government Code Title 7, Chap. 3; Section 65300	Union Oil Marine Terminal Site
	Conditional Use Permit(2)	California State Government Code Title 7, Chap. 4; Section 65800	Union Oil Marine Terminal Site
	Zone Change Application(2)	California State Government Code Title 7, Chap. 4; Section 65800	Union Oil Marine Terminal Site
County of Ventura Planning Department	Modification to Existing Conditional Use Permit	California State Government Code Title 7, Chap. 4; Section 65800	Union Oil Marine Terminal Site
County of Ventura Flood Control District	Watercourse Encroachment Permit	Ventura County Flood Control Act California Water Code, Chap. 46, Vol. 71	Onshore Pipelines for Union Oil Marine Terminal Site(3), Onshore Pipelines for Ormond Beach Site(4)
County of Ventura Local Agency Formation Commission	Annexation to City or Water District	District Reorganization Act of 1965 California State Government Code Title 6, Chap. 1; Section 56000	All Onshore Sites(5)
Port Hueneme Oxnard Harbor District	Easement Permit(6)	Not Known	Onshore Pipelines for Ormond Beach Site
County of Ventura Property Administration Agency	Land Lease Permit	California State Government Code Title 3, Div. 2, Section 25520	Mandalay Site(7)

TABLE 3.8-2 (Continued)

Reviewing Agency	Permit, Lease or Approval Required	Authority Source or Enabling Legislation	Applicable Project Component
County of Ventura Air Pollution Control District	Permit Authority to Construct and Operate	California Health & Safety Code Div. 26, Chap. 4; Section 42300	All Onshore Sites
California Coastal Commission	Coastal Development Permit	California Coastal Act of 1976 California Natural Resources Code Title 14, Chapter 5	Offshore Pipelines(8), All Onshore Elements
	Federal Consistency Certification	Coastal Zone Management Act of 1972 16 USC 1457	Overall Project(9) Review
State Lands Commission	Lease of Pipeline Right-of-Way	California Public Resources Code Div. 6, Chapter 3, Section 6831	All Offshore Pipelines(10)
State Department of Fish & Game	Stream Alteration Permit	California Fish and Game Code Div. 2, Chapter 6; Sections 1601-1603	Onshore Pipeline for Union Oil Marine Terminal Site(11), Onshore Pipelines for Ormond Beach Site(12)
State Department of Boatings & Waterways	Comments Only		
State Department of Parks and Recreation	Comments Only(13)		
State Department of Conservation	Comments Only(14)		
California Regional Water Quality Control Board	Trenching Permit	Clean Water Act of 1977 33 USC 1342	All Offshore Pipelines(15)
	Hydrostatic Test Permit	Clean Water Act of 1977 33 USC 1342	All Offshore Pipelines(16)
U.S. Army Corps of Engineers	Platform Structure Permit	Rivers and Harbors Act of 1899 33 USA 403	Platforms Gina and Gilda
	Section 404 Permit	Clean Water Act of 1977 33 USC 1344	Offshore Pipelines for Both Platforms
U.S. Coast Guard	Navigational Aids Approval	Outer Continental Shelf Lands Act 43 USC 1333	For Lights and Sound Signals on Both Offshore Platforms
U.S. Geological Survey	Plan of Development Approval	Outer Continental Shelf Lands Act 43 USC 1333	Platforms Gina and Gilda
	Air Quality Permit	Outer Continental Shelf Lands Act Lands Act as Amended 1978	Platforms Gina and Gilda
State Water Resources Control Board	Federal Consistency Certification	Clean Water Act of 1977 33 USA 1341	All Offshore Pipelines(16)

TABLE 3.8-2 (concluded)

Reviewing Agency	Permit, Lease or Approval Required	Authority Source or Enabling Legislation	Applicable Project Component
U.S. Environmental Protection Agency	Prevention of Significant Deterioration (PSD) Permit	Clean Air Act of 1977 43 USC 7470	All Onshore Sites
	National Pollution Discharge Elimination System (NPDES) Permit	Clean Water Act of 1977 33 USC 1342	Offshore Pipelines and Platforms

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(1) These permits, applications, and maps are processed concurrently with the General Plan Amendment. They may also be required for the in-line booster stations depending on their exact locations.

(2) These permits, applications, and maps are processed concurrently with the General Plan Amendment.

(3) This permit is required should lines cross the Santa Clara River.

(4) Numerous permits required for channels and drains for Option A and B pipelines and for onshore pipelines from Platform Gina.

(5) The Union Oil Marine Terminal site would require annexation to the city of San Buenaventura. All other sites would require annexation to the Calleguas Water District.

(6) Not enough specific information is known about the pipeline routes to give specific information at this point.

(7) Since this is the only site located on county property, this lease permit would only apply to this site.

(8) This permit involves the offshore pipelines (within the three mile limit) from Platform Gina and Gilda and all onshore processing sites.

(9) This consistency certification is an overall review of the project as mandated by the Coastal Zone Management Act of 1972.

(10) This lease involves all offshore pipelines (between three mile limit and high water mark) from Platforms Gina and Gilda.

(11) If pipeline crosses over Santa Clara River and no work is necessary on bridge in the river, then a permit is not required.

(12) If the pipelines cross over channels and drains and no work is necessary within those channels and drains, then no permit is required.

(13) Comments only unless state park lands are crossed or historic areas are involved.

(14) This department includes the Divisions of Oil and Gas, and Mines and Geology.

(15) At a time before construction commences, Union would file a request for an NPDES permit which would cover the temporary construction and testing of the offshore platform pipelines in state waters.

(16) Should the Regional Water Quality Control Board issue a permit, then the State Water Resources Control Board must make a Federal Consistency Determination of this permit.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 GEOTECHNICAL

In this section, potential adverse impacts of the project on the geologic and hydrologic environments are discussed. Potential impacts related to effects of the geologic and hydrologic environments on the project are discussed in Section 12.1.6.

For the purpose of geotechnical impact assessment, the "hydrologic environment" is considered to include all ground waters, and surface waters inland from mean higher high water (MHHW). Potential impacts on ocean waters offshore from MHHW are discussed in Section 4.3.

4.1.1 Proposed Mandalay Configuration

4.1.1.1 Construction

4.1.1.1.1 Platforms

Platform Gina

Emplacement of Platform Gina and driving of piles through the six jacket legs would result in minor disturbance of the seafloor. Alteration of seafloor topography from this disturbance would be insignificant. No other adverse impacts on the geologic environment are expected to result from construction of Platform Gina.

During construction of Platform Gina, approximately 588,000 gallons (2,225,580 L) of fresh water would be consumed. Because this water would be obtained from desalination units onboard the work barge, no impact on regional fresh-water supplies is expected.

Onshore disposal of liquid or solid wastes produced would be at approved disposal sites, in accordance with all applicable regulations, including those of the Regional Water Quality Control Board (RWQCB) and local agencies. Therefore, waste disposal is not expected to produce adverse impacts on surface or ground water quality. No other potential adverse impacts on the hydrologic environment are expected to result from construction of Platform Gina.

Platform Gilda

Emplacement of Platform Gilda and driving of piles through the 12 jacket legs would result in minor disturbance of the seafloor. Alteration of seafloor topography from this disturbance would be insignificant. No other adverse impacts on the geologic environment are expected to result from construction of Platform Gilda.

During construction of Platform Gilda, approximately 1,470,000 gallons (5,563,950 L) of fresh water would be consumed. Because this water would be obtained from desalination units onboard the work barge, no impact on regional fresh-water supplies is expected.

Onshore disposal of liquid or solid wastes produced would be at approved disposal sites, in accordance with all applicable regulations. Therefore, waste disposal is not expected to produce adverse impacts on surface or ground water quality. No other potential adverse impacts on the hydrologic environment are expected to result from construction of Platform Gilda.

4.1.1.1.2 Offshore Pipelines and Power Cables

Platform Gina

Construction of the offshore pipelines and power cable associated with Platform Gina would result in disturbance of: a 7.3-acre (2.9-ha) onshore marshalling and fabrication area; a 40-foot (12-m)-wide corridor across the beach and nearshore zone (to a water depth of 20 feet (6 m)); and, a 40-foot (12-m)-wide corridor from the nearshore zone to the platform. Alteration of onshore and seafloor topography resulting from disturbance in these areas is expected to be insignificant, due to the minor and temporary nature of the disturbance. The onshore marshalling and fabrication area would be regraded to a state as similar to that which existed prior to disturbance as is practicable, and revegetated with appropriate dune-stabilizing plant species, if necessary, to prevent wind erosion. Offshore, wave action and other processes should quickly restore all disturbed areas. No increase in beach erosion is expected to result from construction activities because of the short time period in which disturbance would occur and the short time required for natural recovery from the disturbance (see also Section 4.3.1.1.2).

The marshalling and fabrication area would be located in an area of Coastal Beaches soils. These soils are generally very low in fertility and lack well developed profiles. Therefore, no adverse impact on these soils is expected to occur as a result of activities associated with construction. No other adverse impacts on the geologic environment are expected to occur as a result of construction of the Platform Gina offshore pipelines and power cable.

During construction, approximately 1,050 gallons (3,974 L) of fresh water would be consumed. This amount represents less than 0.000003 percent of the annual demand for fresh water in the Oxnard Plain area. Therefore, the potential impact on regional fresh-water supplies would be negligible.

Seawater would be used for hydrostatic testing of the pipelines, and used test water would be disposed of in the ocean. (See Section 4.3 for discussion of impacts.) Onshore disposal of liquid or solid wastes produced would be at an approved disposal site, in accordance with all applicable regulations. Therefore, hydrostatic testing and waste disposal are not expected to produce adverse impacts on surface or ground water quality. No other adverse impacts on the hydrologic environment are expected to result from construction of the Platform Gina offshore pipelines and power cable.

Platform Gilda

Potential adverse impacts on the geologic and hydrologic environments resulting from construction of the offshore pipelines and power cable associated with Platform Gilda are expected to be essentially the same as those for Platform Gina (see preceding discussion). However, slightly more fresh water would be consumed (2,450 gallons (9,275 L)). Because of its small amount (less than 0.000007 percent of the annual demand), this would represent a negligible impact on regional fresh-water supplies.

4.1.1.1.3 Onshore Treating Facility

During construction of the onshore treating facility, extensive grading of the site would not be required--only minor redistribution of the surface sands. Therefore, alteration of topography would be insignificant. Because of the high permeability of the sands, there is no surface runoff from the site; therefore, increased erosion by water is not expected to result from construction activities. Disturbance of areas other than the site proper is expected to be minimal. Consequently, increased wind erosion should not be significant.

The site is located in an area of Coastal Beaches soils. Because of their low fertility and lack of well developed profiles, no adverse impact on these soils is expected to result from treating facility construction. No other adverse impacts on the geologic environment are expected to occur as a result of construction of the onshore treating facility.

During construction, approximately 132,000 gallons (499,620 L) of fresh water would be consumed for hydrostatic testing of tanks and general construction purposes. This amount represents less than 0.00037 percent of the annual demand for fresh water in the Oxnard Plain area. Therefore, the potential impact on regional fresh-water supplies would be negligible.

Onshore disposal of solid or liquid wastes (including used hydrostatic test water) would be at approved disposal sites, in accordance with all applicable regulations. Therefore, waste disposal is not expected to produce adverse impacts on surface or ground water quality. No other potential adverse impacts on the hydrologic environment are expected to result from construction of the onshore treating facility.

4.1.1.1.4 Onshore Pipelines

The terrain along the proposed pipeline route is essentially flat; consequently, alteration of topography would be insignificant. Construction of onshore pipelines is not expected to increase erosion by either water or wind because of the flatness of the topography and the short time period in which disturbance would occur.

The pipeline route crosses soils of the Riverwash-Sandy Alluvial Land-Coastal Beaches and Pico-Metz-Anacapa associations. Because the individual soils crossed are generally low in fertility and lack well developed profiles, and the time period in which disturbance would occur would be short, potential adverse impacts on the soils resulting from construction of the onshore pipelines are expected to be of low significance. No other adverse impacts on the geologic environment are expected to result from construction of the onshore pipelines.

During construction, approximately 52,000 gallons (197,000 L) of fresh water would be consumed for hydrostatic testing of the pipelines and general construction purposes. This amount represents less than 0.00015 percent of the annual demand for fresh water in the Oxnard Plain area. Therefore, the potential impact on regional fresh-water supplies would be negligible.

The product crude oil pipeline would be attached to the Harbor Boulevard bridge in order to cross the Santa Clara River, and the corridor would be located more than 600 feet (180 m) from McGrath Lake. Onshore disposal of solid or liquid wastes (including used hydrostatic test water) would be at approved disposal sites, in accordance with all applicable regulations. Therefore, pipeline construction and waste disposal are not expected to produce adverse impacts on surface or ground water quality. No other potential adverse impacts on the hydrologic environment are expected to result from construction of the onshore pipelines.

4.1.1.1.5 Total Impact

The following are potential adverse impacts on the geologic and hydrologic environments expected to result from construction activities associated with the proposed Mandalay configuration:

- alteration of existing topography, resulting from disturbance of offshore and onshore areas during grading and/or emplacement of facilities;
- disturbance of soils during grading and emplacement of onshore facilities; and,
- consumption of approximately 187,000 gallons (707,800 L) of fresh water (which represents approximately 0.00052 percent of the annual demand for fresh water in the Oxnard Plain area).

These impacts are expected to be of low significance. No significant adverse impacts are expected.

4.1.1.2 Drilling

4.1.1.2.1 Platform Gina

Deposition of drill cuttings on the seafloor near Platform Gina would result in a roughly conical mound, approximately 20 feet (7.6 m) high and 125 feet (38 m) in diameter. Alteration of the existing seafloor topography by this mound would represent an impact of low significance. No other adverse impacts on the geologic environment are expected to result from drilling activities at Platform Gina.

During drilling, approximately 1,360,800 gallons (5,150,600 L) of fresh water would be consumed. This amount represents approximately 0.0038 percent of the annual demand for fresh water in the Oxnard Plain area. Therefore, a potential impact of low significance on regional fresh-water supplies is expected.

Prior to drilling, Union must obtain approval of their proposed well-casing program from the U.S. Geological Survey (USGS). Before such approval can be granted, the USGS must be satisfied that the program includes adequate measures to prevent contamination of fresh-water aquifers. Onshore disposal of liquid or solid wastes would be at approved disposal sites, in accordance with all applicable regulations. Therefore, waste disposal and other drilling activities are not expected to produce adverse impacts on surface or ground water quality. No other impacts on the hydrologic environment are expected to occur as a result of drilling activities at Platform Gina.

4.1.1.2.2 Platform Gilda

Repetto Formation

Deposition of drill cuttings on the seafloor near Platform Gilda would result in a roughly conical mound, approximately 40 feet (12 m) high and 225 feet (70 m) in diameter. Alteration of the existing seafloor topography by this mound would represent an impact of low significance. No other adverse impacts on the geologic environment are expected to result from Repetto Formation drilling at Platform Gilda.

During the drilling period, approximately 7,350,000 gallons (27,819,750 L) of fresh water would be consumed. This corresponds to an annual usage of about 3,000,000 gallons (11,355,000 L), which represents approximately 0.008 percent of the annual demand for fresh water in the Oxnard Plain area. Therefore, an impact of low to moderate significance on regional fresh-water supplies is expected. Potential adverse impacts on ground or surface water quality are the same as those for the Platform Gina drilling program (Section 4.1.1.2.1). No other impacts on the hydrologic environment are expected to result from Repetto Formation drilling at Platform Gilda.

Monterey Formation

Potential impacts associated with Monterey Formation drilling from Platform Gilda were assessed under the assumption that maximum development (30 wells) would occur. (See Section 3.4.2.2 for discussion of the Monterey Formation test and production drilling programs.) Cuttings derived from Monterey Formation drilling at Platform Gilda would be deposited on the existing mound produced by Repetto Formation drilling. Maximum development of the Monterey Formation would result in the mound's ultimate size being increased from approximately 40 to 50 feet (12 to 15 m) in height, and approximately 225 to 300 feet (70 to 90 m) in diameter. Alteration of the existing seafloor topography by this slightly larger mound would also represent an impact of low significance. No other adverse impacts on the geologic environment are expected to result from Monterey Formation drilling at Platform Gilda.

During the drilling period, approximately 5,670,000 gallons (21,460,950 L) of fresh water would be consumed. This corresponds to an annual usage of about 3,000,000 gallons (11,355,000 L), which represents less than 0.008 percent of the annual demand for fresh water in the Oxnard Plain area. Therefore, an impact of low to moderate significance on regional fresh-water supplies is expected. Potential adverse impacts on ground or surface water quality are the same as those for the Platform Gina drilling program (Section 4.1.1.2.1). No other impacts on the hydrologic environment are expected to result from Monterey Formation drilling at Platform Gilda.

4.1.1.2.3 Total Impact

The following potential adverse impacts on the geologic and hydrologic environments are expected to result from drilling activities associated with the proposed Mandalay configuration:

- alteration of existing seafloor topography at the platform sites by deposition of drill cuttings; and,
- consumption of approximately 14,380,800 gallons (541,431,350 L) of fresh water over the drilling period. This corresponds to a maximum annual usage of 4,600,000 gallons (17,407,200 L), which represents approximately 0.01 percent of the annual demand for fresh water in the Oxnard Plain area.

Deposition of drill cuttings mounds is considered an impact of low significance; fresh water consumption is considered a relatively short-term impact of low to moderate significance.

4.1.1.3 Production

4.1.1.3.1 Platforms

Platform Gina

Production of hydrocarbon fluids at Platform Gina would result in removal of approximately 9.53 million barrels of oil and 1.72 billion standard cubic feet of natural gas from the Hueneme sand and Sespe Formation during the lifetime of the project. This represents depletion of mineral resources that are not renewable on a human time scale. It is not considered a significant adverse impact on the geologic environment.

Production of hydrocarbon fluids at Platform Gina could result in lowering recovery in California State waters, because of the possiblity of production from a common reservoir. This possibility should be evaluated and resolved by the regulatory agencies (USGS and State Lands Commission) and oil companies involved, using proprietary subsurface geologic information available only to those parties.

Withdrawal of fluids, with the consequent lowering of reservoir fluid pressures, can cause compaction and eventual ground surface subsidence. Although certain geologic conditions (such as a thick, shallow, unconsolidated sand section) generally are required for subsidence to occur, the principal controlling factor is pore-fluid pressure. During production at Platform Gina, Union plans to implement a water injection program to maintain reservoir fluid pressures and maximize recovery. This program should ensure that significant subsidence would not be caused by production. Consequently, no adverse impact due to induced subsidence is expected.

Induced seismicity has been associated with ground subsidence caused by hydrocarbon fluid withdrawal, as well as pressure increases caused by fluid injection. Ground subsidence in the Wilmington oil field during the 1940's and 1950's generated shocks with magnitudes estimated from 2.4 to 3.3 (Kovach, 1974). In Colorado, fluid injection quantities at the Rangely oil field and Rocky Mountain Arsenal were shown to be correlated with seismic events with magnitudes up to 3.4 and 4.3, respectively (Raleigh et al., 1972 and 1976; Evans, 1966). Each of these cases of induced seismicity was apparently triggered by significantly changing the virgin reservoir pore pressures. As discussed above, Union plans a pressure maintenance program for production at Platform Gina. Careful control of reservoir pressures is expected to ensure against the occurrence of induced seismicity.

During the production period, approximately 625,000 gallons (2,365,600 L) of fresh water would be consumed. This amount corresponds to an annual usage of about 35,000 gallons (132,500 L), which represents less than 0.0001 percent of the annual demand for fresh water in the Oxnard Plain area. Therefore, the potential impact on regional fresh-water supplies would be negligible.

Onshore disposal of solid or liquid wastes produced would be at approved sites, in accordance with all applicable regulations. Therefore, waste disposal is not expected to result in adverse impacts on ground or surface water quality.

Platform Gilda (Repetto Formation)

Production of hydrocarbon fluids from the Repetto Formation at Platform Gilda would result in removal of approximately 43 million barrels of oil and 40 billion standard cubic feet of natural gas during the lifetime of the project. This represents depletion of mineral resources that are not renewable on a human time scale. It does not represent a significant adverse effect on the geologic environment.

As discussed above, ground subsidence and increased seismicity can be induced by significantly changing reservoir fluid pressures. As maximum production from the Repetto Formation is not predicted to require pressure maintenance, Union does not currently have plans for such a program. However, injection of produced water into the Repetto Formation is expected when the amount of water produced during combined Gina and Gilda production exceeds the amount required for the Platform Gina pressure maintenance program. Consequently, unless Repetto reservoir pressures are carefully controlled, the potential for induction of ground subsidence and/or increased seismicity exists; however, this potential would be low. No other adverse impacts on the geologic environment are expected to occur as a result of Repetto Formation production activities at Platform Gilda.

During the platform production lifetime, approximately 2,415,000 gallons (9,140,800 L) of fresh water would be consumed. This corresponds to an annual usage of 120,750 gallons (457,000 L), which represents approximately 0.0003 percent of the annual demand for fresh water in the Oxnard Plain area. Therefore, the potential impact on regional fresh-water supplies would be negligible.

Potential adverse impacts on ground or surface water quality are the same as those for production at Platform Gina, discussed above. No other impacts on the hydrologic environment are expected to result from Repetto Formation production at Platform Gilda.

Platform Gilda (Monterey Formation)

Potential impacts associated with Monterey Formation production from Platform Gilda were assessed under the assumption that maximum development (30 wells) would occur. (See Section 3.5.1.1.2 for discussion of the Monterey Formation production program.)

Removal of hydrocarbon fluids (estimates of the volumes of potentially recoverable fluids cannot be determined until after the test program) from the Monterey Formation would represent depletion of mineral resources that are not renewable on a human time scale. This does not represent a significant effect on the geologic environment. Other potential adverse impacts on the geologic environment are the same as those discussed above for Repetto Formation production.

Fresh water consumption during Monterey Formation production is discussed above in conjunction with Repetto Formation production. Potential impacts on ground or surface water quality are the same as those for Platform Gina, discussed above. No other adverse impacts on the hydrologic environment are expected to result from Monterey Formation production.

4.1.1.3.2 Offshore Pipelines and Power Cables

No adverse impacts on the geologic or hydrologic environments are expected to occur during the production phase as a result of operation of the offshore pipelines and power cables associated with Platforms Gina and Gilda.

4.1.1.3.3 Onshore Treating Facility

No adverse impacts on the geologic environment are expected to result from operation of the onshore treating facility during the production phase.

During the production phase, approximately 30,000 gallons (113,500 L) of fresh water would be consumed. This corresponds to an annual usage of roughly 1,500 gallons (5,700 L), an amount which represents less than 0.0000042 percent of the annual demand for fresh water in the Oxnard Plain area. Therefore, the potential impact on regional fresh-water supplies would be negligible.

An accidental release of hydrocarbon fluids or produced water could occur at the onshore treating facility during the production phase. There is no surface water at the site and nearby ground waters are not used because of their relatively poor quality. In addition, Union plans to set all tanks and vessels within a concrete-lined pit with sufficient capacity to contain the total volume of the tanks and vessels. Consequently, the potential for significant adverse impacts on ground or surface water quality to occur as a result of accidental releases of fluids is considered low. Disposal of solid or liquid wastes would be at approved sites, in accordance with all applicable regulations. Therefore, waste disposal and potential accidental spills from the treating facility are not expected to produce any significant adverse impacts on ground or surface water quality during the production phase. No other impacts on the hydrologic environment are expected to result from operation of the treating facility during production.

4.1.1.3.4 Onshore Pipelines

No adverse impacts on the geologic environment are expected to result from operation of the onshore pipelines during the production phase.

Accidental fluid releases from pipeline leaks or ruptures could potentially degrade surface or ground water quality. Particularly sensitive areas in the vicinity of the proposed pipeline route are McGrath Lake and the Santa Clara River. The significance of any adverse impact on these, or other ground or surface waters, would depend on the size and duration of the releases and the type of fluid involved. Union plans to install pipeline pressure and volume sensors connected to an automatic shutdown system, and to conduct regular visual inspections of the pipeline corridor to prevent and detect leaks. Consequently, the potential for large, long-term releases of potentially toxic fluids from onshore pipelines to the environment, with resultant adverse impacts on ground or surface water quality, is considered low. No other potential adverse impacts on the hydrologic environment are expected to result from operation of the onshore pipelines during the production phase.

4.1.1.3.5 Total Impact

The following potential adverse impacts on the geologic and hydrologic environments are expected to result from production activities associated with the proposed Mandalay configuration:

- depletion of non-renewable mineral resources;
- consumption of approximately 3,070,000 gallons (11,619,950 L) of fresh water over the production period. This corresponds to an annual usage of 153,500 gallons (581,000 L), which represents approximately 0.0004 percent of the annual demand for fresh water in the Oxnard Plain area; and,
- possible induced ground subsidence and/or increased seismicity;

- possible degradation of ground or surface water quality due to accidental releases of hydrocarbon fluids.

Lowered petroleum production in state-controlled waters would be possible. This possibility should be evaluated and resolved by the USGS, State Lands Commission, and oil companies involved, using proprietary subsurface geologic information available only to those parties. Induced subsidence and/or seismicity are considered possible, but highly unlikely. Non-renewable resource depletion and fresh water consumption are not considered to represent significant geotechnical impacts. The potential for significant degradation of ground or surface water quality due to an accidental release of hydrocarbon fluids or produce water is considered low.

4.1.2 East Mandalay Alternative Configuration

Potential adverse impacts on the geologic and hydrologic environments associated with the East Mandalay configuration would be the same as those for the proposed Mandalay configuration (Section 4.1.1).

4.1.3 Union Oil Marine Terminal Alternative Configuration

4.1.3.1 Construction

4.1.3.1.1 Platforms

Potential adverse impacts on the geologic and hydrologic environments associated with construction of Platforms Gina and Gilda for this alternative configuration would be identical to those for the proposed Mandalay configuration (Section 4.1.1.1.1).

4.1.3.1.2 Offshore Pipelines and Power Cables

Potential adverse impacts on the geologic and hydrologic environments associated with the offshore pipelines and power cables for Platforms Gina and Gilda for this alternative configuration would be identical to those for the proposed Mandalay configuration (Section 4.1.1.1.2).

4.1.3.1.3 Onshore Treating Facility

Construction of the onshore treating facility is not expected to result in any adverse impacts on topography or soils because of its location in an existing developed area. Consumption of fresh water and potential impacts on ground and surface water quality would be the same as those for the proposed Mandalay configuration (Section 4.1.1.1.3). No other adverse impacts on the geologic or hydrologic environment are expected to result from construction of the onshore treating facility.

4.1.3.1.4 Onshore Pipelines and Booster Station

Construction of the onshore pipelines would result in disturbance of the Santa Clara River bed. Construction activities would be conducted during the dry season (when there is little or no flow), and the surface of the river bed would be restored after the pipelines had been emplaced. Consequently, no significant adverse impacts on the geologic environment are expected to result from pipeline emplacement in the Santa Clara River bed.

During construction, approximately 222,000 gallons (840,000 L) of fresh water would be consumed for hydrostatic testing of the pipelines and general construction purposes. This amount represents approximately 0.0006 percent of the annual demand for fresh water in the Oxnard Plain area. Therefore, the potential impact on regional fresh-water supplies would be negligible. Other potential impacts on the geologic and hydrologic environments associated with onshore pipeline construction would be the same as those for the proposed Mandalay configuration (Section 4.1.1.1.4).

The quantity of fresh water which would be consumed during construction of the booster station is included in the 222,000 gallons (840,000 L) estimated for onshore pipeline construction. Other potential impacts on the geologic and hydrologic environments would be the same as those for construction of the onshore treating facility for the proposed Mandalay configuration (Section 4.1.1.1.3).

4.1.3.1.5 Total Impact

The following potential adverse impacts on the geologic and hydrologic environments are expected to result from construction activities associated with the Union Oil Marine Terminal alternative configuration:

- alteration of existing topography resulting from disturbance of offshore and onshore areas (including the Santa Clara River bed) during grading and/or emplacement of facilities;
- disturbance of soils during grading and emplacement of onshore facilities; and,
- consumption of approximately 357,000 gallons (1,351,250 L) of fresh water (which represents less than 0.001 percent of the annual demand for fresh water in the Oxnard Plain area).

These impacts are expected to be of low significance. No significant adverse impacts are expected.

4.1.3.2 Drilling

Potential adverse impacts on the geologic and hydrologic environments associated with drilling at Platforms Gina and Gilda for this alternative configuration would be identical to those for the proposed Mandalay configuration (Section 4.1.1.2).

4.1.3.3 Production

Potential adverse impacts on the geologic and hydrologic environments associated with production at Platforms Gina and Gilda for this alternative configuration would be identical to those for the proposed Mandalay configuration (Section 4.1.1.3).

4.1.4 Ormond Beach Alternative Configuration

4.1.4.1 Construction

4.1.4.1.1 Platforms

Potential adverse impacts on the geologic and hydrologic environments associated with construction of Platforms Gina and Gilda for this alternative configuration would be identical to those for the proposed Mandalay configuration (Section 4.1.1.1).

4.1.4.1.2 Offshore Pipelines and Power Cables

Platform Gina

Construction of the offshore pipelines associated with Platform Gina would result in disturbance for a marshalling and fabrication area at Silver Strand Beach and a construction corridor from the fabrication area to the platform. Characteristics of these areas, and potential associated adverse impacts on the geologic and hydrologic environments would be essentially the same as those for the proposed Mandalay configuration marshalling area (Section 4.1.1.1.2). These impacts would be insignificant. Routing and construction of the power cable, and associated impacts, would be identical to those for the proposed Mandalay configuration (Section 4.1.1.1.2).

Platform Gilda

Potential adverse impacts on the geologic and hydrologic environments associated with construction of the offshore pipelines and power cable for Platform Gilda would be the same for this alternative configuration as for the proposed Mandalay configuration (Section 4.1.1.1.2).

4.1.4.1.3 Onshore Treating Facility

Construction of the onshore treating facility is not expected to result in any adverse impacts on topography or soils because of its location in an existing developed area. Consumption of fresh water and potential impacts on ground and surface water quality would be the same as for the proposed Mandalay configuration (Section 4.1.1.1.3). No other impacts on the geologic or hydrologic environments are expected to result from construction of the onshore treating facility.

4.1.4.1.4 Onshore Pipelines and Booster Stations

Platform Gina Alternative Pipeline Route and Booster Station

With the exception of the Port Hueneme crossing, the terrain along this pipeline route is essentially flat; consequently, alteration of topography would be insignificant. Construction of onshore pipelines is not expected to increase erosion by water or wind because of the flatness of the topography and the short time period in which disturbance would occur. The pipeline route crosses soils of the Riverwash-Sandy Alluvial Land-Coastal Beaches and Camarillo-Hueneme-Pacheco associations. Because the individual soils crossed generally have been highly disturbed, potential adverse impacts on soils associated with construction of the pipelines are expected to be of low significance. Crossing of Port Hueneme would result in minor disturbance of the harbor bottom. This is expected to represent an impact of very low geologic significance. No other adverse impacts on the geologic environment are expected to result from construction of the Platform Gina alternative onshore pipelines.

During construction, approximately 75,000 gallons (283,875 L) of fresh water would be consumed for hydrostatic testing of the pipelines, and general construction purposes. This amount represents less than 0.0002 percent of the annual demand for fresh water in the Oxnard Plain area. Therefore, the potential impact on regional fresh-water supplies would be negligible. Pipeline construction and waste disposal are not expected to produce any adverse impacts on surface or ground water quality. No other impacts on the hydrologic environment are expected to result from construction of the Platform Gina alternative onshore pipelines.

The quantity of fresh water which would be consumed during construction of the booster station is included in the 75,000 gallons (283,875 L) estimated for onshore pipeline construction. Other potential adverse impacts on the geologic and hydrologic environments would be the same as those for construction of the onshore treating facility for the proposed Mandalay configuration (Section 4.1.1.1.3). These impacts would be insignificant.

Option A and Booster Station

The terrain along this pipeline route is essentially flat; consequently, alteration of topography would be insignificant. Construction of onshore pipelines is not expected to increase erosion by water or wind because of the flatness of the topography and the short time period in which disturbance would occur. The pipeline route crosses soils of the Riverwash-Sandy Alluvial Land-Coastal Beaches, Camarillo-Hueneme-Pacheco, and Pico-Metz-Anacapa associations. Because the individual soils crossed generally have been highly disturbed, potential adverse impacts on soils associated with construction of Option A pipelines are expected to be of low significance. No other adverse impacts on the geologic environment are expected to result from construction of the Option A pipelines.

During construction, approximately 620,000 gallons (2,346,700 L) of fresh water would be consumed for hydrostatic testing or general construction purposes. This amount represents less than 0.002 percent of the annual demand for fresh water in the Oxnard Plain area. Therefore, the potential impact on regional fresh-water supplies would be negligible. Pipeline construction and waste disposal are not expected to produce any adverse impacts on surface or ground water quality. No other adverse impacts on the hydrologic environment are expected to result from construction of the Option A onshore pipelines.

The quantity of fresh water which would be consumed during construction of the booster station is included in the 620,000 gallons (2,346,700 L) estimated for Option A pipeline construction. Other potential adverse impacts on the geologic and hydrologic environments would be the same as those for construction of the onshore treating facility for the proposed Mandalay configuration (Section 4.1.1.1.3).

Option B and Booster Stations

Potential adverse impacts on the geologic and hydrologic environments resulting from construction of the Option B pipelines and booster stations would be nearly the same as those associated with construction of the Option A pipelines and booster station. Principal differences are discussed below.

During construction, approximately 1,150,000 gallons (4,352,750 L) of fresh water would be consumed for hydrostatic testing and general construction purposes. This amount represents approximately 0.003 percent of the annual demand for fresh water in the Oxnard Plain area. Therefore, a potential impact of low significance on regional fresh-water supplies is expected.

Construction of the onshore pipelines and the second booster station (near the intersection of Gonzales and Rice roads) could result in disturbance of soils on up to approximately 35 acres (14 ha) of agricultural land. This would represent an impact of low to moderate significance.

4.1.4.1.5 Total Impact

Option A

The following potential adverse impacts on the geologic and hydrologic environments are expected to result from construction activities associated with the Ormond Beach Option A alternative configuration:

- alteration of existing topography, resulting from disturbance of offshore and onshore areas during grading and/or emplacement of facilities;
- disturbance of soils during grading and emplacement of onshore facilities; and,
- consumption of approximately 830,500 gallons (3,143,450 L) of fresh water (which represents approximately 0.0023 percent of the annual demand for fresh water in the Oxnard Plain area).

These impacts are expected to be of low significance. No significant adverse impacts are expected.

Option B

Potential adverse impacts on the geologic and hydrologic environments expected to result from construction activities associated with the Ormond Beach Option B alternative configuration would be nearly the same as for Option A. Principal differences would be:

- disturbance of 35 acres (14 ha) of agricultural soils during grading and emplacement of onshore pipelines and the second booster station; and,
- consumption of 1,365,000 gallons (5,166,500 L) of fresh water (which represents less than 0.0038 percent of the annual demand for fresh water in the Oxnard Plain area).

Potential impacts are expected to be of low to moderate significance. No significant adverse impacts are expected.

4.1.4.2 Drilling

Potential adverse impacts on the geologic and hydrologic environments associated with drilling at Platforms Gina and Gilda for this alternative configuration would be identical to those for the proposed Mandalay configuration (Section 4.1.1.2).

4.1.4.3 Production

Potential adverse impacts on the geologic and hydrologic environments associated with production at Platforms Gina and Gilda for this alternative configuration would be identical to those for the proposed Mandalay configuration (Section 4.1.1.3).

4.2 ATMOSPHERIC SCIENCES

4.2.1 Air Quality

Potential impacts on ambient air quality have been assessed by determining the atmospheric emissions associated with the proposed and alternative project configurations and relating these emissions to the Ventura County Air Pollution Control District (VCAPCD), U.S. Environmental Protection Agency (EPA), and the Department of the Interior (DOI) ambient air quality impact regulations. These regulations define significant air quality impacts. Atmospheric dispersion modeling was also conducted based on a request from the California Air Resources Board during development of the EIR/EA Work Program.

4.2.1.1 Atmospheric Emissions

Air pollutant emissions from onshore and offshore sources would occur as a result of construction, drilling, and production operations. Construction and drilling emissions would be of short duration, while those for production would occur throughout the life of the project. Emission sources would include worker transportation (automobile and boat), supply boats and trucks, electric power generation, and various types of portable and stationary diesel-fired and natural gas-fired equipment.

The worker transportation (automobile) and electric power generation emissions that would be directly related to this project are difficult to assess. Automobile emissions have been calculated assuming that the workers involved in the various project phases currently do not drive to work. This assumption results in the total amount of emissions associated with automobile use being attributed to this project. However, the actual emissions directly attributable to the proposed project would be equal to the difference between the current worker automobile travel emissions and the project-related automobile emissions. Because of several unknowns related to the current worker automobile use, this calculation is not possible.

Electric power generation emissions have been calculated assuming that the power required results from operation of a fuel oil-fired power plant. However, this power would actually come from the existing SCE electric power grid which includes power generated by nuclear fuel plants, hydroelectric plants, and natural gas-fired plants as well as fuel oil-fired plants. For this reason, the exact emissions associated with electric power use cannot be computed, and the exact source of these emissions cannot be determined.

4.2.1.1.1 Proposed Mandalay Configuration

Construction

Construction activities for the proposed Mandalay configuration would include platform (Gina and Gilda) erection, offshore pipeline and power cable installation, onshore treating facility emplacement, and onshore pipeline installation. Associated with these activities would be various transportation, diesel fuel-burning equipment, electric power generation, and fugitive emissions. These emissions would be temporary, ranging in duration from 1 day to approximately 16 weeks. The time periods and emission rates for each construction activity are shown in Appendix B.1, Tables B.1-1 and B.1-2. The peak construction emission rates would occur between 12 and 15 weeks after project approval as a result of overlaps for the Platform Gilda, Platform Gina offshore pipeline, onshore treating facility, and onshore pipeline construction activities. The emission rates for all phases of construction for the proposed Mandalay configuration are shown in Table 4.2-1. Detailed emissions calculations are shown in Appendix B.1.

Platforms: The same types of equipment would be associated with erection of Platforms Gina and Gilda. Sources of transportation-related emissions would include commuter vehicles, supply trucks, crew boats, supply boats, tugboats, and helicopters. Diesel fuel-burning equipment used for platform erection would include welding machines, cranes, and an electric power generator. Fugitive emissions would result from the use of a diesel storage tank located on the construction barge.

Offshore Pipelines: Installation of the offshore pipelines and power cables for Platform Gina and Platform Gilda would result in transportation-related emissions from commuter vehicles, supply trucks, trains, and tugboats. Diesel fuel-burning equipment would include cranes, welding machines, and an

TABLE 4.2-1

PROPOSED MANDALAY CONFIGURATION - CONSTRUCTION EMISSIONS

Project Element	Pollutant Emissions, lb/day[a]				
	NO_x (NO_2)[b]	THC	CO	SO_2	PM
PLATFORM GINA					
Employee Transportation	7.9	4.4	39.3	0.4	1.1
Supply Truck Transportation	2.0	0.2	1.3	0.3	0.2
Crew Boat Transportation	16.0	1.9	5.4	1.4	--
Supply Boat Transportation	6.4	2.5	3.2	0.7	--
Tugboat	82.4	1.9	12.4	4.2	3.6
Helicopter	1.3	2.4	4.9	0.2	0.1
Construction Equipment	938.0	75.0	204.0	62.4	67.0
Diesel Storage	--[c]	0.6	--	--	--
PLATFORM GILDA					
Employee Transportation	7.1	3.9	35.2	0.3	1.0
Supply Truck Transportation	4.0	0.4	2.6	0.6	0.4
Crew Boat Transportation	16.0	1.9	5.4	1.4	--
Supply Boat Transportation	6.4	2.5	3.2	0.7	--
Tugboat	82.4	1.9	12.4	4.2	3.6
Helicopter	1.8	2.5	5.5	0.2	0.2
Construction Equipment	938.0	75.0	204.0	62.4	67.0
Diesel Storage	--	0.6	--	--	--
PLATFORM GINA MANDALAY OFFSHORE PIPELINE ROUTE					
Employee Transportation (Pipeline)	14.2	8.0	71.3	0.8	2.0
Employee Transportation (Power Cable)	0.4	0.2	1.8	--	0.1
Supply Truck Transportation	4.2	0.4	2.7	0.6	0.4
Railroad Transportation	0.8	0.2	0.3	0.1	0.1
Tugboat (Pipeline)	117.4	5.3	45.5	10.5	--
Tugboat (Power Cable)	11.5	1.2	4.3	2.0	--
Construction Equipment	446.3	35.7	96.6	29.7	31.9

TABLE 4.2-1 (Concluded)

Project Element	Pollutant Emissions, lb/day[a]				
	NO_x (NO_2)[b]	THC	CO	SO_2	PM
PLATFORM GILDA OFFSHORE PIPELINE ROUTE					
Employee Transportation (Pipeline)	14.2	8.0	71.3	0.8	2.0
Employee Transportation (Power Cable)	0.2	0.1	0.8	--[b]	--[b]
Supply Truck Transportation	6.2	0.6	4.0	0.8	0.6
Railroad Transportation	0.7	0.2	0.2	0.1	--[b]
Tugboat (Pipeline)	117.4	5.3	45.5	10.5	--
Tugboat (Power Cable)	4.9	0.5	1.8	0.9	--
Construction Equipment	446.3	35.7	96.6	29.7	31.9
ONSHORE TREATING FACILITY					
Employee Transportation	12.9	7.2	64.8	0.7	1.9
Supply Truck Transportation	2.0	0.2	1.3	0.3	0.2
Construction Equipment	2.2	0.2	0.4	0.2	0.2
Electric Power Generation	3.1	0.3	0.3	3.6	0.6
Fugitive Dust	--	--	--	--	27.6
ONSHORE PIPELINE ROUTE					
Employee Transportation	8.0	4.5	40.5	0.4	1.1
Supply Truck Transportation	3.6	0.4	2.3	0.5	0.4
Construction Equipment	3.5	0.2	0.6	0.2	0.2
Fugitive Dust	--	--	--	--	11.4
OVERALL AVERAGE EMISSION RATE	761.9	70.9	296.5	57.5	77.6

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[a] Calculated over the total construction time period for the appropriate project element.

[b] Abbreviations are:

NO_x (NO_2) - nitrogen oxides as nitrogen oxide
THC - total hydrocarbons
CO - carbon monoxide
SO_2 - sulfur dioxide
PM - particulate matter

[c] Rate less than 0.1 lb/day or 0.

electric power generator. The duration of individual construction activities for pipeline and power cable installation varies from one day to 7 weeks.

Onshore Treating Facility: Atmospheric emissions during construction of the onshore treating facility would result from worker and supply truck transportation, construction equipment, electrical power generation, and fugitive dust emissions. Construction and equipment installation would take approximately 16 weeks. However, construction equipment and fugitive dust emissions would occur only during the first 6 weeks.

Onshore Pipelines: Construction activities for the onshore pipelines for the proposed Mandalay configuration would involve employee and supply truck transportation, various types of construction equipment, and fugitive dust emissions.

Drilling

The atmospheric emissions sources associated with drilling operations at Platforms Gina and Gilda would include employee transportation, supply and crew boat transportation, drilling equipment, and electric power generation. At Platform Gilda, drilling into the Repetto and Monterey formations would occur concurrently utilizing the same labor force and drilling equipment (there are two drilling rigs). Therefore, there would be no incremental daily emissions associated with drilling into the Monterey Formation. Emissions which would result during drilling operations at Platforms Gina and Gilda are summarized in Table 4.2-2. Detailed emissions calculations are shown in Appendix B.1.

Production

The atmospheric emissions associated with production for the proposed Mandalay configuration originate from platform (both Gina and Gilda) and onshore treating facility operations. Emissions sources would include employee transportation, crew and supply boat transportation, diesel fuel-burning equipment, electric power generation, gas turbine compressors (possible future installation), natural gas-fired heater treaters, and

TABLE 4.2-2

PROPOSED MANDALAY CONFIGURATION - DRILLING EMISSIONS

Project Element	Pollutant Emissions, lb/day				
	NO_x (NO_2)	THC	CO	SO_2	PM
PLATFORM GINA					
Employee Transportation	14.5	8.2	72.9	0.8	2.1
Crew Boat Transportation	22.2	1.7	5.4	1.9	--[a]
Supply Boat Transportation	4.8	0.8	1.6	0.5	--
Drilling Equipment	19.7	1.6	4.3	1.3	1.4
Electric Power Generation	74.5	5.8	6.5	85.9	13.0
PLATFORM GILDA					
Employee Transportation	19.4	10.9	97.2	1.0	2.8
Crew Boat Transportation	43.1	3.2	10.0	3.6	--
Supply Boat Transportation	9.3	1.0	2.6	0.8	--
Drilling Equipment	39.4	3.2	8.6	2.6	2.8
Electric Power Generation	173.9	13.6	15.1	200.3	30.2

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[a] Rate less than 0.1 lb/day.

fugitive hydrocarbon emissions. When both the Repetto and Monterey formations were producing concurrently, the same crew and diesel-fired equipment would be used. Therefore, the only incremental daily emissions for production from the Monterey Formation would be those from the two gas-fired turbine compressors. Production emissions associated with the proposed Mandalay configuration are summarized in Table 4.2-3.

Total Emissions for the Proposed Mandalay Configuration

The total emissions associated with the proposed Mandalay configuration would occur during construction, drilling, and production activities. Once construction was completed, emissions sources would be located at Platform Gina, Platform Gilda and the onshore facility. Total emissions for each pollutant for the proposed Mandalay configuration are shown in Figure 4.2-1.

4.2.1.1.2 East Mandalay Alternative Configuration

Construction

The only difference between the emissions associated with construction of the proposed Mandalay configuration and those with the East Mandalay alternative is related to onshore pipeline construction. The slightly greater onshore pipeline corridor length and rights-of-way widths would result in different fugitive dust emissions during construction. The construction emissions for this alternative configuration are shown in Table 4.2-4. Detailed emissions calculations are shown in Appendix B.1.

Drilling

The drilling emissions associated with this alternative would be identical to those associated with the proposed Mandalay configuration (Section 4.2.1.1.1). These emissions are shown in Table 4.2-2.

Production

The production emissions associated with this alternative would be identical to those of the proposed Mandalay configuration (Section 4.2.1.1.1). These emissions are shown in Table 4.2-3.

TABLE 4.2-3

PROPOSED MANDALAY CONFIGURATION - PRODUCTION EMISSIONS

Project Element	Pollutant Emissions, lb/day				
	NO_x (NO_2)	THC	CO	SO_2	PM
PLATFORM GINA					
Employee Transportation	1.9	1.1	9.7	0.1	0.3
Crew Boat Transportation	22.2	1.7	5.4	1.9	--[a]
Supply Boat Transportation	1.4	0.3	0.5	0.1	--
Diesel Fuel	12.9	1.0	2.8	0.9	0.9
Electric Power Generation	24.8	1.9	2.2	28.6	4.3
Equipment Seal Leakage	--	1.9	--	--	--
PLATFORM GILDA					
Employee Transportation	2.9	1.6	14.6	0.2	0.4
Crew Boat Transportation	43.1	3.2	10.0	3.6	--
Supply Boat Transportation	2.7	0.3	0.8	0.2	--
Diesel Fuel	25.7	2.1	5.6	1.7	1.8
Electric Power Generation	99.4	7.8	8.6	114.5	17.3
Equipment Seal Leakage	--	150.3	--	--	--
Gas Turbines (Monterey Formation)	216.8	72.8	46.0	0.4	5.6
ONSHORE TREATING FACILITY					
Heater Treaters	76.8	2.7	14.7	0.6	8.7
Electric Power Generation	24.8	1.9	2.2	28.6	4.3
Equipment Seal Leakage	--	144.3	--	--	--

---

[a] Rate less than 0.1 lb/day.

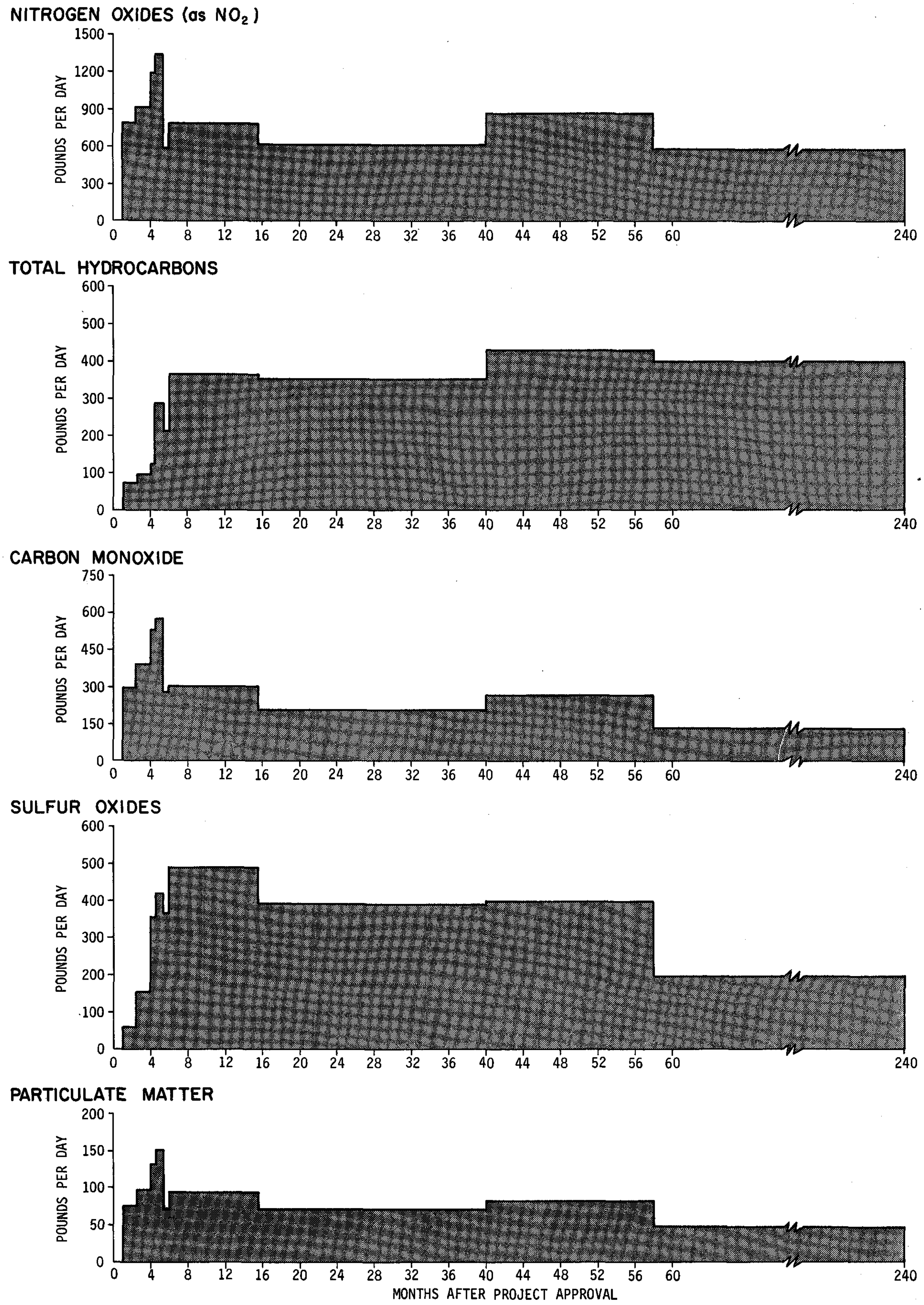

FIGURE 4.2-1

TOTAL EMISSIONS FOR PROPOSED MANDALAY CONFIGURATION

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TABLE 4.2-4

EAST MANDALAY ALTERNATIVE CONFIGURATION - CONSTRUCTION EMISSIONS

Project Element	Pollutant Emissions, lb/day[a]				
	NO_x (NO_2)	THC	CO	SO_2	PM
PLATFORM GINA					
Employee Transportation	7.9	4.4	39.3	0.4	1.1
Supply Truck Transportation	2.0	0.2	1.3	0.3	0.2
Crew Boat Transporation	16.0	1.9	5.4	1.4	--[b]
Supply Boat Transporation	6.4	2.5	3.2	0.7	--
Tugboat	82.4	1.9	12.4	4.2	3.6
Helicopter	1.3	2.4	4.9	0.2	0.1
Construction Equipment	938.0	75.0	204.0	62.4	67.0
Diesel Storage	--	0.6	--	--	--
PLATFORM GILDA					
Employee Transportation	7.1	3.9	35.2	0.3	1.0
Supply Truck Transportation	4.0	0.4	2.6	0.6	0.4
Crew Boat Transportation	16.0	1.9	5.4	1.4	--
Supply Boat Transportation	6.4	2.5	3.2	0.7	--
Tugboat	82.4	1.9	12.4	4.2	3.6
Helicopter	1.8	2.5	5.5	0.2	0.2
Construction Equipment	938.0	75.0	204.0	62.4	67.0
Diesel Storage	--	0.6	--	--	--
PLATFORM GINA MANDALAY OFFSHORE PIPELINE ROUTE					
Employee Transportation (Pipeline)	14.2	8.0	71.3	0.8	2.0
Employee Transportation (Power Cable)	0.4	0.2	1.8	--	0.1
Supply Truck Transportation	4.2	0.4	2.7	0.6	0.4
Railroad Transportation	0.8	0.2	0.3	0.1	0.1
Tugboat (Pipeline)	117.4	5.3	45.5	10.5	--
Tugboat (Power Cable)	11.5	1.2	4.3	2.0	--
Construction Equipment	446.3	35.7	96.6	29.7	31.9

TABLE 4.2-4 (Concluded)

Project Element	Pollutant Emissions, lb/day[a]				
	NO_x (NO_2)	THC	CO	SO_2	PM
PLATFORM GILDA OFFSHORE PIPELINE ROUTE					
Employee Transportation (Pipeline)	14.2	8.0	71.3	0.8	2.0
Employee Transportation (Power Cable)	0.2	0.1	0.8	--	--
Supply Truck Transportation	6.2	0.6	4.0	0.8	0.6
Railroad Transportation	0.7	0.2	0.2	0.1	--
Tugboat (Pipeline)	117.4	5.3	45.5	10.5	--
Tugboat (Power Cable)	4.9	0.5	1.8	0.9	--
Construction Equipment	446.3	35.7	96.6	29.7	31.9
ONSHORE TREATING FACILITY					
Employee Transportation	12.9	7.2	64.8	0.7	1.9
Supply Truck Transportation	2.0	0.2	1.3	0.3	0.2
Construction Equipment	2.2	0.2	0.4	0.2	0.2
Electric Power Generation	3.1	0.3	0.3	3.6	0.6
Fugitive Dust	--	--	--	--	27.6
ONSHORE PIPELINE ROUTE					
Employee Transportation	8.0	4.5	40.5	0.4	1.1
Supply Truck Transportation	3.6	0.4	2.3	0.5	0.4
Construction Equipment	3.5	0.2	0.6	0.2	0.2
Fugitive Dust	--	--	--	--	13.5
OVERALL AVERAGE EMISSION RATE	761.9	70.9	296.5	57.5	79.2

---

[a] Calculated over the total construction time period for the appropriate project element.

[b] Rate less than 0.1 lb/day or 0.

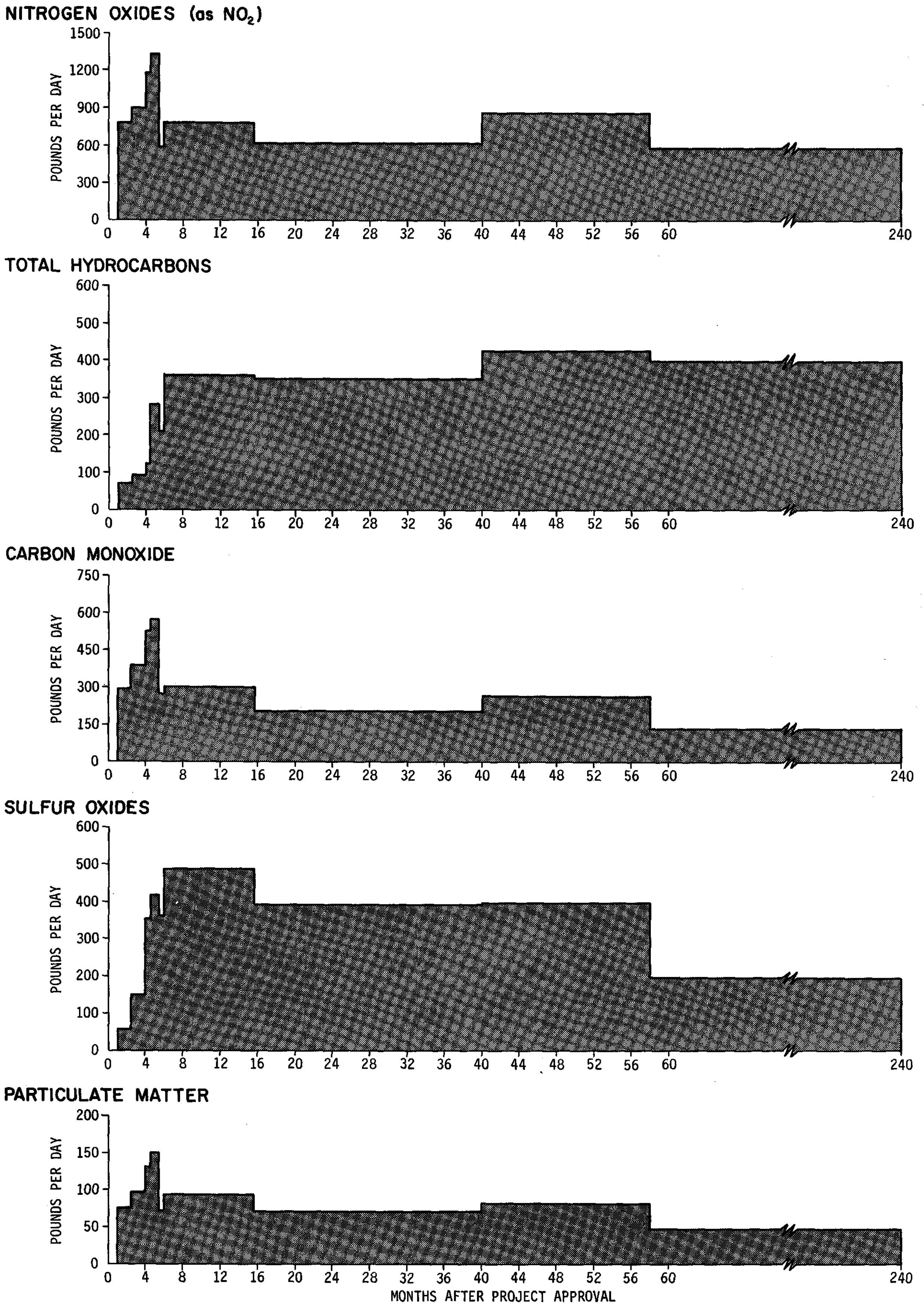

FIGURE 4.2-2

TOTAL EMISSIONS FOR EAST MANDALAY ALTERNATIVE

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Total Emissions for the East Mandalay Alternative Configuration

The total emissions associated with this alternative would be identical to the proposed Mandalay configuration for all pollutants except for a slightly higher amount of particulates from construction. The total emissions for each pollutant for the alternative configuration are shown on Figure 4.2-2.

4.2.1.1.3 Union Oil Marine Terminal Alternative Configuration

Construction

The construction emissions associated with this alternative would be higher than those of the proposed Mandalay configuration because of differences in the onshore pipeline system, including construction of a booster station. Emission rates associated with construction for the Union Oil Marine Terminal alternative configuration are shown in Table 4.2-5. Detailed emissions calculations are shown in Appendix B.1.

Drilling

The drilling emissions associated with this alternative would be identical to those associated with the proposed Mandalay configuration (see Section 4.2.1.1.1). These emissions are shown in Table 4.2-2.

Production

The higher emissions associated with this alternative compared to those of the proposed Mandalay configuration would result from the operation of the onshore pipeline system. The additional emissions would result from electric power generation, the natural gas-fired booster station heater, and fugitive hydrocarbon emissions from booster station equipment seal leakage. The production emissions associated with this alternative are shown in Table 4.2-6. Detailed emission calculations are shown in Appendix B.1.

Total Emissions for the Union Oil Marine Terminal Alternative Configuration

The construction and production emissions associated with this alternative would be slightly higher than the emissions associated with the proposed

TABLE 4.2-5

UNION OIL MARINE TERMINAL ALTERNATIVE CONFIGURATION - CONSTRUCTION EMISSIONS

Project Element	Pollutant Emissions, lb/day[a]				
	NO_x (NO_2)	THC	CO	SO_2	PM
PLATFORM GINA					
Employee Transportation	7.9	4.4	39.3	0.4	1.1
Supply Truck Transportation	2.0	0.2	1.3	0.3	0.2
Crew Boat Transportation	16.0	1.9	5.4	1.4	--[b]
Supply Boat Transportation	6.4	2.5	3.2	0.7	--
Tugboat	82.4	1.9	12.4	4.2	3.6
Helicopter	1.3	2.4	4.9	0.2	0.1
Construction Equipment	938.0	75.0	204.0	62.4	67.0
Diesel Storage	--	0.6	--	--	--
PLATFORM GILDA					
Employee Transportation	7.1	3.9	35.2	0.3	1.0
Supply Truck Transportation	4.0	0.4	2.6	0.6	0.4
Crew Boat Transportation	16.0	1.9	5.4	1.4	--
Supply Boat Transportation	6.4	2.5	3.2	0.7	--
Tugboat	82.4	1.9	12.4	4.2	3.6
Helicopter	1.8	2.5	5.5	0.2	0.2
Construction Equipment	938.0	75.0	204.0	62.4	67.0
Diesel Storage	--	0.6	--	--	--
PLATFORM GINA MANDALAY OFFSHORE PIPELINE ROUTE					
Employee Transportation (Pipeline)	14.2	8.0	71.3	0.8	2.0
Employee Transportation (Power Cable)	0.4	0.2	1.8	--	0.1
Supply Truck Transportation	4.2	0.4	2.7	0.6	0.4
Railroad Transportation	0.8	0.2	0.3	0.1	0.1
Tugboat (Pipeline)	117.4	5.3	45.5	10.5	--
Tugboat (Power Cable)	11.5	1.2	4.3	2.0	--
Construction Equipment	446.3	35.7	96.6	29.7	31.9

TABLE 4.2-5 (Concluded)

Project Element	NO_x (NO_2)	THC	CO	SO_2	PM
	Pollutant Emissions, lb/day[a]				
PLATFORM GILDA OFFSHORE PIPELINE ROUTE					
Employee Transportation (Pipeline)	14.2	8.0	71.3	0.8	2.0
Employee Transportation (Power Cable)	0.2	0.1	0.8	--	--
Supply Truck Transportation	6.2	0.6	4.0	0.8	0.6
Railroad Transportation	0.7	0.2	0.2	0.1	--
Tugboat (Pipeline)	117.4	5.3	45.5	10.5	--
Tugboat (Power Cable)	4.9	0.5	1.8	0.9	--
Construction Equipment	446.3	35.7	96.6	29.7	31.9
ONSHORE TREATING FACILITY					
Employee Transportation	12.9	7.2	64.8	0.7	1.9
Supply Truck Transportation	2.0	0.2	1.3	0.3	0.2
Construction Equipment	2.2	0.2	0.4	0.2	0.2
Electric Power Generation	3.1	0.3	0.3	3.6	0.6
Fugitive Dust	--	--	--	--	27.6
ONSHORE PIPELINE ROUTE					
Employee Transportation (Onshore Pipeline)	19.6	11.0	98.4	1.1	2.8
Employee Transportation (Booster Station)	4.6	2.6	23.1	0.2	0.6
Fugitive Dust (Booster (Station)	--	--	--	--	7.5
Supply Truck Transportation	3.5	0.4	2.3	0.5	0.3
Construction Equipment	3.5	0.2	0.6	0.2	0.2
Fugitive Dust (Onshore Pipeline)	--	--	--	--	32.5
OVERALL AVERAGE EMISSION RATE	783.5	81.6	392.2	59.6	111.6

---

[a] Calculated over the entire construction time period for each project element.

[b] Rate less than 0.1 lb/day or 0.

TABLE 4.2-6

UNION OIL MARINE TERMINAL ALTERNATIVE CONFIGURATION - PRODUCTION EMISSIONS

Project Element	Pollutant Emissions, lb/day[a]				
	NO_x (NO_2)	THC	CO	SO_2	PM
PLATFORM GINA					
Employee Transportation	1.9	1.1	9.7	0.1	0.3
Crew Boat Transportation	22.2	1.7	5.4	1.9	--[a]
Supply Boat Transportation	1.4	0.3	0.5	0.1	--
Diesel Fuel	12.9	1.0	2.8	0.9	0.9
Electric Power Generation	24.8	1.9	2.2	28.6	4.3
Equipment Seal Leakage	--	1.9	--	--	--
PLATFORM GILDA					
Employee Transportation	2.9	1.6	14.6	0.2	0.4
Crew Boat Transportation	43.1	3.2	10.0	3.6	--
Supply Boat Transportation	2.7	0.3	0.8	0.2	--
Diesel Fuel	25.7	2.1	5.6	1.7	1.8
Electric Power Generation	99.4	7.8	8.6	114.5	17.3
Equipment Seal Leakage	--	150.3	--	--	--
Gas Turbines (Monterey Formation)	216.8	72.8	46.0	0.4	5.6
ONSHORE TREATING FACILITY					
Heater Treaters	76.8	2.7	14.7	0.6	8.7
Electric Power Generation	24.8	1.9	2.2	28.6	4.3
Equipment Seal Leakage	--	144.3	--	--	--
BOOSTER STATION					
Booster Station Heater	39.8	1.3	7.3	0.3	4.3
Electric Power Generation	15.9	1.2	1.4	18.3	2.8
Equipment Seal Leakage	--	35.0	--	--	--

---

[a] Rate less than 0.1 lb/day.

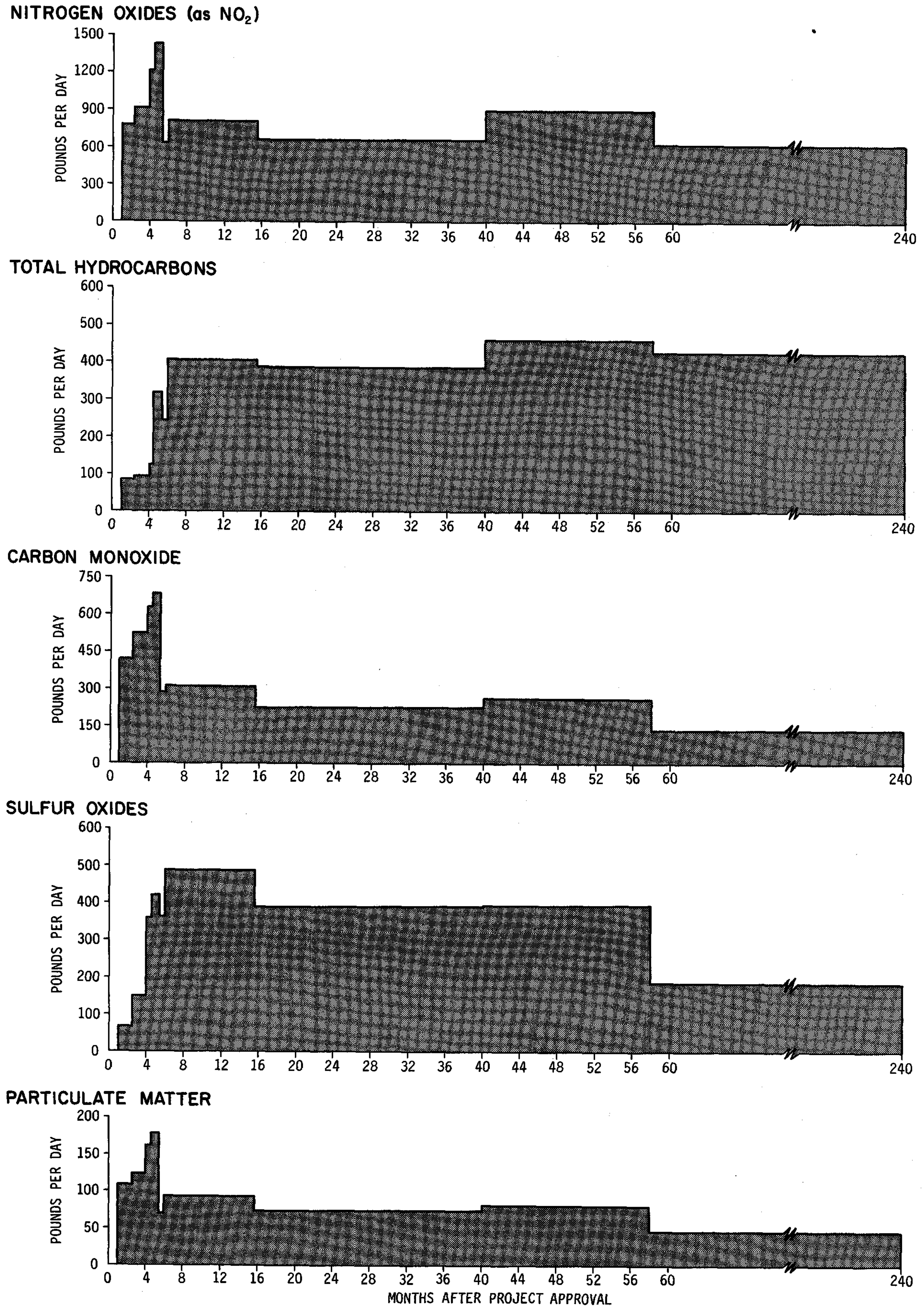

FIGURE 4.2-3

TOTAL EMISSIONS FOR UNION OIL MARINE TERMINAL ALTERNATIVE

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Mandalay configuration. This difference would result from higher construction emissions associated with a wider pipeline corridor and construction and operation of a booster station. The total emissions associated with this alternative configuration are shown on Figure 4.2-3.

4.2.1.1.3 Ormond Beach Alternative Configuration

Construction

The construction emissions associated with this alternative would be higher than those associated with the proposed Mandalay configuration due to differences in the offshore and onshore pipeline routes and construction of onshore booster stations. Emissions associated with construction of the Ormond Beach alternative configuration (Option A or B) are shown in Table 4.2-7. Detailed emissions calculations are shown in Appendix B.1.

Drilling

The drilling emissions associated with this alternative would be identical to those associated with the proposed Mandalay configuration (Section 4.2.1.1.1). These emissions are summarized in Table 4.2-2.

Production

The greater production emissions associated with this alternative compared to the proposed Mandalay configuration would result from the operation of the onshore pipeline system (Option A or B). Additional emissions associated with the onshore pipelines operation would result from electric power generation, natural gas-fired booster station heaters, and fugitive hydrocarbon emissions from booster station equipment seal leakage. The total production emissions for this alternative are shown in Table 4.2-8. Detailed emissions calculations are shown in Appendix B.1.

Total Emissions for the Ormond Beach Alternative Configuration

The construction and production emissions associated with this alternative (Option A or B) would be higher than those associated with the proposed Mandalay configuration because of the longer and wider onshore pipeline corridors and operation of the booster stations. The total emissions for each

TABLE 4.2-7

ORMOND BEACH ALTERNATIVE CONFIGURATION (OPTIONS A AND B) - CONSTRUCTION EMISSIONS

Project Element	Pollutant Emissions, lb/day[a]				
	NO_x (NO_2)	THC	CO	SO_2	PM
PLATFORM GINA (Options A or B)					
Employee Transportation	7.9	4.4	39.3	0.4	1.1
Supply Truck Transportation	2.0	0.2	1.3	0.3	0.2
Crew Boat Transportation	16.0	1.9	5.4	1.4	--[b]
Supply Boat Transportation	6.4	2.5	3.2	0.7	--
Tugboat	82.4	1.9	12.4	4.2	3.6
Helicopter	1.3	2.4	4.9	0.2	0.1
Construction Equipment	938.0	75.0	204.0	62.4	67.0
Diesel Storage	--	0.6	--	--	--
PLATFORM GILDA (Options A or B)					
Employee Transportation	7.1	3.9	35.2	0.3	1.0
Supply Truck Transportation	4.0	0.4	2.6	0.6	0.4
Crew Boat Transportation	16.0	1.9	5.4	1.4	--
Supply Boat Transportation	6.4	2.5	3.2	0.7	--
Tugboat	82.4	1.9	12.4	4.2	3.6
Helicopter	1.8	2.5	5.5	0.2	0.2
Construction Equipment	938.0	75.0	204.0	62.4	67.0
Diesel Storage	--	0.6	--	--	--
PLATFORM GINA ALTERNATIVE OFFSHORE PIPELINE ROUTE (Options A or B)					
Employee Transportation (Pipeline)	14.2	8.0	71.3	0.8	2.0
Employee Transportation (Power Cable)	0.1	0.1	0.6	--	--
Supply Truck Transportation	4.6	0.5	2.9	0.6	0.4
Railroad Transportation	0.3	0.1	0.1	--	--
Tugboat (Pipeline)	117.4	5.3	45.5	10.5	--
Tugboat (Power Cable)	3.8	0.4	1.4	0.7	--
Construction Equipment	446.3	35.7	96.6	29.7	31.9

TABLE 4.2-7 (Continued)

Project Element	Pollutant Emissions, lb/day				
	NO_x (NO_2)	THC	CO	SO_2	PM
PLATFORM GILDA OFFSHORE PIPELINE ROUTE (Options A or B)					
Employee Transportation (Pipeline)	14.2	8.0	71.3	0.8	2.0
Employee Transportation (Power Cable)	0.2	0.1	0.8	--	--
Supply Truck Transportation	6.2	0.6	4.0	0.8	0.6
Railroad Transportation	0.7	0.2	0.2	0.1	--
Tugboat (Pipeline)	117.4	5.3	45.5	10.5	--
Tugboat (Power Cable)	4.9	0.5	1.8	0.9	--
Construction Equipment	446.3	35.7	96.6	29.7	31.9
ONSHORE TREATING FACILITY (Options A or B)					
Employee Transportation	12.9	7.2	64.8	0.7	1.9
Supply Truck Transportation	2.0	0.2	1.3	0.3	0.2
Construction Equipment	2.2	0.2	0.4	0.2	0.2
Electric Power Generation	3.1	0.3	0.3	3.6	0.6
Fugitive Dust	--	--	--	--	27.6
ONSHORE PIPELINE ROUTE (Option A)					
Employee Transportation (Onshore Pipeline)	21.9	12.3	109.9	1.2	3.1
Employee Transportation (Booster Station)	18.4	10.4	92.6	1.0	2.6
Supply Truck Transportation (Pipeline & Booster Station)	7.1	0.7	4.6	0.9	0.7
Construction Equipment (Pipeline & Booster Station)	3.5	0.2	0.6	0.2	0.2
Fugitive Dust (Onshore Pipeline)	--	--	--	--	14.3
Fugitive Dust (Booster Station)	--	--	--	--	15.1

TABLE 4.2-7 (Concluded)

Project Element	Pollutant Emissions, lb/day[a]				
	NO_x (NO_2)	THC	CO	SO_2	PM
ONSHORE PIPELINE ROUTE (Option B)					
Employee Transportation (Onshore Pipeline)	26.5	14.9	133.1	1.5	3.8
Employee Transportation (Booster Station)	18.4	10.4	92.6	1.0	2.6
Supply Truck Transportation (Pipeline & Booster Station)	10.6	1.0	6.9	1.4	1.0
Construction Equipment (Pipeline & Booster Station)	3.5	0.2	0.6	0.2	0.2
Fugitive Dust (Onshore Pipeline)	--	--	--	--	20.4
Fugitive Dust (Booster Station)	--	--	--	--	22.6
OVERALL AVERAGE EMISSION RATE (OPTION A)	755.0	83.0	430.0	54.6	91.4
OVERALL AVERAGE EMISSION RATE (OPTION B)	665.2	78.9	437.5	48.3	98.5

---

[a] Calculated over the total construction time period for the appropriate project element.

[b] Rate less than 0.1 lb/day.

TABLE 4.2-8

ORMOND BEACH ALTERNATIVE CONFIGURATION (OPTIONS A AND B) - PRODUCTION EMISSIONS

Project Element	Pollutant Emissions, lb/day				
	NO_x (NO_2)	THC	CO	SO_2	PM
PLATFORM GINA (Options A or B)					
Employee Transportation	1.9	1.1	9.7	0.1	0.3
Crew Boat Transportation	22.2	1.7	5.4	1.9	--[a]
Supply Boat Transportation	1.4	0.3	0.5	0.1	--
Diesel Fuel	12.9	1.0	2.8	0.9	0.9
Electric Power Generation	24.8	1.9	2.2	28.6	4.3
Equipment Seal Leakage	--	1.9	--	--	--
PLATFORM GILDA (Options A or B)					
Employee Transportation	2.9	1.6	14.6	0.2	0.4
Crew Boat Transportation	43.1	3.2	10.0	3.6	--
Supply Boat Transportation	2.7	0.3	0.8	0.2	--
Diesel Fuel	25.7	2.1	5.6	1.7	1.8
Electric Power Generation	99.4	7.8	8.6	114.5	17.3
Equipment Seal Leakage	--	150.3	--	--	--
Gas Turbines (Monterey Formation)	216.8	72.8	46.0	0.4	5.6
ONSHORE TREATING FACILITY (Options A or B)					
Heater Treaters	76.8	2.7	14.7	0.6	8.7
Electric Power Generation	24.8	1.9	2.2	28.6	4.3
Equipment Seal Leakage	--	144.3	--	--	--
BOOSTER STATIONS (Option A)					
Booster Station Heaters	79.4	2.6	14.6	0.6	8.6
Electric Power Generation	46.5	3.6	4.0	53.5	8.1
Equipment Seal Leakage	--	70.0	--	--	--
BOOSTER STATIONS (Option B)					
Booster Station Heaters	119.1	3.9	21.9	0.9	12.9
Electric Power Generation	77.3	6.0	6.7	89.0	13.4
Equipment Seal Leakage	--	105.0	--	--	--

---

[a] Rate less than 0.1 lb/day.

pollutant for the Ormond Beach alternative configuration (Options A and B) are shown on Figures 4.2-4 and 4.2-5.

4.2.1.2 New Source Review

The proposed project elements are subject to county, state and federal new source review regulations. The ambient air quality impact of pollutant emissions sources located onshore and offshore to the 3-mile limit are subject to the jurisdiction of the Ventura County Air Pollution Control District (VCAPCD), the California Air Resources Board (CARB) and the U.S. Environmental Protection Agency (EPA). The ambient air quality impact of pollutant emission sources located beyond the 3-mile limit offshore (on the OCS) are subject to the jurisdiction of the U.S. Department of the Interior (DOI). This delineation of authority has been upheld by a recent opinion of the Ninth Circuit Court of Appeals (Exxon Corporation vs. EPA) which held that the DOI has sole authority for regulating air emissions on the OCS. The ambient air quality impact of the emissions associated with transportation emission sources and electric power generation are not subject to any of these regulations.

4.2.1.2.1 Ventura County Air Pollution Control District

The VCAPCD Rule 26-New Source Review (Authority to Construct and Permit to Operate) is the current new source review rule in Ventura County. This rule applies to the pollutant emissions from sources located onshore and offshore to the 3-mile limit. The provisions of this rule include the following requirements:

(1) For new stationary sources with SO_2, CO, or particulate matter (PM) emissions greater than 5 lb/hr (50 lb/hr for CO), equipment representing Best Available Air Pollution Control Technology must be used to control these emissions. For new sources of nitrogen oxides (NO_x) or volatile organic compounds (VOC) in the southern zone of the County, Best Available Air Pollution Control Technology is required regardless of the emission rate. The proposed and all alternative onshore project elements are in the southern zone of the County (as defined by Rule 26).

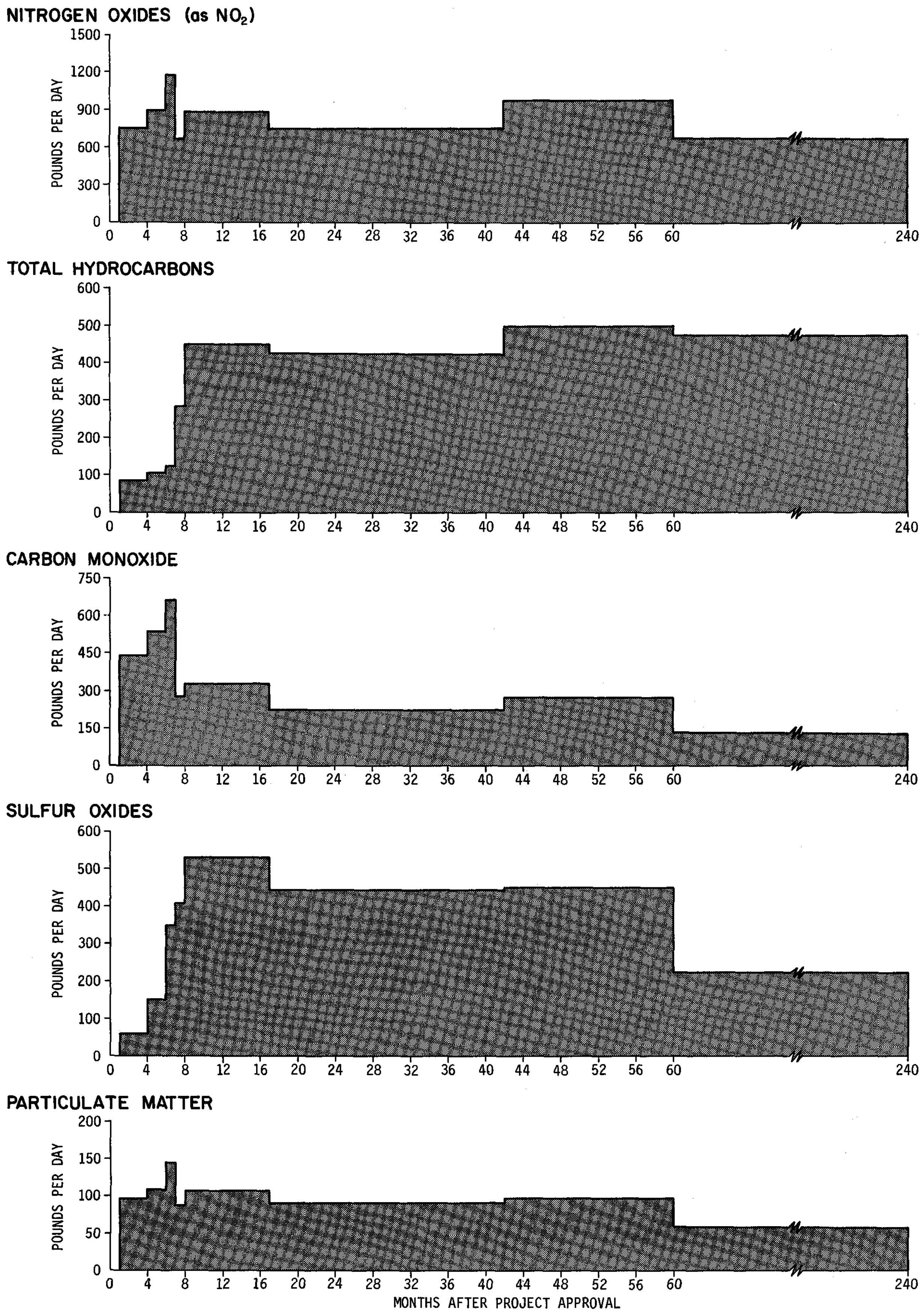

FIGURE 4.2-4

TOTAL EMISSIONS FOR ORMOND BEACH ALTERNATIVE (OPTION A)

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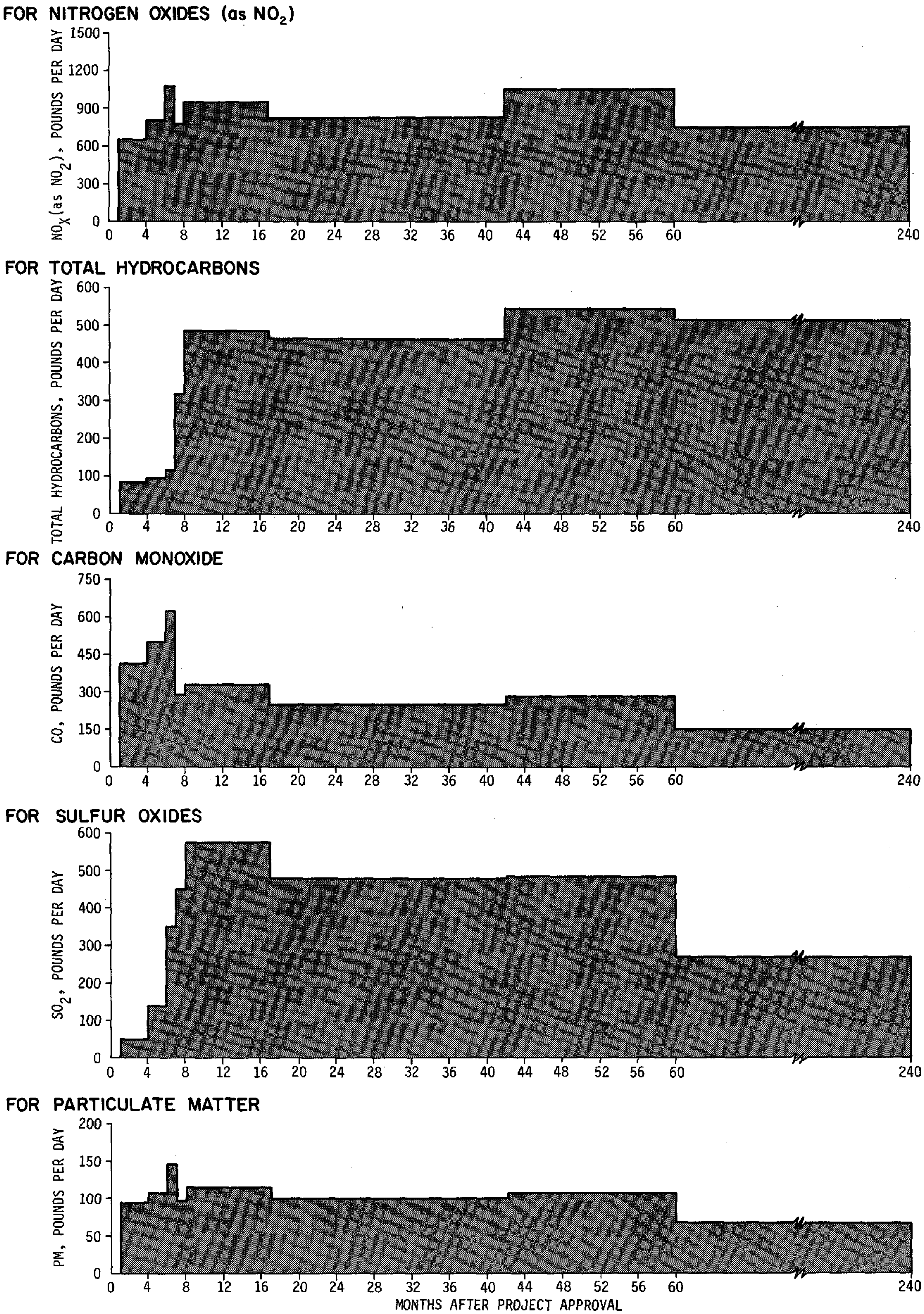
FOR NITROGEN OXIDES (as NO_2)

FOR TOTAL HYDROCARBONS

FOR CARBON MONOXIDE

FOR SULFUR OXIDES

FOR PARTICULATE MATTER

FIGURE 4.2-5

TOTAL EMISSIONS FOR ORMOND BEACH ALTERNATIVE (OPTION B)

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(2) For new stationary sources with SO_2, CO, or PM emissions greater than 10 lb/hr (100 lb/hr for CO), the permit application must include an air quality impact analysis which demonstrates that emissions will not cause a violation of, or interfere with the maintenance or attainment of, any national or California ambient air quality standard.

(3) For sources of NO_x or VOC in the southern zone of the County, appropriate emissions offsets must be obtained if emissions are higher than an amount determined by the VCAPCD emissions allocation plan.

(4) A source may be exempt from the requirements of (2) if appropriate emissions offsets are obtained.

Emissions from project elements subject to Rule 26 are given in Table 4.2-9 for the proposed and all alternative configurations. Onshore stationary source emissions of SO_2, CO, and would be substantially less than 5 lb/hr for the proposed project configuration or any one of the primary alternatives. Therefore, the onshore SO_2, CO, and PM emissions are not considered significant by the VCAPCD and would be exempt from review under Rule 26.

Onshore stationary source emissions of NO_x and VOC would require appropriate offsets for emissions greater than the allocations allowed by Rule 26. Offset/allocation ratios (offset emissions/increased emissions) range from 1.0 to 3.0 depending on the area in which the offset/allocation is obtained.

Union has received an authority to construct from the VCAPCD for the proposed Mandalay onshore treating facility. The NO_x and VOC emissions offset requirements were met using the VCAPCD emissions allocation plan. This emissions allocation would also apply should the East Mandalay alternative configuration be chosen. The selection of either the Union Oil Marine Terminal or Ormond Beach alternative would require additional emissions allocations (see Table 4.2-9). However, this change would probably not result in the requirement for emissions offsets beyond the allocation.

TABLE 4.2-9

ONSHORE STATIONARY SOURCE EMISSIONS - PROPOSED AND ALTERNATIVE CONFIGURATIONS

	Emission Rate, lb/hr (ton/yr)				
Configuration and Source	NO_x (as NO_2)	THC[a]	CO	SO_2	PM
Mandalay (Proposed)					
Heater Treaters	3.2(14.0)	0.1(0.4)	0.6(2.6)	0.03(0.13)	0.4(1.8)
Fugitive	0.0(0.0)	6.0(26.3)	0.0(0.0)	0.0(0.0)	0.0(0.0)
Total	3.2(14.0)	6.1(26.7)	0.6(2.6)	0.03(0.13)	0.4(1.8)
East Mandalay (Alternative)					
Heater Treaters	3.2(14.0)	0.1(0.4)	0.6(2.6)	0.03(0.13)	0.4(1.8)
Fugitive	0.0(0.0)	6.0(26.3)	0.0(0.0)	0.0(0.0)	0.0(0.0)
Total	3.2(14.0)	6.1(26.7)	0.6(2.6)	0.03(0.13)	0.4(1.8)
Union Oil Marine Terminal (Alternative)					
Heater Treaters	3.2(14.0)	0.1(0.4)	0.6(2.6)	0.03(0.13)	0.4(1.8)
Booster Station Heaters	1.7(7.4)	0.1(0.4)	0.3(1.3)	0.01(0.04)	0.2(0.9)
Fugitive	0.0(0.0)	7.5(32.7)	0.0(0.0)	0.0(0.0)	0.0(0.0)
Total	4.9(21.4)	7.7(33.5)	0.9(3.9)	0.04(0.17)	0.6(2.7)
Ormond Beach-Option A (Alternative)					
Heater Treaters	3.2(14.0)	0.1(0.4)	0.6(2.6)	0.03(0.13)	0.4(1.8)
Booster Station Heaters	3.3(14.4)	0.1(0.4)	0.6(2.6)	0.03(0.13)	0.4(1.8)
Fugitive	0.0(0.0)	8.9(39.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
Total	6.5(28.4)	9.1(39.8)	1.2(5.2)	0.06(0.26)	0.8(3.6)
Ormond Beach-Option B (Alternative)					
Heater Treaters	3.2(14.0)	0.1(0.4)	0.6(2.6)	0.03(0.13)	0.4(1.8)
Booster Station Heaters	5.0(21.9)	0.2(0.9)	0.9(3.9)	0.04(0.18)	0.5(2.2)
Fugitive	0.0(0.0)	10.4(45.6)	0.0(0.0)	0.0(0.0)	0.0(0.0)
Total	8.2(35.9)	10.7(46.9)	1.5(6.5)	0.07(0.31)	0.9(4.0)

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[a] Volatile organic compounds are the reactive portion of total hydrocarbons. Therefore, VOC emissions would be less than the amounts given here.

4.2.1.2.2 California Air Resources Board

The CARB has the authority to oversee the operations of individual air pollution control districts/air quality management districts within the state and to overrule decisions made by individual districts. The CARB has approved a model rule to be used by individual districts as a basis for an acceptable new source review regulation. The VCAPCD New Source Review Rule (Rule 26) is in many respects more stringent than the model rule and has been allowed to stand by the CARB.

4.2.1.2.3 U.S. Environmental Protection Agency

The EPA has promulgated two regulations dealing with new source review. These are commonly referred to as the Prevention of Significant Deterioration (PSD) rules (Federal Register, June 19, 1978) and the emissions offset rule (Federal Register, January 16, 1979). The PSD rules were promulgated to apply to areas and pollutants where the National Ambient Air Quality Standards (NAAQS) are not exceeded (attainment areas). The emissions offset rules were promulgated to apply to areas and pollutants where the NAAQS are exceeded (nonattainment areas).

The EPA has listed the attainment status of all areas in the U.S. with respect to the NAAQS (Federal Register, March 3, 1978). Some designations have been updated in the Federal Register since that date. The southern portion of Ventura County is currently classified as nonattainment for ozone (O_3) and total suspended particulates (TSP) and as attainment for NO_2, SO_2 and CO. Emissions of VOC are recognized by EPA as a precursor to O_3 and, therefore, are subject to regulations for nonattainment pollutants.

In June 1979, the U.S. Court of Appeals for the District of Columbia Circuit (Alabama Power Company vs. Costle) found that many provisions of the PSD rules were invalid. This ruling was finalized in December 1979. While this opinion was directed solely towards the PSD rules, the emissions offset rules were also affected since several concepts addressed by the Court were applicable to both regulations. The Court opinion prompted EPA to issue proposed revisions to the PSD and emissions offset regulations (Federal Register, September 5, 1979). Finalization of the proposed regulations is expected during June 1980. The EPA issued a stay of the original PSD rules (Federal Register, February 5, 1980) for sources which either: (1) would not be major under the proposed rules; or, (2) would be located in an area that was nonattainment for pollutants for which the source would be major under the proposed rules.

The PSD rules apply to emissions of NO_x, SO_2, and CO in Ventura County. Under both existing and proposed rules, a source is exempt from full PSD review (including an air quality impact analysis) if it is not a major source for any air pollutant. A major source is defined as one with the potential to emit greater than 250 tons per year of any air pollutant. A 100-ton-per-year limit applies for a select group of 28 source types. Petroleum production projects are not included in this latter group. A major difference between the existing and proposed rules is the definition of "potential to emit." In the existing rule, potential emissions refer to the emissions occurring at maximum rated capacity without any control equipment. In the proposed rule, control equipment can be considered in determining potential emissions.

Under the existing rule, a major source would be exempt from full PSD review on a pollutant-by-pollutant basis, if controls were installed to reduce the actual pollutant emissions to less than 50 tons per year. Under the proposed rule, full PSD review would be required for all pollutants if the source were classified as major for any one pollutant. Pollutants with emissions below given <u>de minimis</u> emission levels or with demonstrated air quality impacts below given <u>de minimis</u> air quality levels would be exempt from this requirement.

The proposed and alternative onshore configurations would not be major sources for NO_x, SO_2 or CO under the proposed definitions of major source and potential to emit (see Table 4.2-9). Therefore, PSD review would not be required.

The emissions offset rules were generally applicable until June 30, 1979 at which time they were superseded by either: (1) the preconstruction review provisions of an approved State Implementation Plan (SIP); or, (2) a prohibition on construction of major new sources if the SIP was not approved. The emissions offset rules would continue to apply to nonattainment areas classified as such after the SIP approval and, therefore, not included in the SIP. In any event, the emissions offset rules can be viewed as a guide since the California SIP revisions have not yet been approved by EPA.

Under the existing emissions offset rules, a source is defined as major if its uncontrolled emissions are greater than 100 tons per year. Sources with actual emissions limited by permit conditions to less than 50 tons per year, 1000 pounds per day or 100 pounds per hour (whichever is most restrictive) are exempt from the existing rules. Under the proposed rules, a major source is one with controlled emissions of greater than 100 tons per year. As shown in Table 4.2-9, the proposed and alternative configurations would not be major sources under the revised definition. Therefore, the prohibition on construction does not apply.

4.2.1.2.4 U.S. Department of Interior

The DOI (through the U.S. Geological Survey) has recently promulgated regulations concerning the new source review of air pollutant emissions sources located on the OCS (Federal Register, March 7, 1980). These regulations specify the conditions for review and control of emissions occurring on the OCS affecting both attainment and nonattainment areas. Although these regulations apply to all OCS emission sources, more stringent conditions have been proposed for OCS emission sources located offshore California (Federal Register, March 7, 1980).

A facility is subject to these regulations if its emissions are greater than a calculated threshold value "E". This threshold value is a function of the distance from shore a source is located as shown in the following equations:

CO emissions: $E = 3400\ D^{2/3}$

PM, SO_2, NO_x, VOC emissions: $E = (33.3)D$

PM, SO_2, NO_x, VOC emissions: $E = (15.3)D$ (proposed for offshore California)

E = threshold value, ton/yr

D = distance from shore, miles

If a pollutant emission rate exceeds this threshold, then the ambient air quality impact of that emission must be addressed. Air dispersion modeling is used to address the impact of SO_2, CO, PM, or NO_x emissions exceeding the threshold values.

If the air dispersion modeling indicates a significant onshore impact, the pollutant emissions must be controlled using equipment reflecting the Best Available Control Technology (BACT). Significant impacts are defined as those exceeding the EPA defined air quality de minimis levels (Federal Register, September 5, 1979). No additional emissions controls (beyond BACT) are required for facilities significantly affecting attainment areas if the modeling indicates that the NAAQS or PSD increments would not be violated. If nonattainment areas are affected, emissions must be reduced with further controls or through the use of emission offsets.

VOC emissions are assumed to significantly impact onshore O_3 air quality levels if they exceed the threshold values. If attainment areas are affected, VOC emission control equipment reflecting BACT must be installed. If nonattainment areas are affected, VOC emissions must be reduced with further controls or through the use of emissions offsets.

These regulations also include special provisions for activities occurring on a temporary basis (less than three years). If the emissions during temporary activities exceed the threshold limits and air dispersion modeling indicates that a significant air quality impact would occur, equipment reflecting BACT must be used to control these emissions. Emissions offsets are not required for these activities.

Platform Gina would be located approximately 4.5 miles (7.2 km) offshore and Platform Gilda would be located approximately 10 miles (16 km) offshore. This results in the following threshold values:

	Emission Threshold, ton/yr	
Pollutant	Platform Gina	Platform Gilda
CO	9,267	15,781
PM, NO_x, SO_2, VOC	150	333
PM, NO_x, SO_2, VOC[a]	69	153

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[a] proposed offshore California regulations.

The estimated atmospheric emissions during drilling and production activities on both platforms are shown in Tables 4.2-10 and 4.2-11. The following maximum emissions would occur during concurrent drilling and production activities on each platform:

	Pollutant Emissions, ton/yr					
	Platform Gina			Platform Gilda		
	Drilling[a]	Production	Total	Drilling	Production[b]	Total
SO_2	0.2	0.2	0.4	0.5	0.4	0.9
NO_x	3.6	2.4	6.0	7.2	44.3	51.5
CO	0.8	0.5	1.3	1.6	9.4	11.0
PM	0.3	0.2	0.5	0.5	1.4	1.9
THC	0.3	0.5	0.8	0.6	41.1	41.7

---

[a] Platform Gina drilling emissions are exempt from review since they occur for a period less than 3 years.

[b] These emissions include the equipment necessary for development of the Monterey Formation.

TABLE 4.2-10

OFFSHORE STATIONARY SOURCE EMISSIONS - DRILLING OPERATIONS

	Emission Rate, ton/yr				
Emission Source	NO_x(as NO_2)	THC[a]	CO	SO_2	PM
Platform Gina[b]	3.6	0.3	0.8	0.2	0.3
Platform Gilda[c]	7.2	0.6	1.6	0.5	0.5

---

[a] Volatile organic compounds are the reactive portion of total hydrocarbons (THC). Therefore, VOC emissions would be less than the amounts given here.

[b] Duration - 13 months

[c] Duration - 54 months

TABLE 4.2-11

OFFSHORE STATIONARY SOURCE EMISSIONS - PRODUCTION OPERATIONS

	Emission Rate, ton/yr				
Emission Source	NO_x(as NO_2)	THC[a]	CO	SO_2	PM
Platform Gina					
Diesel Fuel Usage	2.4	0.2	0.5	0.2	0.2
Equipment Seal Leakage	--	0.3	--	--	--
Platform Gilda[b]					
Diesel Fuel Usage	4.7	0.4	1.0	0.3	0.3
Gas Turbines	39.6	13.3	8.4	0.1	1.0
Equipment Seal Leakage	--	27.4	--	--	--

---

[a] Volatile organic compounds are the reactive portion of total hydrocarbons. Therefore, VOC emissions would be less than the amounts given here.

[b] These emissions include the equipment necessary for the development of the Monterey Formation.

These emission rates are below the applicable threshold values. For this reason, the ambient air quality impact of these emissions does not require further review under the DOI regulations.

4.2.1.3 Atmospheric Dispersion Modeling

The analyses presented in Sections 4.2.1.1 and 4.2.1.2 indicate that the atmospheric emissions from the proposed and alternative project configurations would not have a significant impact on ambient air quality. This was determined by comparing the calculated emissions with the applicable air quality regulations. Different regulations apply to different project elements. The overall ambient air quality impact of the proposed project or alternative configurations is not reviewed by air quality agencies due to jurisdictional considerations. The results of an ambient air quality impact analysis for the combined onshore and offshore portions of the proposed Mandalay configuration are presented in this section.

Atmospheric emissions would occur during the construction, drilling, and production phases. Construction emissions would occur for short periods of time and would not cause significant long-term, adverse, air quality impacts. The emissions that would occur during drilling and production operations have a greater potential to impact ambient air quality because of their long-term (greater than 1-year) occurrence. Maximum emissions would occur during the following simultaneous operations:

- Drilling and production at Platform Gilda
- Production at Platform Gina
- Onshore treating at maximum design capacity

The Platform Gilda emissions are assumed to result from combined drilling and production from the Repetto and Monterey formations. Union has indicated that production from the Monterey Formation would occur only if the test drilling program indicates commercial quantities of hydrocarbons are recoverable from this formation.

The stack parameters associated with these operations for the proposed Mandalay configuration are shown in Table 4.2-12. The NO_x emissions shown assume that the emitted NO_x is 100 percent NO_2. The emitted NO_x would actually be approximately 10 percent NO_2 and 90 percent NO. The emitted NO would be oxidized to NO_2 after reaction in the atmosphere.

The Texas Episodic Model (TEM) and the Climatological Dispersion Model (CDM) were used to calculate the ambient air quality impact of the proposed Mandalay configuration. Both of these models have been approved by the EPA for use in determining the air quality impact of point sources of air pollutants.

TEM is a Gaussian dispersion model used to calculate short-term (1- to 24-hour average) pollutant concentrations. It is described in detail by Christiansen (1976). Plume rise is calculated from the formulas of Briggs (1969, 1971) for buoyant plumes. Dispersion rates are described by the Pasquill-Gifford dispersion curves (Turner, 1970). Also included in the calculations are the effect of a mixing lid in restricting pollutant dispersion and the effect of the increase in wind speed with height above the surface.

TEM normally determines 1-hour average concentrations by first calculating a 10-minute average concentration and then applying a peak-to-mean ratio to derive a 1-hour average concentration. This method results in a 1-hour concentration that is somewhat lower than the 10-minute concentration. This peak-to-mean ratio is not used in other EPA-approved models. For this reason, application of the peak-to-mean ratio was not used in this analysis. Therefore, 1-hour average concentrations reported here are equal to the 10-minute average concentrations calculated by TEM.

TEM calculates all concentrations on a rectangular grid system. For this study, a grid spacing of 1,640 feet (500 m) was used. TEM utilizes hourly wind speed, wind direction, temperature, atmospheric stability, and mixing height (height of the mixing lid). All stability classes were considered with

TABLE 4.2-12

PROPOSED MANDALAY CONFIGURATION PROJECT STACK DATA

Stack Description	Stack Height[a], m	Stack Diameter, m	Stack Gas Velocity, m/sec	Exit Temperature, °K	Emission Rate, g/sec				
					NO_x	SO_2	PM	CO	THC
Gina - Production	19.2	0.1	3.3	589	0.07	0.01	0.01	0.01	0.01
Gilda - Drilling	27.4	0.1	7.0	589	0.21	0.01	0.01	0.05	0.02
Gilda - Production	19.2	0.1	6.7	589	0.14	0.01	0.01	0.03	0.01
Gilda - Gas Turbine	19.2	0.7	24.4	700	0.57	0.0009	0.01	0.12	0.04
Gilda - Gas Turbine	19.2	0.7	24.4	700	0.57	0.0009	0.01	0.12	0.04
Onshore Heater-Treater	7.6	1.0	24.4	478	0.14	0.0009	0.02	0.03	0.005
Onshore Heater-Treater	7.6	1.0	2.4	478	0.14	0.0009	0.02	0.03	0.005
Onshore Heater-Treater	7.6	1.0	2.4	478	0.14	0.0009	0.02	0.03	0.005

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[a] Above sea level.

wind speeds ranging from 1 to 6 meters per second. An ambient temperature of 15°C (59°F) and a mixing height of 1,970 feet (600 m) were used. The average summer afternoon mixing height (Table 12.2-6) was used, which is lower (more restrictive) than afternoon mixing heights for other seasons. Only afternoon mixing heights were considered. A wind direction of 261.5 degrees (from approximately due west) was used because wind from this direction would cause the plumes from Platform Gilda to pass directly over the onshore treating facility and allow the additive effect of both sources to be evaluated. The plumes from Platform Gilda, rather than Platform Gina, were used because emissions from Platform Gilda would be greater than those associated with Platform Gina.

CDM is a Gaussian-type dispersion model used to calculate annual average pollutant concentrations. A complete description of this model is given by Busse and Zimmerman (1973). Briggs plume rise formulas and Pasquill-Gifford dispersion curves were used in the calculations. Mixing height and wind speed increase with height were also considered.

Concentrations are calculated at user-defined receptor points. The CDM output grid had a rectangular spacing of 1,640 feet (500 m). Joint frequency wind speed, wind direction, and atmospheric stability distributions were input. The joint frequency distribution was derived from meterological data taken at Ventura County Airport. Stability classes were determined from wind speed and cloud cover observations by the Pasquill-Turner or STAR method described by Turner (1964). A temperature of 15°C (59°F) was used. Morning and afternoon mixing heights were 1,970 and 2,625 feet (600 and 800 m), respectively.

The maximum pollutant concentrations calculated using the stack data shown in Table 4.2-12 and the TEM and CDM programs are shown in Table 4.2-13. The maximum calculated concentration is the 1-hour average NO_2 concentration (28 $\mu g/m^3$). This concentration occurs approximately 1,640 feet (500 m) inland from the proposed Mandalay onshore treating facility site during meteorological conditions of neutral atmospheric stability with a 3-meter-per-second

TABLE 4.2-13

MAXIMUM CALCULATED AMBIENT AIR QUALITY IMPACT

Pollutant	Calculated Maximum Pollutant Concentration, $\mu g/m^3$ 1-hour Average	Annual Average	Impact Concentrations[a], $\mu g/m^3$
NO_2	28	1	1 (annual average)
SO_2	<1	<1	5 (24-hour average)
CO	6	<1	500 (8-hour average)
TSP	4	<1	5 (24-hour average)

---

[a] These concentrations have been defined by EPA as de minimis guidelines (Federal Register, September 5, 1979). Calculated air quality impacts greater than these concentrations are defined as significant.

wind. The maximum background 1-hour average NO_2 level measured in the area is 376 μg/m^3 (measured in the Port Hueneme area in 1978). If the calculated maximum and measured background maximum were to occur at the same time, a 404 μg/m^3 maximum 1-hour average NO_2 concentration would result. This is below the California Ambient Air Quality Standard for NO_2 (470 μg/m^3, 1-hour average). This maximum concentration would decrease to approximately 1 μg/m^3 (1-hour average) at a point approximately 1.6 miles (2.5 km) from the proposed Mandalay treating facility site.

In both the 1-hour and annual average calculations, the plumes from the onshore and offshore sources did not produce significant additive effects. For example, approximately 3 percent of the maximum calculated 1-hour average NO_2 concentration (or about 1 μg/m^3) was due to the offshore NO_x sources.

For all pollutants, the maximum calculated concentrations do not exceed the significant impact levels defined by EPA as de minimis guidelines (Federal Register, September 5, 1979). Calculated ambient air quality impacts greater than these concentrations are defined as significant. These calculations support the conclusion that the emissions associated with the proposed Mandalay configuration would not significantly impact ambient air quality.

The preceding discussions have dealt with pollutants traditionally defined as inert; that is, only minimally reactive in the atmosphere. To determine the impact on ambient O_3 levels, atmospheric chemistry must be analyzed since this pollutant is produced by reactions between other chemical species in the atmosphere. The primary pollutants involved in these reactions are NO_x and reactive hydrocarbons (RHC).

The Empirical Kinetic Modeling Approach (EKMA) has been developed by the EPA (EPA-450/2-77-021a; November, 1977) to be used to calculate the impact of NO_x and RHC emissions on ambient O_3 levels. This procedure involves estimating the ozone produced from predicted morning NO_x and RHC ambient air concentrations. If all of the hydrocarbons emitted from elements of the proposed Mandalay configuration are assumed to be reactive, the estimated maximum 1-hour average RHC concentration would be approximately 1 $\mu g/m^3$ (0.0015 ppmv as CH_4). This magnitude increase is not sufficient to produce any calculable change in the resulting O_3 concentrations using the EKMA procedure.

All of the calculations discussed in this section specifically reflect atmospheric emissions from the proposed Mandalay configuration. The selection of any of the proposed alternative configurations would not significantly affect these results.

4.2.2 Environmental Acoustics

4.2.2.1 Proposed Mandalay Configuration

4.2.2.1.1 Construction

Platforms

Platform Gina: Construction activities associated with the erection of Platform Gina would result in an estimated equivalent sound level contribution (L_{eq}) of 93 dB (decibels, A-weighted scale) at a distance of 50 feet (15 m) from the center of activity (Table 4.2-14). The "noisiest" period would occur during pile driving, when maximum sound levels of 107 dB would occur at a distance of 50 feet (15 m) from the hammer. Although the sound contribution of these activities is higher than background ambient daytime and nighttime sound levels, noise-sensitive onshore receptor locations would not be affected. Sound levels in the immediate construction area (particularly during pile driving) would be sufficiently high to pose a risk of hearing damage to workers. Hearing protection would be required during pile driving activites to reduce workers' daily noise exposure below OSHA's maximum permissible exposure criteria.

Crew boat, supply boat, and helicopter movements to the platform during construction would not add significantly to the background ambient sound environment.

TABLE 4.2-14

CONSTRUCTION SOUND LEVEL DATA

Construction Activity	Equipment	Number of Units	Daily[a] Usage	Usage[b] Factor	Reference Distance (feet)	Sound Level At Reference Distance (dB)	Total Equivalent Sound Level, L_{eq}, at Reference Distance (dB)
Platform Gina Erection	barge	1	1.00	1.00	50	83	
	cranes	2	1.00	0.08	50	88	
	tugboat (3000 hp)	2	0.10	1.00	50	93	
	generator	1	1.00	1.00	50	78	
	welding maching	6	0.40	1.00	50	75	
	pile driver	1	0.50	0.04	50	107	92.7 dB @ 50 feet
Platform Gilda Erection	barges	2	1.00	1.00	50	83	
	cranes	2	0.50	0.08	50	88	
	tugboat (3000 hp)	2	0.10	1.00	50	93	
	generator	1	1.00	1.00	50	78	
	welding machine	6	0.40	1.00	50	75	
	pile driver	1	0.50	0.04	50	107	93.0 dB @ 50 feet
Offshore Pipeline Construction	barge	1	1.00	1.00	50	83	
	tugboat (2000 hp)	1	0.50	1.00	50	90	
	welding machines	6	0.90	1.00	50	75	
	crane (100 hp)	1	0.50	0.08	50	88	
	generator (25 hp)	1	0.05	1.00	50	76	89.6 dB @ 50 feet
Offshore Power Cable Installation	barge	1	1.00	1.00	500	63	
	tugboat (1000 hp)	1	1.00	1.00	500	67	68.4 dB @ 500 feet
Onshore Treating Facility Site Preparation	backhoe (100 hp)	2	0.40	0.22	50	82	
	trucks (50-100 hp)	variable[c]	0.20	0.09	50	88	
	dozer (150 hp)	1	0.40	0.27	50	85	
	scraper (100 hp)	1	0.40	0.44	50	82	80.5 dB @ 50 feet
Onshore Treating Facility Equipment Installation	backhoe (100 hp)	2	0.40	0.22	50	82	
	trucks (50-100 hp)	variable[c]	0.20	0.09	50	88	
	welding machines	6	0.40	1.00	50	75	
	generator	1	0.60	1.00	50	82	
	air compressor	1	0.40	1.00	50	81	84.3 dB @ 50 feet
Onshore Pipeline Construction	dozer (100 hp)	1	0.40	0.27	50	84	
	backhoe (50 hp)	1	0.40	0.22	50	82	
	trenching machine (100 hp)	1	0.40	1.00	50	81	
	crane (50 hp)	1	0.40	0.07	50	83	
	welding machines	6	0.40	1.00	50	75	
	trucks (50-100 hp)	variable[c]	0.20	0.09	50	88	82.9 dB @ 50 feet

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Notes

(a) Fraction of a 24-hour day that the equipment is operating.

(b) Fraction of the time while operating that the maximum sound level is produced.

(c) Sound level predictions are based on the usage of a maximum of two trucks simultaneously.

Platform Gilda: Construction noise during the erection of Platform Gilda would be essentially the same as that described above for Platform Gina but would last for a longer period of time (5 weeks); i.e., L_{eq} = 93 dB at a distance of 50 feet (15 m) from the center of construction activity (Table 4.2-14).

Owing to the large separation distance between the platform and the shoreline, platform construction noise would not be perceptible at onshore noise-sensitive receptor locations.

Crew boat, supply boat, and helicopter movements to the platform during construction would not add significantly to the background ambient sound environment.

Offshore Pipelines and Power Cables

Platform Gina: Construction activities during Platform Gina offshore pipeline fabrication and installation would produce an estimated L_{eq} of 90 dB at a distance of 50 feet (15 m) from the center of construction activities (Table 4.2-14). Laying of the offshore power cable would create an L_{eq} of 68 dB at a distance of 500 feet (150 m) from the barge and tugboat.

The proposed onshore marshalling and fabrication area is located approximately 2,500 feet (760 m) from the closest noise-sensitive residential receptor (Oxnard Shores Mobile Home Park). At these residences, the resultant L_{eq} of offshore pipeline fabrication and installation during the period when the barge and tugboat are operating near the shoreline would be 56 dB. Tugboat and barge operations associated with power cable installation are estimated to produce a maximum L_{eq} of 54 dB at the mobile home park during the period when the tugboat and barge are operating near the shoreline. For the majority of the period of pipeline and power cable installation, support vessels would be operating away from the shoreline, remote from populated areas.

Truck trips required to deliver pipe, cable, and consumable supplies to the onshore fabrication area would average about 2 per day, and would not significantly affect the ambient sound environment along the travel routes.

Platform Gilda: Sound levels associated with the fabrication and installation of the Platform Gilda offshore pipelines and power cable would be essentially the same as described above for Platform Gina. Identical construction methods, equipment, and onshore fabrication areas would be utilized. However, the duration of construction activities would be 7 calendar weeks rather than 3 as in the case of Platform Gina.

Onshore Treating Facility

Preparation of the proposed onshore treating facility site is estimated to result in an L_{eq} of 81 dB at a distance of 50 feet from the center of construction activities (Table 4.2-14). The "noisiest" period of construction would occur during equipment installation when an L_{eq} of 84 dB would occur at a distance of 50 feet (15 m).

Construction of a concrete block wall along the western and southern edges of the proposed Mandalay site would result in a noise reduction of approximately 8 dB during subsequent construction operations. The construction L_{eq} at the nearest noise-sensitive residential receptors (Oxnard Shores Mobile Home Park) along West Fifth Street is estimated to be 42 dB during equipment installation. These same receptors would experience an estimated L_{eq} of 47 dB during site preparation prior to construction of the block wall.

Truck trips along West Fifth Street and local arterials required to transport materials and supplies to the onshore site would average 1 per day and would not significantly affect the ambient sound environment along these routes.

Onshore Pipelines

Construction activities during the preparation of the onshore pipeline right-of-way and during pipeline installation are anticipated to result in an estimated L_{eq} of 83 dB at a distance of 50 feet (15 m) from the center of activity, as shown in Table 4.2-14. Sound levels may vary somewhat, depending on the leadtime between right-of-way preparation and pipeline installation. Pipeline installation for the Harbor Boulevard bridge segment is anticipated to result in an L_{eq} of 80 dB at 150 feet (15 m) since excavation equipment would not be required for this segment.

Construction would occur adjacent to Harbor Boulevard away from residential areas. Noise-sensitive receptors nearest to the pipeline corridor are at campsites within McGrath State Beach Park located approximately 150 feet (45 m) west of Harbor Boulevard. The L_{eq} at the nearest campsites is estimated to be 73 dB during the period when construction of onshore pipelines is occurring opposite the park. Impacts at any one receptor location would be relatively short-term.

Total Impact

The results of the proposed Mandalay configuration construction acoustics analysis are summarized in Table 4.2-15. These data include background sound levels and calculated construction sound levels at five measurement/receptor sites. These sites are described in Section 12.2 (Table 12.2-26 and Figure 12.2-6). The EPA's short-term day-night sound level (L_{dn}) goal of 65 dB is generally applicable to sites 1, 4, and 5. Sites 2 and 3 are considered as industrial zones.

Sound levels presented in Table 4.2-15 represent the "worst-case" construction condition when offshore pipeline fabrication and installation at the Mandalay marshalling area would occur concurrently with construction of the treating facility. After completion of offshore pipeline construction, there would be a significant reduction in the construction sound level contribution at the nearest residences (Oxnard Shores Mobile Home Park). Onshore treating facility construction would be shielded from these closest receptors by the proposed 10-foot (3-m)-high wall along the southern border of the site. The sound levels generated during construction would not cause the nearest residential sound levels to exceed the EPA's short-term sound level goal of 65 dB (L_{dn}).

TABLE 4.2-15

ESTIMATED CONSTRUCTION AMBIENT SOUND LEVELS FOR THE PROPOSED MANDALAY CONFIGURATION

	Background Ambient Sound Level - dB			Construction Sound Level (L_{eq}) Contribution - dB[b,c]					Construction Ambient Sound Level - dB			Change in the Ambient - dB		
Measurement Site[a]	L_d	L_n	L_{dn}	PC	OFP	OFC	TFEI	ONP	L_d	L_n	L_{dn}	L_d	L_n	L_{dn}
1	57	45	56	--[d]	56	54	42	49	61	58	65	4	13	9
2	54	51	58	--	90	88	76	83	92	92	98	NA	NA	NA
3	56	52	59	--	57	55	54	60	63	60	67	7	8	8
4	53	53	59	--	--	--	--	54	55	53	60	2	0	1
5	54	51	58	--	--	--	--	--	54	51	58	0	0	0

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[a] See Table 12.2-26.

[b] Abbreviations:
PC - Platform Construction (Gina and Gilda)
OFP - Offshore Pipeline Fabrication and Installation
OFC - Offshore Power Cable Installation
TFEI - Onshore Treating Facility Equipment Installation
ONP - Onshore Pipeline Installation
NA - Not Applicable (within the construction area)

[c] Construction sound levels are based on distances of 2,500 feet, 50 feet, 700 feet, and 1300 feet from source to receiver for locations 1, 2, 3, and 4, respectively. Offshore pipeline fabrication and treating facility construction would be centered 2,200 feet and 1,500 feet from measurement site No. 3, respectively. Measurement site 2 lies within the proposed Mandalay site construction area.

[d] Blanks indicate no construction activity within the area, or construction sound level contributions more than 10 dB below the background ambient sound level.

4.2.2.1.2 Drilling

Sound levels produced by typical equipment and area sources during drilling are as follows:

Equipment or Area	Sound Level in dB
Well Bays	72-90
Drilling Platforms	84-89
Shops and Laboratories	70-92
Operators' Offices	65-72
Radio Rooms	62-77
Crew Quarters	50-72
Tool House	64-72

Equipment sound levels shown above represent typical ranges of sound levels as measured within 3 to 5 feet (0.9 to 1.5 m) of the various sources. Area measurements represent typical sound levels measured at workbenches or other typical workers' positions and are indicative of a wide fluctuation in distances from major noise sources to the measurement site. Lowest levels are representative of systems incorporating good sound attenuation qualities or equipment of low power ratings.

Platform Gina

The L_{eq} resulting from peak drilling operations on Platform Gina is estimated to be 89 dB at a distance of 50 feet (15 m) from the center of activities. Adequate silencing would be provided to maintain sound levels in the machinery room, general work areas, and control room at or below 85 dB, 75 dB, and 55 dB, respectively. Employee noise exposures would be held to within OSHA limits.

Platform Gina drilling noise would not be perceptible at onshore noise-sensitive receptor locations. Helicopter, crew boat, and supply boat movements during drilling would not contribute significantly to the ambient sound environment.

Platform Gilda

Platform Gilda would be fitted with similar types of drilling equipment as are planned for Platform Gina. The power ratings of certain equipment on Platform Gilda would be higher than on Gina to accommodate the deeper drilling depths. Despite the increased sound energy emitted by particular pieces of equipment, overall sound levels on Platform Gilda during drilling are expected to be approximately the same as those cited above for Platform Gina (because of additional silencing that would be provided to comply with OSHA requirements).

Drilling noise from Platform Gilda would not be perceptible at noise-sensitive onshore receptor locations. Helicopter, crew boat, and supply boat movements during drilling would not contribute significantly to the ambient sound environment.

Total Impact

Because of the distance separating Platforms Gina and Gilda and their remote offshore locations, noise produced during their respective drilling programs would not be perceptible to each other or to onshore noise-sensitive receptors. Machinery noise sources during drilling would be silenced as required to limit workers' noise exposures to acceptable levels. Helicopter, crew boat, and supply boat movements during drilling would not contribute significantly to the ambient sound environment.

4.2.2.1.3 Production

Platforms

Typical sound levels for equipment and area noise sources are listed below, based on published data for a similar platform structure (Judd, 1977) and Dames & Moore inhouse data:

Equipment or Area	Sound Level in dB
Water Injection Pump House	103-109
Trap and Separator Areas	86-89
Integral Engine-Driven Reciprocating Compressor House	90-99

Equipment or Area	Sound Level in dB
Shipping Pump Areas	76-94
Operators' Offices	65-72
Radio Rooms	62-77
Bunk House	50-72

All major noise-producing machinery on Platforms Gina and Gilda during production would be silenced to limit workers' daily noise exposure to below 90 dB. Platform Gina and Platform Gilda production noise would not be perceptible at noise-sensitive onshore receptor locations. Crew boat and supply boat movements during production would not contribute significantly to the ambient sound environment.

Offshore Pipelines and Power Cables

No noise impacts are anticipated to result from the normal operation of the offshore pipeline system. Maintenance requirements are anticipated to be minimal and are not expected to result in significant marine traffic or noise along either the Platform Gina Mandalay route or Platform Gilda route.

Onshore Treating Facility

Sound levels associated with the operation of the onshore treating facility were estimated based on preliminary design specifications and performance characteristics of equipment to be installed. The equivalent sound level resulting from operation of the onshore treating facility is estimated to be 76 dB at the northern and eastern property boundaries. At the southern and western boundaries, the equivalent sound level contribution is expected to be reduced to 68 dB because of the presence of a 10-foot (3-m)-high block wall. The nearest noise-sensitive receptors (Oxnard Shores Mobile Home Park) would not experience sound level increases due to the operation of the proposed onshore treating facility.

Onshore Pipelines

Noise associated with the operation of the onshore pipeline system is anticipated to be minimal. Activities at the Union Oil Marine Terminal are not expected to increase significantly over existing conditions. No significant noise impacts are expected.

Total Impact

The results of the acoustics analysis are presented in Table 4.2-16. The sound levels produced from the proposed Mandalay configuration production operations would not cause a perceptible change in the existing sound levels at the nearest noise-sensitive receptors (Sites 1, 4, and 5). Measurement/receptor site 2 (industrial zone) would experience a perceptible sound level increase.

4.2.2.2 East Mandalay Alternative Configuration

4.2.2.2.1 Construction

Platforms

Noise impacts resulting from construction of Platforms Gina and Gilda would be identical to those described for the proposed Mandalay configuration (Section 4.2.2.1.1).

Offshore Pipelines and Power Cables

Noise impacts resulting from construction of the offshore pipelines and power cables for Platforms Gina and Gilda would be the same as described for the proposed project (Section 4.2.2.1.1).

Onshore Treating Facility

The equivalent sound level, L_{eq}, during site preparation and equipment installation at the East Mandalay alternative site would be 81 dB and 84 dB (respectively) at a distance of 50 feet (15 m) from the center of construction activities (Table 4.2-14).

Construction of concrete block wall along the western border of the proposed East Mandalay site would result in a noise reduction of approximately 8 dB during subsequent construction operations. The construction L_{eq} at the nearest noise-sensitive receptors (Oxnard Shores Mobile Home Park) would be 40 dB during equipment installation.

TABLE 4.2-16

ESTIMATED PRODUCTION AMBIENT SOUND LEVELS FOR THE PROPOSED MANDALAY CONFIGURATION

Measurement Site[a]	Background Ambient Sound Level - dB			Operational Sound Level (L_{eq}) Contribution - dB[b,c]					Operational Ambient Sound Level - dB[c]			Change in the Ambient - dB		
	L_d	L_n	L_{dn}	Gina	Gilda	OFP	TF	ONP	L_d	L_n	L_{dn}	L_d	L_n	L_{dn}
1	57	45	56	--[d]	--	--	--	--	57	45	56	0	0	0
2	54	51	58	--	--	--	66	--	66	66	72	12	15	14
3	56	52	59	--	--	--	44	--	56	53	60	0	1	1
4	53	53	59	--	--	--	--	--	53	53	59	0	0	0
5	54	51	58	--	--	--	--	--	54	51	58	0	0	0

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[a] See Table 12.2-26

[b] Abbreviations:
Gina - Platform Gina Construction Operations
Gilda - Platform Gilda Construction Operations
OFP - Offshore Pipeline Fabrication and Installation
TF - Onshore Treating Facility Operations
ONP - Onshore Pipeline Installation

[c] Operational sound levels based on distances of 2500 feet, 10 feet and 1500 feet from sources to receiver for Locations 1, 2 and 3, respectively.

[d] Blanks indicate no construction activity within the area, or construction sound level contributions more than 10 dB below the background ambient sound level.

Trucks required to transport materials and supplies to the onshore site would average 1 per day and would not significantly affect the ambient sound environment.

Onshore Pipelines

Onshore pipeline corridors for the proposed Mandalay configuration and East Mandalay alternative configuration would be essentially the same. Noise impacts resulting from construction of the East Mandalay onshore pipelines would be the same as described in Section 4.2.2.2.1.

Total Impact

A summary of the acoustics analysis is presented in Table 4.2-17. Sound levels presented in Table 4.2-17 represent the "worst case" construction conditions when offshore pipeline fabrication and installation at the Mandalay marshalling area would be occurring concurrently with construction of the East Mandalay treating facility. Subsequent to the completion of offshore pipeline construction, there would be a significant reduction in the construction sound level contribution at the nearest residences to both these sites (Oxnard Shores Mobile Home Park). The sound level at Oxnard Shores Mobile Home Park would not exceed the EPA's short-term sound level goal of 65 dB (L_{dn}). Construction noise would not be perceptible at measurement location 4 or 5.

4.2.2.2.2 Drilling

Noise impacts resulting from the Platform Gina and Platform Gilda drilling programs would be the same as discussed in Section 4.2.2.1.2.

4.2.2.2.3 Production

Platforms

Noise produced during the production phase on Platforms Gina and Gilda would be the same as described for the proposed Mandalay configuration (Section 4.2.2.1.3).

TABLE 4.2-17

ESTIMATED CONSTRUCTION AMBIENT SOUND LEVELS FOR THE EAST MANDALAY ALTERNATIVE CONFIGURATION

	Background Ambient Sound Level - dB			Construction Sound Level[b,c] (L_{eq}) Contribution - dB					Construction Ambient Sound Level - dB			Change in the Ambient - dB		
Measurement Site[a]	L_d	L_n	L_{dn}	PC	OFP	OFC	TFEI	ONP	L_d	L_n	L_{dn}	L_d	L_n	L_{dn}
1	57	45	56	--[d]	56	54	40	49	61	58	65	4	13	9
2	54	51	58	--	90	88	46	83	92	92	98	NA	NA	NA
3	56	52	59	--	57	55	76	60	75	65	75	NA	NA	NA
4	53	53	59	--	--	--	--	54	55	53	60	2	0	1
5	54	51	58	--	--	--	--	--	54	51	58	0	0	0

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[a] See Table 12.2-26

[b] Abbreviations:
PC - Platform Construction (Gina and Gilda)
OFP - Offshore Pipeline Fabrication and Installation
OFC - Offshore Power Cable Installation
TFEI - Onshore Treating Facility Equipment Installation
ONP - Onshore Pipeline Installation
NA - Not Applicable (within the construction area)

[c] Construction sound levels are based on the following distances between source and receiver (feet):

	Site 1	Site 2	Site 3	Site 4
OFP	2500	50	2200	
OFC	2500	50	2200	
TFEI	3100	1500	50	
ONP	2500	50	700	1300

[d] Blanks indicate no construction activity within the area, or construction sound level contributions more than 10 dB below the background ambient sound level.

Offshore Pipelines and Power Cables

No noise impacts would result from the normal operation of the Platform Gina and Platform Gilda offshore pipeline systems.

Onshore Treating Facility

Noise sources for the East Mandalay alternative onshore treating facility would be the same as those for the proposed Mandalay configuration. The equivalent sound level at the western property line is estimated to be 68 dB, assuming construction of a 10-foot (3-m)-high block wall. At other property line boundaries, the equivalent sound level is estimated to be 76 dB. The nearest noise-sensitive receptors (Oxnard Shores Mobile Home Park) would not experience sound level increases due to the operation of the proposed onshore treating facility.

Onshore Pipelines

No significant noise impacts would result from the normal operation of the onshore pipeline system.

Total Impact

The results of the acoustics analysis are summarized in Table 4.2-18. The sound levels produced during the proposed East Mandalay configuration production operations would not cause a perceptible change in the existing sound levels at nearby noise-sensitive areas (sites 1, 4, and 5). Measurement/receptor site 3 (industrial zone) would experience a perceptible sound level change.

4.2.2.3 Union Oil Marine Terminal Alternative Configuration

4.2.2.3.1 Construction

Platforms

Noise impacts resulting from construction of Platforms Gina and Gilda would be identical to those described for the proposed Mandalay configuration (Section 4.2.2.1.1).

TABLE 4.2-18

ESTIMATED PRODUCTION AMBIENT SOUND LEVELS FOR THE EAST MANDALAY ALTERNATIVE CONFIGURATION

Measurement Site[a]	Background Ambient Sound Level - dB			Operational Sound Level (L_{eq}) Contribution - dB[b]					Operational Ambient Sound Level - dB			Change in the Ambient - dB		
	L_d	L_n	L_{dn}	Gina	Gilda	OFP	TF	ONP	L_d	L_n	L_{dn}	L_d	L_n	L_{dn}
1	57	45	56	--[c]	--	--	--	--	57	45	56	0	0	0
2	54	51	58	--	--	--	--	--	54	51	58	0	0	0
3	56	52	59	--	--	--	68	--	68	68	74	12	16	15
4	53	53	59	--	--	--	--	--	53	53	59	0	0	0
5	54	51	58	--	--	--	--	--	54	51	58	0	0	0

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[a] See Table 12.2-26

[b] Abbreviations:
Gina - Platform Gina Construction Operations
Gilda - Platform Gilda Construction Operations
OFP - Offshore Pipeline Fabrication and Installation
TF - Onshore Treating Facility Operations
ONP - Onshore Pipeline Installation

[c] Blanks indicate no construction activity within the area, or construction sound level contributions more than 10 dB below the background ambient sound level.

Offshore Pipelines and Power Cables

Noise impacts resulting from construction of offshore pipelines and power cables for Platforms Gina and Gilda would be the same as described for the proposed configuration (Section 4.2.2.1.1).

Onshore Treating Facility

The equivalent sound level, L_{eq}, during site preparation and equipment installation at the Union Oil Marine Terminal alternative site would be 81 dB and 84 dB, respectively, at a distance of 50 feet (15 m) from the center of construction activities (Table 4.2-14). The construction L_{eq} at the nearest noise-sensitive receptor (Ventura Marina parking lot) is estimated to be 60 dB during construction.

Trucks required to transport materials and supplies to the onshore site would average 1 per day and would not significantly affect the ambient sound environment.

Onshore Pipelines

Construction activities during the preparation of the onshore pipeline right-of-way and during pipeline and booster station installation are anticipated to result in an estimated L_{eq} of 83 dB at 50 feet (15 m) from the center of activity as shown in Table 4.2-14. Sheet pile and trenching activities across the Santa Clara River are anticipated to result in an L_{eq} of 89 dB at 50 feet (15 m) from the center of activity. Impacts at any one receptor location would be relatively short-term.

Total Impact

Results of the acoustics analysis are presented in Table 4.2-19. The largest change in ambient sound levels at nearby noise-sensitive areas (Oxnard Shores Mobile Home Park) would occur during offshore pipeline fabrication and installation. This sound level increase would not result in an exceedance of EPA's short-term goal of 65 dB (L_{dn}).

TABLE 4.2-19

ESTIMATED CONSTRUCTION AMBIENT SOUND LEVELS FOR THE UNION OIL MARINE TERMINAL ALTERNATIVE CONFIGURATION

Measurement Site[a]	Background Ambient Sound Level - dB			Construction Sound Level (L_{eq}) Contribution - dB[b,c]					Construction Ambient Sound Level - dB			Change in the Ambient - dB		
	L_d	L_n	L_{dn}	PC	OFP	OFC	TFEI	ONP	L_d	L_n	L_{dn}	L_d	L_n	L_{dn}
1	57	45	56	--[d]	56	54	--	--	61	58	65	4	13	9
2	54	51	58	--	90	88	--	83	92	92	98	NA	NA	NA
3	56	52	59	--	57	55	--	60	62	60	67	6	8	8
4	53	53	59	--	--	--	60	54	60	55	62	7	1	3
5	54	51	58	--	--	--	--	--	54	51	58	0	0	0

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[a] See Table 12.2-26

[b] Abbreviations:
PC - Platform Construction (Gina and Gilda)
OFP - Offshore Pipeline Fabrication and Installation
OFC - Offshore Power Cable Installation
TFEI - Onshore Treating Facility Equipment Installation
ONP - Onshore Pipeline Installation
NA - Not Applicable (within the construction area)

[c] Construction sound levels are based on the following distances between source and receiver (feet):

	Site 1	Site 2	Site 3	Site 4
OFP	2500	50	2200	
OFC	2500	50	2200	
TFEI				800
ONP		50	700	1300

[d] Blanks indicate no construction activity within the area, or construction sound level contributions more than 10 dB below the background ambient sound level.

4.2.2.3.2 Drilling

Noise impacts resulting from the Platform Gina and Platform Gilda drilling programs would be the same as discussed in Section 4.2.2.1.2.

4.2.2.3.3 Production

Platforms

Noise during production operations on Platforms Gina and Gilda would be the same as described for the proposed configuration (Section 4.2.2.1.3).

Offshore Pipelines and Power Cables

No noise impacts are anticipated to result from the normal operation of the Platform Gina and Platform Gilda offshore pipeline systems.

Onshore Treating Facility

Machinery noise sources for the Union Oil Marine Terminal alternative onshore treating facility would be the same as those for the proposed Mandalay configuration. The equivalent sound level is estimated to be 76 dB at the property line boundaries. This would not cause a perceptible change in the existing sound level at the nearest noise-sensitive receptors (Ventura Marina).

Onshore Pipelines

Except for the operation of the Mandalay Beach booster station, no noise impacts are expected to result from the normal operation of the onshore pipeline system. The estimated sound level contribution of the booster station is 72 dB at a distance of 50 feet (15 m) from the center of the facility. This would not cause a perceptible change in the existing sound level at the nearest noise-sensitive receptors (Oxnard Shores Mobile Home Park).

Total Impact

The results of the acoustics analysis are summarized in Table 4.2-20. The sound levels produced during the Union Oil Marine Terminal configuration

TABLE 4.2-20

ESTIMATED PRODUCTION AMBIENT SOUND LEVELS FOR THE UNION OIL MARINE TERMINAL ALTERNATIVE CONFIGURATION

Measurement Site[a]	Background Ambient Sound Level - dB			Operational Sound Level (L_{eq}) Contribution - dB[b,c]					Operational Ambient Sound Level - dB			Change in the Ambient - dB		
	L_d	L_n	L_{dn}	Gina	Gilda	OFP	TF	ONP	L_d	L_n	L_{dn}	L_d	L_n	L_{dn}
1	57	45	56	--[d]	--	--	--	38	57	46	57	0	1	1
2	54	51	58	--	--	--	--	66	66	66	72	12	15	14
3	56	52	59	--	--	--	--	--	56	52	59	0	0	0
4	53	53	59	--	--	--	52	--	56	56	62	3	3	3
5	54	51	58	--	--	--	--	--	54	51	58	0	0	0

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[a] See Table 12.2-26

[b] Abbreviations:
Gina - Platform Gina Construction Operations
Gilda - Platform Gilda Construction Operations
OFP - Offshore Pipeline Fabrication and Installation
TF - Onshore Treating Facility Operations
ONP - Onshore Pipeline Installation

[c] Operational sound levels are based on distances of 2500, 100, and 800 feet from source to receiver for Locations 1, 2, and 4, respectively.

[d] Blanks indicate no construction activity within the area, or construction sound level contributions more than 10 dB below the background ambient sound level.

production operations would not cause a perceptible change in the existing noise-sensitive area (Ventura Marina) sound levels. Measurement/receptor site 2 (industrial zone) would experience a perceptible sound level increase.

4.2.2.4 Ormond Beach Alternative Configuration

4.2.2.4.1 Construction

Platforms

Noise impacts resulting from the construction of Platforms Gina and Gilda would be identical to those described for the proposed Mandalay configuration (Section 4.2.2.1.1).

Offshore Pipelines and Power Cables

Platform Gina: Fabrication and installation of the Platform Gina offshore pipeline system would result in a maximum L_{eq} of 90 dB at 50 feet (15 m) from the pipeline fabrication area at Silver Strand Beach. The pipeline fabrication area would be centered approximately 250 feet (75 m) from the nearest residences. The maximum construction sound level contribution at these residences during pipeline fabrication and installation would be 76 dB. Construction sound levels would decrease as barge and tugboat operations proceeded to move away from the shoreline.

Platform Gilda: Noise impacts resulting from the construction of the Platform Gilda offshore pipelines and power cable would be the same as described for the proposed configuration (Section 4.2.2.1.1).

Onshore Treating Facility

The equivalent sound level, L_{eq}, during site preparation and equipment installation at the Ormond Beach alternative site would be 81 dB and 84 dB, respectively, at a distance of 50 feet (15 m) from the center of construction activities (Table 4.2-14). This sound level would not cause a perceptible change in the existing sound level at the nearest noise-sensitive receptor (residential development on Ocean View Drive).

Trucks required to transport materials and supplies to the onshore site would not significantly affect the ambient sound environment.

Onshore Pipelines

Construction of onshore pipelines and booster stations for the Ormond Beach alternative configuration would produce an estimated L_{eq} of 83 dB at a distance of 50 feet (15 m) from the center of construction activities.

Option A: The Option A pipeline corridor would pass in close proximity to noise-sensitive residential receptors along Harbor Boulevard, Channel Islands Boulevard, Ventura Road, and Hueneme Road. Residences and other noise-sensitive receptors lying within 100 feet (30 m) of ongoing construction activities are anticipated to experience daytime sound levels greater than 77 dB. Impacts at any one receptor location would be relatively short in duration.

Option B: The Option B pipeline corridor would pass in close proximity to noise-sensitive residential receptors along Gonzales and Pleasant Valley roads. Residences and other noise-sensitive receptors lying within 100 feet (30 m) of ongoing construction activities are expected to experience daytime sound levels greater than 77 dB. Impacts at any one receptor location would be relatively short-term.

Total Impact

A summary of the acoustics analysis is presented in Table 4.2-21. Construction activities for the Ormond Beach alternative configuration would cause a perceptible increase in the ambient L_{dn} at three measurement/receptor sites. However, the short-term EPA exterior sound level objective of 65 dB (L_{dn}) would not be exceeded at the noise-sensitive receptor site (site 1, Oxnard Shores Mobile Home Park). Residential property adjacent to pipeline fabrication areas at Silver Strand Beach could experience construction sound levels exceeding 65 dB. In addition, numerous residences along the Option A or B onshore pipeline system right-of-way would experience daytime construction sound levels exceeding 65 dB.

TABLE 4.2-21

ESTIMATED CONSTRUCTION AMBIENT SOUND LEVELS FOR THE ORMOND BEACH ALTERNATIVE CONFIGURATION

	Background Ambient Sound Level - dB			Construction Sound Level (L_{eq}) Contribution - dB[b,c]					Construction Ambient Sound Level - dB			Change in the Ambient - dB		
Measurement Site[a]	L_d	L_n	L_{dn}	PC	OFP	OFC	TFEI	ONP	L_d	L_n	L_{dn}	L_d	L_n	L_{dn}
1	57	45	56	--	56	54	--	49	61	58	65	4	13	9
2	54	51	58	--	90	88	--	83	92	92	98	NA	NA	NA
3	56	52	59	--	57	55	--	60	62	60	67	6	8	8
4	53	53	59	--	--	--	--	54	55	53	60	2	0	1
5	54	51	58	--	--	--	46	52	56	51	59	2	0	1

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[a] See Table 12.2-26

[b] Abbreviations:
PC - Platform Construction (Gina and Gilda)
OFP - Offshore Pipeline Fabrication and Installation
OFC - Offshore Power Cable Installation
TFEI - Onshore Treating Facility Equipment Installation
ONP - Onshore Pipeline Installation
NA - Not Applicable (within the construction area)

[c] Construction sound levels are based on the following distances between source and receiver (feet):

	Site 1	Site 2	Site 3	Site 4	Site 5
OFP	2500	50	2200		
OFC	2500	50	2200		
TFEI					3800
ONP	2500	50	700	1300	1700

[d] Blanks indicate no construction activity within the area, or construction sound level contributions more than 10 dB below the background ambient sound level.

4.2.2.4.2 Drilling

Noise impacts resulting from the Platform Gina and Platform Gilda drilling programs would be the same as discussed in Section 4.2.2.1.2.

4.2.2.4.3 Production

Platforms

Noise during production operations on Platforms Gina and Gilda would be the same as described for the proposed project (Section 4.2.2.1.3).

Offshore Pipelines

No noise impacts are anticipated to result from the normal operation of the Platform Gina and Platform Gilda offshore pipeline systems.

Onshore Treating Facility

Noise sources for the Ormond Beach alternative onshore treating facility site would be the same as those for the proposed configuration. The equivalent sound level is estimated to be 76 dB within 50 feet (15 m) of the heater treaters and compressor facilities. The equivalent sound level at the property lines is estimated to be 68 dB, assuming construction of a 10-foot (3-m)-high block wall surrounding the onshore treating facility. This would not result in perceptible changes in the sound levels at the nearest noise-sensitive receptors.

Onshore Pipelines

The Ormond Beach alternative configuration would require two (Option A) or three (Option B) booster stations. The estimated sound level contribution of the booster stations is 72 dB at 50 feet (15 m).

Option A: Two booster stations would be required for the Ormond Beach Option A configuration. They would be located near the landfall points at Mandalay Beach and Silver Strand Beach. The nearest noise-sensitive receptor to the Mandalay Beach booster station (the Oxnard Shores Mobile Home Park, 2,500 feet (750 m) distant) would experience a sound level contribution of 38 dB. The sound level contribution at the noise-sensitive receptor nearest to the Silver Strand Beach booster station is estimated to be 58 dB at a distance of approximately 250 feet (75 m). Except for noise from the two booster stations, no noise impacts are expected to result from the normal operation of the onshore pipeline system.

Option B: Three booster stations would be required for the Ormond Beach Option B configuration--one at Mandalay Beach, one at Silver Strand Beach, and one near the intersection of Rice and Gonzales roads. The sound level contribution for each of the former two sites would be as described above for Option A. The sound level contribution (L_{eq}) at the noise-sensitive receptor nearest to the Rice Road booster station would be 42 dB at a distance of approximately 1,500 feet (460 m). Noise associated with other areas along the pipeline corridor and at the Union Oil Marine Terminal would be minimal.

Total Impact

Results of the acoustics analysis for the Ormond Beach Alternative configurations (Option A or Option B) are presented in Table 4.2-22. No perceptible increase over existing ambient daytime, nighttime, and day-night sound levels is expected to occur at measurement locations 1, 3, 4, or 5. Day-night sound levels at location 2 (industrial zone) would experience a perceptible sound level increase.

The booster station at Silver Strand Beach (required for the Option A or B onshore pipeline system) would be relatively close (approximately 250 feet (75 m)) to noise-sensitive residential receptors. It is expected that booster station operation would not result in the existing sound levels exceeding EPA's short-term goal of 65 dB (L_{dn}).

TABLE 4.2-22

ESTIMATED PRODUCTION AMBIENT SOUND LEVELS FOR THE ORMOND BEACH ALTERNATIVE CONFIGURATION

Measurement Site[a]	Background Ambient Sound Level - dB			Operational Sound Level (L_{eq}) Contribution - dB[b,c]					Operational Ambient Sound Level - dB			Change in the Ambient - dB		
	L_d	L_n	L_{dn}	Gina	Gilda	OFC	TFEI	ONP	L_d	L_n	L_{dn}	L_d	L_n	L_{dn}
1	57	45	56	--[d]	--	--	--	38	57	46	57	0	1	1
2	54	51	58	--	--	--	--	66	66	66	72	12	15	14
3	56	52	59	--	--	--	--	--	56	56	59	0	0	0
4	53	53	59	--	--	--	--	--	53	53	59	0	0	0
5	54	51	58	--	--	--	--	--	54	54	58	0	0	0

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[a] See Table 12.2-26

[b] Abbreviations:

Gina	-	Platform Gina Construction Operations
Gilda	-	Platform Gilda Construction Operations
OFP	-	Offshore Pipeline Fabrication and Installation
TF	-	Onshore Treating Facility Operations
ONP	-	Onshore Pipeline Installation

[c] Operational sound levels are based on distances of 2,500 and 3,800 feet from source to receiver for Locations 1 and 2, respectively.

[d] Blanks indicate no construction activity within the area, or construction sound level contributions more than 10 dB below the background ambient sound level.

4.3 OCEANOGRAPHY

4.3.1 Proposed Mandalay Configuration

4.3.1.1 Construction

4.3.1.1.1. Platforms

Platform Gina

Activities associated with the emplacement and erection of Platform Gina would affect the physical and chemical nature of ocean water in the vicinity of the proposed platform site. The sources of possible impact include bottom sediment disturbance and wastewater discharges.

Setting the 6-leg platform jacket on the seafloor would cause an increase in water column turbidity resulting from stirring and suspension of bottom sediments. Driving of piles within each of the jacket legs may also result in the vibratory suspension of sediment. Turbidity resulting from these disturbances would be short-term and localized (dissipating within tens of feet of the platform legs), and should have no significant effect on ocean water quality.

Sanitary wastes generated during the 2-week construction period would be treated and chlorinated in a Microphor Marine Sanitation unit or equivalent device and discharged directly to the ocean. The estimated average discharge volume of 240 gallons (910 L) per day would occur in small intermittent releases throughout the day. It is expected that these releases would be rapidly dispersed by surface currents and waves, and that the water quality impacts would be undetectable at distances of a few tens of feet from the discharge point.

Potable water required during construction (approximately 1,000 barrels (bbl) or 160,000 L per day) may be provided by desalination units onboard the work barge. Operation of the desalination units would create a brine wastewater stream. It is estimated that the brine would be approximately five times as saline as seawater and would be generated at a ratio of 1 volume of brine per each 4 volumes of potable water produced. Upon discharge to the ocean, the brine would tend to sink toward the bottom of the water column because of its higher density. Complete mixing and dispersion of the plume is expected to occur within a distance on the order of a few hundred feet from the plume centerline. The overall water quality impact of brine wastewater discharges is expected to be of minor significance. Union has indicated that potable water requirements during construction would most likely be met using fresh water stored in tanks onboard the work vessel.

Platform Gilda

The causes and nature of impacts on the oceanographic environment during the Platform Gilda 5-week construction period would be essentially the same as those described above for Platform Gina. These include increases in turbidity during platform jacket setting and pile driving and changes in water quality related to discharges of treated sewage effluent and brine wastewater. The same work barge would be used for Platform Gilda construction as for Platform Gina.

The Platform Gilda jacket would have 12 legs. Because of this greater number of legs, the magnitude and duration of potential impacts associated with emplacement and pile driving would be somewhat greater/longer than those described for Platform Gina. However, because of the minor, localized, and temporary nature of the potential effects, there would be no significant impact on the oceanographic environment.

The average daily discharge of treated and chlorinated sanitary wastewater during Platform Gilda construction would be 240 gallons (910 L). The discharge would occur in the form of intermittent, small-volume releases over the 5-week construction period. The effluent would be rapidly dispersed by surface currents and wind waves; therefore, no detectable degradation of water quality is anticipated.

Up to 250 bbl (40,000 L) per day of brine wastewater would be produced during periods when the work barge desalination units were operating. As described for Platform Gina, it is expected that the brine would sink toward the bottom of the water column upon discharge and that measurable water quality impacts would be negligible more than a few hundred feet from the center of the effluent plume. No significant or long-term degradation of ocean water quality is anticipated to result from brine wastewater discharges during construction.

4.3.1.1.2 Offshore Pipelines and Power Cables

Platform Gina

The two pipelines from Platform Gina would be assembled at the Mandalay Beach marshalling and fabrication area and pulled offshore to the platform.

The act of pulling the pipelines offshore would cause some disturbance and suspension of bottom sediments. Effects could persist slightly beyond the 3-week period of pipeline installation. The turbid plume generated by the pulling could exend several to many tens of feet up or downcoast (depending on bottom sediment type, local current advection, and wave mixing). However, the impact is considered to be of negligible significance in relation to natural turbidity in the area generated periodically by Santa Clara River outflow to the ocean or by dredging activity at Channel Islands Harbor, the Ventura Marina, or Port Hueneme. Installation of the offshore power cable for Platform Gina is expected to generate negligible turbidity.

Where the pipeline corridor crosses the beach and surf zone, the pipelines would be buried to a depth of approximately 3 feet (0.9 m) below the winter beach surface. The power cable would be buried to an approximate depth of 6 feet (1.8 m) and cemented in place. Excavation activities would result in a temporary increase in nearshore turbidity and a minor redistribution of sediments. However, the nearshore zone is a high energy environment where sediments are subject to natural movement and redistribution by active longshore transport processes. Therefore, the impacts associated with pipeline and power cable burial are not expected to be a significant incremental contribution to the effects of naturally occurring processes within the nearshore zone. The affected areas would be impacted to a far greater degree by storm wave action and dumping of dredge spoil from bypassing operations at harbor entrances in the general area.

After pipeline installation was completed, the lines would be hydrostatically tested with approximately 180,000 gallons (680,000 L) of seawater provided by an intake source at Platform Gina. After testing, the water would be discharged into state or federal offshore waters. It may contain traces of oil and grease (used as lubricants or pipe coatings) and trace metals in concentrations above those normally found in seawater. The discharge quality would be regulated by an NPDES permit issued by the Environmental Protection Agency (EPA) (for discharge in federal waters) or the California Regional Water Quality Control Board (CRWQCB) (for discharge in state waters), as appropriate. It is expected that the impact on receiving waters would be below detection limits within a matter of hours after the release.

Sanitary wastes generated during pipeline installation would be collected in chemical toilets onboard the work vessels.

Platform Gilda

The causes and nature of impacts associated with installation of the three pipelines and power cable for Platform Gilda would be similar to those described for Platform Gina. The principal differences would be due to the longer length of the pipeline corridor (9.9 versus 6.5 miles) (15.9 versus 10.5 km) and longer duration of construction activities (7 versus 3 weeks).

Pulling the three pipelines to the Platform Gilda site would result in temporary turbidity increases that are not expected to exceed levels naturally occurring in the area. Similarly, burial of the pipelines and power cable through the nearshore zone would cause very short-term and localized effects that are expected to fall well within the range of naturally occurring turbidity ranges.

Approximately 523,000 gallons (1,980,000 L) of seawater could be used for hydrostatic testing of the pipelines. The seawater would be provided via an intake source at Platform Gilda. After testing, the water would be discharged into state or federal offshore waters. The discharge would be performed in accordance with the provisions of an NPDES permit issued by the EPA (for discharge in federal waters) or the CRWQCB (for discharge in state waters) as appropriate. It is expected that the impact of the hydrostatic test water discharge on receiving waters would be below detection limits within a matter of hours after the release.

4.3.1.1.3 Total Impact

Potential impacts on the oceanographic environment from construction of offshore elements for the proposed Mandalay configuration would be as follows:

- Minor, localized, short-term turbidity caused by setting and pinning the platforms, pulling pipelines over a combined length of 16.4 miles (25.4 km) of seafloor, and burying pipelines and cables through the nearshore zone.

- Minor, local, temporary alteration of ocean water quality from discharging treated and chlorinated sanitary wastes in the following total amounts:

Platform Gina construction:	3,360 gallons (12,700 L)
Platform Gilda construction:	8,400 gallons (32,000 L)

- Potential minor alteration of ocean water by discharging brine wastewater in the following estimated maximum total quantities:

Platform Gina construction:	3,500 bbl (556,000 L)
Platform Gilda construction:	8,750 bbl (1,390,000 L)

- Minor alteration of ocean water quality by discharging the following estimated total quanitities of hydrostatic test water:

Platform Gina pipelines:	180,000 gallons (680,000 L)
Platform Gilda pipelines:	523,000 gallons (1,980,000 L)

The impacts discussed above are expected to be insignificant because of the small areas and short time frames of effects. Measurable impacts would probably occur over areas involving hundreds of feet or less and within time frames of days or less. No permanent changes in physical oceanography or ocean water quality would occur. Construction activities for the project elements would be conducted sequentially and not overlap in time. Furthermore, project elements are widely separated in space (distances measuring miles). Therefore, overall impacts of construction are expected to be discretely localized and not additive in nature.

4.3.1.2 Drilling

4.3.1.2.1 Platform Gina

Twelve wells would be drilled from Platform Gina for production and injection. Drilling would occur over a 12-month period, during which time washed drill cuttings, small volumes of salt water-base drilling muds, and treated, chlorinated sanitary wastes would be discharged into ocean waters. All discharges would be made in conformance with OCS Orders No. 7 and 8 and EPA requirements.

Approximately 24 bbl (3.8 m^3) of drill cuttings would be generated per drilling-day. These would be thoroughly washed to remove (and recover) drilling mud and oil and grease, and would be discharged through a vertical pipe (cuttings chute) whose terminus would be 80 feet (24.4 m) below sea level and about 15 feet (4.6 m) above the seafloor. The cuttings would fall rapidly to the seafloor and are not expected to produce significant turbidity because of the removal of fines during washing.

Small volumes of salt water-base drilling mud may be infrequently discharged to the ocean through the cuttings chute. Mud discharges would be made in conformance with OCS Order No. 7 and are not expected to have significant or lasting effect on ocean water quality.

Sanitary sewage amounting to about 360 gallons (1,360 L) per day would be aerobically treated, chlorinated, and discharged to the ocean through a vertical chute having a terminus approximately 15 feet (4.6 m) above the seafloor. The wastes are expected to be released as they are generated throughout the day, resulting in low volume individual discharges. Because the effluent would be released into relatively calm bottom waters, the potential exists for an accumulation of waste components and creation of a local water mass with diminished dissolved oxygen levels, altered pH, and increased nutrient levels. It is anticipated that these effects would dissipate within a matter of days following the termination of the discharge.

4.3.1.2.2 Platform Gilda

<u>Repetto Formation</u>

Development of the Repetto Formation from Platform Gilda would involve drilling up to 50 wells over a 54-month period. During drilling, an estimated 48 bbl (7.6 m^3) of washed drill cuttings and 1,000 gallons (3,800 L) of treated, chlorinated sanitary wastes would be discharged daily to the ocean. Infrequent and small-volume discharges of salt water-base drilling muds may also occur in accordance with OCS Order No. 7.

Washed drill cuttings would be discharged through the cuttings chute which would terminate approximately 60 feet (18.3 m) above the seafloor. Cuttings would become somewhat dispersed during their fall and would accumulate in a broad, low cone below the discharge pipe. Some attendant increase in local water column turbidity may result from cuttings disposal, although not of a magnitude sufficient to cause a significant degradation of water quality.

An average of 1,000 gallons (3,800 L) per day of treated, chlorinated sanitary wastes would be intermittently discharged to the ocean through a vertical pipe having a terminus lying approximately 30 feet (9.1 m) above the ocean bottom. The quality of the wastewater would be in accordance with EPA regulations and OCS Order No. 8. Since it would be introduced into relatively calm bottom waters, the discharge may create an accumulation of waste products near the discharge terminus, causing local effects similar to those described for Platform Gina.

Monterey Formation

The drilling program for the Monterey Formation would initially involve a minimum of three test wells. If commercially developable hydrocarbon deposits are discovered, up to 30 wells would be completed. Monterey Formation drilling would be performed as an extension of Repetto Formation drilling utilizing the same work force, drilling equipment, and support facilities. Maximum discharge rates of drill cutting and sanitary wastes would be the same as described for Repetto Formation drilling. The impact of discharging washed drill cuttings and treated, chlorinated sanitary wastes would be the same as described for the Repetto Formation.

4.3.1.2.3 Total Impact

The total impact of drilling activities from Platforms Gina and Gilda is expected to derive from the discharge of washed drill cuttings (24 bbl (3.8 m^3) per day from Platform Gina; 48 bbl (7.6 m^3) per day from Platform Gilda) and from the discharge of treated, chlorinated sanitary wastes (360 gallons (1,360 L) per day from Platform Gina; 1,000 gallons (3,800 L) per day from Platform Gilda). Discharges of washed drill cuttings are judged to be of little consequence to physical oceanography and ocean water quality. Sanitary waste discharges may produce local, detectable effects on ocean water quality near the discharge structures. These effects may persist throughout the 12-month Platform Gina drilling program and 54-month Platform Gilda drilling program. However, it is expected that the effects would disappear relatively soon after the cessation of wastewater discharges, and that there would be no permanent effects on ocean water quality.

The spatial separation between Platforms Gina and Gilda would be sufficiently large so that no additive impacts on physical oceanography or ocean water quality are anticipated to result from their respective drilling programs.

4.3.1.3 PRODUCTION

4.3.1.3.1 Platforms

Platform Gina

Sanitary waste generated at Platform Gina would amount to about 50 gallons (190 L) per day of treated, chlorinated wastewater. This wastewater would be released on an intermittent basis through a 4-inch (10-cm) diameter vertical pipe terminating approximately 15 feet (4.6 m) above the seafloor. Discharges would be made in accordance with EPA and OCS Order No. 8 requirements.

The total daily volume of sanitary waste discharges would be approximately 15 percent of those generated during drilling. The volume and rate of discharge would be sufficiently low so that no detectable effects on ocean water quality are expected beyond a distance of a few tens of feet from the discharge point. Although the discharge would occur over the 18-year lifetime of the platform, no accumulation of chemical constituents in ocean water is anticipated.

Contaminated deck drainage from Platform Gina would be collected and transported to the onshore treating facility. Therefore, no adverse impacts on ocean water quality are expected.

Trace amounts of metallic ions would be leached from sacrificial anodes attached to the platform for corrosion control. The small amounts of trace metals dissolved are not expected to be detectable at any given time during the life of the platform. The impact is expected to be insignificant.

Platform Gilda

The causes and nature of impacts on physical oceanography and ocean water quality from production activities at Platform Gilda would be generically similar to those discussed for Platform Gina.

The 100 gallons (380 L) per day of treated, chlorinated sanitary sewage discharged to the ocean would be an order of magnitude less than similar discharges occurring during drilling activities from the platform. The discharge would comply with EPA and OCS Order No. 8 requirements. Effects are not expected to be measurable outside of the immediate vicinity of the discharge point.

Impacts resulting from contaminated deck drainage and from leaching of sacrificial anodes are expected to be inconsequential, for the same reasons as discussed for Platform Gina.

4.3.1.3.2 Offshore Pipelines and Power Cables

Platform Gina

The skin temperature of the pipeline carrying the oil/water/gas mixture from Platform Gina to the onshore treating facility is expected to be 130°F (54°C) at the platform. Thermal dissipation is expected to reduce the skin temperature to that of ambient seawater within approximately 1,000 feet (305 m) of the platform. Ambient seawater temperatures in this area most often occur with the range of 50-70°F (10-21°C). Some degree of elevation of those ambient values would occur within a few feet of the pipeline where it leaves the platform (the effect would diminish with increasing distance from the platform). The impact of the temperature change, per se, would be inconsequential to physical oceanography and ocean water quality; any impacts would derive from potential effects on marine biota (Section 4.4).

Sacrificial anodes would be attached to the pipelines for corrosion control. As discussed for similar anodes on the platforms (Section 4.3.1.3.1), the effects are expected to be insignificant because of the extremely slow rate of leaching of metals from the anodes.

Platform Gilda

The causes, nature, and significance of potential impacts from the Platform Gilda offshore pipelines would be essentially the same as those discussed for the Platform Gina offshore pipelines.

4.3.1.3.3 Total Impact

The total impact of production activities associated with offshore elements of the proposed Mandalay configuration is expected to be minimal on physical oceanography and ocean water quality. The discharge of 50 gallons (190 L) per day of treated, chlorinated sanitary wastes from Platform Gina and 100 gallons (380 L) per day of similar wastes from Platform Gilda would be insignificant in comparison to the capacity of the nearby Oxnard sanitary outfall to discharge up to 25 million gallons (94.6 million L) of wastes per day. Sanitary waste discharges from the two platforms would occur at geographically separate locations and would be made in conformance with OCS Order No. 8 and EPA requirements. No additive or significant long-term effects are anticipated.

Heat dissipation from pipelines, and metal leaching from the platforms' and pipelines' sacrificial anodes, are expected to have no measurable effects outside of the immediate vicinity of the sources. The total impact from these sources is considered insignificant.

4.3.2 East Mandalay Alternative Configuration

Offshore project elements and operations for the East Mandalay alternative configuration would be identical to those described for the proposed Mandalay configuration. Impacts on physical oceanography and ocean water quality would be the same as discussed in Section 4.3.1.

4.3.3 Union Oil Marine Terminal Alternative Configuration

Offshore project elements and operations for the Union Oil Marine Terminal alternative configuration would be identical to those described for the proposed Mandalay configuration. Impacts on physical oceanography and ocean water quality would be the same as discussed in Section 4.3.1.

4.3.4 Ormond Beach Alternative Configuration

4.3.4.1 Construction

4.3.4.1.1 Platforms

Platform locations and construction characteristics for the Ormond Beach alternative configuration would not differ from those described for the proposed Mandalay configuration. Impacts on physical oceanography and ocean water quality would be the same as discussed in Section 4.3.1.1.1.

4.3.4.1.2 Offshore Pipelines and Power Cables

Platform Gina

Impacts on physical oceanography and ocean water quality resulting from pipeline installation would be generically similar to those discussed in Section 4.3.1.1.2: (1) turbidity caused by pulling pipelines from shore to the platform location; (2) turbidity caused by burial of pipelines through the nearshore zone; and, (3) water quality impacts resulting from discharge of hydrostatic test water.

Turbidity caused by pulling the pipelines offshore could persist throughout the 9-week construction period; that resulting from nearshore burial would occur over a shorter time period. In both cases, overall levels of construction-induced turbidity are expected to be substantially smaller than the turbidity caused by natural storm wave action and the dumping of dredge spoil from bypassing operations at harbor entrances in the general area. Impacts on water quality are expected to be of minor significance and short duration.

Approximately 110,000 gallons (416,000 L) of seawater would be taken in at the Platform Gina site and used in hydrostatically testing the pipelines. During testing, the water may become contaminated with traces of oil and grease, particulates, and dissolved metals. The discharge would be regulated according to the provisions of an NPDES permit issued by the EPA (for discharge in federal waters) or the CRWQCB (for discharge in state waters), as appropriate. It is expected that dischage concentrations of contaminants would be below detection limits within a matter of hours after release.

Excavation through the surf zone for the Platform Gina power cable likely would be conducted in conjunction with that for the Platform Gilda pipelines and power cable, the impacts of which are described below.

No significant turbidity is expected to result from the laying of the power cable on the seafloor between Mandalay Beach and the Platform Gina site.

Platform Gilda

The routing and construction characteristics of the Platform Gilda offshore pipelines and power cable for the Ormond Beach alternative configuration are identical to those for the proposed Mandalay configuration. Impacts on physical oceanography and ocean water quality would be the same as discussed in Section 4.3.1.1.2.

4.3.4.1.3 Total Impact

The total impact on physical oceanography and ocean water quality from construction of offshore elements for the Ormond Beach alternative configuration would be as follows:

- Minor, localized, short-term turbidity caused by setting the platforms, pulling pipelines over a combined length of 13.9 miles (22.4 km) of seafloor, and burying pipelines and cables through the nearshore zones at Mandalay Beach and Silver Strand Beach.

- Minor, local, temporary alteration of ocean water quality from discharging treated and chlorinated sanitary wastes in the following total amounts:

Platform Gina construction:	3,360 gallons (12,700 L)
Platform Gilda construction:	8,400 gallons (32,000 L)

- Potential minor alteration of ocean water quality by discharging brine wastewater in the following estimated maximum total quantities:

Platform Gina construction:	3,500 bbl (556,000 L)
Platform Gilda construction:	8,750 bbl (1,390,000 L)

- Minor alteration of ocean water quality by discharging the following estimated total quantities of hydrostatic test water:

Platform Gina pipelines:	110,000 gallons (416,000 L)
Platform Gilda pipelines:	523,000 gallons (1,980,000 L)

The impacts discussed above are expected to be insignificant because of the small areas and short time frames of effects. Measurable impacts would probably occur over areas involving hundreds of feet or less and within time frames of days or less. No permanent changes in physical oceanography or ocean water quality would occur. Construction activities for the project elements would be conducted sequentially and not overlap in time. Furthermore, project elements are widely separated in space (distances measuring miles). Therefore, overall impacts of construction are expected to be discretely localized and not additive in nature.

4.3.4.2 Drilling

Drilling operations and associated effects on physical oceanography and ocean water quality would be identical to those described in Section 4.3.1.2 for the proposed Mandalay configuration.

4.3.4.3 Production

4.3.4.3.1 Platforms

Platform production operations and associated effects on physical oceanography and ocean water quality would be identical to those described in Section 4.3.1.3.1 for the proposed Mandalay configuration.

4.3.4.3.2 Offshore Pipelines and Power Cables

Platform Gina

The causes and nature of impacts on physical oceanography and ocean water quality from operation of the Platform Gina offshore pipelines would be generically similar to those discussed in Section 4.3.1.3.2; that is, heat loss to seawater and leaching of metallic ions from sacrificial anodes. Thermal dissipation is expected to reduce the skin temperature of the oil/water/gas line to ambient seawater temperature within approximately

1,000 feet (305 m) of the platform; a relatively small water mass would be affected. Metal leaching from the sacrificial anodes would occur at too low a rate to be detectable. Neither of these impacts is considered significant.

Platform Gilda

Impacts resulting from the operation of the Platform Gilda offshore pipeline system would be identical to those discussed in Section 4.3.1.3.2 for the proposed Mandalay configuration.

4.3.4.3.3 Total Impact

The total impact of production activities associated with offshore elements of the Ormond Beach alternative configuration on physical oceanography and ocean water quality is expected to be minimal. Discharge of 50 gallons (190 L) per day of treated, chlorinated sanitary wastes from Platform Gina and 100 gallons (380 L) per day of similar wastes from Platform Gilda would be insignificant in comparison to the capacity of the nearby Oxnard sanitary outfall to discharge up to 25 million gallons (94.6 million L) of wastes per day. Sanitary waste discharges from the two platforms would occur at geographically separate locations and would be made in conformance with OCS Order No. 8 and EPA requirements. No additive or significant long-term effects are anticipated.

Heat dissipation from pipelines, and metal leaching from the platforms' and pipelines' sacrificial anodes, are expected to have no measurable effects outside of the immediate vicinity of the sources. The total impact from these sources is considered insignificant.

4.3.5 Accidental Oil Spills

The impact of an accidental crude oil or refined petroleum product spill on physical oceanography and ocean water quality would be dependent on the type and volume of material released and the prevailing oceanographic and meteorological conditions. Physical oceanographic parameters (e.g., temperature, density, water mass movement) are unlikely to be significantly altered by even a major spill. A large slick could inhibit the formation of local wind waves, but would not alter the basic wave regime. More likely to be affected are water properties of a chemical or optical nature, such as specific ion concentrations, water transparency, dissolved oxygen concentrations, biochemical oxygen demand, and odor.

Formation of a floating oil slick on the ocean surface would create a barrier to gaseous exchange between the water and the atmosphere. Weathering of the slick would consume oxygen dissolved in the adjoining water mass. The reduction in the dissolved oxygen concentration could be severe immediately adjacent to the slick, in areas where oil had been admixed with surface waters, or near the seafloor, where oil may have accumulatd either through natural or induced sedimentation. Alyakrinskaya (1966) has shown that the dissolved oxygen concentration of seawater is reduced and the biochemical oxygen demand (BOD) is increased as the petroleum concentration rises. Observations following the 1969 Santa Barbara Oil Spill (Kolpack et al., 1971) confirm this finding, although measured dissolved oxygen concentrations following the spill remained above the saturation level.

Formation of a surface slick could also affect the transmission of light through the water column. The extent of this effect would be dependent on the nature of the oil, its thickness, the sea state, and the sun angle. McAuliffe (1973) reports that only under extremely calm sea surface conditions does oil tend to form a continuous slick. In most instances, the oil aggregates into thick, rope-like configurations surrounded by a thin sheen. In these cases, light transmission is reduced over only a small portion of the total spill area surface.

Seawater covered by a petroleum slick often emits an unpleasant odor. The persistence of the odor is influenced by duration and extent of the slick, the hydrocarbon composition of the spilled material, and the temperature. Alyakrinskaya (1966) reports that at petroleum concentrations of 5 ml/liter and greater, polluted seawater covered by an oil film can retain the odor for a period of 2 to 3 weeks.

Trace metals and pollutant compounds (some of which are toxic) could be introduced into the water mass as a result of an accidental petroleum spill. The lifetimes of these chemicals are dependent on a multitude of variables and on a number of poorly understood elimination pathways. From a water quality standpoint, these compounds apparently are purged or dispersed from local water masses relatively quickly after a spill by either chemical alteration, weathering, or advective processes.

4.4 MARINE BIOLOGY

4.4.1 Proposed Mandalay Configuration

4.4.1.1 Construction

4.4.1.1.1 Platforms

Platform Gina

Impacts on the marine biota of the area that could potentially occur during the construction of Platform Gina would result from: anchoring and presence of the work barge; placement of the platform; and, non-petroleum discharges.

An area of approximately 78,000 square feet (7,250 m^2) of ocean bottom around the proposed platform site location would be disturbed by anchoring of the work barge. Impacts would include: burial, removal, or dislocation of epifaunal and infaunal biota; decreased local plankton productivity; and potential clogging of filter-feeding benthic biota caused by increased turbidity. Recolonization of disturbed areas is expected to be rapid and to occur from existing, undisturbed biota within the region. Impacts would be insignificant because of the small area affected, the short time of disturbance, and the broadly uniform habitat in which it would occur.

Emplacement of the six jacket legs would result in displacement or elimination of benthic organisms within the 77-square-foot (7.2-m^2) area directly beneath those legs. This would be a long-term, but insignificant, impact because of the very small area affected.

Approximately 240 gallons (910 L) per day (3,360 gallons (12,720 L) total) of sanitary sewage would be treated and discharged from the work barge during construction. This discharge rate is less than 0.0015 percent of the average daily discharge of the Oxnard Sewage Treatment Plant. The principal potential impacts associated with this discharge would be minor changes in primary productivity within the immediate vicinity of the discharge point as a result of increased nutrient and chlorine levels, and turbidity effects. Impacts would be insignificant because of the discharge's small volume, quick dilution, localized effect, and short duration.

Potable water may be obtained from desalination units onboard the work barge. Should these units be used, intake of approximately 52,500 gallons (198,700 L) of seawater per day (approximately 0.006 percent of the daily seawater intake at the Mandalay and Ormond Beach generating stations) would result in entrainment of approximately 215 pounds (98 kg) of plankton. Disposal of approximately 10,500 gallons (39,750 L) of produced brine each day would create a small non-buoyant plume below the discharge point. The effects of this plume on the marine biota would be localized, short-term, and insignificant. Therefore, insignificant impacts would result from seawater intake and brine discharge during construction.

During construction, access would be restricted from an approximately 0.3-square-mile (0.78-km^2) area surrounding the platform site. This would represent a loss of potential fishing area for commercial fishermen. This impact would be insignificant because of the small area involved, its location away from major regional fishing areas, and the short duration of restricted access.

Platform Gilda

The potential impacts associated with construction of Platform Gilda would be similar to those discussed for Platform Gina. The differences result from the greater length of time necessary to complete construction; the greater area affected by anchoring and emplacement of jacket legs; the greater intake of seawater; and, the greater total volume of sanitary sewage and brine discharged.

Approximately 81,000 square feet (7,525 m^2) of ocean bottom would be disturbed by anchoring of the work barge during the 5-week construction period. Recolonization of this area should occur shortly after the barge is removed.

Emplacement of the 12 jacket legs would result in displacement or elimination of organisms from the 190-square-foot (17.7-m^2) area directly beneath the legs. All potential impacts resulting from disturbance of the ocean bottom would be insignificant because of the very small area affected and/or the short duration of the effects.

The rate of seawater intake and discharge of sanitary sewage and brine effluents would be the same as for Platform Gina, but would last for approximately 5 weeks. Small amounts of plankton would be entrained during seawater intake. Discharges would produce minimal, short-term changes in plankton productivity within the immediate vicinity of the discharge point.

The principal commercial fishing activity that would be affected by the 0.3-square-mile (0.78-km^2) exclusion zone would be trawling. Purse-seining would less likely be affected by the fixed restricted area because of the widespread distribution of pelagic species such as anchovy and mackerel throughout the region. The proposed site is located within the Santa Barbara trawling grounds; however, more than 90 percent of the commercial activities in this region are aimed at pelagic species captured by purse-seiners, and less than one percent of the total catch consists of the principal species captured by trawlers (halibut). Loss of commercial fishing area during the construction of Platform Gilda would represent a minor impact because of the small area involved and the short duration of restricted access.

4.4.1.1.2 Offshore Pipelines and Power Cables

Platform Gina

Impacts on the marine biota that could potentially occur during installation of the offshore pipelines and power cable from Platform Gina would result from: disturbance and displacement of sedimentary substrate and associated biota during jetting, burial, and emplacement of the pipelines and cable; and, discharge of hydrostatic test water.

Approximately 120,000 square feet (11,150 m^2) of sediment surface between MLLW and the 20-foot (6-m) isobath would be disturbed during jetting operations. The impact resulting from this disturbance would be insignificant because of the small area involved (approximately 0.4 percent of the total similar habitat between Hueneme Canyon and the Santa Clara River) and the short time period over which disturbance would occur; recolonization of the affected sediments should begin shortly after completion of the operation.

Disturbance of up to 41,000 square feet (3,810 m^2) of intertidal sand surface area during jetting would result in removal or dislocation of the infauna within that area. This would be an insignificant impact because of the paucity of the infauna found at the site, the small area disturbed (0.003 percent of the sandy beach habitat within the region), the brief duration of the disturbance, and the presence nearby of similar biotas for recolonization which should begin shortly after completion of construction operations.

Within the portion of the corridor from the 20-foot (6-m) isobath to the platform site, the pipelines and power cable would be laid directly on the ocean bottom. The epifauna and infauna within the 61,000 square-foot (5,665-m^2) area directly under these structures would be displaced or eliminated. Considering the relative uniformity of the benthic biota throughout the region, the loss of the organisms in the area covered by the pipelines and cable would be long-term, but insignificant when compared to the 640,000,000 square feet (59,456,000 m^2) of similar habitat (-20 to -100 feet (-6 to -30 m) MLLW) in the site area.

Approximately 180,000 gallons (681,300 L) of seawater would be used for hydrostatic testing of the pipelines (less than 0.02 percent of the daily combined intake of seawater by the Mandalay and Ormond Beach generating stations). Depending on the time of year, up to 1,500 pounds (680 kg) of zooplankton could be entrained. Using a 15 percent biomass conversion efficiency (Slobodkin, 1968; Ryther, 1969), this mass of zooplankton would be equivalent to 258 pounds (130 kg) of planktivorous fish (e.g., anchovy) or 35 pounds (16 kg) of higher carnivore (e.g., bonito). The loss of this amount of zooplankton would be insignificant when compared to the local standing crop or the amount of zooplankton entrained in the daily combined seawater intake of the two generating stations. Replacement from surrounding plankton populations is expected to occur shortly after discharge of the used test water.

Discharge of the used hydrostatic test water could introduce small amounts of iron and other metals into the receiving waters and increase turbidity. Rapid dilution should occur, and thus impacts of the metals and of the turbidity on the benthos are expected to be insignificant. The temporary loss of the corridor (approximately 1.6 square miles (4.1 km^2) total area) to commercial fishing activities during construction would be short-term and insignificant for the same reasons as discussed in Section 4.4.1.1.1.

Platform Gilda

The offshore pipeline and power cable corridor from Platform Gilda coincides with the Platfrom Gina Mandalay corridor for approximately 1.1 miles (1.8 km) in the nearshore area. Therefore, potential impacts would be the same as those discussed for the corresponding portion of the Platform Gina Mandalay corridor.

The surface area covered by the unburied portion of the Platform Gilda offshore pipelines and the power cable would be approximately 150,000 square feet (14,000 m^2). Loss of the organisms within this area is considered to be an insignificant impact when compared with the amount of similar habitat and biota within the region (640,000,000 square feet (59,456,000 m^2) to 100-foot (30-m) depth and 190,000,000 square feet (17,651,000 m^2) from 100- to 200-foot (30- to 60-m) depths). In addition, normal movement of sediments could bury the pipelines and cable and reinstate habitat similar to the original type.

Seawater required for hydrostatic testing of the three pipelines would be approximately 520,000 gallons (1,968,200 L), which represents less than 0.06 percent of the combined daily seawater intake of the Mandalay and Ormond Beach generating stations. Approximately 5,000 pounds (2,270 kg) of zooplankton could be entrained during this operation. This amount of zooplankton could represent about 750 pounds (340 kg) of plankton-feeding fish (e.g., anchovy), or about 100 pounds (45 kg) of predatory fish (e.g., mackerel). The overall impact of this activity would be insignificant in terms of the large regional standing crop, and its short-term effect because of the rapid replacement capability of zooplankton. Discharge of used test water would result in slightly increased turbidity near the release point which could have minor, short-term effects on productivity.

Temporary loss of the corridor (approximately 2.5 square miles (6.5 km^2) total area) to commercial fishing activities during construction would be short-term and insignificant for the same reasons as discussed in Section 4.4.1.1.1.

4.4.1.1.3 Total Impact

Potential impacts that would occur during the construction phase would be limited to:

- Temporary disturbance of 320,000 square feet (29,730 m^2) of sedimentary habitat and associated organisms during platform placement and pipeline power cable installation.
- Permanent (for the life of the project) elimination of 210,000 square feet (19,500 m^2) of sedimentary habitat and associated organisms resulting from platform placement and pipeline/power cable installation.
- Lowered productivity because of decreased water quality resulting from discharge of 11,760 gallons (44,500 L) of sanitary sewage and 700,000 gallons (2,649,500 L) of used hydrostatic test water.
- Loss of approximately 6,500 pounds (2,950 kg) of zooplankton that would be entrained during intake of seawater for hydrostatic testing.
- Temporary loss of approximately 4.7 square miles (12.2 km^2) of potential fishing area due to exclusion zones which would be established during platform and pipeline/power cable installation.

The impacts on the regional and site marine biotas would all be insignificant because of the relatively small areas disturbed or lost, the large areas of similar habitats and biota within the region and site, and the short duration of the potential effects. Loss of potential commercial fishing area would be an insignificant to minor impact because of the small areas involved, the nature of fishing activities within these areas, and the short duration of restricted access.

4.4.1.2 Drilling

4.4.1.2.1 Platform Gina

Potential impacts on the marine biota that would occur during drilling would result from: presence of the platform (a high relief artificial reef); placement of conductor pipes; discharge of treated sanitary sewage, drill cuttings, and drilling mud; and, increased drilling noise.

The sequence of epibiotal and fish faunal habitation of offshore Platforms Hilda and Hazel in the Santa Barbara Channel during the first few years following construction has been discussed by Carlisle et al. (1964). In addition, observations by Dames & Moore of the biota associated with a sunken vessel near the proposed Platform Gina site provide further information concerning the epibiota and fishes expected to occur on or around the deeper (80- to 95-foot; 25- to 29-m) portions of the proposed platform.

During drilling operations, the biota expected to occur on the submerged portion of the platform would include algae (in the upper water column) hydroids, scallops, mussels and barnacles. Certain species of fish, different from those associated with the present sedimentary bottom of the site, would also be associated with the platform. Species present would include seaperch, halfmoons, mackerel and bonito. The increase in diversity and biomass associated with the introduced biota would continue throughout the life of the platform (see Section 4.4.1.3.1) and is considered a localized beneficial impact.

The surface area subjected to burial during emplacement of the conductor pipes is approximately 50 square feet (4.6 m^2). Potential loss of biota within this area would be insignificant.

During drilling, approximately 360 gallons (1,360 L) per day (120,000 gallons (454,200 L) total) of sanitary waste would be treated and discharged into the ocean water at the platform site. Minor changes in primary productivity could occur within the immediate vicinity of the discharge site; however, dilution should confine this effect to a very small area. The daily discharge rate would be approximately 0.002 percent of that of the Oxnard Sewage Treatment Plant. The effects of this discharge should not last beyond the period of the drilling activity and are not expected to be significant.

During drilling from Platform Gina, approximately 135 cubic feet (3.8 m^3) of drill cuttings would be discharged daily. Drilling muds would be reused throughout drilling; however, small amounts of drilling mud would periodically be discharged with the cuttings. Although drilling mud discharges have been shown to increase concentrations of barium, iron, and lead around drilling platforms (U.S. Department of the Interior, 1979), the small amounts of drilling muds expected to be discharged from Platform Gina should have a minimal effect on the marine biota of the area, limited to a small area under the discharge pipe.

Based on the rate and total amount of drill cuttings to be discharged, and comparison with existing Santa Barbara Channel platforms, it is expected that a roughly conical mound approximately 20 feet (6 m) high and 125 feet (38 m) in diameter would be formed beneath Platform Gina. The basal area of this mound would be approximately 12,500 square feet (1,160 m^2). Depending on the rate of deposition and the lithologic character of the cuttings (probably significantly different from the existing sediment), it is likely that most, or all, of the infaunal organisms under the cuttings mound would be eliminated or displaced. Recolonization of the cuttings mound may occur, but the faunal assemblage would likely be different from that which presently exists. Certain species, such as starfish and anemones (Bascom et al., 1976), would be expected to reinhabit the cuttings mound and/or the shells of mussels and other fouling organisms deposited on the mound from platform communities. Carlisle et al. (1964) concluded that formation of cuttings mounds at Platforms Hilda and Hazel had neither positive nor negative effects on the biota of the area. The impact of formation of the cuttings mound at Platform Gina would be minor because of the small area involved (approximately 0.002 percent of similar habitat within the region) and the expected recolonization by a variety of species.

Potential impacts of increased noise from drilling activities and boat traffic on marine mammals during drilling are not well known. No generally accepted conclusions on the effects of noise associated with offshore oil development activities have been reached, but whale migration through the Santa Barbara Channel does not appear to have decreased since inception of development of the area's petroleum reserves (NMFS, 1979b). The area is currently subjected to ship and boat traffic and drilling activities, and the probability of significant negative impacts on marine mammals resulting from these activites is low (NMFS, 1979a,c). Therefore, impacts on marine mammals resulting from the proposed project are not expected to be significant.

4.4.1.2.2 Platform Gilda

Repetto Formation

Potential impacts during Repetto Formation drilling from Platform Gilda would have the same causal factors that were discussed for Platform Gina: presence of the platform; placement of conductor pipes; discharge of drill cuttings, mud, and sanitary sewage; and, noise and increased vessel traffic. The magnitude of the resulting impacts would be slightly greater at Platform Gilda, however.

Platform Gilda would be larger than Platform Gina. Therefore, it would accommodate a larger complement of introduced epibiotal and fish species similar in composition to that discussed for Platform Gina. This would represent a local beneficial effect which would continue throughout the life of the platform (see Section 4.4.1.3.1).

Placement of the conductor pipes would eliminate or displace organisms from an approximately 200-square-foot (19-m^2) area. This impact would be insignificant because of the relative homogeneity of the habitat and biota over an approximately 190,000,000-square-foot (17,651,000-m^2) area at these depths within the region.

Discharge of treated sewage (approximately 1,000 gallons (3,785 L) per day; 875,000 gallons (3,311,875 L) total) could result in a decrease in water quality and minor changes in primary productivity in the immediate area of the discharge. The daily discharge rate is approximately 0.006 percent of the average daily discharge rate at the Oxnard Sewage Treatment Plant. Dilution of contaminants is expected to be rapid, and detrimental effects are expected to be minor and to not last beyond the period of drilling.

Amounts of drilling mud discharged with drill cuttings are expected to be minor. Potential effects of these muds would be minor, highly localized, and therefore insignificant.

Discharge of drill cuttings would produce a mound approximately 40 feet (12 m) high and 225 feet (70 m) in diameter. The basal area of this mound would be approximately 40,000 square feet (3,720 m^2). This covered area would represent approximately 0.02 percent of the total regional area of similar habitat and biota for similar depths. The impact of formation of the cuttings mound at Platform Gilda would be minor because of the small area involved and the expected recolonization by a variety of species.

Effects of noise and general platform activity during drilling, although difficult to predict precisely, are not expected to be significant.

Monterey Formation

The potential impacts associated with the Monterey Formation drilling program would be essentially the same in nature, magnitude, and significance as those discussed for the Repetto Formation.

Because Monterey Formation drilling would represent a chronologic extension of the same activities that would be conducted for the Repetto Formation program, no significant additive effects are expected for: platform presence (same platform involved); sewage discharge (small daily amounts and rapid dilution); mud discharge (very small amounts and localized effects); and, noise and general activity.

Emplacement of conductor pipes would displace or eliminate infauna from an approximately 125 square-foot (11.6-m^2) area in addition to that for the Repetto program. Discharge of drill cuttings would increase the size of the mound to aproximately 50 feet (15 m) in height, and 300 feet (90 m) in diameter, with a basal area of approximately 70,000 square feet (6,500 m^2). Neither of these additional effects would change the significance of the combined impact from that discussed for the Repetto Formation program alone.

4.4.1.2.3 Total Impact

Potential impacts that would occur during the drilling phase would be limited to:

- Increased biomass and species diversity in the vicinities of the two platforms.
- Permanent elimination of approximately 83,000 square feet (7,700 m^2) of sedimentary habitat and associated organisms resulting from conductor pipe emplacement and discharge of drill cuttings.
- Changed productivity because of altered water quality resulting from discharge of approximately 1,000,000 gallons (3,785,000 L) of sanitary sewage over the 5-year drilling period.
- Possible effects on marine mammals because of increased noise and platform activity.

The increase in faunal biomass and species diversity represents a localized, long-term beneficial impact. Other impacts on the regional and site marine biotas would be insignificant because of the relatively small areas disturbed or lost, the large areas of similar habitat and biota within the region and site, or the short duration of the potential effects.

4.4.1.3 Production

4.4.1.3.1 Platforms

Platform Gina

Potential impacts on the marine biota during production would be associated with the presence of high relief, solid substrate habitat, discharge of treated sewage waters, intake of seawater at Platform Gina for reinjection, and loss of potential commercial fishing area.

Within the Santa Barbara Channel, two production platforms (Hazel and Hilda) have been intensively studied to determine the succession of biotas associated with these structures and their cuttings mounds through time (Carlisle et al., 1964; Bascom et al., 1976; and , Allen and Moore, 1976). In addition, Dames & Moore divers' observations of the biota of a sunken ship near the proposed Platform Gina site furnish additional data useful for predicting the probable species composition at the platform during the production phase. Following the drilling phase (approximately one year), the fishes expected to appear (residents or transients) around the platform would include seaperch, rockfish, lingcod, sharks, and ocean sunfish. Carlisle et al. (1964) estimated an average of over 3,000 fish under Platform Hazel within seven months of construction. Hardy (cited in Bascom et al., 1976) estimated that by 1970 there were 12,500 fish under the platform and as many as 30,000 fish were estimated to be at that location by 1975 (Bascom et al., 1976). The variety and number of fishes associated with these two platforms were considerably greater than that found in the surrounding, low relief sedimentary habitat.

The invertebrate fauna associated with platforms also consists of a different assemblage of species than that associated with the surrounding sedimentary habitat. After one year, Hazel and Hilda were inhabited by a variety of encrusting organisms including hydroids, anemones, barnacles, kelp scallops, and mussels (Carlisle et al., 1964). Approximately 17 years after construction, the fouling community was dominated by anemones (Corynactis californica and Metridium senile), mussels, and seastars (Bascom et al., 1976). A wide variety of invertebrate and fish taxa were observed by Dames & Moore marine biologists at the shipwreck near the proposed Platform Gina site (Section 12.4). Since no antifoulant would be used on the submerged portion of the platform, the composition and abundance of epifauna on Gina, after 10 years, could be expected to be similar to that reported for other platforms at a similar depth, and to that found on the nearby shipwreck. This long-term impact is considered beneficial with increased productivity, and increased variety of epifauna and fish expected during the production phase. An estimate of the biomass and productivity at Platform Gina during the middle of the production phase is given in Table 4.4-1.

TABLE 4.4-1

ESTIMATED BIOMASS AND PRODUCTIVITY AT PROPOSED PLATFORMS, MID-PRODUCTION PHASE

	Platform Gina	Platform Gilda
Submerged Surface Area	30,000 ft^2	260,000 ft^2
Estimated Attached Biomass	625,000 lb	5,400,000 lb
Average Biomass per Unit Area		
Platform	20.8 lb/ft^2	20.8 lb/ft^2
Fine Sediment Habitats[a]	0.85 lb/ft^2	0.85 lb/ft^2
Ratio	24	24
Estimated Annual Productivity per Unit Area		
Platform	10.4 lb/ft^2	10.4 lb/ft^2
Fine Sediment Habitats	3.4 lb/ft^2	3.4 lb/ft^2
Ratio	3	3
Estimated Associated Fish Biomass	4200 lb	8400 lb

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[a] Average biomass for the southern California shelf finer sediment habitats (State of California, 1965).

The discharge of the treated sanitary sewage (50 gallons (190 L) per day) during the production phase is expected to have a minor impact on the marine biota of the local area. Potential impacts would include disturbance of the sedimentary substrate and associated infauna and changes in primary productivity (due to increased turbidity, increased nutrients, and chlorine effects) immediately around the discharge point. This is considered a long-term (occurring throughout the production phase), but local and minor impact when compared to the average daily discharge of 17,000,000 gallons (64,345,000 L) from the Oxnard Sewage Treatment Plant. A return to ambient conditions should occur shortly after termination of production.

Potential impacts associated with the seawater intake system at Platform Gina include entrainment of planktonic organisms and possible impingement of marine fishes. The terminal velocity (average speed of seawater through each intake slot) for the maximum intake rate of 320,000 gallons (1,211,200 L) per day would be approximately 1.6 feet (0.6 m) per second. The velocity would decrease to less than 0.3 foot (0.1 m) per second within 1.3 feet 0.4 m) of the intake slots. Impingement of fishes on the slots would be limited to weaker swimming species, such as sea perches, which passed within 3 to 6 inches (8 to 15 cm) of the intake. This impact is considered insignificant. The loss of plankton by entrainment during the approximately 3-year duration of the intake operation is also considered insignificant. Assuming the weight of zooplankton to be one gram per cubic centimeter and that the average daily intake would be 160,000 gallons (605,600 L), an average of roughly 1,300 pounds (590 kg) of plankton per day would be entrained. This volume of plankton would equate to approximately 195 pounds (90 kg) of planktivorous fish or 20 pounds (9 kg) of predator fish. This zooplankton volume would be small in comparison to the local standing crop or to that entrained during the daily seawater intake (approximately 940,000,000 gallons (3,557,900,000 L)) of the Mandalay and Ormond Beach generating stations. Therefore, the potential impact of the Platform Gina seawater intake is considered insignificant.

The loss of potential area for commercial fishing activities due to the platform's presence is considered insignificant. The area lost to commercial fishing activities would be approximately 0.3 square miles (0.78 km^2). A fish block encompasses an area of approximately 100 square miles (259 km^2) and fishing activities within Block 683 are predominantly for pelagic species (anchovies constitute over 90 percent of the landings) caught by seining operations. Halibut (the principal target species for trawling activities) catches are limited in this block, accounting for less than 5,000 pounds (2,270 kg) per year. The loss of 0.3 percent of the fish block (15 pounds (7 kg) of halibut) to trawling activities is, therefore, considered minor.

Platform Gilda

Potential impacts during production at Platform Gilda would have the same causal factors that were discussed for Platform Gina: presence of the platform; discharge of treated sewage; and, restriction of access to the immediate platform area. The magnitude of the impacts would be slightly greater at Platform Gilda, however.

Platform Gilda would be larger than Platform Gina. Therefore, it would accommodate a larger complement of introduced epibiotal and fish species similar in composition to that discussed for Platform Gina. An estimate of the biomass and productivity at Platform Gilda during the middle of the production phase is given in Table 4.4-1. Because of the expected increases in biomass and faunal diversity, the presence of Platform Gilda would represent a localized long-term beneficial impact.

Discharge of treated sewage (100 gallons (380 L) per day) could result in minor effects on productivity and local infauna. Because of the small amount (approximately 0.0006 percent of the daily discharge at the Oxnard Sewage Treatment Plant) and rapid dilution of the discharge, potential impacts would be insignificant.

Commercial fishing activities would be restricted within a 0.3-square-mile (0.78-km^2) area around Platform Gilda. Within Fish Block 665, approximately

66,000 pounds (30,000 kg) of halibut are caught each year. Assuming a relatively uniform distribution of this species, the loss of 0.3 percent of the total catch (200 pounds (90 kg) per year) is considered a minor impact. The loss of this area is, therefore, considered insignificant.

4.4.1.3.2 Offshore Pipelines and Power Cables

Platform Gina

The presence of the offshore pipelines and power cable from Platform Gina to the Mandalay Beach area would have both positive and negative potential impacts on the marine biota of the area.

As discussed for the platform, the presence of the two pipelines would introduce solid substrate to an otherwise sedimentary habitat. The pipelines would support a different and more varied biota than now exists, including barnacles, hydroids, sponges, mussels, and possibly algae. All of these organisms are potential food sources for other invertebrates and fishes, and thus would act as an attractant to those organisms.

The skin temperature of the oil and gas pipeline is expected to be 130°F (54°C) at the platform and is expected to reach ambient seawater temperature within 1,000 feet (305 m) of the platform. Reduced fouling may occur along the first 1,000 feet (305 m) of the pipeline. This would not constitute a loss to the environment, but a reduction in the potentially available artificial substrate. Water around the pipeline would be subjected to slightly increased temperatures. Potential impacts associated with increased temperature are expected to be negligible.

Overall, the presence of the pipelines are expected to have a localized, long-term, beneficial impact on the biota during the production phase.

The potential for interference with commercial fishing activities due to the presence of the exposed pipelines is considered minimal. Ninety-two percent of the fish caught within the five local fish blocks and expected to occur within the area of the platform and pipelines (anchovies and bonito) are usually caught by purse-seine operations. Although the area is within the California halibut trawl area, this species does not comprise a significant portion of the commercial catch of these blocks (approximately 0.4 percent). Some loss or damage to fishing gear (predominantly trawl nets) by pipelines could be expected, but this should be infrequent and generally limited to fraying of nets. Considering the relatively uniform bottom type throughout the region, and the relatively small area impacted by the presence of the pipelines, the impacts on commercial fishing activities are considered minimal, but long-term.

Platform Gilda

Impacts associated with the presence of the three offshore pipelines from Platform Gilda are essentially the same as those discussed for Platform Gina.

The greater length of the pipelines from Platform Gilda would make the potential for impacts on commercial fishing activites greater than for the Platform Gina lines. A relatively large amount (approximately 48,000 pounds (21,775 kg) per year) of halibut is caught annually in the vicinity of the proposed Platform Gilda pipeline corridor; however, halibut account for less than 1 percent of the total commercial fish catch in the area. The loss of potential fishing area due to the presence of the pipelines (approximately 2 square miles (5.2 km^2) is minor in comparison with the amount of similar habitat in the region which would be expected to support similar ichthyofauna. No data on the specific location of the fishing activities within a fish block are available, but if an even distribution of the species is assumed, the loss of the pipeline area would amount to approximately 250 pounds (115 kg) of halibut per year.

4.4.1.3.3 Total Impact

Potential impacts that would occur during the production phase would be limited to:

- Increased biomass and species diversity in the vicinity of the two platforms and their associated pipelines and power cables.
- Changed productivity because of altered water quality resulting from discharge of approximately 150 gallons (570 L) per day of sanitary sewage over the roughly 20-year production phase.

- Loss of approximately 1,300 pounds (590 kg) of plankton and a small amount of fish each day over a 3-year period resulting from intake of seawater for injection at Platform Gina.
- Loss of approximately 0.6 square miles (1.6 km^2) of potential fishing area because of the platform exclusion zones.
- Damage to trawl and purse-seine nets.

The increase in faunal biomass and species diversity represents a localized, long-term beneficial impact. Other impacts on the regional and site biotas and on commercial fishing activities would be insignificant to minor due to the small areas affected and large areas of similar habitat and biota within the region and site.

4.4.2 East Mandalay Alternative Configuration

Offshore project elements and activities for the East Mandalay alternative configuration would be identical to those associated with the proposed Mandalay configuration. See Section 4.4.1 for potential environmental impacts during the construction, drilling, and production phases.

4.4.3 Union Oil Marine Terminal Alternative Configuration

Offshore project elements and activities for the Union Oil Marine Terminal alternative configuration would be identical to those associated with the proposed Mandalay configuration. See Section 4.4.1 for potential environmental impacts during the construction, drilling, and production phases.

4.4.4 Ormond Beach Alternative Configuration

4.4.4.1 Construction

4.4.4.1.1 Platforms

Platform construction for the Ormond Beach alternative configuration would be identical to that described for the proposed Mandalay configuration. See Section 4.4.1.1.1 for discussion of environmental impacts.

4.4.4.1.2 Offshore Pipelines and Power Cables

Platform Gina

The power cable from the Mandalay Generating Station to Platform Gina would be emplaced within the same corridor as for the proposed Mandalay configuration. Potential impacts associated with the installation of the power cable would be identical to those discussed for the corresponding cable in Section 4.4.1.1.2.

Potential impacts associated with offshore pipeline construction would have the same causal factors as for the proposed Mandalay configuration (Section 4.4.1.1.2). Trenching and jetting operations would remove or disrupt the marine biota along a 0.25-mile (0.4-km)-long corridor between the intertidal area and -20 feet (-6 m) (MLLW). Displacement of approximately 52,000 square feet (4,830 m^2) of sediment (less than 0.2 percent of the similar habitat within the region) during these operations would increase turbidity in the offshore area and disrupt or remove those infaunal organisms within the corridor. The impacts of this activity are considered short-term and insignificant, when compared to the large area of similar habitat within the region.

Beyond the 20-foot (6-m) isobath, the pipelines would be laid on the bottom. The organisms directly below the pipelines would be eliminated or displaced. Displacement of approximately 30,000 square feet (2,787 m^2) of surface area (approximately 0.04 percent of the habitat within the region at these depths) and the associated organisms is considered insignificant due to the extensive area of similar habitat supporting a similar biota in the region. The introduction of over 30,000 square feet (2,787 m^2) of solid substrate habitat would be a localized, long-term positive impact.

The intake and discharge of approximately 110,000 gallons (416,350 L) of hydrostatic test water would result in a loss of approximately 930 pounds (420 kg) of plankton during water intake and increased turbidity during discharge. The test water volume represents less than 0.02 percent of the average daily discharge volume of the Mandalay and Ormond Beach generating stations. The 930 pounds (420 kg) of zooplankton lost represents about 140 pounds (65 kg) of anchovy or about 14 pounds (6 kg) of bonito. Therefore, impacts associated with intake and discharge of hydrostatic test water would be insignificant.

The pipeline corridor would traverse Fish Block 683. Commercial trawling activities within this block are relatively minor (halibut represents only 0.1 percent of the total annual catch from this block). Thus, the presence of the pipelines and loss of this area to commercial trawling activities is considered minor (estimated at 37 pounds (17 kg) per year).

Platform Gilda

Impacts associated with construction of the Platform Gilda pipelines and power cable would be the same as discussed for the proposed Mandalay configuration (Section 4.4.1.1.2).

4.4.4.1.3 Total Impact

Potential impacts that would occur during the construction phase would be limited to:

- Temporary disturbance of 375,000 square feet (34,850 m^2) of sedimentary habitat and associated organisms during platform placement and pipeline/power cable installation.
- Permanent (for the life of the project) elimination of 195,000 square feet (88,500 m^2) of sedimentary habitat and associated organisms resulting from platform placement and pipeline/power cable installation.
- Changed productivity because of altered water quality resulting from discharge of 11,760 gallons (44,500 L) of sanitary sewage and 630,000 gallons (2,384,550 L) of used hydrostatic test water.
- Loss of approximately 6,000 pounds (2,720 kg) of zooplankton that would be entrained during intake of seawater for hydrostatic testing.
- Temporary loss of approximately 6.0 square miles (16 km^2) of potential fishing area due to exclusion zones which would be established during platform and pipeline/power cable installation.

The impacts on the regional and site marine biotas would be insignificant because of the relatively small areas disturbed or lost, the large areas of similar habitat and biota within the region and site, and the short duration of the potential effects. Loss of potential commercial fishing area would be an insignificant to minor impact because of the small areas involved, the nature of fishing activities within these areas, and the short duration of restricted access.

4.4.4.2 Drilling

Project activities during the drilling phase for the Ormond Beach alternative configuration would be identical to those for the proposed Mandalay configuration. See Section 4.4.1.2 for discussion of potential drilling-related environmental impacts.

4.4.4.3 Production

Project activities during the production phase for the Ormond Beach alternative configuration would be identical to those for the proposed Mandalay configuration. See Section 4.4.1.3 for discussion of potential production-related environmental impacts.

4.4.5 Potential Impacts on Sensitive Habitats and Rare or Endangered Species

There are no specially sensitive marine habitats within the area that would be affected by normal project activities during the construction, drilling, and production phases for the proposed or alternative project configurations. Therefore, no significant impacts on specially sensitive marine habitats would occur.

Two species of endangered marine-associated birds (California brown pelican and California least tern) occur within the project region. Several species of whales may also occur, but only the California grey whale would be expected regularly, particularly in spring and autumn when it passes through the Santa Barbara Channel during migration. Although the presence of project facilities and increased human activity could have some minor indirect effects on some individuals of rare or endangered species, normal project activities during the construction, drilling, and production phases (for the proposed or alternative project configurations) would not produce any significant impacts on populations of rare or endangered species.

4.4.6 Accidental Oil Spills

4.4.6.1 Potential Spills from the Proposed Project

Accidental oil spills could potentially occur during the construction, drilling, or production phases of the proposed Platform Gina and Platform Gilda Project. Such spills can be categorized into four principal types: minor (less than 10 bbl); moderate (10 - 10,000 bbl) from a platform or offshore section of pipeline; moderate (10 - 10,000 bbl) from a beach/ nearshore section of pipeline; and, major (greater than 10,000 bbl) from a platform. The potential for oil spills to occur and representative trajectories of the resulting slicks are discussed in detail in Sections 4.9.2 and 4.9.3 and in Appendix B.2. A very brief synopsis of the results of the trajectory analyses conducted for the proposed project by Dames & Moore follows.

Oil spill trajectory modeling (Section 4.9.3, Appendix B.2) indicates that points along the mainland coast from the City of Santa Barbara to Point Mugu, and the northern and eastern coasts of Santa Cruz and Anacapa islands could be affected by a moderate spill from an offshore source. Travel time of the potential spills prior to impact on shore would range from roughly 0.5 to 3 days for most points, depending primarily on wind conditions at the time of the spill.

The trajectory modeling further indicates that areas along the mainland coast between Rincon Point and a location approximately 3 miles (5 km) southeast of Point Mugu could be affected by a moderate spill from a nearshore/beach source. Travel time of the potential spills would range from 0 to about 1.5 days. The Channel Islands would not be affected by significant quantities of oil in the event of such a spill.

The mainland coast from Point Conception to Newport Beach and the inner and outer Channel Islands could be affected by a major spill from either Platform Gina or Platform Gilda. Travel time of potential spills to mainland areas between Santa Barbara and Santa Monica Bay and the inner Channel Islands would range from roughly 0.5 to 3 days. Travel time to other potentially affected areas would be somewhat longer.

4.4.6.2 General Fates and Effects of Petroleum in the Marine Environment

Information concerning the constituents, types, fates, and effects of petroleum compounds in the marine environment is included in several recent reviews (e.g., Moore et al., 1973 and 1974; Evans and Rice, 1974; Lee, 1977; U.S. Department of the Interior, 1979).

As may be seen in Table 4.4-2, crude oils differ in the relative proportions of hydrocarbon and non-hydrocarbon components. Table 4.4-2 also shows the extent to which several types of oil are soluble in water. The aromatic constituents in petroleum are the most significant in terms of toxicity effects.

The fate of petroleum, once it enters the marine environment, depends on a number of factors including: water and air temperatures; amounts and types of nutrient and inorganic substances present; and, winds, tides, currents, and the amount of sediment suspended in the water. Irrespective of the physical conditions of the environment, the chemical composition of petroleum changes ("weathers") upon entering the ocean (Moore et al., 1973). Weathering occurs by evaporation, dissolution, microbial oxidation, chemical oxidation, and/or photochemical reactions (Blumer and Sass, 1972). The effects of weathering are generally rapid (1-2 days) for the lower boiling fractions due to evaporation and dissolution. Degradation of the higher boiling fractions is slower (periods of years), occurring primarily by microbial and chemical oxidation (Moore et al., 1973).

Effects of petroleum are generally categorized into six types: (1) lethal toxicity; (2) sublethal disruption of cellular or behavioral processes; (3) incorporation into tissues (tainting); (4) lethal coating; (5) sublethal coating; and, (6) alteration of habitats (Moore et al., 1973).

Soluble aromatic compounds in crude oil are generally toxic to marine organisms at concentrations of 0.1 to 100 ppm, with larvae (usually planktonic) being most sensitive and affected at lower concentrations. These aromatic fractions have low boiling points and thus evaporate rapidly; but,

TABLE 4.4-2

COMPOSITION AND SOLUBILITY OF VARIOUS PETROLEUM SUBSTANCES

Fraction	Description	"Heavy" Crude A	"Medium" Crude B	#2 Fuel Oil	Kerosene	Residual Or Bunker C
1	Low Boiling Paraffins	1	10	15	15	0
2	High Boiling Paraffins	1	7	20	20	1
3	Low Boiling Cyclo-Paraffins	5	15	15	20	0
4	High Boiling Cyclo-Paraffins	5	20	15	20	1
5	Mono- and Di-Cyclic Aromatics	2	5	15	15	0
6	Polycyclic Aromatics	6	3	5	2	1
7	Naphtheno-Aromatics	15	15	15	8	1
8	Residual	65	25	--	--	96
Estimated Maximum % Soluble		10	30	60	65	1
Estimated Maximum % Soluble Aromatic Derivatives		0.1-10	0.1-10	1-30	1-20	0-1
Reported % Soluble Aromatics Obtained in Seawater Extracts		0.1	0.01, 0.1		0.01	

Reference: Moore et al., 1973.

they also are rather soluble in seawater, and thus exposure of larvae and holoplanktonic organisms can occur. A summary of petroleum hydrocarbon toxicity data is shown in Table 4.4-3.

Sublethal effects include disruption of behavioral and physiological activities. Responses or behavior of crustaceans and fish appear to be altered when oil interferes with, or masks, the detection of pheromones within the water. This field has not been extensively studied. Although indications are that concentrations of petroleum at 10 to 100 ppb can cause disruption, it is generally concluded that the toxic effects of low boiling point fractions are more significant than their behavior-altering effects (Moore et al., 1974).

Filter-feeding organisms appear to be most susceptible to tainting. Marine molluscs, certain fishes, and polychaete worms have been shown to accumulate petroleum within specific tissues when exposed to concentrations as low as 1 to 10 ppb. Depuration (self-cleaning) has, however, also been demonstrated to occur relatively quickly (within weeks to months) upon exposure to "unoiled" water (Moore et al., 1974).

The coating of fur or feathers with oil decreases the insulation and/or buoyancy properties of these coverings. Straughan (1971) summarized the effects of coating of birds by oil. She stated that usually it is the weathered (residual) portion of the oil (fractions not dissolved or evaporated) that coat the organisms. Likewise, a heavy coating on some kinds of sessile invertebrates can result in smothering. Due to reduced availability of light and CO_2, photosynthetic rates of macroalgae have been shown to decrease when coating occurs for a prolonged period of time. Zooplankton may also be susceptible to coating in oil-water emulsions.

Organisms most affected by habitat alteration (incorporation of petroleum into sediments or onto hard substrates) are those that ingest sediments (detritus feeders) or attach to the substrate. When anoxic conditions exist within the bottom sediments, degradation of all crude oil fractions is reduced and thus long-term effects can occur (Moore et al., 1974).

TABLE 4.4-3

SUMMARY OF PETROLEUM HYDROCARBON TOXICITY

	Estimated Typical Toxicity Level (ppm) for Various Substances			
Class of Organism	SAD[a]	#2 Fuel Oil/Kerosene	Fresh Crude	Weathered Crude
Plants	10-100	50-500	$10^4 - 10^5$	Coating more significant than toxicity
Finfish	5-50	25-250	$10^4 - 10^5$	Coating more significant than toxicity
Larvae	0.1-1.0	0.5-5	$10^2 - 10^3$	Coating more significant than toxicity
Pelagic Crustaceans	1-10	5-50	$10^3 - 10^4$	Coating more significant than toxicity
Gastropods	10-100	50-500	$10^4 - 10^5$	Coating more significant than toxicity
Bivalves	5-50	25-250	$10^4 - 10^5$	Coating more significant than toxicity
Benthic Crustaceans	1-10	5-50	$10^3 - 10^4$	Coating more significant than toxicity
Other Benthic Invertebrates	1-10	5-50	$10^3 - 10^4$	Coating more significant than toxicity

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[a] Soluble aromatic derivatives (aromatics and naptheno-aromatics).
[b] Reference: Moore et al., 1973.

4.4.6.3 Effects of Previous Oil Spills

A limited number of documented studies have been conducted to assess the acute and chronic biological impacts of marine oil spills. A brief summary of the effects of four selected spills is presented in Table 4.4-4. Because most studies have been made in estuaries, few data are available concerning effects in open-ocean areas. However, certain generalizations about various effects of previous oil spills in the marine environment can be made.

In general, where damage was severe, the oil spill was massive relative to the size of the affected area, and the spill was confined to a limited area of relatively shallow water for a period of several days. Different oils were found to have different effects, with toxicity being most pronounced for refined distillates, and physical smothering being most severe with viscous crude oils or Bunker C crude oil. Refined No. 2 fuel oil was among the types having the most toxic effect.

Mortality of some organisms has been found in all major spills for which studies have been published, with pelagic diving birds (particularly grebes) being the most obvious casualties. The extent of mortality depended on local conditions and was greatest when the spills were confined to inshore areas where marine resources were abundant.

Recovery of the polluted areas varied greatly, and apparently depended on flushing of the area, the type of sediments present, and the degree of isolation of the ecosystems. The time period for recovery varied from a few months to several years. Additional subtle effects may persist well beyond the period of apparent recovery.

4.4.6.4 Potential Impacts of Oil Spills from the Proposed Project

4.4.6.4.1 Minor Spills

Minor oil spills (less than 10 bbl) should be readily contained and have only minor, short-term local effects on the marine biota. These effects would be limited to those organisms directly contacted by, or in the immediate vicinity of, the spill as it is unlikely that a spill of less than 10 barrels

TABLE 4.4-4

BIOLOGICAL EFFECTS OF SELECTED LARGE OIL SPILLS

Date	Source	Type of Oil	Amount (barrels)	Affected Shoreline (miles)	Biological Effects	Reference
March 1957	Tampico Maru; Baja, California	Diesel	60,000	2	Nearly total devastation immediately; luxuriant growth of seaweed within months, biota 90% restored after 3-4 years; relative abundance of certain species remained somewhat altered beyond 4 years.	North et al., 1964
January 1969	Platform A; Santa Barbara Channel	Crude	80,000	40	High mortalities of intertidal organisms smothered with oil; about 3,600 birds killed; no apparent effects on fish and plankton; no directly attributable damaging effects of oil on large marine mammals or on benthic fauna; area recovering well within one year.	Fauchald, 1971; Foster et al, 1971a,b; Nicholson, 1972; Nicholson and Cimberg, 1971; Straughan, 1971.
September 1969	Florida; West Falmouth, Massachusetts	No.2 Fuel Oil	4,500	3	Severe pollution of sublittoral zone, with 95% kill of all fauna, including many fish, worms, molluscs, crabs, lobsters, and other crustaceans and invertebrates; local shellfish industry severely affected; some areas still closed to shellfishing in May 1974.	Blumer et al., 1970; Blumer and Sass, 1972
January 1971	Arizona Standard and Oregon Standard; San Francisco Bay	Bunker C	20,000	60	Some damage to shore life, mainly acorn barnacles, limpets, mussels, and striped shore crabs; 4,500 birds killed; area nearly recovered within one year.	Chan, 1973

would reach shore, or contribute significant amounts of toxic soluble hydrocarbons to the water column. The number of organisms potentially impacted would be insignificant because of the very small area affected (approximately 0.4 square mile (1.0 km^2)) and the expected rapid cleanup.

4.4.6.4.2 Moderate and Major Spills

It is impossible to predict with much confidence what the consequences of an accidental moderate (10 - 10,000 bbl) or major (greater than 10,000 bbl) oil spill on the marine biota would be because of the tremendous number of potential sets of circumstances which could exist at the time of the spill. By studying the results of oil spill trajectory analyses (Section 4.9.3 and Appendix B.2) and of previous documented studies of oil spills, however, it is possible to develop a general idea of potential impacts. In the summary which follows, it is assumed that whether the spill was of moderate or major size, the nature of the effects would be the same, only the magnitude would differ.

Review of several published studies of past oil spills (e.g., North et al., 1964; Smith, 1968; Straughan, 1970; Nicholson and Cimberg, 1971; Blumer et al., 1970; Chan, 1973) suggests that the 1969 Santa Barbara Oil Spill provides the most pertinent data for assessing the effects of the type of spill that could potentially occur as a result of the proposed project. It was a large spill of crude oil into the open ocean, which would cover the range of effects associated with a moderate or major spill that might result from the proposed project. (The only other hydrocarbon liquid that could be released in great amounts is diesel fuel from the platform construction barge; however, because of the short time period during which the barge would be onsite (approximately 10 weeks), the probability of a large spill occurring is very low. In addition, if such a spill did occur, it would take place in the open ocean and the resulting effects would likely be much less severe than the Tampico Maru and Florida spills (Table 4.4-4) which were confined to small areas of relatively shallow water.)

The most serious impact of the 1969 Santa Barbara Oil Spill was to marine bird populations, with estimates of over 3,600 individuals killed (California Department of Fish and Game, 1969). No noticeable fish kills resulted from the spill and macroplankton showed no significant changes (University of California, Santa Barbara, 1971). Further, Straughan (1970) stated that her study was "unable to prove large scale damage to plankton, benthos or marine mammals as a result of the oil spill in January 1969. This does not mean that these populations escaped completely unharmed, but it does indicate a lack of acute catastrophic effects." Nicholson (1972) observed the smothering of some sessile rocky intertidal organisms, adhering of oil to the upper intertidal areas, and removal of organisms attached to oil patches when these patches were washed away. Straughan (1973) summarized the effect on sandy intertidal biota as "...I have been able to detect no change in species distribution and abundance attributable...to the Santa Barbara oil spill". Also, no long-term effects on commercial fisheries could be attributed to the spill and decreases in catches were apparently caused by loss of fishing time and fouling of gear, rather than loss of fish (U.S. Department of the Interior, 1979).

A general summary of the potential impacts of a moderate or major oil spill on the major groups of marine biota within the potentially affected area for the proposed project follows.

Marine Birds

Deaths of birds would result from oil coating their plumage, and toxic effects of ingesting oil. They could also suffer from sublethal effects such as altered egg-laying, food-gathering, and migration patterns. Certain birds, such as loons and grebes, would be particularly susceptible since they float low in the water and dive for food. Bird deaths resulting from the 1969 Santa Barbara and the 1971 San Francisco Bay oil spills were estimated at over 3,600 and 4,500, respectively. Similar numbers of birds could be affected by a spill from the proposed project. This would represent a significant short-term impact, but recovery of populations would be expected within a few years' time.

Marine Mammals

It is difficult to assess the potential impact of a moderate or major oil spill on marine mammals. Although most investigators of the Santa Barbara Oil Spill could find no conclusive evidence of significant damage to marine mammals (e.g., Orr, 1969; Brownell and Le Boeuf, 1971), such findings have been contested by others (e.g., Connell, 1973). An oil spill could potentially cause the following effects to marine mammals: death by exposure due to destruction of the insulating air layer; death by ingestion of oil; death by coating of the respiratory surface; death by asphyxiation due to blocking of the blowhole; death of young on rookery breeding beaches; and, changes in normal migration routes. The significance of these, or other, potential impacts would largely depend on the magnitude, time, and location of the spill.

Fish

Fish at all stages of their development would be susceptible to effects of spilled oil. As adults, they could be affected directly by physical contact, or indirectly through the food chain by ingestion of contaminated food. Whereas it is reasonable to assume that juvenile and adult fishes would be able to avoid oiled areas, the near-surface eggs and larvae of many species would not be able to do so due to their lack of mobility. Therefore, these life stages would be most susceptible to adverse impacts.

A moderate or major spill would result in direct mortality and gill damage to epipelagic and neritic adult fish and nektonic invertebrates inhabiting the upper layers of the ocean. Fish eggs, larvae, and fry would be most severely affected life stages. Death of planktonic organisms could also remove important food resources. Because of the widespread geographical distribution and large reproductive potentials of most of the fish species, recovery from adverse impacts would be expected to be rapid. In addition, studies conducted after the Santa Barbara Oil Spill revealed that no significant damage to fish populations had occurred. Therefore, a short-term impact of low to moderate significance would be expected.

Plankton

Although some reduction of phytoplankton photosynthesis could occur, no significant impact on regional plankton populations would be expected because of their widespread geographical distribution and large reproductive potentials.

Benthos

Little is known about the impact of crude oil on the benthos. Some degree of smothering would be expected as the suspended material reached the bottom. However, mobile organisms are expected to be able to move through this material. In addition, it is questionable whether crude oil that settles in sediments remains sticky or retains a high percentage of its toxic components. Therefore, significant impacts on the benthic biota would not be expected to be produced by an accidental oil spill from the proposed project.

Intertidal Biota

Sandy Beach Habitat: Sandy beaches are common within the area potentially affected by a moderate or major spill from the proposed project (e.g., at Santa Barbara, Ventura-Oxnard, Santa Monica Bay). In these areas, physical effects of the oil would probably be more harmful than chemical toxicity. Because of the high-energy nature of these sandy beach areas, the paucity of infaunal inhabitants of sandy beaches in the site and regional areas, and the rapid turnover rate, no significant impacts would be expected to persist beyond one year of the spill. After one year, recovery and recolonization by most species should be well advanced.

Rocky Shore Habitat: Rocky intertidal areas occur throughout the area potentially affected by a moderate or major spill (e.g., Rincon Point, Point Mugu, much of the Channel Islands). Although not as prevalent areally as sandy beaches, rocky intertidal areas are ecologically important because they support a relatively much greater biomass and variety of plants and animals. In addition, due to their topographic position, they often receive spilled oil earlier and in greater amounts than neighboring areas. Physical effects of oil on invertebrates would be more likely to cause adverse impacts than would chemical toxicity. Algae may also be affected, but apparently many species are able to withstand exposure to oil better than many animals. Sublethal effects on plants and animals may also occur. Although potential impacts would be somewhat greater than for sandy beach areas, the high-energy nature of the environment should lead to relatively rapid recovery and recolonization by most species. Therefore, no significant long-term impacts would be expected.

4.4.6.5 Potential Impacts on Sensitive Habitats and Rare or Endangered Species

Sensitive marine habitats, such as the Channel Islands and Mugu Lagoon, could be affected by an accidental oil spill. Existing oil spill contingency plans (Section 5.9) contain measures to protect these habitats. Although contamination of these habitats could occur in the event of an accidental spill, rapid deployment of oil containment and recovery equipment could minimize potential impacts. Therefore, significant long-term effects may not occur.

Rare or endangered marine birds and mammals would be subject to the types of effects discussed above for marine birds and mammals in general. Although some individuals of rare or endangered species could be affected by an accidential oil spill, no significant long-term impacts on populations of such species should occur.

4.5 TERRESTRIAL BIOLOGY

4.5.1 Proposed Mandalay Configuration

4.5.1.1 Construction

4.5.1.1.1 Platforms

Onshore support for offshore platform construction would be provided from established facilities at Port Hueneme and Ventura County Airport. Neither this activity nor those offshore would significantly affect terrestrial plants or animals.

4.5.1.1.2 Offshore Pipelines and Power Cables

Construction of the offshore pipelines and power cables associated with Platforms Gina and Gilda would require establishment and use of an onshore marshalling and fabrication area. This area would be located on relatively flat terrain immediately south of the Southern California Edison (SCE) Mandalay Generating Station and east of the foredune ridge. A 40-foot (12-m)-wide corridor would be extended through the foredune ridge and across the flat beach to accommodate pulling the pipelines offshore.

Grading and removal of vegetation from the marshalling/fabrication area and corridor would result in the loss of about 7.3 acres (2.9 ha) of relatively disturbed dune scrub and about 0.5 acre (0.2 ha) of foredune habitat. Small numbers of individuals of various animal species (principally rodents and lizards) commonly associated with these vegetation types would be displaced or eliminated during establishment of the area.

Construction activities would result in local increases in noise, nighttime illumination, and human activity. This may discourage some animals from using nearby habitats while such conditions exist (approximately 10 weeks). Minor amounts of air pollutants and solid and liquid wastes would enter the environment on, and adjacent to, the construction area. None of these should result in significant impacts on the local plants or animals.

Restoration of the marshalling/fabrication area would be conducted upon completion of construction activities in accordance with applicable regulatory requirements. Assuming that native (e.g., silver beachweed) or introduced (e.g., European beachgrass, sea fig) species were used, reestablishment of vegetation and its associated fauna would require up to 3 years.

4.5.1.1.3 Onshore Treating Facility

Grading and removal of vegetation from the treating facility site would result in the loss of about 1.5 acres (0.6 ha) of foredune and 0.3 acre (0.1 ha) of dune scrub habitat. In addition, increased noise and human activity and minor amounts of air pollutants and liquid and solid wastes would be introduced to the local environment. These activities would result in impacts on the local terrestrial biota similar in nature to, but of lower magnitude and significance than, those described for the onshore marshalling/fabrication area (Section 4.5.1.1.2). However, the 1.8 acres (0.7 ha) of foredune and dune scrub habitat would be lost for the duration of project operation (approximately 20 years). Upon completion of the project's operational lifetime, the treating facility would be removed and the area restored in accordance with regulatory requirements applicable at the time. Up to 3 years would be required for reestablishment of vegetation and its associated fauna.

4.5.1.1.4 Onshore Pipelines

Removal of vegetation during installation of onshore pipelines would result in the loss of ruderal (6.6 acres (2.6 ha)), dune scrub (1.1 acres (0.4 ha)), urban (0.4 acre (0.2 ha)), and foredune (0.3 acre (0.1 ha)) habitat. In addition, increased noise and human activity and minor amounts of air pollutants and liquid/solid wastes would be introduced to the local environment as pipeline construction proceeded sequentially along the route.

Between MLLW and Harbor Boulevard, foredune and dune scrub vegetation would be disturbed. Associated impacts would be similar in nature to, but of lower magnitude and significance than, those described for the onshore marshalling/fabrication area, because of the smaller area and shorter time involved in construction.

Northward along Harbor Boulevard to the marine terminal, principally ruderal and urban habitat would be disturbed, as the corridor would be located in an existing right-of-way adjacent to the eastern side of the road. Because of the proximity of considerable existing human activity and the highly disturbed nature of the right-of-way, impacts on the local biota resulting from construction along this portion of the corridor would be negligible.

Surface restoration would be conducted in accordance with applicable regulatory reqirements. Reestablishment of vegetation and associated fauna would be expected within 1 year for ruderal and urban areas and up to 3 years for foredune and dune scrub areas.

4.5.1.1.5 Total Impact

The following impacts on the terrestrial biota would result from construction activities for the proposed Mandalay configuration:

- Removal of vegetation from areas of dune scrub, ruderal, urban, and foredune habitat (acreages given in Table 4.5-1).
- Temporary displacement, or elimination, of small numbers of individuals of animal species associated with the disturbed and adjacent habitats.

All impacts, from both single and combined activities, would be of negligible to minor magnitude and significance. Except for the loss of foredune and dune scrub habitat from the treating facility site (for the life of the project), all impacts would be of short duration. In most areas, reestablishment of vegetation and its associated fauna would occur within 1 to 3 years after completion of construction and restoration activities.

4.5.1.2 Drilling

Drilling activities on Platforms Gina and Gilda would not have significant effects on the terrestrial flora or fauna. Onshore support would be provided from established facilities at Port Hueneme and Ventura County Airport. Noise and atmospheric emissions would have dissipated prior to reaching shore, and solid wastes would be transported to shore and hauled to an approved disposal site.

TABLE 4.5-1

POTENTIAL AREAL DISTURBANCE - TERRESTRIAL HABITAT

	Habitat[a]								
	F	DS	FM	Ri	SM	Ru	A	U	Total
PROPOSED MANDALAY CONFIGURATION									
Site	1.5[b]	0.3	-	-	-	-	-	-	1.8
Onshore Pipeline Corridor	0.3	1.1	-	-	-	6.6	-	0.4	8.4
Offshore Pipeline Marshalling and Fabrication Area	0.5	7.3	-	-	-	-	-	-	7.8
TOTAL	2.3	8.7	-	-	-	6.6	-	0.4	18.0
EAST MANDALAY ALTERNATIVE CONFIGURATION									
Site	-	1.8	-	-	-	-	-	-	1.8
Onshore Pipeline Corridor	0.5	2.4	-	-	-	6.6	-	0.4	9.9
Offshore Pipeline Marshalling and Fabrication Area	0.5	7.3	-	-	-	-	-	-	7.8
TOTAL	1.0	11.5	-	-	-	6.6	-	0.4	19.5
UNION OIL MARINE TERMINAL ALTERNATIVE CONFIGURATION									
Site	-	-	-	-	-	-	-	1.8	1.8
Onshore Pipeline Corridor	0.5	3.2	-	3.6	-	7.6	5.1	1.1	21.1
Booster Station	0.4	0.3	-	-	-	-	-	-	0.7
Offshore Pipeline Marshalling and Fabrication Area	0.5	7.3	-	-	-	-	-	-	7.8
TOTAL	1.4	10.8	-	3.6	-	7.6	5.1	2.9	31.4
ORMOND BEACH ALTERNATIVE CONFIGURATION (OPTION A)									
Site	-	-	-	-	-	1.8	-	-	1.8
Onshore Pipeline Corridors	3.9	6.5	-	-	-	11.4	1.0	35.6	58.5
Booster Stations	1.1	0.3	-	-	-	-	-	-	1.4
Offshore Pipeline Marshalling and Fabrication Areas	7.8	7.3	-	-	-	-	-	-	15.1
TOTAL	12.8	14.1	-	-	-	13.2	1.0	35.6	76.8
ORMOND BEACH ALTERNATIVE CONFIGURATION (OPTION B)									
Site	-	-	-	-	-	1.8	-	-	1.8
Onshore Pipeline Corridors	3.9	1.5	-	-	-	37.0	33.2	26.3	101.9
Booster Stations	1.1	0.3	-	-	-	-	0.7	-	2.1
Offshore Pipeline Marshalling and Fabrication Areas	7.8	7.3	-	-	-	-	-	-	15.1
TOTAL	12.8	9.1	-	-	-	38.8	33.9	26.3	120.9

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[a] F = Foredune; DS = Dune Scrub; FM = Fresh Water Marsh; Ri = Riparian; SM = Salt Marsh; Ru = Ruderal; A = Agricultural; U = Urban.

[b] All areas given in acres.

4.5.1.3 Production

4.5.1.3.1 Offshore Platforms and Pipelines

Production activities associated with Platforms Gina and Gilda and their offshore pipeline systems would not have significant impacts on the terrestrial flora or fauna for the same reasons as discussed for drilling (Section 4.5.1.2).

4.5.1.3.2 Onshore Treating Facility and Pipelines

Normal operations at the onshore treating facility would have negligible impacts on the terrestrial biota adjacent to the site. The facility would be enclosed by a 10-foot (3-m)-high block wall on the sides away from the generating station and would operate unattended. The separation equipment would produce only minor offsite noise and atmospheric emissions, and solid and liquid wastes would be hauled to an approved disposal site.

Normal pipeline operations would have no significant impacts on the terrestrial flora or fauna. Should portions of the pipeline require replacement during the life of the project, the associated impacts in the area affected would be similar to those discussed for pipeline construction (Section 4.5.1.1.4).

4.5.1.3.3 Total Impact

Normal production operations would have no significant impacts on the terrestrial biota.

4.5.2 East Mandalay Alternative Configuration

4.5.2.1 Construction

4.5.2.1.1 Platforms and Offshore Pipelines

Impacts on the terrestrial biota associated with offshore platform and pipeline construction, including those resulting from establishment and use of the onshore marshalling and fabrication area, would be identical to those described for the proposed Mandalay configuration (Sections 4.5.1.1.1 and 4.5.1.1.2).

4.5.2.1.2 Onshore Treating Facility

Grading and removal of vegetation from the treating facility site would result in the loss of about 1.8 acres (0.7 ha) of dune scrub habitat. Small numbers of individuals of various animal species associated with this vegetation type (primarily rodents and lizards) also would be displaced or eliminated during establishment of the site. In addition, some animals may be discouraged from using nearby habitats because of the increased noise and human activity. Releases of small amounts of air pollutants and liquid and solid wastes to the environment on, and adjacent to, the site would not have significant effects on the flora and fauna of the area. The 1.8 acres (0.7 ha) of dune scrub habitat would be lost for the duration of project operation (approximately 20 years). Upon completion of the project's operational lifetime, the treating facility would be removed and the area restored in accordance with regulatory requirements applicable at the time. Assuming that native species indigenous to the local area (e.g., sea-cliff buckwheat, mock heather, yellow willow) were used, reestablishment of vegetation and its associated fauna would require up to 3 years.

4.5.2.1.3 Onshore Pipelines

The onshore pipeline corridor associated with the East Mandalay alternative site would be the same as that for the proposed Mandalay configuration with the following two exceptions:

- The portion of the corridor between Mandalay Beach and the Harbor Boulevard/Edison Canal area would be wider to accommodate a greater number of pipelines.
- A segment approximately 0.1 mile (0.2 km) long would be required between Harbor Boulevard and the site.

Impacts resulting from installation of the onshore pipelines would be of the same nature as those described for the proposed Mandalay configuration (Section 4.5.1.1.4). The magnitude and significance of these impacts would be negligible to minor. Surface restoration would be essentially the same as was described for the proposed Mandalay configuration.

4.5.2.1.4 Total Impact

The following impacts on the terrestrial biota would result from construction activities for the East Mandalay alternative configuration:

- Removal of vegetation from areas of dune scrub, ruderal, foredune, and urban habitats (acreages given in Table 4.5-1).
- Temporary displacement, or elimination, of small numbers of individuals of animal species associated with the disturbed and adjacent habitats.

All impacts, from both single and combined activities, would be of negligible to minor magnitude and significance. Except for the loss of dune scrub habitat from the treating facility site (for the life of the project), all impacts would be of short duration. In most areas, reestablishment of vegetation and its associated fauna would occur within 1 to 3 years after completion of construction and restoration activities.

4.5.2.2 Drilling

Drilling activities on Platforms Gina and Gilda would not have significant effects on the terrestrial biota for the same reasons that were discussed for the proposed Mandalay configuration (Section 4.5.1.2).

4.5.2.3 Production

Impacts on the terrestrial biota associated with production activities at both offshore and onshore project facilities would be essentially the same as those discussed for the proposed Mandalay configuration (Section 4.5.1.3) and would be negligible.

4.5.3 Union Oil Marine Terminal Alternative Configuration

4.5.3.1 Construction

4.5.3.1.1 Platforms and Offshore Pipelines

Impacts on the terrestrial biota associated with offshore platform and pipeline construction, including those resulting from establishment and use of the onshore marshalling/fabrication area, would be identical to those described for the proposed Mandalay configuration (Sections 4.5.1.1.1 and 4.5.1.1.2).

4.5.3.1.2 Onshore Treating Facility

No significant vegetation or populations of animals are associated with the Union Oil Marine Terminal alternative site because of its location in an industrialized area. Consequently, site preparation would not result in loss of biological habitat. Local increases in noise, human activity, and cycling of small amounts of air pollutants and liquid/solid wastes would have no significant impacts on the flora or fauna of adjacent areas.

4.5.3.1.3 Onshore Pipelines and Booster Station

The onshore pipeline corridor associated with the Union Oil Marine Terminal alternative site would be the same as that for the proposed Mandalay configuration with the following two exceptions:

- The corridor would be wider to accommodate a greater number of pipelines.
- Because of the necessity for a wider corridor, the pipelines would be emplaced in the bed of the Santa Clara River rather than attached to the Harbor Boulevard bridge.

In addition, a booster station would be required near the offshore pipeline landfall point at Mandalay Beach (approximately at the proposed Mandalay onshore treating facility site) to facilitate transport of the produced fluids to the marine terminal area.

Grading and removal of vegetation from the booster station site and the pipeline corridor between MLLW and Harbor Boulevard would result in the loss of about 1.8 acres (0.7 ha) of dune scrub and 0.9 acre (0.4 ha) of foredune habitats. In addition, increased noise and human activity and minor amounts of air pollutants and solid/liquid wastes would be introduced to the local environment. Impacts resulting from booster station and onshore pipeline construction in these areas would be of the same nature as those described for treating facility and onshore pipeline construction for the proposed Mandalay configuration (Sections 4.5.1.1.3 and 4.5.1.1.4). Surface restoration would be essentially the same as for the proposed Mandalay configuration.

Northward along Harbor Boulevard to the marine terminal, the following areas of habitats would be disturbed: ruderal (7.6 acres (3.0 ha)); agricultural (5.1 acres (2.0 ha)); riparian (3.6 acres (1.4 ha)); dune scrub (1.4 acres (0.6 ha)); and urban (1.1 acres (0.4 ha)). The agricultural vegetation type would be affected because the width of the corridor would extend beyond the ruderal area alongside the road, and onto the adjacent fields. Riparian vegetation would be disturbed during burial of the pipelines across the Santa Clara River.

Impacts on the terrestrial biota resulting from pipeline construction within ruderal, dune scrub, and urban areas would be of the same nature as those described for the proposed Mandalay configuration (Section 4.5.1.1.4). They would be of negligible to minor magnitude and significance. Restoration of these areas would be essentially the same as for the proposed Mandalay configuration.

Within the agricultural areas, the principal impact would be temporary loss of about 5 acres (2.0 ha) of cropland. The significance of this impact would depend on the timing of disturbance in relation to cropping patterns; however, at worst, it would be minor. Few vertebrates reside in these agricultural fields, but several forage there. Temporary loss of these areas would result in negligible impacts on such animals. Assuming that vegetable crops typical for the area were replanted, restoration of agricultural habitat and animal usage would require 3 to 6 months.

Removal of vegetation and trenching across the Santa Clara River would eliminate 3.6 acres (1.4 ha) of riparian habitat. This activity also would temporarily displace, or eliminate, some individuals of resident amphibian and reptile species, as well as nesting birds and small numbers of mammals. These impacts would be similar in nature to, but of much smaller magnitude than, those which occur naturally during periods of high flow volumes in the river (such as the winters of 1969, 1978, and 1980). Disturbed riparian areas would recover naturally, with most vegetation and its associated fauna reestablished within 1 to 3 years.

Increased noise and human activity in the riverbed could discourage some animals from using nearby habitats during the 3-month construction period. In addition, minimal amounts of air pollutants and liquid and solid wastes would be introduced to the local environment. These would have negligible effects on the local biota.

Impacts on the aquatic biota would be negligible because construction would occur during a period of little or no surface flow within the river. Impacts on downstream habitats (including the salt marsh and intermittent lagoon) also would be negligible.

4.5.3.1.4 Total Impact

The following impacts on the terrestrial biota would result from construction activities for the Union Oil Marine Terminal alternative configuration:

- Removal of vegetation from areas of dune scrub, ruderal, agricultural, riparian, urban, and foredune habitats (acreages given in Table 4.5-1).
- Temporary displacement, or elimination, of small numbers of individuals of animal species associated with the disturbed and adjacent habitats.

Impacts resulting from onshore pipeline construction across the Santa Clara River would be of minor magnitude and moderate significance. All other impacts would be of negligible to minor magnitude and significance, both from single and combined activities. Except for loss of dune scrub habitat at the booster station site (for the life of the project), all impacts would be of short duration. In most areas, reestablishment of vegetation and its associated fauna would occur within 3 months to 3 years after completion of construction and restoration activities.

4.5.3.2 Drilling

Drilling activities on Platforms Gina and Gilda would not have significant effects on the terrestrial biota for the same reasons that were discussed for the proposed Mandalay configuration (Section 4.5.1.2).

4.5.3.3 Production

Impacts on the terrestrial biota associated with production activities at both offshore and onshore project facilities would be essentially the same as those discussed for the proposed Mandalay configuration (Section 4.5.1.3) and would be negligible.

4.5.4 Ormond Beach Alternative

4.5.4.1 Construction

4.5.4.1.1 Platforms

Impacts on the terrestrial biota associated with platform construction would be identical to those that were discussed for the proposed Mandalay configuration (Section 4.5.1.1.1).

4.5.4.1.2 Offshore Pipelines and Power Cables

Platform Gina Offshore Pipelines

Construction of the Platform Gina offshore pipelines along the Ormond Beach alternative route would require establishment and use of a second marshalling and fabrication area, to be located near the landfall point at Silver Strand Beach. This would result in disturbance of approximately 7.3 acres (2.9 ha) of foredune habitat. Foredune habitat at Silver Strand Beach consists of flat sandy beach, essentially devoid of vegetation. As such, it is little used by animals, except for resting and feeding by shorebirds. Consequently, construction activities would have a negligible impact on the local terrestrial biota.

Platform Gina Power Cable and Platform Gilda Offshore Pipelines and Power Cable

Impacts on the terrestrial biota associated with construction of the Platform Gilda offshore pipelines and the power cables for each platform would be identical to those discussed for the proposed Mandalay configuration (Section 4.5.1.1.2).

4.5.4.1.3 Onshore Treating Facility

Although classified as ruderal habitat, the Ormond Beach alternative site presently supports little, or no, vegetation because of continuing disturbance. As such, it is little used by animals, except for resting by birds such as gulls and terns. Consequently, site preparation would not result in loss of biological habitat. Local increases in noise, human activity, and cycling of small amounts of air pollutants and liquid and solid wastes would have no significant impacts on the flora and fauna of nearby habitats.

4.5.4.1.4 Onshore Pipelines and Booster Stations

Platform Gina Onshore Pipelines and Booster Station

Construction of the Platform Gina onshore pipelines would result in disturbance of 4.6 acres (1.8 ha) of urban, 3.6 acres (2.0 ha) of foredune, and 0.5 acre (0.2 ha) of ruderal habitat. In addition, construction of a booster station, to be located near the offshore pipeline landfall point at Silver Strand Beach, would disturb 0.7 acre (0.3 ha) of foredune habitat. Increased noise and human activity, and introduction of small amounts of air pollutants and liquid and solid wastes would occur in the vicinity of all construction activities.

Foredune habitat at Silver Strand and Port Hueneme City beaches is essentially devoid of vegetation. As such, it is little used by animal species, except for resting and feeding by shorebirds. Consequently, onshore pipeline and booster station construction activities would have a negligible impact on the terrestrial biota of these areas. Foredune habitat between Port Hueneme City Beach and Perkins Road consists of scattered hummocks covered primarily by silver beachweed. Few animals significantly use these areas. Impacts resulting from onshore pipeline construction in these areas would be of minor magnitude and significance.

Disturbance of areas of urban and ruderal habitat would result in no significant impacts on the terrestrial biota. These areas contain little vegetation, are used by few animals, and are subject to a high level of human disturbance.

Option A Pipelines and Booster Station

Construction of the Option A onshore pipelines would result in removal of vegetation from areas of urban (31.0 acres (12.4 ha)), ruderal (10.9 acres (4.4 ha)), dune scrub (6.5 acres (2.6 ha)), agricultural (1.0 acre (0.4 ha)), and foredune (0.3 acre (0.1 ha)) habitat. Increased noise and human activity, and introduction of small amounts of air pollutants and liquid and solid wastes to the environment would also occur in local areas as pipeline construction proceeded sequentially along the route.

Between the Ormond Beach alternative site and the Harbor Boulevard/Channel Islands Boulevard intersection, disturbance would involve principally urban and ruderal habitats. Impacts on the terrestrial biotas in these areas would be negligible.

Along Harbor Boulevard between Channel Islands Boulevard and the SCE Mandalay Generating Station, disturbance would involve dune scrub, urban, and ruderal habitats. Impacts in areas of dune scrub would be similar in nature to those described for the proposed Mandalay configuration (Section 4.5.1.1.4). They would be of minor to moderate significance. Impacts on the terrestrial biota of the urban and ruderal habitats would be negligible.

The remainder of the corridor would follow the same route as that for the proposed Mandalay configuration. Consequently, impacts on the terrestrial biota would be essentially the same as those discussed in Section 4.5.1.1.4.

The location of the booster station required near Mandalay Beach would be the same as that for the Union Oil Marine Terminal alternative configuration. Impacts would be identical to those discussed in Section 4.5.3.1.3.

Option B Pipelines and Booster Stations

Construction of the Option B onshore pipelines would result in removal of vegetation from areas of ruderal (36.5 acres (14.6 ha)), agricultural (33.2 acres (13.3 ha)), urban (21.7 acres (8.7 ha)), dune scrub (1.5 acres (0.6 ha)), and foredune (0.3 acre (0.1 ha)) habitats. Increased noise and human activity and introduction of small amounts of air pollutants and liquid/solid wastes to the environment would also occur.

Between the site and the Harbor Boulevard/Gonzales Road intersection, disturbance would involve ruderal, agricultural, and urban habitats. Impacts on the terrestrial biota associated with agricultural habitat would generally be of the same nature as those discussed for similar areas along the Union Oil Marine Terminal alternative configuration pipeline corridor (Section 4.5.3.1.3). They would be of moderate magnitude and significance. Impacts on the biota of ruderal and urban areas would be negligible.

The remainder of the corridor would follow the same route as that for the proposed Mandalay configuration. Consequently, impacts on the terrestrial biota would be essentially the same as those discussed in Section 4.5.1.1.4. The location of the booster station required near Mandalay Beach would be the same as that for the Union Oil Marine Terminal alternative configuration. Impacts would be identical to those discussed in Section 4.5.3.1.3. The second booster station would be situated near the Rice Road/Gonzales Road intersection. Construction of the booster station would disturb about 0.7 acre (0.3 ha) of agricultural land. Impacts would be of the same nature as those for the Option B pipeline corridor in similar areas. The magnitude and significance of the impacts would be minor.

4.5.4.1.5 Total Impact

The following impacts on the terrestrial biota would result from construction activities for the Ormond Beach alternative configuration:

Option A

- Removal of vegetation from areas of urban, dune scrub, ruderal, foredune, and agricultural habitats (acreages given in Table 4.5-1).
- Temporary displacement, or elimination, of small numbers of individuals of animal species associated with the disturbed and adjacent habitats.

Impacts resulting from removal of dune scrub vegetation would be of moderate magnitude and significance. All other impacts, from both single and combined activities, would be of negligible to minor magnitude and significance. Except for the loss of areas of dune scrub and foredune habitats at the booster station locations (for the life of the project), all impacts would be of short duration. In most areas, reestablishment of vegetation and its associated fauna would occur within 3 months to 3 years after completion of construction and restoration activities.

Option B

Impacts would be of the same nature as for Option A. Impacts resulting from disturbance of agricultural habitat would be of moderate magnitude and significance. All other impacts, from both single and combined activities, would be of negligible to minor magnitude and significance. Except for the loss of areas of dune scrub, foredune, and agricultural habitats at the booster station sites (for the life of the project), all impacts would be of short duration. Recovery of disturbed areas would be essentially the same as for Option A.

4.5.4.2 Drilling

Drilling activities on Platforms Gina and Gilda would not have significant effects on the terrestrial biota for the same reasons that were discussed for the proposed Mandalay configuration (Section 4.5.1.2).

4.5.4.3 Production

Impacts on the terrestrial biota associated with production activities at both offshore and onshore project facilities would be essentially the same as those discussed for the proposed Mandalay configuration (Section 4.5.1.3) and would be negligible.

4.5.5 Potential Impacts on Rare or Endangered Species

4.5.5.1 Plants

The proposed project would have no significant impact on Cordylanthus maritimus or Astragalus pycnostachyus var. lanosissimus. Neither species was observed during the Dames & Moore field surveys, and neither is expected to occur on or near the proposed or alternative sites or their associated pipeline corridors.

4.5.5.2 Animals

The proposed project would have no significant impact on the six endangered bird species which may occur within the project area.

The California brown pelican (Pelecanus occidentalis californicus) is common in the project area. It has been observed feeding offshore and in coastal areas including the Santa Clara River mouth, McGrath Lake, Channel Islands Harbor, and Port Hueneme. In addition, brown pelicans frequently use beaches, and other coastal areas, for resting. Feeding and resting activities of brown pelicans would be interrupted in local areas during project construction. These interruptions would not produce significant or long-term effects on populations of the brown pelican. Drilling and production activities would have no significant effects on feeding or resting activities.

The California least tern (Sterna albifrons browni) breeds at two known locations in the project area--at the Santa Clara River mouth and near the Ormond Beach Generating Station. Neither of these breeding locations would be affected by activities related to the proposed project.

Because of its physical characteristics (flatness, lack of substantial vegetation, loose substrate, and proximity to McGrath Lake and the Santa Clara River mouth), the Mandalay Beach area potentially could provide nesting habitat for least terns. However, historic nesting in the area has not been recorded and, based on the high level of pedestrian activity, it is considered unlikely that least terns would use the area for nesting in the future.

Localized disturbances of feeding and resting activities of least terns would be expected to occur, similar to those discussed for the brown pelican. Such disturbances would not result in significant or long-term impacts on least tern populations.

Potential effects on brown pelicans or least terns would result from construction activities which would occur on beaches or areas immediately adjacent to them. For the proposed Mandalay configuration, and the East Mandalay and Union Oil Marine Terminal alternative configurations, construction activities would disturb approximately 10 acres (4.0 ha) in the Mandalay Beach area. The Ormond Beach alternative configuration (Option A or Option B) would result in disturbance of a similarly-sized area near Mandalay Beach, as well as about 16 acres (6.4 ha) at Silver Strand and Port Hueneme City beaches.

The Belding's savannah sparrow (*Passerculus sandwichensis beldingi*) breeds within salt marshes at two known locations within the project area--at McGrath State Park and near the Ormond Beach Generating Station. However, neither location would be affected by activities related to the proposed project.

The American peregrine falcon (*Falco peregrinus anatum*), southern bald eagle (*Haliaeetus leucocephalus leucocephalus*), and light-footed clapper rail (*Rallus longirostris levipes*) are not expected to significantly utilize habitats within the project area.

The six endangered bird species would be subject to the effects of accidental spills. Potential effects on these species would be of the same nature as those discussed in general for the project area avifauna (Section 4.4). Although some individuals of these species could be disturbed or eliminated by accidental spills, no significant long-term effects on populations are expected.

4.5.6 Potential Impacts on Sensitive Habitats

4.5.6.1 Normal Project Activities

Implementation of the proposed project (either the proposed Mandalay configuration or one of the alternatives) would not result in significant long-term impacts on terrestrial areas within the project area that may be designated as sensitive biologic habitat (McGrath Lake, salt marsh, coastal dunes, and the Santa Clara River mouth). McGrath Lake and salt marsh habitat in the vicinity of Ormond Beach are located outside the area that would be disturbed by the proposed project. Consequently, they would not be affected by project-related activities.

Approximately 10 acres (4 ha) of coastal dunes south of the SCE Mandalay Generating Station (within the Mandalay dune complex) would be disturbed during the following activities:

- Establishment of a marshalling and fabrication area (all configurations).
- Installation of onshore pipelines (all configurations).
- Installation of the treating facility (proposed Mandalay configuration).
- Installation of a booster station (Union Oil Marine Terminal and Ormond Beach alternative configurations).

All, or most, of this area previously was disturbed during construction of the generating station. The vegetation present within the area consists primarily of scattered native shrubs and introduced dune stabilizing secies. Except for small areas occupied by the treating facility or booster station (1.8 and 0.7 acres (0.7 and 0.3 ha), respectively), disturbance would be of short duration. Upon completion of activities (construction or production, as appropriate), the areas would be revegetated in conformance with applicable regulatory requirements. Reestablishment of vegetation and its associated fauna would require up to 3 years.

The Santa Clara River mouth would not be affected by project activities for the proposed Mandalay, East Mandalay alternative, or Ormond Beach configuration. Emplacement of pipelines in the river bed east of the Harbor Boulevard bridge for the Union Oil Marine Terminal alternative configuration could have minor indirect effects on the river mouth caused by introduction of construction-related wastes and quantities of sediment into the area. Such effects would be negligible, however, in comparison to the natural disturbance that takes place during periods of high flow in the river (e.g., the winters of 1969, 1978, and 1980).

4.5.6.2 Accidental Spills

McGrath Lake and the salt marsh habitat in the vicinity of Ormond Beach would not be significantly affected by project-related spills of hydrocarbon fluids or produced water because of their distances from project facilities.

Coastal dune areas within, and immediately adjacent to, onshore pipeline corridors could be affected by an accidental spill of hydrocarbon fluids or produced water. A release of crude oil could produce significant local impacts on sand dune habitat, principally as a result of the elimination of vegetation. Because of the porosity and permeability of the sands, the spilled oil would penetrate rapidly and spread a limited distance laterally. Thus, affected areas would be relatively small. Within these areas, however, recovery would probably be slow because of the paucity, in sandy soils, of microorganisms which would actively break down the oil. Depending on the size and nature of the specific area involved, effects would be of negligible to moderate significance when compared to the total area of sand dune habitat within the region. Possible spills of produced water should not produce significant impacts on coastal dunes areas.

The Santa Clara River mouth could be affected by offshore spills or spills from onshore pipelines which would cross the river on the Harbor Boulevard bridge (proposed Mandalay, East Mandalay alternative, or Ormond Beach alternative configuration), or within the riverbed (Union Oil Marine Terminal alternative configuration). The greatest potential impacts would result from a major spill of crude oil occurring offshore. The probability of such a spill reaching sensitive habitats within the river mouth is considered low, however, for the following reasons:

- During periods of high-volume discharge from the river, oil would be prevented from entering the river mouth by the force of the current.
- During periods of low flow, a sand bar is usually present at the mouth of the river that would prevent oil from entering the area.
- The river mouth is recognized as a sensitive biological area by Union, and measures for its protection are included in their oil spill contingency plan (Section 5.9).

Effects that could occur as a result of a spill of hydrocarbon fluids or produced water from the onshore pipelines probably would be of smaller magnitude than those from an offshore spill.

The short-term effects on the river mouth habitats that would result from moderate or large spills from either offshore or onshore sources could be highly significant. However, significant long-term effects would not be expected, because subsequent high flows within the river would remove remnants of the spill and allow natural recovery to take place. Introduction of weathered crude oil into the marine environment resulting from river discharge would produce negligible to minor effects because the oil would be highly dispersed and it toxicity decreased before it reached the ocean.

4.5.7 Effects of Accidental Spills and Gas Leaks

4.5.7.1 Potential Impacts of Produced Water Spills

In the event of a pipeline rupture or other accident, produced water could be released to the environment. Specific effects of such a release would depend on several factors, including the location and volume of the spill. Spilled water would collect near the source of its release or drain from the area, and/or percolate into the soil. This would directly and indirectly affect vegetation and resident animals. These effects would be localized, short-term impacts of negligible to moderate significance. Subsequent leaching of accumulated salts would occur, and reestablishment of vegetation and its associated fauna probably would occur within five years.

4.5.7.2 Accidental Oil Spills

4.5.7.2.1 Potential Spills from the Proposed Project

Accidental oil spills could potentially occur from offshore and onshore project facilities. The potential for oil spills to occur and representative trajectories of slicks resulting from offshore and shoreline spills are discussed in detail in Sections 4.9.2 and 4.9.3 and in Appendix B.2.

4.5.7.2.2 Effects of Crude Oil on Terrestrial Plants and Animals

Crude oils vary in toxicity according to the amounts of low-boiling, unsaturated, aromatic, and acidic compounds contained in them. Toxicity generally increases with increasing concentrations of these substances. Crude oil is more toxic when it is fresh than after it weathers, because the more toxic components are among the first to evaporate (Cowell, 1971).

Effects of oil that have been observed on terrestrial plants include: incorportion of oil into plant tissues; yellowing or death of oiled leaves or plants; reduction of reproductive success; and, in some cases, growth stimulation (Baker, 1970). Hot, sunny weather promotes evaporation of toxic aromatics from spilled oil, but also favors active plant metabolism which may promote uptake of oil. Oil which has penetrated into the soil also may affect plants, both directly (through contact with roots or other underground plant parts) and indirectly. Crude petroleum is converted to soil organic matter by bacteria and fungi. During the conversion, these organisms fix large amounts of atmospheric nitrogen. Organic matter improves the physical and chemical characteristics of the soil and later, the fixed nitrogen becomes available for plant growth. Observed growth stimulation in some species after light oiling, and in many species during the late stages of recovery from large spills, may be related to the increase in nitrogen, nutrients released from other oil-killed organisms, or growth-regulating compounds (Cowell, 1971).

Relatively little information is available concerning the effects of terrestrial crude oil spills on vertebrates. Effects on avifauna, including marine and shore-associated birds, are discussed in Section 4.4.6.

The general effects of oil on fresh water organisms include: coating of respiratory surfaces of fish and other invertebrates, causing anoxia and death; coating of the water surface, inhibiting re-aeration from the atmosphere; de-oxygenation of the water due to the decay of organisms; and, direct toxicity due to effects on nervous systems.

The specific effects of oil on terrestrial plants and animals depend on several factors, including: the type and amount of oil spilled; the local terrain; the plant and animal species involved; local soil characteristics; and, meteorologic conditions at the time. Potential effects would likely fall within the range of those described here.

4.5.7.2.3 Potential Impacts of Oil Spills from the Proposed Project

Offshore oil spills would have little effect on the terrestrial biota. Areas affected by offshore spills would mostly be below MHHW. Potential impacts within these areas are discussed in Section 4.4.6. Above MHHW, localized impacts on areas of foredune habitat would occur which would be of negligible to minor magnitude and significance in terms of the regional resource base.

Onshore oil spills at treating facility or booster station sites would have no significant effects on the terrestrial biota. Such spills would be contained within impermeable-surfaced areas by dikes surrounding the tanks and equipment.

Oil spilled from an onshore pipeline rupture within the project area would accumulate near the leak because of the flat terrain. Such accumulations of oil would have significant impacts on plants and animals within the immediate area of the spill. Affected areas are expected to be relatively small, however, because the pipeline system could be shut down within a short time after detection of the leak, thus limiting the amount of oil released. Habitats most likely to be affected by a pipeline spill would be ruderal, urban, agricultural, and dune scrub. Impacts of a spill on the biotas of ruderal or urban areas would be negligible because of the highly disturbed nature of these habitats. Impacts on the biotas of agricultural or dune scrub areas would be of moderate to high significance locally, but of minor significance on a regional scale. Reestablishment of vegetation and its associated fauna following an oil spill could require as little as 3 months, or as much as 10 years, depending on the nature of the spill and the area affected.

The effects of possible oil spills on rare or endangered species that may be designated as sensitive habitat are discussed in Sections 4.5.5.2 and 4.5.6.2, respectively.

4.5.7.3 Potential Impacts of Natural Gas Leaks

In the event of a gas leak, impact on the vegetation would be minor from the gas itself. Natural gas is not toxic to plants, although under certain circumstances it may asphyxiate roots by displacing soil oxygen. Rupture of a high-pressure gas pipeline could also result in a fire or explosion which would eliminate plants and animals in the immediate vicinity of the accident. In any case, impacts of a gas leak would be localized, and of negligible to minor magnitude and significance. Reestablishment of vegetation and its associated fauna would require up to three years.

4.6 LAND USE

Impacts of the proposed Platform Gina and Platform Gilda Project on land use, public policy, recreation, traffic, and aesthetics are described in the following sections. Impacts on water use are discussed in Section 4.9.1 (marine traffic and recreational boating) and Sections 4.4 and 4.7 (commercial fishing).

4.6.1 Land Use

4.6.1.1 Proposed Mandalay Configuration

4.6.1.1.1 Construction

Offshore Pipelines

Marshalling and fabrication of the offshore pipelines for Platforms Gina and Gilda would occur on land located immediately south of the proposed Mandalay treating facility site. The area is currently undeveloped and is situated within the industrial setting of the SCE Mandalay Generating Station. Use of the land for pipeline fabrication would alter the present land use characteristics for a period of approximately 10 weeks. Construction activities would not significantly interfere with surrounding land uses. Following fabrication, the area would be restored as closely as possible to pre-construction conditions. No long-term impacts are anticipated.

Onshore Treating Facility

The proposed treating facility site occupies presently undeveloped land located south of and adjacent to the existing SCE Mandalay Generating Station. The land is included within property planned for future development as the Mandalay Beach County Park. However, the site itself is not part of the area planned for park development. Construction activities would alter the existing condition of the property. No significant interference with adjacent land uses is expected, although there would be intermittent interference with nearby beach use throughout the 16-week construction period. Owing to the short duration of construction activities, impacts on land use are considered to be minor.

Onshore Pipelines

From MLLW at Mandalay Beach to the proposed treating facility site, the pipelines to/from Platforms Gina and Gilda would be buried within a construction corridor traversing beach and dune habitat. During construction, public access across the beach would be restricted. Impacts on beach access and beach use would be of short duration and thus are not considered to be significant.

From the treating facility to Harbor Boulevard, pipeline construction activities would occur near open space areas and the SCE Mandalay Generating Station. The nature and duration of activity would not adversely affect these land uses.

Along the Harbor Boulevard segment of the route, the pipelines would be installed within an existing pipeline right-of-way. Construction would not substantially interfere with adjacent rural, industrial, agricultural, and recreational uses. There could be a restriction of traffic flow during the period when the product oil pipeline is being attached to the Santa Clara River bridge crossing. At all major road crossings, boring techniques would be utilized such that the flow of traffic would not be impeded.

Total Impact

Land use changes caused by construction of the proposed Mandalay configuration would be confined primarily to the treating facility site and onshore pipeline rights-of-way. Access across Mandalay Beach would be restricted during the period when pipelines to/from Platforms Gina and Gilda are being installed across the beach. Some short-term adverse impacts on recreational use of Mandalay Beach and traffic flow on Harbor Boulevard may also occur. In general, however, construction activities are not expected to significantly interfere with surrounding land uses.

4.6.1.1.2 Drilling

Drilling activities on Platforms Gina and Gilda would not affect land use in the onshore project area.

4.6.1.1.3 Production

Onshore Treating Facility

The undeveloped onshore treating facility site would be converted to an industrial use for the 20-year lifetime of the project. At the end of the project lifetime, the facility would be dismantled and the site would be restored and revegetated in accordance with Ventura County or other applicable agency regulations in effect at that time.

Existing land uses surrounding the proposed site would be unaffected by normal treating facility operations. Industrial use of the site would be compatible with adjacent industrial facilities and operations (i.e., the SCE Mandalay Generating Station and two nearby oil drilling facilities). Operation of the treating facility is not expected to be incompatible with the planned Mandalay Beach County Park for the following reasons: (1) to most observers, the site would appear to be a part of the Mandalay Generating Station which is, and will continue to be, the dominant feature of the landscape; (2) the site would be screened from public view by block walls on the south and west; (3) the facility is being designed to operate unattended and would be associated with minimal human activity; and, (4) there are no intrinsic features of treating facility operations which would detract from the recreational appeal of the planned park given the existence of other major industrial facilities in the area.

Onshore Pipelines

Because the onshore pipelines would be buried and be predominantly within existing rights-of-way, there would be no impact on land uses within or adjacent to the pipeline rights-of-way. Public access would not be restricted where the pipelines cross the beach.

Total Impact

The present land use of the treating facility site would be altered to an industrial use for the 20-year life of the project. Surrounding land uses would not be significantly affected. The buried pipelines would not affect land uses on or adjacent to the pipeline rights-of-way.

4.6.1.2 East Mandalay Alternative Configuration

4.6.1.2.1 Construction

Offshore Pipelines

The onshore marshalling area utilized for pipeline fabrication would be the same as for the proposed Mandalay configuration. Refer to Section 4.6.1.1.1 for a discussion of impacts.

Onshore Treating Facility

The East Mandalay alternative site is situated east of Harbor Boulevard within SCE property. Surrounding land uses are predominantly electrical transmission facilities, agriculture, petroleum production, and vacant land. The site itself is presently undeveloped. Construction activities would alter the present condition of the property, but would not significantly interfere with surrounding land uses. Land use impacts associated with treating facility construction would be minimal.

Onshore Pipelines

The onshore pipelines connecting the East Mandalay treating facility with the offshore pipeline system and with the Union Oil Marine Terminal follow the same corridor as for the proposed Mandalay configuration. The only difference would be a short segment across undeveloped sand dunes needed to connect the treating facility site with Harbor Boulevard and a wider construction right-of-way from Mandalay Beach to the treating facility site. Land use impacts during construction would be essentially the same as described for the proposed project configuration (Section 4.6.1.1.1).

Total Impact

Land use changes caused by construction would be confined primarily to the treating facility site and pipeline rights-of-way. Except for the temporary marshalling area utilized to fabricate the offshore pipelines, and the temporary closure of a small area of Mandalay Beach during pipeline installation, adjacent land uses would be unaffected. Some short-term adverse impacts on recreational use of Mandalay Beach and traffic flow on Harbor

Boulevard may occur. Because of the short duration of construction activities, these impacts are expected to be minor.

4.6.1.2.2 Drilling

Drilling activities on Platforms Gina and Gilda would not affect land use in the onshore project area.

4.6.1.2.3 Production

Onshore Treating Facility

The currently undeveloped property on which the treating facility would be located would be committed to an industrial use for the 20-year project lifetime. At the end of the project lifetime, the facility would be dismantled and the site restored and revegetated in accordance with regulatory agency requirements in effect at that time.

Existing land uses surrounding the East Mandalay alternative site would not be significantly affected by treating facility operations. Industrial use of the site would be compatible with other industrial facilities and operations in the area, including SCE electrical transmission facilities, an SCE substation, a petroleum waste disposal site, and several oil production operations.

Onshore Pipelines

Because the onshore pipelines would be buried and be predominantly within existing rights-of-way, there would be no impact on land uses within the pipeline rights-of-way or in adjacent areas.

Total Impact

Land which is presently undeveloped open space would be converted to an industrial use for the 20-year lifetime of the project. Adjacent land uses would not be significantly affected. The buried onshore pipelines would not affect land uses on or adjacent to the pipeline rights-of-way. Public access would not be restricted where the pipelines cross the beach.

4.6.1.3 Union Oil Marine Terminal Alternative Configuration

4.6.1.3.1 Construction

Offshore Pipelines

The onshore marshalling area utilized for pipeline fabrication would be the same as described for the proposed Mandalay configuration. Refer to Section 4.6.1.1.1 for a discussion of impacts.

Onshore Treating Facility

The Union Oil Marine Terminal alternative site is located within the boundaries of an existing Union marine terminal and storage facility. This facility is fenced and diked. Much of the land within the site is already developed to an intensive industrial use. The site where the treating facility would be located is presently vacant. The change in land use from a vacant condition to a developed state would be consistent with surrounding land uses in the Union Oil Marine Terminal. Construction activities would not impact present or future land uses of areas in the immediate vicinity of the marine terminal.

Onshore Pipelines and Booster Station

The route of the onshore pipeline corridor for the Union Oil Marine Terminal alternative configuration would be the same as for the proposed Mandalay configuration. The width of the construction right-of-way would be wider. Land use impacts resulting from pipeline installation would be essentially the same as discussed for the proposed Mandalay configuration (Section 4.6.1.1.1), except that a small amount of agricultural land would be temporarily affected.

The Union Oil Marine Terminal alternative configuration would require construction of a booster station near the shoreward extension of the pipelines to/from Platforms Gina and Gilda. This facility would probably be at the location currently planned for the proposed Mandalay configuration onshore treating facility. Booster station construction may cause intermittent interference with beach use during the 3-month construction period, but is otherwise not expected to substantially interfere with surrounding land uses.

Total Impact

Land use changes caused by construction would be confined primarily to the Union Oil Marine Terminal site, the Mandalay Beach booster station site, the temporary marshalling area at Mandalay Beach, and the onshore pipeline system right-of-way. Some short-term interference with recreational uses of Mandalay Beach and traffic flow on Harbor Boulevard may occur during pipeline installation and booster station construction, but construction is not otherwise expected to interfere with surrounding land uses.

4.6.1.3.2 Drilling

Drilling activities on Platforms Gina and Gilda would not affect land use in the onshore project area.

4.6.1.3.3 Production

Onshore Treating Facility

The land use of the Union Oil Marine Terminal alternative site would be altered from its present vacant condition to an industrial use for the 20-year lifetime of the project. At the end of the project lifetime, the facility would be dismantled and the site restored in accordance with regulatory agency requirements in effect at that time. Normal treating facility operation would not significantly interfere with surrounding land uses. Industrial use of the property would be consistent with industrial facilities and operations at the existing Union Oil Marine Terminal and in the immediately surrounding area.

Onshore Pipelines and Booster Station

Because the onshore pipelines would be buried and be predominantly within existing rights-of-way, there would be no land use impact within the pipeline corridor permanent right-of-way or in adjacent areas.

The land required for the Mandalay Beach booster station would be altered from its present condition and committed to industrial use for the 20-year lifetime of the project. Termination and abandonment procedures would be the same as described above for the onshore treating facility. Booster station normal operation is not expected to significantly interfere with adjoining and surrounding land uses. The booster station would be compatible with the adjoining SCE Mandalay Generating Station and the planned Mandalay Beach County Park.

Total Impact

The present land use of the treating facility and booster station sites would be altered to an industrial use for the 20-year life of the project. Operation of these facilities is not expected to substantially impact surrounding land uses, nor to be incompatible with existing uses. The buried onshore pipelines would not affect land uses on or adjacent to the pipeline right-of-way. Public access would not be restricted where the pipelines cross the beach.

4.6.1.4 Ormond Beach Alternative Configuration

4.6.1.4.1 Construction

Offshore Pipelines

Platform Gina: The Ormond Beach alternative configuration would require the temporary placement of a pipeline fabrication and marshalling area near the landfall point at Silver Strand Beach. Upon completion, the area would be restored as closely as possible to its former condition. Recreational activities within the marshalling area would be suspended throughout the 9-week construction period. Construction activities would occur in full view of a number of residences fronting on Silver Strand Beach. Although the duration of construction activities would be short, pipeline fabrication at Silver Strand Beach has the potential to interfere with existing recreational and residential land uses. Temporary land use impacts are expected to be of moderate magnitude and significance. There would be no permanent impacts.

Platform Gilda: The onshore marshalling area utilized for fabrication of the Platform Gilda pipelines would be the same as for the proposed Mandalay configuration. Refer to Section 4.6.1.1.1 for a discussion of impacts.

Onshore Treating Facility

The Ormond Beach alternative site is located within an area which is planned for and developed with heavy industrial uses. The facility would be consistent with the existing and intended land uses.

Land use changes during construction would consist of altering the present undeveloped state of the site to one of industrial development. Surrounding land uses would not be impacted by construction.

Onshore Pipelines and Booster Stations

Platform Gina Pipelines and Booster Station: The construction of the pipelines from the landfall point at Silver Strand Beach to the Ormond Beach site would temporarily affect various land uses and activities along its 2.5-mile (4.0 km) length. Significant adverse impacts could result in the Port of Hueneme where construction along the pipeline route could interfere with shipping and cargo-handling activities, access to the piers, and general traffic flow within the port itself. Although these interruptions would be temporary, the duration would likely be long enough to significantly curtail the activities of the port.

The pipeline route would pass through the Hueneme Beach Park within an SCE easement. Development of the park, now underway, includes a new parking lot which would be traversed by the pipeline route. Disruption to the parking lot and surrounding activities and uses would occur for the duration of pipeline construction through this area. The impact would be temporary and minor. Other land use impacts resulting from pipeline installation would be confined to the temporary disruption of traffic access through certain residential and industrial areas, and temporary restriction of public access across the beach.

A booster station would be installed near the shoreward extension of pipelines to/from Platform Gina. The exact location of the booster station has not been specified, but it would be placed on Silver Strand Beach. Construction of the booster station would require a curtailment of recreational activities in the affected area. Movements of men and materials could cause traffic congestion on nearby streets. Although the duration of construction activities would be relatively short, installation of a booster station at Silver Strand Beach would not be compatible with surrounding recreational and residential land uses, and may temporarily interfere with such uses to a moderate degree.

Option A Pipelines and Booster Station: The construction of pipelines through the Oxnard and Port Hueneme urban centers between the Ormond Beach alternative site and the Union Oil Marine Terminal could result in brief, but significantly adverse, impacts on uses along the pipeline route. This would be especially true for commercial uses along Ventura Road and Channel Islands Boulevard, where access to retail establishments would be impaired during construction. Public access across the beach would be temporarily restricted at the Platform Gilda landfall point at Mandalay Beach. No permanent land use impacts would result.

Near the Platform Gilda pipeline landfall point at Mandalay Beach, a booster station would be constructed. Land use impacts would be the same as described for the Union Oil Marine Terminal alternative configuration (Section 4.6.1.3.1).

Option B Pipelines and Booster Stations: The Option B route would avoid the urban centers traversed by Option A and would create less impact to commercial and other uses along the pipeline route. As shown in Table 12.6-5 (See Volume II), much of the territory through which the Option B pipeline would pass is open space and industrial uses. Although access to some adjacent uses may be impaired during construction, such impacts would be temporary. No permanent land use impacts would result.

Two booster stations would be installed for the Option B alternative: one at Mandalay Beach, and one near the intersection of Rice Road and Gonzales Road. Impacts caused by construction of the Mandalay Beach booster station would be the same as discussed in the preceding paragraph for Option A.

Construction of the Rice Road/Gonzales Road booster station may have a minor to moderate impact on surrounding agricultural use, depending on its final location.

Total Impact

Option A: Fabrication of the offshore pipelines connecting Platforms Gina and Gilda with the treating facility would require the temporary use of beach use land at Mandalay and Silver Strand beaches for marshalling areas. The use of these two areas would alter the land use for 3 and 9 calendar weeks, respectively. During that time, use for recreational activities would be interfered with or suspended. Following construction, the two marshalling areas would be returned to their original condition. No permanent impacts would result. Construction of onshore booster stations at Silver Strand Beach and Mandalay Beach would also cause interference with recreational activities. The impact at Silver Strand Beach could be of moderate magnitude.

Land use changes caused by construction of a treating facility at the Ormond Beach site would be restricted to the immediately affected area. Impacts on surrounding industrial land uses are expected to be minimal.

Construction of the Platform Gina Ormond Beach alternative pipeline route from Silver Strand Beach through Port Hueneme to the treating facility site could create significant adverse impacts within the Port of Hueneme. Construction activities could interfere with shipping and cargo-handling activities, access to the piers, and traffic flow within the Port area. Depending on ship and port schedules, this could curtail loading and unloading of vessels. Construction of the pipelines would also interfere with the new parking lot to be constructed within Hueneme Beach Park. These impacts would be temporary, but of possibly moderate significance; however, no permanent impacts would result.

Construction of the onshore pipelines between the treating facility and the Union Oil Marine Terminal could result in brief, but significantly adverse, impacts on uses along the pipeline route. Commercial activities along Ventura Road and Channel Islands Boulevard, where access may be impaired, could experience a reduced level of business activity during the time pipeline construction is in the immediate vicinity. No permanent impacts would result, however.

Public access would be temporarily restricted where pipelines cross beaches.

Option B: Construction impacts would be the same as discussed above for the Option A alternative, except that routing of onshore pipelines through less urbanized areas would eliminate the adverse impact on commercial uses occurring along Ventura Road and Channel Islands Boulevard. Construction of the booster station at the Rice Road/Gonzales Road intersection could have a minor to moderate impact on surrounding agricultural and light industrial uses.

4.6.1.4.2 Drilling

Drilling activities on Platforms Gina and Gilda would not affect land use in the onshore project area.

4.6.1.4.3 Production

Onshore Treating Facility

The land use of the treating facility site would be altered to an industrial use for the 20-year project life. Existing industrial land uses surrounding the site would be unaffected by treating facility operation. At the end of the project lifetime, the facility would be dismantled and the site restored in accordance with regulatory agency requirements in existence at that time.

Onshore Pipelines and Booster Stations

Platform Gina Pipelines and Booster Station: The present land use of the booster station site at Silver Strand Beach would be altered to an industrial use for the 20-year project lifetime. Operation of the booster station would probably not significantly interfere with surrounding recreational and residential land uses, but is not considered to be highly compatible with these uses.

Onshore, the pipelines to/from Platform Gina would be buried and be predominantly within existing rights-of-way. There would be no impact on land uses within or adjacent to the pipeline right-of-way.

Option A Pipelines and Booster Station: No impact on land uses within or adjacent to the Option A pipeline rights-of-way would occur as the pipelines would be buried, be predominantly within existing rights-of-way, and require minimal maintenance. Operation of a booster station at Mandalay Beach would not significantly interfere with surrounding industrial and recreational uses. The booster station is expected to be compatible with these surrounding uses.

Option B Pipelines and Booster Stations: No impact on land uses within or adjacent to the Option B pipeline rights-of-way would occur as the lines would be buried, be predominantly within existing rights-of-way, and require minimal maintenance. Land areas occupied by the booster stations at Mandalay Beach and near the intersection of Rice Road and Gonzales Road would be committed to industrial use over the 20-year project lifetime. Operation of these facilities would not significantly interfere with surrounding land uses, and should be relatively compatible with all such uses.

Total Impact

Option A: The existing character of the Ormond Beach alternative treating facility site and booster station sites at Mandalay and Silver Strand beaches would be converted to an industrial use for the 20-year lifetime of the project. Operation of these facilities is not expected to substantially interfere with surrounding land uses, although the Silver Strand Beach booster station would not be highly compatible with nearby residential and recreational uses. The Mandalay Beach booster station site and Ormond Beach alternative treating facility site would be more compatible with surrounding land uses because of the presence of other major industrial elements. Operation of the buried onshore pipelines would not affect land uses on or adjacent to the rights-of-way. Public access would not be restricted where the pipelines cross the beach.

Option B: The total impact would be the same as for Option A except that land required for the third booster station site (near the intersection of Rice Road and Gonzales Road) would also be committed to an industrial use for the 20-year project lifetime. Operation of this booster station is not expected to significantly interfere with surrounding land uses. Depending on its exact location, the booster station could remove 0.7 acre (0.3 ha) of agricultural land from production for a 20-year period.

4.6.2 Public Policy

4.6.2.1 Proposed Mandalay Configuration

4.6.2.1.1 Construction

Offshore Pipelines

Approval for temporary use of the pipeline fabrication and marshalling area at Mandalay Beach would be processed together with the approval requests for the onshore treating facility, as discussed below.

Onshore Treating Facility

The proposed Mandalay treating facility site is situated within the City of Oxnard and would be subject to the zoning designations and general plans of that city.

The City of Oxnard has received an application from Union for development of the treating facility at the Mandalay site. The city has notified Union that the proposed development would not be in conformance with the General Plan and that a General Plan Amendment would be required prior to approval of the project. The EIR/EA must be completed before the request for amendment to the General Plan can be processed. In addition, the following permits are required and have been applied for by Union: Special Use Permit (SUP) No. 806, Zone Change Application No. 643, and Parcel Map No. 79-3 (for subdivision of a parcel of land to which Ventura County holds title) (Steele, 1979).

General Plan Amendment approval normally requires a minimum of 60 days with the possibility of an indeterminant amount of time being required beyond that initial time frame. The SUP, zone change, and parcel map applications would be processed concurrent with General Plan Amendment proceedings and would require a minimum of approximately 60 days for approval (Walrod, 1979).

Onshore Pipelines

Municipal approvals for pipeline construction would be incorporated as part of the application approval for the entire project. Zoning changes or General Plan Amendments would not be required exclusively for the onshore pipelines; rather, the SUP which would be granted if the project was approved would include approvals of the pipeline routing in Oxnard (Walrod, 1980). For portions of the right-of-way within the City of Ventura, a Conditional Use Permit (CUP) would be required. Ventura County requires a letter of request to the Planning and Public Works Departments accompanied by a project description; the need for a CUP would be determined by the Planning Department (Collart, 1980).

Total Impact

A zoning change and General Plan Amendment would be required by the City of Oxnard prior to project approval. The processing of the zone change, SUP, and a parcel map would take place concurrently with the General Plan Amendment process. The pipeline routes would be included with the treating facility in the application process. Pipeline segments within the City of Ventura (and possibly within county jurisdiction) would require a CUP(s).

4.6.2.1.2 Drilling

Onshore project facilities in existence during the drilling phase would conform to the General Plan, zoning ordinances, SUP, and CUP(s) that would be changed or granted prior to the start of construction.

4.6.2.1.3 Production

Onshore Treating Facility

The onshore treating facility would be consistent with the General Plan as amended prior to construction (Section 4.6.2.1.1). Zoning would likewise reflect actual use. The project would operate according to the terms of the SUP which would be granted prior to the start of construction. Upon completion of the 20-year project lifetime, the City of Oxnard could again act to alter the General Plan and zoning, if desired.

Onshore Pipelines

Operation of the pipelines would be carried out according to the terms of the SUP and CUP(s) which would be granted prior to the start of construction (Section 4.6.2.1.1).

Total Impact

Project facilities during production would conform to the General Plan, zoning ordinances, SUP, and CUP(s) which would be changed or granted prior to the start of construction (Section 4.6.2.1.1).

4.6.2.2 East Mandalay Alternative Configuration

4.6.2.2.1 Construction

The East Mandalay site is situated within the City of Oxnard and would be subject to the zoning designations and General Plan of that city. Preliminary analysis indicates that development at this site would require approvals similar to the proposed Mandalay site, including a General Plan Amendment, SUP, and parcel map (Section 4.6.2.1.1). Processing of these applications would require approximately the same time as for the proposed Mandalay configuration (Walrod, 1979).

Portions of the onshore pipeline system lying within the City of Ventura (and possibly within county jurisdiction) would require a CUP(s).

4.6.2.2.2 Drilling

Onshore project facilities during the drilling phase would conform to the General Plan, zoning ordinances, SUP, and CUP(S) that would be changed or granted prior to the start of construction.

4.6.2.2.3 Production

Project facilities during the production phase would conform to the General Plan, zoning ordinances, SUP, and CUP(s) that would be changed or granted prior to the start of construction. At the end of the 20-year project lifetime, the City of Oxnard could again act to alter the General Plan and zoning, if desired.

4.6.2.3 Union Oil Marine Terminal Alternative Configuration

4.6.2.3.1 Construction

Offshore Pipelines

Approvals required for temporary use of the pipeline fabrication and marshalling area at Mandalay Beach would generally follow the same procedure outlined in Section 4.6.2.1.1.

Onshore Treating Facility

The Union Oil Marine Terminal alternative site is situated within unincorporated territory bordered on three sides by the City of Ventura. Processing of a development application for the Union Oil Marine Terminal alternative site would be undertaken by either the County of Ventura or the City of Ventura.

The Ventura County Guidelines for Development state that within spheres of interest where city services exist, and within "urban" areas as exhibited on the Open Space Element of the county General Plan, applicants should be discouraged from making application to the county for Urban Land Uses and be directed to the appropriate city to achieve their development objectives (Ventura County, 1979). In accordance with this policy, the county would recommend annexation of the site to the City of Ventura (Davis, 1979). However, both the city and the applicant have the right to refuse annexation, and the possibility therefore exists that the county may process the development application. If this were the case, a planned development permit application would be submitted to the county by Union. Since the alternative site is located within the boundaries of an existing oil processing facility operating under Ventura County CUP No. 106 (approved by the County Board of Supervisors on February 20, 1951), the County Planning Commission could either: (1) grant a request for major modification to CUP No. 106; or, (2) grant a development permit under the Harbor Planned Development Zone Section 8134-0.5.10 (storage and trans-shipment facilities). In either case, review and approval would rest with the County Planning Commission. This permitting process is expected to require a minimum of 3 months (Vogelbaum, 1979).

If the City of Ventura were to process the application, the following procedural elements would be required upon receipt of a final environmental document (Meyer, 1979):

(1) Determination of necessity for General Plan Amendment by the Environmental Review Committee.
(2) Annexation of the site to the city.
(3) Change in the city zoning ordinance.
(4) Issuance of a CUP for Natural Resources Development.

The concurrent annexation procedure would consist of (Braitman, 1979):

(1) Prezoning of the site by the annexing city (Ventura).
(2) Application for annexation to the Local Area Formation Commission.
(3) Final action by the City Council.

This annexation process would normally take from 4.5 to 5.5 months to complete (Braitman, 1979).

Processing of the City of Ventura General Plan Amendment (if necessary) would require filing an application 6 months prior to amendment proceedings (hearings are scheduled twice annually). Processing of the CUP, as well as the change of zone application, would take place over a period of approxitely 1 to 1½ months. This review process would be concurrent with and approval subject to the completion of annexation and General Plan Amendment proceedings. Therefore, final annexation and amendment of the General Plan would complete the City of Ventura permitting process. Given minimum procedural requirements for permit processing, the City of Ventura review and approval process could take at least 7 months to complete, including annexation (Meyer, 1979).

Onshore Pipelines and Booster Station

Approvals for the Mandalay Beach booster station and the portions of the onshore pipeline corridor lying within the City of Oxnard would generally follow the procedures outlined in Section 4.6.2.1.1. The booster station could require a General Plan amendment or zoning change depending on its final location. Pipeline construction and operation within Oxnard would require an SUP. Portions of the pipeline lying within City of Ventura territory (and possibly county jurisdiction) would require approvals and a CUP from these jurisdictions.

Total Impact

The approval process for construction of the Union Oil Marine Terminal alternative onshore treating facility would depend on the jurisdiction exercising authority over the area. In the event that the City of Ventura chose not to annex the site to the city and process the approval application, then the responsibility would rest with Ventura County.

Depending on the exact placement of the Mandalay Beach booster station, a General Plan Amendment, zoning change, parcel map, and CUP may be required from the City of Oxnard. That portion of the onshore pipeline system within Oxnard would require an SUP. Within the jurisdiction of the city and possibly the County of Ventura, pipeline approvals would be in the form of a CUP(s) issued in conjunction with the approvals for the treating facility.

4.6.2.3.2 Drilling

During drilling, onshore project facilities would conform with the permits and approvals granted prior to construction.

4.6.2.3.3 Production

During production, the project would operate consistent with the permits and approvals granted prior to construction.

4.6.2.4 Ormond Beach Alternative Configuration

4.6.2.4.1 Construction

Offshore Pipelines

Approvals required for temporary use of the pipeline fabrication and marshalling area at Mandalay Beach would be obtained from the City of Oxnard in conjunction with the approval requests for the balance of the project falling within Oxnard jurisdiction. Approval for temporary use of the marshalling and pipeline fabrication area at Silver Strand Beach would be secured from the County of Ventura.

Onshore Treating Facility

The Ormond Beach alternative site conforms to the General Plan designation of Heavy Industrial. Therefore, it is expected that a General Plan Amendment would not be required for approval of a development permit at this site. An SUP and possibly a parcel map would be required. This permitting process would necessitate a minimum time frame of 60 days for review. However, the extensive pipeline routes associated with this site could lengthen the review and approval process (Walrod, 1979).

Onshore Pipelines and Booster Stations

Platform Gina Pipelines and Booster Stations: Pipeline routes within the City of Oxnard would be approved for construction together with approvals for the balance of the project. An SUP would be required (Walrod, 1979). CUPs would be required for the Silver Strand Beach booster station and those portions of the pipelines traversing county territory; such determination would be made by the County Planning Department upon receiving a letter of request from Union accompanied by a project description (Collart, 1980). The City of Port Hueneme would require a written request through the Public Works Department for approvals to construct a pipeline and for the easements for same. Action would be taken by the City Council (Figg, 1980; Duffey, 1980). The portion of the pipelines crossing the Naval Construction Battalion Center would require federal approval; federal approval would require demonstration that this is the only feasible routing.

Option A Pipelines and Booster Station: Approvals for the Mandalay Beach booster station and Option A pipelines would be processed in substantially the same manner as for the proposed Mandalay configuration (Section 4.6.2.1.1).

Option B Pipelines and Booster Stations: Approvals for the Mandalay Beach and Rice Road/Gonzales Road Boulevard booster stations and Option B pipelines would be processed in substantially the same manner as for the proposed Mandalay configuration (Section 4.6.2.1.1).

Total Impact

Option A: Construction of a treating facility at the Ormond Beach site would require an SUP from the City of Oxnard. No General Plan Amendment or zoning change would be required for the treating facility but they may be necessary for the Mandalay Beach booster station (depending on its exact placement). The SUP application and approval process would cover all project facilities to be constructed within Oxnard, including the planned pipeline routes and Mandalay Beach booster station. Those portions of the project facilities within the City of Port Hueneme would require a written request for approval to the city's Public Works Department. Approval action would be carried out by the Port Hueneme City Council. CUPs would be required for the project pipeline segments planned for the City of Ventura. A CUP may also be required by the County of Ventura for the Silver Strand Beach booster station and pipeline segments within county jurisdiction (pending a determination by the County Planning Department). The portions of the pipelines crossing the

Naval Construction Battalion Center would require federal approval; federal approval would require demonstration that this is the only feasible routing.

Option B: Approvals would be processed in substantially the same manner as described for Option A. The Rice Road/Gonzales Road booster station falls within the jurisdiction of the City of Oxnard and may require a General Plan Amendement, zoning change, and parcel map depending on its exact placement.

4.6.2.4.2 Drilling

During drilling, the project would operate consistent with the permits and approvals granted prior to construction.

4.6.2.4.3 Production

During production, the project would operate consistent with the permits and approvals granted prior to construction.

4.6.3 Recreation

4.6.3.1 Proposed Mandalay Configuration

4.6.3.1.1 Construction

Offshore Pipelines

Any recreational activities on the site to be used as a marshalling area would be suspended during the brief period of offshore pipeline fabrication and construction. Because of the short duration of these activities, small amount of area involved, and relatively low beach use activity in the area, impacts on recreation are expected to be minor.

Onshore Treating Facility

The onshore treating facility would be situated on land adjacent to the planned Mandalay Beach County Park. Development plans for the park do not include the site area itself because of its close proximity to the SCE Mandalay Generating Station. Construction of the treating facility would not affect the existing low beach use activity or future planned use of the beach area; however, brief intermittent interruptions of access and use might occur as construction vehicles and personnel move to and from the site. Because the duration of construction activities would be only 16 weeks, impacts are expected to be minor.

No other recreational facilities would be adversely affected by the construction of the treating facility. However, the prepayment of ground lease charges by Union for the lease of property to which the county holds title would provide an opportunity for the county to begin development of the Mandalay Beach County Park. This is considered to be a locally significant beneficial impact.

Onshore Pipelines

Onshore pipeline construction across Mandalay Beach would require a temporary restriction on recreational activities within the construction corridor. Impacts are expected to be minor because of the short duration of construction activities and relatively small amount of beach affected. Construction along other portions of the pipeline route is not expected to interfere with recreational opportunities.

Total Impact

Construction activities would briefly interfere with recreational activities on a small portion of Mandalay Beach. Because of the short duration of cons-truction, the impact would be minor. The prepayment of ground lease charges to the County of Ventura for use of the treating facility site would enable the county to develop facilities at Mandalay Beach County Park, a locally significant beneficial impact.

4.6.3.1.2 Drilling

Drilling activities at Platforms Gina and Gilda would not affect recreational opportunities or facilities in the onshore project area.

4.6.3.1.3 Production

Onshore Treating Facility

Operation of the treating facility would not interfere with the plans for or the operation of Mandalay Beach County Park. Rather, the prepayment of lease fees to the County of Ventura would provide an opportunity for the county to develop the park facilities as planned. Recreational activities on the beach would not be impacted by operation of the treating facility. Public access to the beach may be enhanced by the road constructed to serve the treating facility.

Onshore Pipelines

Since the onshore pipelines would be buried, there would be no impact on recreational activities within the pipeline rights-of-way or in adjacent areas.

Total Impact

Operation of the proposed project would not restrict access to existing or planned recreational areas and would not adversely affect recreational activities. The prepayment of lease fees to the County of Ventura for use of the treating facility site would provide an opportunity for the county to develop facilities at the planned Mandalay Beach County Park, a locally significant and long-term beneficial impact. The service road to the treating facility may also enhance public access to the beach.

4.6.3.2 East Mandalay Alternative Configuration

4.6.3.2.1 Construction

Offshore Pipelines

Any recreational activities on the site to be used as a marshalling area at Mandalay Beach would be suspended during the brief period of offshore pipeline fabrication and installation. The impact would be short-term and minor.

Onshore Treating Facility

Construction of the onshore treating facility at the East Mandalay alternative site would not impact recreational resources or activities.

Onshore Pipelines

Onshore pipeline construction across Mandalay beach would require a temporary suspension of recreational activities within the construction corridor. The impact would be minor because of the short duration of construction activities and relatively small amount of beach area affected. Construction along the Harbor Boulevard portion of the pipeline route is not expected to interfere with recreational opportunities.

Total Impact

Construction activities would briefly interfere with recreational activities on a small portion of Mandalay Beach. Because of the short duration of construction and small area affected, this impact is expected to be minor.

4.6.3.2.2 Drilling

Drilling activities at Platforms Gina and Gilda would not affect recreational opportunities or facilities in the onshore project area.

4.6.3.2.3 Production

Production operations would not restrict access to existing or planned recreational areas and would not adversely affect recreational activities within the onshore project area.

4.6.3.3 Union Oil Marine Terminal Alternative Configuration

4.6.3.3.1 Construction

Offshore Pipelines

Any recreational activities on the site to be used as a pipeline fabrication and marshalling area at Mandalay Beach would be suspended during the brief period of offshore pipeline fabrication/installation. Impacts would be minor and short-term.

Onshore Treating Facility

Construction of a treating facility at the Union Oil Marine Terminal would not significantly interfere with recreational activities or resources at the Ventura Marina.

Onshore Pipelines and Booster Station

Construction of a booster station near Mandalay Beach and burial of pipelines across the beach would require suspension of any recreational activities within the directly affected areas. However, construction activities would be short-term and no significant impacts are anticipated.

Total Impact

Construction activities would briefly restrict recreational activities on a small portion of Mandalay Beach. Because of the short duration of construction, this impact would be minor.

4.6.3.3.2 Drilling

Drilling activities at Platforms Gina and Gilda would not affect recreational opportunities or facilities in the onshore project area.

4.6.3.3.3 Production

Normal production operations would not restrict access to existing or planned recreational areas and would not adversely affect recreational activities within the onshore project area.

4.6.3.4 Ormond Beach Alternative Configuration

4.6.3.4.1 Construction

Offshore Pipelines

Any recreational activities on the sites to be utilized as pipeline fabrication/marshalling areas at Mandalay and Silver Strand beaches would be suspended during the period of offshore pipeline installation. Construction activity may temporarily reduce the recreational appeal of adjoining beach areas and impair the recreational enjoyment of persons attempting to use the beaches, particularly at Silver Strand Beach. Adverse impacts would be short-term.

Onshore Treating Facility

Construction of the onshore treating facility at the Ormond Beach alternative site would not impact recreational resources or activities.

Onshore Pipelines and Booster Stations

Platform Gina Pipelines and Booster Station: Construction activities would briefly interfere with recreational activities at Silver Strand Beach, Hueneme Beach Park, and the Ormond Beach area. In addition to the temporary access restriction during pipeline burial across Silver Strand Beach, construction of a booster station in this area could result in a total impact on recreational use of moderate magnitude.

Option A Pipelines and Booster Station: Construction activities along the Option A pipeline corridor would not significantly impact recreational resources or activities, although some disruption of traffic on Harbor Boulevard and Channel Islands Boulevard may make access to beach areas difficult. This impact would be brief and would not affect the availability of recreational resources. Recreational impacts of booster station construction at Mandalay Beach are discussed in Section 4.6.3.3.1.

Option B Pipelines and Booster Stations: Pipeline construction activities would not significantly impact recreational resources or activities along the rights-of-way. Pipeline burial across Mandalay Beach and associated booster station construction would cause a temporary restriction of recreational activities in the affected areas. Construction of the Rice Road /Gonzales Road booster station would not impact recreational resources or activities.

Total Impact

Option A: Recreational activities at Silver Strand and Mandalay beaches would be temporarily restricted during booster station construction and fabrication of the offshore pipelines. Because of the short duration of these construction activities, impacts are expected to be minor to moderate.

Construction of the onshore portion of the pipelines between Platform Gina and the Ormond Beach alternative site would briefly interfere with recreational activities at Silver Strand Beach, Hueneme Beach Park, and the Ormond Beach area. This could be a minor to moderate impact. Construction of the onshore pipeline segment between the treating facility and the Union Oil Marine Terminal could disrupt traffic access to beach areas adjacent to Harbor Boulevard, a temporary and minor impact.

Option B: Impacts on recreational activities and facilities would be the same as for the Option A alternative discussed above, except that routing of onshore pipelines through less urbanized areas would eliminate impacts on beach access from Harbor Boulevard.

4.6.3.4.2 Drilling

Drilling activities at Platforms Gina and Gilda would not affect recreational opportunities or facilities in the onshore project area.

4.6.3.4.2 Production

Onshore Treating Facility

Operation of the treating facility at Ormond Beach would not impact recreational resources or activities in the area.

Onshore Pipelines and Booster Stations

For either the Option A or Option B Ormond Beach alternative configuration, two 0.7-acre (0.3-ha) parcels of beach property (one at Silver Strand Beach, one at Mandalay Beach) would be removed from recreational use and converted to an industrial use for the 20-year lifetime of the project. The industrial character of the booster station at Silver Strand Beach could reduce the recreational appeal of the adjoining beach area. Operation of buried onshore pipelines would not restrict public access to recreational areas or affect recreational activities or facilities in the project area.

Total Impact

Option A: Operation of booster stations at Silver Strand and Mandalay beaches would preclude recreational activities within the two 0.7-acre (0.3-ha) sites during the 20-year project lifetime. At Silver Strand Beach, the booster station would represent an industrial intrusion into a scenic beach area. The booster station at Mandalay Beach would not constitute an industrial intrusion because of the proximity of the Mandalay Generating Station. Production operations are not otherwise expected to cause locally significant adverse impacts on recreational facilities, access, or activities.

Option B: Impacts on recreation would be the same as described above for Option A.

4.6.4 Traffic

The following discussion addresses impacts resulting from onshore traffic that would be generated from the proposed or alternative project configurations. Impacts resulting from increased offshore traffic are discussed in Section 4.9.1. Potential traffic generated by construction of the various project elements was estimated based on traffic generation factors developed by numerous public and private traffic engineering agencies in California. The distribution of estimated traffic increases on segments of the local road system in the project area was based on information from Thomas Montgomery and Associates. Increases on individual segments represent the highest expected increase at a given point in time; therefore, these types of increases are not additive.

Projected peak-hour (7 to 9 a.m. and 4 to 6 p.m.) and daily traffic volumes for 1980 are shown in Table 4.6-1 for various road segments in the project area that potentially could be affected by project-related traffic. These traffic volumes were estimated based on information obtained from the City of Oxnard (Genovese, 1980) and the 1977 Oxnard General Plan. The design peak-hour, normally the afternoon peak-hour when total traffic volumes are highest, and daily street segment capacities were estimated based on discussions with the City's traffic engineering staff (Genovese, 1980). Daily street capacities were assumed to be 22,000 vehicles per day for four-lane facilities and 10,000 for two-lane facilities, with design peak-hour capacities of 2,200 and 1,000 vehicles per hour, respectively. Data comparable to those in Table 4.6-1 are provided for 1982 in Table 4.6-2. The locations of the various road segments are shown on Figure 4.6-1.

TABLE 4.6-1

PROJECTED 1980 TOTAL TRAFFIC VOLUMES

Location Number[a]	Location Description	Total Traffic		Volume/Capacity Ratio	
		Peak Hour	Daily	Peak Hour	Daily
1	Hueneme Rd--Ventura Rd to Saviers Rd	880	8,800	0.44	0.40
2	Hueneme Rd--Saviers Rd to Rose Ave	650	6,500	0.72	0.65
3	Hueneme Rd--Rose Ave to Route 1	440	4,400	0.48	0.44
4	Pleasant Valley Rd--Ventura Rd to Savier Rd	1,310	13,100	0.66	0.60
5	Pleasant Valley Rd--Saviers Rd to Rose Ave	1,740	17,400	0.87	0.79
6	Pleasant Valley Rd--Rose Ave to Route 1	1,310	13,100	0.66	0.60
7	Ventura Rd--Hueneme Rd to Pleasant Valley Rd	2,730	27,300	1.36	1.24
8	Ventura Rd--Pleasant Valley Rd to Channel Islands Bl	2,730	27,300	1.36	1.24
9	Ventura Rd--Channel Islands Bl to Fifth St	1,850	18,500	0.92	0.84
10	Ventura Rd--Fifth St to Gonzales Rd	3,050	30,500	1.53	1.39
11	Saviers Rd--Hueneme Rd to Pleasant Valley Rd	2,180	21,800	1.09	0.99
12	Saviers Rd--Pleasant Valley Rd to Channel Islands Bl	2,180	21,800	1.09	0.99
13	Saviers Rd--Channel Islands Bl to Fifth St	2,620	26,200	1.31	1.19

TABLE 4.6-1 (Concluded)

Location Number[a]	Location Description	Total Traffic		Volume/Capacity Ratio	
		Peak Hour	Daily	Peak Hour	Daily
14	Channel Islands Bl--Ventura Rd to Victoria Ave	1,380	13,800	0.69	0.63
15	Harbor Bl--Victoria Ave to Fifth St	1,270	12,700	0.64	0.58
16	Fifth St--Harbor Bl to Victoria Ave	580	5,800	0.64	0.58
17	Harbor Bl--Fifth St to Gonzales Rd	150	11,500	1.27	1.15
18	Gonzales Rd--Harbor Bl to Victoria Ave	580	5,800	0.64	0.58
19	Harbor Bl--Gonzales Rd to Olivas Park Dr	1,040	10,400	1.14	1.04
20	Victoria Ave--Gonzales Rd to Route 101	690	6,900	0.34	0.31
21	Olivas Park Dr--Harbor Bl to Victoria Ave	430	4,300	0.47	0.43
22	Harbor Bl--north of Olivas Park Dr	1,150	11,500	0.57	0.52
23	Route 1--south of Pleasant Valley Rd	1,860	18,600	0.52	0.47
24	Route 1--north of Pleasant Valley Rd	1,650	16,500	0.45	0.42
25	Rice Rd--Route 1 to Gonzales Rd	1,300	13,000	0.65	0.59
26	Gonzales Rd--Rice Rd to Oxnard Bl	660	6,600	0.73	0.66
27	Gonzales Rd-Oxnard Bl to Victoria Ave	660	6,600	0.73	0.66

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[a] These locations are shown on Figure 4.6-1

TABLE 4.6-2

PROJECTED 1982 TOTAL TRAFFIC VOLUMES

Location Number[a]	Location Description	Total Traffic		Volume/Capacity Ratio	
		Peak Hour	Daily	Peak Hour	Daily
1	Hueneme Rd--Ventura Rd to Saviers Rd	920	9,200	0.46	0.42
2	Hueneme Rd--Saviers Rd to Rose Ave	680	6,800	0.75	0.68
3	Hueneme Rd--Rose Ave to Route 1	460	4,600	0.51	0.46
4	Pleasant Valley Rd--Ventura Rd to Savier Rd	1,360	13,600	0.68	0.62
5	Pleasant Valley Rd--Saviers Rd to Rose Ave	1,810	18,100	0.90	0.82
6	Pleasant Valley Rd--Rose Ave to Route 1	1,360	13,600	0.68	0.62
7	Ventura Rd--Hueneme Rd to Pleasant Valley Rd	2,840	28,400	1.42	1.29
8	Ventura Rd--Pleasant Valley Rd to Channel Islands Bl	2,840	28,400	1.42	1.29
9	Ventura Rd--Channel Islands Bl to Fifth St	1,920	19,200	0.96	0.87
10	Ventura Rd--Fifth St to Gonzales Rd	3,170	31,700	1.58	1.44
11	Saviers Rd--Hueneme Rd to Pleasant Valley Rd	2,270	22,700	1.13	1.03
12	Saviers Rd--Pleasant Valley Rd to Channel Islands Bl	2,270	22,700	1.13	1.03
13	Saviers Rd--Channel Islands Bl to Fifth St	2,720	27,200	1.36	1.24

TABLE 4.6-2 (Concluded)

Location Number[a]	Location Description	Total Traffic Peak Hour	Total Traffic Daily	Volume/Capacity Ratio Peak Hour	Volume/Capacity Ratio Daily
14	Channel Islands Bl--Ventura Rd to Victoria Ave	1,520	15,200	0.76	0.69
15	Harbor Bl--Victoria Ave to Fifth St	1,400	14,000	0.70	0.64
16	Fifth St--Harbor Bl to Victoria Ave	640	6,400	0.70	0.64
17	Harbor Bl--Fifth St to Gonzales Rd	1,270	12,700	1.40	1.27
18	Gonzales Rd--Harbor Bl to Victoria Ave	640	6,400	0.70	0.64
19	Harbor Bl--Gonzales Rd to Olivas Park Dr	1,140	11,400	1.25	1.14
20	Victoria Ave--Gonzales Rd to Route 101	720	7,200	0.79	0.72
21	Olivas Park Dr--Harbor Bl to Victoria Ave	470	4,700	0.52	0.47
22	Harbor Bl--north of Olivas Park Dr	1,270	12,700	0.64	0.58

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[a] These locations are shown in Figure 4.6-1.

4.6.4.1 Proposed Mandalay Configuration

4.6.4.1.1. Construction

Platforms

Platform Gina: Construction of Platform Gina would require a total of 80 workers for two 12-hour shifts each day (40 workers/shift). It is estimated that, as a "worst case condition," 50 percent of this workforce would commute daily to and from their residences, with the remainder electing to remain on the work barge during construction. Thus, at any given time, a maximum of 40 vehicle movements would be generated by the workforce. Based on a maximum of 2 truck movements per day for delivery of materials and equipment, the maximum total daily onshore traffic generated by construction activity for Platform Gina would be 42 vehicle movements per day. These movements would be distributed as follows:

Road Location (see Figure 4.6-1)	Daily Vehicle Trips	Percent Increase in 1980 Projected Daily Traffic
1	23	0.26
2	8	0.12
3	4	0.09
4	4	0.03
5	6	0.03
6	2	0.02
7	19	0.07
8	15	0.05
9	11	0.06
10	8	0.03
11	15	0.07
12	11	0.05
13	8	0.03
14	4	0.03
15	2	0.02
17	1	0.01

Work shifts would begin at noon and midnight; therefore, the maximum onshore traffic generated by construction of Platform Gina would not coincide

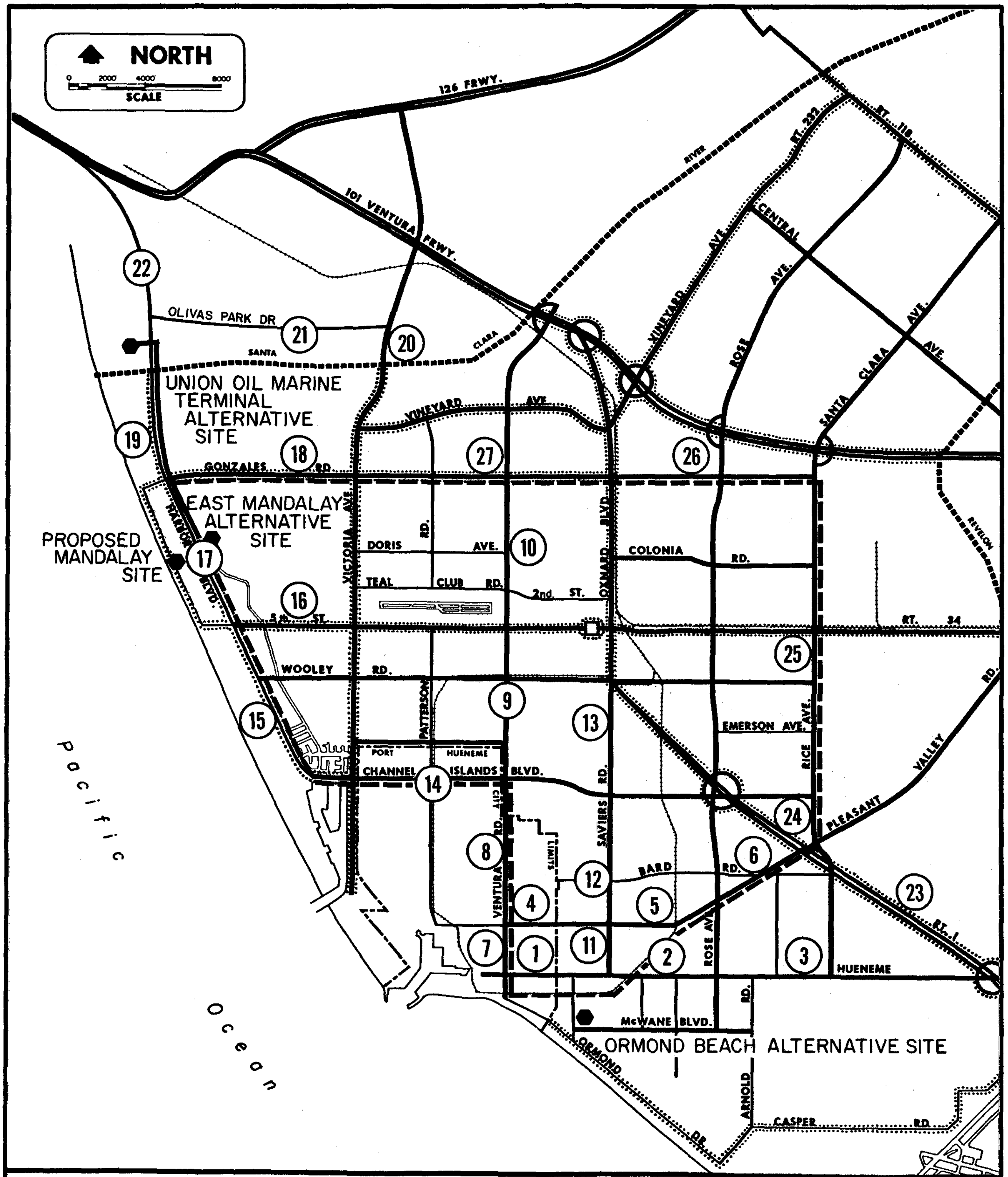

FIGURE 4.6-1

LOCATIONS OF POTENTIALLY AFFECTED ROAD SEGMENTS

DAMES & MOORE

with normal commuter periods. In addition, the increase in daily traffic along all road segments likely to be affected would be less than 0.5 percent. No significant impact on the local road system would result from construction of Platform Gina.

Platform Gilda: Platform Gilda would be constructed after Platform Gina and involve the same workforce. The number of workers likely to commute to and from their residences during construction of Platform Gilda would be the same as for Platform Gina, with a maximum of 40 vehicle movements. The maximum number of truck movements per day would be 6. Thus, the maximum total number of vehicle movements at any given time and location would be 46. Those movements would be distributed as follows:

Road Location (see Figure 4.6-1)	Daily Vehicle Trips	Percent Increase in 1980 Projected Daily Traffic
1	25	0.28
2	9	0.14
3	4	0.09
4	4	0.03
5	7	0.04
6	2	0.02
7	21	0.08
8	16	0.06
9	12	0.06
10	9	0.03
11	16	0.07
12	12	0.06
13	9	0.03
14	4	0.03
15	2	0.02
17	1	0.01

The increase in traffic would be less than 0.5 percent along the road segments likely to be affected. In addition, project-related traffic would not coincide with normal commuter peak periods. Therefore, no significant adverse traffic impacts would result from construction of Platform Gilda.

Offshore Pipelines and Power Cables

Platform Gina: Fabrication and installation of the offshore pipelines and power cable for Platform Gina would require 28 workers for each of two 12-hour shifts and a maximum of 4 truck movements per day. It is assumed that 100 percent of the workers would commute to and from their homes each day, which results in a maximum of 60 vehicle movements at any given time. These movements would be distributed as follows:

Road Location (see Figure 4.6-1)	Daily Vehicle Trips	Percent Increase in 1980 Projected Daily Traffic
1	8	0.09
2	3	0.05
3	1	0.02
4	1	0.01
5	2	0.01
6	1	0.01
7	6	0.02
8	8	0.03
9	7	0.04
10	6	0.02
11	5	0.02
12	4	0.02
13	3	0.01
14	9	0.07
15	11	0.09
16	15	0.26
17	23	0.20
18	13	0.22
19	8	0.08
20	8	0.12
22	8	0.19

Most of these movements would not occur during normal peak hours and would represent a very small increase in traffic along road segments likely to be affected. Therefore, no significant adverse traffic impacts would result from fabrication and installation of the offshore pipelines and power cables for Platform Gina.

Platform Gilda: Fabrication and installation of the offshore pipelines and power cable for Platform Gilda would involve the same workforce and number of daily commuter trips (56 total) as for Platform Gina. The number of daily truck movements would be increased from 4 to 6; thus, maximum total vehicle movements at any given time would be 62, distributed as follows:

Road Location (see Figure 4.6-1)	Daily Vehicle Trips	Percent Increase in 1980 Projected Daily Traffic
1	8	0.09
2	3	0.05
3	1	0.02
4	1	0.01
5	2	0.01
6	1	0.01
7	6	0.02
8	8	0.03
9	7	0.04
10	6	0.02
11	5	0.02
12	4	0.02
13	3	0.01
14	9	0.07
15	11	0.09
16	16	0.28
17	24	0.21
18	14	0.24
19	8	0.08
20	8	0.12
22	8	0.19

No significant adverse impact on the local road system would be expected as a result of fabrication and installation of the offshore pipelines and power cable for Platform Gilda.

Onshore Treating Facility

Construction of the proposed Mandalay onshore treating facility would require a total of 40 workers for one 12-hour shift (6:30 a.m. to 6:30 p.m.). Assuming that 100 percent of these workers commute to and from their homes, a maximum of 40 vehicle movements would occur at any given time. In addition, the maximum number of truck movements per day would be 20. Total vehicle movements per day could be as high as 100; however, not all 100 movements would occur at the same time. These movements would be distributed as follows:

Road Location (see Figure 4.6-1)	Daily Vehicle Trips	Percent Increase in 1980 Projected Daily Traffic
8	5	0.02
9	5	0.03
10	5	0.02
14	15	0.11
15	20	0.16
16	30	0.52
17	45	0.39
18	25	0.43
19	15	0.14
20	15	0.22
22	15	0.13

Peak-hour traffic at the proposed treating facility site may coincide with normal commuter peak-hour traffic. However, because of the small volume of project-related traffic relative to projected 1980 traffic, no significant adverse impact on the local road system would be anticipated to result from construction of the proposed Mandalay onshore treating facility.

Onshore Pipelines

Installation of the onshore pipelines for the proposed Mandalay configuration would require approximately 35 workers for one 10-hour shift (6:30 a.m. to 4:30 p.m.) and a maximum of 4 truck deliveries per day. The maximum number of vehicle movements at any given point would be 39. This would result in a maximum total of 78 vehicle movements per day, distributed as follows:

Road Location (see Figure 4.6-1)	Daily Vehicle Trips	Percent Increase in 1980 Projected Daily Traffic
8	4	0.01
9	4	0.02
10	4	0.01
14	13	0.09
15	17	0.13
16	26	0.45
17	39	0.34
18	22	0.38
19	39	0.38
20	13	0.19
21	15	0.35
22	39	0.34

Work shift peak inbound and outbound traffic would coincide with commuter peak periods. However, the total increase in daily traffic resulting from installation of the onshore pipelines for the proposed Mandalay configuration would be small and would not represent a significant adverse impact on the local road system.

Total Impact

During the construction phase of the proposed Mandalay configuration, the greatest amount of project-related traffic would occur when treating facility construction and onshore pipeline and offshore pipeline and power cable installation occur simultaneously. When this is the case (estimated as the fourth month after project approval), the resulting increase in peak-hour and daily traffic at various points would be as shown in Table 4.6-3.

The greatest increase in traffic would occur along Harbor Boulevard (locations 15, 17, and 19), in the vicinity of the onshore treating facility site, during peak hours. Increases in peak-hour traffic would range from

TABLE 4.6-3

PERCENTAGE INCREASES IN PEAK-HOUR AND DAILY TRAFFIC FOR THE PROPOSED MANDALAY CONFIGURATION (CONSTRUCTION)

Road Location (see Figure 4.6-1)	Peak-Hour Traffic	Percent Increase in Peak-Hour Traffic	Daily Vehicle Trips	Percent Increases in Daily Traffic
1	3	0.04	8	0.09
2	1	0.15	3	0.05
3	0	-	1	0.02
4	0	-	1	0.01
5	1	0.06	2	0.01
6	0	-	1	0.01
7	2	0.07	6	0.02
8	7	0.26	17	0.06
9	6	0.32	16	0.09
10	6	0.20	15	0.05
11	2	0.09	5	0.02
12	2	0.09	4	0.02
13	1	0.04	3	0.01
14	15	1.09	37	0.27
15	19	1.50	48	0.38
16	29	5.00	72	1.24
17	43	4.13	108	0.94
18	24	3.48	61	1.05
19	25	5.81	62	0.60
20	14	2.03	36	0.52
21	6	1.40	15	0.35
22	25	2.17	62	0.54

approximately 1 to 6 percent above projected 1980 levels. These increases could represent a moderately significant short-term impact on traffic in this area because projected 1980 peak-hour capacities would be exceeded at several locations (Table 4.6-1).

4.6.4.1.2 Drilling

Platform Gina

During drilling, a maximum total of 45 workers would be employed for three 8-hour shifts per day (15 workers/shift). Assuming all 15 workers on each shift commute daily to and from their residences, the maximum number of vehicle movements at any given time would be 30. (Supplies would be trucked to Port Hueneme for delivery to the platform on an as-needed basis). These movements would be distributed as follows:

Road Location (see Figure 4.6-1)	Daily Vehicle Trips	Percent Increase in 1982 Projected Daily Traffic
1	16	0.17
2	6	0.09
3	3	0.07
4	3	0.02
5	4	0.02
6	1	0.01
7	14	0.05
8	11	0.04
9	8	0.04
10	6	0.02
11	11	0.05
12	8	0.04
13	6	0.02
14	3	0.02
15	1	0.01
17	1	0.01

Traffic related to drilling activity at Platform Gina would not result in a significant increase in daily traffic along road segments likely to be affected. No significant adverse impact on the local road system would occur as a result of drilling at Platform Gina.

Platform Gilda: Drilling at Platform Gilda would require a maximum of 21 workers per shift for three 8-hour shifts per day. Assuming 100 percent of the workers commute to and from their residences each day, the maximum number of vehicle movements at any given time would be 42. (Supplies would be trucked to Port Hueneme for delivery to the platform on an as-needed basis). These movements would be distributed as follows:

Road Location (see Figure 4.6-1)	Daily Vehicle Trips	Percent Increase in 1982 Projected Daily Traffic
1	23	0.25
2	8	0.12
3	4	0.09
4	4	0.03
5	6	0.01
6	2	0.01
7	19	0.07
8	15	0.05
9	11	0.06
10	8	0.03
11	15	0.07
12	11	0.05
13	8	0.03
14	4	0.03
15	2	0.01
17	1	0.01

Drilling-related traffic associated with Platform Gilda would represent a small fraction of the projected 1982 daily traffic in the area (Table 4.6-2). No significant adverse impact on the local road system is expected to occur as a result of drilling activity at Platform Gilda.

Total Impact

Table 4.6-4 provides the percentage increase in peak-hour and daily traffic resulting from drilling activity at Platforms Gina and Gilda, using projected 1982 traffic volumes (Table 4.6-2) as a base. Eight project area road segments are projected to be operating in excess of peak-hour and/or daily design capacities in 1982. However, drilling-related traffic would be less than 2 percent of total peak-hour traffic demand and no more than 0.42 percent of daily traffic demand on any road segment. Therefore, no significant impact on the local road system is expected to result from drilling activity at Platforms Gina and Gilda.

4.6.4.1.3 Production

During the production phase, only 5 workers per shift (2 on Platform Gina and 3 on Platform Gilda) would be required for operation. The maximum number of daily vehicle movements at any given time would be 4 for Platform Gina and 6 for Platform Gilda. A maximum of 15 additional workers would be required during infrequent servicing periods. Truck deliveries would be on an as-needed basis only. Because of the small permanent workforce, no significant impact on the local road system is expected to occur during production at Platforms Gina and Gilda.

The onshore treating facility would contain no structures that exceed 15 feet (4.6 m) in height. Given this low profile and the proximity of the facility to the SCE Mandalay Generating Station, no effects on air traffic approach zones are anticipated.

4.6.4.2 East Mandalay Alternative Configuration

Traffic impacts resulting from construction, drilling, and production for the East Mandalay alternative configuration would be identical to those for the proposed Mandalay configuration (Section 4.6.4.1).

TABLE 4.6-4

PERCENTAGE INCREASES IN PEAK-HOUR AND DAILY TRAFFIC FOR THE PROPOSED MANDALAY CONFIGURATION (DRILLING)

Road Location (see Figure 4.6-1)	Peak-Hour Traffic	Percent Increase in Peak-Hour Traffic	Daily Vehicle Trips	Percent Increases in Daily Traffic
1	16	1.74	39	0.42
2	6	0.88	14	0.21
3	3	0.65	7	0.15
4	3	0.22	7	0.05
5	4	0.22	10	0.06
6	1	0.07	3	0.02
7	13	0.46	33	0.12
8	10	0.35	26	0.09
9	8	0.42	19	0.10
10	6	0.19	14	0.04
11	10	0.44	26	0.11
12	8	0.35	19	0.08
13	6	0.22	14	0.05
14	3	0.20	7	0.05
15	1	0.07	3	0.02
17	1	0.08	2	0.02

4.6.4.3 Union Oil Marine Terminal Alternative Configuration

4.6.4.3.1 Construction

Platforms

Impacts resulting from construction of Platforms Gina and Gilda would be identical to those discussed for the proposed Mandalay configuration (Section 4.6.4.1).

Offshore Pipelines and Power Cables

Impacts resulting from fabrication and installation of the offshore pipelines and power cables would be identical to those discussed for the proposed Mandalay configuration (Section 4.6.4.1).

Onshore Treating Facility

The nature of the workforce and traffic generated for construction of the Union Oil Marine Terminal alternative treating facility would be essentially the same as for the proposed Mandalay configuration (Section 4.6.4.1), but would be distributed as follows:

Road Location (see Figure 4.6-1)	Daily Vehicle Trips	Percent Increase in 1980 Projected Daily Traffic
14	5	0.04
15	10	0.08
16	10	0.17
17	20	0.17
18	10	0.17
19	30	0.29
20	10	0.14
21	40	0.93
22	20	0.17

The greatest traffic increase would occur along Olivas Park Drive between Harbor Boulevard and Victoria Avenue; however, this increase would be less than 1 percent of the 1980 projected daily traffic on this road. All other traffic increases likely to occur would be less than 0.5 percent above projected 1980 levels. No significant adverse impacts on the local road system would be expected to occur during construction of the Union Oil Marine Terminal alternative treating facility.

Onshore Pipelines

Installation of the onshore pipelines and booster station for the Union Oil Marine Terminal alternative configuration would require a total of 105 workers for one 10-hour shift each day. Assuming all workers commute to and from their residences, the maximum number of vehicle movements at any one time would be 105. In addition, a maximum of 4 truck deliveries per day could be necessary for materials and supplies. Thus, a maximum total of 109 vehicle movements could occur at at a given time. The maximum total number of vehicle movements per day would be 218, distributed as follows:

Road Location (see Figure 4.6-1)	Daily Vehicle Trips	Percent Increase in 1980 Projected Daily Traffic
1	1	0.01
7	3	0.01
8	11	0.04
9	11	0.06
10	11	0.04
11	1	0.00
12	3	0.01
13	3	0.01
14	36	0.26
15	47	0.37
16	73	1.26
17	109	0.95
18	61	1.05
19	109	1.05
20	36	0.52
21	42	0.98
22	109	0.95

Harbor Boulevard would experience the greatest increase in daily traffic—from approximately 0.95 to 1.26 percent above projected 1980 levels. These increases would represent a short-term traffic impact of minor to moderate significance.

Total Impact

The greatest total increase in traffic would occur when installation of onshore pipelines and offshore pipelines and power cable to Platform Gilda and construction of the onshore treating facility occur simultaneously. The distribution of this additional traffic is shown in Table 4.6-5.

Road segments in the vicinity of Harbor Boulevard between Channel Islands Boulevard and Olivas Park Drive would experience the greatest increase in peak-hour and daily traffic. Construction-related traffic could increase peak-hour traffic by as much as about 7.7 percent along Olivas Park Drive between Harbor Boulevard and Victoria Avenue. However, the peak-hour volume-to-capacity ratio in this area is 0.47, indicating ample capacity to absorb this short-term added demand. Other peak-hour increases also would be readily absorbed by the existing road system, except where volume-to-capacity ratios are projected to be exceeded (Table 4.6-1). Traffic increases at these locations would represent a possibly moderate significant short-term impact. Other road segments in the project area would not experience significant increases in either peak-hour or daily traffic as a result of construction of the Union Oil Marine Terminal alternative configuration.

4.6.4.3.2 Drilling

Traffic impacts during the drilling phase would be identical to those discussed for the proposed Mandalay configuration (Section 4.6.4.1.2).

4.6.4.3.3 Production

Traffic impacts occurring during the production phase would be identical to those discussed for the proposed Mandalay configuration (Section 4.6.4.1.3).

TABLE 4.6-5

PERCENTAGE INCREASES IN PEAK-HOUR AND DAILY TRAFFIC FOR THE UNION OIL MARINE TERMINAL ALTERNATIVE CONFIGURATION (CONSTRUCTION)

Road Location (see Figure 4.6-1)	Peak-Hour Traffic	Percent Increase in Peak-Hour Traffic	Daily Vehicle Trips	Percent Increases in Daily Traffic
1	4	0.45	9	0.10
2	1	0.15	3	0.05
3	0	-	1	0.02
4	0	-	1	0.01
5	1	0.06	2	0.01
6	0	-	1	0.01
7	4	0.15	9	0.03
8	8	0.29	19	0.07
9	7	0.38	18	0.10
10	7	0.23	17	0.06
11	2	0.09	6	0.03
12	3	0.14	7	0.03
13	2	0.08	6	0.02
14	20	1.45	50	0.36
15	27	2.13	68	0.54
16	40	6.90	99	1.71
17	61	5.30	153	1.33
18	34	5.86	85	1.47
19	59	5.67	147	1.41
20	22	3.19	54	0.78
21	33	7.67	82	1.91
22	55	4.78	137	1.19

4.6.4.4 Ormond Beach Alternative Configuration

4.6.4.4.1 Construction

Platforms

Traffic impacts resulting from construction of Platforms Gina and Gilda would be identical to those discussed for the proposed Mandalay configuration (Secton 4.6.4.1).

Offshore Pipelines and Power Cables

Platform Gina: Fabrication and installation of the offshore pipelines and power cable to Platform Gina would require 28 workers for each of two 12-hour shifts and a maximum of 12 truck deliveries per day. It is assumed that 100 percent of the workers would commute to and from their residences each day, which results in a maximum of 68 vehicle movements at any given time and a maximum of 136 total vehicle movements per day. These movements would be distributed as follows:

Road Location (see Figure 4.6-1)	Daily Vehicle Trips	Percent Increase in 1980 Projected Daily Traffic
1	10	0.11
2	3	0.05
5	2	0.01
8	11	0.04
12	6	0.03
14	12	0.09
15	6	0.05
17	6	0.05
19	5	0.05

Most of these movements would not occur during normal commuter peak hours and would represent insignificant increases (0.1 percent or less) in traffic along the road segments likely to be affected. Therefore, no significant impact on the local road system is expected to result from installation of the offshore pipelines and power cable to Platform Gina.

Platform Gilda: Traffic impacts resulting from fabrication and installation of the offshore pipeline and power cable to Platform Gilda would be identical to those discussed for the proposed Mandalay configuration (Section 4.6.4.1.1).

Onshore Treating Facility

Construction of the Ormond Beach alternative onshore treating facility would require a total of 40 workers for one 12-hour shift per day. Assuming that all of these workers commute to and from their residences, a maximum of 40 vehicle movements could occur at any given time. In addition, the maximum number of truck deliveries per day would be 10. The maximum total number of vehicle movements at any given time could, therefore, be 50. Total vehicle movements per day could reach a maximum of 100, distributed as follows:

Road Location (see Figure 4.6-1)	Daily Vehicle Trips	Percent Increase in 1980 Projected Daily Traffic
1	45	0.51
2	20	0.31
5	10	0.06
8	30	0.14
12	30	0.14
14	15	0.11
15	10	0.08
17	5	0.04
19	5	0.05

Peak-hour traffic at the Ormond Beach treating facility site may coincide with normal commuter peak-hour traffic. Four of the road segments likely to experience some increase in traffic (locations 8, 12, 17, and 19) are projected to experience daily and peak-hour volume-to-capacity ratios in excess of 1.0 in 1980. Daily traffic increases at these locations would be about 0.1 percent or less and would not be expected to add significantly to the already high volume-to-capacity ratios. No significant adverse impact on the local road system is expected to result from construction of the Ormond Beach alternative onshore treating facility.

Onshore Pipelines and Booster Stations

Option A: Fabrication and installation of the onshore pipelines and booster stations for the Ormond Beach Option A alternative configuration would require a total of 175 workers for one shift per day. Assuming 100 percent of these workers commute to and from their homes, 175 vehicle movements could occur at any given time. A maximum of 5 truck deliveries would be required for supplies and equipment. Therefore, a maximum of 180 vehicle movements could occur at any given time and location. The maximum total number of vehicle movements per day would be 360, distributed as follows:

Road Location (see Figure 4.6-1)	Daily Vehicle Trips	Percent Increase in 1980 Projected Daily Traffic
1	180	2.05
2	80	1.23
5	40	0.23
8	180	0.66
12	120	0.55
14	180	1.30
15	180	1.42
17	180	1.57
19	180	1.73

Traffic increases would be 2 percent or less along road segments likely to be affected. Most of these increases would be easily absorbed by the existing road system. However, the increases anticipated for locations 8, 12, 17, and 19 would represent a possible minor to moderate significant short-term traffic impact because these roads are projected to be operating above capacity in 1980 (Table 4.6-1).

Option B: Fabrication and installation of the onshore pipelines and booster stations for the Ormond Beach Option B alternative configuration would require a total of 195 workers for one shift and up to 8 truck deliveries per day. Assuming all 195 workers commute to and from their residences each day a maximum of 203 vehicle movements could occur at any given time and location. The maximum total number of vehicle movements per day would be 406, distributed as follows:

Road Location (see Figure 4.6-1)	Daily Vehicle Trips	Percent Increase in 1980 Projected Daily Traffic
1	200	2.27
2	200	3.08
5	100	0.57
6	200	1.53
12	100	0.46
16	200	3.45
17	80	0.70
18	200	3.45
23	50	0.27
24	50	0.30
25	200	1.54
26	200	3.03
27	200	3.03

Traffic increases would be less than 3.5 percent along all road segments likely to be affected. The greatest increases would occur on roads with projected 1980 daily volume-to-capacity ratios less than 0.8 and would not represent significant traffic impacts. Two locations, 12 and 17, currently have volume-to-capacity ratios in excess of 1.0. At these locations, increases in traffic resulting from onshore peipeline installation and booster station construction may represent a minor to moderate significant short-term impact.

Total Impact

Option A: The greatest total increase in traffic would occur when fabrication and installation of the Platform Gina offshore pipelines and the onshore pipelines and booster stations and construction of the onshore treating facility occur simultaneously. Distribution of the total additional traffic is shown in Table 4.6-6. Significant increases in peak-hour traffic would occur at locations 8, 12, 17, and 19 because these roads are projected to be operating in 1980 at peak-hour volume-to-capacity ratios in excess of 1.0. The increases anticipated for these locations could represent a moderately significant short-term traffic impact. Increases in peak-hour traffic at other locations would be absorbed by the existing street system. Daily traffic would increase relatively substantially for a short period of time at locations 12, 17, and 19. These increases could represent a moderately significant short-term impact.

Option B: The greatest total increase in traffic would occur when fabrication and installation of the Platform Gina offshore pipelines and the onshore pipelines and booster stations and construction of the treating facility occur simultaneously. Distribution of this additional traffic is shown in Table 4.6-7.

High peak-hour traffic percentage increases would occur at several locations (1, 2, 8, 16-19, 26, and 27) in the project area. These increases may represent significant short-term impacts, especially where peak-hour volume-to-capacity ratios are projected to exceed 1.0 (locations 8, 12, 17, and 19). Several locations (2, 16, 18, 26, and 27) may experience short-term volume-to-capacity ratios greater than 1.0 as a result of project-related traffic. These increases would represent a minor to moderate short-term traffic impact.

4.6.4.4.2 Drilling

Traffic impacts resulting during the drilling phase would be identical to those discussed for the proposed Mandalay configuration (Section 4.6.4.1.2).

TABLE 4.6-6

PERCENTAGE INCREASES IN PEAK-HOUR AND DAILY TRAFFIC FOR THE ORMOND BEACH OPTION A ALTERNATIVE CONFIGURATION (CONSTRUCTION)

Road Location (see Figure 4.6-1)	Peak-Hour Traffic	Percent Increase in Peak-Hour Traffic	Daily Vehicle Trips	Percent Increases in Daily Traffic
1	94	10.68	235	2.67
2	41	6.31	103	1.58
5	21	1.21	52	0.30
8	88	3.22	221	0.81
12	62	2.84	156	7.2
14	83	6.01	207	1.50
15	78	6.14	196	1.54
17	76	6.61	191	1.66
19	76	7.31	190	1.83

TABLE 4.6-7

PERCENTAGE INCREASES IN PEAK-HOUR AND DAILY TRAFFIC FOR THE ORMOND BEACH OPTION B ALTERNATIVE CONFIGURATION (CONSTRUCTION)

Road Location (see Figure 4.6-1)	Peak-Hour Traffic	Percent Increase in Peak-Hour Traffic	Daily Vehicle Trips	Percent Increases in Daily Traffic
1	102	11.59	255	2.90
2	89	13.69	223	3.43
5	45	2.59	112	0.64
6	80	6.11	200	1.53
8	16	0.59	41	0.15
12	54	2.48	136	0.62
14	11	0.80	27	0.20
15	6	0.47	16	0.13
16	80	13.79	200	3.45
17	36	3.13	91	0.79
18	80	13.79	200	3.45
19	4	0.38	10	0.10
23	20	1.08	50	0.27
24	20	1.21	50	0.30
25	80	6.15	200	1.54
26	80	12.12	200	3.03
27	80	12.12	200	3.03

4.6.4.4.3 Production

Traffic impacts resulting during the production phase would be essentially the same as those discussed for the proposed Mandalay configuration (Section 4.6.4.1.3).

4.6.5 Aesthetics

Assessment of aesthetic impacts involves evaluating the potential visibilities of the various project elements from representative public viewing points. These visibilities were evaluated based on distance from viewing points to the project element or activity, size of the project element, amount of potential public visual exposure, and potential for visual intrusion into the existing landscape. The degree of visual intrusion is influenced by form, line, color, texture, and contrast with the existing landscape, and by individual perceptions and attitudes. Because individual viewing preferences are highly varied and subjective, the following analyses deal with the more objective factors influencing visibility. The representative viewing points used to evaluate potential visibilities of the various project elements are listed in Table 4.6-8 and shown on Figures 4.6-2, 4.6-3, and 4.6-4.

4.6.5.1 Proposed Mandalay Configuration

4.6.5.1.1 Construction

Platforms

Platform Gina: The major components of Platform Gina would be fabricated outside of Ventura County and transported by barge through the Santa Barbara Channel to the offshore site, where most of the construction activity would take place. Other construction activity would include delivery of supplies and materials to Port Hueneme (one truck trip per day), from Port Hueneme to the offshore site (one supply boat trip per day), and transport of personnel between Port Hueneme and the platform site (two crew boat trips per day). Erection of Platform Gina would take approximately 2 weeks.

Construction activity potentially would be visible from all representative viewing points shown on Figure 4.6-2. Views from these areas would be relatively unobstructed by physical features.

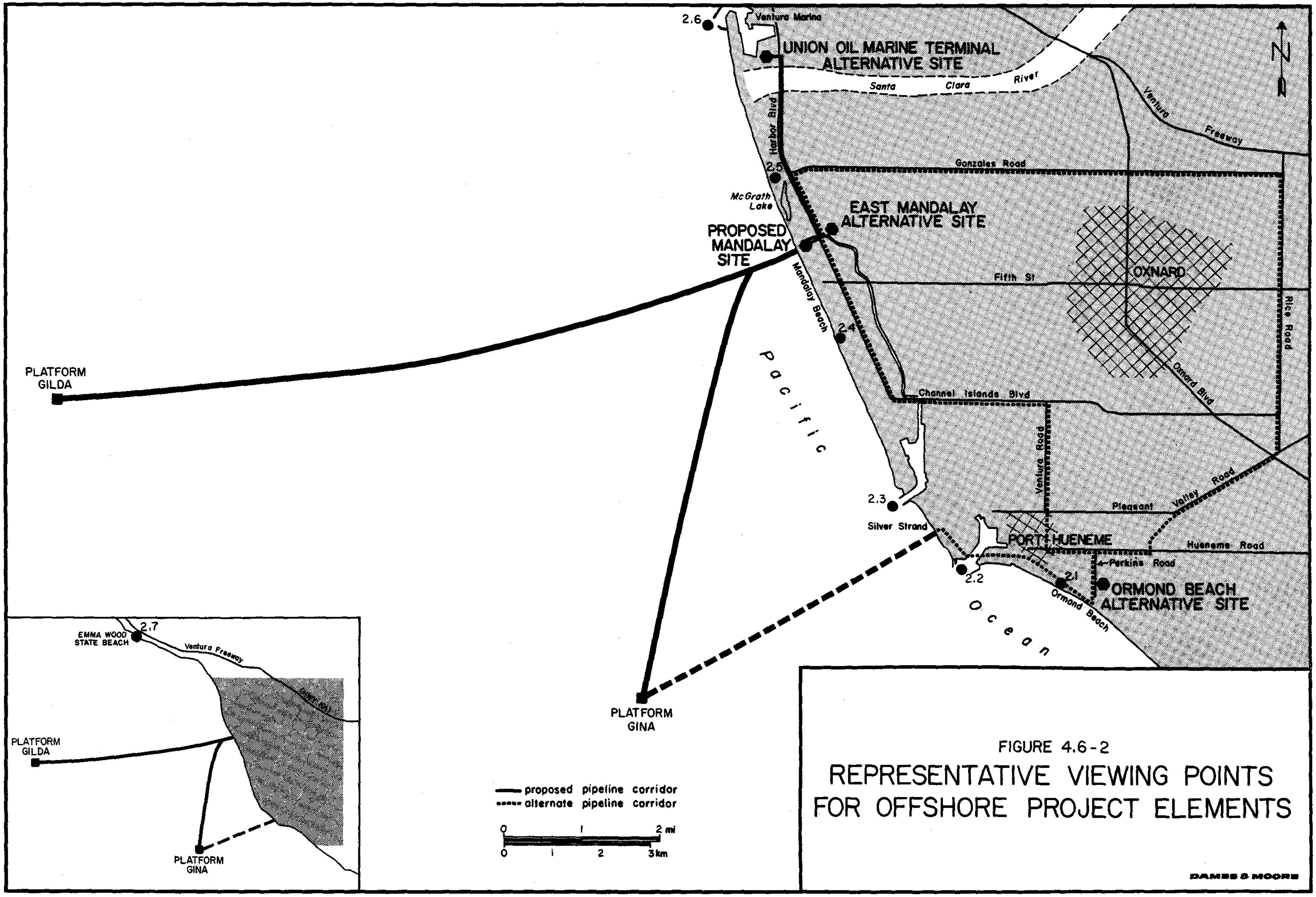

FIGURE 4.6-2

REPRESENTATIVE VIEWING POINTS FOR OFFSHORE PROJECT ELEMENTS

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TABLE 4.6-8

REPRESENTATIVE VIEWING POINTS

Area of Visibility	Viewing Point	Corresponding Figure
Offshore	2.1 Ormond Beach	4.6-2
Offshore	2.2 Port Hueneme	4.6-2
Offshore	2.3 Channel Islands Harbor	4.6-2
Offshore	2.4 Mandalay Beach-Oxnard Shores	4.6-2
Offshore	2.5 McGrath State Beach Park	4.6-2
Offshore	2.6 Ventura Marina	4.6-2
Offshore	2.7 Emma Wood State Beach-Highway 101	4.6-2
Onshore Mandalay/Ventura Marina	3.1 Offshore of Mandalay Beach	4.6-3
Onshore Mandalay/Ventura Marina	3.2 Oxnard Shores Mobile Home Park	4.6-3
Onshore Mandalay/Ventura Marina	3.3 Mandalay Beach County Park (planned)	4.6-3
Onshore Mandalay/Ventura Marina	3.4 Harbor Boulevard, south of Gonzales Road	4.6-3
Onshore Mandalay/Ventura Marina	3.5 Harbor Boulevard, north of Fifth Street	4.6-3
Onshore Mandalay/Ventura Marina	3.6 McGrath State Beach Park	4.6-3
Onshore Mandalay/Ventura Marina	3.7 Harbor Boulevard, north of Gonzales Road	4.6-3
Onshore Mandalay/Ventura Marina	3.8 Ventura Marina	4.6-3
Onshore Ormond Beach	4.1 Ormond Beach	4.6-4
Onshore Ormond Beach	4.2 Port Hueneme-Channel Islands Harbor	4.6-4
Onshore Ormond Beach	4.3 Mandalay Beach-Oxnard Shores	4.6-4
Onshore Ormond Beach	4.4 Intersection of Gonzales Road & Rice Road	4.6-4
Onshore Ormond Beach	4.5 Intersection of Channel Islands Boulevard & Ventura Road	4.6-4
Onshore Ormond Beach	4.6 Hueneme Road, east of Saviers Road	4.6-4

Ormond Beach/Port Hueneme/Channel Islands Harbor--viewing points 2.1, 2.2, and 2.3. Distances from these viewing points range from approximately 3 to 6 miles (4.8 to 9.6 km). The work barge, platform components, and platform erection activity would be visible to most potential viewers and would be in moderately high contrast with the flat seascape at the proposed Platform Gina site. The potential viewing population would include residents of beachfront homes, beach users, and offshore boaters in all three areas, and naval, offshore oil operations, and commercial shipping personnel at Port Hueneme. No figures for occupancy rates or beach use are available; 100 percent occupancy and high summertime beach use are assumed. Boating traffic at Port Hueneme averages approximately 30 movements per day of primarily commercial activity. No figures for offshore boating traffic at Channel Islands Harbor are available; however, it likely would be heavy on a typical summer weekend. There are 1,600 boat slips (1,400 occupied) and 400 boats in dry storage at Channel Islands Harbor. Potential visibility would be relatively high from these viewing points. During the period from July through October, fog or haze would block views of Platform Gina approximately one-half of the time. From November through March, the platform would be obscured by fog approximately 20 percent of the time and from April through June, approximately 30 percent of the time (U.S. Department of the Interior, 1976). The degree of potential visual instrusion would be high for local residents and recreationists. Because of its predominantly commercial orientation, much of the viewing population at Port Hueneme potentially would be less susceptible to visual intrusion of construction elements for Platform Gina.

Mandalay Beach-Oxnard Shores--viewing point 2.4. Distance to the proposed Platform Gina site is approximately 6 miles (9.6 km). Potential viewers would be residents of beachfront homes and beach users. No figures for occupancy rates or beach attendance are available; public visual exposure could be moderate during summer months when attendance at beaches is usually at its peak. The work barge and platform erection activities would be visible to local residents, offshore boaters, and beach users. Potential visual intrusion would be moderate.

McGrath State Beach Park--viewing point 2.5. Distance to the proposed Platform Gina construction site would be approximately 7 miles (11.1 km). Potential viewers would be park visitors, who, in 1977, numbered approximately 145,000. Views of construction activities from most campsites would be obstructed by landscaping within the park. The work barge and platform erection activities possibly would be visible from the beach. The potential visual intrusion would be moderately low.

Ventura Marina--viewing point 2.6. Distance to the proposed Platform Gina site would be approximately 9 miles (14.5 km). The work barge and major platform components could be visible to harbor users and offshore recreational boaters. Activity in the marina is heaviest on weekends; an estimated 600 boats sail from the harbor on a typical Sunday. Because of the distance involved, visibility of construction activities would be relatively low; thus, the potential visual intrusion would be low.

Emma Wood State Beach Park-Highway 101--viewing point 2.7. Distance to the Platform Gina site would be approximately 12 miles (19.3 km). Potential viewers of construction activity would be park visitors, motorists on Highway 101, and residents of beachfront homes. Visibility of construction activities would be low due to the distance from this area to the proposed platform site. Potential visual intrusion would be low.

Construction activity associated with proposed Platform Gina would occur relatively near the Port Hueneme area and would be in moderate contrast with the existing environment. This environment is characterized by the presence of large, ocean-going vessels associated with naval and commercial shipping activities and boats associated with offshore oil production, fishing, and other activities. The short-term visual impacts resulting from construction could be moderately significant for residents of beachfront homes and beach users and other recreationists, but less significant for naval, offshore oil production, or other commercially oriented persons. Overall, short-term visual impacts resulting from construction of proposed Platform Gina would be moderately significant.

<u>Platform Gilda</u>: Principal construction activities for Platform Gilda would be the same as those described for Platform Gina, except for the following:

- Components for Platform Gilda would be larger than those for Platform Gina.
- Delivery of supplies and materials to Port Hueneme would require an average of 2 truck trips per day.
- Erection of Platform Gilda would begin immediately after that for Platform Gina and would take approximately 5 weeks.

Construction activity potentially would be visible from all representative viewing points shown on Figure 4.6-2. These views would be generally unobstructed by physical features.

Ormond Beach/Port Hueneme/Channel Islands Harbor--viewing points 2.1, 2.2, and 2.3. Distances to the proposed Platform Gilda site are approximately 11 to 13 miles (17.7 to 20.9 km). The work barge, platform components, and platform erection potentially would be visible to most viewers in these areas and would be in moderate contrast with the immediate environment at the platform site. Platform Gilda would be located approximately 4.5 miles (7.2 km) from an existing offshore oil production platform, Platform Grace. Platform Grace would appear in the same visual field as proposed Platform Gilda, for all representative viewing points. Thus, construction activities at the proposed Platform Gilda site would contrast less with the surrounding environment than if they occurred in an area with no previously existing oil production development.

The potential viewing population would be the same as that for Platform Gina. Potential public visual exposure could be high; however, visibility of construction activity would be lessened by the distances involved and by the presence of fog or haze in the Channel. The degree of potential visual intrusion would be moderately low for local residents and recreationists, and possibly lower for viewers engaged in naval or commercial activities at Port Hueneme.

Mandalay Beach-Oxnard Shores--viewing point 2.4. Distance to the proposed Platform Gilda site is approximately 10 miles (16.1 km). The visible construction elements and potential viewing population would be the same as for Platform Gina. The potential visual intrusion would be relatively low.

McGrath State Beach Park--viewing point 2.5. Distance to the Platform Gilda site would be approximately 10 miles (16.1 km). The potential viewing population and visible construction elements would be the same as for Platform Gina. The potential visual intrusion would be low due to the distance to the Platform Gilda site and view obstructions.

Ventura Marina/Emma Wood State Beach-Highway 101--viewing points 2.6 and 2.7. Distances to the proposed Platform Gilda site would be approximately 10 to 11 miles (16.1 to 17.7 km). The potential viewing population and visible construction activities would be the same as for Platform Gina. Potential public visual exposure would be relatively high; however, because of distance, visibility would be relatively low. Potential visual intrusion would be low.

Construction activity associated with proposed Platform Gilda would occur in a visual field that would include Platform Grace. Distances from onshore viewing points and the presence of fog or haze would lessen the visibility of construction activity. For these reasons, short-term visual impacts resulting from construction of Platform Gilda would be expected to be of minor significance.

Offshore Pipelines and Power Cables

Platform Gina: The offshore pipelines and power cable for Platform Gina would be fabricated in a 400 x 800-foot (122 x 244-m) marshalling and fabrication area at Mandalay Beach, adjacent to the proposed onshore facility site (Figure 4.6-3). Construction activity for Platform Gina pipelines and power cable would take approximately 3 weeks and its potentially visible elements would include:

- pipe and other materials at the Mandalay Beach fabrication area
- workers, equipment, and welding activity 24 hours per day at the fabrication area
- dust from construction activities, personal vehicles (maximum of 40 trips per day), and supply trucks (2 trips per day) entering the fabrication area
- a barge and tugboat offshore pulling the pipelines from the marshalling and fabrication area to the platform

Oxnard Shores Mobile Home Park--viewing point 3.2. Distance from Fifth Street (the northern limit of the mobile home park) to the marshalling and fabrication area would be approximately 0.5 to 0.75 mile (0.8 to 1.2 km). Some residents (of the approximately 25 homes adjacent to Fifth Street) would have views of the fabrication area; however, potential visibility would be largely obstructed by intervening sand dunes and vegetation. Furthermore, the presence of construction activity at the site would not be a prominent feature in views from Oxnard Shores because the SCE Mandalay Generating Station would continue to dominate these views. Therefore, the potential visual intrusion would be low.

Harbor Boulevard, north of Fifth Street--viewing point 3.5. Distance to the marshalling and fabrication area would be approximately 0.5 mile (0.8 km) from this point. Fabrication activity would be intermittently visible to northbound motorists from about 1 mile (1.6 km) south of the fabrication area. Average daily northbound traffic is approximately 14,000 vehicles. Visibility of the marshalling and fabrication area would be largely obscured by topography, vegetation, and the SCE generating station. Potential visual intrusion would be low.

Harbor Boulevard, south of Gonzales Road--viewing point 3.4. Distance to the marshalling and fabrication area would be approximately 0.5 mile (0.8 km). Potential viewers would be motorists southbound on Harbor Boulevard. Average daily southbound traffic is approximately 16,000 vehicles. Visibility of the

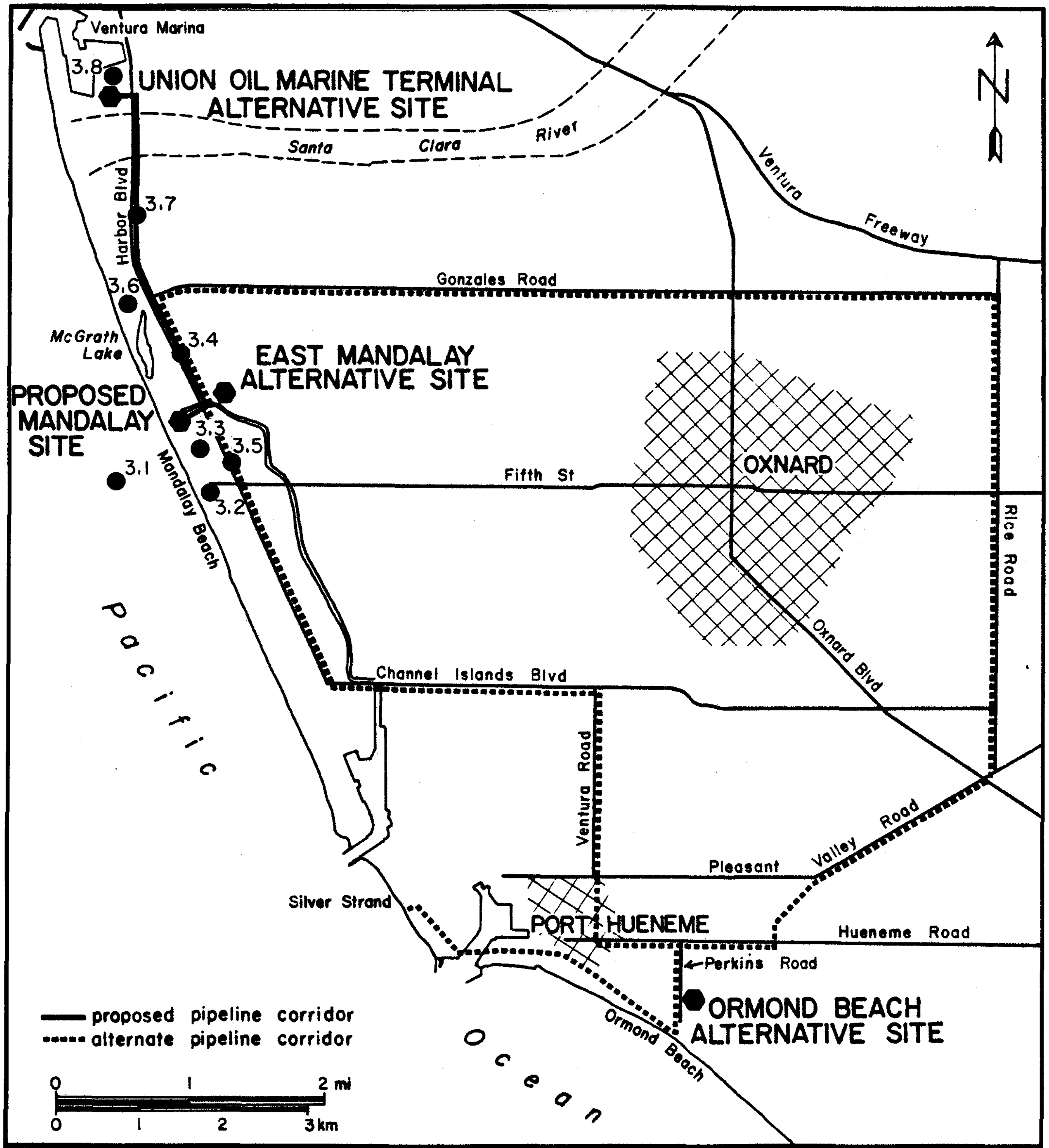

FIGURE 4.6-3

REPRESENTATIVE VIEWING POINTS FOR ONSHORE PROJECT ELEMENTS (PROPOSED MANDALAY CONFIGURATION)

NOTE: THESE SAME VIEWING POINTS ARE APPLICABLE TO THE EAST MANDALAY AND UNION OIL MARINE TERMINAL ALTERNATIVE CONFIGURATIONS.

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fabrication area would be blocked by the SCE Mandalay Generating Station; thus, potential visual intrusion would be negligible.

McGrath State Beach Park--viewing point 3.6. Distance from the southern boundary of the park to the marshalling and fabrication area would be approximately 900 to 1,200 feet (273.3 to 367.8 m). Potential viewers would be park visitors. Attendance at the park was approximately 145,000 in 1977. Views of the fabrication area from campsites within the park would be blocked by landscaping and the SCE Mandalay Generating Station; thus, no visual impacts would occur.

Offshore of Mandalay Beach--viewing point 3.1. Distance to the marshalling and fabrication area would be 1 mile (1.6 km) or more because offshore boating traffic would be restricted in the area during installation of the offshore pipelines and power cables. No figures for boating traffic in this area are available. Visibility of the fabrication area would be low due to intervening topography, offshore boating restrictions, and the visual dominance of the SCE Mandalay Generating Station. Thus, potential visual intrusion would be low.

Offshore pulling activity associated with pipeline and power cable installation to Platform Gina potentially would be visible from Oxnard Shores Mobile Home Park, Harbor Boulevard, McGrath State Beach Park, offshore of Mandalay Beach, and Ventura Marina--viewing points 3.2, 3.4 and 3.5, 3.6, 3.1, and 3.8.

A pull barge and tugboat would be visible to some residents of Oxnard Shores Mobile Home Park and from the beach at McGrath State Beach Park. Views from Harbor Boulevard would be obscured by topography, residences, and the SCE Mandalay Generating Station. Offshore boating traffic would be restricted near the marshalling area; however, public visual exposure to offshore pulling activity could be moderately high on summer weekends. Visibility from Ventura Marina would be somewhat lowered by distance (approximately 3 to 4 miles

(4.8 to 6.4 km)). Overall, potential visual intrusion due to offshore activity associated with offshore pipeline and power cable installation for Platform Gina would be relatively low.

Public visual exposure to the construction and installation activities for the Platform Gina pipelines and power cable would be transitory, except at Oxnard Shores Mobile Home Park. Views from all directions would be obstructed by topography and/or the SCE Mandalay Generating Station. Where visible, the marshalling and fabrication area would be visually dominated by the Mandalay Generating Station.

Platform Gilda: The elements of construction and installation of the offshore pipelines and power cable for Platform Gilda would be essentially the same as those for Platform Gina, with the following exceptions:

- Fabrication and installation activity would begin immediately upon completion of that for Platform Gina pipelines and would take approximately 7 weeks.
- An average of 3 supply truck trips per day would be required.
- The barge and tugboat would pull the pipelines further offshore on a more westward path.

Representative viewing points, visibilities, and potential visual intrusion of marshalling and fabrication activities for the Platform Gilda offshore pipelines and power cable would be essentially the same as those for Platform Gina. Principal differences are that offshore pipeline construction and installation for Platform Gilda would take approximately 4 weeks longer than that for Platform Gina and visibility and potential visual intrusion of offshore activity would be lessened by the more westward path of the tugboat and barge. Potential visual intrusion would be low.

Onshore Treating Facility

The major components of the proposed onshore treating facility would be fabricated outside of Ventura County and trucked to the proposed site.

Construction would take approximately 16 weeks and occur concurrently with construction of the proposed platforms and installation of the offshore pipelines and power cables. Much of the construction activity would take place behind a 10-foot (3-m)-high block wall along the south and west sides of the site. A description of the major components, supplies, and equipment required for construction is given in Appendix A.

Potentially visible elements associated with construction of the proposed Mandalay treating facility would be:

- workers (about 40) and equipment at the site
- dust produced by machinery and trucks during clearing and grading of the site

The following representative viewing points from which construction activity possibly would be visible and distances to the site are the same as for fabrication and installation of the offshore pipelines and power cables. The treating facility site would be approximately 200 x 400 feet (61 x 122 m).

Oxnard Shores Mobile Home Park/Harbor Boulevard--viewing points 3.2, 3.4, and 3.5. Visibility of construction activity at the proposed treating facility site would be largely obstructed by intervening dunes and vegetation and obscured against the backdrop of the SCE Mandalay Generating Station. Potential visual intrusion would be low.

McGrath State Beach Park--viewing point 3.6. Construction activities for the onshore treating facility would not be visible from McGrath State Beach Park due to landscaping within the park and the presence of the Mandalay Generating Station.

Offshore of Mandalay Beach--viewing point 3.1. Visibility of construction of the treating facility would be low because of intervening topography and the visual dominance of the generating station.

Potential visual exposure to construction activities for the proposed onshore treating facility would be moderately high; however, views from all directions would be obstructed by topography, vegetation, and the SCE Mandalay Generating Station. In addition, the generating station would continue to dominate all views of the area. Therefore, visual impacts would be relatively minor.

Onshore Pipelines

Installation of the proposed onshore pipeline system would take approximately 4 weeks and would be concurrent with installation of offshore pipelines to Platform Gilda and the later stages of construction of the proposed onshore treating facility. Potentially visible elements would include:

- workers (about 35), tractors, backhoes, and clearing, grading, pipelaying, and backfilling activity along the proposed pipeline corridor
- boring activity at major road crossings
- stock-piled ditching material along the right-of-way
- individual pipe sections strung along the right-of-way

Construction activity potentially would be visible from the following representative viewing points (Figure 4.6-3).

Harbor Boulevard--viewing points 3.4, 3.5, and 3.7. Much of the construction and installation of the onshore pipelines would take place adjacent to the east side of Harbor Boulevard along a previously disturbed right-of-way. Public visual exposure would be relatively high (refer to Volume II, Table 12.6-7 for traffic data) for brief periods of time while motorists drive past the construction zone. Potential visual intrusion would be moderate.

McGrath State Beach Park--viewing point 3.6. Portions of onshore pipeline installation would be visible from the entrance to the park and possibly from some campsites within the park. However, landscaping would obstruct most views from within the park.

Ventura Marina--viewing point 3.8. Portions of pipeline installation activity possibly would be visible from the Marina entrance along Spinnaker

Drive. Marina facilities and the existing Union Oil Marine Terminal facility would obstruct views of construction from most of Spinnaker Drive and from the Marina itself.

Installation of the complete proposed onshore pipeline system would take approximately 4 weeks; construction activity at any given location would take less time. Overall, visual impacts would be expected to be relatively minor.

Total Impact

Potential aesthetic impacts resulting from the construction of the proposed Mandalay configuration would be:

- moderate to high visual intrusion of Platform Gina construction elements from viewing points in the Ormond Beach/Port Hueneme/Channel Islands Harbor area (viewing points 2.1, 2.2, and 2.3)
- low to moderate visual intrusion of Platform Gina construction elements from all viewing points away from the Ormond Beach/Port Hueneme/Channel Islands Harbor area
- low to moderate visual intrusion of Platform Gilda construction elements from all viewing points
- moderate, short-term visual intrusion of onshore pipeline installation activity

Visual impacts resulting from the construction of Platform Gina would be moderately significant because of its relatively short distance from some coastal residential and recreation areas. Visual impacts resulting from construction of Platform Gilda would not be significant because of its greater distance from coastal viewing points, proximity to Platform Grace, and decreased visibility due to fog or haze in the Santa Barbara Channel.

Visual impacts resulting from construction of the remaining elements of the proposed Mandalay configuration would not be significant due to their temporary nature and overall low visibility and/or low public visual exposure.

4.6.5.1.2 Drilling

Platform Gina

Visual impacts due to drilling activity at proposed Platform Gina would be essentially the same as for production at Platform Gina (Section 4.6.5.1.3).

Platform Gilda

Visual impacts due to drilling activity at proposed Platform Gilda would be essentially the same as for production at Platform Gilda (Section 4.6.5.1.3).

4.6.5.1.3 Production

Platforms

Platform Gina: The major visible element of Platform Gina during the production phase of the proposed Mandalay configuration would be the platform superstructure. The platform would be painted white and the crane yellow. The physical appearance of Platform Gina would be similar to that of existing offshore oil platforms in the Santa Barbara Channel, such as Heidi and Hope. Production at Platform Gina would last approximately 18 years.

Platform Gina potentially would be visible from all representative viewing points shown on Figure 4.6-2. Views from these areas would be relatively unobstructed by physical features. In the following discussions, approximate distances between Platform Gina and the viewing points are given in parentheses.

Ormond Beach/Port Hueneme/Channel Islands Harbor--viewing points 2.1, 2.2, and 2.3 (3 to 6 miles (4.8 to 9.6 km)). Potential viewing populations, visibility, and public visual exposure to Platform Gina during production would be the same as for construction. The degree of visual intrusion would be relatively high for coastal residents and recreationists. Much of the viewing population at Port Hueneme possibly would be less susceptible to visual impacts resulting from production at Platform Gina (Section 4.6.5.1.1).

Mandalay Beach-Oxnard Shores--viewing point 2.4 (6 miles (9.6 km)). Potential viewers, visibility, and public visual exposure would be the same as for construction (Section 4.6.5.1.1). The potential visual intrusion would be moderately low.

McGrath State Beach Park--viewing point 2.5 (7 miles (11.1 km)). Potential viewers, visibility and public visual exposure would be the same as for construction (Section 4.6.5.1.1). Potential visual intrusion would be low.

Ventura Marina/Emma Wood State Beach-Highway 101--viewing points 2.6 and 2.7 (9 to 12 miles (14.5 to 19.3 km)). Potential viewers, visibilities, and public visual exposure would be the same as for construction (Section 4.6.5.1.1). Visual intrusion would be low.

Platform Gina would be visible from several beachfront homes and recreational beaches and would be in fairly high contrast with its surrounding environment. Thus, for local residents and beach users in these areas, the presence of Platform Gina in the Santa Barbara Channel potentially would represent a significant adverse visual impact. This impact possibly would be less significant to naval, offshore oil production, and other commercially oriented personnel at Port Hueneme. Visual impacts for potential viewers at other viewing points would not be significant because of decreased visibilities. Overall, adverse visual impacts resulting from the presence of Platform Gina in the Santa Barbara Channel would be moderately significant.

Platform Gilda: The major visible element of Platform Gilda during production would be the platform superstructure. The color scheme for the platform would be the same as for Platform Gina. The physical appearance of Platform Gilda would be similar to that of Platform Grace.

Platform Gilda potentially would be visible from all representative viewing points shown on Figure 4.6-2. Views from these areas generally would be unobstructed by physical features.

Visibilities, potential viewing populations, and public visual exposure during production would be the same, from all viewing points, as described for construction (Section 4.6.5.1.1). Potential visual intrusion would be low for all viewing points.

Platform Gilda would be in the same visual field as Platform Grace. Distance from onshore viewing points and the presence of fog or haze would reduce the platform's visibility. For these reasons, visual impacts resulting during the production phase for Platform Gilda generally would be expected to be of minor significance.

Offshore Pipelines and Power Cables

The offshore pipelines and power cables to/from the proposed Platforms Gina and Gilda would not be visible during the production phase of the proposed Mandalay configuration; therefore, no aesthetic impacts would occur.

Onshore Treating Facility

An artist's conception of the proposed onshore treating facility as it would appear during the production phase is shown on Figure 3.2-4. The facility potentially would be visible from the following representative viewing points (Figure 4.6-3).

Oxnard Shores Mobile Home Park/Harbor Boulevard--viewing points 3.2, 3.4, 3.5, and 3.7 (0.5 to 1 mile (0.8 to 1.6 km)). Views of the proposed treating facility would be largely obstructed by intervening topography and vegetation. In addition, the facility would be obscured against the backdrop of the SCE Mandalay Generating Station. Potential visual intrusion would be somewhat less than during construction due to reduced activity at the site.

McGrath State Beach Park--viewing point 3.6 (900 to 1,200 feet (273.3 to 367.8 m)). The proposed onshore treating facility would not be visible from McGrath State Beach Park because of landscaping within the park, the presence of the Mandalay Generating Station, and intervening topography.

Offshore of Mandalay Beach--viewing point 3.1 (0.6 mile (1 km)). Potential viewers would be offshore recreational boaters. No figures are available for boating traffic in this area. Visibility of the treating facility would be relatively low because of intervening topography and the visual dominance of the generating station.

Mandalay Beach County Park--viewing point 3.3 (adjacent to facility). The proposed treating facility would be visible to visitors to the planned Mandalay Beach County Park. Visibility of the facility would be reduced by a 10-foot (3-m)-high block wall and landscaping on the south and west sides. Views from many areas also would be obstructed by topography and vegetation. Public visual exposure would be relatively high from some areas within the park. Visual intrusion would be relatively low, however, due to the visual dominance of the SCE Mandalay Generating Station.

Public visual exposure to the proposed onshore treating facility would be largely transitory, except at Oxnard Shores Mobile Home Park and the planned Mandalay Beach County Park. Views from all directions would be obstructed to some extent by intervening topography, vegetation, and/or the SCE Mandalay Generating Station. Where visible, the treating facility would be largely obscured against the backdrop of the generating station.

Onshore Pipelines

The onshore pipelines of the proposed Mandalay configuration would be buried during the production phase. Public visual exposure would be limited to periods of repair when, and if, necessary. No significant adverse visual impacts would occur during the production phase.

Total Impact

On most days, visibility of proposed Platform Gina would be moderately high from the Port Hueneme area. Visibility of Platform Gilda would be relatively low because of its greater distance from coastal viewing points. Fog or haze would reduce visibilities of both platforms, especially during the summer and fall months. Potential visual intrusion of Platform Gilda would be further reduced by its proximity (approximately 4.5 miles (7.2 km)) to Platform Grace.

Offshore pipelines and power cables and onshore pipelines would not be visible during the production phase.

Visibility of the onshore treating facility from nearby viewing points would be obscured by topography, vegetation, and its proximity to the SCE Mandalay Generating Station.

Visual impacts resulting from Platform Gina during the production phase would be moderately significant. Visual impacts resulting from the remaining elements of the proposed Mandalay configuration generally would not be significant.

4.6.5.2 East Mandalay Alternative Configuration

4.6.5.2.1 Construction

Platforms

Visible construction elements, potential viewing populations, and potential visual intrusion associated with Platforms Gina and Gilda would be the same as for the proposed Mandalay configuration (Section 4.6.5.1.1).

Offshore Pipelines and Power Cables

Visible construction and installation elements, potential viewing populations, and potential visual intrusion would be the same as for the proposed Mandalay configuration (Section 4.6.5.1.1).

Onshore Treating Facility

The nature of construction activity for the East Mandalay alternative configuration would be essentially the same as that for the proposed Mandalay configuration. In addition, construction of a short access road from Harbor Boulevard to the site may be required.

Construction activity at the East Mandalay alternative site potentially would be visible from the same representative viewing points described for the proposed Mandalay site and shown on Figure 4.6-3.

Oxnard Shores Mobile Home Park--viewing point 3.2. Distance to the East Mandalay alternative site would be approximately 0.75 mile (1.2 km). Visibility of construction activity at the East Mandalay alternative site would be obstructed by intervening topography and vegetation. The treating facility would be located immediately south of an SCE substation and high voltage transmission lines; therefore, potential visual intrusion would be low.

McGrath State Beach Park--viewing point 3.6. Distance from the park entrance would be approximately 0.75 mile (1.2 km). Construction activities would not be visible from within the park because of intervening topography, landscaping, and the presence of the SCE substation.

Offshore of Mandalay Beach--viewing point 3.1. Distance to the East Mandalay alternative site would be approximately 1 mile (1.6 km). Visibility of construction activity would be low due to intervening topography and the SCE Mandalay Generating Station. Potential visual intrusion would be negligible.

Harbor Boulevard, between Gonzales Road and Fifth Street--viewing points 3.4 and 3.5. The East Mandalay alternative site would be immediately east of Harbor Boulevard. Construction activities would be visible for short periods of time as motorists pass by the site. Approximate average daily traffic on this portion of Harbor Boulevard is 30,000 vehicles. Potential visual intrusion would be moderate.

Public visual exposure to construction activities for the onshore treating facility at the East Mandalay alternative site could be moderately high from Harbor Boulevard; however, visual exposure would be for brief periods of time.

Other views would be partially obstructed by topography, vegetation, residences, and SCE substation structures. Overall, potential visual intrusion would be moderately low.

Onshore Pipelines

Visible construction and installation elements, potential viewing populations, and potential visual intrusion would be the same as for the proposed Mandalay configuration (Section 4.6.5.1.1).

Total Impact

The nature of aesthetic impacts resulting from construction of the East Mandalay alternative configuration would be essentially the same as for the proposed Mandalay configuration (Section 4.6.5.1.1).

Visual impacts resulting from construction of Platform Gina would be moderately significant due to its relatively short distance from some coastal residential and recreation areas. Visual impacts resulting from construction of Platform Gilda would not be expected to be significant due to its greater distance from coastal viewing areas and decreased visibility due to fog or haze in the Santa Barbara Channel.

Visual impacts resulting from construction of the onshore treating facility at the East Mandalay site would be moderately significant for brief periods of time for motorists on Harbor Boulevard.

Visual impacts resulting from the construction of the remaining elements of the East Mandalay alternative configuration would be of minor significance because of their temporary nature and overall low visibility and/or low public visual exposure.

4.6.5.2.2 Drilling

Visual impacts resulting from drilling activities at Platforms Gina and Gilda would be the same as for the proposed Mandalay configuration (Section 4.6.5.1.3).

4.6.5.2.3 Production

Platforms

Visible production elements, potential viewing populations, and potential visual impacts for Platforms Gina and Gilda would be the same as for the proposed Mandalay configuration (Section 4.6.5.1.3).

Offshore Pipelines and Power Cables

The offshore pipelines to/from Platforms Gina and Gilda would not be visible during the production phase of the East Mandalay alternative configuration. Therefore, no aesthetic impacts would occur.

Onshore Treating Facility

The appearance of the onshore treating facility would be the same as for the proposed Mandalay configuration and potentially would be visible from the same representative viewing points.

Oxnard Shores Mobile Home Park--viewing point 3.2. Views of the treating facility would be obstructed by intervening topography and vegetation. Visibility of the site would be obscured by the presence of the SCE substation and transmission lines. Potential visual intrusion would be very low, less than that during construction, due to reduced activity at the site.

McGrath State Beack Park--viewing point 3.6. The onshore treating facility would not be visible due to landscaping within the park, intervening topography, and the presence of the SCE substation.

Offshore of Mandalay Beach--viewing point 3.1. The onshore treating facility would not be visible to offshore boaters because of intervening topography, vegetation, and the SCE Mandalay Generating Station.

Mandalay Beach County Park--viewing point 3.3. Views of the treating facility from this planned park area would be partially obstructed by intervening topography and vegetation. Potential visual intrusion would be low.

Public visual exposure to the onshore treating facility would be largely transitory. Views from most directions would be obstructed by intervening topography, vegetation, and/or the SCE Mandalay Generating Station or substation. Overall, potential visual intrusion would be low.

Onshore Pipelines

The onshore pipelines for the East Mandalay alternative configuration would not be visible during the production phase except during brief periods of repair, if necessary. Therefore, no aesthetic impacts would occur.

Total Impact

Visual impacts resulting from Platform Gina during production would be moderately significant. Visual impacts resulting from other production elements of the East Mandalay alternative configuration generally would not be significant.

4.6.5.3 Union Oil Marine Terminal Alternative Configuration

4.6.5.3.1 Construction

Platforms

Visible construction elements, potential viewing populations, and potential visual impacts for Platforms Gina and Gilda would be identical to those for the proposed Mandalay configuration (Section 4.6.5.1.1).

Offshore Pipelines and Power Cables

Visible construction and installation elements, potential viewing populations, and potential visual impacts would be the same as for the proposed Mandalay configuration (Section 4.6.5.1.1).

Onshore Treating Facility

The nature of construction activity for the Union Oil Marine Terminal alternative treating facility would be essentially the same as for the proposed Mandalay configuration (Section 4.6.5.1.1). Construction activity potentially would be visible from the following representative viewing points (Figure 4.6-3).

Ventura Marina--viewing point 3.8. Distance to the onshore treating facility site would be approximately 0.25 mile (0.4 km). It is estimated that approximately 600 boats sail from the harbor on a typical Sunday. The adjacent Ventura Keys residential development contains 315 waterfront lots, 250 of which are developed with boat slips. Construction activity would be located within an existing Union Oil tank farm and, thus, would not contrast greatly with the immediate environment. Views from the Marina, parking lot, and portions of Spinnaker Drive would be obstructed by intervening topography and/or vegetation. Potential public visual exposure could be relatively high, especially during the summer months when Marina use is at its peak. However, potential visual intrusion would be relatively low because of the proximity of existing industrial structures and activity.

Harbor Boulevard, north of Gonzales Road--viewing point 3.7. Distance to the onshore treating facility construction site would be approximately 0.25 mile (0.4 km). Construction activity would not be visible to passing motorists because of intervening landscaping and Union Oil Marine Terminal structures. Visual impacts would be negligible.

Onshore Pipelines and Booster Station

Visible construction and installation elements and potential viewing populations would be the same as for the proposed Mandalay configuration (Section 4.6.5.1.1). The right-of-way widths would be increased in order to accommodate a greater number of pipelines. In addition, trenching across the Santa Clara River bed would be necessary. Additional visible elements for trenching activity would be:

- a sheet pile barrier moved sequentially across the river
- 50 construction workers and miscellaneous equipment, pipe, and supplies

Installation of the complete onshore pipeline system for the Union Oil Marine Terminal alternative configuration would take approximately 12 weeks. Potential visual intrusion would be moderately high for the trenching phase and moderate for the remaining elements of onshore pipeline installation.

Visibilities, potential viewing populations, and representative viewing points associated with construction of the booster station at Mandalay Beach would be essentially the same as those for the offshore pipelines and power cables. The booster station would be approximately 150 x 200 feet (45.7 x 60.9 m) and its construction would be concurrent with construction and installation of the onshore pipelines and would not be expected to result in significant additional visual impacts.

Total Impact

Visual impacts resulting from construction of Platform Gina would be moderately significant due to its proximity to some coastal residential and recreational areas. Visual impacts resulting from construction of Platform Gilda would not be expected to be significant because of its greater distance from coastal viewing points, decreased visibility due to fog or haze, and proximity to Platform Grace.

Visual impacts resulting from construction and installation of the onshore pipelines would be of minor significance, with the exception of trenching activity across the Santa Clara River bed. This activity would result in short-term, moderately significant visual impacts for motorists passing by on Harbor Boulevard.

Visual impacts resulting from construction of the remaining elements of the Union Oil Marine Terminal alternative configuration would be of minor significance due to their temporary nature and relatively low visibility and/or public visual exposure.

4.6.5.3.2 Drilling

Visual impacts resulting from drilling activities at Platforms Gina and Gilda would be the same as for the proposed Mandalay configuration (Section 4.6.5.1.3).

4.6.5.3.3 Production

Platforms

Visible production elements, potential viewing populations, and potential visual impacts associated with Platforms Gina and Gilda would be the same as for the proposed Mandalay configuration (Section 4.6.5.1.3).

Offshore Pipelines and Power Cables

The offshore pipelines and power cables to/from Platforms Gina and Gilda would not be visible during the production phase of the Union Oil Marine Terminal alternative configuration. Therefore, no aesthetic impacts would occur.

Onshore Treating Facility

Visibilities, potential viewing populations, and potential public visual exposure during production would be the same as discussed for construction (Section 4.6.5.3.1). Potential visual intrusion would be low for all representative viewing points.

Onshore Pipelines and Booster Station

The onshore pipelines would not be visible during production except for brief periods of repair, if necessary. Therefore, no aesthetic impacts would occur.

Potential viewing populations and visibilities of the booster station would be the same as for construction (Section 4.6.5.3.1). Potential visual intrusion would be low for all representative viewing points.

Total Impact

Visual impacts resulting from the presence of Platform Gina during the production phase would be moderately significant because of its potentially high public visual exposure and proximity to some coastal residential and recreational areas. Visual impacts resulting from Platform Gilda would not be significant due to its distance from coastal viewing points, reduced visibility because of fog or haze, and proximity to Platform Grace.

Visual impacts resulting from the remaining elements of the Union Oil Marine Terminal alternative configuration would not be significant.

4.6.5.4 Ormond Beach Alternative Configuration

4.6.5.4.1 Construction

Platforms

Visible construction elements, potential viewing populations, and potential visual intrusions would be identical to those for Platforms Gina and Gilda for the proposed Mandalay configuration (Section 4.6.5.1.1).

Offshore Pipelines and Power Cables

Platform Gina: The offshore pipelines to/from Platform Gina would be placed in a corridor separate from that for Platform Gilda, if the Ormond Beach alternative were selected. This would necessitate the establishment of a second onshore marshalling and fabrication area, to be located near the landfall at Silver Strand Beach. Visible construction elements at this site would be the same as those described for the proposed Mandalay Beach marshalling and fabrication area, with the following exceptions:

- 100 additional truck deliveries would be required.
- Construction would take approximately 9, rather than 3, weeks.

Onshore activities associated with pipeline fabrication and installation potentially would be visible from the following representative viewing points (Figure 4.6-4).

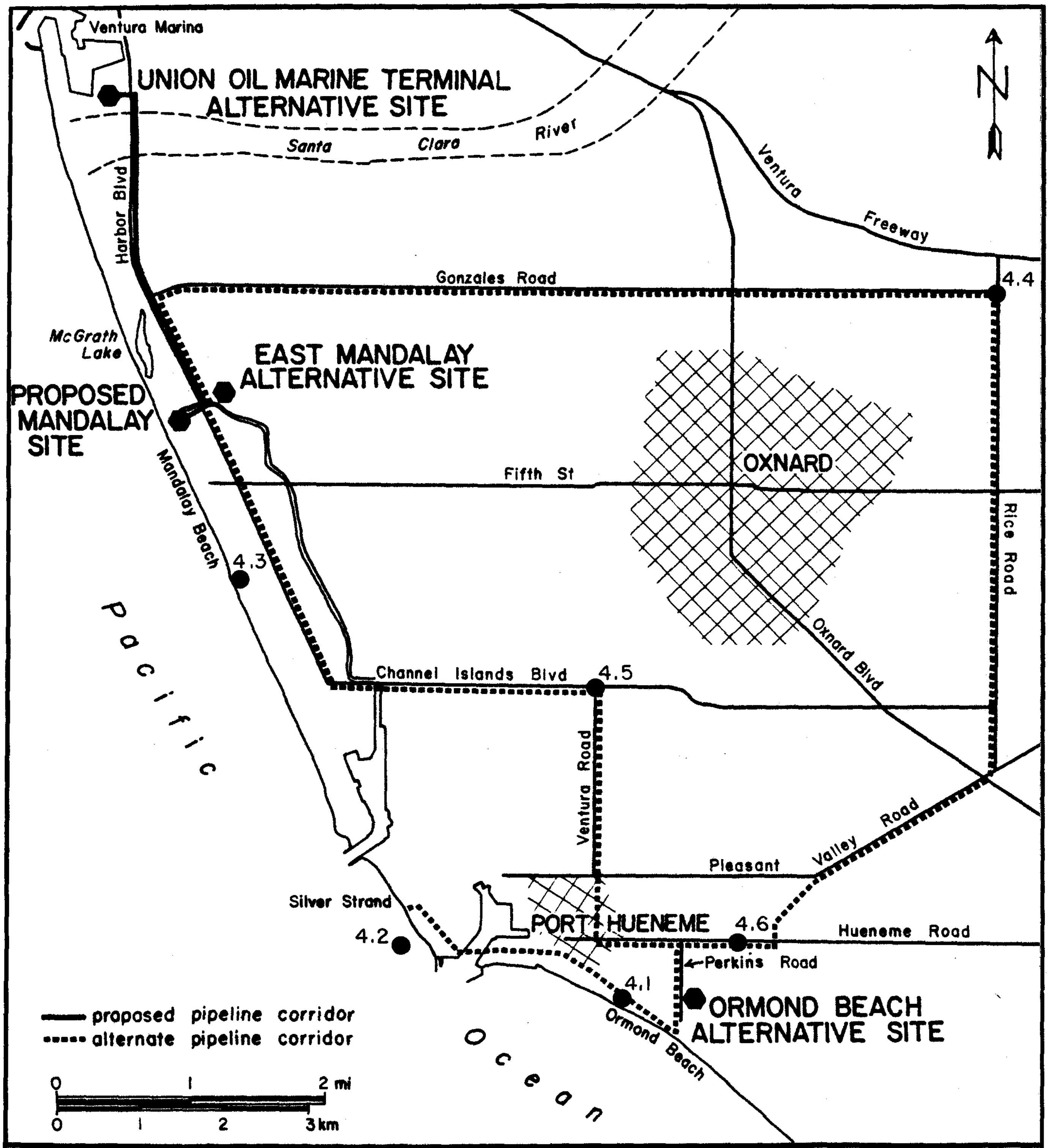

FIGURE 4.6-4

REPRESENTATIVE VIEWING POINTS FOR ONSHORE PROJECT ELEMENTS (ORMOND BEACH ALTERNATIVE CONFIGURATION)

DAMES & MOORE

Ormond Beach--viewing point 4.1. Distance to the Platform Gina offshore pipeline marshalling and fabrication area would be approximately 2 miles (3.2 km). Views of construction activities would be obstructed by topography, existing structures, and harbor activity at Port Hueneme. Potential visual intrusion would be low.

Port Hueneme-Channel Islands Harbor--viewing point 4.2. Distance to the marshalling and fabrication area would be up to approximately 0.5 mile (0.8 km). Construction activity would be highly visible to residents and beach users at Silver Strand Beach and would be in contrast with the existing recreation-oriented environment. Potential visual intrusion would be high.

Construction activity at the marshalling and fabrication area potentially would be visible to offshore boaters at Channel Islands Harbor. Views from the harbor would be obstructed by structures and residences. Visibility would be relatively low because of distance to the marshalling and fabrication area. Potential visual intrusion would be moderately low.

Views of the marshalling and fabrication area from Port Hueneme would be somewhat obstructed by port facilities and harbor traffic. The potential viewing population would be largely commercially oriented and, thus, potentially less susceptible to visual impacts resulting from construction activity at Silver Strand Beach.

Offshore activity associated with pipeline installation for Platform Gina potentially would be visible from Ormond Beach, Port Hueneme, Channel Islands Harbor, and Mandalay Beach. Visible elements would be the same as for the proposed Mandalay configuration (Section 4.6.5.1.1)..

Visibility of pulling activity for residents and beach users in the Mandalay Beach area would be moderately low because of distance (3.5 to 6 miles (5.6 to 9 km)). The pull barge and tugboat would be similar in appearance to the many ships and boats which regularly traverse the area and appear in views of this portion of the Santa Barbara Channel. Therefore, potential visual intrusion would be low.

Visibility of pulling activity for beach users, local residents, and harbor facilities users in the Ormond Beach/Port Hueneme/Channel Islands Harbor area would be relatively high. However, potential visual intrusion would be moderate to low because the pull barge and tugboat would be similar in appearance to the normal marine traffic in the area.

Platform Gilda: Visible construction and installation elements, potential viewing populations, and potential visual intrusions would be the same as for the proposed Mandalay configuration (Section 4.6.5.1.1).

Onshore Treating Facility

The nature of construction activity would be essentially the same as for the proposed project (Section 4.6.5.1.1). Construction activity potentially would be visible from the following representative viewing points (Figure 4.6-4).

Ormond Beach--viewing point 4.1. Distance to the treating facility would be approximately 0.25 mile (0.4 km). Views of the construction site from the beach would be obstructed by intervening topography and existing industrial structures. No figures for beach use are available; however, it could be relatively high during the summer months. The existing immediate environment is predominantly industrial. The visual intrusion of treating facility construction would be negligible.

Hueneme Road, east of Saviers Road--viewing point 4.6. Distance to the treating facility site would be approximately 0.75 mile (1.2 km). Average daily traffic on Hueneme Road in this area is approximately 12,500 vehicles. Construction activity would not be visible to passing motorists because of intervening industrial structures. Potential visual intrusion would be negligible.

Port Hueneme-Channel Islands Harbor--viewing point 4.2. Distance to the treating facility would be approximately 2 miles (3.2 km). Visibility of the construction site would be blocked by intervening industrial structures, residences, and topography. Visual intrusion would be negligible.

Public visual exposure to construction activities at the Ormond Beach alternative onshore treating facility site would be low. Views from all directions, except east, would be blocked by existing industrial structures. The area to the east currently is used for agriculture; the number of potential viewers would be small. Overall, the potential visual intrusion of construction elements for the Ormond Beach alternative treating facility would be low.

Onshore Pipelines and Booster Stations

Visible construction and installation elements would be the same as those described for the proposed Mandalay configuration. However, the right-of-way widths between the treating facility site and the Mandalay Beach area would have to be increased to accommodate a greater number of pipelines. Additional workers, equipment, and supplies would be required, and construction would extend over a longer period.

Option A: Installation of the onshore pipeline system would require 175 workers for 22 weeks. Construction and installation activity potentially would be visible from the following representative viewing points (Figure 4.6-4).

Ormond Beach--viewing point 4.1. Views of booster station construction from local residences would be blocked by harbor facilities at Port Hueneme. Portions of pipeline installation would be visible to beach users and local residents for short periods of time. Because of the largely industrial character of land use in the vicinity of the pipeline corridor near Ormond Beach and the temporary nature of pipeline installation activity, potential visual intrusion would be low.

Port Hueneme-Channel Islands Harbor--viewing point 4.2. From Port Hueneme, visibility of construction of the booster station at Silver Strand Beach would be obstructed by harbor facilities and activities. Potential visual intrusion would be moderately low for viewers in the port area. Pipeline installation across Port Hueneme would be highly visible to port users for a short period of time. This short-term visual intrusion could be relatively high.

Distance from Channel Islands Harbor to the landfall at Silver Strand Beach would be up to about 0.5 mile (0.8 km). Construction activity would not be visible to harbor users; however, booster station and pipeline installation potentially would be highly visible to residents and recreationists at Silver Strand Beach. Construction activities would contrast with the residential/ recreational character of the area and would represent a high potential visual intrusion for local residents and beach users.

Hueneme Road, east of Saviers Road--viewing point 4.6. Motorists on Hueneme Road between Ventura Road and Perkins Road would be exposed to pipeline installation activity along Hueneme Road. Average daily traffic is approximately 12,500 vehicles. Because of the industrial nature of much of the surrounding area and the temporary nature of installation activity, potential visual intrusion would be low.

Channel Islands Boulevard-Ventura Road--viewing point 4.5. Motorists driving along these roads would be exposed to pipeline installation activity. Average daily traffic on Ventura Road, south of Channel Islands Boulevard is approximately 24,000 vehicles; thus, public visual exposure would be high. No figures for average daily traffic on Channel Islands Boulevard are available. Based on current usage, however, public visual exposure to pipeline installation activity in this area would be relatively high. Potential visual intrusion would be high for brief periods of time.

Mandalay Beach-Oxnard Shores--viewing point 4.3. From Mandalay Beach to Ventura Marina, visibilities, public visual exposure, and potential visual intrusions for viewing points in this area would be the same as for the proposed Mandalay configuration (Section 4.6.5.1.1). Construction of a booster station at Mandalay Beach potentially would be visible from these viewing points. This activity would be concurrent with offshore pipeline and power cable installation activity for Platform Gilda and would not represent a significant visual impact.

Option B: Installation of the onshore pipelines would require 195 workers for about 28 weeks. Construction and installation activity potentially would be visible from the following representative viewing points (Figure 4.6-4).

Ormond Beach/Port Hueneme-Channel Islands Harbor/Hueneme Road--viewing points 4.1, 4.2, and 4.6. Visible construction elements, potential public visual exposure, and potential visual intrusions would be the same as discussed for Option A.

Gonzales Road-Rice Road--viewing point 4.4. Motorists driving along Rice Road between Gonzales Road and Pleasant Valley Road and/or along Gonzales Road between Rice Road and Harbor Boulevard would be exposed to pipeline installation activity. No figures for average daily traffic in this area are available. Potential visual intrusion would be moderate for short periods of time. Construction of a booster station in the vicinity of the intersection of Gonzales and Rice roads would be visible to motorists and local residents and could represent a relatively high visual intrusion into the predominantly rural/agricultural character of the surrounding environment.

Mandalay Beach-Oxnard Shores--viewing point 4.3. Visiblities, potential viewing populations, and potential visual intrusions for this portion of onshore pipeline installation would be essentially the same as for the proposed Mandalay configuration (Section 4.6.5.1.1).

Visibilities, potential viewing populations, and potential visual intrusions of construction activity associated with the booster stations proposed for Silver Strand and Mandalay beaches would be the same as for Option A.

Total Impact

Option A: Aesthetic impacts resulting from construction of the Ormond Beach Option A alternative configuration would be:

Onshore Pipelines and Booster Stations

The onshore pipelines would not be visible during the production phase; thus, no aesthetic impacts would occur.

Option A: Potential viewing populations, visibilities, and potential public visual exposure to the booster stations would be the same as for construction (Section 4.6.5.4.1). Potential visual intrusion would be low for the Mandalay Beach booster station because of the visual dominance of the SCE Mandalay Generating Station. Visual intrusion of the Silver Strand Beach booster station would be high for local residents and recreationists.

Option B: Potential viewing populations, visibilities, and potential public visual exposure to the booster stations would be the same as for construction (Section 4.6.5.4.1). Potential visual intrusions would be the same as for Option A for the Mandalay Beach and Silver Strand Beach booster stations. Potential visual intrusion of the Gonzales Road-Rice Road booster station would be high, for a relatively small viewing population, because of the rural/agricultural character of the surrounding area.

Total Impact

Option A: Visual impacts resulting from Platform Gina during the production phase would be moderately significant because of its relatively short distance from some coastal residential and recreational areas. Visual impacts resulting from Platform Gilda during production would not be significant because of its greater distance from coastal viewing points, decreased visibility due to fog or haze, and proximity to Platform Grace.

Visual impacts resulting from the booster station at Silver Strand Beach would be significant for local residents and recreationists because of its relatively high contrast with the residential/recreational nature of the area.

Visual impacts resulting from the remaining production elements of the Ormond Beach Option A alternative configuration would be of minor significance.

Option B: Aesthetic impacts during the production phase for the Ormond Beach Option B alternative configuration would be the same as for Option A, except as discussed below.

Visual impacts resulting from the booster station near the Gonzales Road-Rice Road intersection would be moderately significant, for a relatively small viewing population, because of its contrast with the rural/agricultural character of the surrounding environment.

4.6.6 Effects of Accidental Oil Spills on Beach Use

An accidental crude oil spill resulting from the proposed Platform Gina and Platform Gilda Project could have a significant but temporary adverse effect on beach use. Major recreational facilities within the project area that potentially could be affected include San Buenaventura State Beach Park, Ventura Marina, Marina Park, McGrath State Beach Park, Channel Islands Park and Harbor, Hollywood Beach Park, Silver Strand Beach Park, Port Hueneme City Beach Park, and the planned Mandalay Beach County Park. Beach contamination could also extend beyond the boundaries of the project area (Section 4.9.3). At locations where oil came ashore and caused the contamination and/or closure of beaches, water sports such as swimming, surfing, diving, spearfishing, underwater photography, water skiing, and pleasure boating would be precluded or greatly reduced. Also affected could be such seashore-related activities as beachcombing, shell collecting, painting, shoreline/tidepool nature study, jogging/walking, and sunbathing. Recreational use of beach areas would likely remain restricted until most of the oil and tar had been cleared from the affected area(s).

The magnitude of the oil spill impact on beaches and associated recreational uses of the project area coastline would depend on: the size of the spill, its direction and rate of drift, where it came ashore, and the use characteristics of the affected areas(s). Impacts would likely be greatest in an instance where a large concentration of oil washed ashore at a heavily used beach during the peak of the recreation season (e.g., at a state beach park during mid-July or August). A spill of this type would not only require rapid and extensive cleanup procedures to return the beach to acceptable standards, but could also result in a major temporary drop in beach attendance. Oil spill-related materials fouling nearshore water surfaces or beach areas would constitute an adverse aesthetic impact for persons viewing and/or attempting to utilize these areas. In addition, oil spill materials often emit an unpleasant odor. Secondary adverse impacts might include crowding at other (uncontaminated) beaches, as well as local revenue loss due to the diversion of tourists and visitors to other locales.

Union's Oil Spill Contingency Plan for the Southern District, Ventura Area, includes specific procedures to be utilized in the event that harbors or recreational beaches are threatened by an accidental oil spill. These procedures are outlined in Response Guide 4 of the Plan, available for review at the Los Angeles office of the USGS. Although primary emphasis is given to the rapid containment and recovery of spilled oil before it reaches the shoreline, the Plan also contains specific cleanup methods and equipment that would be used to decontaminate recreational beaches according to the type of substrate affected (i.e., cobbles/boulders, gravel, sand).

4.7 SOCIOECONOMICS

4.7.1 Proposed Mandalay Configuration

4.7.1.1 Construction

4.7.1.1.1 Platforms

Platform Gina

Population and Housing: The principal components of Platform Gina would be fabricated in a suitable shipyard outside of Ventura County and transported to the site by barge. No local Ventura County labor would be involved in the fabrication process and, therefore, no impact on county population or housing is expected to result.

Construction activities at the offshore platform site are expected to require 80 construction workers for a period of 2 calendar weeks. The workers' living quarters would be provided on a work barge at the site; no onshore housing would be required. According to Pipefitters Local 250, whose jurisdiction includes the affected offshore area, ample personnel are available in the Ventura-Santa Barbara-Los Angeles counties area for platform construction; no new permanent population or housing would result from this 2-week activity (Stewart, 1980).

Utilities: Electrical energy requirements during platform construction would amount to an estimated 500 KVA, which would be provided by a diesel generator on the work barge at the platform site. No load would be placed on the onshore generating or distribution facilities of Southern California Edison Company (SCE).

No natural gas would be required for construction of Platform Gina.

Potable water requirements during construction would average about 1,000 barrels (bbl) (159 m^3) per day over the 2-week construction period. This water would be obtained from desalination units located onboard the work barge or fresh water obtained at the barges point of origin. There would be no impact on local onshore water systems.

Sanitary sewage is estimated to amount to 240 gallons (912 L) per day at the construction site. This volume would be treated in small, packaged sewage treatment units located on the work barge and the platform. Local onshore sanitary sewer systems and facilities would not be impacted by construction.

All other liquid wastes (estimated to amount to 30 gallons (114 L) per day of paints, solvents, etc.) and general refuse (amounting to 145 pounds (66 kg) per day) would be collected at the offshore site and transported to local onshore disposal sites. Items requiring a Class I disposal site would be sent either to: (1) the Simi Valley Landfill, a public facility operated by the Ventura Regional County Sanitation District; or, (2) a private site located at Fifth Street and Harbor Boulevard in Oxnard and operated by J & J, Inc. This latter facility is not a Class I site, but is licensed to receive oily wastes (Yacoub, 1980). Given the small volumes of wastes generated, no significant adverse impact on the onshore disposal sites is expected.

Services: Construction of Platform Gina would have no direct impact on local police services onshore. Even to the extent that construction workers spend time ashore between work shifts or at the beginning or end of the 2-week construction period, there is little likelihood that police service would need to be increased.

Fire prevention, detection, and suppression at the platform would be the responsibility of the applicant. No impact on the local fire departments in Ventura County is anticipated.

All personnel involved in the construction process would be derived from an existing labor pool in the Ventura-Santa Barbara-Los Angeles counties area. The short-term (2 weeks) nature of construction would make permanent relocation of families highly unlikely. No population impact on the County would be anticipated; therefore, no corresponding impact on schools would be expected.

Emergency medical care may be required during the construction phase for Platform Gina. If an injury or illness at the platform site requires immediate treatment, helicopter service could be provided to either St. John's Hospital in Oxnard or General Hospital of Ventura, where adequate space exists for helicopter landing (Mills, 1980). Both emergency departments are designated as providing "Basic Emergency Medical Services," which requires a full-time emergency department with surgical services immediately available for life threatening situations (Ventura-Santa Barbara Health Systems Agency, 1979).

Economic Base: Construction of Platform Gina would have no significant direct effect on the agricultural industry or manufacturing base of Ventura County.

The construction area would be located entirely outside the boundaries of Ventura County; therefore, no new property tax revenues would accrue to the taxing jurisdictions as a direct result of the project. In the category of sales and use tax revenue, however, a beneficial impact on Ventura County would result from construction. The local purchase of $1.7 million in services and materials (most of which would be taxable) for Platform Gina would generate an additional $17,500 in sales and use tax remissions for the local cities and Ventura County. The location of the actual expenditures would determine the specific recipients of this beneficial impact.

A third category of economic impact would be the expenditures by construction workers in the local establishments in the area. The total estimated payroll for the construction of Platform Gina is $2 million, of which a portion may be spent locally. Because the residence location of the offshore constuction workers is not certain (some may come from Los Angeles and Santa Barbara counties), it is not possible to predict the magnitude of local purchases. However, sales tax revenue would accrue to the cities and county of Ventura as a result of any local purchases.

Port Hueneme would be the port of operations for all crew boats, supply boats, and support vessels for Platform Gina construction. Helicopter services, as necessary, would be furnished from Oxnard Airport. Therefore, it is likely that much of the economic benefit of local purchases by the contractor and employees would accrue to businesses in Oxnard and Port Hueneme. As a result, tax revenues would accrue to those cities as well.

Commercial fishing activities in the vicinity of the platform would be temporarily (2 weeks) suspended during construction. This would have no significant impact on the commercial fishing industry.

Construction would have a beneficial economic impact on the port facilities in Port Hueneme, which would serve as the port of operations for all crew boats, supply boats, and support vessels. The duration of the project is short, however, and the benefits would be small.

The total payroll for construction of Platform Gina is estimated at $2 million. If the entire payroll went to residents of Ventura County, it would represent an increase of less than 0.1 percent of county personal income, using 1976 as a base. It is probable that a portion of the payroll would be paid to residents of Los Angeles and Santa Barbara counties, thus further reducing the projected small beneficial impact on Ventura County.

Retail sales by local Ventura County establishments are estimated to be $1.75 million during the construction period for such items as diesel fuel, welding rods, acetylene, oxygen, and food (Section 3.3). In the case of food, an estimated 500 pounds (277 kg) per day would be purchased locally during the 2-week construction period. Of the total of $1.75 million in retail sales, about 99 percent would be taxable, the balance being nontaxable food items. The projected taxable retail sales would represent an increase of approximately 0.1 percent in Ventura County taxable retail sales, using 1978 as a base. Because the onshore base of operations would be Port Hueneme, it is likely that most of this beneficial impact would occur in the communities of Oxnard and Port Hueneme.

Employment: Employment of 80 persons for construction of Platform Gina would have a minor beneficial effect on the employment situation in Los Angeles and Ventura counties. Because the Pipefitters Local 250 in Los Angeles has jurisdiction over all offshore work of this type in Los Angeles and Ventura counties, it is possible that some of the construction crew may not be permanent residents of Ventura County. Therefore, the beneficial effect may be diluted over a large geographical area. Ample workers exist within the area to meet labor requirements during construction (Bauerlein, 1980; Stewart, 1980).

Platform Gilda

Population and Housing: As with Platform Gina, the principal components of Platform Gilda would be fabricated in a shipyard outside of Ventura County and transported to the Gilda site by barge. No impact on Ventura County population or housing is expected to result from the fabrication activity.

Construction activities at the offshore platform site are expected to require 80 construction workers for a period of 5 calendar weeks. This crew would be the same crew utilized during Platform Gina construction; they would move from the Platform Gina site to the Platform Gilda site when Platform Gina was completed. As with Platform Gina, the workers' living quarters would be provided on a work barge at the site; no onshore housing would be required. No new permanent population or housing would result from this 5-week activity.

Utilities: Daily requirements for utility services and the impacts of providing same would be identical to those previously discussed for Platform Gina.

Services: The impact of Platform Gilda construction on local services would be the same as previously discussed for construction of Platform Gina.

Economic Base: Construction of Platform Gilda would have no significant direct effect on the agricultural industry or manufacturing base of Ventura County.

The impact of construction of Platform Gilda on local government would be identical to that for Platform Gina, except that local expenditures for purchased services and materials (most of which would be taxable) would amount to $5 million. This would generate an additional $50,000 in sales and use tax remissions to local cities and Ventura County.

The total estimated payroll for construction of Platform Gilda is $5 million, of which a portion may be spent locally. Because the residence location of the offshore construction workers is not certain, it is not possible to predict the magnitude of local purchases, which would be derived from this source. However, sales tax revenue would accrue to the cities and county of Ventura as a result of any local purchases.

As with Platform Gina, Port Hueneme would be the port of operations for all crew boats, supply boats, and support vessels for Platform Gilda construction. Helicopter services, as necessary, would be furnished from Oxnard Airport. Therefore, it is likely that much of the economic benefit of local purchases by the contractor and employees will accrue to businesses in Oxnard and Port Hueneme. As a result, tax revenues would accrue to those cities as well.

Commercial fishing activities in the vicinity of the platform would be temporarily (5 weeks) suspended during construction. This would have no significant impact on the commercial fishing industry.

The impact on port facilities at the Port of Hueneme would be identical to that resulting from construction of Platform Gina, although of longer duration.

The total payroll for construction of Platform Gilda is estimated at $5 million. If the entire payroll went to residents of Ventura County, it would represent an increase of less than 0.2 percent of county personal income, using 1976 as a base. It is probable that a portion of the payroll would be paid to residents of Los Angeles and Santa Barbara counties, thus further reducing the projected small beneficial impact on Ventura County.

Retail sales by local Ventura County establishments are estimated to be $5 million during the construction period for such items as diesel fuel, welding rods, acetylene, oxygen, and food (Section 3.3). In the case of food, an estimated 500 pounds (277 kg) per day would be purchased locally during the 5-week construction period. Of the total of $5 million in retail sales, about 99 percent would be taxable, the balance being nontaxable food items. The projected taxable retail sales would represent an increase of approximately 0.25 percent in Ventura County taxable retail sales, using 1978 as a base. Because the onshore base of operations would be Port Hueneme, it is likely that most of this beneficial impact would occur in the communities of Oxnard and Port Hueneme.

Employment: Employment impacts would be the same as those discussed for Platform Gina, but for a longer duration.

4.7.1.1.2 Offshore Pipelines and Power Cables

Platform Gina

Population and Housing: The offshore pipelines for Platform Gina would be assembled in a marshalling area south of the proposed treating facility and pulled offshore. A total of 44 construction personnel would be required, 22 in each shift, for a period of 3 calendar weeks (Section 3.3). In addition, a workforce of 12 persons would be required for installation of the submarine power cable to the platform.

The Ventura County Building and Construction Trades Council indicates that a minimum of 90 percent of the construction workforce would be drawn from the Ventura County labor pool (Bauerlein, 1980). Therefore, no more than 10 percent (about 6 workers) would be imported from outside the county. It is unlikely that these imported workers would permanently relocate to the county as a result of construction activities, which are of short duration (3 weeks). Therefore, no permanent population and housing impacts on the county are expected.

Temporary housing may be required for the imported workers for the duration of the construction phase. Ample transient accommodations exist in the Oxnard-Port Hueneme-Ventura area to satisfy such a requirement.

Utilities: Onshore electrical requirements would be related primarily to the pipe welding and inspection operations, which would occur at the marshalling area. The electrical load imposed by this construction activity is included with the load for construction of the treatment facility (Section 4.7.1.1.3).

Natural gas would not be required for installation of the pipelines and power cable.

Potable water would be available as part of the total requirements for construction of the onshore treating facility (Section 4.7.1.1.3). After installation, the pipelines would be hydrostatically tested with ocean water. No impact on local onshore water services is anticipated.

For onshore activities, portable chemical toilets would be provided. For offshore installation of the pipelines and power cable, sanitary sewage would be treated on the tugboat and barge using chemical toilets. Therefore, construction activities would not affect local municipal sanitary sewer facilities.

General refuse amounting to an estimated 200 pounds (90 kg) per day, resulting from construction activities would be disposed of at approved local Class II dumpsites. The impact on the dumpsites would be negligible.

Services: The marshalling area in which pipeline welding would occur is within the jurisdiction of the Oxnard Police Department. The department states that no additional personnel or equipment would be required because of these construction activities (Egan, 1980).

The Oxnard Fire Department is responsible for protective support in the Mandalay area. The onshore construction activities related to the offshore pipelines would not significantly impact the Fire Department. Normal fire safety practices and facilities would be required of the contractor by the Fire Department (Perez, 1980).

All construction personnel would be derived from existing labor pools in the area, mostly from Ventura County. No new permanent residents of Ventura County are expected to result from this short-duration activity. Therefore, no impact on schools is anticipated.

Emergency health care may be required during the construction phase. Ambulance service is available in the area. Emergency cases would be transported from the Mandalay area to St. John's Hospital in Oxnard, where 24-hour service is available. The expected impact on local emergency treatment facilities would be negligible (Mills, 1979 and 1980).

Economic Base: Construction of the offshore pipelines would have no direct impact on the agricultural industry or manufacturing base of Ventura County.

Construction activities, to the extent that they are within the 3-mile (5.6-km) limit from the shoreline, are subject to assessment by the County of Ventura and to property taxes on the completed value as of the assessment date. The project schedule, however, indicates that all construction would be completed prior to the March 1, 1981 assessment date and the entire facility would be in operation. Therefore, property tax revenue would not accrue to the various taxing jurisdictions during the construction period.

In the category of sales and use tax revenue, a direct beneficial impact would result from two categories of expenditures: (1) local purchases of materials and services; and, (2) local spending by construction workers. In the first instance, Union estimates that $100,000 in local purchases of materials and services would occur during the construction phase, all of which would be taxable. This would result in $1,000 in sales and use tax remissions to local governments in Ventura County, an insignificant impact. In the second category, Union estimates that construction activities would involve $500,000 in payroll, of which at least 90 percent would be paid to local Ventura County residents. This local payroll (estimated $450,000) would result in approximately $320,000 of new disposable income in the county which, in turn, would result in about $120,000 of new taxable retail sales. Sales and use tax remissions to local jurisdictions would amount to $1,200, an insignificant beneficial impact.

Commercial fishing activities in the vicinity of the offshore construction right-of-way would be suspended for 3 weeks during construction. This would have no significant impact on the commercial fishing industry.

Construction would have a small beneficial impact on the Port of Hueneme during the installation of the offshore pipelines and power cable as the barge and tugboat would utilize the port as a base of operations.

The estimated total payroll for construction of the Platform Gina offshore pipelines and power cable would be $500,000. At least 90 percent of this payroll would accrue to Ventura County residents. This would represent an increase of only 0.02 percent of county personal income (using 1976 as a base), a negligible impact.

As discussed earlier, construction activity would result in new taxable retail sales of about $220,000 within the county, an increase of only 0.01 percent in total county taxable retail sales (using 1978 as a base), a negligible impact.

Employment: Direct employment during construction is expected to amount to a total of 56 persons. The Ventura County Building and Construction Trades Council indicates that at least 90 percent of the workforce can be obtained from the local Ventura County labor pool (Bauerlein, 1980). Because of the short duration of construction, employment of these persons would not have a significant effect on unemployment in the county.

Platform Gilda

Population and Housing: Construction activities for the Platform Gilda pipelines and power cable would utilize the same construction crews and techniques as would be used for Platform Gina. Therefore, the impacts on population and housing would be identical to those previously described for Platform Gina. The only difference would be that construction would take 7 calendar weeks, rather than the 3 weeks required for Platform Gina.

Utilities: Requirements for utilities services and the impacts of providing same would be identical to those previously discussed for Platform Gina's offshore pipelines and power cable.

Services: The impacts of Platform Gilda's offshore pipelines and power cable construction phase on local services would be identical to those previously discussed for Platform Gina.

Economic Base: Construction of the offshore pipelines and power cable would have no direct impact on the agricultural industry or manufacturing base of Ventura County.

The impact of construction on local property tax revenues would be identical to that previously discussed for Platform Gina's offshore pipeline and power cable construction. In the category of sales and use taxes, the direct beneficial impact on local revenues would be derived from the same sources as discussed for Platform Gina; however, the aggregate amounts would be higher as follows:

(1) Local purchases of materials and services:	
Taxable retail sales	$300,000
Sales & use tax remission to local governments	$ 3,000
(2) Local expenditures by construction workers:	
Taxable retail sales	$720,000
Sales & use tax remission to local governments	$ 7,200

The total beneficial impact would amount to an estimated $10,200, of which most would accrue to the cities of Oxnard, Port Hueneme, and Ventura, as well as the County of Ventura.

Commercial fishing activities in the vicinity of the offshore construction right-of-way would be temporarily (7 weeks) suspended during construction. This would have no significant impact on the commercial fishing industry.

Construction would have a small beneficial impact on port facilities at the Port of Hueneme during installation of the offshore pipelines and power cable because the barge and tugboat would utilize the port as a base of operations.

The estimated total payroll for construction would be $3 million. At least 90 percent of this payroll would accrue to Ventura County residents. This would represent an increase of 0.1 percent of county personal income, using 1976 as a base. This would be a negligible impact.

As indicated previously, construction activities would result in new taxable retail sales of about $1.02 million within the county, an increase of about 0.05 percent in total county taxable retail sales (using 1978 as a base). This would be a negligible impact.

Employment: Employment impacts would be identical to those previously discussed for the construction of Platform Gina offshore pipelines and power cable. However, they would occur over a 7-week, rather than a 3-week, period.

4.7.1.1.3 Onshore Treating Facility

Population and Housing

The major components of the onshore treating facility would be manufactured offsite and delivered to the site. Onsite construction would require an estimated 16 calendar weeks. The construction force would be approximately 100 persons during this period, with a maximum of 40 persons onsite at any one time (Section 3.3).

A representative of the Ventura County Building and Construction Trades Council has stated that a minimum of 90 percent of the construction workforce would be drawn from the Ventura County labor pool (Bauerlein, 1980). Therefore, no more than 10 percent, or 10 workers, would be imported from outside the county. Workers who are already county residents would probably commute to the jobsite on a daily basis from their homes. It is unlikely that the imported workers would permanently relocate to Ventura County as a result of this project, because the duration (16 weeks) of construction activities would be too short to assure those workers of a future source of income. Therefore, no permanent population and housing impacts on the county are expected.

Temporary housing may be required for the imported workers for the duration of the construction phase. Ample transient accommodations exist in the Oxnard-Port Hueneme-Ventura area to satisfy this requirement.

Utilities: Electrical requirements during construction would be approximately 100 KVA, which would either be purchased from SCE or supplied by a portable diesel generator at the site. SCE has stated that it could provide the required electrical power (Racicot, 1980). The 100 KVA electrical requirement includes that needed for the offshore pipeline construction (Section 4.7.1.1.2).

Natural gas would not be required for construction of the treating facility. Fuel requirements associated with construction would be satisified by purchasing LPG from a local supplier. No significant adverse impact would result. A beneficial impact on local business would result.

Potable water requirements would average 50 gallons (190 L) per day and would be supplied in bottles by a local vendor. A beneficial impact on local business would result. Water for hydrostatic testing would be obtained from an existing system at the Union Oil Marine Terminal. No significant impact on the city's water system is expected to result from this one-time use.

Sanitary wastes during construction would be collected in portable chemical toilets. The construction activities would impose no impact on local municipal sanitary sewer facilities.

Wastewater would result from hydrostatic testing and contaminated storm water. Approximately 3,000 bbl (477 m^3) of hydrostatic test water would be discharged in accordance with regulatory requirements or trucked from the site to an approved Class I or II dumpsite. Contaminated storm water, if any, likewise would be sent to an approved Class I or II dumpsite for disposal. Uncontaminated storm water would be routed to natural drainage. General refuse resulting from construction activities would be disposed of at an approved local Class II dumpsite. None of the preceding would have a measurable impact on local dumpsites.

<u>Services</u>: The treating facility site would be within the jurisdiction of the Oxnard Police Department. The department states that no additional personnel or equipment would be required because of these construction activities (Egan, 1980).

The Oxnard Fire Department is responsible for protective support in the Mandalay area. Construction of the treating facility would not significantly impact the Fire Department. Normal fire safety practices and facilities would be required of the contractor by the Fire Department (Perez, 1980).

All construction personnel would be derived from existing labor pools in the area, mostly from Ventura County. No new permanent residents of Ventura County are expected to result from the construction phase. Therefore, no impact on schools is anticipated.

Emergency health care may be required during construction. Ambulance service is available in the area. Emergency cases would be transported from the Mandalay area to St. John's Hospital in Oxnard, where 24-hour service is available. The expected impact on local emergency treatment facilities would be negligible (Mills, 1979, and 1980).

Economic Base: Construction of the treating facility would have no direct impact on the agricultural industry, commercial fishing, commercial port facilities, or manufacturing base of Ventura County.

Facilities under construction are subject to assessment by the County of Ventura and to property taxes on the completed value as of the March 1 assessment date. However, the project schedule indicates that all construction would be completed prior to the March 1, 1981 assessment date and the entire facility would be in operation at that time. Therefore, property tax revenues would not accrue to the various taxing jurisdictions during the construction period.

In the area of sales and use tax revenue, a direct beneficial impact would result from two categories of expenditures: (1) local purchases of materials and services; and, (2) local spending by construction workers. In the first instance, Union estimates that $1.8 million in local purchases of materials and services would occur during the construction phase, all of which would be taxable. This would result in $18,000 in new sales and use tax remissions to local governments in Ventura County. In the second category, Union estimates that construction activities would involve $2.8 million in payroll, of which at least 90 percent would be paid to local Ventura County residents. This local payroll of $2.52 million would result in approximately $1.8 million of new disposable income in the county which, in turn, would yield about $0.7 million of new taxable retail sales, and $7,000 in new sales and use tax remissions to local governments. Total new sales and use tax remissions to local governments, therefore, would be about $25,000 as a direct result of the construction program; new revenues to the State of California would amount to about $125,000.

The estimated total payroll for construction would be $2.8 million. At least 90 percent of this payroll would accrue to Ventura County residents. This would represent an increase of less than 0.1 percent of county personal income, using 1976 as a base.

As discussed previously, construction activities would result in new taxable retail sales of about $2.5 million, an increase of about 0.13 percent for the county as a whole (using 1978 as a base). This would be a minor impact.

Employment: Direct employment during construction is expected to amount to 100 persons. The Ventura County Building and Construction Trades Council has stated that 90 percent of the work force will be derived from the existing Ventura County labor pool (Bauerlein, 1980). Because of the short 16-week duration of construction, it is unlikely that any measurable effect on the county's unemployment rate would result.

4.7.1.1.4 Onshore Pipelines

Population and Housing

Pipeline construction is expected to take 4 calendar weeks. The construction workforce required would be 35 persons, assigned to a 10-hour day shift (Section 3.3).

A representative of the Ventura County Building and Construction Trades Council has stated that a minimum of 90 percent of the construction workforce would be drawn from the Ventura County labor pool (Bauerlein, 1980). Therefore, no more than 10 percent, or 4 workers, would be imported from outside the county. Workers who are already county residents would probably commute to the jobsite on a daily basis from their homes. It is unlikely that the imported workers would permanently relocate to Ventura County, because the construction duration (4 weeks) is too short. No permanent population or housing impact on the county is, therefore, expected.

Temporary housing may be required for the imported workers for the duration of the construction phase. Ample transient accommodations exist in the Oxnard-Port Hueneme-Ventura area to satisfy this requirement.

Utilities: Electrical requirements for pipeline welding activities would be satisfied through the use of diesel-powered generators. There would be no impact on SCE electrical generating capacity.

Natural gas would not be required for construction.

Approximately 50,000 gallons (190,000 L) of water would be required for hydrostatic testing of the pipelines. This water would be obtained from Union's existing water supply system at the Union Oil Marine Terminal. The impact of this one-time requirement on the local water delivery system is not expected to be significant.

Sanitary wastes generated during construction would be collected in portable chemical toilets. The fresh water used to hydrostatically test the completed pipelines would be discharged into the City of Ventura sewer system. This one-time discharge would have a negligible impact on the system.

Solid wastes, consisting of general refuse and debris, would be disposed of at an approved Class II dumpsite and would not have a measurable impact on dumpsite capacities.

Services: The pipeline route would fall within the jurisdiction of three agencies--the Oxnard Police Department, the City of Ventura Police Department, and the Ventura County Sheriff's Department. These departments state that the construction activities would not adversely affect their operations, providing that traffic control measures required by the departments are taken by Union or the contractor (Egan, 1980; Askay, 1980; Seery, 1980).

Fire department support along the pipeline route would be furnished by three agencies--the Oxnard Fire Department, the City of Ventura Fire Department, and the Ventura County Fire Department. These departments state that construction activities would not impose an adverse impact on their departments, providing necessary safety practices required by the departments are followed (Perez, 1980; Zamazanuk, 1980; Bogardus, 1980).

No persons are expected to permanently relocate to Ventura County or move within the county as a result of construction requirements. Therefore, no impact on schools is anticipated.

Emergency health care may be required during construction. Ambulance service is available in the area. Emergency cases would be transported from the construction site to either St. John's Hospital in Oxnard or General Hospital of Ventura, both of which possess 24-hour emergency service. The expected impact, if any, on local emergency treatment facilities would be negligible (Mills, 1979 and 1980).

Economic Base: Construction of onshore pipelines would have no direct impact on the agricultural industry, commercial fishing, commercial port facilities, or the manufacturing base of Ventura County.

Facilities under construction are subject to assessment by the County of Ventura and to property taxes on the completed value as of the March 1, 1981 assessment date. The project schedule indicates that all construction would be completed prior to the March 1, 1981 assessment date and the pipeline would be operational at that time. Therefore, property tax revenues would not accrue to the various taxing jurisdictions during the construction period.

In the area of sales and use tax revenue, a direct beneficial impact would result from two categories of expenditures: (1) local purchases of materials and services; and, (2) local spending by construction workers. In the first instance, Union estimates that $200,000 in local purchases of materials and services would occur during the construction phase, all of which would be taxable. This would result in $2,000 in new sales and use tax remissions to local governments in Ventura County. In the second category, Union estimates that construction activities would involve $100,000 in payroll, of which at least $90,000 would be paid to local Ventura County residents. This local payroll would result in approximately $64,000 in new disposable income in the county which, in turn, would yield about $24,000 of new taxable retail sales, and $240 in new sales and use tax remissions to local governments. Total new sales and use tax remissions to local governments would amount to about $2,240 as a direct result of the construction program, an insignificant beneficial impact.

The estimated total payroll for construction is $100,000, of which $90,000 would accrue to Ventura County residents. This would represent an insignificant effect on personal income in the county.

As discussed previously, construction activities would result in new taxable retail sales of about $224,000, an increase for the county of about 0.01 percent (using 1978 as a base). This would be an insignificant impact.

Employment: Direct employment of 35 persons for a period of 4 weeks would not significantly affect the unemployment situation in Ventura County.

4.7.1.1.5 Total Impact

Population and Housing

Construction activities would require employment of an estimated 171 persons resident in Ventura County. Up to an additional 20 workers may be imported from outside the county. The latter workers are not expected to seek permanent residence in the county because of the short duration (6 months) of the construction phase. Therefore, no permanent population growth or demand for new housing is expected to occur as a result of construction activities.

Temporary housing may be required for the imported workers for the duration of their involvement in the construction program. Ample transient accommodations exist in the Oxnard-Port Hueneme-Ventura area to satisfy this requirement.

Utilities: The maximum load which would be imposed on SCE during construction would be 100 KVA at the treating facility site, which could be met by the utility company without significant impact (Racicot, 1980). All other electrical requirements during construction would be met through the use of diesel-powered generators.

Natural gas would not be required during construction.

Potable water requirements for offshore construction activities would be supplied by desalination units or fresh water stored onboard the work barge. Onshore potable water needs would be satisfied by the use of bottled drinking water from a local supplier. Hydrostatic test water would be required for both the offshore and onshore pipeline systems. Offshore needs would be met through the use of ocean water, while onshore needs would be met from Union's existing system at the Marine Terminal, which is supplied by the City of Ventura. Construction water demands are not expected to significantly impact onshore municipal water delivery systems. A beneficial impact on the local supplier of bottled water would result.

For offshore platform construction activities, sanitary waste would be treated in small, packaged sewage treatment units located on the work barge and the platforms. Portable chemical toilets would be used onshore and on the boats employed to install the offshore pipelines/power cables. Wastewater resulting from hydrostatic testing would be discharged in accordance with regulatory requirements. Construction activities are not expected to significantly impact local municipal sanitary sewer facilities.

If wastewater cannot be discharged into the local municipal sanitary sewer system, it would be trucked to an approved dumpsite. General refuse from construction activities, as well as vegetative debris, would similarly be trucked to a local Class II dumpsite. None of these activities would have a measurable impact on local dumpsite capacities.

Services: The various onshore project elements are within the jurisdictions of the Oxnard Police Department, the City of Ventura Police Department and the Ventura County Sheriff's Department. These departments state that construction activities would not adversely affect their operations, providing that traffic control measures required by the departments are taken by Union and/or the contractor (Egan, 1980; Askay, 1980; Seery, 1980).

Fire department support to the onshore project elements would be furnished by the Oxnard Fire Department, the City of Ventura Fire Department, and the Ventura County Fire Department. Construction activity would not adversely impact their operations, providing that necessary safety practices required by the departments are followed (Perez, 1980, Zamazanuk, 1980; Bogardus, 1980).

No persons are expected to permanently relocate to Ventura County or relocate within the county as a result of construction. Therefore, no impact on schools is anticipated.

Emergency health care may be required during construction. Ample facilities exist in Oxnard and Ventura with 24-hour emergency treatment capabilities; similarly, adequate methods exist for transporting emergency cases to the treatment facilities. The potential impact of construction activities on overall emergency health care delivery systems would be negligible (Mills, 1979 and 1980).

Economic Base: Construction would have no direct impact on the agricultural industry or manufacturing base of Ventura County.

Because construction would be completed and the project in operation prior to the March 1, 1981 assessment date, no property tax revenues would result from the construction phase.

Local purchases in Ventura County of materials and services for construction have been estimated at $9.15 million, all of which would be taxable. This would result in $91,500 of new sales and use tax remissions to local governments in the county and $457,500 to the State of California. In addition, Union estimates that construction activities would result in $5.76 million in payroll to county residents. This excludes any payroll for construction of Platforms Gina and Gilda, where residences of construction workers cannot be determined at this time. This local payroll would result in about $4.106 million of new disposable income in the county, which, in turn, would yield an estimated $1.54 million in new taxable retail sales. New sales and use tax remissions to local governments would be $15,400 and new revenues to the State of California would be $77,000. New revenues to local governments would total $106,900 and those to the State of California would total $534,500, both of which are minor to moderate beneficial impacts.

Commercial fishing activities in the vicinity of the platforms and pipeline/power cable rights-of-way would be temporarily suspended during construction. No significant adverse impact on commercial fishing is expected to result.

A small, brief beneficial impact on the Port of Hueneme would occur during construction of the offshore elements of the project. The port would be the base of operations for all crew boats, supply boats, and support vessels.

The estimated total payroll to local residents would be $5.76 million during construction. This represents 0.21 percent of countywide personal income (using 1976 as a base), a minor beneficial impact.

As discussed previously, new taxable retail sales resulting directly from the construction program would amount to $10.69 million. This represents a 0.58 percent increase in countywide taxable retail sales (using 1978) as a base, a minor beneficial impact.

Employment: Employment of 171 Ventura County residents at various times over a 6-month period would be a beneficial impact on county employment. Because of the short duration, it would not measurably affect the unemployment rate.

4.7.1.2 Drilling

4.7.1.2.1 Platform Gina

Population and Housing

Drilling activity at Platform Gina is estimated to occur for approximately one year. Three drilling crews composed of 10 to 15 workers each would work three 8-hour shifts on the platform. These crews would be leased by Union and would likely consist of personnel already engaged in offshore drilling activities in the Santa Barbara Channel. These crews are accustomed to being moved about in the area as their drilling assignments change. No new population growth or housing demand would result in Ventura County as a direct consequence of the drilling activity at Platform Gina.

Utilities: Drilling activities would impose a demand of approximately 1,500 KVA. This requirement would be supplied by SCE via the submarine power cable. The utility company indicates that it could meet this demand without significant impact (Racicot, 1980).

No purchased natural gas would be consumed on the platform during drilling.

Fresh water requirements during drilling would be met by purchasing water from a local supplier and transporting it to the platform by supply boat. Local municipal water systems would not be impacted.

The platform would house a small, packaged sewage treatment unit which would be used to treat sanitary wastes on the platform prior to ocean discharge. Local municipal sanitary sewers would not be impacted by the drilling phase.

All other liquid and solid wastes would be collected and sent onshore to either the treating facility (oily liquid wastes) or an approved dumpsite. The 200 pounds (91 kg) per day of general refuse would not significantly affect local dumpsite capacities.

Services: Platform Gina would be outside the jurisdiction of local police departments. Therefore, no impact on police services is expected.

Fire prevention, detection, and suppression at the platform would be the responsibility of Union. No impact on local fire departments in Ventura County is anticipated.

Drilling crew personnel on Platform Gina would not be likely to permanently relocate their residences as a direct result of the drilling program. Therefore, local schools would not be impacted.

Emergency medical care may be required during the drilling phase, which would necessitate personnel removal to a local onshore emergency treatment facility. If an injury or an illness at the platform requires immediate treatment, helicopter service could be provided to either St. John's Hospital in Oxnard or General Hospital of Ventura, where adequate space exists for helicopter landing (Mills, 1980). Both emergency departments are designated as providing "Basic Emergency Medical Services," which requires a full-time emergency department with surgical services immediately available for life threatening services (Ventura-Santa Barbara Health Systems Agency, 1979).

Economic Base

Drilling activities would have no direct effect on the agricultural industry or manufacturing base of Ventura County.

The drilling activities would be located entirely outside the boundaries of Ventura County; therefore, no new property tax revenues would accrue to the taxing jurisdictions in the county.

In the category of sales and use tax revenues, a direct beneficial impact would result from two categories of expenditures: (1) local purchases of materials and services; and, (2) local spending by the drilling crews. In the first category, Union estimates that $9.9 million in local purchases of materials and services would occur during the drilling phase, nearly all of which would be taxable. This would result in $99,000 in new sales and use tax remissions to local governments and $495,000 to the State of California. In the second category, Union estimates that drilling would involve $2 million in payroll, most of which would be locally spent. This payroll would result in about $1.42 million in new disposable income in the county which, in turn, would yield about $530,000 of new taxable retail sales. This would result in $5,300 in new sales and use tax remissions to local governments and $26,500 to the State of California. Total new sales and use tax remissions to local governments would amount to about $104,300 and new revenues to the State of California would total $521,500. These would be minor to moderate beneficial impacts.

Under normal operating circumstances, the drilling phase would not affect commercial fishing activities to any significant degree.

The Port of Hueneme would experience a minor beneficial impact because the crew and supply boats would operate on a regular basis out of the port.

The total payroll of $2 million for drilling activities would represent 0.07 percent of county personal income (using 1976 as a base), an insignificant impact.

As discussed previously, drilling activities would result in new taxable retail sales of about $10.43 million, an increase for the county of 0.56 percent (using 1978 as a base). This would be a minor to moderate beneficial impact.

Employment: The direct employment of between 30 and 45 persons for the one-year drilling program may be a minor benefit to the employment situation for this field in Ventura County. However, all of the workers would be skilled in this particular field and probably are currently employed. Therefore, it is unlikely that the unemployment rolls would be reduced.

4.7.1.2.2 Platform Gilda

Repetto Formation

Population and Housing: Drilling in the Repetto Formation is estimated to occur over a period of 54 months. Two drilling rigs would be staffed by crews containing a total of 52 to 67 workers on three 8-hour shifts. These crews would be leased by Union and likely would consist of personnel already engaged in offshore drilling activities in the Santa Barbara Channel. These crews are accustomed to being moved about in the area as their drilling assignments change. No new population growth or housing demand would result in Ventura County as a direct consequence of the drilling activity for the Repetto Formation.

Utilities: Impacts on utilities would be the same as those discussed for Platform Gina drilling (Section 4.7.1.2.1), with the exception of electrical demand. Electrical requirements would amount to 3,500 KVA. This requirement could be supplied by SCE without significant impact (Racicot, 1980).

Services: Impacts on services would be the same as those discussed for Platform Gina drilling (Section 4.7.1.2.1).

Economic Base: Impacts on the various sectors of the economic base would be identical to those discussed for Platform Gina drilling (Section 4.7.1.2.1) with the exceptions discussed below.

An estimated $72 million in local purchases of materials and services would occur over the life of the drilling program, nearly all of which would be taxable. This would result in $720,000 in new sales and use tax remissions to local governments and $3.6 million to the State of California. In addition, the drilling program would involve $16 million in payroll, most of which would be locally spent. This payroll would result in approximately $11.4 million in new disposable income in the county which, in turn, would yield about $4.27 million of new taxable retail sales. About $42,700 in new sales and use tax remissions to local governments and $213,500 to the State of California would result. Total new sales and use tax remissions to local governments would amount to about $762,700 and new revenues to the State of California would total $3,813,500. These would be moderate beneficial impacts.

The total payroll of $16 million represents 0.58 percent of County personal income (using 1976 as a base), a minor beneficial impact on the county economy.

As discussed above, new taxable retail sales in the amount of $76.27 million would result from the drilling program, an increase for the county of 4.1 percent over the 1978 annual sales tax figure of $1,858 million. This would be a significant beneficial impact on the county.

Employment: Direct employment of between 52 and 67 workers on this 54-month program would beneficially impact the employment situation in Ventura County. All of the workers, however, would be skilled in this particular field and are probably currently employed. Therefore, it is unlikely that the unemployment rolls would be reduced as a result of this project.

Monterey Formation

If commercially recoverable hydrocarbon reserves are proven during test drilling for the Monterey Formation, up to 30 wells would be developed for producing the crude oil. Drilling would be conducted within the same overall time frame as for the Repetto Formation, using the same workforce and equipment. Therefore, impacts on population and housing, utilities, services, and employment would not differ from those previously discussed for the Repetto Formation. Impacts on the Ventura County economic base also would be essentially the same, with the exceptions discussed below.

An estimated $600,000 in additional local purchases of materials and services would occur over the life of the drilling program, nearly all of which would be taxable. This would result in $6,000 in new sales and use tax remissions to local governments and $30,000 to the State of California. In addition, the drilling program would involve at least $4.5 million in new payroll, most of which would be locally spent. This payroll would result in approximately $3.2 million in new disposable income in the county which, in turn, would yield about $1.2 million of new taxable retail sales. About $12,000 in new sales and use tax remissions to local governments and $60,000 to the State of California would result. Total new sales and use tax remissions to local governments would amount to about $18,000, and new revenues to the State of California would be $90,000.

The total payroll of $4.5 million represents 0.16 percent of county personal income (using 1976 as a base), a minor beneficial impact on the county economy.

As discussed above, new Ventura County taxable retail sales in the amount of $1.8 million would result from the drilling program, an increase for the county of 0.1 percent over the 1978 annual sales tax figure of $1,858 million. This would be a minor beneficial impact on the county.

4.7.1.2.3 Total Impact

Population and Housing

Drilling activities would employ, during the peak period when both platforms are in the drilling phase, between 82 and 112 workers. The crews utilized would be leased by Union and would likely consist of personnel already engaged in offshore drilling activities in the Santa Barbara Channel. No new population growth or housing demand in Ventura County would be expected as a direct consequence of employment of these crews or other activities during the drilling phase.

Utilities: Drilling activities would impose a total electrical demand of approximately 5,000 KVA. This requirement would be supplied by SCE via submarine power cables to the platforms. The utility company indicates that it could meet this demand without significant impact (Racicot, 1980).

No purchased natural gas would be consumed on the platforms during drilling.

Fresh water requirements during drilling would be met by purchasing water from a local supplier and transporting it to the platforms by supply boat. Local municipal water systems would not be significantly impacted.

The platforms would house small, packaged sewage treatment units which would be used to treat sanitary wastes on the platforms prior to ocean discharge. Local municipal sanitary sewers would not be impacted by the drilling phase.

All other liquid and solid wastes would be collected and sent onshore to the treating facility (oily wastewater) or an approved dumpsite. The 400 pounds (182 kg) per day of general refuse would not significantly affect local dumpsite capacities.

SERVICES

The platforms would be outside the jurisdiction of local police departments. Therefore, there would be no impact on police services.

Fire prevention, detection, and suppression at the platforms would be the responsibility of Union. No impact on local fire departments in Ventura County is anticipated.

Drilling crew personnel on the platforms would not be likely to permanently relocate their residences as a direct result of the drilling programs. Therefore, local schools are not expected to be impacted.

Emergency medical care may be required during the drilling phase, which would necessitate removal of personnel to a local onshore emergency treatment facility. If an injury or an illness at the platforms requires immediate treatment, helicopter service could be provided to either St. John's Hospital in Oxnard or General Hospital of Ventura, where adequate space exists for helicopter landing (Mills, 1980).

ECONOMIC BASE

Drilling at the two platforms would have no significant effect on the agricultural industry or manufacturing base of Ventura County.

Drilling at both platforms would occur entirely outside the boundaries of Ventura County; therefore, no new property tax revenues would accrue to the taxing jurisdictions in the county as a direct result of this project phase.

In the category of sales and use tax revenues, a direct beneficial impact would result from two categories of expenditures: (1) local purchases of materials and services; and, (2) local spending. In the first category, Union estimates that $82.5 million in local purchases of materials and services would occur, nearly all of which would be taxable. This would result in $825,000 in new sales and use tax remissions to local governments and $4.125 million to the State of California. In the second category, Union estimates that drilling would involve $22.5 million in payroll, most of which would be locally spent. This payroll would result in about $16 million in new disposable income in the county which, in turn, would yield about $6 million of new taxable retail sales. About $60,000 in new sales and use tax remissions to local governments and $300,000 to the State of California would result. Total new sales and use tax remissions to local governments would amount to about $885,000, and new revenues to the State of California would total $4.425 million. These would be moderate beneficial impacts.

Under normal operating circumstances, drilling would not affect commercial fishing activities to any measurable degree.

The Port of Hueneme would experience a minor beneficial impact because the crew and supply boats would operate out of the port on a regular basis and use port facilities.

The total payroll of $22.5 million for drilling activities at both platforms represents 0.81 percent of county personal income (using 1976 as a base), a moderate beneficial impact.

As discussed previously, drilling activities would result in new taxable retail sales of about $88.5 million, an increase for the county of 4.8 percent (using 1978 as a base). This would be a moderate beneficial impact.

EMPLOYMENT

Direct employment of between 82 and 112 persons during the peak period of the drilling programs for both platforms would beneficially impact the employment situation in Ventura County. All of the workers, however, would be skilled in this particular field and probably are currently employed. Therefore, it is unlikely that the unemployment rolls would be reduced.

4.7.1.3 Production

4.7.1.3.1 Platforms

PLATFORM GINA

Population and Housing

Production activities on Platform Gina would require 2 fulltime personnel per shift on a three shift per day basis. In addition, Union indicates that a service crew of up to 15 persons would perform maintenance, repair, and support activities at the platform for the equivalent of one month per year (15 man-months). Union further indicates that the source of these personnel would be the local Ventura County labor market. No new workers would likely be imported from outside the county. Because personnel would be residents of the area, no new Ventura County population growth or housing demand would be anticipated as a result of production activities at the platform.

Utilities

Electrical demand would amount to an estimated 500 KVA. This requirement would be supplied by SCE through the submarine power cable. The utility company indicates that it could meet this demand without significant impact (Racicot, 1980).

No purchased natural gas would be required during production.

The fresh water requirement of approximately 100 gallons (380 L) per day would be supplied by a commercial service and transported to the platform by the supply boat. Local municipal water systems would not be impacted.

The platform would house a small, packaged sewage treatment unit which would be used to treat sanitary sewage on the platform prior to ocean discharge. Local municipal sanitary sewers would not be impacted.

Solids from the sewage treatment units, as well as general refuse, would be collected and sent to shore by boat for disposal at an approved dumpsite. The small volume of waste anticipated would not impact the capacities at local dumpsites in Ventura County.

Services

The platform would be outside the jurisdiction of local police departments. Therefore, no impact on these services is anticipated.

Fire prevention, detection, and suppression at the platform would be the responsibility of Union. No impact on the local fire departments in Ventura County is anticipated.

Production personnel on Platform Gina are expected to be Ventura County residents and would not be likely to permanently relocate their residences. Therefore, local schools are not expected to be impacted.

Emergency medical care may be required during the production phase, which would necessitate personnel removal to a local onshore emergency treatment facility. If an injury or an illness at the platform requires immediate treatment, helicopter service could be provided to either St. John's Hospital in Oxnard or General Hospital of Ventura, where adequate space exists for helicopter landing (Mills, 1980).

Economic Base

Production at Platform Gina would have no direct impact on the agricultural industry or manufacturing base of Ventura County.

The platform would be situated entirely outside the taxing jurisdiction of Ventura County; therefore, no new property tax revenues would accrue to the taxing agencies in the county.

In the category of sales and use tax revenues, a small beneficial impact would result from the local purchase of materials and services. Union estimates that about $5.6 million would be spent locally over the 18-year platform lifetime (approximately $310,000 per year), nearly all of which would be taxable. In addition, the production payroll would amount to an estimated $1.7 million over the 18-year lifetime, which would result in about $1.2 million in new disposable income and $450,000 in taxable retail sales. Spread over the 18-year lifetime of the platform, this would amount to $25,000 per year of new taxable retail sales. The total new taxable retail sales resulting directly from activities on Platform Gina would therefore be about $335,000. This would result in $3,350 of new sales and use tax remissions annually to local governments in Ventura County and $16,750 in annual revenue to the State of California. Both of these impacts would be considered insignificant, but beneficial.

Royalties would accrue to the U.S. government pursuant to the terms of the federal lease. The lease covering Platform Gina provides for the payment to the government of a royalty equal to 1/6 of the value of production. The value is based on the officially posted price of the product (according to its gravity) at the location nearest the lease (Adams, 1980). Based on the current uncontrolled price of crude oil of similar gravity at other Union operation locations and prevailing prices for natural gas, production from Platform Gina could be valued at:

Crude Oil - $25 per bbl
Gas - $2 per thousand standard cubic feet (MSCF)

Platform Gina's expected production over the 18-year field lifetime would be 9.53 million bbl (1.5 million m^3) of oil and 1.72 billion SCF (0.05 billion m^3) of gas. Royalties could total $40.3 million over the 18 years, based on the above figures.

The production phase would not significantly impact commercial fishing.

The Port of Hueneme would experience a minor beneficial impact because the crew and supply boats would operate out of the port on a regular basis and use port facilities.

The total payroll of $1.7 million for 18 years of production activities ($94,400 per year) represents an insignificant impact on county personal income.

As discussed previously, production activities would result in new taxable retail sales of about $335,000 per year, an increase for the county of 0.02 percent (using 1978 as a base). This would be an insignificant beneficial impact.

Employment

Direct employment of 2 fulltime persons per shift for the 18-year production lifetime would beneficially impact the employment situation in Ventura County, but not to any measurable degree.

PLATFORM GILDA

Population and Housing

Production activities on Platform Gilda would require 3 fulltime production personnel per shift on a three shifts per day basis. All other employment factors would be identical to those discussed above for Platform Gina. No new population growth or housing demand would be anticipated in Ventura County as a result of production activites on Platform Gilda.

Utilities

Electrical demand during production would amount to an estimated 2,000 KVA. SCE indicates that it could meet this demand without significant impact (Racicot, 1980).

An estimated 400,000 SCF per day of natural gas would be required during production if the Monterey Formation is developed. Natural gas produced at the platform would be utilized to meet this requirement. No adverse impact on local supplies or distribution modes would occur.

The fresh water requirement of approximately 8 to 10 bbl (1.3 to 1.6 m^3) per day would be supplied by a commercial service and transported to the platform by supply boat. Local municipal water systems would not be impacted.

Liquid sanitary wastes would be handled in a manner identical to that discussed for Platform Gina. No impacts on local municipal sanitary sewer systems would be anticipated.

Solid wastes would be removed from the platform and disposed of at an approved onshore dumpsite. As previously discussed for Platform Gina, no impact on local dumpsites would be anticipated.

Services

The impacts on local services that would result from production operations at Platform Gilda would be identical to those previously discussed for Platform Gina.

Economic Base

Production at Platform Gilda would have no direct impact on the agricultural industry or manufacturing base of Ventura County.

The platform would be situated entirely outside the taxing jurisdiction of Ventura County; therefore, no new property tax revenues would accrue to the taxing agencies in the county.

In the category of sales and use tax revenues, a small beneficial impact would result from the local purchase of materials and services. Union estimates that about $34 million would be spent locally over the 20-year platform lifetime (approximately $1.7 million per year), nearly all of which would be taxable. In addition, the production payroll would amount to an estimated $16.3 million over the 20-year lifetime, which would result in about $11.6 million in new disposable income and $4.4 million in taxable retail sales. Spread over the 20-year lifetime of the platform, this would amount to

$220,000 per year of new taxable retail sales. The total new taxable retail sales resulting directly from activities on Platform Gilda would be about $1.92 million. This would result in $19,200 of new sales and use tax remissions annually to local governments in Ventura County and $96,000 in annual revenue to the State of California. Both of these impacts would be considered insignificant, but beneficial.

On the federal level, royalties would accrue to the U.S. government pursuant to the terms of the federal lease. The lease covering Platform Gilda provides for the payment to the government of a royalty equal to 1/6 of the value of production. Platform Gilda's expected production over the 20-year field lifetime would be 43 million bbl (6.8 million m^3) of oil and 40 billion SCF (1.1 billion m^3) of gas. Royalties could total approximately $120.8 million over the 20 years, based on the above figures.

The production phase would not significantly impact commercial fishing.

The Port of Hueneme would experience a minor beneficial impact because the crew and supply boats would operate out of the port on a regular basis and use port facilities.

The total payroll of $16.3 million for 20 years of production ($815,000 per year) represents an insignificant impact on county personal income.

Production activities would result in new taxable retail sales of about $1.92 million annually, an increase for the county of 0.1 percent (using 1978 as a base). This would be a minor beneficial impact.

Employment

Direct employment of 3 fulltime persons per shift over the 20-year production lifetime would beneficially impact the employment situation in Ventura County, but not to any significant degree.

4.7.1.3.2 Offshore Pipelines

PLATFORM GINA

During the production phase, operation of the Platform Gina offshore pipeline system would not require any fulltime personnel or provision of utility services (e.g., electricity, natural gas, potable water). Therefore, no impacts are anticipated on population and housing, utilities, services, and employment. Economic base impacts would not be expected, except as discussed below.

The pipelines, to the extent that they lie within the 3-mile (5.6-km) limit from the shoreline, would be subject to assessment by the County of Ventura and to property taxes on the completed value as of the assessment date. Beginning with the March 1, 1981 assessment date and the ensuing 1981-1982 fiscal year, revenues would accrue to the various taxing authorities in Ventura County. Of the total 6.5-mile (10.4-km) offshore length of the pipelines from Platform Gina, an estimated 6.2 miles (9.9-km) (about 95.4 percent) of length would be within the 3-mile (5.6-km) jurisdiction. Applying the percentage length to the estimated pipeline value upon completion ($2 million) would result in a value for tax purposes of approximately $1.9 million. At a tax rate equivalent to 1 percent of value (exclusive of bonded indebtedness), the first-year property tax revenues accruing to the local taxing agencies would be $19,000. This figure excludes any taxes on the possessory interest held by Union in the state-owned pipeline right-of-way.

The State of California would receive revenues from the lease of the pipeline right-of-way. The California Administrative Code provides for three methods of calculation of lease payments:

(1) The conventional approach which requires an appraisal of the market value of the right-of-way; the lessee is charged an annual fee or rent of 8 percent of the appraised value.

(2) Application of a formula as follows:
$.015 per diameter-inch of pipeline per lineal foot of pipeline per year.

(3) The volumetric rental approach which equates rental charges to the volume passing through the subject pipeline. This is a negotiable figure based on such factors as the price in the market place charged by private pipeline companies, the portion of the total pipeline run which is located on state lands, and the unit market value of the product carried in the pipeline.

Any or all of the three approaches may be considered by the state when finally negotiating fees (Grimes, 1980). Therefore, no estimate currently can be made regarding the state revenues which might accrue as a result of this portion of the project.

In the category of sales and use tax revenues, a small beneficial impact would result from the local purchases resulting from project payrolls and procurement of materials and services. Over the 18-year lifetime, this is expected to amount to approximately $230,000, or about $12,800 per year in taxable retail sales. This would be an insignificant impact on sales and use tax revenues.

The total labor expenditure for periodic pipeline maintenance over the 18-year lifetime of Platform Gina would amount to an estimated $100,000 (about $5,600 per year), an insignificant impact on county personal income.

New taxable retail sales related to offshore pielines would amount to approximately $12,800 per year, due principally to the local purchase of maintenance materials and services. This would be an insignificant impact on county taxable retail sales.

PLATFORM GILDA

During the production phase, operation of the Platform Gilda offshore system would not require any fulltime personnel or provision of utility servies (e.g., electricity, natural gas, potable water). Therefore, no impacts are anticipated on population and housing, utilities, services, and employment. Economic base impacts would not be expected, except as discussed below.

As discussed for the Platform Gina offshore pipelines, the Platform Gilda pipelines would be subject to assessment by the County of Ventura and to property tax levies. Of the total 9.9-mile (15.8-km) offshore length of the Platform Gilda pipeline, approximately 3 miles (5.6 km) (about 30.3 percent) would be within county jurisdiction. At a total completed value of $4 million, the value subject to taxation would be about $1.2 million. At a tax rate equivalent to 1 percent of value (exclusive of bonded indebtedness), the first-year tax revenues accruing to the local taxing agencies would be $12,000. This figure excludes any taxes on the possessory interest held by Union in the state-owned pipeline right-of-way.

State of California revenues would be derived on the basis of the alternative methods previously discussed for the Platform Gina offshore pipelines. An estimate of the magnitude of these revenues cannot be made until the state determines the final leasing arrangement for a right-of-way.

In the category of sales and use tax revenues, a small beneficial impact would result from the local purchases related to payrolls and procurement of materials and services. Over the 20-year lifetime of Platform Gilda, this would amount to approximately $750,000, or about $37,500 per year, in new taxable retail sales. This would be an insignificant impact on sales and tax revenue.

The total labor expenditure for periodic pipeline maintenance over the 20-year lifetime of Platform Gilda would amount to an estimated $400,000, or about $20,000 per year. This would be an insignificant impact on county personal income.

New taxable retail sales resulting from the project, amounting to an estimated $37,500 per year, would be an insignificant impact on county taxable retail sales.

4.7.1.3.3 Onshore Treating Facility

POPULATION AND HOUSING

The onshore treating facility is designed to operate untended. Personnel requirements would consist solely of support to normal maintenance activities. No additional population growth or housing demand would be created by the operation of the treating facility.

UTILITIES

Electrical requirements during production would be approximately 500 KVA, which includes the electrical demand associated with operating the onshore pipeline system. SCE indicates that it could meet the demand without significant impact (Racicot, 1980).

Natural gas produced from the platforms would be utilized to meet gas needs at the treating facility. No adverse impact on local gas supplies or distribution modes would result.

Potable water sufficient to meet the occasional maintenance needs would be supplied by a bottled water distributor. Local municipal water systems would not be impacted.

The Oxnard Fire Department would require a minimum water flow of 2,000 gallons (7,600 L) per minute at the treating facility for fire protection. The existing 8-inch main in Harbor Boulevard would provide 16,000 gallons (60,800 L) per minute at 65 pounds of pressure, sufficient to satisfy the fire department requirement (Perez, 1980). Utilization of this service, however, would require detachment from the Colonia Municipal Water District and concurrent annexation to both the Metropolitan Water District and the Calleguas Municipal Water District. This would necessitate a letter application to the Calleguas District requesting such concurrent annexation by either the County of Ventura (who holds title to the land) or Union (Berry, 1980).

Portable chemical toilets would be available at the treating facility. The contents would be emptied at regular intervals by a licensed contractor, and the contents disposed of by methods approved by local regulatory agencies. Local sanitary sewer facilities would not be impacted.

General refuse would be periodically disposed of at an approved local dumpsite, which would not be impacted by the small quantities of refuse anticipated. Oily wastes would be disposed of at a Class I disposal site or any other site permitted by the Regional Water Quality Control Board to accept such wastes.

SERVICES

The treating facility site would be within the jurisdiction of the Oxnard Police Department. The department states that no additional personnel or equipment would be required because of this facility.

The Oxnard Fire Department is responsible for protective support in the Mandalay area. The treating facility would not significantly impact the Fire Department, provided that certain protective measures are undertaken in the design and construction of the facility. These measures are presently being studied and worked out jointly by the Oxnard Fire Department and Union. Among the items which are under consideration, but which may or may not be implemented, depending on studies now underway, are:

(1) Installation of onsite and perimeter fire hydrants, no more than 300 feet (91.4 m) apart.

(2) Installation of fixed deluge guns on the two 3,000-barrel (477-m^3) tanks for cooling down a tank(s) not involved in a fire.

(3) Installation of automatic foam systems where necessary.

(4) Location of the 3,000-bbl (477-m^3) tanks a distance from the property line equal to the diameter of the tanks.

(5) Installation of fire sprinkler systems in structures, as determined by the fire protection engineer.

(6) Provision of at least two access points to the facility site, each served by an allweather road at least 25 feet (3.6 m) in width and capable of handling the gross vehicle weight of the city's fire equipment.

(7) A water flow at the hydrants of at least 2,000 gallons (7,600 L) per minute (water availability is addressed in the preceding discussion of Services).

The Fire Department reports that with adequate fire detection systems, together with the above items, no additional personnel or equipment would be required by the department as a result of the operation of the treating facility. The department would be impacted in that it would be: (1) required to maintain a state of readiness in anticipation of a call for fire suppression; and, (2) responsible for periodically inspecting the facility and acquainting its personnel with the facility and its equipment (Perez, 1980). The first response to the treating facility, in the event of an emergency would consist of three engine companies and one truck company, with a total complement of 13 personnel.

Because no new population growth would be expected to result from facility operation, no impact on schools would be anticipated.

Due to the fact that the facility would operate unattended, it would be unlikely that any demands would be placed on the health care delivery systems in Ventura County. In the event emergency care would be required, St. John's Hospital in Oxnard would furnish 24-hour treatment capability. No impact on health care would be anticipated.

ECONOMIC BASE

Treating facility operation would have no direct impact on the agricultural or manufacturing base of Ventura County.

The treating facility site is within the County of Ventura's Tax Rate Area 3148, which possesses an overall tax rate of $4.2474 per $100 of Assessed Valuation, broken down as follows:

Category	Rate Per $100 of Assessed Valuation
Maximum 1 percent Tax	$4.0000
Bonded Indebtedness:	
High School Bond #2-Oxnard	.0664
Ventura Community College Bond	.0268
Elementary School Bond #2-Oxnard	.1276
United Water Conservation Bond	.0266
Total Rate	$4.2474

Source: County of Ventura, 1979.

The estimated value of the treating facility upon completion would be $6 million, exclusive of the value of Union's possessory interest in the land, which would be leased from the County of Ventura. Using the 25 percent assessed valuation ratio, property taxes for the first year would be approximately $63,700, which would be divided among the various taxing authorities. Based on the project schedule, the first tax year would be the 1981-1982 fiscal year.

In the category of sales and use taxes, a small direct beneficial impact would be experienced as a result of: (1) local purchases of materials and services; and, (2) local spending by maintenance employees who would derive a portion of their income from working at the treating facility. In the first case, Union estimates that $4 million in local purchases would occur over the 20-year life of the facility, or $200,000 per year of taxable retail sales. In the second category, a total of approximately $540,000 in new taxable retail sales would result, or about $27,000 per year. The total of $227,000 of new taxable retail sales annually would result in $2,270 of new revenues for local jurisdictions and $11,350 for the State of California. This would be an insignificant impact.

The County of Ventura would receive compensation for the lease of approximately 1.8 acres (0.73 ha) to Union. Final negotiations regarding the exact amount have not yet been completed.

Union estimates that approximately $100,000 annually in payroll would be expended for maintenance activities over the 20-year life of the facility. This would have a negligible impact on personal income in Ventura County.

As discussed previously, taxable retail sales would be expected to increase by $227,000 annually as a result of the operation of the treating facility. This would be a minor impact within Ventura County.

EMPLOYMENT

Except for occasional maintenance activities, the treating facility would operate untended. No measurable impact on the employment level of Ventura County would be expected.

4.7.1.3.4 Onshore Pipelines

POPULATION AND HOUSING

Fulltime personnel would not be required during production to operate or maintain the onshore pipeline system (maintenance and inspection would be conducted periodically, as necessary). Therefore, there would be no new population growth or housing demand resulting from pipeline operation.

UTILITIES

No utility services would be required during production for pipeline operation. All electrical demands associated with pumping products through the onshore pipelines are included as part of the requirements at the treating facilty. Therefore, no impacts on municipal utility services would result.

SERVICES

The pipeline route would be within the jurisdiction of three agencies--the Oxnard Police Department, the City of Ventura Police Department, and the Ventura County Sheriff's Department. These departments state that operation of the pipeline would not adversely affect their operations (Egan, 1980; Askay, 1980; Seery, 1980).

Fire department support along the pipeline route would be furnished by three agencies--the Oxnard Fire Department, the City of Ventura Fire Department, and the Ventura County Fire Department. These departments state that pipeline operation would not cause an adverse impact on their departments (Perez, 1980; Zamazanuk, 1980; Bogardus, 1980).

Because no population growth or relocation is anticipated as a result of pipeline operation, local schools would not be impacted.

Due to the fact that pipeline operations would require no operating personnel, it would be unikely that any demands would be placed on the health care delivery sytems in Ventura County. In the event emergency care would be required, St. John's Hospital in Oxnard would furnish 24-hour treatment capability. No impact on health care would be anticipated.

ECONOMIC BASE

Operation of the onshore pipeline system would have no impact on the agricultural or manufacturing base of Ventura County.

The 2.9-mile (4.7-km)-long onshore pipeline system would traverse many tax code areas and would be subject to property taxes levied by the various taxing agencies. The estimated total value of the onshore pipeline system would be approximately $500,000. At a tax rate equivalent to 1 percent of value (exclusive of bonded indebtedness), the first-year property tax revenues accruing to the local agencies would be $5,000, an insignificant beneficial impact. This figure excludes any taxes on the possessory interest held by Union in the pipeline right-of-way on public land.

In the category of sales and use taxes, a small beneficial impact would result from the local expenditures by Union for maintenance materials, services, and payroll. Over the 20-year project life, Union estimates that $100,000 would be spent for purchased materials and services, all of which likely would be spent locally. This would translate to $5,000 per year of taxable sales. This would amount to only $50 of local revenues and $250 of new revenues to the State of California, an insignificant impact. Furthermore, Union projects an annual expenditure of $5,000 for maintenance labor. This would result in about $1,300 in new taxable retail sales and $13 in new local revenues, an insignificant impact.

The $5,000 per year in local payroll resulting from operation of the onshore pipeline system would be an insignificant impact on personal income in Ventura County. New taxable retail sales resulting from pipeline operation would be about $6,300 annually, an insignificant impact in Ventura County.

EMPLOYMENT

No new fulltime employment would result from onshore pipeline operation. No impact on the employment levels in Ventura County would be anticipated.

4.7.1.3.5 Total Impact

POPULATION AND HOUSING

The only elements of the proposed project which would require the employment of fulltime personnel solely assigned to the project would be the platforms. An estimated 5 fulltime persons per shift would be employed on a three-shift basis, for a total of 15 persons. These persons would commute on a daily basis to the platforms via crew boats based in Port Hueneme. Union further indicates that a 15-person service crew also would be assigned on the equivalent of one month per year per platform to perform maintenance, repair, and support functions. Both the 15 fulltime and the maintenance personnel would be residents of the area; no importation of persons or families exclusively for this project would be expected. Therefore, no impact on population growth or housing demand is anticipated.

UTILITIES

Total electrical demand by all project elements during production would amount to a maximum of an estimated 3,000 KVA. SCE indicates that it could meet this requirement without significant impact (Racicot, 1980).

Natural gas would be required at Platform Gilda to operate gas turbine compressors if the Monterey Formation is developed, and at the treating facility to separate oil/water and gas. The source of this gas would be production from the two platforms. No impact on local gas supplies or distribution systems would result.

Potable water requirements at the platforms would be met by supplying bottled water on a daily basis via the supply boat. The onshore treating facility would be supplied with bottled water from a local supplier. Municipal water systems would not be impacted.

The Oxnard Fire Department would require that an adequate water supply be available at the onshore treating facility for fire protection purposes. A minimum flow of 2,000 gallons (7,600 L) per minute would be required and is available at the 8-inch main in Harbor Boulevard (Perez, 1980). Utilization of this service would require detachment from the Colonia Municipal Water District and concurrent annexation to both the Metropolitan Water District and the Calleguas Municipal Water District. Either the County of Ventura (holder of title to the land) or Union would begin the annexation process with a letter application to the Calleguas District (Berry, 1980).

Sanitary sewage at the platforms would be treated in small, packaged sewage treatment units. Treated wastes would be discharged to the ocean. At the onshore treating facility, portable chemical toilets would be used, supplied by a local contractor. Local municipal sanitary sewers would not be impacted by the production phase of the project.

Solids from the sewage treatment units and general refuse generated on the platforms would be collected and sent to shore by boat for disposal at an approved dumpsite. Similarly, general refuse from the treating facility would also be disposed of at a local dumpsite. Oily wastes from the treating facility would be taken to a Class I disposal site or any other site permitted by the Regional Water Quality Control Board to accept such wastes. No measurable impact on either type of disposal site is expected to occur as a result of production operations.

SERVICES

The onshore facilities would be within the jurisdiction of the Oxnard Police Department, the City of Ventura Police Department, and the Ventura County Sheriff's Department. These departments state that operation of the particular project elements within their respective jurisdictions would not significantly impact their operations (Egan, 1980; Askay, 1980; Seery, 1980).

Fire department support to onshore project facilities would be furnished by three agencies--the Oxnard Fire Department, the City of Ventura Fire Department, and the Ventura County Fire Department. All three departments indicate that pipeline operations would not adversely impact their operations (Perez, 1980; Zamazanuk, 1980; Bogardus, 1980). The treating facility would be situated within the jurisdiction of the Oxnard Fire Department. The department indicates that operation of the facility would not significantly impact their operations, provided that certain protective measures are undertaken in the design and construction of the facility.

Because no new population growth or relocation would be expected to result from operation of the project, no impact on schools would be anticipated.

Emergency medical care may be required during the production phase of the project. If an injury or illness at the platform sites requires immediate treatment, helicopter service could be provided to either St. John's Hospital in Oxnard or General Hospital of Ventura, where adequate space exists for helicopter landing (Mills, 1980). In the event that emergency care would be required at onshore facilities, ambulance service is available in the area. The expected impact on local emergency treatment facilities would be negligible (Mills, 1979 and 1980).

ECONOMIC BASE

The production phase would have no direct impact on the agricultural industry or manufacturing base of Ventura County.

New property tax revenues would be expected to accrue to the various taxing jurisdictions within Ventura County as follows:

Project Element	First-Year Tax Revenues (Fiscal year 1981-82) Basic 1 Percent Tax	Bonded Indebtedness
Platforms	(None - Outside Ventura Co. jurisdiction)	
Offshore Pipelines (within 3-mile (5.6-km) limit)	$31,000	Not Available
Treating Facility	60,000	$3,700
Onshore Pipelines	5,000	Not Available
Total	$96,000	$3,700

The above figures exclude any taxes which would be levied on the possessory interest Union would hold in the ground lease for the treating facility or the pipeline rights-of-way (both offshore and onshore). The expected annual property taxes would not significantly impact government revenues in Ventura County.

In the category of sales and use taxes, an estimated $25,400 of new revenues would accrue annually to local jurisdictions, principally the cities of Oxnard, Port Hueneme, and Ventura, as well as the County of Ventura. This would be a result of the local purchase of materials and services by Union and of expenditures by persons receiving payroll dollars for work on the project. In addition, the share of sales and use tax revenue to the State of California would be approximately $127,000 annually.

The County of Ventura would receive compensation for the lease of approximately 1.8 acres (0.73 ha) of land to Union; the final amount has not yet been negotiated.

The State of California would receive revenues from the lease of the offshore pipeline rights-of-way that traverse state lands. The California Administrative Code provides for three alternative methods of revenue determination. The specific method that would apply to the proposed project has not yet been determined.

Royalties would accrue to the U.S. government pursuant to the terms of the applicable federal leases, which provide for the payment to the government of a royalty equal to 1/6 of the value of production (Adams, 1980). Assuming a valuation of $25 per bbl for crude oil and $2 per MSCF for gas, then revenues to the government over the life of the project would be approximately $232.8 million.

Production activities would have no significant effect on commercial fishing activites.

The crew and supply boats used to shuttle personnel and supplies between the platforms and shore would be based in the Port of Hueneme. Use of port facilities would result in a small beneficial impact on the port.

An estimated $20.6 million in new payroll expenditures would result from the production phase of this project, or slightly in excess of $1 million per year. This would represent an increase of approximately 0.04 percent of total Ventura County personal income (using 1976 as a base), an insignificant impact.

The new taxable retail sales that would result from project operation are estimated at approximately $2.54 million annually, or approximately 0.14 percent of total Ventura County taxable retail sales in 1978. This would represent a minor beneficial impact.

EMPLOYMENT

Operation of the project would require the employment of approximately 15 fulltime persons on the platforms and would contribute to the employment of maintenance personnel servicing the various project elements. The project would have no measurable impact on county employment levels.

4.7.2 East Mandalay Alternative Configuration

4.7.2.1 Construction

Impacts associated with construction activities for the East Mandalay alternative configuration would be the same as discussed for the proposed Mandalay configuration (Section 4.7.1.1).

4.7.2.2 Drilling

Impacts associated with drilling activities for the East Mandalay alternative configuration would be the same as discussed for the proposed Mandalay configuration (Section 4.7.1.2).

4.7.2.3 Production

Impacts associated with production activities for the East Mandalay alternative configuration would be the same as discussed for the proposed Mandalay configuration (Section 4.7.1.3), with the exception of property tax revenues for the onshore treating facility. The latter is discussed below.

The onshore treating facility would be within the County of Ventura's Tax Rate Area 3040, which possesses an overall tax rate of $4.4921 per $100 of Assessed Valuation, broken down as follows:

Category	Rate Per $100 of Assessed Valuation
Maximum 1 percent tax	$4.0000
Bonded Indebtedness:	
High School Bond #2-Oxnard	.0664
Ventura Community College Bond	.0268
Metropolitan Water Anx #4	.1500
City of Oxnard District #1	.0947
Elementary School Bond #2-Oxnard	.1276
United Water Conservation Bond	.0266
Total Rate	$4.4921

Source: County of Ventura, 1979.

The estimated value of the treating facility upon completion would be $6 million. Using the 25 percent assessed valuation ratio, property taxes for the first year would be approximately $67,400, which would be divided among the various taxing authorities. The first tax year would be fiscal year 1981-1982.

The total property taxes that would be collected for the East Mandalay alternative configuration in the first fiscal year would be $103,400, exclusive of taxes on possessory interests. These taxes would be for the onshore treating facility, onshore pipeline system, and those portions of the offshore pipeline systems within Ventura County taxing jurisdiction.

4.7.3 Union Oil Marine Terminal Alternative Configuration

4.7.3.1 Construction

4.7.3.1.1 Platforms

Impacts associated with construction of Platforms Gina and Gilda for the Union Oil Marine Terminal alternative configuration would be the same as discussed for the proposed Mandalay configuration (Section 4.7.1.1.1).

4.7.3.1.2 Offshore Pipelines and Power Cables

Impacts associated with construction of the Platform Gina and Platform Gilda offshore pipelines/power cables for the Union Oil Marine Terminal alternative configuration would be the same as discussed for the proposed Mandalay configuration (Section 4.7.1.1.2).

4.7.3.1.3 Onshore Treating Facility

POPULATION AND HOUSING

Population and housing impacts would be identical to those discussed for the proposed Mandalay configuration (Section 4.7.1.1.3).

UTILITIES

Impacts on local utilities during construction would be identical to those discussed for the proposed Mandalay configuration (Section 4.7.1.1.3).

SERVICES

The Union Oil Marine Terminal alternative treating facility site would be within the policing jurisdiction of the Ventura Police Department. The department states that facility construction would have a negligible impact on police services (Askay, 1980).

The City of Ventura Fire Department would be responsible for protective support to the Union Oil Marine Terminal alternative treating facility site. Construction of the treating facility would not significantly impact the fire department. Normal fire safety practices and facilities would be required of the construction contractor by the department (Bogardus, 1980).

All construction personnel would be derived from existing labor pools in the area. No new permanent residents of Ventura County are expected to result from the construction phase. Therefore, no impact on schools is anticipated.

Emergency health care may be required during construction. Ambulance service is available in the area. Emergency cases would be transported to either St. John's Hospital in Oxnard or to the General Hospital of Ventura, both of which possess 24-hour emergency treatment facilities. The impact on local hospitals and ambulance services would be negligible (Mills, 1979 and 1980).

ECONOMIC BASE

Impacts on the economic base resulting from construction of the treating facility would be identical to those discussed for the proposed Mandalay configuration (Section 4.7.1.1.3).

EMPLOYMENT

Construction phase impacts on employment would be the same as those discussed for the proposed Mandalay configuration (Section 4.7.1.1.3).

4.7.3.1.4 Onshore Pipelines

POPULATION AND HOUSING

Population and housing impacts resulting from onshore pipeline and booster station construction would be identical to those discussed for the proposed

Mandalay configuration (Section 4.7.1.1.4). However, the duration of construction would be 28 weeks rather than the 4 weeks anticipated for the proposed Mandalay configuration.

UTILITIES

Impacts on utilities during construction would be the same as those discussed discussed for the proposed Mandalay configuration (Section 4.7.1.1.4).

SERVICES

Impacts on services during construction would be the same as those discussed for the proposed Mandalay configuration (Section 4.7.1.1.4).

ECONOMIC BASE

Construction of the onshore pipeline system would have no direct impact on the agricultural industry or manufacturing base of Ventura County.

Facilities under construction are subject to assessment by the County of Ventura and to property taxes on the completed value as of the March 1 assessment date. The project schedule, however, indicates that all construction would be completed prior to the March 1, 1981 assessment date and the pipeline system would be operational at that time. Therefore, property tax revenues would not accrue to the various taxing jurisdictions during the construction period.

In the area of sales and use tax revenues, a direct beneficial impact would result from two categories of expenditures: (1) local purchases of materials and services; and, (2) local spending. In the first instance, Union estimates that $4.9 million in local purchases of materials and services would occur during the construction phase, all of which would be taxable. This would result in $49,000 in new sales and use tax remissions to local governments. In the second category, Union estimates that construction activities would involve $5.7 million in payroll, of which at least $5.13 million would be paid to local Ventura County residents. This local payroll would result in about $3.65 million in new disposable income in the county. This would yield about $1.37 million of new taxable retail sales, and $13,700 in new sales and use tax remissions to local governments. Total new sales and use tax revenues to local governments would amount to about $62,700 as a direct result of the construction program. New state revenues from sales and use taxes would be approximately $313,500 during the construction program.

The estimated total payroll for construction of the onshore pipelines is $5.7 million, of which $5.13 million would accrue to Ventura County residents. This would represent an increase of about 0.2 percent in personal income in the county (using 1976 as a base), a minor beneficial impact.

As discussed previously, construction activities would result in new local taxable retail sales of about $6.27 million, an increase for the county of about 0.3 percent (using 1978 as a base). This would be a minor beneficial impact.

EMPLOYMENT

The direct employment of 105 persons for onshore pipeline and booster station construction for a period of 28 weeks would not significantly affect the unemployment situation in Ventura County.

4.7.3.1.5 Total Impact

POPULATION AND HOUSING

Population and housing impacts would be the same as those discussed for the proposed Mandalay configuration (Section 4.7.1.1.5).

UTILITIES

Impacts on utilities during construction would be identical to those discussed for the proposed Mandalay configuration (Section 4.7.1.1.5).

SERVICES

Impacts on services would be identical to those discussed for the proposed Mandalay configuration (Section 4.7.1.1.5), except as described below.

Police protection for the treating facility would be provided by the City of Ventura Police Department. All other factors defining potential impacts would remain the same as discussed for the proposed Mandalay configuration. A negligible impact on police operations would result.

Fire support for the treating facility would be the responsibility of the City of Ventura Fire Department. All other factors defining potential impacts would remain essentially the same as discussed for the proposed Mandalay configuration. Construction would not adversely impact the operations of the fire departments furnishing support for the onshore project elements, provided necessary safety practices that would be established by the fire departments are followed.

ECONOMIC BASE

Impacts on the economic base would be the same as discussed for the proposed Mandalay configuration (Section 4.7.1.1.5), except as described below.

Local purchases in Ventura County of materials and services for construction have been estimated at $13.85 million, all of which would be taxable. This would result in $138,500 of new sales and use tax remissions to local governments in the county and $692,500 to the State of California. In addition, Union estimates that construction activities would result in $10.8 million in new payroll to county residents. This excludes any payroll for construction of Platforms Gina and Gilda, where the residences of construction workers cannot be determined at this time. This local payroll would result in about $7.69 million of new disposable income in the county which, in turn, would yield an estimated $2.88 million in new taxable retail sales. New sales and use tax remissions to local governments would be $28,800 and new revenues to the State of California would be $144,000. New revenues to local governments would total $167,300 and to the State of California would total $836,500, both of which are moderate beneficial impacts.

The estimated total payroll to local residents would be $10.8 million during construction. This represents 0.4 percent of countywide personal income (using 1976 as a base), a minor beneficial impact.

As discussed previously, the new taxable retail sales resulting directly from construction would amount to $16.73 million. This represents a 0.9 percent increase in countywide taxable retail sales (using 1978 as a base), a minor to moderate beneficial impact.

EMPLOYMENT

Employment of 190 Ventura County residents at various times over a 6-month period would be a beneficial impact on county employment. Because of the short construction period, there would be no measurable effect on the unemployment rate.

4.7.3.2 Drilling

Impacts during the drilling phase for the Union Oil Marine Terminal alternative configuration would be identical to those discussed for the proposed Mandalay configuration (Section 4.7.1.2).

4.7.3.3 Production

4.7.3.3.1 Platforms

Impacts resulting from production operations at the platforms would be identical to those discussed for the proposed Mandalay configuration (Section 4.7.1.3.1).

4.7.3.3.2 Offshore Pipelines

Impacts resulting from offshore pipeline operations would be identical to those discussed for the proposed Mandalay configuration (Section 4.7.1.3.2).

4.7.3.3.3 Onshore Treating Facility

POPULATION AND HOUSING

Impacts resulting from treating facility operation would be identical to those discussed for the proposed Mandalay configuration (Section 4.7.1.3.3).

UTILITIES

Electrical requirements for treating facility operation would be approximately 820 KVA, which includes the electrical demand associated with operating the onshore pipeline system. SCE indicates that it could meet the demand without significant impact (Racicot, 1980).

Natural gas produced from the platforms would be utilized to meet gas needs at the treating facility. No adverse impact on local gas supplies or distribution modes would result.

Potable water sufficient to meet the occasional needs of maintenance personnel would be supplied by a bottled water distributor. Local municipal water systems would not be impacted. Water for fire protection purposes would be supplied by the City of Ventura from an 8-inch line in Spinnaker Drive.

Portable chemical toilets would be used at the treating facility. The contents would be emptied at regular intervals by a licensed contractor, and the contents disposed of by methods approved by local regulatory agencies. Local sanitary sewer facilities would not be impacted.

General refuse would be periodically disposed of at an approved local dumpsite, which would not be impacted by the small quantities of refuse anticipated. Oily wastes would be disposed of at a Class I disposal site or other site permitted by the Regional Water Quality Control Board to accept such wastes.

SERVICES

The treating facility site would be within the jurisdiction of the City of Ventura Police Department. The department states that no additional personnel or equipment would be required because of this facility (Askay, 1980).

The treating facility would be within the service area of the Ventura City Fire Department. The department would require the design and installation of the normal fire detection and suppression systems and equipment, including an automatic subsurface injected foam system for the storage tanks. No significant impact on the Fire Department would result from the operation of the treating facility (Bogardus, 1980).

Because no new population growth would be expected to result from treating facility operation, no impact on schools would be anticipated.

Due to the fact that the treating facility would operate unattended, it would be unlikely that any demands would be placed on the health care delivery systems in Ventura County. In the event emergency care would be required, St. John's Hospital in Oxnard or the General Hospital of Ventura would be able to receive cases on a 24-hour basis. Ambulances are available to transport cases to either location. No impact on health care would be anticipated.

ECONOMIC BASE

Impacts on all elements of the economic base would be identical to those discussed for the proposed Mandalay configuration (Section 4.7.1.3.3), with the exception of property tax revenues.

The treating facility site would be within the County of Ventura's Tax Rate Area 91003, which possesses an overall tax rate of $4.1010 per $100 of Assessed Valuation, broken down as follows:

Category	Rate Per $100 of Assessed Valuation
Maximum 1 percent tax	$4.0000
Bonded Indebtedness:	
Ventura Community College Bond	.0268
United Water Conservation Import	.0476
United Water Conservation Bond	.0266
Total Rate	$4.1010

Source: County of Ventura, 1979.

The estimated value of the treating facility and onshore pipeline system upon completion would be $21.5 million. Using the 25 percent assessed valuation ratio, property taxes for the first year would be approximately $220,400, which would be divided among the various taxing authorities. Based on the project schedule, the first tax year would be the 1981-1982 fiscal year.

EMPLOYMENT

Except for occasional maintenance activities, the treating facility would operate unattended. Therefore, no measurable effect on the employment level in Ventura County would result.

4.7.3.3.4 Onshore Pipelines

POPULATION AND HOUSING

Impacts would be identical to those discussed for the proposed Mandalay configuration (Section 4.7.1.3.4).

UTILITIES

Impacts would be identical to those discussed for the proposed Mandalay configuration (Section 4.7.1.3.4).

SERVICES

Impacts would be essentially identical to those discussed for the proposed Mandalay configuration (Section 4.7.1.3.4).

ECONOMIC BASE

Impacts on the economic base would be the same as discussed for the proposed Mandalay configuration (Section 4.7.1.3.4), except as described below.

Property tax revenues relating to the onshore pipeline system are included in the discussion for the onshore treating facility (Section 4.7.3.3.3).

In the category of sales and use taxes, a small beneficial impact would result from the local expenditures for maintenance materials, services, and payroll. Over the 20-year project life, Union estimates that $9 million would be spent for purchased materials and services, all of which likely would be spent locally. This would be equivalent to $450,000 per year of taxable sales, resulting in $4,500 of local revenues and $22,500 of new revenues to the State of California annually. Furthermore, Union projects an annual expenditure of $50,000 for maintenance labor. This would result in about

$36,000 in new taxable retail sales annually, and $360 in new local revenues and $1,800 in new revenues to the State of California annually. Total new annual revenues to local governments from sales and use taxes related to operation of the onshore pipeline system would amount to $4,860, while state revenues would increase by $24,300 per year.

An additional $50,000 per year in local payroll would result from the operation of the onshore pipelines, an insignificant impact on personal income in Ventura County.

New taxable retail sales resulting from pipeline system operation would be about $486,000 annually, an insignificant impact on taxable retail sales in Ventura County.

EMPLOYMENT

No new fulltime employment would result from onshore pipeline system operation. No impact on the employment levels in Ventura County would be anticipated.

4.7.3.3.5 Total Impact

POPULATION AND HOUSING

Impacts during production would be identical to those discussed for the proposed Mandalay configuration (Section 4.7.1.3.5).

UTILITIES

Total electrical demand by all project elements during production would amount to a maximum of an estimated 3,320 KVA. SCE indicates that it could meet this requirement without significant impact (Racicot, 1980).

Natural gas would be required at the treating facility and at Platform Gilda to operate gas turbine compressors if the Monterey Formation is developed. The source of this gas would be production from the two platforms. No impact on local gas suppliers or distribution systems would result.

Potable water requirements at the platforms would be met by supplying bottled water on a daily basis via the supply boat. The onshore treating facility would be supplied with bottled water from a local supplier. Water for fire protection at the treating facility would be supplied by the City of Ventura from an 8-inch line in Spinnaker Drive. Municipal water systems would not be impacted.

Disposal of sanitary wastes and impacts on municipal sanitary sewer systems would be the same as discussed for the proposed Mandalay configuration (Section 4.7.1.3.5).

Solid waste disposal and the related impacts would be identical to those discussed for the proposed Mandalay configuration (Section 4.7.1.3.5).

SERVICES

The onshore facilities would be within the jurisdiction of the Oxnard Police Department, the City of Ventura Police Department, and the Ventura County Sheriff's Department. These departments state that operation of the particular project elements within their respective jurisdictions would not significantly impact their operations (Egan, 1980; Askay, 1980; Seery, 1980).

Fire department support to onshore project facilities would be furnished by three agencies--the Oxnard Fire Department, the City of Ventura Fire Department, and the Ventura County Fire Department. All three departments indicate that pipeline system operations would not adversely impact their operations (Perez, 1980; Zamazanuk, 1980; Bogardus, 1980). The treating facility would be in the service area of the Ventura City Fire Department. The department would not be impacted by the operation of the facility, provided that certain fire detection and suppression systems (Section 4.7.3.3.3) were installed at the facility (Bogardus, 1980).

Because no new population growth or relocation would be expected to result from operation of the project, no impact on schools would be anticipated.

Emergency medical care may be required during the production phase of the project. If an injury or an illness at the platform sites requires immediate treatment, helicopter service could be provided to either St. John's Hospital in Oxnard or General Hospital of Ventura, where adequate space exists for helicopter landing (Mills, 1980). In the event that emergency care would be required at onshore facilities, ambulance service is available in the area. The expected impact on local emergency treatment facilities would be negligible (Mills, 1979 and 1980).

ECONOMIC BASE

Total impact on the economic base would be the same as discussed for the proposed Mandalay configuration (Section 4.7.1.3.5), except as described below.

New property tax revenues would be expected to accrue to the various taxing jurisdictions within Ventura County as follows:

	First-Year Tax Revenues (Fiscal year 1981-82)	
Project Element	Basic 1 Percent Tax	Bonded Indebtedness
Platforms	(None - Outside Ventura Co. jurisdiction)	
Offshore Pipelines (within 3-mile (5.6-km) limit)	$ 31,000	Not Available
Treating Facility	--	--
Onshore Pipelines	215,000	5,400
Total	$246,000	$5,400

The above figures exclude any taxes which would be levied on the possessory interest Union would hold in the pipeline rights-of-way both offshore and onshore. The expected annual property taxes would not significantly impact government revenues in Ventura County.

In the category of sales and use taxes, an estimated $30,200 of new revenues would accrue annually to local jurisdictions, principally the cities of Oxnard, Port Hueneme, and Ventura, as well as the County of Ventura. This would be a result of the local purchase of materials and services and expenditures of payroll dollars. In addition, the share of sales and use tax revenue to the State of California would be approximately $151,000 annually.

An estimated $21.5 million in new payroll expenditures would result from the production phase of this project, or $1.075 million per year. This would represent an increase of approximately 0.04 percent of total Ventura County personal income (using 1976 as a base), an insignificant impact.

The new taxable retail sales that would result from project operation are estimated at aproximately $3.02 million annually, or approximately 0.16 percent of total Ventura County taxable retail sales in 1978. This would represent an insignificant impact.

EMPLOYMENT

Project operation would require employment of 15 fulltime persons on the platforms, as well as employment of maintenance personnel on an intermittent basis to service the various project elements. No measurable impact on county employment levels would result.

4.7.4 Ormond Beach Alternative Configuration

4.7.4.1 Construction

4.7.4.1.1 Platforms

Impacts associated with platform construction for this alternative configuration would be identical to those discussed for the proposed Mandalay configuration (Section 4.7.1.1.1).

4.7.4.1.2 Offshore Pipelines and Power Cables

PLATFORM GINA

Population and Housing

The offshore pipelines for Platform Gina would be fabricated at Silver Strand Beach and pulled offshore. A total of 44 construction personnel would be required, 22 in each shift, for a period of 9 calendar weeks. In addition, a workforce of 12 persons would be required for installation of the submarine power cable to the platform. Skills requirements would be the same as those discussed for the proposed Mandalay configuration (Section 4.7.1.1.2).

The Ventura County Building and Construction Trades Council indicates that a minimum of 90 percent of the construction workforce would be drawn from the Ventura County labor pool (Bauerlein, 1980). Therefore, no more than 10 percent (about 6 workers) would be imported from outside the county. It is unlikely that these imported workers would permanently relocate to the county as a result of construction activities, which are of short duration (9 weeks). Therefore, no permanent population and housing impact on the county is expected.

Temporary housing may be required for the imported workers for the duration of the construction phase. Ample transient accommodations exist in the Oxnard-Port Hueneme-Ventura area to satisfy this requirement.

Utilities

Impacts on local utility services would be essentially the same as those discussed for the proposed Mandalay configuration (Section 4.7.1.1.2).

Services

The onshore areas in which pipeline welding would take place are within the jurisdiction of the Oxnard Police Department and the Ventura County Sheriff's Department. Both departments state that no additional personnel or equipment would be required because of construction activities (Egan, 1980; Seery, 1980).

The Oxnard Fire Department and the Ventura County Fire Department are responsible for protective support in the Silver Strand Beach area. The onshore activities related to assembly of the offshore pipelines would not significantly impact the Fire Departments. Normal fire safety practices and facilities would be required of the contractor by the Fire Departments (Perez, 1980; Zamazanuk, 1980).

All construction personnel would be derived from existing labor pools in the area, mostly (90 percent) from Ventura County. No new permanent residents of Ventura County are expected to result from the short-term construction phase. Therefore, no impact on schools is anticipated.

Emergency health care may be required during construction. Ambulance service is available in the area. Emergency cases would be transported from the area to St. John's Hospital in Oxnard, where 24-hour service is available. The potential impact on local emergency treatment facilities would be negligible (Mills, 1979 and 1980).

Economic Base

Construction would have no direct impact on the agricultural industry or manufacturing base of Ventura County.

Construction activities, to the extent that they are within the 3-mile (5.6-km) limit from the shoreline, are subject to assessment by the County of Ventura and to property taxes on the completed value as of the assessment date. The project schedule, however, indicates that all construction would be completed and facilities in a operation prior to the March 1, 1981 assessment date. Therefore, property tax revenues would not accrue to the various taxing jurisdictions during the construction period.

In the category of sales and use tax revenue, a direct beneficial impact would result from two categories of expenditures: (1) local purchases of materials and services; and, (2) local spending. In the first category, Union estimates that $800,000 in local purchases of materials and services would occur during the construction phase, all of which would be taxable. This would result in $8,000 in new sales and use tax remissions to local governments in Ventura County, and $40,000 to the State of California. In the second category, Union estimates that construction activities would involve $1.5 million in payroll, at least 90 percent of which would be paid to local Ventura County residents. This local payroll of an estimated $1.35 million would result in approximately $960,000 of new disposable income in the county which, in turn, would result in about $360,000 of new taxable retail sales. Sales and use tax remissions to local jurisdictions would amount to $1,200; new revenues to the State of California would amount to an estimated $6,000. In total, new sales and use tax revenues to local jurisdictions, primarily the cities of Oxnard, Port Hueneme, and Ventura, would amount to $9,200. An increase in revenues to the state of about $46,000 would occur.

Commercial fishing activities in the vicinity of the offshore construction right-of-way would be temporarily suspended during construction. This would have no significant impact on the commercial fishing industry.

Construction would have a small beneficial impact on the Port of Hueneme during the installation of the offshore pipelines and power cable because the barge and tugboat would utilize the port as a base of operations.

The estimated total payroll for construction of the Platform Gina offshore pipelines and power cable would be $1.5 million. At least 90 percent of this payroll would accrue to Ventura County residents. This would represent an increase of only 0.05 percent of county personal income (using 1976 as a base), an insignificant impact.

As discussed previously, construction activity would result in new taxable retail sales of about $1.16 million within the county. This would be an increase of 0.06 percent in total county taxable retail sales (using 1978 as a base), an insignificant impact.

Employment

Direct employment during construction is expected to amount to a total of 56 persons over a period of 9 calendar weeks. The Ventura County Building and Construction Trades Council indicates that at least 90 percent of the workforce could be obtained from the local Ventura County labor pool (Bauerlein, 1980). Because of the short duration of construction, employment of these persons would not have a significant effect on unemployment in the county.

PLATFORM GILDA

Impacts would be identical to those discussed for the proposed Mandalay configuration (Section 4.7.1.1.2).

4.7.4.1.3 Onshore Treating Facility

Impacts of construction would be essentially the same as those discussed for the proposed Mandalay configuration (Section 4.7.1.1.3).

4.7.4.1.4 Onshore Pipelines

OPTION A

Population and Housing

The construction workforce required for the onshore pipelines and booster stations would amount to about 175 persons assigned to a 10-hour day shift. Labor skills requirements for this workforce complement would be the same as discussed for the proposed Mandalay configuration (Section 3.3).

The Ventura County Building and Construction Trades Council has stated that at least 90 percent of the construction workforce would be drawn from the Ventura County labor pool (Bauerlein, 1980). Therefore, no more than 10 percent (18 workers) would be imported from outside the county. Workers who are already county residents would probably commute to the jobsite on a daily basis from their homes. It is unlikely that the imported workers would permanently relocate to Ventura County since the duration of construction would be relatively short. Therefore, no permanent population or housing impacts on the county are expected.

Temporary housing may be required for the imported workers for the duration of the construction phase. Ample transient accommodations exist in the Oxnard-Port Hueneme-Ventura area to satisfy this requirement.

Utilities

Impacts on utilities would be identical to those discussed for the proposed Mandalay configuration (Section 4.7.1.1.4).

Services

The pipeline route would be within the jurisdication of four agencies--the Oxnard Police Department, the City of Ventura Police Department, the Port Hueneme Police Department, and the Ventura County Sheriff's Department. These departments state that construction would not adversely affect their operations, providing that traffic control measures required by the departments are taken by Union or the contractor (Egan, 1980; Askay, 1980; Seery, 1980; Anderson, 1980).

Fire department support along the pipeline route would be furnished by three agencies--the Oxnard Fire Department, the City of Ventura Fire Department, and the Ventura County Fire Department. These departments state that construction would not cause an adverse impact on their operations, providing that necessary safety practices required by the departments are followed (Perez, 1980; Zamazanuk, 1980; Bogardus, 1980).

No persons are expected to permanently relocate to Ventura County or move within the county as a result of construction activities. Therefore, no impact on schools is anticipated.

Emergency health care may be required during construction. Ambulance service is available in the area. Emergency cases would be transported from the construction site to either St. John's Hospital in Oxnard or General Hospital of Ventura, both of which possess 24-hour emergency service. The potential impact, if any, on local emergency treatment facilities would be negligible (Mills, 1979 and 1980).

Economic Base

Construction would have no direct impact on the agricultural or manufacturing base of Ventura County.

Facilities under construction are subject to assessment and taxation by the County of Ventura, with taxes based on the completed value of facilities as of the March 1 assessment date. The project schedule indicates that once rights-of-way have been secured, construction of the pipeline would take about 22 weeks. It is likely that the pipeline would be completed and operational prior to the first March 1 assessment date. Therefore, property tax revenues would not accrue to the various taxing jurisdictions during the construction period.

In the area of sales and use tax revenue, a direct beneficial impact would result from two categories of expenditures: (1) local purchases of materials and services; and, (2) local spending. In the first instance, Union estimates that $3.75 million in local purchases of materials and services would occur during the construction phase, all of which would be taxable. This would result in $37,500 in new sales and use tax remissions to local governments and $187,500 to the State of California. In the second category, Union estimates that construction activities would involve $8.4 million in payroll, of which at least $7.56 million would be paid to local Ventura County residents. This local payroll would result in about $5.38 million in new disposable income in the county which, in turn, would yield about $2.02 million in new taxable retail sales. This would amount to $20,200 in new sales and use tax remissions to local governments and $101,000 to the State of California. Total new sales and use tax remissions would amount to about $5.77 million as a direct result of the construction program, yielding $57,700 to local governments and $288,500 to the State of California in new revenues.

The estimated total payroll for construction of the onshore pipeline system is $8.4 million of which $7.56 million would accrue to Ventura County residents. This would represent 0.28 percent of Ventura County personal income (using 1976 as a base), a minor beneficial impact.

As discussed previously, construction would result in new taxable retail sales of about $5.77 million, an increase for the county of about 0.31 percent (using 1978 as a base), a minor beneficial impact within Ventura County.

Employment

Direct employment of 175 persons on this project for a period of 22 weeks would not significantly affect employment or unemployment levels in Ventura County.

OPTION B

Population and Housing

Impacts on population and housing would be identical to those discussed above for the Option A pipeline system.

Utilities

Impacts on utilities would be the same as those discussed for the proposed Mandalay configuration (Section 4.7.1.1.4).

Services

Impacts on services would be identical to those discussed above for the Option A pipeline system.

Economic Base

Impacts on the economic base would be identical to those discussed above for the Option A pipeline system, except as described below.

Scheduling for construction of the Option B pipeline system is anticipated to be such that there would be at least one assessment and property tax levy during construction. Assuming that the construction would be 50 percent complete as of the assessment date, with a value of $12.5 million, property taxes of approximately $62,500 would be remitted to the county and distributed to the various taxing jurisdictions. This figure excludes taxes over and above the 1 percent maximum which are designated to retire bonded indebtedness; it also excludes property taxes on the possessory interest which would be held by Union in onshore rights-of-way.

Sales and use tax revenues would accrue to local cities, the County of Ventura, and the State of California from expenditures for construction materials and services, as well as from local purchases made by construction workers. In the first case, Union estimates that $3.7 million in local purchases would occur during construction, resulting in $37,000 in new local revenues and $185,000 in new state revenues. In the second category, a total payroll of $11.1 million is estimated for construction labor, of which at least $9.99 million would be paid to local Ventura County residents. This local payroll would result in about $7.11 million in new disposable income which, in turn, would yield about $2.67 million of new taxable retail sales. Local revenues would increase by $26,700; state revenues would increase by $133,500. Total new sales and use tax revenues would amount to about $6.37 million as a direct result of construction, yielding $63,700 to local governments and $318,500 to the State of California.

The estimated total payroll for pipeline construction would be $11.1 million, of which $9.99 million would accrue to Ventura County residents. This would represent 0.36 percent of Ventura County annual personal income (using 1976 as a base), a minor beneficial impact.

As indicated above, taxable retail sales would increase by $6.37 million over the duration of construction. This would represent a 0.34 percent increase within the county (using 1978 as a base), a minor beneficial impact.

Employment

Impacts on direct employment would be the same as discussed previously for the Option A pipeline system.

4.7.4.1.5 Total Impact

OPTION A

The total socioeconomic impact of construction activities for the Ormond Beach Option A alternative configuration would be essentially the same as discussed for the proposed Mandalay configuration (Section 4.7.1.1.5), except as described below.

A portion of the onshore pipeline system would be within the jurisdiction of the Port Hueneme Police Department. The department has indicated it would not be adversely affected during the construction phase if traffic control measures required by the department are taken by Union and/or the contractor (Anderson, 1980).

Construction would likely be completed prior to a property tax assessment date (March 1) and no property tax revenue would result from the construction phase.

Sales and use tax revenues from the local purchase of construction materials and services and from expenditures of disposable income by construction workers would be as follows:

Local revenues from:	
. Purchased materials and services	$134,000
. Expenditures	37,700
Total	$171,700
State of California revenues from:	
. Purchased materials and services	$670,000
. Expenditures	188,500
Total	$858,500

The estimated total payroll to local residents would be $14.13 million. This would represent an increase in Ventura County personal income of 0.51 percent (using 1976 as a base), a minor beneficial impact.

The new taxable retail sales in Ventura County would be approximately $17.2 million. This represents approximately 0.93 percent of the actual taxable retail sales in Ventura County in 1978. A significant impact would result.

Employment of 297 Ventura County residents at various times over the construction period would be a small beneficial impact on county employment.

OPTION B

The total socioeconomic impact of construction activities for the Ormond Beach Option B alternative configuration would be essentially the same as discussed above for Option A, except as described below.

Construction is not likely to be completed prior to a property tax assessment date (March 1). Therefore, property tax revenues would result from the construction phase. Property taxes during construction would amount to about $62,500.

Sales and use tax revenues from the local purchase of construction materials and services and from expenditures of disposable income by construction workers would be as follows:

Local revenues from:	
. Purchased materials and services	$133,500
. Expenditures	44,200
Total	$177,700
State of California revenues from:	
. Purchased materials and services	$667,500
. Expenditures	221,000
Total	$888,500

The estimated total payroll to local residents would be $16.56 million. This would represent an increase in Ventura County personal income of 0.06 percent (using 1976 as a base), a minor beneficial impact.

The new taxable retail sales in Ventura County would be approximately $17.8 million. This represents approximately 0.96 percent of the actual taxable retail sales in Ventura County in 1978. A significant impact would result.

4.7.4.2 Drilling

Drilling impacts associated with the Ormond Beach alternative configuration would be identical to those discussed for the proposed Mandalay configuration (Section 4.7.1.2).

4.7.4.3 Production

4.7.4.3.1 Platforms

Impacts resulting from production operations at the platforms would be identical to those discussed for the proposed Mandalay configuration (Section 4.7.1.3.1).

4.7.4.3.2 Offshore Pipelines

PLATFORM GINA

All socioeconomic impacts of production related to the Platform Gina offshore pipelines would be essentially the same as those discussed for the proposed Mandalay configuration (Section 4.7.1.3.2), with the exception of the elements of the economic base described below.

The offshore pipelines, to the extent that they are within the 3-mile (5.6-km) limit from the shoreline, are subject to assessment by the County of Ventura and to property taxes on the value as of the assessment date. Of the total 4 miles (6.4 km) of offshore pipeline length, an estimated 3.2 miles (5.1 km) (80 percent) of length would be within the 3-mile (5.6-km) jurisdiction. Applying the percentage length to the estimated pipeline value upon completion of $1.5 million, approximately $900,000 in value would be subject to property taxes. At a rate equivalent to 1 percent of value (exclusive of bonded indebtedness), the first-year property tax revenues accruing to local taxing agencies would be $9,000. These figures exclude any taxes on the possessory interest held by Union in the state-owned pipeline right-of-way.

PLATFORM GILDA

Impacts would be identical to those discussed for the proposed Mandalay configuration (Section 4.7.1.1.2).

4.7.4.3.3 Onshore Treating Facility

Socioeconomic impacts related to operation of the Ormond Beach alternative onshore treating facility would be the same as discussed for the proposed Mandalay configuration (Section 4.7.1.3.3), except as described below.

Electrical requirements at the treating facility would vary, depending on whether the Option A or Option B onshore pipeline system were implemented. For the Option A case, approximately 1,470 KVA would be required. For the Option B case, about 2,090 KVA would be necessary. For either case, SCE indicates that it could meet the demand without significant impact (Racicot, 1980).

The treating facility site would be within the City of Oxnard's Ormond Beach area and within the County of Ventura's Tax Rate Area 3071, which possesses an overall tax rate of $4.6886 per $100 of Assessed Valuation, broken down as follows:

Category	Rate Per $100 of Assessed Valuation
Maximum 1 percent tax	$4.0000
Bonded Indebtedness:	
Elementary school bond - Port Hueneme	.0367
Port Hueneme State Building Loan	.2918
High School Bond #2 - Oxnard	.0664

Category	Rate Per $100 of Assessed Valuation
Ventura Community College Bond	.0268
City of Oxnard District #1	.0947
Port Hueneme Sanitation Bond	.0156
Metropolitan Water Annex. #7	.1300
United Water Conservation Bond	.0266
Total Rate	4.6886

Source: County of Ventura, 1979.

The estimated value of the treating facility upon completion would be $6 million, exclusive of the value of the land, which is already on the Ventura County tax rolls. Using the 25 percent assessed valuation ratio, property taxes for the first year would be approximately $70,300, which would be divided among the various taxing authorities.

In the category of sales and use taxes, a small direct beneficial impact would be experienced as a result of: (1) local purchases of materials and services; and, (2) local spending by maintenance employees who would derive a portion of their income from working at the treating facility. In the first case, Union estimates that $4 million in local purchases would occur over the 20-year life of the project, or $200,000 per year of taxable retail sales. In the second category, a total of approximately $540,000 in new taxable retail sales would result, or about $27,000 per year. The total of $227,000 new taxable retail sales annually would result in $2,270 of new revenues for local jurisdictions and $11,350 for the State of California; these would be insignificant impacts.

Union estimates that approximately $100,000 annually in payroll would be expended for maintenance activities over the 20-year life of the project. This would have an insignificant impact on personal income in Ventura County.

As discussed above, taxable retail sales would be expected to increase by $227,000 annually as a result of the operation of the treatment facility. This would be an insignificant impact on retail sales levels in Ventura County.

4.7.4.3.4 Onshore Pipelines

OPTION A

Socioeconomic impacts would be identical to those discussed for the proposed Mandalay configuration (Section 4.7.1.3.4), except as described below.

The pipeline system would be within the jurisdiction of four agencies--the Oxnard Police Department, the City of Ventura Police Department, the Port Hueneme Police Department, and the Ventura County Sheriff's Department. These departments state that operation of the pipeline system would not adversely affect their operations (Egan, 1980; Askay, 1980; Seery, 1980; Anderson, 1980).

Fire department support for the pipeline system would be furnished by three agencies--the Oxnard Fire Department, the City of Ventura Fire Department, and the Ventura County Fire Department. These departments state that pipeline operations would not impose an adverse impact on their departments (Perez, 1980; Zamazanuk, 1980; Bogardus, 1980).

The onshore pipeline system would traverse many tax code areas and be subject to property taxes allocated for many jurisdictions. The estimated total value of the onshore pipeline system would be approximately $24.6 million. At a tax rate equivalent to 1 percent of value (exclusive of bonded indebtedness), the first-year property tax revenues accruing to the local agencies would be $246,000, a minor to moderate beneficial impact. This figure excludes any taxes on the possessory interest held by Union in the pipeline rights-of-way on public land.

In the category of sales and use taxes, a minor beneficial impact would result from the local expenditures by Union for maintenance materials, services, and payroll. Over the 20-year project life, Union estimates that $11.5 million would be spent for purchased materials and services, all of which likely would be spent locally. This would be equivalent to $575,000 per year of taxable sales, resulting in $5,750 of local revenues and $28,750 of new revenues to the State of California. Furthermore, Union projects an annual expenditure of $75,000 for maintenance labor, which would result in about $20,000 in new taxable retail sales. This would generate $200 in new local revenues and $1,000 in state revenues. These would be insignificant impacts.

An additional $75,000 per year in local payroll would result from the operation of the onshore pipeline system, an insignificant impact on Ventura County personal income levels.

The new taxable retail sales resulting from pipeline system operation, about $595,000 annually, would be an insignificant impact in Ventura County.

OPTION B

Impacts of the Option B pipeline system would be essentially the same as for the Option A pipeline system discussed above, except for certain areas of the economic base as described below.

First-year property tax revenue which would accrue to local jurisdictions would be based on a $30.7 million estimated value of the onshore pipeline system. The first-year property taxes would amount to approximately $307,000, exclusive of taxes related to bonded indebtedness and the possessory interest held by Union in the pipeline rights-of-way.

In the area of sales and use taxes, the local expenditure of $17 million for materials and services over the 20-year life of the project would translate to $850,000 annually in taxable retail sales. This would result in new local revenues of $8,500 annually and new revenues to the State of California of $42,500 annually. Union projects an expenditure of $150,000 annually for maintenance labor, resulting in another $40,000 in taxable retail sales and $400 in new local revenues. State revenues would increase by $2,000 annually. These would be insignificant impacts.

An additional $150,000 per year in local payroll would result from the operation of the onshore pipelines, an insignificant impact on Ventura County personal income.

New taxable retail sales resulting from pipeline operation would be about $890,000 annually, a minor beneficial impact in Ventura County.

4.7.4.3.5 Total Impact

OPTION A

The total socioeconomic impact of production activities for the Ormond Beach Option A alternative configuration would be essentially the same as discussed for the proposed Mandalay configuration (Section 4.7.1.3.5), except as discussed below.

Total electrical demand would amount to about 3,970 KVA. SCE indicates that it could meet this requirement without significant impact (Racicot, 1980).

A portion of the onshore pipeline system would be within the jurisdiction of the Port Hueneme Police Department. The department has indicated it would not be adversely affected during the production phase (Anderson, 1980).

New property tax revenues would be expected to accrue to the various taxing jurisdictions within Ventura County as follows:

Project Element	First-Year Tax Revenues (Fiscal year 1981-82)	
	Basic 1 Percent Tax	Bonded Indebtedness
Platforms	(None - Outside Ventura Co. jurisdiction)	
Offshore Pipelines (within 3-mile (5.6-km) limit)	$ 21,000	Not Available
Treating Facility	60,000	$10,300
Onshore Pipelines	246,000	Not Available
Total	$327,000	$10,300

The above figures exclude any taxes which would be levied on the possessory interest Union would hold in the pipeline rights-of-way both offshore and onshore.

In the category of sales and use taxes, an estimated $31,300 of new revenues would accrue annually to local jurisdictions, principally the cities of Oxnard, Port Hueneme, and Ventura, as well as the County of Ventura. This would be a result of the local purchase of materials and services by Union and of expenditures by persons receiving payroll dollars for work on the project. In addition, the share of sales and use tax revenue to the State of California would be approximately $156,500 annually.

An estimated $22 million in new payroll expenditures would result from the production phase of this alternative configuration, or slightly in excess of $1.1 million per year. This would represent an increase of approximately 0.04 percent of total Ventura County personal income (using 1976 as a base), an insignificant impact.

The new taxable retail sales that would result from project operation are estimated at approximately $3.13 million annually, approximately 0.17 percent of total Ventura County taxable retail sales in 1978. This would be an insignificant impact.

OPTION B

The total socioeconomic impact of production activities for the Ormond Beach Option B alternative configuration would be essentially the same as discussed above for Option A, except as described below.

Total electrical demand would amount to about 4,590 KVA. SCE indicates that it could meet this requirement without significant impact (Racicot, 1980).

New property tax revenues would be expected to accrue to the various taxing jurisdictions within Ventura County as follows:

	First-Year Tax Revenues (Fiscal year 1981-82)	
Project Element	Basic 1 Percent Tax	Bonded Indebtedness
Platforms	(None - Outside Ventura Co. jurisdiction)	
Offshore Pipelines (within 3-mile (5.6-km) limit)	$ 21,000	Not Available
Treating Facility	60,000	$10,300
Onshore Pipelines	307,000	Not Available
Total	$388,000	$10,300

The above figures exclude any taxes which would be levied on the possessory interest Union would hold in the pipeline rights-of-way both offshore and onshore.

In the category of sales and use taxes, an estimated $34,200 of new revenues would accrue annually to local jurisdictions, principally the cities of Oxnard, Port Hueneme, and Ventura, as well as the County of Ventura. This would be a result of the local purchase of materials and services by Union and of expenditures by persons receiving payroll dollars for work on the project. In addition, the share of sales and use tax revenue to the State of California would be approximately $171,000 annually.

An estimated $23.5 million in new payroll expenditures would result from the production phase of this alternative configuration, or slightly in excess of $1.2 million per year. This would represent an increase of approximately 0.04 percent of total Ventura County personal income (using 1976 as a base), an insignificant impact.

The new taxable retail sales that would result from project operation are estimated at approximately $3.42 million annually, approximately 0.18 percent of total Ventura County taxable retail sales in 1978. This would be an insignificant impact.

4.7.5 Accidental Oil Spills

The economic cost of an accidental crude oil spill resulting from the proposed Platform Gina and Platform Gilda Project would be dependent on a number of variables. These include:

- the volume of oil spilled
- the area covered by pollutants
- the duration of the spill
- the intensity of oil concentrations (i.e., thickness, width, length) on beach areas where the oil washed ashore
- the number of persons directly and indirectly affected by the spill
- the effectiveness of clean up/containment measures
- the actual cost of clean up activities to the operator, government agencies, and other organizations involved in the containment effort

Because of the multitude of physical, social, and economic factors that could contribute to the total cost of an oil spill, an accurate estimate of the direct and indirect costs to society is only possible after the fact. Therefore, it is not reasonable or realistic to attempt to develop detailed cost analyses of potential oil spills from the proposed Platform Gina and Platform Gilda Project. However, Mead and Sorenson's (1970) estimate of the economic costs of the 1969 Santa Barbara Oil Spill provides an illustrative example of potential costs associated with a large spill.

Table 4.7-1 summarizes Mead and Sorenson's estimate of the economic cost of the oil spill. According to the authors, the oil spill resulted in a total cost of approximately $16.4 million (1969 dollars). The largest percentage of the total cost (about 64 percent) was spent on cleaning up the estimated spill of 80,000 bbl (12,720 m^3) barrels and containing the blowout. Recreational value lost ranked second, amounting to approximately 19 percent of the total cost. Lesser cost contributors included: (1) damage to tourism; (2) damage to the commercial fishing industry; (3) damage to the marine environment; (4) costs incurred by government agencies involved in the cleanup effort; (5) loss of the oil resource; and, (6) a decline in beachfront property values.

The uses and characteristics of the coastline in the project area are similar to those which were affected during the Santa Barbara Oil Spill. Thus, the same general categories of socioeconomic impacts would potentially apply. Although a spill equivalent to the size of that incident is highly unlikely to occur as a result of the proposed Platform Gina and Platform Gilda Project (refer to Section 4.9.2), the cost of such an incident could be substantial and have a significant adverse impact on the local and regional economy.

TABLE 4.7-1

ESTIMATED COSTS OF THE SANTA BARBARA OIL SPILL

Category	Estimated Cost ($)	Percentage of Total Cost
Oil Company Costs[1]	10,487,000	63.8
A. Beach cleanup	4,887,000	(29.7)
B. Oil collection	3,600,000	(21.9)
C. Oil well control	2,000,000	(12.2)
Recreational value lost[2]	3,150,000	19.2
Property value loss[3]	1,197,000	7.3
Damage to commercial fishermen[4]	804,250	4.9
Governmental agencies[5]	639,200	3.9
Value of oil lost[6]	130,000	0.8
Damage to marine plants, animals, fish, and fowl		
. low estimate	8,400	--
. high estimate	32,400	0.2
Damage to tourism[7]	-- Not computed --	
Total Costs		
. low estimate	$ 16,415,850	
. high estimate	$ 16,439,850	

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[1] Costs to Union Oil on behalf of itself and three partners (Gulf Oil, Mobil Oil, and Texaco).

[2] The value of recreation lost (in $) was derived using a detailed survey in which local residents were asked to compare the enjoyment received from a beach visit with the enjoyment received from attending a movie. A typical beach visit was estimated to be nearly two times as enjoyable as a movie. In the 12 months following the January, 1969 spill, it was estimated that people made 744,000 fewer visits to the beach than would be expected under normal conditions.

[3] Some beachfront real estate was damaged by the spill and property values declined as a result. The authors saw the decline as temporary and felt that it would dissipate within 5 years.

[4] During the Platform A spill, commercial fishing vessels were confined to Santa Barbara Harbor for one month. In addition, they lost another month of normal fishing operations due to excessive pollution. The dollar value was derived by estimating the total reduction in the size of the 1969 fish catch that was directly or indirectly related to oil spill causes.

[5] Includes costs incurred in clean-up operations, disaster monitoring, beach and offshore inspection trips, etc. by various governmental groups and organizations (e.g., the U.S. Department of the Interior, California State Department of Fish and Game, and the County of Santa Barbara).

[6] Based on spillage of approximately 80,000 barrels of oil valued at the World Market oil price of $2.15/barrel (1969). The authors did not attempt to determine tax revenue losses.

[7] As the authors were only analyzing "social costs," they did not compute the estimated loss of tourist revenues to local area establishments ("private costs"). Instead, losses to motel operators in the Santa Barbara area were considered negligible to society, since they were cancelled out by the private gains to motels in other areas. However, it should be recognized that if a major spill were to occur, that a decrease in local area revenues (within the South Coastal Region) would probably result and that this decrease would have a measurable adverse impact on the area.

Source: Mead and Sorenson (1970).

4.8 CULTURAL RESOURCES

Detailed cultural resources studies have been conducted for the offshore and onshore areas associated with the proposed and primary alternative project configurations (Dames & Moore, 1980a, 1980b, and 1980c). This section presents a summary of the findings from these studies related to impact considerations. Locational and/or descriptive information that might place cultural resources in jeopardy (e.g., from unauthorized collection or looting) is not discussed. This type of information is described in the reports prepared for the original studies. These reports are on file with the City of Oxnard (offshore and onshore) and the U.S. Geological Survey, Los Angeles (offshore only). The reports are available for review at these two locations by appropriate regulatory agencies and members of the professional archaeological community.

4.8.1 Zone of Potential Impact

4.8.1.1 Offshore Facilities

Potential impacts on offshore cultural resources could occur during project construction and drilling phases; no potential impacts would be expected during the production phase because routine operations generally do not involve activities that would cause surface or subsurface disturbance to earth materials in which cultural resources might occur. The principal activities that might result in impacts on cultural resources are platform installation, pipeline and power cable installation, well drilling, and anchoring of vessels during the construction and drilling phases.

The zone of potential impact at platform sites is estimated to be a square column 200 feet (60 m) on a side that would extend vertically from the seafloor surface down into upper Pleistocene sediments. Potential impacts resulting from vessel anchors during platform construction and, possibly, drilling activities are estimated to occur within a zone with a radius of 0.5 mile (0.8 km) centered on the platform site. The areal extent of this zone was estimated based on the zones of impact of previous exploratory drilling operations observed on the acoustic records obtained from the Platform Gina and Platform Gilda marine geophysical surveys. Depth of impact from anchors is expected to be less than 6 feet (2 m).

From MLLW to a water depth of 20 feet (6 m), the pipelines would be buried below the depth of scour by divers who would jet the sand from beneath the pipelines, allowing them to sink. From a water depth of 20 feet (6 m) to the platform sites, the pipelines would rest on the ocean floor. The associated power cables would be buried to a depth of 6 feet (2 m) below the winter beach profile. From MLLW to the platform sites, the cables would rest on the ocean floor. Therefore, the zone of potential impact on cultural resources would be limited to:

(1) a corridor 40 feet (12 m) wide from MLLW to a water depth of 20 feet (6 m). Burial of the pipelines and power cables in this corridor would be confined to a zone of active sediment movement; and,

(2) a corridor conservatively assumed to be as wide as the offshore pipeline marine geophysical survey corridors to a sediment depth no greater than 6 feet (2 m), assuming vessels are anchored while pipelaying and cable laying operations are being conducted along segments of the corridor.

4.8.1.2 Onshore Facilities

Potential impacts on onshore cultural resources could occur during project construction; no potential impacts would be expected during the drilling and production phases (operations during these phases generally do not involve onshore activities that would cause surface or subsurface disturbance to earth materials in which cultural resources might occur). The zones of potential impact on onshore cultural resources are expected to be limited to: (1) proposed and alternative treating facility sites, as well as a 130-foot (40-m) buffer area on all sides; (2) all access roads and a 32-foot (10-m) buffer area on each side; and, (3) pipeline construction rights-of-way. Potential impacts along pipeline routes are expected to be limited to the width of construction rights-of-way. Pipeline construction right-of-way widths vary for the proposed and three primary alternative project configurations, ranging from a minimum of 20 feet (6 m) to a maximum of 60 feet (18 m)(Section 3.3).

4.8.2 Proposed Mandalay Configuration

4.8.2.1 Construction

4.8.2.1.1 Platforms

Platform Gina

Literature analysis and evaluation of marine geophysical survey records revealed no evidence of cultural resources occurrence (e.g., nautics, features indicative of former environments favorable for aboriginal habitation) within the zone of potential impact for Platform Gina construction. Consequently, platform installation and anchoring of vessels during construction are not expected to have an impact on cultural resources. A confirmed shipwreck is located outside and northwest of the zone of potential impact; this location can and should be avoided during construction.

Platform Gilda

Literature analysis and evaluation of marine geophysical survey records revealed no evidence of cultural resources occurrence within the zone of potential impact for Platform Gilda construction. Consequently, platform installation and anchoring of vessels during construction are not expected to have an impact on cultural resources.

4.8.2.1.2 Offshore Pipelines and Power Cables

Platform Gina

Literature analysis and evaluation of marine geophysical survey records revealed no evidence of features indicative of former environments favorable for aboriginal habitation within the zone of potential impact for the Platform Gina offshore Mandalay pipeline corridor. Furthermore, the area in which pipeline and power cable construction activites would occur would involve: (1) the surf zone where the pipeline would be buried below the depth of scour (i.e., the sediments above the depth of burial would be in a zone of active sediment movement where no intact aboriginal sites would be expected to occur;

below this zone, it is expected that marine sediments would be encountered where aboriginal sites are not anticipated to occur); and, (2) the area beyond the surf zone, where aborignal resources would be expected to occur at a greater sediment depth than could be anticipated to be affected by a pipeline or power cable laid on the surface of the seafloor or by vessel anchors. Therefore, no adverse impacts on such potential sites are expected to occur as the result of pipeline and power cable construction activities.

Three areas or loci of possible anomalous returns were interpreted from the marine geophysical survey records and evaluated as potential shipwreck remains within the pipeline corridor (Section 12.8.2.2.2). Depending on the final routing selected for the pipelines and power cable, these area/loci could be either avoided or directly impacted. If the areas/loci cannot be avoided, the recommended mitigation measures discussed in this EIR/EA (see Section 5.8) should be implemented.

Platform Gilda

Literature analysis and evaluation of marine geophysical survey records revealed no evidence of features indicative of former environments favorable for aboriginal habitation within the zone of potential impact for the Platform Gilda pipeline corridor. Therefore, no adverse impacts on aboriginal sites or artifacts are expected to result from pipeline and power cable construction activities. The Platform Gilda pipelines and power cable would be buried through the surf zone in a common corridor with the Platform Gina pipelines and power cable. As discussed above, no adverse impacts on aboriginal sites or artifacts are expected to occur as a result of construction activities within this corridor.

Two areas of possible anomalous returns were interpreted from the marine geophysical survey records and evaluated as potential shipwreck remains (Section 12.8.2.3.2). These areas involve buried objects that are inferred to be below the zone of potential impact associated with pipeline and power cable construction activites (pipelines and the power cable would be laid on the seafloor surface near these areas), including vessel anchors. Therefore, no adverse impacts on these potential cultural resources are expected.

4.8.2.1.3 Onshore Treating Facility

No cultural resources (archaeological, ethnographic, and historic landmark sites) were observed on the proposed Mandalay site. No buried sites are expected to occur. Therefore, no adverse impacts on cultural resources are expected to occur on the Mandalay site as a result of constructing the treating facility.

A potential basket material site (ethnographic resource) is located off-site and to the south of the treating facility site. The movement of people, vehicles, and equipment in the general area during construction could result in possible adverse impacts on the basketry material site.

4.8.2.1.4 Onshore Pipelines

No cultural resources were observed along the onshore pipeline corridor associated with the proposed Mandalay site. However, the possibility of buried sites occurring along the corridor is high. If buried sites are encountered and disturbed or eliminated during construction, a potentially significant adverse impact would result. No cultural resources are expected to occur at the onshore marshalling area.

4.8.2.1.5 Total Impact

Offshore, the proposed Mandalay configuration could have direct adverse impacts on potential shipwreck remains at three locations.

Onshore, a potential ethnographic site (basket material) located south of the proposed Mandalay site could be adversely affected by construction-related activities. The possibility of buried sites occurring along the pipeline corridor associated with the proposed Mandalay configuration is high; disturbance or elimination of buried sites would be a potentially significant adverse impact.

4.2.2.2 Drilling

4.8.2.2.1 Platform Gina

The zone of potential impact on cultural resources during drilling would be the same (or smaller) as during construction. Based on the cultural resources information discussed for the construction phase for Platform Gina (Section 4.8.2.1.1), no adverse impact on cultural resources is expected during drilling.

4.8.2.2.2 Platform Gilda

The zone of potential impact on cultural resources during drilling would be the same (or smaller) as during construction. Based on the cultural resources information discussed for the construction phase for Platform Gina (Section 4.8.2.1.1), no adverse impact on cultural resources is expected during drilling.

4.8.2.2.3 Total Impact

The proposed Mandalay configuration is not expected to adversely impact any cultural resources during drilling at Platform Gina and Platform Gilda.

4.8.2.3 Production

No offshore or onshore cultural resources are expected to be affected by normal operations during the production phase.

4.8.3 East Mandalay Alternative Configuration

4.8.3.1 Construction

4.8.3.1.1 Platforms

Potential impacts on cultural resources would be the same as discussed for the proposed Mandalay configuration (Section 4.8.2.1.1).

4.8.3.1.2 Offshore Pipelines and Power Cables

Potential impacts on cultural resources would be the same as discussed for the proposed Mandalay configuration (Section 4.8.2.1.2).

4.8.3.1.3 Onshore Treating Facility

No cultural resources were observed on the East Mandalay alternative site. However, the possibility of buried sites occurring at this location is high. If buried sites are encountered and disturbed or eliminated during construction, a potentially significant adverse impact would result.

4.8.3.1.4 Onshore Pipelines

The onshore pipeline corridor associated with the East Mandalay alternative configuration is essentially the same as that for the proposed Mandalay configuration (see Section 4.8.2.1.4 for discussion of impacts). It differs only in that there would be an additional segment of pipeline corridor to connect the East Mandalay alternative site with the Harbor Boulevard construction right-of-way. No cultural resources were observed along this additional segment, but the possibility of buried sites occurring along it is high. If buried sites are encountered and disturbed or eliminated during construction, a potentially significant adverse impact would result. No cultural resources are expected to occur at the onshore marshalling area.

4.8.3.1.5 Total Impact

Offshore, the East Mandalay alternative configuration could have direct adverse impacts on potential shipwreck remains at three locations.

Onshore, the possibility of buried sites occurring at the East Mandalay alternative site and along the associated pipeline corridor is high. If buried sites were disturbed or eliminated, there would be a potentially significant adverse impact.

4.8.3.2 Drilling

Potential impacts on cultural resources would be the same as discussed for the proposed Mandalay configuration (Section 4.8.2.2).

4.8.3.3 Production

No offshore or onshore cultural resources are expected to be affected by normal operations during the production phase.

4.8.4 Union Oil Marine Terminal Alternative Configuration

4.8.4.1 Construction

4.8.4.1.1 Platforms

Potential impacts on cultural resources would be the same as discussed for the proposed Mandalay configuration (Section 4.8.2.1.1).

4.8.4.1.2 Offshore Pipelines and Power Cables

Potential impacts on cultural resources would be the same as discussed for the proposed Mandalay configuration (Section 4.8.2.1.2).

4.8.4.1.3 Onshore Treating Facility

No cultural resources were observed on the Union Oil Marine Terminal alternative site. No buried sites are expected to occur. Therefore, no adverse impacts on cultural resources are expected to occur as a result of constructing the treating facility.

4.8.4.1.4 Onshore Pipelines

No cultural resources were observed along the onshore pipeline corridor associated with the Union Oil Marine Terminal alternative site. However, the possibility of buried sites occurring along the corridor is high. If buried sites are encountered and disturbed or eliminated during construction, a potentially significant adverse impact would result. No cultural resources are expected to occur at the onshore marshalling area or booster station site.

4.8.4.1.5 Total Impact

Offshore, the Union Oil Marine Terminal alternative configuration could have direct adverse impacts on potential shipwreck remains at three locations.

Onshore, the possibility of buried sites occurring along the pipeline corridor associated with the Union Oil Marine Terminal alternative site is high. If buried sites were disturbed or eliminated, there would be a potentially significant adverse impact.

4.8.4.2 Drilling

Potential impacts on cultural resources would be the same as discussed for the proposed Mandalay configuration (Section 4.8.2.2.).

4.8.4.3 Production

No offshore or onshore cultural resources are expected to be affected by normal operations during the production phase.

4.8.5 Ormond Beach Alternative Configuration

4.8.5.1 Construction

4.8.5.1.1 Platforms

Potential impacts on cultural resources would be the same as discussed for the proposed Mandalay configuration (Section 4.8.2.1.1).

4.8.5.1.2 Offshore Pipelines and Power Cables

Platform Gina

The Ormond Beach alternative configuration would involve laying a power cable to the Platform Gina site within the same corridor as for the proposed Mandalay configuration. Potential cultural resources that could be impacted by construction activities within this corridor are discussed in Section 4.8.2.1.2.

Literature analysis and evaluation of marine geophysical survey records revealed no evidence of features indicative of former environments favorable for aboriginal habitation within the zone of potential impact for the Platform Gina Ormond Beach alternative pipeline corridor. Therefore, no adverse impact on aboriginal sites or artifacts are expected to result from pipeline construction activities.

Five areas or loci of possible anomalous returns were interpreted from the marine geophysical survey records and evaluated as potential shipwreck remains within the pipeline corridor (see Section 12.8.2.2.2). Depending on the final routing selected for the pipelines, these areas/loci could be either avoided or directly impacted. If the areas/loci cannot be avoided, the recommended mitigation measures discussed in Section 5.8 should be implemented.

Platform Gilda

Potential impacts on cultural resources would be the same as discussed for the proposed Mandalay configuration (Section 4.8.2.1.2).

4.8.5.1.3 Onshore Treating Facility

An historic archaeological site, 4-VEN-664(H), is located on the Ormond Beach alternative site. Construction of the treating facility would have an adverse impact on the remaining cultural values of the site. The possibility of buried sites occurring on the site exists. If buried sites are encountered and disturbed or eliminated, a potentially significant adverse impact would occur.

4.8.5.1.4 Onshore Pipelines

Platform Gina Ormond Beach Alternative Pipeline Corridor

A prehistoric archaeological site, 4-VEN-663, is located along this pipeline corridor. This site has been previously disturbed, but there is a high probability that intact burials and buried deposits occur in association with the site. Pipeline construction activities would have an adverse impact on the remains of the site, but should not cause a significant impact on those attributes of the site which give it local historic significance. Encroachment on any possible associated burials would be considered an adverse effect by the descendents of the Chumash Indians; testing would be required to determine the presence or absence of buried remains.

The probability of buried sites occurring along other portions of this corridor is high. If buried sites are encountered and disturbed or eliminated, a potentially significant adverse impact would result.

No cultural resources are expected to occur at the onshore marshalling area or booster station site.

Option A Pipeline Corridor

Construction along the Option A pipeline corridor could potentially impact three actual and/or potential prehistoric archaeological sites (4-VEN-662, 4-VEN-667, and Field No. Oxnard 2), one Ventura County landmark (No. 20), and one local historic landmark (Ventura Road Eucalyptus Grove). Potential impacts on these cultural resources are discussed below. Furthermore, the probability of buried sites occurring along the corridor is high. If buried sites are encountered and disturbed or eliminated, a potentially significant adverse impact would result. No cultural resources are expected to occur at the onshore marshalling area or booster station site.

Construction activities would cause a change in those qualities which make 4-VEN-662 significant. This effect would be adverse because of the loss of potential information. An adverse effect would also result if burials are associated with the site; the nature and extent of adverse effect would need to be determined through a program of testing.

Site 4-VEN-667 is a possible prehistoric archaeological site. Testing would be required to determine the significance and nature of origin of this deposit. If pipeline construction activities disturbed or eliminated a buried component of the deposit, an adverse effect would result.

Field No. Oxnard 2 is a possible aboriginal site. Testing is required to: (1) identify the nature of the deposit; and, (2) determine whether the deposit extends into the zone of potential impact. If the deposit is determined to be of cultural origin, a determination of effect and adverse effect (36 CFR 800) would need to be made.

Construction-related dust and noise would have a temporary impact on Ventura County Landmark 20 (Bard Memorial). However, these temporary impacts are not expected to reduce those qualities of Bard Memorial which make it a significant local historic resource.

Construction activities (e.g., trenching) could have an effect on Ventura Road Eucalyptus Grove. The nature and extent of the effect would depend on the final alignment for the pipeline route.

Option B Pipeline Corridor

Construction along the Option B pipeline corridor could potentially impact three actual and potential prehistoric archaeological sites (4-VEN-665, 4-VEN-666, and Field No. Oxnard 7) and one Ventura County landmark (No. 15). Potential impacts on these cultural resources are discussed below. Furthermore, the possibility of buried sites occurring along the corridor and at the inland booster station site is high. If buried sites are encountered and disturbed or eliminated, a potentially significant adverse impact would result. No cultural resources are expected to occur at the onshore marshalling area or at the coastal booster station site.

Construction activities would have an effect on site 4-VEN-665; this would be an adverse effect if there is a loss of potential information. An adverse effect would also result if burials are associated with the site; testing would be required to determine the nature and extent of adverse effect. Similar impacts and testing requirements would apply to site 4-VEN-666.

Field No. Oxnard 7 is a possible aboriginal site. Evaluation of potential impacts on this site needs to be conducted along the same lines as discussed for Field No. 2 (see discussion for Option A pipeline corridor).

Construction activities (e.g., trenching) could have an effect on Ventura County Landmark 15 (Naumann Giant Gum Tree and Eucalyptus Grove). The nature and extent of the effect would depend on the final alignment for the pipeline route.

4.8.5.1.5 Total Impact

Option A

Offshore, the Ormond Beach Option A alternative could have direct adverse impacts on potential shipwreck remains at eight locations.

Onshore, this alternative configuration could have direct adverse impacts on one historic archaeological site, four actual and potential prehistoric archaeological sites, one Ventura County landmark, and one local historic landmark. Furthermore, the possibility of buried sites occurring at the Ormond Beach alternative site and along the associated pipeline corridors is high. If buried sites were disturbed or eliminated, there would be a potentially significant adverse impact.

Option B

Offshore, the Ormond Beach Option B alternative configuration could have direct adverse impacts on potential shipwreck remains at eight locations.

Onshore, this alternative configuration could have direct adverse impacts on one historic archaeological site, four actual and potential prehistoric archaeological sites, and one Ventura County landmark. Furthermore, the possibility of buried sites occurring at the Ormond Beach alternative site, the inland booster station site, and along the associated pipeline corridors is high. If buried sites were disturbed or eliminated, there would be a potentially significant adverse impact.

4.8.5.2 Drilling

Potential impacts on cultural resources would be the same as discussed for the proposed Mandalay configuration (Section 4.8.2.2).

4.8.5.3 Production

No offshore or onshore cultural resources are expected to be affected by normal operations during the production phase.

4.9 SAFETY AND RELIABILITY

4.9.1 Marine Traffic Safety

Implementation of the proposed Platform Gina and Platform Gilda Project would create a potential hazard to navigation. Project-related support vessel movements during the construction through production phases would increase marine traffic in the project area, thereby increasing the possibility of ship-to-ship collisions. In addition, the presence of the two platforms would pose a potential hazard in terms of a ship-to-structure collision. The nature of these potential hazards and recommended mitigation measures that could minimize potential adverse effects on marine safety are included in this section.

4.9.1.1 Construction

4.9.1.1.1 Proposed Mandalay Configuration

Platforms

Platform Gina would be erected approximately 1.75 miles (2.8 km) northeast of the northbound lane of the Santa Barbara Channel Traffic Separation Scheme (TSS) and 1.75 miles (2.8 km) northwest of the Port Hueneme Fairway. Platform Gilda would be situated approximately 3 miles (4.8 km) north of the northbound lane of the TSS.

The Santa Barbara Channel TSS was established by the U.S. Coast Guard and the shipping industry in 1969. These one-way traffic lanes are recommended for use by all vessels traveling through the Channel. The separation zones are intended to separate inbound and outbound traffic and are not to be utilized for any other reason except crossing purposes (NOAA, 1974). Historically, vessels operating in the Channel have generally adhered to the traffic lanes. However, compliance with the TSS lane scheme is on a voluntary basis. Certain vessels, such as tankers operating from offshore moorings, have occasion to depart from the traffic lanes.

Vessel traffic in the vicinity of the proposed platform sites is fairly heavy, including 13 large vessels per day using the TSS lanes plus assorted fishing boats, oil-production service vessels and various recreation-related craft. Traffic associated with the Port Hueneme Harbor amounts to about 30 vessel movements per day, averaging about one deep-draft vessel and 29 oil service-related craft and fishing boats. Vessel movements associated with the construction phase of the proposed project would average about 6 per day (crew plus supply boats) during the 7-week construction period, representing a 20 percent increase to the current volume of marine traffic utilizing Port Hueneme Harbor. Dumb and diesel-powered barges and tugboats would also be present near the proposed platform sites during the platform construction period.

Potential marine safety considerations associated with the erection of Platforms Gina and Gilda are ship-to-ship and ship-to-structure collisions. Although all major ships are equipped with radar, an accidental collision between two vessels or a vessel and one of the platforms could possibly occur during periods of low visibility, such as at night or in fog. Fog is the primary cause of low visibility in the Santa Barbara Channel area.

In addition to its location in an area subject to low visibility during portions of the year, Platform Gina would be sited within the narrowest part of the Santa Barbara Channel and in close proximity to the TSS northbound traffic lane and the Port Hueneme Fairway. It would also be the first platform encountered by shipping approaching from the direction of Los Angeles/Long Beach and El Segundo offshore tanker moorings, whether utilizing the TSS or an inshore route to or from offshore moorings. In view of the potential hazards to both marine traffic and the proposed platforms, the U.S. Coast Guard will require the application of all practical mitigation measures as a condition of project approval. A discussion of potential mitigation measures is presented in Section 4.9.1.3.

Offshore Pipelines and Power Cables

Construction along the Platform Gina Mandalay pipeline corridor and Platform Gilda pipeline corridor would occur over a 10-week period. During this period, pipeline sections would be welded together at a staging area near the proposed Mandalay site. For about 2 weeks during this period, they would be pulled offshore to the platforms using a tug and a dumb barge. Pipeline and power cable installation would not cross the TSS, but construction activities could temporarily interfere with commercial and recreational vessel movements in the inshore area, as well as vessel movements into and out of Ventura Harbor, Channel Islands Harbor, and Port Hueneme. Estimated peak daily boating traffic associated with these three harbor facilities is presented in Section 12.6.4.2.

4.9.1.1.2 Primary Alternative Configurations

Platforms

The locations of Platforms Gina and Gilda would not be affected if the East Mandalay, Union Oil Marine Terminal, or Ormond Beach alternative sites were selected. Therefore, marine safety considerations described for the proposed Mandalay configuration (Section 4.9.1.1.1) are also applicable to the three primary alternatives.

Offshore Pipelines and Power Cables

The offshore pipeline and power cable corridors for the East Mandalay and Union Oil Marine Terminal alternative configurations would be identical to those for the proposed Mandalay configuration. Therefore, the information provided in Section 4.9.1.1.1 would also be applicable to these alternatives. If the Ormond Beach alternative site were selected, the pipelines to/from Platform Gina would be installed in a separate pipeline corridor which would reach the shoreline near Silver Strand Beach. It would also be necessary for this pipeline corridor to cross the Port Hueneme Harbor mouth. Owing to the congested nature of this area, Union anticipates that offshore pipeline fabrication and installation would take 6 weeks longer than if the proposed Mandalay offshore pipeline corridor were utilized. Hazards and/or inconvenience to marine traffic utilizing the Channel Islands and Port Hueneme Harbors would be greater for this alternative configuration than if the proposed Platform Gina Mandalay offshore pipeline corridor were utilized.

4.9.1.2 Drilling and Production

4.9.1.2.1 Platforms

Marine safety considerations discussed in Section 4.9.1.1 would be equally applicable to the drilling and production phases of the proposed project. Although the platforms would represent potential obstacles to navigation, they would also serve as landmarks and thereby function as aids to navigation.

Crew and supply boats serving the platforms during the drilling and production phases would operate out of Port Hueneme. The crew boat would make an average of three round trips per day, while supply boat trips would occur on an as-needed basis. These vessel movements would increase the current volume of traffic within the Port Hueneme Harbor by approximately 20 percent.

4.9.1.2.2 Offshore Pipelines

The proposed pipelines from Platform Gina and Platform Gilda to the Mandalay site would pass close to the Mandalay Beach Generating Station mooring facility. The U.S. Coast Guard (Terveen, 1979) considers this a potential marine safety problem.

4.9.1.3 Mitigation Measures

The U.S. Coast Guard will require Union to implement "all practical" mitigation measures as a condition of approval of the Platform Gina and Platform Gilda Project. These include:

(1) Aids to navigation: Additional lights/lighting should be provided on the platforms to supplement the required Class A structure aids to navigation and enhance their visibilty. If further measures to identify and discriminate between offshore platforms are required, a radio navigation device called RACON (Radar Responder Beacon) could be used. RACON is a radio navigation system transmitting a response to a predetermined received radar signal. This response is a pulsed radar return signal with specific characteristics which provide bearing and distance data.

(2) Emergency Generator: An emergency electrical generating unit should be installed on each of the proposed platforms. This system should be designed to ensure reliable automatic starting and transfer of aids to navigation electrical load (lights and fog signal) in the event of a power failure. The generators should have sufficient capacity to operate all such emergency equipment simultaneously.

(3) Visual Identification Measures: A conflict in objective exists in terms of the color scheme and visual characteristics of the platforms. From the standpoint of onshore aesthetics, the platforms should be as unobtrusive as possible, blending with the marine environment. From the standpoint of marine traffic conflicts and collision avoidance, they should be highly visible and identifiable. Because of the proximity of the platforms to the TSS and Port Hueneme Fairway, identification for avoidance of collision purposes is considered the most important factor. To afford maximum visibility, white or yellow colors should be used. Procedures should be developed to ensure that the quality of the painted surfaces that afford this enhanced visual effect is maintained during the life of the structure.

(4) OCS Safety Zone: In accordance with Inter-Governmental Maritime Consultative Organization (IMCO) Resolution A.379 (X), the establishment of a permanent 500-meter safety zone around each platform should be required during construction, drilling, and production. This should provide reasonable separation between shipping activities and the platforms. As presently situated and planned for installation, both platforms are farther than 500 meters from the Santa Barbara Channel and the Port Hueneme Fairway traffic lanes.

(5) Notification of Marine Interests: Prior to commencement of platform and pipeline installation, appropriate notification must be given to marine interests. Early notification of impending installation activities such as jacket installation and pipeline laying will be via Notices to Mariners by the Eleventh Coast Guard District and the

Defense Mapping Agency Hydrographic Center. These notices will then be incorporated in the Pacific Coast edition of the U.S. Coast Pilot 7, published by the National Oceanic and Atmospheric Administration (NOAA). All permanent facilities would be identified in this publication, along with necessary safety precautions to avoid traffic conflicts. Mariners are expected to make chart corrections as a result of these notices and publications. Eventually, updated marine charts would be published which show the specific locations of the offshore project elements. These measures should ensure adequate notification to marine interests. Notices regarding anchoring restrictions would be particularly important to preclude pipeline damage.

(6) Offshore Pipeline Routing: The offshore pipeline corridor near Mandalay should be relocated as far away as practicable from the SCE Mandalay Generating Station offshore tanker mooring to minimize potential conflicts between the pipeline and vessels utilizing the offshore mooring. In addition, burial of the pipelines in the vicinity of the mooring should be considered as possible additional mitigation.

4.9.2 Oil Spill Risk Analysis

4.9.2.1 Introduction

The purpose of this risk analysis is to estimate the probability of occurrence and distribution of spill sizes for potential petroleum spills associated with the proposed Platform Gina and Platform Gilda Project. This information, when combined with the oil spill trajectory analysis in Section 4.9.3, can be used to derive estimates of the probability of oil spills reaching open ocean or shoreline areas within the project area. The following discussion, patterned after that presented in a report by the Massachusetts Institute of Technology (MIT, 1974), summarizes essential features of the limitations in developing appropriate risk statistics for marine oil spills:

(1) The size range of spills is extremely large. Spills may range from a minor amount--on the order of a few gallons--up to several tens of millions of gallons, such as the recent IXTOC I Spill in the Gulf of Mexico.

(2) The frequency distribution of spill sizes is highly nonuniform. For example, in 1972, 96 percent of all petroleum industry related spills reported by the Coast Guard were less than 1,000 gallons (24 bbl; 3.8 m^3). As a result of this highly skewed distribution, the problem of accurately describing the statistical properties of the frequency distribution over the full range of spill sizes is extremely difficult.

(3) Most of the spilled volume occurs in a few very large spills. For example, oil released from the IXTOC I blowout (3 million bbl (4,77,000 m^3) to date) is larger than the sum of all other oil spills reported in 1979. Similarily, the Torrey Canyon incident spilled twice as much oil as all the oil which was reported spilled in the United States in 1970.

(4) In many cases, reported spilled volumes are highly inaccurate. Except for tanker spills, where the amount of oil released has a definite upper limit, it is difficult to accurately measure the volume of oil spilled. For example, volume estimates for the Santa Barbara Oil Spill in 1969 ranged from 20,000 to 80,000 bbl (3,180 to 12,720 m^3) with some more unreliable estimates even exceeding the latter number. Consequently, development of a precise statistical distribution is not possible when the data base itself contains such large inaccuracies.

(5) There is no one single data base containing comprehensive statistics on oil spill occurrences. Due to a number of factors, such as regulatory requirements and reporting techniques, it is not possible to rely on any one single data source for all types of petroleum industry spills.

Based on these observations, quantitative spill risk estimates must be developed and interpreted with considerable care. In particular, single point estimates of spill frequency or spill size have a very large confidence interval with respect to the mean estimate.

4.9.2.2 Methodology

The methodology employed in this analysis is to use historical data to project oil spill risks throughout the project lifetime. This technique is based on two fundamental assumptions:

(1) The underlying processes, or causes, of oil spills will not change in the future and have not changed over the period for which the data base exists. This implies, for example, that human error always has been and always will be a contributing factor to the occurrence of oil spills, and that the basic nature of human error has not changed over the period of interest. One could reasonably question this assumption in light of the constantly evolving technology used in the exploration, transportation, and production of oil. However, there is no reliable way of estimating the effectiveness of this increasingly sophisticated technology. Assuming that new technology works to lessen the probability of an oil spill occurrence, risk estimates based on past accident experience will be conservative.

(2) The underlying processes responsible for oil spills are independent of geographic region. This assumption is essentially equivalent to assuming that the underlying causes that would generate oil spills in the Santa Barbara Channel are the same as those that are occurring in other OCS operations in the United States, as well as around the world. As with the first assumption, there is no statistical information available that would allow a more accurate assumption.

Using available data under the assumptions above, it has been observed (MIT, 1974) that confidence intervals on point estimates of expected total spill volume are very much larger than the estimator itself. However, the rate of occurrence of spills and the spill size distributions separately exhibit definite regularity, given the sample sizes of available data bases. Consequently, for this analysis, the frequency of occurrence of spills and their size distributions are estimated separately.

Spill events of interest to this project are classified according to the underlying cause, such as blowouts, accidents or mechanical failures associated with everyday platform operations, failures or ruptures along the pipelines transporting the produced hydrocarbons, and accidents or mechanical failures at the onshore treating facility.

In addition to these possible sources of potentially major spills, there are other events during the drilling and operational phases that could result in minor spills. These sources would include such events as helicopter accidents, "paint bucket" spills from the platforms, ruptured water return lines, and accidents involving crew and supply boats. Because the statistics for these events have not been well defined, and since the consequences of a spill would be comparatively minor in light of the potentially more devastating types of possible spills, they have not been quantitatively assessed in this study.

Within each of the evaluated spill categories, the technique for estimating oil spill risk (measured by frequency of occurrence and distribution of spill size) is based on the assumption that these measures can be correlated with some descriptive exposure variables, such as hydrocarbon production volume, number of well drillings, miles of pipeline, and duration of operations. The appropriate exposure variable is selected and then correlated with historical accident experience (as contained in the data base of similar operations) to yield estimates of the spill risk for the proposed project.

4.9.2.3 Risk Projections

4.9.2.3.1 Blowouts

Rate of Occurrence

The largest available data base for loss of control events is USGS statistics covering 16,000 offshore wells between 1956 and 1973 (USGS, 1974). These figures include seven loss of well control events involving the loss of more than 100 bbl (15.9 m^3) of oil. Based on these data, a blowout rate of about 1 in 2,000 per offshore well is inferred. It should be emphasized that blowout occurrences are not limited to drilling operations, but may also occur during well completion, production, and well workovers. In fact, between 1971 and 1975, the only oil spillage resulting from blowouts in the Gulf of Mexico was from nondrilling-related incidents (Danenberger, 1976). The 1 in 2,000 per well blowout risk is applicable to the entire life of well, not merely to the drilling phase.

For the proposed Platform Gina and Platform Gilda Project, a maximum of 102 production/injection wells would be drilled. For a 1 in 2,000 per well lifetime blowout expectation, the chances of an oil blowout occurring sometime during the project lifetime would be:

$$102 \text{ wells} \times 0.0005 \frac{\text{blowouts}}{\text{well}} = 0.051 \text{ blowouts},$$

or about 1 chance in 20 of a blowout spill exceeding 100 bbl (15.9 m^3).

Distribution of Spill Sizes

The USGS reported seven blowouts resulting in oil spills greater than 100 bbl (15.9 m^3) during the 1956 to 1973 period covered by their statistics (USGS, 1974). Since the determination of spill size distribution is based on such a limited data set and since even the available data are subject to large inaccuracies, two cases bracketing the data will be examined. Only one data point will be different for the two cases; i.e., the estimate for the size of the Santa Barbara Oil Spill. Case 1 is based on testimony from Allen (1969), who reported the Santa Barbara Oil Spill to be on the order of 80,000 bbl (12,720 m^3). Case 2 is based on a USGS (1974) spill size estimate of 22,000 bbl (3,500 m^3). The seven spills are ranked in order of decreasing volume as follows:

Year of Blowout	Location	Estimated Size of Spill (bbl)	
		Case 1	Case 2
1969	Santa Barbara Channel	80,000	22,000*
1970	South Timbalier Bay	53,000	53,000
1964	Eugene Island	5,200	5,200
1969	Ship Shoal	2,500	2,500
1965	Ship Shoal	1,700	1,700
1971	Eugene Island	450	450
1964	West Delta	100	100

---

* This figure will be ranked number two when the data are plotted and analyzed.

Risk assessments will be based on the assumption of a log normal distribution for the oil spill size (Figures 4.9-1 and 4.9-2). Based on this distribution, the mean spill volume for Case 1 is 3,300 bbl (525 m^3), while the mean for Case 2-is 2,700 bbl (430 m^3).

The probabilities that a given oil well blowout would result in a spill of a certain size based on the assumed log normal distribution of the data are as follows:

Probability of Exceeding the Indicated Volume	Case 1 Spill Size (bbl)	Case 2 Spill Size (bbl)
0.50	3,300	2,730
0.40	6,000	4,690
0.30	11,600	8,480
0.20	25,000	16,200
0.10	72,100	43,600
0.05	173,000	95,500

4.9.2.3.2 Platform Operations

Rate of Occurrence

There is a certain risk of spillage resulting from normal platform operations involving equipment failures and human error. Spills as a result of platform operations, in this analysis, will refer to spills related to petroleum handling at the platforms exclusive of blowouts.

Danenberger (1976) has compiled figures for production-related spills for offshore production platforms in the Gulf of Mexico covering the 5-year period from 1971 through 1975. Platform Gilda may be reasonably likened to a production platform because of its size and the presence of a treating subsystem consisting of a separator and, eventually, a freewater knockout system. However, Platform Gilda would not contain all of the equipment normally associated with a production platform. Spill rate estimates based on Gulf of Mexico production platforms should therefore be conservative if applied to Platform Gilda (because there would be fewer components on Gilda prone to failure).

In contrast to Platform Gilda, Platform Gina would be a very small platform lacking the types of equipment normally found on a production platform. The total volume of crude oil present on Platform Gina at any one time would be about 10 bbl (1.6 m^3). Although a major spillage could occur via a potential blowout (addressed in the previous section), the risk from normal production operations on Platform Gina is expected to be negligible and is assigned a zero risk.

During the 5-year period 1971-75, there were 6 major spills (greater than 50 bbl; 8 m^3) and 536 minor spills (less than 50 bbl; 8 m^3) caused by equipment malfunctions or misuse on production platforms in the Gulf of Mexico (Danenberger, 1976). During this same time period, the estimated average number of production platforms with one or more producing wells operating in the Gulf of Mexico was 1,150. The average rate of operational spills from production platforms in the Gulf of Mexico is thus inferred to be about one spill per production platform for every 10.6 years of production, assuming that a spill is equally likely to occur at any of the platforms. Applying this rate to Platform Gilda (having a projected 20-year production lifetime)

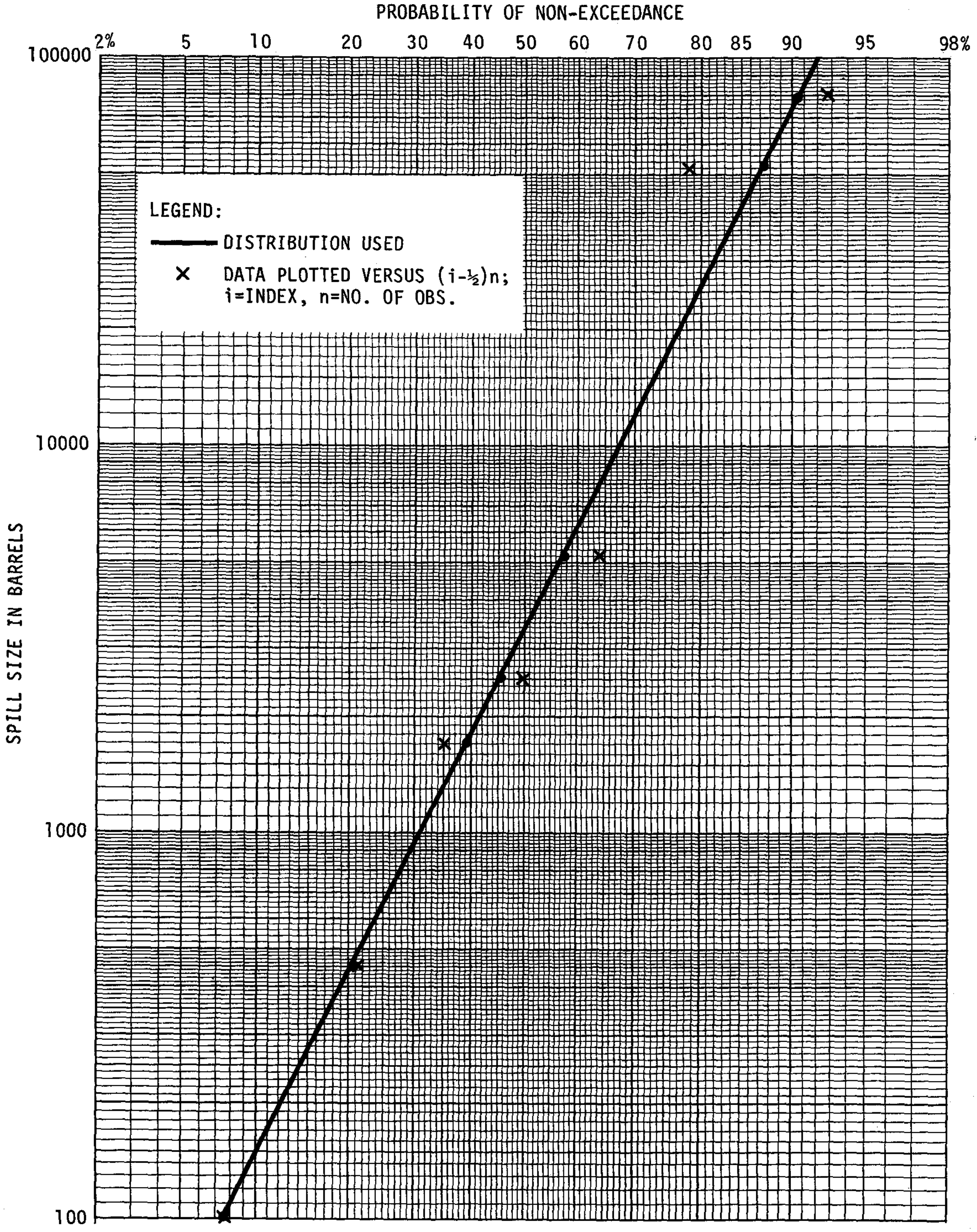

FIGURE 4.9-1

OIL SPILL SIZE DISTRIBUTION FROM BLOWOUTS

(CASE 1: SANTA BARBARA SPILL≈80,000 BARRELS)

DAMES & MOORE

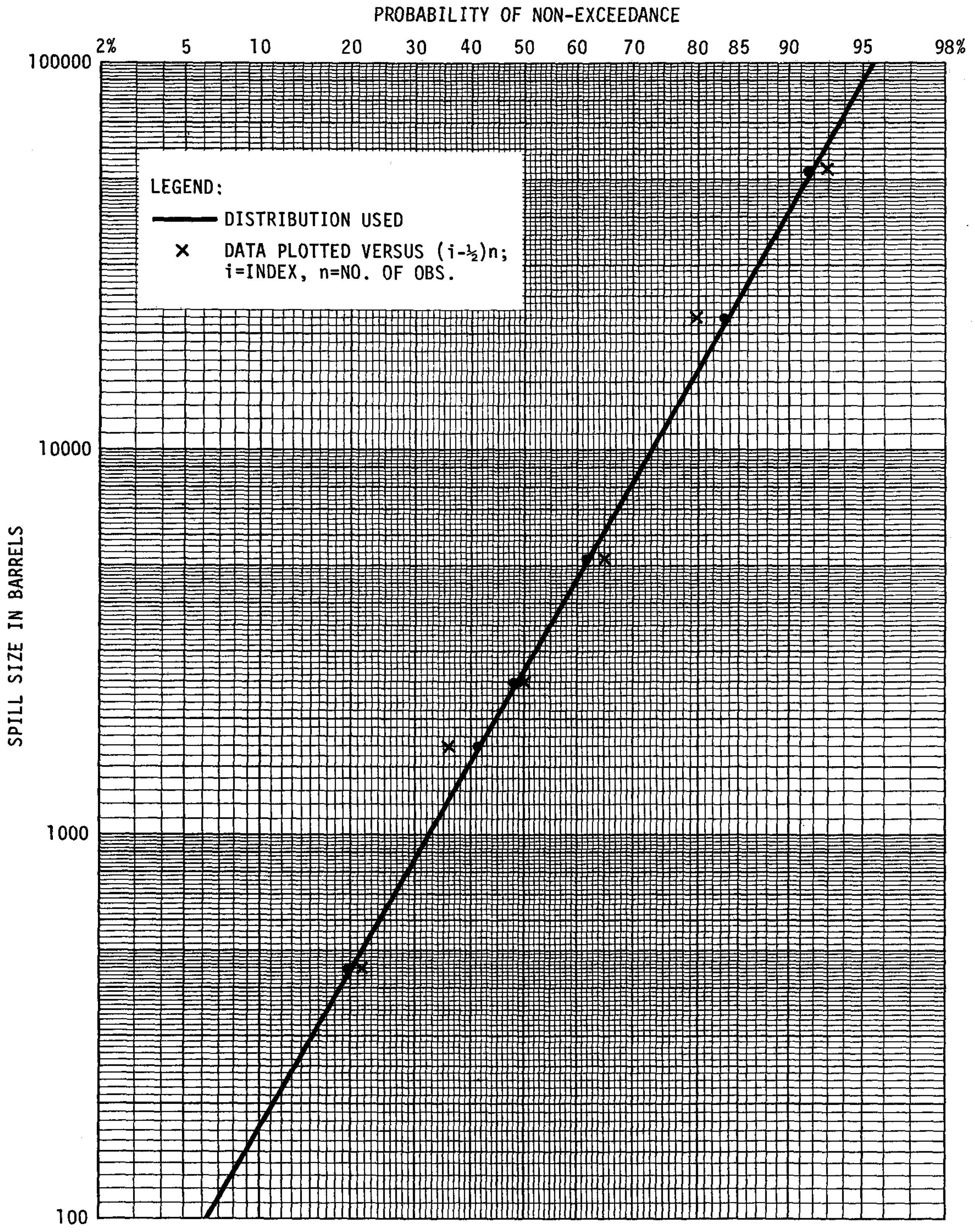

FIGURE 4.9-2

OIL SPILL SIZE DISTRIBUTION FROM BLOWOUTS

(CASE 2: SANTA BARBARA SPILL≈22,000 BARRELS) yields a statistical expectation of 1.9 spills over the total project lifetime.

One point should be noted relative to the applicability of the Gulf of Mexico OCS production platform spill statistics. The number of platforms experiencing one or more production-related spills declined almost continuously between 1971 and 1975, ranging from a high of 174 in 1971 to a low of 38 in 1974. Although this reduction could be attributable to normal statistical variation (i.e., chance), it is considered more likely that the improvement is a reflection of better equipment and more stringent regulations imposed on OCS operators. If the latter is the case, the spill rate derived above should be conservative for present day operations.

Spill Size Distribution

Ninety-nine percent of the production spills occurring on production platforms in the Gulf of Mexico OCS during 1971-75 were smaller than 50 bbl (8 m^3), with an average size of 4.26 bbl (0.7 m^3) (Danenberger, 1976). In comparison, the six major spills ranged in size from a low of 75 bbl (12 m^3) to a high of 9,935 bbl (1,580 m^3).

4.9.2.3.4 Pipelines

Rate of Occurrence

One parameter that may be used to estimate the probability of oil spills from pipelines is pipeline length. Although throughput volume is the preferred exposure variable, pipeline length was chosen because the data base for throughput volume is not well defined and, in addition, pipeline length is a parameter commonly used in various reporting schemes (OIW, 1978).

In a series of studies of pipeline spills in the U.S., it was determined that the annual spill rate for onshore pipelines was about 220 spills per 100,000 miles (161,100 km) of line while the annual spill rate for offshore pipelines was about 84 spills per 100,000 miles (161,000 km) of line (OIW, 1978). The likelihood of an onshore or offshore pipeline spill occurring during the project lifetime was estimated for each project configuration using: (1) the above-mentioned accident rates; (2) the onshore and offshore pipeline lengths for oil-containing pipelines as presented in Table 3.2-1; and, (3) an assumed 18-year lifetime for the Platform Gina incoming oil/water/gas line and 20-year lifetimes for other oil-containing lines (product oil pipeline and Platform Gilda incoming oil/water/line). The results are summarized below:

Project Configuration	Offshore Pipeline Length (miles)	Offshore Pipeline Chance of one or more spills during the project lifetime (percent)	Onshore Pipeline Length (miles)	Onshore Pipeline Chance of one or more spills during the project lifetime (percent)
Mandalay[1]	16.4	23	3.1	13
East Mandalay[2]	16.4	23	3.4	14
Union Oil Marine Terminal[2]	16.4	23	6.0	22
Ormond Beach Option A[2]	13.9	20	19.9	58
Ormond Beach Option B[2]	13.9	20	32.3	76

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[1] Proposed configuration

[2] Alternative configuration

Spill Size Distribution

The size distributions of petroleum spills exceeding 2.4 bbl (0.4 m^3) from onshore and offshore pipelines have been compiled by the OIW (1978) as part of their risk analysis study for the Northern Tier pipeline and transshipment facility. The size distributions for onshore and offshore pipeline spills are as follows:

Spill Size (bbl)	Percentage of Occurrence Among Spills Observed	
	Offshore Pipelines	Onshore Pipelines
More than 10	32.2	63.1
" " 100	11.9	15.4
" " 1000	6.8	2.9
" " 10,000	1.7	0.3

Note: Percentages apply to the class of spills exceeding 2.4 bbl (0.4 m^3).

4.9.2.3.4 Onshore Treating Facility

Rate of Occurrence

The data base for accidents resulting in oil spills from onshore treating facilities such as that proposed for the Platform Gina and Platform Gilda Project is not well defined. However, the treating facility for this project is somewhat analogous to the production system on an offshore production platform both in size (capacity) and operational characteristics. Consequently, the data base developed by Danenberger (1976) for mechanical failures/ equipment misuse on production platforms operating in the Gulf of Mexico OCS (1971-1975) was used to estimate the risk of oil spills at the proposed onshore treating facility.

During the 5-year period 1971-1975, there were 542 oil spill events on production platforms operating on the Gulf of Mexico OCS caused by equipment failure/misuse (Danenberger, 1976). Six of these were major spills (greater than 50 bbl; 8 m^3) and the remaining 536 were minor spills (less than 50 bbl; 8 m^3). Over the same 1971-1975 time period, there was an average of 1,150 production platforms operating on the Gulf of Mexico OCS having at least one producing well. The implied average rate of spillage caused by production equipment failure/misuse is thus about 0.094 spills per platform per year, or about one spill per platform every 10.6 years. The assumption is made that the equipment failures/human errors responsible for these spills are independent of the location of the production equipment; i.e., the spills would have been as likely to occur onshore as offshore. Assuming that the equipment and processing sequence at the proposed onshore treating facility is equivalent to that for an offshore oil production platform, the implied rate of spillage at the onshore treating facility is about 0.094 spills per year. Over the proposed 20-year lifetime of the project, there would be a statistical expectation of about 2 spills.

Spill Size Distribution

Based on Gulf of Mexico OCS accident data between 1971-75, about 99 percent of spills from production facilities attributable to equipment malfunction or misuse are smaller than 50 bbl (8 m^3), with an average volume of 4.26 bbl (0.7 m^3) (Danenberger, 1976). For spills greater than 50 bbl (8 m^3) (6 events representing 1 percent of total spills), the spill volume ranged from a low of 75 bbl (12 m^3) to a high of 9,935 bbl (1,580 m^3). It should be noted that the equipment at the proposed onshore treating facility would be placed below grade and surrounded by an 18- to 24-inch (45- to 60-cm)-high dike capable of containing the entire contents of all the tanks and other process equipment. Thus if a spill were to occur at the onshore treating facility, it is unlikely that offsite property would be affected.

4.9.3 Oil Spill Movement Analysis

An oil spill movement analysis was conducted for the proposed Platform Gina and Platform Gilda Project to identify the location and extent of possible shoreline contamination in the event of an accidental crude oil spill from an offshore or nearshore location (platform or pipeline). This information can be used in conjunction with data on the probability of occurrence for a spill event of a given size (Section 4.9.2) to provide perspective on the potential for exposure to spilled oil within the Santa Barbara Channel and associated shoreline areas.

Several factors influence oil transport in the marine environment, including spill volume, physical and chemical properties of the oil, meteorological conditions (primarily wind speed and direction), oceanographic conditions (principally current speed and direction), and biological processes.

Currently available analytical methods for predicting oil spill movement have varying limitations on their usefulness related to their ability to take into account the preceding factors. For this study, three methods of analysis were used to address the range of potential spills that might occur: (1) a trajectory analysis for a spill volume less than 10,000 barrels (bbl; 1,590 m^3); (2) a shoreline model for a spill source in the nearshore zone; and, (3) a qualitative analysis for a spill volume substantially larger than 10,000 bbl (1,590 m^3).

A detailed discussion of the oil spill movement analysis is provided in Appendix B.2. This includes an explanation of methodology, environmental data inputs, detailed results, and graphical displays of results. The following sections summarize and highlight the results of the three methods of analysis.

4.9.3.1 Trajectory Analysis

The trajectory analysis was used to model the movement of the centroid of an oil spill with the objective of identifying the area of shoreline that would be impacted, and the estimated time for the oil slick to reach the impact point. In this model, the slick centroid is assumed to move at the same instantaneous velocity as the vectoral sum of the underlying oceanic and tidal currents, as well as 3 percent of the wind speed. Trajectory results are not dependent on oil spill volumes or mass-dependent effects of oil. However, the applicability of the results is related to spill volume. The maximum spreading diameter for a 10,000-bbl (1,590-m^3) spill under calm conditions is about 3.5 miles (5.6 km). The trajectory analysis predicts a range of shoreline impact areas substantially larger than would be expected for this spreading diameter. Predictive errors increase substantially with larger volume spills and associated greater spreading diameters. For this reason, the trajectory analysis is considered valid for spill volumes of 10,000 bbl (1,590 m^3) or less.

Trajectories were calculated for five spill release locations: Platform Gina, Platform Gilda, the midpoint of the proposed Platform Gina Mandalay offshore pipeline route, the midpoint of the proposed Platform Gilda offshore pipeline route, and the midpoint of the Platform Gina Ormond Beach alternative offshore pipeline route. Thirty-six trajectories were generated for each combination of spill site, wind scenario, and oceanic current condition for a total of 1,140 trajectories. Each trajectory was calculated using the following data combinations:

(1) 5 wind scenarios (summer, winter, Santa Ana, pre-storm, and calm)
(2) 2 oceanic surface current patterns (strong and weak)
(3) 1 tidal current pattern
(4) 6 wind starting times (4-hour interval)
(5) 6 tidal current starting times (4-hour interval)
(6) 5 oil spill sites.

The results of the trajectory analysis were then displayed on gridded maps of the Santa Barbara Channel area, keyed to the five wind scenarios identified above. (Wind conditions are the dominant factor influencing movement of an oil slick.) The maps indicate the locations of shorelines that would be impacted, the estimated time to reach the impact point, and the percentage frequency of impact along shoreline areas (Appendix B.2, Figures B.2-21 through B.2-45). An annual summary that includes the combined effects of the five wind scenarios was also prepared (Appendix B.2, Figure B.2-46).

The results of the trajectory analysis indicated that the majority of impact points would occur in the immediate vicinity of Port Hueneme; however, impacts ranged from the eastern Santa Barbara Channel Islands to as far west as Santa Barbara. The overall results in terms of the five wind scenarios were as follows:

(1) The summer condition moved the slick directly to the Port Hueneme area.
(2) Both the winter and calm conditions moved the slick downcoast, parallel to the shoreline, with few shoreline impacts within the Santa Barbara Channel area.

(3) The Santa Ana condition directed oil to the eastern shorelines of the Santa Barbara Channel Islands.

(4) The pre-storm (southeaster) condition directed the slick upcoast toward Santa Barbara with some shoreline impact.

4.9.3.2 Nearshore Model

A shoreline model was used to predict the movement of oil with an assumed release point in the nearshore zone (i.e., accidental spillage from a pipeline). The shoreline model includes a dependence on spill volume. It predicts the position and diameter of a slick as a function of time as it travels along the coast. The model indicates estimated lengths of contaminated coastline for various combinations of spill volumes, deposition loads (volume per unit area), and longshore currents.

The results of the nearshore analysis relate to the cause of a pipeline break at the coastline. Release volumes were calculated by combining the entire amount of oil contained in an offshore pipeline and in a small section of its onshore component. Because the proposed Mandalay pipeline route and Platform Gilda pipeline route cross the nearshore zone in a common corridor, a break of the Platform Gilda pipeline was addressed as a worst case since the maximum spill volume would be greater. The Ormond Beach alternative pipeline route was also evaluated. For the proposed Platform Gilda and Ormond Beach alternative pipelines, the spill volumes calculated were 4,000 bbl (636 m^3) and 9,000 bbl (1,431 m^3), respectively. From the data in Appendix B.2 (Figures B.2-47 and B.2-48), the total length (miles; km) of coastline contaminated by oil and the duration (days) of the active phenomena can be calculated. For example, at the Ormond Beach alternative pipeline, a current of 0.5 knot (0.25 m/sec) and a deposition load of 600 bbl/mile (50 m^3/km) would result in the contamination of approximately 7.8 miles (12.5 km) of coast in a time of 14 hours. For the proposed Platform Gilda pipeline, the same current and deposition load would cause the contamination of 18 miles (29 km) in 32 hours.

The longshore current direction is southward about 70 percent of the time. A coastal spill of 4,000 bbl (636 m^3) at Port Hueneme could contaminate the coast to Point Laguna if the current direction was southeast, or to the Ventura Marina if the current was northwest. A spill from a break of the proposed Platform Gilda pipeline at the coastline could contaminate beaches up to 3 miles (5 km) southeast of Point Mugu or as far as Rincon Point 2.5 miles (4 km) southeast of Carpinteria.

4.9.3.3 Large Offshore Spill

There is general agreement among experts in the field that the state-of-the-art for modeling is inadequate for application of a quantitative dispersion analysis to oil spills substantially in excess of 10,000 bbl (1,590 m^3). Current oil spill modeling efforts are limited by an insufficient understanding of the basic phenomena and the difficulties associated with accurately specifying the dominant environmental driving forces over a large area. For these reasons, a qualitative analysis was used to estimate the possible extent of shoreline contamination for a very large spill. The analysis incorporated consideration of known parameters influencing spill behavior and data available concerning the 1969 Santa Barbara Oil Spill.

This qualitative analysis considered the predominant mechanisms involved in a large offshore spill and an assessment of the potential range of shoreline exposure. The two primary mechanisms for large spill movements are surface transport and mass-dependent effects of the oil. The surface transport mechanism is mainly controlled by oceanographic and meteorologic factors. The mass-dependent effects, which depend on environmental factors and oil properties, include spreading, evaporation, dissolution, dispersion, emulsification, sedimentation, biodegradation, and photooxidation. Each of these effects is explained in detail in Appendix B.2. The surface transport of the oil slick would mainly be influenced by wind velocity and direction. The following paragraphs discuss potential slick movement from a large spill primarily as a function of seasonal wind conditions.

If a spill substantially greater than 10,000 bbl (1,590 m^3) should occur at Platform Gina or Platform Gilda during typical wind conditions, the resulting slick would generally impact the shoreline between Carpinteria and Santa Monica Bay in one to three days. After three days, the oil slick would continue to travel downcoast, reaching perhaps Newport Beach or beyond. Weathered segments of the slick could be circulated in the eastern Santa Barbara Channel current gyre and impact the eastern Santa Barbara Channel Islands and the mainland, possibly to Point Conception.

For a large spill occurring during severe weather conditions, such as a pre-storm southeaster wind or Santa Ana conditions, the slick would travel away from the spill area at a relatively fast rate. A Santa Ana wind condition would move the slick away from either of the platforms southwestward, causing all sides of the Santa Barbara Channel Islands to be impacted in a time of less than one to just over two days. If, after this time, the Santa Ana conditions end and typical wind patterns resume, the prevailing wind and current conditions could push segments of the slick southeasterly, impacting San Nicolas, Santa Catalina, and San Clemente islands. Other slick portions may be driven to the mainland, impacting the shoreline from Point Conception to Santa Monica.

A pre-storm southeaster would move the slick from either of the platform sites northwesterly up the coast. In this case, the area of greatest initial impact would be the Santa Barbara area. The time until impact would be up to two days. During this time, the oil could possibly travel upcoast, north of Point Conception. It is assumed that the slick would not be pushed further north because a southeaster wind condition is not expected to last more than two days. After the southeaster condition ended and if prevailing winds resumed, the oil slick would probably travel back downcoast and contaminate the shoreline to perhaps Santa Monica; it could possibly reach some of the Santa Barbara Channel Islands.

Overall, a large oil slick could result in shoreline impacts from approximately Point Conception to Newport Beach during typical prevailing winds. The coastline of the Santa Barbara Channel Islands and outer Channel Islands, along with the mainland coastline, would be contaminated during Santa Ana conditions. During a pre-storm southeaster wind condition, the most severe shoreline impact would be in the Santa Barbara vicinity. The slick would impact from approximately Point Conception to Santa Monica and perhaps reach some of the Santa Barbara Channel Islands.

4.9.4 Platform Structural Design

Structural design studies for Platform Gina have been completed by Santa Fe Engineering Services Company (1979). A third party design verification study, required by USGS regulations, was conducted by PMB Systems Engineering, Inc. (1980). These studies were conducted under contract to Union and involve proprietary information that is not publically releasable; however, non-proprietary information is on file at Union's Ventura offices and available for inspection by appropriate parties.

The following sections provide a highlighted summary of findings from the two consultant studies mentioned above. These two firms are completing similar studies for Platform Gilda; however, results are not currently available for summarization in this EIR/EA.

4.9.4.1 Design Criteria

Environmental conditions considered by Santa Fe in design of Platform Gina were: wave, current, wind, and earthquake. Gravity loads were considered for two phases of platform operation: drilling and production. Since the drilling phase would last for only one year, environmental loadings were modified (reduced in intensity) for this short time span. Oceanographic criteria were based on studies by Intersea Research Corporation (1976).

For the drilling phase, a 50-year design wave with a 33-foot (10-m) height and 13-second period was used along with a 25-year storm wave that was 28 feet (8.5 m) high and 11-seconds in period. For the production phase, a 100-year design wave was specified with a 42-foot (12.8-m) height and a 15-second period.

The design current was conservatively assumed to be inline with the maximum design wave. The current velocity was 1.5 knots at the ocean surface and 0.5 knot at the seafloor (mudline).

Geotechnical Consultants, Inc. (1976) recommended site-specific earthquake design spectra for a platform at the proposed Gina site. However, Santa Fe chose to design to the more recent seismic criterion in the API RP2A, 9th Edition using the design response spectra shown on Figure 4.9-3. This criterion considers site soil effects in a quantitative manner with a variable soil factor. The Platform Gina site was assumed to match soil category B, a shallow strong Alluvium consisting of competent sands, silts and stiff clays with shear strength in excess of 1,500 psf (72 kPa), limited to depths of less than about 200 feet (61 m), and overlying rock-like material.

Two design earthquake levels are suggested in API:

(1) Strength Level - The platform members should be adequately sized (proportioned) in terms of strength and stiffness to prevent yielding or buckling for the level of earthquake motion that may normally be expected during the life of the structure.

(2) Ductile Level - The platform should be designed with sufficient energy absorption capacity to prevent its collapse during rare intense earthquake motions. The platform may be engineered to possess the energy absorption capacity by using ductile materials, compact sections (members that yield without brittle local buckles), redundant or alternate load paths, stronger sections at joints, and good detailing.

For the Santa Barbara Channel Region, API has recommended a seismic zone 4 earthquake activity index. The Strength Level earthquake has an effective horizontal ground acceleration (or scale factor on the spectrum shown on Figure 4.9-3) of 0.25. For the Ductility Level event, the scale factor suggested by API is twice the strength level or 0.5.

Santa Fe conservatively chose to design the platform to remain elastic (all member stresses were kept below yield or buckling stress) for the Ductility Level (rare intense) event. Thus, the reserve energy absorbing capacity of the inelastic structure is available in the event the site experiences a larger earthquake than anticipated by API for the Santa Barbara Channel.

Santa Fe (1979) states that the seismic design criteria it selected governed the size and strength of the majority of the elements in the structure and foundation. PMB Systems (1980) states that the seismic input criterion is consistent with industry recommendations and is equal to or more conservative than recent practices in the Santa Barbara Channel.

Gravity loads for the two phases of platform operation were considered in the design. For the drilling phase, these loads included:

(1) Dead weight of the structure

(2) Dead weight of equipment and tanks with their contents
(All tanks 50 percent full)

(3) Pipe rack storage

(4) Live loads varying from 200 to 1,000 psf (10 to 48 kPa) over the deck

For the production phase, the loads included:

(1) Dead weight of the structure

(2) Dead weight of equipment at the production and subdeck levels

(3) Live load of 50 psf (3 kPa) on the drilling deck
(All tanks 50 percent full)

(4) Live load of 50 psf (3 kPa) on the production and subdeck areas not occupied by equipment

Wind, wave, current, and gravity loads were treated as static loads. Earthquake loading was analyzed dynamically. Earthquake loads were conservatively considered to act in three mutually perpendicular directions along the principal axis of the structure: 100 percent in one horizontal

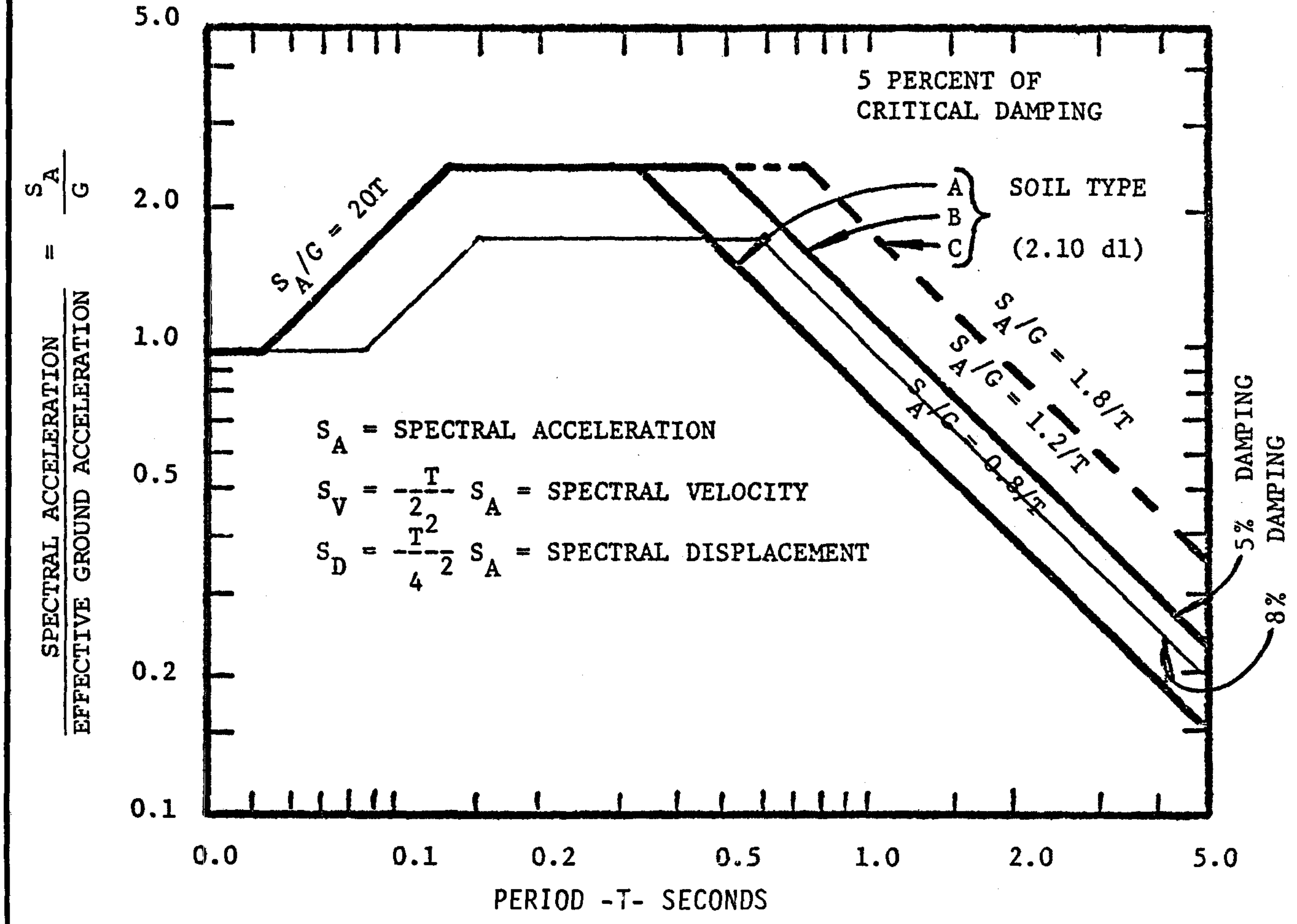

FIGURE 4.9-3

PLATFORM GINA DESIGN RESPONSE SPECTRA

API RP2A FIG. 2.10 d.2

RESPONSE SPECTRA

SPECTRA NORMALIZED TO 1.0 GRAVITY

DAMES & MOORE

REFERENCE: SANTA FE ENGINEERING SERVICES COMPANY, 1979 direction, 67 percent in the other horizontal direction, and 50 percent vertically. The typical load combinations considered in the design included:

(1) Dead load plus drilling live load.

(2) Dead load plus production live load.

(3) Dead load plus drilling live load plus 50-year storm (winds, wave, current)

(4) Dead load plus production live load plus 100-year storm

(5) Dead load plus drilling live load plus Strength Level earthquake (5 percent of critical damping)

(6) Dead load plus production live load plus Strength Level earthquake (5 percent of critical damping)

(7) Dead load plus production live load plus Ductility Level earthquake (8 percent of critical damping).

Storm and earthquake factors were not considered in the combined loading cases. This is consistent with current platform design practice. The rare intense, Ductility Level earthquake was not considered as a load combination during the one-year drilling phase. The probability that such an event will occur during the one-year drilling period is relatively low. Furthermore, design results reported by Santa Fe indicate earthquake forces in the structure for the Strength Level event were only 10 percent larger during the drilling phase than during the production phase.

4.9.4.2 Analytical Methodology

4.9.4.2.1 Computer Solutions

The platform analysis was conducted using two separate 3-dimensional linear elastic structural analysis programs. Static loads (e.g., operational, wind, wave, and currents) and pseudo-dynamic (e.g., maximum earthquake load patterns) were analyzed with Santa Fe's SPACE4 computer program. Dynamic earthquake loads were computed with SAP V, a general purpose computer program developed at the University of California at Berkeley and the University of Southern California.

A two-part analysis was performed. Dynamic earthquake forces at each joint in the structure were computed with SAP V. These inertia joint loads were combined as static load patterns along with the other static loads (see load conditions 5, 6, and 7 in Section 4.9.4.1) in the SPACE4 computer analysis. Structural member stress levels were checked by the computer program to see that they met API and AISC design guidelines.

The pseudo-dynamic analysis followed by Santa Fe used conservative assumptions for combining the seismic load patterns and resulted in a conservative design. This fact was demonstrated by the separate dynamic analysis that was performed with SAP V to study the influence of soil-pile stiffness on structural member sizes.

4.9.4.2.2 Models

Two models were formulated to analyze the platform. The first model represented the structure as series of 3-dimensional beam column members and the piles as beams laterally supported by equivalent elastic soil springs. The properties for the soil springs were based on Geotechnical Consultants' (1976) recommendations. This model was analyzed with SAP V and SPACE4.

The second model represented the structure in the same general form but modelled the pile-soil stiffness as a single beam with the equivalent pile head stiffness characteristics. The spring constraints for the soil stiffness were based on a report by Civil Systems, Inc. (1979).

The second model was analyzed with SAP V and the member forces compared with the original solution with SAP V and SPACE4. The results from the second model using the more vigorous dynamic analysis were reportedly less than the results from the original model using pseudo-dynamic analysis procedures.

4.9.4.2.3 Results

The computed fundamental period of platform vibration ranged from 0.89 seconds (Production Phase - Original Model) to 1.09 seconds (Drilling Phase -

Second Model). This period range is consistent with the computed periods for other Santa Barbara Channel Templet type platforms.

The critical load combination that controlled most of the structural and foundation member sizes was Case 7: dead load, production live load plus Ductility Level earthquake. This is consistent with platform design experience in the Santa Barbara Channel. Storm load conditions are relatively insignificant in contrast with earthquake. In fact, computed fatigue stress from wave and current loads were so low that they were neglected in the design, per API recommended criteria.

4.9.4.3 Design Procedures

4.9.4.3.1 Platform

Santa Fe designed the platform members with a safety factor of 1.67 to 2.0 against yield in tension or buckling in compression for normal platform dead loads and operational live loads. The American Institute of Steel Construction (AISC) (1969) specifications and API Recommended Practices for Designing and Constructing Fixed Offshore Platforms (API RP2A, 9th Edition) were used as the basis for computing allowable design stresses.

Under storm conditions the allowable stress was increased by 1.33, reducing the safety factor to about 1.26 to 1.5. For the Strength Level and the Ductility Level earthquakes, the allowable stress was multiplied by 1.7, reducing the safety factor to approximately 1.0. Thus, structural members would be at initial yield or buckling under load combinations that included the Strength and Ductility Level earthquake. These increases in allowable stress for temporary storm conditions and rare intense earthquakes are consistent with API recommended practice and conventional structural design.

Structural members were designed with steels that possess good energy absorbing characteristics and are capable of resisting post yield deformations without brittle rupture. These properties are considered vital to earthquake survivability. The weaker joint zones where tubular members interconnect were reinforced with thick-walled tubes that were heat treated (normalized) to minimize lamellar tearing, a brittle form of failure of thick welded steel plate sections at points of high constraint. By reinforcing the joint zone, all inelastic deformation would be concentrated in the interconnecting members where the behavior is more predictable and generally more ductile.

To assure plastic hinging of the tubular members rather than brittle local buckling failure, the diameter-to-wall-thickness ratio was kept below 94, the API recommended limit. However, the diameter-to-wall-thickness ratios used in the design were not generally low enough to assure compact section behavior (i.e., plastic redistribution of loads in yielded members), according to PMB Systems. This should not represent a significant weakness in this case since the structure was designed to remain elastic for the Ductility Level earthquake. Only events greater than the API specified earthquake would require inelastic deformation, plastic hinging and redistribution of loads.

4.9.4.3.2 Foundations

The safety factor for downward thrust on the piles during the Ductility Level earthquake ranged from 1.24 to 2.2, depending on the depth of final pile penetration and consultant recommendations. Normal design would provide a safety factor of 1.0 under this rare intense earthquake.

The safety factor against pile uplift ranges from 0.73 to 2.3, again depending on final pile embedment and consultant recommendations. This variation in safety factors is to be expected. The low value of 0.73 reflects conservative Gulf of Mexico platform design practice for wave and current loadings. These loads drive the platform in one direction and produce uplift that could pull the pile out of the soil. Earthquake motions are cyclic and short in duration; thus, the tendency for pile pull-out to develop is very remote.

According to Geotechnical Consultants (1976), their anlaysis of the site indicates liquefaction will not occur, even under the most critical earthquake conditions. The site is relatively level and appears to be "grossly stable even under the maximum credible earthquake conditions".

4.9.4.4 Conclusions

Platform Gina's structural members have been designed to remain unyielded and unbuckled under a rare intense earthquake assumed by API committees to be representative of Santa Barbara Channel earthquake activity. Wave, current, and operating loads were also considered in the design but were not found to be critical.

4.10 MARKETING/TRANSMISSION ISSUES

4.10.1 Crude Oil Supply and Demand

4.10.1.1 United States

A 10-year historical summary of crude oil supply and demand within the United States (U.S.) is presented in Table 4.10-1. Total domestic demand for crude oil increased from 10.909 million barrels per day (B/D) in 1970 to 14.817 million B/D in 1979. During the same period, domestic crude oil production declined from 9.637 million B/D (1970) to 8.550 million B/D (1979). The widening gap between domestic crude oil production and demand has resulted in an increasing U.S. dependence on foreign imports. In the year of the Arab oil embargo (1973), the U.S. was importing an average of 3.244 million B/D of crude oil which accounted for approximately 26 percent of total U.S. crude refinery runs. By 1979, crude imports averaged 6.348 million barrels per calendar day and constituted about 44 percent of total U.S. crude refinery runs.

The Carter Administration is implementing several policies in an effort to reverse the trend towards increasing U.S. reliance on foreign imports. Among these are the stimulation of domestic crude oil production and dampening of demand growth through the decontrol of domestic crude oil prices, and the reduction of foreign imports by one-half by 1990. Higher prices and conservation incentives are expected to be successful in slowing the U.S. oil demand growth rate. However, the U.S. is still expected to use more oil in 1990 and 2000 than it used in 1979.

To the extent that U.S. energy policies can stimulate domestic production and reduce demand, the U.S. will become less vulnerable to unpredictable foreign supply disruptions. In a simplified context, every barrel of increased domestic production (or equivalent reduced demand) would correspondingly decrease the need for foreign crude oil to be imported. Developments resulting from OCS lease sales represent one means by which domestic crude oil production can be increased. The proposed Platform Gina and Platform Gilda Project is part of this latter scenario.

TABLE 4.10-1

CRUDE OIL SUPPLY AND DEMAND IN THE UNITED STATES, 1970-1979
(Thousands of barrels daily)

	1979*	1978	1977	1976	1975	1974	1973	1972	1971	1970
SUPPLY										
Crude imports	6,348	6,071	6,548	5,287	4,105	3,477	3,244	2,222	1,681	1,324
Crude production	8,550	8,701	8,179	8,119	8,375	8,764	9,208	9,477	9,463	9,637
Total new supply	14,898	14,771	14,727	13,406	12,480	12,241	12,452	11,699	11,144	10,961
DEMAND										
Crude refinery runs	14,542	14,739	14,605	13,416	12,442	12,133	12,431	11,731	11,199	10,870
Crude transfers	15	15	14	19	17	15	19	12	17	14
Crude exports	245	158	50	8	6	2	2	1	1	14
Crude loss	15	16	16	14	13	13	13	13	12	11
Total crude demand	14,817	14,928	14,685	13,457	12,478	12,163	12,465	11,757	11,299	10,909
Stock change**	+81	-157	+42	-51	+2	+78	-13	-58	-155	+52

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*Preliminary
**Includes unaccounted for crude

Reference: Oil & Gas Journal, 1980.

4.10.1.2 West Coast

California is included in Petroleum Administration District (PAD) V, along with Alaska, Washington, Oregon, Nevada, Arizona, and Hawaii. During 1978, PAD V oil consumption amounted to 2.6 million B/D. Of this total, California consumed approximately 80 percent or 2.1 million B/D. Table 4.10-2 shows the District V 1978 and estimated 1979 supply/demand balance for crude oil and petroleum products. Although California and Alaska rank among the top four oil and gas producing states, the table indicates that PAD V currently imports approximately 700 thousand barrels per day (MB/D) of foreign crude and products. At the same, PAD V transships approximately 400-500 MB/D of Alaskan crude to Districts I - IV. Refined products are also shipped out of PAD V to Districts I - IV, even though PAD V is an importer of refined products.

The reason for the above import/export practices is that existing California refineries--which represent the bulk of West Coast refinery capacity--are not capable of processing all of the available California and Alaskan crude oil without producing a surplus of heavy products (fuel oils) and a deficit of light products (gasoline). California and Alaskan crudes are typically low in gravity and high in sulfur content. Refiners have traditionally depended on substantial imports of high-gravity, low-sulfur crude oil from Indonesia and other sources to balance their feedstocks and produce their required demand slates. At the present time, California and Alaskan crude oil production in PAD V exceeds refinery demand. As a consequence, surplus North Slope oil is being diverted to refineries in the Virgin Islands and the U.S. Gulf Coast.

The PAD V production-refining mix problem is currently under study by a joint committee of California state agencies and oil companies in the context of refinery modifications that would have to be made to permit the increased utilization of California and Alaskan crude oils. Until such time as these modifications are completed, no more than 1.0 million B/D of North Slope-quality crude can be processed in PAD V, and surplus production will continue to move to PADs I - IV.

TABLE 4.10-2

U.S. DISTRICT V SUPPLY/DEMAND[a]
(MB/D)

Demand	1978	1979
District V consumption	2624	2754
Interdistrict and foreign product shipments	136	115
Total Demand	2760	2839
Supply		
Production		
California crude & NGL	951	995
Alaskan pipeline throughput	1065	1250
Cook Inlet production	137	121
Subtotal PAD V production	2153	2366
Foreign Imports		
Crude oil	571	560
Products	120	150
Subtotal	691	710
Interdistrict product receipts	167	155
Refinery process gain	112	115
Total Supply	3123	3346
Alaskan Crude Interdistrict Shipments:	363	507
Memo: Refinery capacity	2889	2868
Crude runs	2361	2419
Percent utilization	82	84

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[a] Reference: Oil Company (confidential), 1979

4.10.1.3 California and the Santa Barbara Channel Production Trends

California currently ranks as the nation's fourth leading oil and gas producing state, behind Texas, Louisiana and Alaska. As of December 31, 1978, the state had 229 active oil fields, 43,375 producing wells, and a production rate of 918 MB/D (Division of Oil and Gas, 1979). California's cumulative oil production through December 31, 1978 was 18.1 billion barrels. Estimated recoverable oil reserves at the end of 1978 totaled 4.2 billion barrels.

Figure 4.10-1 depicts crude oil production trends for California and its three constituent producing subregions during the past decade. Production from the Los Angeles basin and coastal region (including state tidelands and federal OCS offshore production) has declined since 1970, while production from the San Joaquin Valley has increased. Development of the Elk Hills and Yowlumne fields, and expanded steam injection projects in the Kern River, South Belridge, Midway-Sunset, and Mount Poso fields, are primarily responsible for the rise in San Joaquin production since 1970. All of these fields are located within Kern County, the county which presently accounts for approximately 54 percent of total crude oil production in California.

Oil production within the Santa Barbara Channel dates back nearly a century. The earliest production records date back to 1895 when Watts (1896) reported the production of 16,904 barrels of oil in tidelands off Summerland. Since that time, crude oil production within the Santa Barbara Channel has fluctuated in response to new oil field discoveries and the abandonment of fields from which oil and gas have been withdrawn.

Figure 4.10-2 illustrates the three major phases in the oil production history of the Santa Barbara Channel. The earliest discovered fields (e.g., Summerland, Rincon, Ellwood, Capitan, Mesa, Montalvo West) were developed by wells drilled directionally from onshore coastal bluffs or from piers adjacent to the shoreline. The trend toward drilling in deeper water began in 1958 when the State authorized the construction of platforms out to the 3-mile limit. The Summerland Offshore, Coal Oil Point Offshore, Conception Offshore, Cuarta Offshore and Alegria Offshore fields were developed between 1958 and 1962, followed shortly thereafter by the development of the Point Conception, Ellwood South Offshore, and Carpinteria Offshore fields. Production from reserves lying further offshore (beyond the 3-mile limit) was made possible by the issuance of a federal lease in 1967 granting an extension of the Carpinteria Offshore field into federal OCS lands. This was followed by a major OCS lease sale in February of 1968. The proposed Platform Gina and Platform Gilda Project is a result of the OCS lease sale program, and would represent a continuation of the historical trend for new Santa Barbara Channel production to occur at progressively greater distances from the shoreline.

Through 1979, cumulative oil production from the Santa Barbara Channel totaled approximately 585 million barrels. OCS production (Platforms A, B, C, Hillhouse, Houchin, and Hogan) accounted for approximately 33 percent of this amount. The peak production year was 1971, when 40.6 million barrels of crude oil were produced from state tidelands and OCS lease tracts combined. State tidelands production rose during 1979 after experiencing a steady 11-year decline. OCS production increased rapidly between 1968 and 1971, and has been declining rapidly thereafter. In response to the nation's need for new domestic supplies, planned industry efforts to produce from existing Santa Barbara Channel leases and to explore anticipated lease sale #53 areas may halt or reverse this decline.

4.10.1.4 Forecast of Future PAD V Supply/Demand

The California Energy Commission (CEC) has prepared several forecasts of California's energy consumption patterns by the year 2000. Two such projections are presented in Table 4.10-3. Scenario II is a "conventional" case which assumes that petroleum use will grow 1.4 percent annually from 62 percent of total energy consumption in 1978 to 64 percent by the year 2000. Scenario III assumes that a more aggressive shift to alternate resources will result in a 0.2 percent annual growth rate in petroleum use. Both of these assumed growth rates are substantially lower than the 4.5 percent annual increase in PAD V consumption observed between 1960 and 1973 and in the years following the Arab oil embargo.

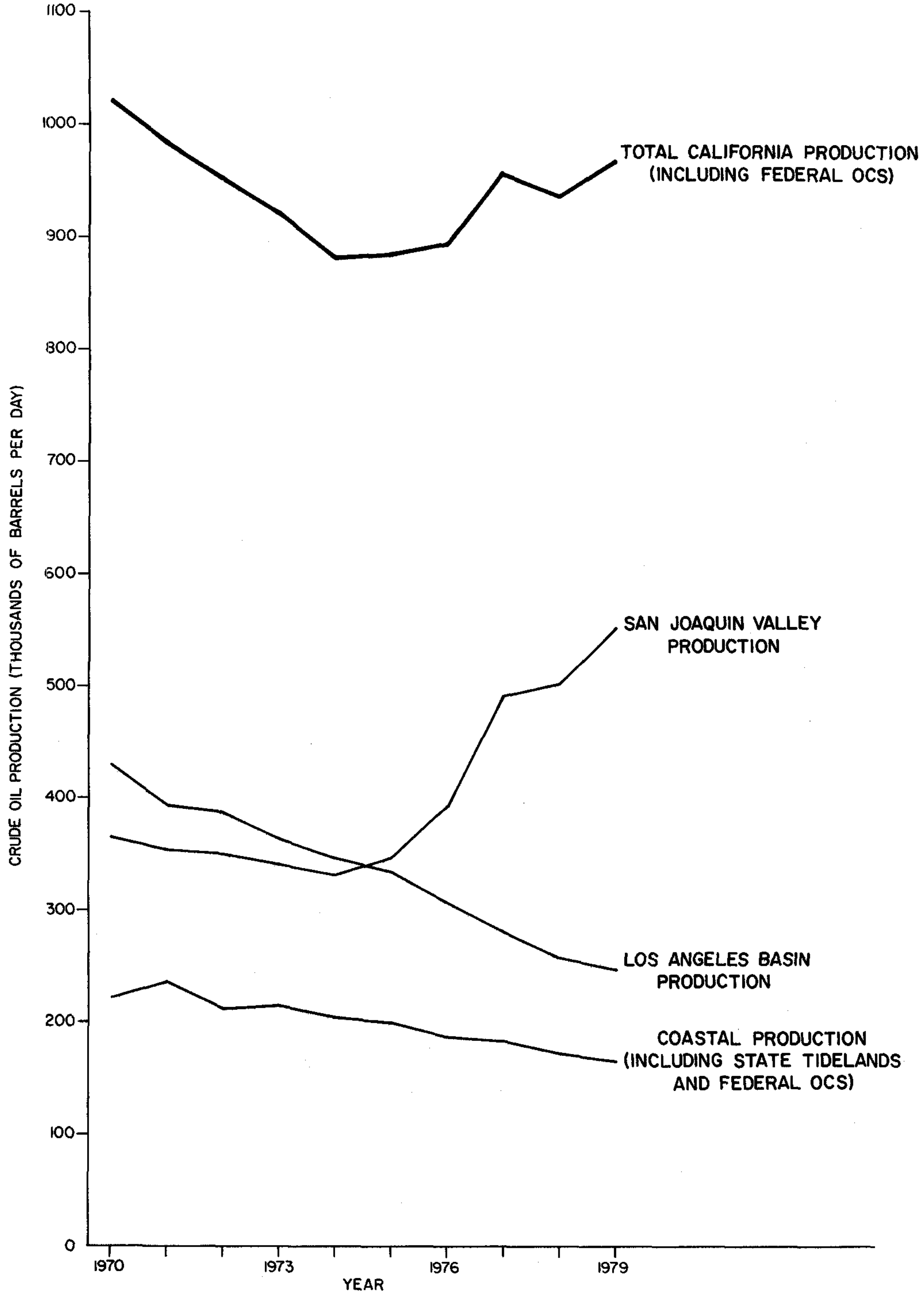

FIGURE 4.10-1

CALIFORNIA CRUDE OIL PRODUCTION TRENDS, 1970-1979

REFERENCE: OIL & GAS JOURNAL (1980)

DAMES & MOORE

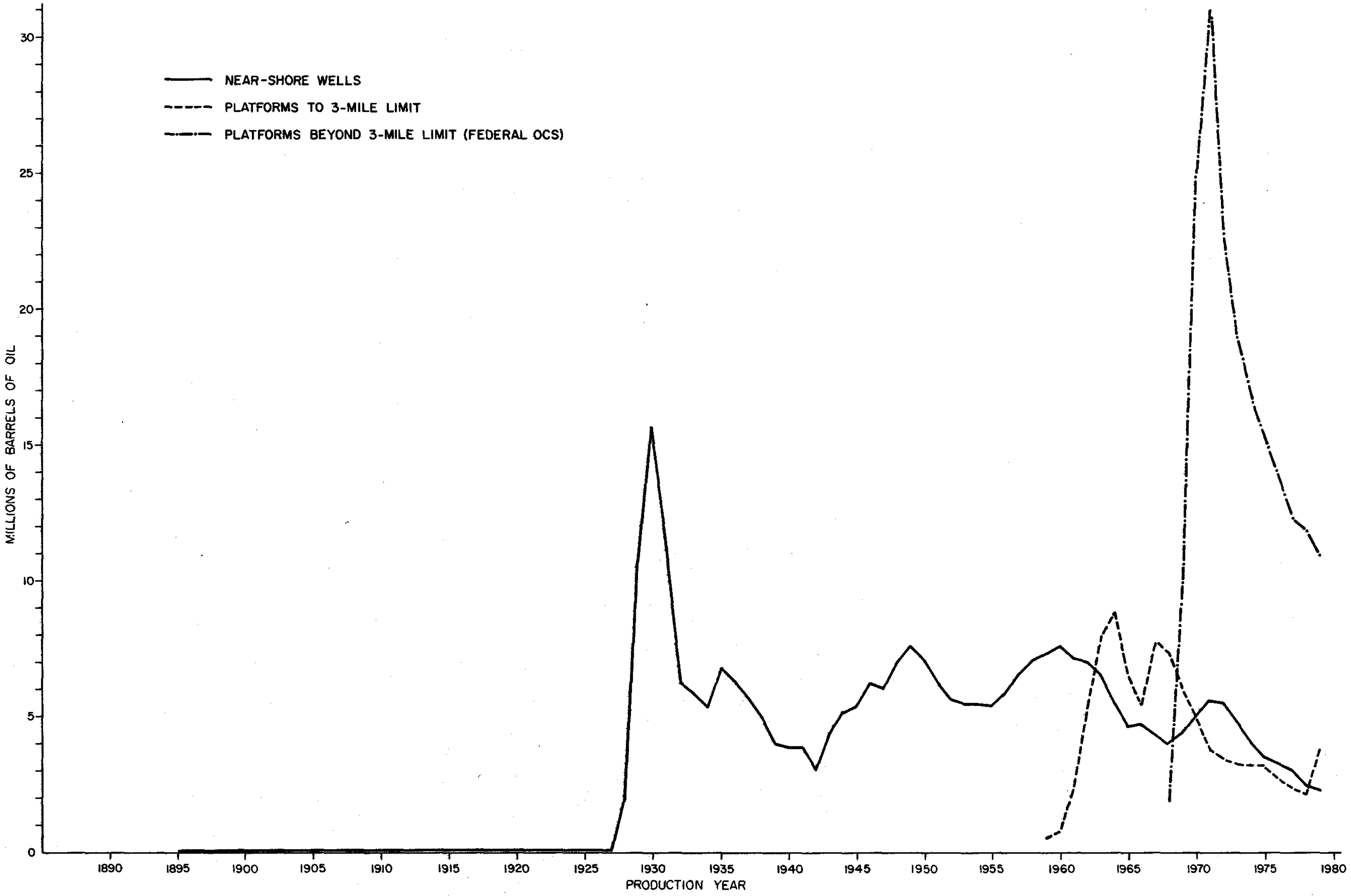

FIGURE 4.10-2

OIL PRODUCTION WITHIN THE SANTA BARBARA CHANNEL

REFERENCE: DATA COMPILED FROM CALIFORNIA DIVISION OF OIL AND GAS (VARIOUS DATES); CALIFORNIA STATE MINING BUREAU (VARIOUS DATES); U.S. GEOLOGICAL SURVEY (1978); HARDOIN (1979)

TABLE 4.10-3

CALIFORNIA NET ENERGY CONSUMPTION BY FUEL TYPE
(MB/D Oil Equivalent)

	1978	2000	
		Scenario II	Scenario III
Gasoline	1,014	1,037	748
Aviation fuels	278	470	447
Distillates	274	354	305
Other petroleum products	491	927	629
Subtotal: Petroleum products	2,057	2,786	2,129
Natural gas	838	809	692
Electricity	346	531	445
Bio Mass	45	105	208
Coal	38	69	69
Geothermal	8	22	107
Solar	0	9	76
Methanol	0	32	63
Net Total Consumption	3,332	4,363	3,789

Reference: California Energy Commission, 1979d.

NOTES: 1. Scenario II is the conventional outlook and represents what the CEC expects to happen without additional actions to redirect established trends in California energy use.

2. Scenario III emphasizes alternative resources and reflects CEC thinking about an achievable future use pattern which minimizes reliance on conventional resources and reduces oil use drastically from the conventional forecast.

3. The underlying state economy growth rate appears to be between 3.25 - 3.5 annually over this period, based on Table 3 in California Energy Commission, 1979e.

Table 4.10-4 shows a moderate base case PAD V demand forecast prepared by Dames & Moore using published and inhouse data. This forecast calls for petroleum use to grow at 1.7 percent annually to 1985, but to average 1.0 percent over the entire 22-year period from 1978 to 2000. This forecast assumes more conservation and shifting to alternative fuels than the CEC Scenario II conventional forecast, but less than the CEC Scenario III forecast. It also assumes "most likely" natural gas supply availability.

According to this moderate base case forecast, production from California reserves will peak at 1,100 MB/D by mid-1980 and remain at the peak through the early 1990's. Some modification of refineries is expected to be completed by 1990 to reduce--but not eliminate--the requirement for high-gravity, low-sulfur foreign crude imports. Alaskan production from existing reserves in Prudhoe Bay and Cook Inlet is expected to peak in the mid-1980's. Shortly thereafter, the existing West Coast surplus, estimated to range between 700 MB/D in 1980 and 450 MB/D in 1985, will disappear.

The likelihood of discovering, developing, and delivering significant quantities of new oil supplies from Alaska's anticipated abundant resources is considered low until the middle 1990's, given the March 1980 DOI lease sale schedule. If discoveries are made in the Beaufort Sea, production could be delivered by the late 1980's. Other lease sale areas scheduled for exploration would be expected initially to have a slow rate of production through the early to mid-1990's, if discoveries are made. During the period from the late 1980's to the late 1990's, the forecast shows that PAD V will be crude short until significant quantities of Alaska crude can be delivered to offset declines in Prudhoe Bay production. Demand during this period (late 1980's to early 1990's) will have to be satisfied by new California production, imports, or accelerated Alaskan development. Secretary Andrus recently released the latest revision to the lease sale schedule, and it did not accelerate the lease sales.

PAD V is forecast to have a crude oil surplus of steadily decreasing magnitude through the 1980's. Soon after the mid-1980's when the giant

TABLE 4.10-4

U.S. DISTRICT V DEMAND/SUPPLY BALANCE THROUGH THE YEAR 2000 (MB/D)

	Actual	Forecast				
	1978	1980	1985	1990	1995	2000
DEMAND						
District V consumption[1]	2,620	2,700	2,960	3,020	3,160	3,300
Interdistrict product exports[2]	140	140	120	130	130	130
Total Demand	2,760	2,840	3,080	3,150	3,290	3,430
SUPPLY						
Most likely California production[3]	920	1,000	1,100	1,100	1,000	950
Foreign imports[4]	690	640	540	330	330	330
Interdistrict production receipts[2]	170	180	80	50	50	50
Process gain	110	120	130	130	130	140
Existing Alaskan production[5]	1,200	1,600	1,680	1,100	500	210
Most likely new Alaskan production[6]	---	---	---	290	1,000	2,130
Total Most Likely Supply	3,090	3,540	3,530	3,000	3,010	3,810
Supply Surplus (Deficit)[7]	330	700	450	(150)	(280)	380

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[1] District V consumption is sensitive to supplies of natural gas to District V. This forecast assumes most likely gas supplies.

[2] These are light products imported and heavy products exported to balance refineries. Any number of scenarios could be constructed for different cases to project the impact of future refinery modifications on product balance shipments. This is an intermediate case.

[3] This is the California Energy Commission most likely forecast of California production. Their maximum production forecast is 1400 MB/D in 1985 and 1990 declining to 1200 MB/D in 2000.

[4] By 1985, the requirement for foreign Indonesian crude would be much lower if refinery modifications are made to process either incremental North Slope or California crude. Refinery modification is assumed by 1990. Foreign crude requirements are assumed constant thereafter.

[5] Alaskan production is a projection of the known reserves in Cook Inlet and Prudhoe Bay. Prudhoe Bay includes production from the Sadlerochit and Kuparuk fields. No assumed new discoveries are included. Consequently this is not a forecast; it is a projection that assumes water flood of the Sadlerochit Formation beginning in 1984.

[6] This is the forecast of incremental production from potential Alaskan resources. Assumed are most likely 1975 USGS resource-estimates and the last announced 1979 lease schedule. The sum of the projection of existing Alaskan production plus the most likely forecast represents total estimated future Alaskan production.

[7] Supply surpluses represent Alaskan crude oil destined for Districts I - IV. Deficits from 1990 represent the potential PAD V requirement for new production from new reserves--or the need for new foreign imports.

References:
California Energy Commission, 1979c.
Alaska Department of Revenue, Petroleum Revenue Division, 1979.
Dames & Moore, 1978 and 1979.

Prudhoe Bay field starts to decline, the PAD V surplus will become a deficit. By 1990, Alaskan production from existing reserves in Prudhoe Bay and Cook Inlet will have declined sufficiently to create a 440 MB/D PAD V supply deficit. Assuming that new Alaskan reserves are discovered and supplied on the most expeditious development schedule subsequent to the forthcoming lease sales, PAD V will be deficit 150 MB/D by 1990. A deficit will most likely persist at least until 1995. By the mid-1990's, new production from new discoveries in the Alaskan OCS is expected to be sufficiently large to again restore balance on the west coast.

The forecasted PAD V supply surplus/deficit situation will be affected by other factors currently developing that will impact the total national picture. President Carter's plans to reduce reliance on foreign imports will necessitate radical changes in both the supply and demand of oil to varying degrees to meet our domestic needs. Uncertainties related to foreign imports may be compounded as soon as the early 1980's owing to circumstances in the U.S.S.R. Because of petroleum development technology problems, it is predicted that by 1982, the U.S.S.R. will change from a net crude oil exporter of 1.8 million B/D to a net importer of possibly 700 MB/D (CIA, 1979). This 2.5 million B/D shift could be very disruptive to existing world supply patterns and the price of oil.

Within this overall context, the crude oil resulting from the Platform Gina and Platform Gilda Project would represent an increment of available domestic production that would help offset the need for and dependence on foreign imports, and help the U.S. move toward President Carter's policy goal. The proposed Platform Gina and Platform Gilda Project would produce a cumulative total of about 52.5 million barrels of crude oil (excluding potential production from the Monterey Formation) during the 20-year project lifetime. This oil would be 15-20° API and have a sulfur content of 2 -4 percent. Peak production is forecast for the 1982-1983 time period, when 20 MB/D would be produced. Production would decline to about 15 MB/D in 1985; 4 MB/D in 1990; 1 MB/D in 1995; and 0.3 MB/D in the year 2000.

Union has indicated that production from Platforms Gina and Gilda would be sent via the existing Torrey pipeline systems to refineries in the Los Angeles area. This could be locally important if foreign import uncertainties and national needs dictated that part of PAD V supplies be diverted to other PADs. In the latter event, Alaskan supplies would most likely be affected because transport modes for delivery of Alaskan crude to PADs I-IV already exist.

4.10.2 Tankship Transport

The proposed project would involve transport of product oil via pipeline from the onshore treating facility to the Union Oil Marine Terminal at Ventura Harbor. At the marine terminal, the product oil would directly enter the existing Torrey pipeline system for subsequent shipment to Los Angeles refineries.

The Union Oil Marine Terminal has existing permit approvals that allow transport of crude oil by tankship from the facility. Crude oil currently entering the facility from various locations is transported to user locations via tankship or the Torrey pipeline system. Therefore, a potential option exists to transport product oil from the proposed project via tankship rather than through the Torrey pipeline system. However, in various discussions and written correspondence (Union Oil Company, 1980), Union has committed to the position that product oil will be transported via the Torrey pipeline system and that tankship transport is not being considered as an alternative. Based on this position and inputs from regulatory agencies to the work program for completion of this EIR/EA, tankship transport is not considered a serious alternative requiring detailed evaluation.

4.10.3 Energy Balance Analysis

An energy balance analysis was conducted to compare the energy required for recovery (consumption) to the equivalent energy of the oil and gas that would be produced from Platforms Gina and Gilda over a 20-year project life. The energy balance comparison is expressed in terms of barrels of oil produced and consumed. Since various grades of oil are produced and consumed, an "equivalent fuel oil" (EFO) barrel is used for comparison purposes. The energy contents (in millions of Btu per barrel) of the various grades of oil and other pertinent information used in the energy balance analysis are as follows:

- An equivalent fuel oil (EFO) barrel contains 6.0 x 10^6 Btu.
- One barrel of crude oil contains 6.25 x 10^6 Btu.
- One barrel of diesel oil contains 5.0 x 10^6 Btu.
- One standard cubic foot of natural gas contains 1,000 Btu.
- Electric power is assumed to be produced by a fuel oil-fired power plant at 40 percent efficiency.
- The miscellaneous equipment used converts diesel fuel to horsepower at 50 percent efficiency.

In addition, information contained in Section 3.0 and Appendix B.1 was used to determine energy consumption for the proposed and alternative project configurations. This energy balance analysis does not include the energy consumed or produced as a result of drilling or production from the Monterey Formation since estimates of proven crude oil and natural gas reserves would not be available until after an exploratory test drilling program.

4.10.3.1 Proposed Mandalay Configuration

The energy produced from this project would consist of the oil and natural gas recovered from the Hueneme Sand, Sespe Formation and Repetto Formation over the 20-year project life. Production operations from Platform Gina and Gilda would ultimately yield the following quantities of energy over the project lifetime:

Source	10^6 EFO Barrels
Platform Gina	
Oil	9.90
Gas	0.28
Platform Gilda	
Oil	44.79
Gas	6.67
TOTAL	61.64

Energy consumption during the project lifetime would result from construction, drilling, and production operations from both onshore and offshore sources. The major energy consumption sources include diesel fuel-fired equipment, natural gas-fired equipment, and electric power generation. Diesel fuel consumption by marine mobile sources (including crew boats, supply boats, and tugboats) were included in the energy balance analysis. Table 4.10-5 shows the energy consumption for all aspects of the proposed Mandalay configuration.

The energy ratio provides a direct comparison between energy produced and energy consumed during the project lifetime. The energy ratio for the proposed Mandalay configuration would be 61.64 x 10^6 EFO barrels produced to 1.85 x 10^6 EFO barrels consumed, or about 33.3 units of energy would be produced for every unit that would be consumed.

4.10.3.2 East Mandalay Alternative Configuration

Energy production and consumption for the East Mandalay alternative configuration would be identical to the proposed Mandalay configuration. Therefore, the energy ratio would be 33.3 to 1.0.

4.10.3.3 Union Oil Marine Terminal Alternative Configuration

The EFO production for this alternative would be the same as the proposed Mandalay configuration. However, the oil consumption figures would change due to production operation differences. These differences include the following:

	10^3 EFO Barrels
1) One 18 x 10^6 Btu per hour booster station heater (90 percent operating factor)	473.04
2) Additional electric power for booster station (320 KVA)	71.76
TOTAL	544.80

TABLE 4.10-5

ENERGY CONSUMPTION FOR PROPOSED MANDALAY CONFIGURATION
(10^3 Equivalent Fuel Oil Barrels)

Source		Operation	
	Construction	Drilling	Production
Platform Gina[a]			
Boat Transportation	0.24[a]	0.62	9.40
Diesel fuel-fired equipment	0.81[a]	0.33	3.97
Electric Power Generation	-	18.22	112.12
Platform Gilda[a]			
Boat Transportation	0.53[a]	4.94	14.79
Diesel fuel-fired equipment	1.99[a]	2.74	7.94
Electric Power Generation	-	176.58	448.47
Onshore Treating Facility			
Diesel fuel-fired equipment	0.01[b]	-	-
Heater Treaters	-	-	933.33
Electric Power Generation	0.04[b]	-	112.12
Sub-total	3.62	203.43	1,642.14
TOTAL	1,849.19 X 10^3 EFO Barrels		

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[a] Includes both platform and offshore pipeline system energy consumption.

[b] Includes onshore treating facility and onshore pipeline system energy consumption.

Adding the above figure to the proposed Mandalay configuration energy consumption results in a total project lifetime energy consumption of 2.39 x 10^6 EFO barrels. The energy ratio for this alternative would be approximately 25.8 to 1.0. This indicates that the energy consumed during the project lifetime for the Union Oil Marine Terminal alternative configuration would be approximately 30 percent greater than the energy consumed for the proposed Mandalay configuration.

4.10.3.4 Ormond Beach Alternative Configuration

The energy production for both Option A and Option B for this alternative would be the same as the proposed Mandalay configuration. However, the energy consumption figures would change due to construction and production operation differences. These differences for the Option A alternative are as follows:

	10^3 EFO Barrels
1) Additional diesel fuel for offshore pipeline construction	0.82
2) Two 18 x 10^6 Btu per hour booster station heaters (90 percent operating factor)	946.08
3) Additional electrical power for booster stations (935 KVA)	209.66
TOTAL	1,156.56

Adding the above figure to the proposed Mandalay configuration energy consumption results in a total project lifetime energy consumption of 3.01 x 10^6 EFO barrels. The energy ratio for the Option A alternative would be approximately 20.5 to 1.0. This indicates that the energy consumed during the project lifetime for the Ormond Beach Option A alternative configuration would be approximately 63 percent greater than the energy consumed for the proposed Mandalay configuration.

The differences in energy consumption for the Option B alternative are as follows:

	10^3 EFO Barrels
1) Additional diesel fuel for offshore pipeline construction	0.82
2) Three 18 x 10^6 Btu per hour booster station heaters (90 percent operating factor)	1,419.12
3) Additional electrical power for booster stations (1,555 KVA)	348.68
TOTAL	1,768.62

Adding the above figure to the proposed Mandalay configuration energy consumption results in a total project lifetime energy consumption of 3.62 x 10^6 EFO barrels. The energy ratio for the Option B alternative would be approximately 17.0 to 1.0. This indicates that the energy consumed during the project lifetime for the Ormond Beach Option B alternative configuration would be approximately 96 percent greater than the energy consumed for the proposed Mandalay configuration.

4.11 CONSOLIDATION

Union has indicated that they would be receptive to plans to consolidate produced crude oil and natural gas from other projects in the eastern Santa Barbara Channel with that from the proposed Platform Gina and Platform Gilda Project. The following possible consolidation options have been identified by regulatory agencies involved in review of the proposed project:

- Consolidation with Shell Oil Company's possible future development of a portion of the West Montalvo field from State tidelands lease PRC-3314.
- Consolidation with Chevron U.S.A., Inc.'s Platform Grace Project.
- Consolidation with other future offshore petroleum production projects in the eastern Santa Barbara Channel.

The proposed project facilities are being designed to accommodate increased oil and gas production rates. For example, the following approximate flow rates could be accommodated:

<u>Offshore Pipelines</u>	<u>Approximate Capacity</u>
Platform Gina to Shore (crude oil/water/gas)	80,000 bbl/day
Platform Gilda to Shore (crude oil/water)	110,000 bbl/day
Platform Gilda to Shore (natural gas)	150×10^6 SCF/day
<u>Onshore Pipelines</u>	
Onshore Treating Facility (Mandalay to Union Oil Marine Terminal; crude oil)	60,000 bbl/day
<u>Onshore Treating Facility</u>	
Crude oil treating capacity	80,000 bbl/day
Natural gas dehydration capacity	60×10^6 SCF/day

The currently designed transport and treating systems would require additional support equipment to handle these increased flow rates. For example, increased offshore transport would require additional pumps or compressors at the platforms to move the produced fluids to shore. Expansion of the capacity of the onshore treating facility would require additional heater treaters, compressors, refrigeration units, tanks, and other equipment. Addition of this treating equipment could be accommodated without expansion of the planned facility site area for the proposed or alternative project configurations.

Crude oil produced by the proposed project would flow from the onshore treating facility to the Union Oil Marine Terminal. The oil would be pumped from the marine terminal to the Los Angeles area through the existing Torrey pipeline system. Consolidation could result in the amount of oil being pumped to the marine terminal exceeding the available capacity of this system. If the capacity was exceeded, expansion of the Torrey pipeline system would be required or the oil would have to be shipped by tankers. Expansion or tanker use would be subject to additional environmental review.

The preceding information indicates that it would be possible for the proposed Platform Gina and Platform Gilda Project to accommodate oil and gas production from other offshore petroleum projects that might be developed in the eastern Santa Barbara Channel. Excess capacity and the capability to develop additional excess capacity would exist at the onshore treating facility, particularly as production from Platforms Gina and Gilda declined from peak levels. This would make it possible for the consolidation of other projects with the proposed Mandalay configuration or primary alternatives. Most future developments are expected to occur to the west and northwest of the Mandalay Beach area. This suggests that consolidation may be less preferable for the Ormond Beach alternative configuration than for the proposed Mandalay and alternative East Mandalay and Union Oil Marine Terminal configurations. The following sections provide information on the status of other projects or possible developments to which the consolidation concept may be applicable.

4.11.1 Future Development of the West Montalvo Field by Shell Oil Company

Shell has proposed drilling exploratory wells on State tidelands lease PRC-3314 to determine the production potential of a portion of the West

Montalvo field. Lease PRC-3314 encompasses most of the area between the shoreline and the three-mile limit extending from south of the Santa Clara River to south of the SCE Mandalay Generating Station. A small portion of this area near the Mandalay Generating Station (lease PRC-735) has been developed by Chevron U.S.A., Inc. from onshore sites.

Shell has submitted an application to the State Lands Commission to drill exploratory wells on their lease. Potential environmental impacts of this proposed activity will be addressed in an environmental report prior to the State Lands Commission decision on the application.

Definitive information on oil and gas production rates would not be available until the data gathered during the exploratory drilling operations were analyzed. Shell would undertake development of lease PRC-3314 only if these data indicated that economically recoverable quantities of hydrocarbons were present. All development activities would be subject to detailed environmental review and applicable permit approvals. Shell has indicated that should their project be implemented, they would be receptive to plans for consolidation of transport and/or treatment of the produced fluids from their lease with the proposed Platform Gina and Platform Gilda Project.

4.11.2 Platform Grace (Chevron U.S.A., Inc.)

This consolidation possibility would involve pipelining the produced fluids from Chevron's Platform Grace to the proposed Platform Gilda. The produced fluids from both platforms would be comingled on Platform Gilda and then would flow to shore.

The Platform Grace Project currently involves sending the produced fluids from Platform Grace to Platform Hope through a new crude oil pipeline and a new natural gas pipeline. These fluids are subsequently transported from Platform Hope to the Chevron-Carpinteria onshore treating facility through existing pipelines. The pipelines from Platform Grace to Platform Hope did not exist when this consolidation possibility was originally identified by regulatory agencies. However, the project received approvals and pipelines have been installed. For this reason, the possible advantage of constructing a pipeline from Platform Grace to Platform Gilda instead of from Platform Grace to Platform Hope has been eliminated. Abandonment of existing facilities to pursue this possibility would result in an economic loss for Chevron associated with the completed installation of a 14-mile (22.5-km) subsea pipeline that would not be used, and equipment modifications on Platform Hope that would not be needed. In addition, this already permitted project would be delayed and cause additional economic loss since another environmental review and permit process would have to be undertaken. Therefore, this consolidation possibility does not appear to be viable at this time.

4.11.3 Potential Activities on the Eastern Santa Barbara Channel OCS

Future opportunities for consolidation could result from offshore oil and gas development on:

- Existing federal OCS leases sold in 1968, and Lease Sale #35.
- Federal OCS leases sold in Lease Sale #48.
- Federal OCS leases which may be sold in future Lease Sales #68, #73, and #80.

Ongoing activities in the area include: exploratory drilling programs by Chevron in the Santa Clara unit and a proposal by Shell to conduct exploratory drilling on OCS lease P-0361, acquired in Lease Sale #48. The latter is located about 3.5 miles (5.6 km) northwest of the Hueneme Field. Definitive information concerning production potential would not be available until the data gathered during the exploratory drilling programs were analyzed. The operators would undertake development only if these data indicated that economically recoverable quantities of hydrocarbons were present. Detailed project-specific assessments of the technological and environmental feasibility of consolidation with Union's Platform Gina and Platform Gilda Project could be conducted during the project engineering planning and permitting processes. Subsequently proposed development activities would be subject to environmental review associated with the applicable permit processes.

4.12 COASTAL ACT CONSIDERATIONS

4.12.1 Regulatory Policy and Project Review Status

The federal Coastal Zone Management Act of 1972 and the California Coastal Act of 1976 provide for several regulatory bodies with planning responsibilities for the Calfornia coastal zone and adjacent offshore federal waters (Outer Continental Shelf). The Coastal Zone Management Act requires that all federal license and permit activities on the OCS must be consistent with the state's Coastal Management Program. In California, the State Coastal Commission conducts this review of consistency in relation to the Coastal Management Program. Development planned for locations within the California coastal zone and state waters (to the 3-mile limit) must receive a Coastal Development Permit. The award of this permit is contingent upon compliance with Coastal Act goals and policies. Initial compliance review and permitting is currently conducted by Regional Coastal Commissions, but their responsibilities are to be assumed by local coastal planning bodies following the certification of the Local Coastal Plan Land Use Plan and associated ordinances. Permitting actions inconsistent with the Coastal Act taken by either of these bodies may be appealed to the State Coastal Commission.

The proposed project includes elements located in federal waters that must receive a California Coastal Management Program consistency certification concurrence from the State Coastal Commission. The affected project elements include Platforms Gina and Gilda and the associated offshore pipeline segments beyond the 3-mile limit. The federal permits for which this consistency certification concurrence is required include: U.S. Geological Survey Plan of Development; U.S. Geological Survey Pipeline Right-of-Way; U.S. Army Corps of Engineers Platform Location Permit; and, Environmental Protection Agency National Pollution Discharge Elimination System Permit. Platform Gina and the associated offshore pipelines in federal waters have received a California Coastal Management Program consistency certification concurrence from the California Coastal Commission. Consistency review for Platform Gilda and associated offshore pipelines in federal waters is in progress.

The offshore state waters and onshore locations associated with the proposed project and alternative configurations are located within the South Central Coast Regional Commission's present jurisdiction. Developments proposed for coastal zone locations are currently required to apply to the Regional Commission for a Coastal Development Permit. The Regional Commission will retain the responsibility of this review until a Local Coastal Program has been certified, or until July 1, 1981, whichever comes first. If a local Coastal Program has not been certified by July 1, 1981, the permitting responsibility in the affected local area will be assumed by the State Coastal Commission.

Following the certification of Local Coastal Programs, individual project elements in the coastal zone would be subject to permitting review by one of three local planning bodies (the City of Oxnard, the City of Ventura, or Ventura County). The Local Coastal Programs for these areas are currently in preparation. The City of Ventura's Harbor Segment of the Local Coastal Plan Land Use Plan has been certified by the Regional Commission and ordinances required to complete the Local Coastal Program are being developed. The Local Coastal Plan Land Use Plans for the City of Oxnard and Ventura County are at the public hearing stage, and have not yet been submitted to the Regional Commission for certification.

4.12.2 EIR/EA Information Revelant to Coastal Act Standards

To assist coastal planners with the evaluation of the proposed project and each alternative project configuration with respect to the California Coastal Act, Table 4.12-1 has been prepared. This table presents potentially applicable Coastal Act Standards (Section 3), project configurations to which they may be applicable, and brief comments and references, as appropriate, to sections of this report containing information relevant to the items of interest.

TABLE 4.12-1

DIRECTORY OF COASTAL ACT STANDARDS AND RELEVANT EIR/EA INFORMATION PROPOSED AND PRIMARY ALTERNATIVE PROJECT CONFIGURATIONS

Standards[1]	Proposed Mandalay Configuration	East Mandalay Alternative Configuration	Union Oil Marine Terminal Alternative Configuration	Ormond Beach Alternative Configuration (Option A)	Ormond Beach Alternative Configuration (Option B)	Platforms
PUBLIC ACCESS AND RECREATION 30210-30244, as appropriate	The onshore treating facility would be located contiguous with the SCE Mandalay Generating Station between the beach and Harbor Blvd. West Fifth Street is nearby. The site is publically owned adjacent land to the south is planned for beach park use. Prepaid lease fees by Union for the treating facility site would facilitate development of the park (Sections 3.1.3, 4.7.1, 12.6).	The onshore treating facility site would be located on the inland side of Harbor Blvd. within SCE property adjacent to power transmission facilities and the Edison Canal (Sections 3.1.3, 12.6).	The onshore treating facility would be located within the existing Union Oil Marine Terminal facility off Spinnaker Dr. at Ventura Marina (Sections 3.1.3, 12.6). The Mandalay booster station would be located on a portion of the onshore treating facility site described for the proposed Mandalay configuration.	The onshore treating facility site would be located on vacant land between existing industrial facilities off Perkins Rd. (Section 3.1.3, 12.6). The Mandalay booster station would be located on a portion of the onshore treating facility site described for the proposed Mandalay configuration. The booster station for Platform Gina would be located on Silver Strand Beach (Sections 3.1.3, 12.6).	The onshore treating facility site would be located on vacant land between existing industrial facilities off Perkins Rd. (Section 3.1.3, 12.6). The Mandalay booster station would be located on a portion of the onshore treating facility site described for the proposed Mandalay configuration. The booster station for Platform Gina would be located on Silver Strand Beach (Sections 3.1.3, 12.6). The inland booster station would be located near the intersection of Rice and Gonzales Rds. (outside of the coastal zone).	Platform Gina would be located on OCS Lease P-0202 about 4.5 miles west-southwest of Port Hueneme (Section 3.1.3). Platform Gilda would be located on OCS Lease P-0216 about 10 miles west of Oxnard (Section 3.1.3).

TABLE 4.12-1 (continued)

Standards[1]	Proposed Mandalay Configuration	East Mandalay Alternative Configuration	Union Oil Marine Terminal Alternative Configuration	Ormond Beach Alternative Configuration (Option A)	Ormond Beach Alternative Configuration (Option B)	Platforms
MARINE ENVIRONMENT						
30230	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Impacts on oceanography and marine biological resources are discussed in Sections 4.3 and 4.4, respectively.
30231	Runoff would be contained onsite and disposed of in accordance with appropriate regulations. The onshore treating facility is designed to operate unattended and requires no process water, thus minimizing water consumption (Sections 3.3.3 and 3.5.3).	Runoff would be contained onsite and disposed of in accordance with appropriate regulations. The onshore treating facility is designed to operate unattended and requires no process water, thus minimizing water consumption (Sections 3.3.3 and 3.5.3).	Runoff would be contained onsite and disposed of in accordance with appropriate regulations. The onshore treating facility and Mandalay booster station are designed to operate unattended and require no process water, thus minimizing water consumption (Sections 3.3.3 and 3.5.3).	Runoff would be contained onsite and disposed of in accordance with appropriate regulations. The onshore treating facility and booster stations at Mandalay and Silver Strand Beach are designed to operate unattended and require no process water, thus minimizing water consumption (Sections 3.3.3 and 3.5.3).	Runoff would be contained onsite and disposed of in accordance with appropriate regulations. The onshore treating facility and three booster stations (at Mandalay, Silver Strand Beach, and inland near the intersection of Rice and Gonzales Rds.) are designed to operate unattended and require no process water, thus minimizing water consumption (Sections 3.3.3 and 3.5.3).	Wastewater discharges and entrainment are addressed in Sections 4.3 and 4.4.
	The product crude oil pipeline would be attached to the Harbor Blvd. bridge across the Santa Clara River (Section 3.3.4).	The product crude oil pipeline would be attached to the Harbor Blvd. bridge across the Santa Clara River (Section 3.3.4).	The onshore pipelines would be emplaced within the riverbed of the Santa Clara River (Section 3.3.4.2.2). Impacts on terrestrial and aquatic biology are discussed in Section 4.5.	The product crude oil pipeline would be attached to the Harbor Blvd. bridge across the Santa Clara River (Section 3.3.4).	The product crude oil pipeline would be attached to the Harbor Blvd. bridge across the Santa Clara River (Section 3.3.4).	
30232	Contingency plans are discussed in Section 5.9. Copies of complete plans are on file with USGS.	Contingency plans are discussed in Section 5.9. Copies of complete plans are on file with USGS.	Contingency plans are discussed in Section 5.9. Copies of complete plans are on file with USGS.	Contingency plans are discussed in Section 5.9. Copies of complete plans are on file with USGS.	Contingency plans are discussed in Section 5.9. Copies of complete plans are on file with USGS.	Contingency plans are discussed in Section 5.9. Copies of complete plans are on file with USGS.
30233	Not Applicable	Not Applicable	Not Applicable	Minor dredging in Port Hueneme Harbor only (Section 3.3.4).	Minor dredging in Port Hueneme Harbor only (Section 3.3.4).	Not Applicable

TABLE 4.12-1 (continued)

Standards[1]	Proposed Mandalay Configuration	East Mandalay Alternative Configuration	Union Oil Marine Terminal Alternative Configuration	Ormond Beach Alternative Configuration (Option A)	Ormond Beach Alternative Configuration (Option B)	Platforms
		Habitats described as sensitive in Draft LCP's are discussed in Section 12.5.7. Impacts are discussed in Section 4.5.6.	Habitats described as sensitive in Draft LCP's are discussed in Section 12.5.7. Impacts are discussed in Section 4.5.6.	Habitats described as sensitive in Draft LCP's are discussed in Section 12.5.7. Impacts are discussed in Section 4.5.6.	Habitats described as sensitive in Draft LCP's are discussed in Section 12.5.7. Impacts are discussed in Section 4.5.6.	
		Not Applicable	The Mandalay booster station would placed on a portion of the onshore treating facility site described for the proposed Mandalay configuration.	The Mandalay booster station would placed on a portion of the onshore treating facility site described for the proposed Mandalay configuration.	The Mandalay booster station would placed on a portion of the onshore treating facility site described for the proposed Mandalay configuration.	
			The treating facility site would be located within the existing Union Oil Marine Terminal site at the Ventura Marina (Section 3.1.3).	The booster station on Silver Strand Beach could be placed adjacent to the Port Hueneme Harbor (Section 5.0).	The booster station on Silver Strand Beach could be placed adjacent to the Port Hueneme Harbor (Section 5.0).	
		Not Applicable	Not Applicable	The treating facility site would be located on vacant land surrounded by industry. This appears to be too small a parcel for viable agriculture.	The treating facility site would be located on vacant land surrounded by industry. This appears to be too small a parcel for viable agriculture.	
					The inland booster station would probably convert 0.7 acre of agricultural lands near Rice and Gonzales Rds. to industrial use (Section 4.5.1, 4.6.1, 12.6).	
		Air and water quality impacts would be minor (Sections 4.1 and 4.2.1).	Air and water quality impacts would be minor (Sections 4.1 and 4.2.1).	Air and water quality impacts would be minor (Sections 4.1 and 4.2.1).	Air and water quality impacts would be minor (Sections 4.1 and 4.2.1).	
		Not Applicable	About 5.1 acres of agricultural soils would be disturbed for onshore pipeline emplacement (Section 4.1.3). However, mitigations (Section 5.0) could be employed to maintain the productivity of these soils.	About 1.0 acre of agricultural soils would be disturbed for onshore pipeline emplacement (Section 4.1.4). However, mitigations (Section 5.0) could be employed to maintain the productivity of these soils.	About 33.9 acres of agricultural soils would be disturbed for onshore pipeline emplacement (Section 4.1.4). However, mitigations (Section 5.0) could be employed to maintain the productivity of the soils.	
		Potential cultural resources would be avoided (Section 12.8). Where avoidance is not practicable, impacts would be mitigated (Section 5.8).	Potential cultural resources would be avoided (Section 12.8). Where avoidance is not practicable, impacts would be mitigated (Section 5.8).	Potential cultural resources would be avoided (Section 12.8). Where avoidance is not practicable, impacts would be mitigated (Section 5.8).	Potential cultural resources would be avoided (Section 12.8). Where avoidance is not practicable, impacts would be mitigated (Section 5.8).	

TABLE 4.12-1 (continued)

Standards[1]	Proposed Mandalay Configuration	East Mandalay Alternative Configuration	Union Oil Marine Terminal Alternative Configuration	Ormond Beach Alternative Configuration (Option A)	Ormond Beach Alternative Configuration (Option B)	Platforms
DEVELOPMENT 30250(a)	The onshore treating facility site would be located contiguous with SCE Mandalay Generating Station. The land is publically owned but would be leased to Union in return for pre-paid fees that would be used to facilitate park development on the rest of the property.	The onshore treating facility site would be located within SCE property adjacent to power transmission facilities and Edison Canal.	The onshore treating facility site would be located within existing Union Oil Marine Terminal facilities.	The onshore treating facility site would be located within an existing industrialized area.	The onshore treating facility site would be located within an existing industrialized area.	Not Applicable
			The Mandalay booster station would be located on a portion of the onshore treating facility site described for the proposed Mandalay configuration.	The Mandalay booster station would be located on a portion of the onshore treating facility site described for the proposed Mandalay configuration.	The Mandalay booster station would be located on a portion of the onshore treating facility site described for the proposed Mandalay configuration.	
				The booster station at Silver Strand Beach could be located adjacent to Port Hueneme Harbor facilities.	The booster station at Silver Strand Beach could be located adjacent to Port Hueneme Harbor facilities.	
					The inland booster station would be located near the intersection of Rice and Gonzales Rds. (outside the coastal zone).	
30251	Onshore treating facility equipment would be emplaced in a pit. Sides open to public view would be surrounded by a block wall and landscaped as appropriate (Section 4.6.5).	Onshore treating facility equipment would be emplaced in a pit. Sides open to public view would be surrounded by a block wall and landscaped as appropriate (Section 4.6.5).	Onshore treating facility equipment would be installed within an existing diked area within the Union Oil Marine Terminal. Principal public views are presently shielded by slat fencing and landscaping (Section 4.6.5).	Onshore treating facility equipment would be emplaced in a pit. The facility would be surrounded by a block wall and landscaped as appropriate (Section 4.6.5).	Onshore treating facility equipment would be emplaced in a pit. The facility would be surrounded by a block wall and landscaped as appropriate (Section 4.6.5).	Certain characteristics relative to visibility of the platforms (such as color and lighting) would be determined in accordance with recommendations of the U.S. Coast Guard. Where this results in a potential conflict with aesthetic concerns, navigational safety would take precedence (Section 4.6.5).

TABLE 4.12-1 (continued)

Standards[1]	Proposed Mandalay Configuration	East Mandalay Alternative Configuration	Union Oil Marine Terminal Alternative Configuration	Ormond Beach Alternative Configuration (Option A)	Ormond Beach Alternative Configuration (Option B)	Platforms
30251 (contd)			The Mandalay booster station would be shielded from public view by block walls and landscaped as appropriate.	The Mandalay, Silver Strand Beach booster stations would be shielded from public view by block walls and landscaped as appropriate (Section 4.6.5).	The Mandalay and Silver Strand Beach, booster stations would be shielded from public view by block walls and landscaped as appropriate (Sections 4.6.5 and 5.0). The inland booster station could be shielded in similar fashion.	
30253 (1 & 2)	Geologic and hydrologic phenomena that could represent hazards to the project are discussed in Section 12.1.6. Project plans and mitigation measures responsive to these considerations are discussed in Sections 3.0 and 5.0.	Geologic and hydrologic phenomena that could represent hazards to the project are discussed in Section 12.1.6. Project plans and mitigation measures responsive to these considerations are discussed in Sections 3.0 and 5.0.	Geologic and hydrologic phenomena that could represent hazards to the project are discussed in Section 12.1.6. Project plans and mitigation measures responsive to these considerations are discussed in Sections 3.0 and 5.0.	Geologic and hydrologic phenomena that could represent hazards to the project are discussed in Section 12.1.6. Project plans and mitigation measures responsive to these considerations are discussed in Sections 3.0 and 5.0.	Geologic and hydrologic phenomena that could represent hazards to the project are discussed in Section 12.1.6. Project plans and mitigation measures responsive to these considerations are discussed in Sections 3.0 and 5.0.	Geologic and hydrologic phenomena that could represent hazards to the project are discussed in Section 12.1.6. Project plans and mitigation measures responsive to these considerations are discussed in Sections 3.0, 4.9.4, and 5.0.
30253 (3)	Union has received an Authority to Construct Permit from the Ventura County APCD for the onshore treating facility (Section 4.2.1.2).	Union would apply for an Authority to Construct Permit from the Ventura County APCD for the onshore treating facility (Section 4.2.1.2).	Union would apply for an Authority to Construct Permit from the Ventura County APCD for the onshore treating facility and Mandalay booster station (Section 4.2.1.2).	Union would apply for an Authority to Construct Permit from the Ventura County APCD for the onshore treating facility and Mandalay and Silver Strand Beach booster stations (Section 4.2.1.2).		A discussion of proposed USGS OCS regulations for offshore California and an evaluation of the emissions from Platforms Gina and Gilda in relation to these proposed regulations is found in Section 4.2.1.2.
30253 (4)	See Section 4.10.3 for a project energy balance analysis. Mitigation measures related to vehicle miles travelled are discussed in Section 5.0.	See Section 4.10.3 for a project energy balance analysis. Mitigation measures related to vehicle miles travelled are discussed in Section 5.0.	See Section 4.10.3 for a project energy balance analysis. Mitigation measures related to vehicle miles travelled are discussed in Section 5.0.	See Section 4.10.3 for a project energy balance analysis. Mitigation measures related to vehicle miles travelled are discussed in Section 5.0.	See Section 4.10.3 for a project energy balance analysis. Mitigation measures related to vehicle miles travelled are discussed in Section 5.0.	See Section 4.10.3 for a project energy balance analysis. Mitigation measures related to vehicle miles travelled are discussed in Section 5.0.
30255	This project requires a site on, or adjacent to, the sea to be able to function at all.	This project requires a site on, or adjacent to, the sea to be able to function at all.	This project requires a site on, or adjacent to, the sea to be able to function at all.	This project requires a site on, or adjacent to, the sea to be able to function at all.	This project requires a site on, or adjacent to, the sea to be able to function at all.	This project requires a site on, or adjacent to, the sea to be able to function at all.

TABLE 4.12-1 (concluded)

Standards[1]	Proposed Mandalay Configuration	East Mandalay Alternative Configuration	Union Oil Marine Terminal Alternative Configuration	Ormond Beach Alternative Configuration (Option A)	Ormond Beach Alternative Configuration (Option B)	Platforms
INDUSTRIAL DEVELOPMENT						
30260 (1)	Primary and secondary alternatives were evaluated in this EIR/EA in accordance with a Work Program developed with inputs from over 30 regulatory agencies. See Section 7.0.	Primary and secondary alternatives were evaluated in this EIR/EA in accordance with a Work Program developed with inputs from over 30 regulatory agencies. See Section 7.0.	Primary and secondary alternatives were evaluated in this EIR/EA in accordance with a Work Program developed with inputs from over 30 regulatory agencies. See Section 7.0.	Primary and secondary alternatives were evaluated in this EIR/EA in accordance with a Work Program developed with inputs from over 30 regulatory agencies. See Section 7.0.	Primary and secondary alternatives were evaluated in this EIR/EA in accordance with a Work Program developed with inputs from over 30 regulatory agencies. See Section 7.0.	Primary and secondary alternatives were evaluated in this EIR/EA in accordance with a Work Program developed with inputs from over 30 regulatory agencies. See Section 7.0.
30260 (2)	This project is consistent with the objectives of the National Energy Plan (Section 3.1.2).	This project is consistent with the objectives of the National Energy Plan (Section 3.1.2).	This project is consistent with the objectives of the National Energy Plan (Section 3.1.2).	This project is consistent with the objectives of the National Energy Plan (Section 3.1.2).	This project is consistent with the objectives of the National Energy Plan (Section 3.1.2).	This project is consistent with the objectives of the National Energy Plan (Section 3.1.2).
30260 (3)	Mitigative measures are given in Section 5.0.	Mitigative measures are given in Section 5.0.	Mitigative measures are given in Section 5.0.	Mitigative measures are given in Section 5.0.	Mitigative measures are given in Section 5.0.	Mitigative measures are given in Section 5.0.
30262 (a)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Drilling and production operations would be conducted in accordance with the USGS Pacific Area OCS Orders and mitigative measures discussed in Section 5.0.
30262 (b)	Consolidation is evaluated, in accordance with Work Program directives, in Sections 4.11 and 7.3.	Consolidation is evaluated, in accordance with Work Program directives, in Sections 4.11 and 7.3.	Consolidation is evaluated, in accordance with Work Program directives, in Sections 4.11 and 7.3.	Consolidation is evaluated, in accordance with Work Program directives, in Sections 4.11 and 7.3.	Consolidation is evaluated, in accordance with Work Program directives, in Sections 4.11 and 7.3.	Consolidation is evaluated, in accordance with Work Program directives, in Sections 4.11 and 7.3.
30262 (c)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Subsea completions are discussed in Section 7.3.
30262 (d)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Marine safety and associated mitigations are discussed in Section 4.9.1.
30262 (e)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Potential subsidence and associated mitigative measures are discussed in Sections 12.1.6, 4.1.1, and 5.1.
30262 (f)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Produced water from both platforms will be re-injected. Refer to Sections 3.5.1.1, 4.1, and 5.1.

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[1] Chapter 3, Articles 2 through 7, California Coastal Act of 1976.

5.0 MITIGATIVE MEASURES

Implementation of the proposed Platform Gina and Gilda Project would require permits and regulatory approvals from a number of federal, state, and local agencies. A preliminary listing of applicable permits and approvals is presented in Table 3.8-2. Many of the regulations associated with these permits and approvals place restrictions on activities that could endanger public health and safety or significantly degrade the quality of the environment (e.g., emissions of air pollutants; discharge of wastewater containing harmful or toxic constituents). Thus, compliance by Union with permit conditions and strict enforcement of regulations by responsible agencies would help ensure that the magnitude and significance of potential environmental impacts identified in Section 4.0 and elsewhere in this document were reduced to the lowest levels possible.

The regulatory agencies involved in the review and approval of the proposed Platform Gina and Platform Gilda Project are identified in Section 3.8. Regulations promulgated by some agencies are standardized and would apply to any OCS development (e.g., U.S. Geological Survey Pacific Area OCS Orders). In other cases, regulations specific to the proposed project would be formulated following environmental review and included as conditions for permit approval (e.g., City of Oxnard Special Use Permit). The principal agencies having jurisdiction over the proposed project, and the types of regulations and controls that are in existence to ensure that potentially adverse environmental impacts are avoided or minimized, are discussed below. More detailed information concerning applicable regulations of federal, state, and local agencies is contained in the Environmental Statement for Lease Sale #48 (BLM, 1979).

- <u>U.S. Department of the Interior (Geological Survey)</u>: Regulations governing the safe conduct of development of the OCS are administered by the USGS. The regulations are contained in Title 30, Part 250 of the Code of Federal Regulations and in the Pacific Area OCS Orders. In the case of violations, leases are subject to cancellation and lessees are subject to penalties as provided for in the OCS Lands Act.

- U.S. Department of Transportation (Coast Guard): The OCS Lands Act delegates to the Coast Guard the authority to promulgate and enforce regulations covering matters related to safety of life and property on OCS platforms (e.g., establishment of navigational aid requirements). The implementing regulations for this delegation are contained in Title 33 of the Code of Federal Regulations. Other Coast Guard regulations cover safety equipment on offshore facilities and vessels and control discharge of pollutants from all vessels.

- U.S. Department of Transportation (Office of Pipeline Safety): The Office of Pipeline Safety supervises safety of gas and oil pipelines including establishment of design criteria for pipeline systems on the OCS.

- U.S. Army Corps of Engineers: The OCS Lands Act provides that the authority of the Secretary of the Army to prevent obstruction to navigation in the navigable waters of the United States be extended to structures located on the OCS. The Corps of Engineers implements this authority by issuing navigational permits for fixed platforms according to provisions in Title 33 of the Code of Federal Regulations.

- U.S. Environmental Protection Agency: Discharge of produced wastewater to federal waters and emission of air pollutants from facilities onshore and offshore to the 3-mile limit are subject to regulation by the EPA.

- California Coastal Commission: OCS development projects must receive a California Coastal Management Program Consistency Certification concurrence from the State Coastal Commission. In addition, onshore facilities within the coastal zone, including facilities within the 3-mile limit, require a Coastal Development Permit issued by the South Central Coast Regional Commission.

- Other California State Agencies: Operations within the 3-mile limit and onshore are subject to applicable regulations of the State Lands Commission, Department of Fish and Game, Regional Water Quality Control Board, and State Water Resources Control Board.

- Local Agencies: Various aspects of certain projects are subject to approval by local agencies (in the case of Union's proposed project, particularly the City of Oxnard and County of Ventura). These agencies generally formulate specific conditions for permit approval based on the findings of their environmental reviews.

The following sections identify key mitigation measures that Union intends to implement, as well as additional mitigation measures that should be given consideration for inclusion in the conditions of project approval.

5.1 GEOTECHNICAL

5.1.1 Mitigation of Potential Effects of Geologic and Hydrologic Phenomena

The proposed project is being designed to comply with all applicable federal, state, and local building requirements. Geotechnical and structural engineering design studies (including a third-party review of design, as required by the USGS) have been completed for Platform Gina and are in progress for Platform Gilda in accordance with USGS requirements (Section 4.9.4). Section 12.1-6 identifies the following geologic and hydrologic phenomena to have a relatively high potential for adversely affecting some or all of the proposed project elements: earthquake ground motion; surface fault rupture; liquefaction/ differential settlement; subsurface accumulations of natural gas; and erosion. It is recommended that these phenomena be evaluated prior to final engineering design for the following project elements/ locations:

Nature of Hazard	Potentially Susceptible Area/Project Element
Earthquake Ground Motion	Platform Gilda and associated offshore pipelines; Platform Gina offshore pipelines; all onshore project elements (Geotechnical Consultants, Inc. has previously evaluated potential ground motion at the proposed Platform Gina site).
Surface Fault Rupture	Proposed Platform Gilda site (likelihood of surface fault rupture affecting other project elements is considered low).
Liquefaction/Differential Settlement	Platform Gilda and associated offshore pipelines; Platform Gina offshore pipelines; all onshore project elements (Geotechnical Consultants, Inc. has previously evaluated potential liquefaction at the proposed Platform Gina site).
Subsurface Natural Gas Accumulations	Platform Gilda and associated offshore pipelines; Platform Gina Ormond Beach alternative offshore pipelines (Ormond Beach alternative configuration only).
Erosion	Portions of all pipelines that would cross nearshore and beach areas; portions of onshore pipelines that would be emplaced in the Santa Clara River bed (Union Oil Marine Terminal alternative configuration only).

Final engineering design of all project elements should incorporate the findings and recommendations contained in the various engineering studies reports. Appropriate aspects of the project should be reviewed by an experienced engineering geologist and activities, such as platform pile driving, should be performed with this supervision.

There is a possiblity of deep subsurface gas pockets occurring near Platform Gilda. The potential for encountering such pockets during drilling should be considered in planning the drilling program.

5.1.2 Mitigation of Potential Environmental Impacts

The following suggested mitigation measures are general in nature and would apply equally to the proposed and primary and alternative project configurations:

- Disturbance of soils - Wherever disturbance of agricultural soils is necessary, they should be stockpiled and replaced in a manner such that the resulting profiles are as similar to those which existed prior to disturbance as is practicable.

- Consumption of fresh water - Consumptive use of fresh water during hydrostatic testing of onshore pipelines should be minimized by testing the pipelines in sections and reusing the test water.

- Induced subsidence/seismicity - Potential subsidence and seismic activity in the vicinities of the platform sites should be monitored. If subsidence and/or increased seismic activity occur during withdrawal or injection of fluids, the USGS should be notified and an appropriate mitigative program implemented.

5.2 ATMOSPHERIC SCIENCES

5.2.1 Air Quality

The proposed project includes the following measures to minimize air pollutant emissions:

- Use of water sprays during construction to minimize fugitve dust.

- Use of specially designed burners on heater treaters (and booster station heaters for the Union Oil Marine Terminal and Ormond Beach alternative configurations) to reduce NO_x emissions.

- THC emissions from all vessels would be controlled using a vapor compression system.

- Regular maintenance and inspection of all valves, flanges, and pump and compressor seals to reduce THC emissions.

As a further mitigation measure, construction contractor employees and Union's new permanent employees should be encouraged to organize carpools to minimize vehicle emissions and help conserve gasoline.

As proposed, the project is expected to have a minor impact on ambient air quality. Therefore, no other special mitigative measures are considered necessary. Union will comply with all conditions of permits issued by the Ventura County APCD and USGS.

5.2.2 Environmental Acoustics

- Offshore pipeline pulling activities should be initiated at 7:00 a.m. early in the week so that tug and barge operations will be farther from shore during the first and subsequent nights and weekend.

- A wall should be constructed around the Silver Strand Beach booster station (Ormond Beach Option A or B alternative configurations) to reduce potential effects on nearby residential areas.

5.3 OCEANOGRAPHY

The quantity and quality of wastewater discharges to the ocean during construction, drilling, and production will comply with applicable USGS and EPA wastewater discharge effluent limitations and standards, including OCS orders and NPDES permits. No additional mitigative measures are considered necessary.

5.4 MARINE BIOLOGY

Compliance with wastewater discharge limitations established by USGS and EPA are considered adequate mitigation of potential adverse impacts on marine biota. Because impacts on marine biology are expected to be minor (and in some cases beneficial), no other mitigative measures are considered necessary.

5.5 TERRESTRIAL BIOLOGY

Revegetation associated with restoration of surface conditions after construction activities at the offshore pipeline marshalling and fabrication areas and along the onshore pipeline systems, as well as the onshore treating facility after project termination, should be dictated by the type and nature of the adjacent vegetation.

- Foredunes and dune scrub habitat should be revegetated with native species or introduced dune stabilizers presently dominating many areas (Mandalay and Ormond beaches), or left without vegetation on flat strand used intensively for recreation (Silver Strand Beach).

- Agricultural and urban habitat should be revegetated with the appropriate crops or landscape species.

- Ruderal habitat should be revegetated with annual or perennial grass or other appropriate cover, in accordance with regulatory directives.

- Riparian habitat in the vicinity of the Santa Clara River should be allowed to revegetate naturally (Union Oil Marine Terminal alternative configuration).

5.6 LAND AND WATER USE

The following mitigative measures are recommended:

- If the Ormond Beach alternative configuration is selected, final pipeline alignment through the Port Hueneme area should be chosen so as to minimize disruption of port activities. The booster station at Silver Strand Beach should be located in the southernmost portion of the beach to minimize interference with recreational activities.

- The detour lane recommendations (listed in Table 5.0-1) should be used to minimize potential impacts on traffic flow during pipeline construction. Boring techniques will be utilized at major road crossings.

- Construction workers should be encouraged to carpool.

- The block walls surrounding the treating facility (all configurations) and booster stations (Union Oil Marine Terminal and Ormond Beach alternatives) should be pale gray or beige in color. No ornamental landscaping should be introduced at the proposed Mandalay or East Mandalay alternative sites as it would highlight the facility against the natural color of the surrounding dunes. Ornamental landscaping, using drought-tolerant species, would be acceptable at the Ormond Beach alternative site.

- Measures recommended by the U.S. Coast Guard for navigation safety (discussed in Section 4.9.1) should be implemented.

5.7 SOCIOECONOMICS

- Prior to finalization of design, Union should hold discussions with appropriate local fire and police departments regarding special requirements that may be required by those agencies. Project plans currently include installation of a burglar alarm with an audible alarm at the onshore treating facility.

- Proper consideration should be given to energy efficiency in the selection, design, and operation of proposed facilities and equipment.

5.8 CULTURAL RESOURCES

Several cultural resources were identified during field surveys that could be adversely effected by the proposed and alternative project configurations.

TABLE 5.0-1

CONSTRUCTION DETOUR LANE RECOMMENDATIONS

Type of Roadway	Average Daily Traffic Volume	Minimum Detour Traffic Lane Recommendations
Arterial	Over 20,000	2 lanes each way at all times
	10,000 to 20,00	2 lanes each way during peak periods, 1 lane each way at all other times
	Under 10,000	1 lane each way at all times
Collector	Over 5,000	1 lane each way at all times
	2,000 to 5,000	Maintain direct local access
	Under 2,000	Short-term closure acceptable
Local Street, Important Access Road, or Driveway	Over 5,000	1 lane each way at all times
	2,000 to 5,000	Maintain direct local access
	Under 2,000	Short-term closure acceptable

Included below are recommended mitigative measures applicable to all project configurations, and additional mitigative measures which should be implemented if the Ormond Beach alternative configuration is selected.

5.8.1 Mitigation Applicable to All Configurations

(1) Avoidance is the preferred mitigation in all cases where a proposed project element would intrude on the known location of a cultural resource.

(2) Should any object of potential cultural significance be encountered during construction of offshore and onshore facilities, a qualified cultural resources consultant should be contacted to evaluate the find and recommend any further mitigation needed.

(3) A qualified archaeologist should be present to monitor all subsurface work during onshore pipeline construction.

(4) Any buried sites discovered during onshore construction should be excavated by a qualified archaeologist using professionally accepted methods and techniques in accordance with an acceptable research design. During such site excavation, a qualified representative of the local descendants of the Chumash Indians should be employed to assist in the study, ensure proper handling of cultural materials, and ensure proper curation or reburial of finds of religious importance or sacred meaning.

(5) The confirmed shipwreck northwest of the Platform Gina site should be avoided during construction and drilling phases.

(6) The three identified locations of potential shipwreck remains along the Platform Gina Mandalay pipeline corridor should be avoided. If avoidance is not possible, further investigation of these potential cultural resources is recommended. A sample program involving direct inspection by qualified diver-archaeologists is on file with the City of Oxnard and the USGS (Los Angeles).

(7) Access to permanent facilities construction areas and the offshore pipeline fabrication/marshalling area near the SCE Mandalay Generating Station should be strictly controlled during construction and operation to avoid encroachment on the basket material site located to the southeast.

5.8.2 Additional Mitigation Recommended for the Ormond Beach Alternative Configuration

(1) The five identified locations of potential shipwreck remains along the Platform Gina Ormond Beach alternative pipeline corridor should be avoided. If avoidance is not possible, further investigation of these potential cultural resources by qualified diver-archaeologists is recommended.

(2) A program of testing should be conducted to determine the nature and extent of potential effects on historic archaeological site 4-VEN-664(H) located at the Ormond Beach alternative site. In addition, a program of documents research should be completed to: (a) determine the date and nature of its earliest use; and, (b) identify subsequent changes in use and ownership.

(3) If the four prehistoric archaeological sites along the Option A pipeline corridor cannot be avoided, a program of testing (to determine the nature and extent of adverse effect) and mitigative excavation would be required. The pipeline corridor should be routed on the side of the street opposite the Ventura Road Eucalyptus Grove. If this cannot be accomplished, an expert in urban forestry or relevant field should determine the nature and extent of potential adverse effect; a minimum safe distance of the pipeline right-of-way from the trees should then be established.

(4) If the four prehistoric archaeological sites along the Option B pipeline corridor cannot be avoided, a program of testing (to determine the nature and extent of adverse effect) and mitigative excavation would be required. The pipeline corridor should be routed on the side of the street opposite Naumann Giant Gum Tree and Eucalyptus Grove (Ventura County Landmark 15). If this cannot be accomplished, an expert in urban forestry or relevant field should determine the nature and extent of potential adverse effect; a minimum safe distance of the pipeline right-of-way from the trees should then be established.

5.9 CONTINGENCY PLANS

Union has prepared areawide contingency plans outlining specific procedures to be followed in the event of an accidental crude oil spill or hydrogen sulfide (H_2S) incident. The Ventura Area Plans cover all Union offshore operations, as well as many onshore operations in Ventura County and parts of Santa Barbara and Los Angeles counties. These plans have been updated to include operations for the proposed Platform Gina and Platform Gilda Project. The latter have been submitted to and reviewed by the USGS. Copies of the plans are on file at the USGS Los Angeles office and at Union's offices in Ventura.

The function of the Oil Spill Contingency Plan is to outline the organization and duties of Union's oil spill response team, and to delineate the equipment and operational procedures that would be used for preventing, reporting, containing, and cleaning up spills of oil or other polluting substances on land or water. Major elements of the Oil Spill Contingency Plan include the following:

(1) An organization chart defining members of the oil spill response team, their duties, and lines of authority and communication.

(2) A listing of persons and agencies to be contacted in the event of a spill, and the sequence and time requirements for notification.

(3) A listing of specific situations in which certain critical drilling and production operations would be curtailed to reduce the likelihood of a spill during times when containment efforts could be hampered.

(4) A description of specific response procedures as a function of spill size and the types of areas potentially affected (e.g., harbors, recreational beaches, and areas of special biological significance).

(5) A description of methods for recovering spilled oil and disposing of oil-contaminated materials.

(6) An inventory of locally and regionally available manpower and oil spill containment and clean-up equipment (owned by Union and others) that could be mobilized in the event of a spill. Equipment is itemized according to type, location, and availability.

(7) A listing of contractors in the southern California and local area who have specialized equipment and/or expertise that could be called upon in the event of a spill.

(8) A description of areas of special biological significance, the nature of the biological resource at each, shoreline and substrate characteristics, and proposed protection and clean-up techniques specific for each area.

Union's Ventura Area Oil Spill Contingency Plan is regularly updated and reviewed by company personnel. Methods and equipment are maintained at current levels of technology. Change in company operations are accompanied by necessary revisions to the Oil Spill Contingency Plan. Revisions to plans are regularly reviewed by the USGS.

In addition to USGS review of Union's Oil Spill Contingency Plan, the State Coastal Commission has provided input. Upon the Commission's recommendations, Union modified their Plan to provide for additional sorbent materials on Platforms Gina and Gilda, and for a motorized boat to be permanently moored at Platform Gilda for rapid deployment of equipment in the event of a spill (Appendix A, Tables A-1 and A-3).

Dames & Moore has also reviewed the Oil Spill Contingency Plan with particular emphasis on proposed techniques for protecting areas of special biological significance. Dames & Moore finds that the Plan is generally adequate and appropriate to fulfill its intended purposes, particularly in view of Plan modifications made by Union at the request of the California Coastal Commission.

Union's Oil Spill Contingency Plan is designed to ensure rapid and effective control of local oil spill incidents using their own manpower and resources. If a spill cannot be easily accommodated locally, a number of additional regional and national resources are available that could be rapidly mobilized. The following is a partial listing of other oil spill contingency plans which are currently in effect in southern California:

- National Contingency Plan
- Region Nine Contingency Plan
- California Oil Spill Contingency Plan
- Oil and Hazardous Materials Contingency Plan (California Department of Fish and Game)
- Clean Seas, Inc.
- Numerous other local and private plans (located in southern California)

The National Contingency Plan provides for an integrated response by departments of the federal government to protect the environment from adverse effects of an oil spill. This plan also promotes the coordination of state and local responses. The state plan is developed to serve as an extension of the national and regional plans. Numerous local and private agencies also have detailed contingency plans. The Union area plan is closely associated with the Santa Barbara-based Clean Seas, Inc. (CSI) oil spill contingency plan. Union is one of several local oil companies that are participants in CSI.

The Union H_2S Contingency Plan provides for the safety of personnel who may be exposed to harmful concentrations of this gas. The key elements of this plan are similar in nature to those described for oil spills. Response procedures are described and personnel are trained in the proper use of protective equipment. This plan also has been reviewed by the USGS for adequacy and completeness. Other regional and local plans would supplement this one as in the case of an oil spill.

6.0 ENVIRONMENTAL CHANGES WHICH WOULD RESULT IF THE PROJECT IS IMPLEMENTED

6.1 UNAVOIDABLE EFFECTS

The environmental impacts that would result from implementation of the proposed project are discussed in Section 4.0. Incorporation of the mitigative measures discussed in Section 5.0 would minimize the potential for adverse impacts to occur as a result of construction, drilling, or production activities. Consequently, no significant unavoidable adverse impacts are expected to occur. The following list includes adverse impacts which can be reduced to a low level, but not eliminated:

Geotechnical

- Minor modification of topography and bathymetry, and minor disturbance of soils and surface sediments resulting from construction activities and deposition of drill cuttings.
- Consumptive use of fresh water
- Extraction of nonrenewable resources (oil and gas)

Atmospheric Sciences

- Minor alteration of ambient air quality resulting from emission of air pollutants during construction, drilling, and production.
- Minor to moderate local sound level increases resulting from construction, drilling, and production activities.

Oceanography

- Temporary localized increases in turbidity resulting from emplacement of offshore facilities, discharge of hydrostatic test water, and deposition of drill cuttings and mud.
- Localized minor alteration of ocean water quality resulting from increased turbidity; discharge of hydrostatic test water, treated sewage, and brine wastewater; and, leaching of ions from sacrifical anodes.
- Localized negligible alteration of ocean water temperature due to operation of the offshore pipelines.

Marine Biology

- Temporary disturbance, or elimination, of sedimentary habitat and associated organisms resulting from emplacement of offshore facilities and deposition of drill cuttings.
- Minor changes in phytoplankton productivity resulting from altered water quality.
- Entrainment of zooplankton during intake of seawater for hydrostatic testing, desalination, and reservoir injection.
- Local restriction of access for commercial fishing in offshore construction areas and around the two platforms.

Terrestrial Biology

- Removal of vegetation from facility site(s), pipeline corridor(s), and construction areas, and temporary displacement or elimination of wildlife using these areas.

Land Use

- Interference with land uses in adjacent areas during construction.
- Commitment of land to long-term industrial use.
- Minor to moderate increased traffic levels on segments of the local road system during construction.
- Visual intrusion of construction activities and of inplace facilities during drilling and production.

Energy Use

- Commitment of energy required for construction, drilling, and production activities.

None of the above impacts would be significant, whether the proposed Mandalay configuration or one of the primary alternatives was selected. However, there would be minor differences in the magnitudes of some of the impacts among the possible configurations. These differences are summarized in Section 7.2.

6.2 IRREVERSIBLE EFFECTS

Resources and energy would be utilized during construction and operation (drilling and production) of the proposed project. The energy would be irreversibly committed as a result of project requirements. However, implementation of the proposed project would make substantially greater amounts of energy available for future use (Section 4.10.3). At the end of the project's lifetime, it may be feasible to salvage and recycle many of the structural components for future uses.

Several mitigative measures have been included in the project to minimize the effects of potential adverse environmental impacts. The impacts which would occur would be of minor to moderate significance and, in most cases, would be of short duration. For the most part, these impacts are reversible although the time frames for the reversal effects to occur would vary from days to several years.

In the event of an accident, crude oil could be released to the environment. The effect that such a release would have on the environment would depend on several factors, including the volume of the spill, its locations, and time of occurrence. However, it is expected that natural recovery would take place within periods of a few days to several years length and that no significant irreversible adverse impacts would occur.

7.0 ALTERNATIVES TO THE PROPOSED ACTION

7.1 NO ACTION

Under this alternative, existing environmental conditions within the project area would be maintained. Adverse impacts on the physical, biological, and social environments due to the construction, drilling, and production phases of the proposed project (Sections 4.0 and 6.0) would not occur. However, potential beneficial economic effects would not be realized. In addition, the estimated 52.5 million barrels of oil that would be recovered as a result of the production phase of the project would remain unavailable if this alternative were selected. This would preserve a nonrenewable resource for future uses. However, selection of this alternative would not be consistent with current national energy policies which are directed toward increased development of domestic oil reserves to reduce U. S. dependence on foreign imports (Section 4.10.1).

7.2 PRIMARY ALTERNATIVES

This section provides a comparative analysis of the proposed Mandalay configuration and the primary alternatives (East Mandalay, Union Oil Marine Terminal, Ormond Beach Option A or Option B). The analysis is based on detailed information provided in Sections 3.0, 4.0, 5.0, and 6.0.

7.2.1 Geotechnical

A detailed analysis of potential impacts on the geotechnical environment is provided in Section 4.1. Aspects of the geotechnical environment that influence project engineering design (e.g., faults, liquefaction, shallow and deep gas) are discussed in Section 12.1 (Volume II of the EIR/EA) and Appendix B.3. Geologic and hydrologic hazards can be accommodated through appropriate engineering design for the proposed Mandalay configuration and any of the primary alternatives.

During construction, the principal potential impacts on the geotechnical environment would be: (1) alteration of topography (onshore and ocean bottom); (2) disturbance of soils; (3) sediment disturbance in beach/nearshore areas;

and, (4) consumptive use of fresh water. These impacts generally would be highly localized, minor in magnitude, and low in significance. The magnitude and significance of these impacts would be essentially the same for the proposed Mandalay and alternative East Mandalay configurations. The Union Oil Marine Terminal alternative configuration would require trenching across the Santa Clara River with associated riverbed disturbance, as well as a twofold increase in fresh water consumption (1.1 acre-feet; 1,360 m^3). The Ormond Beach Option A alternative configuration would involve greater onshore soil disturbance (two booster stations, longer pipeline route and wider corridor) and a fourfold increase in fresh water consumption (2.6 acre-feet; 3,210 m^3). The Ormond Beach Option B alternative configuration would involve the most extensive onshore soil disturbance (three booster stations, longest pipeline route), possible effects on 34 acres (13.8 ha) of agricultural soils, and a sevenfold increase in fresh water consumption (4.2 acre-feet; 5,180 m^3). Although there would be these differences in magnitude, generally the significance of the impacts is considered low.

The drilling phase would involve alteration of existing seafloor topography through deposition of drill cuttings and development of a cuttings mound, as well as consumptive use of fresh water. These would be minor to moderate impacts of low to moderate significance. Because drilling would only involve Platforms Gina and Gilda, the related impacts provide no basis for differentiating between the proposed Mandalay configuration and the primary alternatives.

The principal impacts during production would include depletion of nonrenewable resources (oil and gas) and consumption of fresh water. The former impact is considered of low geologic significance, while the latter is minor in magnitude (914 acre-feet (11,595 m^3) total during the 20-year project lifetime) and of negligible significance. These impacts would occur regardless of which project configuration (proposed or primary alternatives) were implemented and provide no basis for differentiation.

7.2.2 Atmospheric Sciences

7.2.2.1 Air Quality

A detailed discussion of potential air quality impacts that would result from the implementation of either the proposed Mandalay configuration or the primary alternatives is provided in Section 4.2.1. These potential impacts would result from air pollutant emissions from various sources during construction, drilling, and production. For any of the possible configurations, the air pollutant emission levels would have to be in compliance with pertinent federal, state, and local air quality regulations and permit requirements.

Potential impacts during construction would result from emissions related to the use of various diesel-powered equipment, employee and supply transportation (automobile, truck, boat), onshore clearing and grading activities, and electrical power generation. The impact of these emissions is anticipated to be minor and of low significance due to the relatively short duration of construction activities. Although construction time periods and methods differ somewhat for the possible project configurations, the associated emissions and magnitude/significance of impacts are such that they do not provide a substantial basis for differentiating between the proposed Mandalay configuration and the primary alternatives.

The drilling phase would result in potential impacts related to emissions from various sources on Platforms Gina and Gilda, electrical power generation by onshore power plants, and the use of support equipment (supply boats, crew boats). These emissions are not expected to result in significant air quality impacts. The potential impacts relate solely to activities for the two platforms. Therefore, this project phase provides no basis for differentiation between the proposed Mandalay configuration and the primary alternatives.

During production, potential air quality impacts would result from emissions related to both offshore and onshore sources. The major emissions sources would include natural gas-fired heater treaters and turbines (the latter could be installed at Platform Gilda if commercially recoverable reserves are proven for the Monterey Formation). Other emissions sources would involve employee transportation (automobiles and boats), electrical power generation by onshore power plants and equipment seal leakage. Based on maximum design operating conditions, the largest emissions rates would be associated with the Ormond Beach Option B alternative configuration, followed by: Ormond Beach Option A alternative; Union Oil Marine Terminal alternative; and, proposed Mandalay and alternative East Mandalay (same). However, the emissions rates associated with any of the possible configurations would not result in significant air quality impacts.

7.2.2.2 Environmental Acoustics

A detailed analysis of potential impacts on the acoustical environment that could result from implementation of either the proposed Mandalay configuration or the primary alternatives is provided in Section 4.2.2. These potential impacts would result from noise generated by the use of various equipment, machinery, and transportation modes (boats, trucks, employee vehicles). For any of the possible configurations, sound level increases would have to be in compliance with OSHA standards, federal and state regulations, and permit requirements.

During construction, activities that would generate sound level increases which may adversely affect onshore noise-sensitive receptor locations include: (1) installation of offshore pipelines; (2) treating facility construction; and, (3) construction of onshore pipeline systems (including booster stations for the Union Oil Marine Terminal and Ormond Beach alternatives). Potential impacts resulting from these activities are expected to be minor to moderate in magnitude and of low to moderate significance, depending on construction location and duration. Erection and equipment installation activities for Platforms Gina and Gilda are expected to generate sound level increases that would not affect onshore receptors. Based on the number of construction locations, duration of activities, and proximity to noise-sensitive receptor areas, the Ormond Beach Option A alternative configuration is anticipated to have the greatest impact, followed by: Ormond Beach Option B alternative;

Union Oil Marine Terminal alternative; proposed Mandalay; and, East Mandalay alternative.

The drilling phase would involve sound level increases generated by the operation of various equipment on Platforms Gina and Gilda. Sound level increases would be governed by compliance with OSHA requirements and are not expected to result in local adverse impacts. These increases would attenuate with distance from the platforms and would not affect onshore locations. Because this phase involves only the two platforms, potential impacts provide no basis for differentiating between the proposed Mandalay configuration and the primary alternatives.

Sound level increases during production that could affect onshore noise-sensitive receptor locations would principally result from operation of the treating facility (all configurations) and booster stations (Union Oil Marine Terminal and Ormond Beach alternatives). Depending on the source location, potential impacts could be minor to moderate in magnitude and of low to moderate significance. Based on the number and location of sources, the Ormond Beach Option A and Option B alternative configurations are expected to have the greatest impact, followed by: Union Oil Marine Terminal alternative; proposed Mandalay; and, East Mandalay alternative.

7.2.3 Oceanography

A detailed discussion of potential oceanographic and ocean water quality impacts that would result from implementation of the proposed Mandalay configuration and primary alternatives is provided in Section 4.3. For any of the possible configurations, ocean discharges would comply with pertinent regulations as well as federal and/or state permits that would be required as part of project approval.

During construction, potential impacts would involve: (1) turbidity increases from beach and bottom sediment disturbance; and, (2) water quality alteration resulting from ocean discharges of treated sanitary wastes, brine wastewater (from desalination units), and hydrostatic test water (seawater).

These impacts are expected to be highly localized, minor in magnitude, and low in significance. The magnitude and significance of these impacts would not differ to any degree that would provide a basis for differentiating between the proposed Mandalay configuration and the primary alternatives.

The drilling phase would result in potential impacts related to: (1) turbidity increases from discharge of drill cuttings and muds; and (2) water quality alteration caused by sanitary waste discharges. These impacts are expected to be highly localized, minor to moderate in magnitude, and low in significance. Because the drilling phase only involves Platforms Gina and Gilda, potential impacts would be identical for the proposed Mandalay configuration and primary alternatives.

During production, potential impacts would include: (1) water quality alteration resulting from sanitary waste discharges and leaching of metals from sacrificial anodes; and, (2) water temperature alteration caused by heat dissipation from offshore pipelines. These impacts are anticipated to be highly localized, negligible in magnitude, and low in significance. The magnitude and significance of these impacts would not differ to any degree that would provide a basis for differentiating between the proposed Mandalay configuration and the primary alternatives.

7.2.4 Marine Biology

A detailed discussion of potential impacts on marine biota that could result from implementation of either the proposed Mandalay configuration or the primary alternatives is provided in Section 4.4. For any of the possible configurations, no significant adverse impacts are expected with respect to rare or endangered animal species and special biological habitats.

During construction, the principal potential impacts on marine biota would be related to: (1) temporary disturbance or elimination of sedimentary habitat and associated organisms; (2) changes in productivity caused by wastewater discharges (sanitary, brine); (3) zooplankton entrainment during hydrostatic test water (seawater) intake; and, (4) temporary loss of potential commercial fishing area. These impacts are considered minor and low in significance.

The magnitude and significance of these impacts would be identical for the proposed Mandalay and alternative East Mandalay and Union Oil Marine Terminal configurations. The Ormond Beach alternative configuration (Option A or Option B) would result in greater bottom habitat disturbance (sedimentary habitat and associated organisms) and greater temporary potential commercial fishing area loss. However, the significance of these effects would still be low.

The drilling phase would result in elimination of sedimentary habitat and associated organisms (due to conductor pipe emplacement and drill cuttings/mud disposal), as well as primary productivity changes caused by sanitary wastewater discharges. These impacts would be highly localized, minor in magnitude, and low in significance. The presence of the platforms as artificial substrate would increase the local biomass and species variety. This would be a beneficial impact of moderate local importance; however, the effect would be of low significance within a regional context. Because drilling-related impacts would only involve Platforms Gina and Gilda, they provide no basis for differentiating between the proposed Mandalay configuration and the primary alternatives.

During production, the principal potential adverse impacts would include changes in primary productivity (related to sanitary waste discharges), plankton entrainment (associated with seawater intake at Platform Gina for reservoir pressure maintenance), and loss of potential commercial fishing area. Those impacts are expected to be minor and of low significance. The presence of the platforms and pipelines as artificial substrate would increase the local biomass, productivity, and species variety. This would be a beneficial impact of local importance; however, the effect would be of low significance within a regional context. The magnitude and significance of these impacts would not differ to any degree that would provide a basis for distinguishing between the proposed Mandalay configuration and the primary alternatives.

7.2.5 Terrestrial Biology

A detailed discussion of potential impacts on the terrestrial biota that could result from implementation of either the proposed Mandalay configuration or the primary alternatives is provided in Section 4.5. For any of the possible configurations, no significant adverse impacts are anticipated with respect to rare or endangered plant or animal species, or to sensitive biological habitats.

During construction, the principal potential impacts on the terrestrial biota would be: (1) removal of vegetation; (2) displacement or elimination of individuals of animal species; (3) effects of human activity and associated noise; and, (4) effects of air pollutant emissions and solid and liquid wastes. For any of the possible configurations, these impacts are considered minor in magnitude and low in significance. The primary differences between the possible configurations would result from the total amount of vegetation removed and its associated effect on wildlife. The estimated area of vegetation that would be disturbed for each of the configurations is as follows: proposed Mandalay (18.0 acres; 7.2 ha); East Mandalay alternative (19.5 acres; 7.8 ha); Union Oil Marine Terminal alternative (31.4 acres; 12.5 ha); Ormond Beach Option A alternative (76.8 acres; 30.7 ha); and, Ormond Beach Option B alternative (120.9 acres; 48.4 ha).

No impacts on the terrestrial biota are expected during the drilling phase for either the proposed Mandalay configuration or the primary alternatives.

During production, the potential effects of increased noise and air pollutant emissions on the terrestrial biota are expected to be negligible. The magnitude and significance of these effects would be such that they provide no basis for differentiating between the proposed Mandalay configuration and the primary alternatives.

7.2.6 Land Use

A detailed discussion of potential impacts on land use that could result from implementation of either the proposed Mandalay configuration or the primary alternatives is provided in Section 4.6. Potential impacts primarily relate to land use compatibility, recreation, onshore traffic, and aesthetics.

During construction, the principal potential impacts on land use would be: (1) interference with public access and recreational use during temporary use of beach property for marshalling and fabrication areas and pipeline emplacement; (2) interference with normal functioning of adjacent land uses (e.g., commercial and residential uses); (3) visual intrusion affecting areas with varying levels of public exposure; and, (4) increased traffic volumes on segments of the local road system. The magnitude and significance of these impacts would vary with respect to specific geographic locations affected by the possible project configurations. These impacts are expected to be generally minor in magnitude and low in significance for the proposed Mandalay configuration, as well as the East Mandalay and Union Oil Marine Terminal alternatives. A local beneficial impact would result from the proposed Mandalay configuration in that prepayment of lease fees for the treating facility site would provide funds needed to facilitate development of the planned Mandalay Beach County Park. The Ormond Beach alternative configuration (Option A or B) would have impacts generally similar to the other three configurations, except that: (1) a moderately significant impact on beach use at Silver Strand Beach could occur; and, (2) a possibly moderate to major significant impact on Port of Hueneme operations could result from construction-related interference with port activities. Furthermore, the Ormond Beach Option A alternative configuration could have a temporary significant adverse impact on the functioning of commercial and residential areas along the onshore pipeline route.

The drilling phase would involve increased traffic volumes on the local road system and visual effects of the platforms. Traffic level increases would be small and of negligible significance. Platform Gina would be visible from numerous coastal vantage points and could have a moderately significant visual impact. Platform Gilda would be farther offshore from coastal vantage points and would be within the same visual field as the existing Chevron Platform Grace; therefore, potential visual impacts are expected to be minor in magnitude and low in significance. The visual effects of the platforms would persist throughout the project lifetime. The drilling phase would only involve activities associated with the two platforms. Therefore, the related impacts provide no basis for differentiating between the proposed Mandalay configuration and the primary alternatives.

The principal impacts during production would include compatibility of onshore facilities with surrounding land uses, interference with recreational activities, increased traffic volumes on segments of the local road system, and visual intrusion. All onshore facilities associated with the possible project configurations generally would be compatible with surrounding land uses and recreational activities. However, the Ormond Beach alternative configuration (Option A or Option B) would include a booster station at Silver Strand Beach; this would represent an industrial intrusion that could adversely affect beach-use activities. Traffic volume increases would be negligible for any of the possible configurations. Visual intrusion of the treating facility and onshore pipelines associated with any of the possible configurations would represent a minor impact of low significance. The booster station at Silver Strand Beach for the Ormond Beach alternative configuration (Option A or Option B) could have a significant visual impact on local residents and people engaged in recreational activities on the beach.

7.2.7 Socioeconomics

Table 7.0-1 provides a summary of potential impacts on the socioeconomic environment that could result from implementation of either the proposed Mandalay configuration or the primary alternatives. These impacts are discussed in detail in Section 4.7.

During construction, no significant differences between the proposed Mandalay configuration or the primary alternatives are expected with respect to potential adverse impacts concerning: (1) population growth and housing demand; (2) demands on public services and utilities; and, (3) employment. The construction workforce needed for any of the possible project configurations would be relatively small and mostly drawn from available local labor pools. Therefore, potential impacts on population growth and housing and reduction in unemployment rates would be minor and of low significance.

TABLE 7.0-1

SUMMARY OF POTENTIAL IMPACTS
SOCIOECONOMIC ENVIRONMENT
PROPOSED AND ALTERNATIVE PROJECT CONFIGURATIONS

	Magnitude and Significance of Impact				
Nature/Cause of Impact	Proposed Mandalay Configuration	East Mandalay Alternative Configuration	Union Oil Marine Terminal Alternative Configuration	Ormond Beach Alternative Configuration, Option A	Ormond Beach Alternative Configuration, Option B
A. CONSTRUCTION					
1. Population growth and housing demand	Neglibible/L[a,b]	Same as proposed[c] configuration	Neglible/L	Negligible/L	Negligible/L
2. Demand for public utilities	Minor/L	Same as proposed configuration	Minor/L	Minor/L	Minor/L
3. Demand for public services	Minor/L	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration
4. Effect on employment	Minor/L	Same as proposed configuration	Minor/L	Minor/L	Minor/L
5. Effect on economic base					
a. Property tax revenues generated	None	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration	$62,500/L
b. New taxable retail sales within Ventura County	$10.69 million/L	Same as proposed configuration	$16.73/million/M	$17.2 million/M	$17.8 million/M
c. Sales and use tax revenues accruing to:					
(1) Local governments	$106,900/L-M	Same as proposed configuration	$167,300/M	$171,700/M	$177,700/M
(2) State of California	$534,000/L-M	Same as proposed configuration	$836,500/M	$858,500/M	$888,500/M
B. DRILLING					
1. Permanent population growth and housing demand	Negligible/L	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration
2. Demand for public utilities	Minor/L	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration
3. Demand for public services	Minor/L	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration
4. Effect on employment	Minor/L	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration

TABLE 7.0-1 (concluded)

	Magnitude and Significance of Impact				
Nature/Cause of Impact	Proposed Mandalay Configuration	East Mandalay Alternative Configuration	Union Oil Marine Terminal Alternative Configuration	Ormond Beach Alternative Configuration, Option A	Ormond Beach Alternative Configuration, Option B
B. DRILLING (Continued)					
5. Effect on economic base					
a. Property tax revenues generated	None	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration
b. New taxable retail sales within Ventura County	$88.5 million/M	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration
c. Total sales and use tax revenues accruing to:					
(1) Local governments	$885,000/M	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration
(2) State of California	$4.425 million/M	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration
C. PRODUCTION					
1. Permanent population growth and housing demand	Negligible/L	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration
2. Demand for public utilities	Minor/L	Same as proposed configuration	Minor/L	Minor/L	Minor/L
3. Demand for public services	Minor/L	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration
4. Effect on employment	Minor/L	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration
5. Effect on economic base					
a. Property tax revenues generated[d,e]	$99,700/L	$103,400/L	$251,400/L	$337,300/L	$398,300/L
b. New taxable retail sales within Ventura County	$2.54 million per year/L	Same as proposed configuration	$3.02 million per year/L	$3.13 million per year/L	$3.42 million per year/L
c. Sales and use tax revenues accruing to:					
(1) Local governments	$25,400 per year/L	Same as proposed configuration	$30,200 per year/L	$31,300 per year/L	$34,200 per year/L
(2) State of California	$127,000 per year/L	Same as proposed configuration	$151,000 per year/L	$156,500 per year/L	$171,000 per year/L
d. Total estimated royalty payments to United States government	$232.8 million/L	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration	Same as proposed configuration

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[a] Magnitude of effect/significance of effect

[b] Significance
L - Low
M - Moderate

[c] Magnitude and significance of impact are almost identical to the proposed Mandalay configuration.

[d] Excludes taxes levied on possessory interests.

[e] Estimated proposed taxes for first tax year.

Based on discussions with pertinent agencies/organizations and assessment of available excess capacities, potential impacts on public services and utilities from any of the possible project configurations are expected to be minor in magnitude and of low significance. The major difference between the proposed Mandalay configuration and the primary alternatives relates to potential beneficial economic impacts. Based on dollars that would be introduced into the local economy and revenues to government jurisdictions (Table 7.0-1), the Ormond Beach Option B alternative configuration would contribute the greatest amount of dollars, followed by: Ormond Beach Option A alternative; Union Oil Marine Terminal alternative; and, proposed Mandalay and alternative East Mandalay (same contribution). The dollars generated are expected to be a beneficial impact of low to moderate significance.

For reasons similar to those discussed above, potential impacts on population growth, housing, public services, utilities, and employment are expected to be negligible to minor in magnitude and low in significance during the drilling phase. However, the dollars that would be introduced into the local economy and revenues to government jurisdictions (Table 7.0-1) could be a beneficial impact of moderate significance. The potential impacts relate solely to activities for Platforms Gina and Gilda. Therefore, this project phase provides no basis for differentiation between the proposed Mandalay configuration and the primary alternatives.

During production, potential impacts on population growth, housing, public services, utilities, and employment are anticipated to be negligible to minor in magnitude and low in significance. No significant differences between the possible project configurations are expected in regard to these elements of the socioeconomic environment, for reasons similar to those discussed for the construction phase. The major difference between the proposed Mandalay configuration and the primary alternatives concerns potential beneficial economic impacts. Based on the dollars that would be introduced into the local economy and revenues to local government jurisdictions (Table 7.0-1), the Ormond Beach Option B alternative configuration would contribute the greatest amount of dollars, followed by: Ormond Beach Option A alternative; Union Oil Marine Terminal alternative; and, proposed Mandalay and alternative East Mandalay (same). The dollars generated would occur throughout the project lifetime and are expected to be a beneficial impact of low significance.

7.2.8 Cultural Resources

Table 7.0-2 provides a summary of potential impacts on cultural resources that could result from implementation of either the proposed Mandalay configuration or the primary alternatives. These impacts are discussed in detail in Section 4.8.

During construction, cultural resources could be adversely affected by activities involving direct contact with a resource. These activities would disturb or eliminate the resource and its associated scientific, historic, or ethnographic value. Construction of the proposed Mandalay configuration could affect four identified cultural resources. These same resources could be affected by the East Mandalay and Union Oil Marine Terminal alternative configurations. The Ormond Beach Option A or Option B alternative configurations exhibit the greatest potential for effects on known cultural resources (16 and 15, respectively). In all cases, potential impacts could be mitigated by modifications to project design to avoid known resources. The Ormond Beach alternative configuration would require substantially more modifications to project design than the proposed Mandalay and alternative East Mandalay and Union Oil Marine Terminal configurations. Furthermore, the possibility of buried archaeological sites occurring along pipeline routes associated with the proposed and alternative project configurations is considered high. Based on pipeline route length and corridor width, the Ormond Beach alternative configuration (Option A or Option B) has the greatest potential to encounter buried archaeological sites, followed by: Union Oil Marine Terminal alternative; East Mandalay alternative; and, proposed Mandalay.

TABLE 7.0-2

SUMMARY OF POTENTIAL IMPACTS
CULTURAL RESOURCES
PROPOSED AND ALTERNATIVE PROJECT CONFIGURATIONS

	Magnitude and Significance of Impact				
Nature/Cause of Impact	Proposed Mandalay Configuration	East Mandalay Alternative Configuration	Union Oil Marine Terminal Alternative Configuration	Ormond Beach Alternative Configuration, Option A	Ormond Beach Alternative Configuration, Option B
A. CONSTRUCTION					
Possible disturbance/elimination of known cultural resources:					
a. Historic archaeological sites	None	None	None	1/L[a,b]	1/L
b. Prehistoric archaeological sites	None	None	None	4/M-H	4/M-H
c. Ethnographic sites	1/L	1/L	1/L	1/L	1/L
d. Historic landmarks	None	None	None	2/M-H	1/M-H
e. Potential offshore shipwreck locations	3/M-H	3/M-H	3/M-H	8/M-H	8/M-H
B. DRILLING					
Possible disturbance/elimination of known cultural resources	None	None	None	None	None
C. PRODUCTION					
Possible disturbance/elimination of known archaeological resources	None	None	None	None	None

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[a] Number of sites affected (Magnitude)/significance of effect.

[b] Significance

L - Low

M - Moderate

H - High

No impacts on cultural resources are expected during drilling and production phases for either the proposed Mandalay configuration or the primary alternatives.

7.2.9 Energy Balance

An energy balance analysis was conducted for the proposed Mandalay configuration and primary alternatives (Section 4.10.3). The objective was to compare the total amount of energy required for recovery of oil and gas reserves (energy consumption) to that which would be available for use if these resources were recovered (energy production). The energy ratio (units produced:units consumed) provides a direct basis for comparing the proposed Mandalay configuration to the primary alternatives, as shown below.

Configuration	Energy Ratio
Proposed Mandalay	33.3:1.0
East Mandalay Alternative	33.3:1.0
Union Oil Marine Terminal Alternative	25.8:1.0
Ormond Beach Alternative (Option A)	20.5:1.0
Ormond Beach Alternative (Option B)	17.0:1.0

These data indicate that the energy required for the proposed Mandalay and alternative East Mandalay configurations would be the same. Energy required during the project lifetime for the other alternative configurations would be greater than those two configurations by the following percentages: Union Oil Marine Terminal, 30; Ormond Beach Option A, 63; and, Ormond Beach Option B, 96.

7.2.10 Summary Comparison

The preceding sections have identified the principal differences in potential environmental impacts between the proposed Mandalay configuration and the primary alternatives for project construction, drilling, and production phases. Emphasis was placed on those environmental considerations that provide a basis for differentiating between possible project configurations during each project phase.

Table 7.0-3 provides a qualitative ranking of the possible project configurations. The rankings are based on a relative comparison of the configurations given that in most instances the actual differences between them, with respect to the magnitude and significance of potential impacts, are minor. Furthermore, the rankings for each environmental factor in the table reflect qualitative evaluations that combine the potential impacts for construction, drilling, and production. A rank of 1 indicates that a particular configuration is the most favorable for the environmental factor which was evaluated. If there is no appreciable difference between two or more configurations for a given environmental factor, the same ranking is given to the configurations.

The rankings suggest that either the proposed Mandalay or alternative East Mandalay configurations would have the least potential adverse environmental impacts. No substantial differences between these two configurations are apparent. The Union Oil Marine Terminal alternative exhibits a greater potential for adverse impacts, principally related to more extensive construction requirements and higher total energy consumption. The Ormond Beach alternative configuration (Option A or B) shows the greatest potential, overall, for adverse impacts. It would involve the most extensive areas for onshore construction, longest duration of construction activities, and highest total energy consumption. Option B generally appears less desirable than Option A because of the more extensive onshore area that would be adversely affected.

7.3 SECONDARY ALTERNATIVES

Several secondary alternatives to the proposed project have been identified by regulatory agencies involved in the development of the Work Program that guided preparation of this EIR/EA. Studies regarding the engineering, economic, and environmental feasibility of these alternatives have been conducted by Union and various consulting firms (Robert Dundas Associates, 1978, Environmental Report Development-Production, Hueneme Offshore Platform and Onshore Facility; J. Ray McDermott & Co., Inc., 1979, Critique of Alternates, 1979, Environmental Report Development-Production,

TABLE 7.0-3

QUALITATIVE RANKING PROPOSED AND PRIMARY ALTERNATIVE CONFIGURATIONS[1]

	Project Configuration				
	Proposed	Alternatives			
Environmental Factor	Mandalay	East Mandalay	Union Oil Marine Terminal	Ormond Beach Option A	Ormond Beach Option B
Geotechnical	1	1	2	3	4
Air Quality	1	1	2	3	4
Environmental Acoustics	1	1	1	3	2
Oceanography/Water Quality	1	1	1	1	1
Marine Biology	1	1	1	1	1
Terrestrial Biology	1	1	2	3	4
Land Use	1	1	2	4	3
Socioeconomics[2]	4	4	3	2	1
Cultural Resources	1	2	1	3	4
Energy Balance	1	1	2	3	4

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[1] Rankings are based on relative comparison of potential adverse impacts between the proposed Mandalay configuration and the primary alternatives. Rankings do not indicate absolute magnitude or significance of potential impacts. A ranking of 1 correlates with lowest magnitude/significance on relative scale for adverse impacts.

[2] Rankings dominated by potential beneficial economic impacts. A ranking of 1 correlates with highest magnitude/significance on relative scale for beneficial impacts.

Platform Gilda and Subsea Pipeline). The following sections provide a brief discussion of information developed from these studies. The specific secondary alternatives addressed include:

Alternative Number	Description
1	Pipeline the produced fluids to Platform A and then to the existing Mobil-Rincon onshore facility.
2	Pipeline the produced fluids to a subsea location and connnect into the Dos Cuadras pipeline for transport to the existing Mobil-Rincon onshore facility.
3	Pipeline the produced fluids directly to the existing Mobil-Rincon onshore facility.
4	Pipeline the produced fluids to Platform Grace and then to the existing Chevron Carpinteria onshore facility.
5	Use of subsea wellheads.
6	Offshore treating and tanker loading at platform.
7	Use of semisubmersible drillship.

The approximate locations for pipeline routes and facilities associated with various of these alternatives are shown on Figure 7.0-1.

7.3.1 Alternative 1

Union has indicated that this alternative would involve the following scenario. The produced fluid mixture from Platform Gina would be pumped to Platform Gilda via a new 9.5-mile (15.2-km) subsea pipeline. The natural gas and water present in both this stream and the produced fluid from Platform Gilda would be separated from the crude oil using facilities located at a third offshore platform. Union believes that this separation would improve the pumping characteristics of the crude oil. The separated crude oil and natural gas would then flow to Platform A in two new 16.5-mile (26.5-km) pipelines. Separated water would be pumped back to Platform Gina through a new 9.5-mile (15.2-km) pipeline for injection into the producing zones; excess water would be injected at Platform Gilda. From Platform A, the crude oil and natural gas would be commingled with Platform A production and sent to the Mobil-Rincon treating facility through existing pipelines. The existing facilities at Mobil-Rincon are capable of handling the produced fluids associated with the proposed project. The produced crude oil would flow from the facility through an existing onshore pipeline to the Union Oil Marine Terminal. Product natural gas would enter an adjacent sales gas pipeline.

This alternative would require that additional treating facilities (heater treaters, oil/water/gas separators, storage tanks, etc.) be installed offshore. Union has stated that these additional facilities would probably require construction of an additional platform because there would be little space available on the proposed platforms. In addition, this alternative would require approximately 50 miles of new subsea pipelines. The proposed Mandalay configuration would require approximately 43 miles of new subsea pipelines. The differences between this alternative and the proposed project result in an increase in both the material, construction, and production costs. In addition, the energy required to pump the produced fluids would be greater than for the proposed project. Union has stated that the costs associated with these differences would be prohibitive, given the estimated volume of the crude oil and natural gas reserves for the proposed project.

7.3.2 Alternative 2

This alternative involves the same general flow scheme described for Alternative 1. It is different in that the produced crude oil and natural gas would be sent to a subsea connection point rather than to Platform A. This results in the same scenario as that described for Alternative 1 (Section 7.2.1), but with 6 miles less (two pipelines, each 3 miles shorter) of new subsea pipeline and the requirement for a subsea connection. A subsea connnection would be much more complex than an above water tiein and would add to the project costs. Union has stated that the costs associated with these

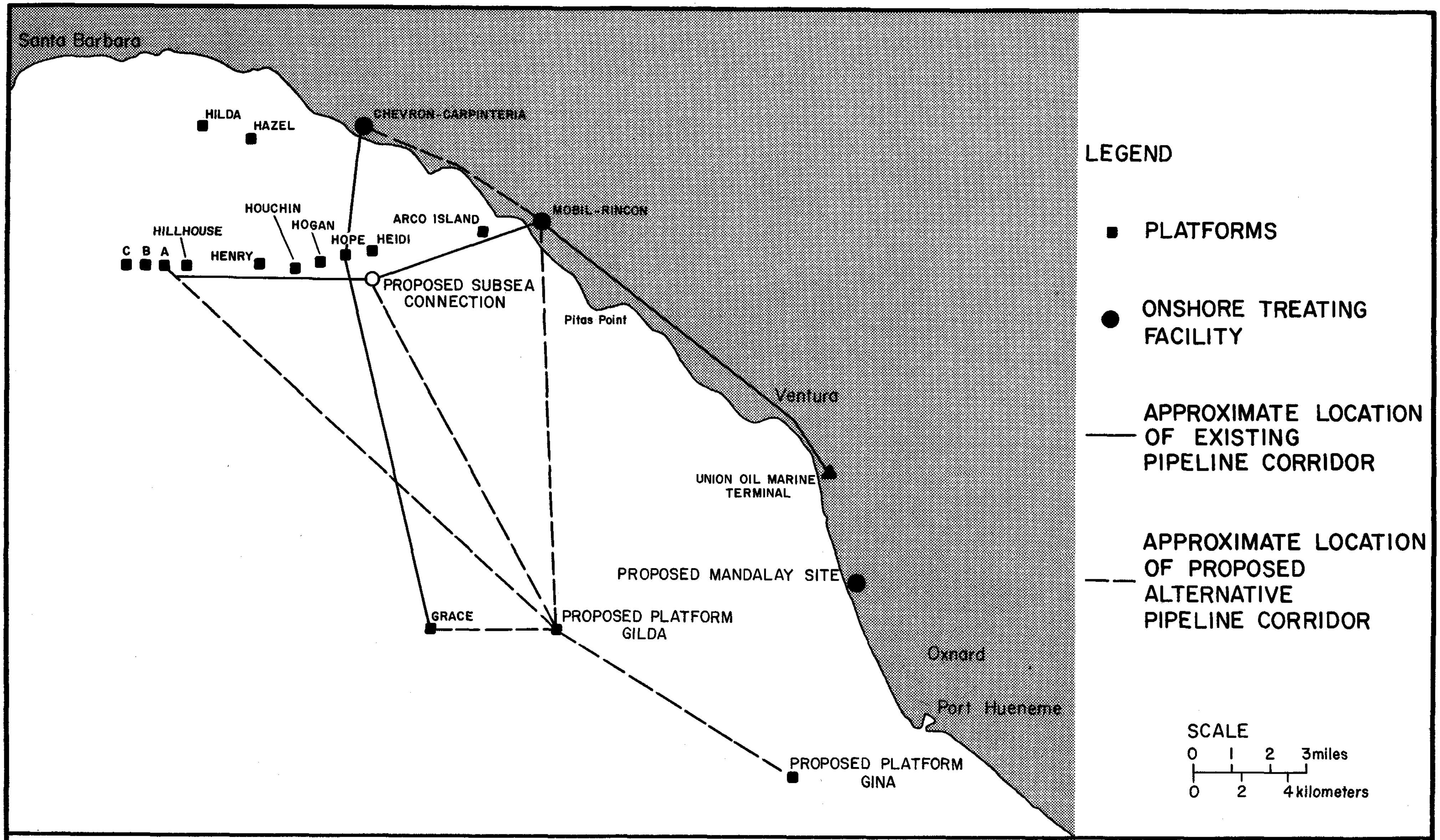

FIGURE 7.0-1

SECONDARY ALTERNATIVES

DAMES & MOORE

differences would be prohibitive, given the estimated volume of the crude oil and natural gas reserves for the proposed project.

7.3.3 Alternative 3

This alternative would involve the same general flow scheme as that described for Alternatives 1 and 2 (Sections 7.3.1 and 7.3.2). It would differ in that the produced crude oil and natural gas would flow directly from the offshore treating platform to the onshore Mobil-Rincon facility.

This results in the same scenario described for Alternative 1 (Section 7.3.1) (with approximately the same total offshore pipeline length as the proposed project), with the additional necessity for having to construct two new pipelines under an existing freeway to the Mobil-Rincon facility. Union has stated that the costs involved with these differences would be prohibitive, given the estimated volume of the crude oil and natural gas reserves for the proposed project.

7.3.4 Alternative 4

This alternative also would involve an initial flow pattern similar to that described for Alternative 1 (Section 7.3.1). The produced fluids from Platforms Gina and Gilda would be pumped to an additional offshore treating platform. The separated crude oil and natural gas would be sent from this platform to Platform Grace, where the crude oil and natural gas from this project would be commingled with the Chevron fluids. The combined fluids would flow from Platform Grace to Chevron's Platform Hope. (The existing pipeline between Platforms Grace and Hope may not have sufficient capacity to accommodate the crude oil production from this project.) At Platform Hope, the fluids from Platforms Gina, Gilda, and Grace would be commingled with the produced fluids from Platform Hope and pumped through an existing pipeline to the onshore treating facility at Carpinteria. The crude oil from the Carpinteria facility would flow to the Mobil-Rincon facility through a new pipeline that may be constructed as part of the Chevron Platform Grace project. Product natural gas would enter an adjacent sales gas pipeline.

This alternative would require between 22 and 50 miles of new offshore pipelines, depending on the capacities of existing systems. The additional platform would increase the material, construction, and production costs to a level substantially above the costs for the proposed project. Union has stated that these costs would be prohibitive, given the estimated volume of the proven crude oil and natural gas reserves for the proposed project.

7.3.5 Alternative 5

This alternative would involve the use of subsea wellheads. Platforms Gina and Gilda would be necessary to facilitate collection and transport of the produced fluids to shore. Subsea wellheads are generally used in deep water for wells that produce natural gas and/or use gas-lift as a producing mechanism. These types of wells can be serviced without a rig. The wells on Platforms Gina and Gilda would not operate as gas-lift wells. This alternative would add facilities and costs to the proposed project without any apparent benefit.

7.3.6 Alternative 6

This alternative would involve offshore treating of the produced fluids, offshore storage of crude oil, and tanker shipment of the produced crude oil. As indicated in the discussion for Alternative 1 (Section 7.3.1), Union anticipates that offshore treating of the produced fluids from Platforms Gina and Gilda would probably require an additional platform. Storage facilities for the crude oil would have to be provided on the platform or on an adjacent storage vessel.

This alternative would involve transporting the produced crude oil to customers using tankers. This alternative transport would result in increased atmospheric emissions. These emissions would be greatly increased unless the transport tankers were equipped with hydrocarbon vapor recovery equipment. In addition, there is no provision in this alternative to send the produced natural gas to customers. For this reason, the produced gas would have to be injected into the producing formation or burned on the platform. This would also increase the atmospheric emissions that would occur on the platform.

This alternative is considered less desirable than the proposed project because of: (1) increased material, constuction, and production costs; (2) increased atmospheric emissions; (3) increased tanker traffic; and, (4) increased potential for accidental oil spills and associated environmental impacts.

7.3.7 Alternative 7

This alternative would involve the use of semisubmersible drillships, rather than the two fixed platforms. The use of drillships requires a mooring system to maintain position during motion caused by waves, currents and winds. This motion causes unavoidable flexing, resulting in fatigue of the risers and increased potential for oil spills. In addition, the use of a drillship would probably require use of subsea completions. These problems are avoided through the use of fixed platforms. For these reasons, this alternative is considered less desirable than the proposed project.

8.0 THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE OF LONG-TERM PRODUCTIVITY

8.1 INFLUENCE OF THE PROPOSED PROJECT ON LONG-TERM PRODUCTIVITY

Implementation of the proposed Platform Gina and Platform Gilda Project would necessitate short-term use of the environment involving construction, operation (drilling and production) over an approximately 20-year period, and dismantling and salvage of some, or all, of the project components. Potential environmental impacts associated with the construction, drilling, and production phases of the project are discussed in Section 4.0.

Following the end of the project's operational lifetime, the facilities would be removed, or abandoned, as described in Section 3.7. Except for the residual cuttings mounds at the platform sites, all ground surfaces would be restored to conditions as near to those which existed prior to construction as is practicable. Environmental impacts associated with removal of facilities would be similar to those involved with their installation (Section 4.0).

Several mitigative measures would be included in the project (Sections 3.0 and 5.0) to minimize the effects of potential environmental impacts. As discussed in Section 4.0, most environmental impacts would be of short duration; none would be of major significance; and, in most cases, recovery from impacts is expected to be rapid. As a result, there should be no narrowing of the range of beneficial uses of the environment, and no long-term risks to health or safety would result from implementation of the proposed project, whether the proposed Mandalay configuration or one of the primary alternatives were selected.

In summary, the short-term use of the environment necessary for production of oil and gas is not expected to result in significant long-term adverse impacts on the productivity of the environment.

8.2 CUMULATIVE EFFECTS

Cumulative effects refer to those produced by the interactions of individual environmental impacts which, when combined, may result in a potentially significant single effect. Cumulative effects may result from a project alone (during either construction or operation phases), or from the project in combination with other developments existing in, or proposed for, its local area. For the proposed Platform Gina and Platform Gilda Project, the combined impacts of project elements (i.e., platforms, onshore treating facility, and offshore and onshore pipelines) represent a further type of cumulative effect; these latter cumulative effects are discussed for each environmental discipline in Section 4.0. The following paragraphs discuss cumulative effects for the proposed project of different environmental factors during construction and operation (drilling and production), as well as with other petroleum-related projects (existing, proposed, or potential) in the Santa Barbara Channel.

During construction of the Platform Gina and Platform Gilda Project facilities, the principal cumulative effect would be a reduction in local environmental quality for marine life, terrestrial vegetation, wildlife, and people. This would result from the combined effects of habitat disturbance, noise, vehicle and equipment emissions, onshore and offshore traffic movements, and human activity. The cumulative effect of these factors on people would be to create less attractive visual and auditory environments, which could have an impact on conducting their daily lives. Terrestrial and marine biota would be affected primarily through habitat elimination and loss of individuals of species. Terrestrial wildlife and marine biota would also be disturbed by construction-related noise, vibrations, and human presence; this would cause the temporary or permanent relocation of individuals or small populations of animal species to adjacent areas of undisturbed habitat. These cumulative effects are considered a short-term impact of minor significance for the proposed Mandalay configuration and the primary alternatives.

Although the significance of the potential effects associated with construction would be minor for each of the possible configurations, the magnitude of the effects would vary slightly between the proposed and alternative configurations. The magnitude of the potential cumulative effects would generally be proportional to the amount of area disturbed by construction activities and the length of time over which these disturbances would take place. There would be essentially no difference between the proposed Mandalay and alternative East Mandalay configurations. The Union Oil Marine Terminal alternative configuration would involve a larger disturbance area for a longer period of time. The Ormond Beach alternative configuration (Option A or Option B onshore pipeline system) would require the largest disturbance area and the longest construction time period.

Few adverse environmental impacts are expected to occur during the drilling and production phases of the Platform Gina and Platform Gilda Project (Section 4.0). Those impacts that would occur should not result in any significant cumulative effects. Potential environmental impacts resulting from the drilling and production phases would be essentially the same for the proposed Mandalay configuration and the primary alternatives. Therefore, potential cumulative effects also would be the same for the possible configurations.

The principal activities and projects with which the proposed Platform Gina and Platform Gilda Project could be expected to produce cumulative effects are related to oil and gas production and transportation in the Santa Barbara Channel area. These activities have been discussed individually and cumulatively in several documents that are incorporated by reference in this EIR/EA (U.S. Department of the Interior, 1975, 1976, 1979, 1980; Office of Planning and Research, 1977; Santa Barbara County, 1978; Joint Industry/ Government Pipeline Working Group, 1979; Ventura County Environmental Resources Agency, 1979; U.S. Department of Commerce, 1979). Most of these discussions include general consideration of offshore oil and gas development activities on federal OCS leases P-0202, -0203, and -0216, the three leases proposed to be developed by implementation of the Platform Gina and Platform Gilda Project. Therefore, the following discussion represents a synthesis of the findings contained in the above-referenced reports, modified as necessary to reflect the more detailed information concerning development of federal leases OCS P-0202, -0203, and -0216 compiled for this EIR/EA.

Principal activities and projects with which the proposed Platform Gina and Platform Gilda Project could be expected to produce cumulative effects include:

- Offshore oil and gas development on existing federal OCS leases sold in 1966, 1968, and Lease Sale #35 (includes leases OCS P-0202, -0203, and -0216--proposed Platform Gina and Platform Gilda Project; lease OCS P-0217--recently installed Platform Grace; and, lease OCS P-0240--recently installed Platform Henry) as well as seven other existing platforms on the OCS in the Santa Barbara Channel;

- Offshore oil and gas development on federal OCS leases sold in Lease Sale #48;

- Potential offshore oil and gas development on federal OCS leases which may be sold in future Lease Sales #68, #73, and #80;

- Existing and potential offshore oil and gas development on existing California State tidelands leases (includes possible development of PRC-3314 by Shell);

- Resumption of drilling on State tidelands leases (Summerland, Carpinteria, and South Ellwood offshore fields);

- Potential installation of an offshore LNG terminal in the Ventura Flats area (in the vicinity of OCS Tract 075, which was selected for sale, but not sold, in Lease Sale #48); and,

- Potential development of the Vaca tar sands from an area approximately 1.5 miles (2.4 km) east of the City of Oxnard.

In combination, these projects could produce cumulative effects both on environmental resources (e.g., air, water, plants, and animals) and on man's use of the environment (e.g., recreation, navigation, and military activities).

There are three principal potential sources of cumulative effects from these projects:

- Presence of, and operational activities associated with, offshore facilities;
- Presence of, and operational activities associated with, onshore facilities; and,
- Oil spills.

Only generalized predictions of future cumulative effects can be made because:

- Engineering and environmental characteristics of many projects are not known at this time;
- The sequence and timing of project implementation is uncertain; and,
- Site-specific environmental data are not available for many areas of the Santa Barbara Channel.

Consequently, Table 8.0-1 provides a generalized summary of the primary sources of cumulative effects and the environmental resources and uses that could be significantly affected.

As shown in Table 8.0-1, the most significant potential cumulative effects on Santa Barbara Channel environmental resources and uses would be associated with major accidental oil spills.

Two proposals are currently undergoing study which could have important consequences related to potential cumulative effects in the Santa Barbara Channel:

- Transport of all produced crude oil by pipeline, rather than tankship; and,
- Routing of large marine vessels seaward of the Channel Islands, rather than through the Santa Barbara Channel.

These measures, if implemented, would be expected to reduce air pollutant emissions, potential navigation impacts, and the potential for major oil spills, which represent three principal potential cumulative effects of existing and future projects in the Santa Barbara Channel area.

TABLE 8.0-1

POTENTIAL CUMULATIVE EFFECTS

	Source of Potential Effects				
	Short-term Effects[a]				Long-term Effects[b]
	Presence and Normal Operation of Facilities		Accidental Oil Spills[c]		Presence, Normal Operation, and Oil Spills
Potentially Affected Resource/Use	Offshore	Onshore	Major	Minor	
Fish and Shellfish	1	0	2	1	2
Marine Birds	1	1	3	1	2
Marine Mammals	2	0	3	1	2
Endangered Species	2	1	3	1	2
Estuaries/Coastal Wetlands	1	0	3	1	2
Water Quality	1	1	2	1	1
Air Quality	1	2	2	1	1
Cultural Resources	NA[d]	NA	NA[d]	NA	2
Navigation	2	0	1	0	0
Military	2	0	1	0	0
Commercial Fishing	1	0	3	1	1
Recreation (including Sport Fishing)	1	0	2	1	1
Marine Sanctuaries[e]	2	0	3	1	2
Infrastructure/Economy	+	+	2	0	1
Aesthetics	2	1	2	1	1

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[a] Short-term effects are those which would not be likely to persist more than approximately 10 years after completion of all activities and removal of facilities; scale of sensitivity to potential effects: 3 = high, 2 = moderate; 1 = low; 0 = not sensitive; + = beneficial effect.

[b] Long-term effects are those which would be likely to persist more than approximately 10 years after of all activities and removal of facilities; scale of expectancy for potential effects: 2 = possible; 1 = unlikely; 0 = not expected.

[c] Major - magnitude spill likely to be associated with a major accident, such as a blowout or tanker rupture. Minor - magnitude spill likely to be associated with a pipeline leak or other system malfunction.

[d] Effects on cultural resources are considered long-term because any alteration of the resource character could permanently alter its scientific value.

[e] For purposes of this assessment, implementation of the preferred alternative for the proposed Channel Islands Marine Sanctuary is assumed (U.S. Department of Commerce, 1979).

As indicated in Table 8.0-1, most of the principal potential cumulative effects would result from offshore activities (possible major oil spill, and presence and operation of offshore facilities). Because the offshore portions of the proposed Platform Gina and Platform Gilda Project would be essentially the same for the proposed Mandalay configuration and each of the primary alternatives, potential cumulative effects associated with other projects and activities would be the same for each of the possible configurations.

8.3 JUSTIFICATION FOR IMPLEMENTING THE PROPOSED PROJECT AT THIS TIME

Making oil and gas resources available to meet the nation's energy needs as rapidly as possible, while balancing orderly energy resource development with protection of the human, marine, and coastal environments, are among the policies of the Outer Continental Shelf (OCS) Lands Act, as amended. In order to ensure correlation between the Department of the Interior's (DOI) energy leasing policy and overall national energy policy, DOI and the Department of Energy (DOE) agreed to establish production goals for energy resources on federal lands. Pursuant to this agreement, DOE formulated OCS oil and gas production goals for 1985, 1990, and 1995.

The DOE production goals are based, in part, on their finding that other energy sources (including solar, geothermal, and nuclear fusion) will not significantly reduce dependence on oil and gas before the end of the century. Therefore, their goal is to maximize OCS energy resource production to the extent practicable. To the extent that this reduces the increasing U.S. dependence on foreign energy sources, undesirable social and economic effects of that dependence can be avoided.

Union believes that implementation of the proposed project is justified at the present time because it is consistent with DOE's OCS oil and gas production goals and overall national energy policy. Furthermore, Union believes that the proposed project has been designed to minimize the potential for occurrence of significant adverse impacts on the human, marine, and coastal environments.

9.0 GROWTH-INDUCING ASPECTS

9.1 PROPOSED MANDALAY CONFIGURATION

9.1.1 Construction

Construction of the proposed Mandalay configuration would have a temporary, relatively insignificant growth-inducing impact on Ventura County (primarily due to the short 4.5-month period of construction). Secondary (indirect and induced) employment would be generated as a result of:

(1) construction workforce payroll spent locally (i.e., within Ventura County); and,

(2) local purchases of construction materials, supplies, and services.

The total direct payroll estimated for construction would be $13.4 million, of which an estimated $5.76 million would be paid to local residents or spent within the county. Of this amount, approximately $4.11 million of new disposable income would be introduced into the local economy as a direct result of construction. Furthermore, Union estimates that $34.4 million in materials, supplies, and services would be purchased for the construction program. Approximately $9.15 million of this total would accrue to local vendors within Ventura County.

Thus, a total of approximately $13.26 million of new income would be introduced into the local Ventura County economy as a result of construction. As this income circulates through the economy and further stimulates additional secondary expenditures, a multiplier effect would occur. Based on normal labor versus material ratios and deductions for personal taxes and nonconsumptive expenditures, the estimated total net impact on the local economy would be approximately $20.3 million of new income.

Assuming an annual productivity rate of $50,000 per worker, the equivalent of approximately 406 secondary jobs would be created as a result of construction. Some of these jobs would be filled by workers from outside of

Ventura County, although most would represent opportunities for workers already residing in the area. Furthermore, some of the secondary job opportunities probably would be assumed by persons already employed. Thus, the total secondary employment expected to occur probably would be less than the estimated 406 indirect and induced jobs. This potential employment increase would be temporary and is not expected to have significant permanent effects on population, housing, or community services.

9.1.2 Drilling

Secondary employment would result from the drilling program as payroll and materials and services purchase dollars are circulated through the local economy. The total estimated payroll for the drilling program would be approximately as follows:

First 13 months	$440,000/month
Months 14 through 56	$286,000/month

Disposable income resulting from this payroll would be:

First 13 months	$312,000/month
Months 14 through 56	$203,000/month

Introduction of the disposable income into the local economy would occur as drilling crews spend their income in the area.

Union estimates that approximately $91 million in materials, supplies, and services would be purchased over the duration of the drilling program. Of this amount, about $82 million would be spent within Ventura County. On a monthly basis, this would be distributed as follows:

First 13 months	$2.046 million/month
Months 14 through 56	$1.285 million/month

A total of approximately $95 million in new income would therefore be introduced into the local economy as a result of the drilling program, scheduled as follows:

First 13 months of drilling	$2.358 million/month
Months 14 through 56	$1.488 million/month

As this income circulates through the economy and further stimulates additional secondary expenditures, the multiplier effect would occur. The estimated total net impact on the economy would be approximately $144 million of new income, scheduled as follows:

First 13 months	$3.6 million/month
Months 14 through 56	$2.27 million/month

Assuming an annual productivity rate of $50,000 per worker, new secondary jobs would be created, equivalent to the following:

First 13 months	860 equivalent jobs
Months 14 through 56	540 equivalent jobs

Some of these jobs would be filled from outside of Ventura County, but most would represent opportunities for workers already residing in the area. Furthermore, some of these secondary job opportunities probably would be assumed by persons already employed. Thus, the total secondary employment expected to occur probably would be less than that estimated above.

This potential employment increase would last for several years while the drilling phase is being completed. A minor amount of permanent population growth may be induced, with an associated small demand on housing and community services. However, no significant growth-inducing impact is anticipated.

9.1.3 Production

The production phase would involve direct employment of about 15 persons, associated with platform operations. The annual payroll dollars and other local expenditures would be too small to induce any measurable secondary impact on the local economy.

9.2 EAST MANDALAY ALTERNATIVE CONFIGURATION

Growth-inducing impacts associated with this alternative would be the same as discussed for the proposed Mandalay configuration (Section 9.1).

9.3 UNION OIL MARINE TERMINAL ALTERNATIVE CONFIGURATION

9.3.1 Construction

The total direct construction payroll for the Union Oil Marine Terminal alternative configuration would be approximately $19 million, of which an estimated $10.8 million would be paid to local residents or spent within the county. Of this amount, approximately $7.69 million of new disposable income would be introduced into the local economy during construction. In addition, Union estimates that $43.8 million would be spent for construction materials, supplies, and services, of which $13.85 million would accrue to local vendors within Ventura County.

Therefore, a total of approximately $21.54 million in new income would be introduced into the local Ventura County economy as a result of construction. The continued circulation of this new income through the local economy would further stimulate additional secondary expenditures, increasing the estimated total net impact to approximately $33 million.

At an annual productivity rate of $50,000 per worker, the equivalent of 660 secondary jobs would be created as a result of construction. Some of these jobs would be filled from outside of Ventura County, but most would represent opportunities for workers already residing in the area. Furthermore, some of these secondary job opportunities probably would be assumed by persons already employed. Thus, the total secondary employment expected to occur probably would be less than the estimated 660 indirect and induced jobs. This potential employment increase would be temporary and is not expected to have significant permanent effects on population, housing, or community services.

9.3.2 Drilling

Growth-inducing impacts associated with the drilling phase of this alternative would be the same as discussed for the proposed Mandalay configuration (Section 9.1.2).

9.3.3 Production

Growth-inducing impacts associated with the production phase for this alternative would be the same as discussed for the proposed Mandalay configuration (Section 9.1.3).

9.4 ORMOND BEACH ALTERNATIVE CONFIGURATION

9.4.1 Construction

9.4.1.1 Option A

Direct construction payroll for the Ormond Beach Option A alternative configuration would be approximately $22.7 million, of which an estimated $14.13 million would be paid to local residents or spent within the county. New disposable income introduced into the local economy would be approximately $10.06 million. Local purchases of construction materials, supplies, and services would result in another $13.4 million being introduced into the local economy. The total of $23.46 million would circulate through the economy, with multiplier effects increasing the total net impact to an estimated $35.9 million.

At an annual productivity rate of $50,000 per worker, the equivalent of 718 secondary jobs would be created as a result of construction. Some of these jobs would be filled from outside of Ventura County, but most would represent opportunities for existing residents. Some of the new job demand might be satisfied by persons already employed. Thus, the total secondary employment expected to occur probably would be less than the estimated 718 indirect and induced jobs. This potential employment increase would be temporary and is not expected to have significant permanent effects on population, housing, or community services.

9.4.1.2 Option B

Construction of the Option B onshore pipeline system for the Ormond Beach alternative configuration would create about 768 secondary jobs. The growth-inducing impact of Option B would be essentially the same as for Option A (Section 9.4.1.1), although slightly greater in magnitude because of the larger number of workers and the longer duration of the construction period.

9.4.2 Drilling

Growth-inducing impacts associated with the drilling phase for either the Option A or Option B Ormond Beach alternative configuration would be the same as discussed for the proposed Mandalay configuration (Section 9.1.2).

9.4.3 Production

Growth-inducing impacts associated with the production phase for either the Option A or Option B Ormond Beach alternative configuration would be the same as discussed for the proposed Mandalay configuration (Section 9.1.3).

10.0 WATER QUALITY ASPECTS

The proposed Platform Gina and Platform Gilda Project is currently under review by various federal, state, and local agencies to ensure that water quality aspects would be in substantial compliance with applicable water quality standards. Information relevant to water quality aspects of the proposed project configuration and the three primary alternatives is presented in the project description (Section 3.0), environmental impacts (Sections 4.1, 4.3, and 4.4), and environmental setting (Sections 12.1, 12.3, and 12.4).

11.0 PERSONS AND ORGANIZATIONS CONSULTED

11.1 EIR/EA CONSULTANT

Technical assistance in the preparation of the Platform Gina and Platform Gilda Project EIR/EA was provided by the firm of Dames & Moore under contract to the City of Oxnard. The scope of technical work was completed consistent with a Final Revised Work Program (dated September 30, 1979) that was approved by over 30 regulatory agencies. Overall management of the consultant work was handled through Dames & Moore's Santa Barbara office (125 East Victoria Street, Suite F, Santa Barbara, California, 93101, 805/965-3055). The following personnel and subcontractors were involved in report preparation:

Project Director	Dr. Bruce A. Wales
Project Manager	Dr. Leslie W. Senger
Technical Integration	Mr. Steven A. Trudell Dr. Anthony J. Mark Mr. Douglas H. Brewer
Geotechnical	Dr. Jeffrey A. Johnson Mr. Roy H. Patterson Mr. Steven A. Trudell
Geophysical	Dr. Jerry C. Wilson, McClelland Engineers, Inc. Fairfield Industries
Meteorology/Air Quality	Mr. Douglas H. Brewer Mr. Joe D. Kuebler Mr. Alex W. Bealer
Environmental Acoustics	Dr. Frederick Kessler Mr. Glenn Cass
Oceanography	Mr. Lee E. Fausak Mr. Frank J. Gremse
Marine Biology	Dr. Thomas B. Scanland Mr. Leray A. deWit Mr. Harold Finney Mr. Gerald A. Johnson

Terrestrial Biology	Mr. Eric R. Sakowicz Ms. Kelly Steele Ms. Maryanne Scott
Land Use	Mr. Donald B. Dufford Ms. Nancy L. Minick Mr. John Koeller Thomas S. Montgomery and Associates
Socioeconomics	Mr. John Koeller Dr. William W. Wade
Cultural Resources	Ms. Heather Macfarlane Mr. Stephen Horne
Marketing/Transmission	Dr. William W. Wade Mr. Douglas H. Brewer
Safety and Reliability	Dr. Roger S. Schlueter Mr. Ken Busen Mr. Phillipe Bardey Dr. Anthony J. Mark Mr. Michael W. Miller Mr. William E. Gates Mr. Donald B. Dufford

Information concerning the qualifications and experience of Dames & Moore and these personnel is on file with the City of Oxnard.

11.2 PERSONS AND ORGANIZATIONS CONTACTED

Regulatory agencies, organizations, and individuals consulted during preparation of the EIR/EA are identified below.

CALIFORNIA ARCHAEOLOGICAL SURVEY

CALIFORNIA NATIVE PLANT SOCIETY

CALLEGUAS MUNICIPAL WATER DISTRICT
    R. Berry

CANDALARIA AMERICAN INDIAN COUNCIL, OXNARD

CHEVRON U.S.A. Inc.
    A. George

CITY OF OXNARD
  Fire Department
    H. Conley
    A. Koog
    M. Perez

CITY OF OXNARD (Concluded)

Planning Department
- B. Fitch
- R. Floch
- D. Hineser
- G. Hosford
- E. Johnduff
- W. Lewis
- R. Steele
- L. Walrod

Police Department
- F. Egan
- R. Owens

Public Works Department
- J. Genovese
- S. Maximous
- J. Yurko

CITY OF PORT HUENEME
- L. Leach

Police Department
- R. Anderson

CITY OF SAN BUENAVENTURA

Department of Community Development
- A. Chaney
- K. Korzun
- R. Meyer

Fire Department
- R. Bogardus

Police Department
- P. Klismet
- B. Talbot

Public Works Department
- O. Ross

CITY OF THOUSAND OAKS
- G. Smith

COUNTY OF VENTURA

Air Pollution Control District
- J. Bush
- S. Johnson
- K. Krause
- J. Rouge

COUNTY OF VENTURA (Concluded)

Assessor's Office
- G. Gray

Department of Environmental Health
- T. Gilday

Emergency Medical Care Committee
- K. Mills

Environmental Resources Agency
- N. Settle
- J. Walker
- M. Willis

Farm Advisor
- M. Dipping

Fire Department
- N. Hall
- P. Zamazanuk

Flood Control District
- W. Frank
- W. Hayden
- D. Hitchingham
- W. Lockard
- M. Mukai
- D. Taylor
- J. Turner

LAFCO
- R. Braitman

Museum

Property Administration Agency
- G. Morton

Public Works Department
- J. Crowley
- A. Knuth
- G. Ogura
- H. Ribi

Sheriff's Department
- R. Seery

Superintendent of Schools
- B. Willerford

HUGO McGRATH COMPANY
- C. Conway

LOS ANGELES MUSEUM OF NATURAL HISTORY
- C. Swift

PIPEFITTERS' LOCAL 250, LOS ANGELES
- D. Stewart

PORT HUENEME HISTORICAL MUSEUM
- E. Stafford

PORT OF HUENEME
- J. Elmore

SOUTHERN CALIFORNIA EDISON COMPANY
- D. Armand
- O. Racicot
- G. Schneider
- J. Stipanov

STATE OF CALIFORNIA
- Air Resources Board
  - J. DeCuir
  - D. Kobberlein
  - G. Lew
  - D. McElfresh
  - A. Ranzieri
  - T. Wong

- Coastal Commission
  - M. Gottdiener
  - S. Stanley

- Department of Boating and Waterways
  - C. August
  - W. Felts
  - M. Mercado

- Department of Conservation
  - S. Butterfield

  - Division of Mines and Geology
    - L. Jones
    - S. Tan
    - J. Treiman

  - Division of Oil and Gas
    - R. Reid

- Department of Fish and Game
  - B. Eliason
  - R. Fordice
  - P. Kelly
  - R. Klingbeil
  - R. Mall
  - R. Nitsos
  - M. Oliphant
  - J. St. Amant

STATE OF CALIFORNIA (Concluded)

- Department of Parks and Recreation
  - R. Auman
  - J. Kolb
  - J. Tryner

- Department of Transportation
  Division of Aeronautics
  - B. Miller

- Office of Historic Preservation
  - H. Bass
  - J. Bingham
  - W. Siedel

- Office of Planning and Research
  - R. Bass

- Regional Water Quality Control Board
  - R. Hertel
  - L. Schinazi
  - H. Yacoub

- State Lands Commission
  - L. Grimes
  - D. Sanders
  - A. Willard

- University of California, Santa Barbara
  - M. Glassow

- Water Resources Control Board
  - J. Huddleson

UNION OIL COMPANY

- J. Attebery
- R. Barnds
- J. Buckingham
- R. Gillen

UNITED STATES

- Army Corps of Engineers
  - R. Surynt

- Bureau of Land Management
  - T. Roy

- Coast Guard
  - D. Taub
  - J. Terveen
  - R. Wendt

UNITED STATES (Concluded)
    Environmental Protection Agency
        B. Jankus
        J. Zenner

    Fish and Wildlife Service
        J. Wolf

    Geological Survey
        M. Adams
        T. Dunaway
        H. Greene
        E. Kreppert
        K. Yenne

    National Archives

    Navy
        R. Doll
        R. Harmuth
        P. Peters

VENTURA COLLEGE
        J. Farrow
        T. Willsrud

VENTURA COUNTY ARCHAEOLOGICAL SOCIETY

VENTURA COUNTY BUILDING AND CONSTRUCTION TRADES COUNCIL
        A. Bauerlein

VENTURA COUNTY CULTURAL HERITAGE BOARD

VENTURA COUNTY HISTORICAL SOCIETY MUSEUM

VENTURA REGIONAL COUNTY SANITATION DISTRICT
        W. Bishop
        M. Hasan
        R. Reed

PRIVATE CITIZENS
        T. Kato
        I. Otani
        M. Wolf

APPENDIX A

PROJECT DESCRIPTION DATA

LIST OF TABLES

LIST OF FIGURES

TABLE A-1

PLATFORM GINA EQUIPMENT

One electrically driven fire water pump.

One diesel driven fire water pump.

One crane 70 ton on drill deck.

One monorail type crane 2.5 ton on production deck.

Deck drain collection and disposal system.

Potable water tank and pump.

Sewage disposal unit.

Public address system.

Alarm system.

Navigational aids (fog horn and lights).

Life saving and flotation equipment.

First aid equipment (Union personnel will be qualified through Red Cross first aid training).

Fire hose reels and monitors as required.

Portable chemical fire extinguishers on the rig floor, on the drilling and production decks, and in enclosed areas.

Direct telephone communications.

Radio communications.

Emergency generator (12.5 KVA for communications and navigational aids).

Gas detectors.

Flame detectors.

Utility air system.

Instrument air system-including air dryer.

Fire water deluge system in all well rooms and other critical locations on the production decks.

Oil containment and cleanup equipment consisting of:
- (a) 1,500 feet of Kempner 8" Sea Curtain oil containment boom
- (b) One Acme 51T oil skimmer.
- (c) Ten drums of Corexit #9527 oil dispersant.
- (d) Three boxes of Conwed sorbent boom
- (e) Three boxes of Conwed sweeps.
- (f) Such other equipment as required by the USGS Area Supervisor.

TABLE A-2

PLATFORM GINA DESIGN SPECIFICATIONS

● Orientation:	The platform would be oriented to offer the least resistance to the maximum expected wind and wave forces.
● Seismic Design:	The design criteria in API RP2A (ninth edition), zone 4 are being used in the preliminary design. Final foundation design criteria will be developed by a soils and foundation engineering consultant.
● Ductility Requirements:	As set forth in API RP2A, ninth edition.
● Winds	
Maximum sustained wind speed:	50 knots (25.7 m/sec)
Maximum wind gusts:	75 knots (38.6 m/sec)
Direction of approach:	165°
● Waves:	
Maximum wave height:	42 feet (12.8 m)
Period:	15 seconds
Direction of approach:	175°
● Current:	
Maximum speed at surface:	1.5 knots (0.8 m/sec)
Maximum subsurface:	1.5 knots (0.8 m/sec)
Maximum at bottom:	0.5 knot (0.3 m/sec)
Direction of approach:	105° to 115°
● Corrosion:	● Sacrificial anodes designed by Union below MLLW ● Tideguard 171 used in the splash zone ● Protective paint or ganvanizing used where applicable above MLLW. The protective paint would be an Ameron Dimetcote D-3 three coat system or equivalent.

TABLE A-3

PLATFORM GILDA EQUIPMENT

One electrically driven fire water pump.

One diesel-driven fire water pump.

Two 70-ton-capacity cranes with 100-foot booms.
  (a) One on north side of drilling deck.
  (b) One on south side of drilling deck.

One 2.5-ton crane on production deck.

Deck drain collection and disposal system.

Potable water tank and pump.

Sewage disposal unit. (Similar to Microphor Marine Sanitation Device - uses bacterial action to reduce sewage to liquid and carbon dioxide.)

Public address system.

Alarm system.

Navigational aids(fog horn + lights) as required by U.S. Coast Guard.

Life saving and flotation equipment.

First aid equipment (Union personnel will be qualified through Red Cross First Aid training).

Fire hose reels and fire monitors as required.

Portable chemical fire extinguishers on the rig floor, on the drilling and production decks, and in enclosed areas.

Direct telephone communications.

Radio communications.

Emergency generator (12.5 KVA for communications and navigational aids).

Hydrocarbon gas detectors.

H_2S detectors.

Flame detectors.

Oil containment and cleanup equipment consisting of:
  (a) 1,500 feet of Kempner 8" Sea Curtain oil containment boom.
  (b) One Acme 51 T oil skimmer.
  (c) Ten drums of Corexit #9527 oil dispersant.
  (d) Three boxes of Conwed sorbent boom.
  (e) Three boxes of Conwed sweeps.
  (f) Such other equipment as required by the USGS Area Supervisor.

Utility air system.

Instrument air system - including air dryer.

Fire water deluge system in all well rooms and other critical locations on the production deck.

TABLE A-4

PLATFORM GILDA DESIGN SPECIFICATIONS

• Design Criteria:	API RP2A (tenth edition)
• Orientation:	The platform would be oriented to offer the least resistance to the maximum expected wind and wave forces.
• Seismic Design:	The response spectrum approach would be used by Union to analyze the platform's earthquake strength requirements. The API response spectrum for Zone 4-soil type A would be used for preliminary design. A site specific response spectrum will be provided for the final design. Final foundation design criteria will be developed by a soils and foundation engineering consultant.
• Ductility Requirements:	The structure/foundation would be designed to absorb four times the amount of energy absorbed at the strength design requirement without experiencing catastrophic structural failure.
• Winds:	
Maximum sustained wind speed:	50 knots (25.7 m/sec)
Maximum wind gusts:	75 knots (38.6 m/sec)
Direction of approach:	130° or 270°
• Waves:	
Maximum wave height:	30 feet (9.2 m)
Period:	12 seconds
Direction of approach:	145°
• Current:	
Maximum speed at surface:	2.5 knots (1.3 m/sec)
Maximum at midpoint:	1.2 knots (0.6 m/sec)
Maximum at bottom:	0.8 knot (0.4 m/sec)
Direction of approach:	112°
• Corrosion:	• Sacrificial anodes designed by Union below MLLW • Tideguard 171 in the splash zone • Protective paint or galvanizing where applicable above MLLW. The protective paint will be a Ameron Dimetcote D-3 three coat system or equivalent.

TABLE A-5

EQUIPMENT TO BE INSTALLED AT THE ONSHORE TREATING FACILITY

1 - 1 x 10^6 BTU/hr Heater Treater

3 - 12 x 10^6 BTU/hr Heater Treater

1 - 1000 BBL Free Water Knock Out Vessel

1 - 25,000 BBL/day Induced Gas Flotation Cell

2 - Crude Oil Shipping Pumps

2 - Treated Produced Water Return Pumps

2 - Gas Separators

3 - Pig Receivers

2 - Natural Gas Sales Compressors

1 - 500 BBL Water Surge Tank

1 - 500 BBL Slop Oil Tank

1 - 500 BBL Washwater Tank

2 - 500 BBL Firewater Tanks (or connection to the city water system)

1 - 3000 BBL Shipping Oil Tank

1 - 3000 BBL Reject Oil Tank

TABLE A-6

PIPELINE SPECIFICATIONS

Description	Outside Diameter, Inches	Wall Thickness, Inches[1]	Pipe Type[2]	Fittings Type	Test Pressure, psig	Maximum Working Pressure, psig
● Platform Gina to onshore treating facility						
crude oil/water line	10.75	0.5	5LX42	900 ASA	3240	2160
return water line	6.625	0.28	5LX42	900 ASA	3240	2160
● Platform Gilda to onshore treating facility						
natural gas line	10.75	0.5	5LX42	900 ASA	3240	2160
crude oil/water line	12.75	0.5	5LX42	900 ASA	3240	2160
return water line	6.625	0.28	5LX42	900 ASA	3240	2160
● Product crude oil line	8	0.28	A53 Grade B	600 ASA	1200	800
● Product natural gas line	6	0.24	A53 Grade B	300 ASA	1050	720

---

[1] Wall thickness subject to final engineering design.

[2] Pipe grade and type subject to final engineering design.

TABLE A-7

EQUIPMENT LIST FOR THE ONSHORE BOOSTER STATION (UNION OIL MARINE TERMINAL AND ORMOND BEACH ALTERNATIVE CONFIGURATIONS)

1 - 18 x 10^6 BTU/hr Oil Heater

1 - 100 BBL Oil/Gas Separator

Gas Compression Equipment

2 - Crude Oil Pumps

1 - 500 BBL Surge Tank

TABLE A-8

CONSTRUCTION MANPOWER REQUIREMENTS FOR THE PLATFORM GINA AND PLATFORM GILDA PROJECT

Craft or Skill	Total Number of Persons	Duration of Employment	Work Days per Week	Shifts per day	Hours per shift
I. PLATFORMS					
Crane Operators	4	2 weeks (Gina) + 6 weeks (Gilda)	7	2	12
Welders	32	↓	↓	↓	↓
Engineers	3	↓	↓	↓	↓
Supervisors	3	↓	↓	↓	↓
Barge Crew	22	↓	↓	↓	↓
Tugboat Crew	9	↓	↓	↓	↓
Supply Boat Crew	3	↓	↓	↓	↓
Crew Boat Crew	2	↓	↓	↓	↓
II. OFFSHORE PIPELINES					
Engineers	2	3 weeks (Gina lines) + 7 weeks (Gilda lines)	7	2	12
Welders	12	↓	↓	↓	↓
Divers	2	↓	↓	↓	↓
X-ray Technicians	2	↓	↓	↓	↓
Laborers	24	↓	↓	↓	↓
Supervisors	2	↓	↓	↓	↓
III. OFFSHORE POWER CABLES					
Barge Crew	10	2 days (Gina) + 2 days (Gilda)	7	2	12
Divers	2	↓	↓	↓	↓
IV. ONSHORE TREATING FACILITY					
Carpenters	10	2 weeks	7	1	12
Pipefitters	20	4 weeks	↓	↓	↓
Welders	12	4 weeks	↓	↓	↓
Electricians	10	4 weeks	↓	↓	↓
Millwrights	2	1 week	↓	↓	↓
Painters	6	2 weeks	↓	↓	↓
Road Gang	10	2 weeks	↓	↓	↓
Laborers	16	11 weeks	↓	↓	↓
Operators	5	1 week	↓	↓	↓
Landscapers	10	4 weeks	↓	↓	↓
V. ONSHORE PIPELINES					
Welders	20	4 weeks	5	1	10
X-ray Technicians	2	4 weeks	↓	↓	↓
Operators	2	4 weeks	↓	↓	↓
Supervisors	2	6 weeks	↓	↓	↓
Laborers	10	4 weeks	↓	↓	↓

TABLE A-9

CONSTRUCTION EQUIPMENT FOR THE PLATFORM GINA AND PLATFORM GILDA PROJECT

Description	Number	Power Source	Power Rating	Daily Usage[(a)]	Duration of Use
I. PLATFORMS					
Barge	1(Gina); 2(Gilda)	None	-	100%	2 weeks (Gina) + 6 weeks (Gilda)
Barge	1	Diesel	(b)	100%	
Crew Boat	1	Diesel	600 Hp	25%	
Supply Boat	1	Diesel	1000 Hp	10%	
Tugboats	2	Diesel	3000 Hp	10%	
Cranes (on barge)	2	Diesel	(b)	(b)	
Welding Machines (on barge)		Diesel	(b)	(b)	
Generator (on barge)		Diesel	(b)	(b)	
II. OFFSHORE PIPELINES					
Barge	1	None	-	100%	3 weeks (Gina) + 7 weeks (Gilda)
Tugboat	1	Diesel	2000 Hp	50%	
Welding Machines	12	Diesel	50 Hp	90%	
Crane	1	Diesel	100 Hp	50%	
Generator	1	Diesel	25 Hp	50%	
III. OFFSHORE POWER CABLES					
Barge	1	None	-	100%	2 days (Gina) + 2 days (Gilda)
Tug	1	Diesel	1000 Hp	100%	
IV. ONSHORE TREATING FACILITY					
Dozer	1	Diesel	150 Hp	40%	1 week
Backhoes	2	Diesel	100 Hp	40%	2 weeks
Scraper	1	Diesel	100 Hp	40%	2 days
Trucks	Variable	Diesel	50-100 Hp	20%	15 weeks
Welding Machines	6	Diesel	50 Hp	40%	6 weeks
Air Compressor	1	Diesel	40 Hp	40%	15 weeks
Generator	1	Diesel	75 Hp	60%	15 weeks
V. ONSHORE PIPELINES					
Dozer	1	Diesel	100 Hp	40%	4 weeks
Backhoe	1	Diesel	50 Hp	40%	
Trenching Machine	1	Diesel	100 Hp	40%	
Crane	1	Diesel	50 Hp	40%	
Welding Machines	6	Diesel	50 Hp	40%	
Trucks	Variable	Diesel	50-100 Hp	20%	

(a) Percentage of use in a 24-hour day.

(b) Estimated diesel fuel consumption by the barge and equipment on the barge is 2,000 gallons per day.

(c) Electrical power requirements may be satisfied using a temporary hookup from Southern California Edison.

TABLE A-10

HUENEME FIELD TYPICAL PRODUCER PROCEDURE

1. Rig up over cellar.
2. Drill 26" hole to 300' MD (100' BML).
3. Run and cement 20" casing 100' BML.
4. Drill 17-1/2" hole to 500' MD (300' BML). Underream hole to 22" to 500' MD.
5. Run and cement 16" casing 300' BML. Install 20" Hydril.
6. Drill 12-1/4" hole to 1200' MD (1000' BML); open hole to 18".
7. Run and cement 13-3/8" casing 1000' BML. Install and test 13-5/8" BOPE.
8. Drill 12-1/4" hole to 2600' MD (2400' BML); open hole to 15".
9. Run and cement 10-3/4" liner from 1100' MD to 2600' MD (2400' BML).
10. Directionally drill 9-7/8" hole to 5540' TMD, 5340' TVD (5140' TVD BML).
11. Run logs.
12. Underream to 15" in two stages: Sespe interval 5306' to 5540' and Hueneme interval 5125' to 5215' MD.
13. Run Caliper log.
14. Run 7" combination blank and slotted 20-mesh wire wrapped casing to 5520' MD.
15. Gravel pack in two stages, Sespe and Hueneme intervals.
16. Cement blank section between gravel packed intervals.
17. Cement blank section above top gravel packed interval.
18. Run Cement Bond log.
19. Run pumping equipment on 2-7/8" tubing.
20. Remove BOPE and install Christmas tree.
21. Place well on production, pumping from Sespe and Hueneme gravel packed intervals.

TABLE A-11

HUENEME FIELD TYPICAL INJECTOR PROCEDURE

1. Rig up over cellar.
2. Drill 26" hole to 300' MD (100' BML).
3. Run and cement 20" casing 100' BML.
4. Drill 17-1/2" hole to 500' MD (300' BML). Underream hole to 22" to 500' MD.
5. Run and cement 16" casing 300' BML. Install 20" Hydril.
6. Drill 12-1/4" hole to 1200' MD (1000' BML); open hole to 18".
7. Run and cement 13-3/8" casing 1000' BML. Install and test 13-5/8" BOPE.
8. Drill 12-1/4" hole to 2600' MD (2400' BML); open hole to 15".
9. Run and cement 10-3/4" liner from 1100' MD to 2600' MD (2400' BML).
10. Directionally drill 9-7/8" hole to 5750' TMD, 5000' TVD (4800' TVD BML).
11. Run logs.
12. Underream to 15" across Sespe and Hueneme intervals from 5420' to 5750' MD.
13. Run Caliper log.
14. Run 7" combination blank and slotted 20-mesh wire wrapped casing to 5730' MD.
15. Gravel pack Sespe and Hueneme intervals.
16. Cement blank section above gravel packed interval.
17. Run Cement Bond log.
18. Run 2-7/8" injection string.
19. Remove BOPE and install injection head.
20. Commence water injection into the Sespe and Hueneme intervals.

TABLE A-12

SANTA CLARA UNIT TYPICAL REPETTO PRODUCTION AND INJECTION WELL PROCEDURE

1. Rig up.
2. Drill 26" hole to 500' VD (200' BOF).
3. Run and cement 20" casing 200' BOF. Install diverter.
4. Directionally drill 17-1/2" hole to 1300' VD (1000' BOF). Underream hole to 22".
5. Run and cement 16" casing 1000' BOF. Install and test 3000 psi BOPE.
6. Directionally drill 15" hole to 3800' VD (3500' BOF).
7. Run and cement 10-3/4" casing 3500' BOF.
8. Directionally drill 9-7/8" hole to 6700' TMD, 5940' TVD.
9. Run logs.
10. Underream Repetto interval to 15" from 6200' to 6700'.
11. Run Caliper log.
12. Run 7" combination blank and slotted 20-mesh wire-wrapped casing to 6680'.
13. Gravel pack Repetto interval.
14. Cement blank section above gravel-packed interval.
15. Run completion equipment on 2-7/8" tubing.
16. Remove BOPE and install Christmas tree.

TABLE A-13

SANTA CLARA UNIT TYPICAL MONTEREY PRODUCER AND GAS INJECTOR WELL PROCEDURE

1. Rig up.
2. Drill 30" hole to 600' VD (300' BOF).
3. Run and cement 24" casing 300' BOF. Install diverter.
4. Directionally drill 17-1/2" hole to 1800' VD (1500' BOF). Underream to 26".
5. Run and cement 20" casing 1500' BOF. Install and test 2000 psi BOPE.
6. Directionally drill 18-5/8" hole to 4800' VD (4500' BOF). Run logs.
7. Run and cement 13-3/8" casing 4500' BOF. Remove 2000 psi BOPE and install 5000 psi BOPE.
8. Directionally drill 12-1/4" hole to 8700' MD. (7000' ±BOF) Run logs.
9. Run and cement 9-5/8" casing at 7000' ±BOF.
10. Directionally drill 8-1/2" hole to 9700' MD, 8800' TVD. Run logs.
11. Run and cement 7" liner from 9700' to 8400'.
12. Run cement bond log.
13. Perforate Monterey interval.
14. Run completion equipment on 2-7/8" tubing.
15. Remove BOPE and install Christmas tree.

TABLE A-14

HYDROCARBON ANALYSIS OF RESERVOIR FLUID SAMPLE

Component	Mol Per Cent	Weight Per Cent
Hydrogen Sulfide	(a)	(a)
Carbon Dioxide	0.03	Trace
Nitrogen	0.39	0.04
Methane	35.74	2.30
Ethane	1.01	0.12
Propane	0.25	0.04
iso-Butane	0.34	0.08
n-Butane	0.11	0.02
iso-Pentane	0.14	0.04
n-Pentane	0.14	0.04
Hexanes	0.76	0.26
Heptanes plus	61.09	97.06
	100.00	100.00

Density @ 60°F: 0.9622 grams/cubic centimeter, 15.4° API
Molecular weight: 395
Well: OCS-P-0202 No. 1A
Field: Hueneme Offshore
Formation: Hueneme Sand
Location: OCS P-0202, Offshore California

Analysis performed by Core Laboratories, Inc., Dallas, Texas.

(a) none detected

TABLE A-15

HYDROCARBON ANALYSIS OF SEPARATOR GAS SAMPLE

Component	Mol Per Cent
Hydrogen Sulfide	(a)
Carbon Dioxide	0.19
Nitrogen	1.19
Methane	96.34
Ethane	1.74
Propane	0.26
iso-Butane	0.08
n-Butane	0.11
iso-Pentane	0.02
n-Pentane	0.02
Hexanes	0.02
Heptanes plus	0.03
	100.00

Calculated gas gravity (air = 1.000) = 0.576

Calculated gross heating value = 1021 BTU per cubic foot of dry gas at 14.696 psia at 60°F.

Collected at 167 psig and 81°F in the field.

Analysis performed by Core Laboratories, Inc., Dallas, Texas.

Well:	OCS-P-0202 No. 1A
Field:	Hueneme Offshore
Formation:	Hueneme Sand
Location:	OCS P-0202 Offshore California

(a) none detected

TABLE A-16

PROPERTIES OF REPETTO FORMATION DEHYDRATED CRUDE OIL, OCS P-0216

	DST 1A	DST 2	DST 3
Gravity, °API	19.0	16.7	20.6
Viscosity, 100°F	107.0	555.0	479.0
140°F	233.6	185.6	171.3
Pour Point, °F	+35	+50	+45
Sulfur, Wt %	3.7	2.7	3.4
Nitrogen, Wt %	0.63	0.62	0.59
Distillation, Engler			
18 P, °F	124	124	120
5%	237	216	245
10%	300	270	304
20%	515	398	475
30%	624	571	612
40%	756	689	730
50%	873	824	845
60%	987	932	942
68.9	---	1069	---
69.5	1067	---	---
69.4	---	---	1057
Recovery, vol %	69.5	68.9	69.4
Resid Oil, vol %	30.5	31.1	30.6
Separated Free Water			
Chloride, ppm(1)	110,000	44 ppm 490 ppm 1560 ppm	No Freewater

---

(1) Sample from each of three, 5-gallon containers.

TABLE A-17

HYDROCARBON ANALYSES OF SEPARATOR PRODUCTS AND CALCULATED WELL STREAMS, OSC P-0216 REPETTO FORMATION NATURAL GAS(1)

Gas-Oil Ratio (SCF/Bbl): 500:1

Component	Separator Liquid Mol Per Cent(2)	Separator Gas Mol Per Cent	312 Well Stream Mol Per Cent	392(3) Well Stream Mol Per Cent
Hydrogen Sulfide	Nil	Nil	Nil	Nil
Carbon Dioxide	0.01	0.26	0.11	0.12
Nitrogen	Trace	0.01	Trace	Trace
Methane	3.85	92.80	39.06	41.04
Ethane	0.55	1.87	1.07	1.15
Propane	2.78	2.72	2.76	2.75
iso-Butane	1.50	0.63	1.16	1.11
n-Butane	3.86	1.03	2.74	2.58
iso-Penetane	3.04	0.30	1.96	1.80
n-Pentane	2.84	0.18	1.78	1.64
Hexanes	5.36	0.11	3.28	2.99
Heptanes plus	76.21	0.09	46.08	41.82
	100.00	100.00	100.00	100.00
Properties of Heptanes plus				
API gravity @ 60°F	20.3			
Specific gravity @ 60/60°F	0.9310		0.931	0.931
Molecular weight	311	103 (assumed)	311	311

Calculated separator gas gravity (air = 1.000) = 0.630
Calculated gross heating value for separator gas = 1125 BTU per cubic foot of dry gas @ 14.73 psia and 60°F.

Primary separator gas collected @ 100 psig and 55°F.
Primary separator liquid collect @ 100 psig and 63°F.
Calculated density of separator liquid = 0.9002 Gm/cm^3 @ 100 psig and 63°F.

---

(1) Analyses performed by Core Laboratories, Inc., Dallas, Texas.
(2) Water content measured to be 20.5%.
(3) Ratio calculated assuming 20.5% water in separator liquid.

TABLE A-18

SALES GAS SPECIFICATIONS

Total Sulfur Content:	< 0.25 grains/100 SCF
Water Content:	35 pounds/10^6 SCF
Delivery Pressure:	200 psig
Dew Point:	40°F
Heating Value:	1000 BTU/SCF
Temperature:	< 100°F

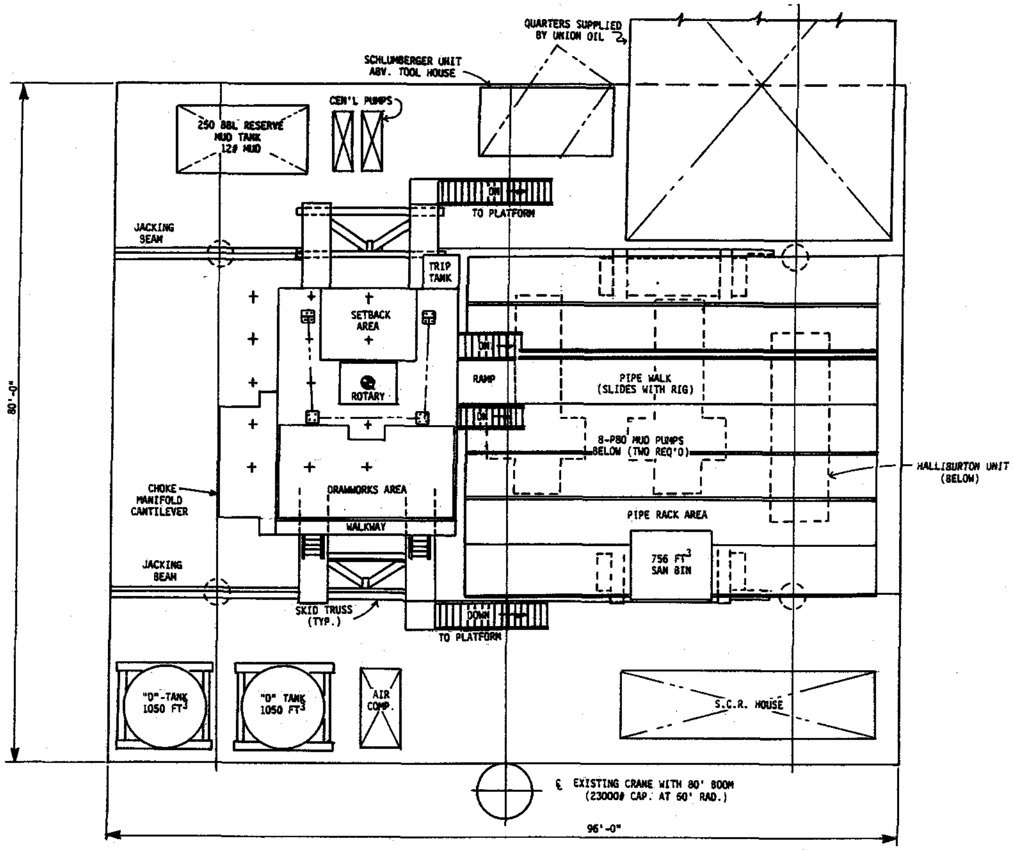


FIGURE A-1

PLATFORM GINA EQUIPMENT LAYOUT

DAMES & MOORE

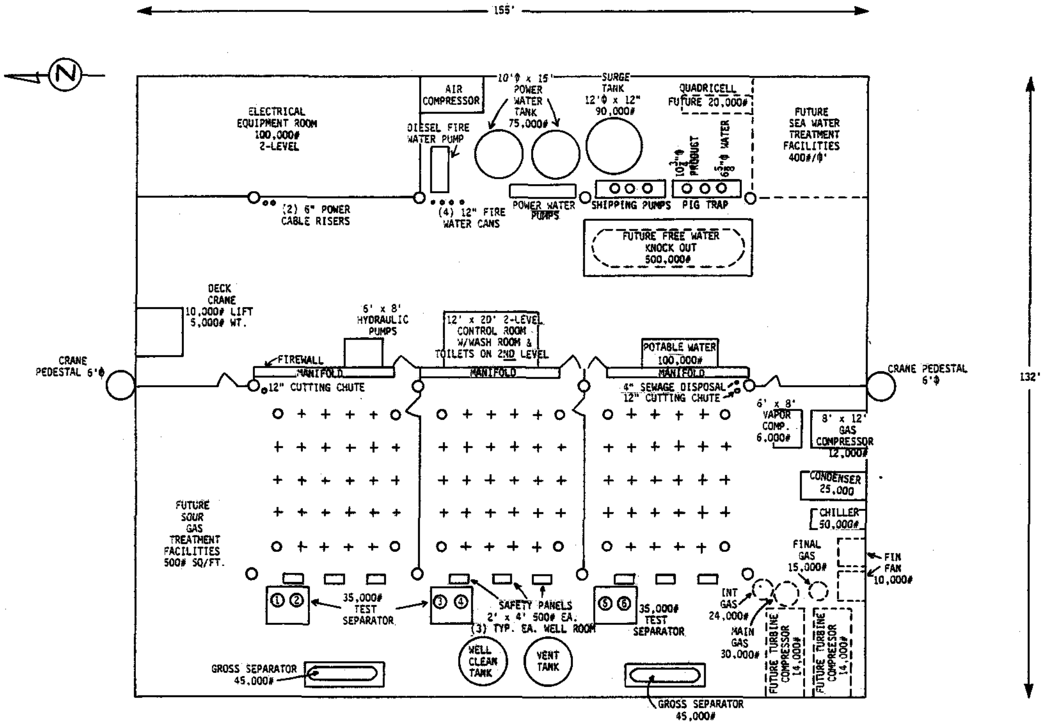


FIGURE A-2

PLATFORM GILDA
PRODUCTION DECK
EQUIPMENT LAYOUT

DAMES & MOORE

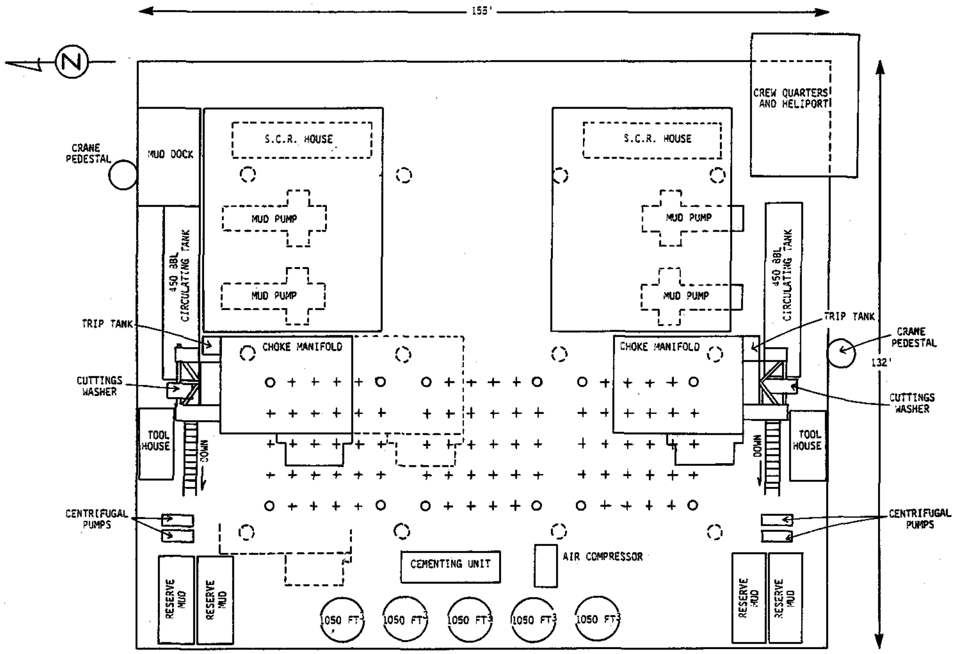


FIGURE A-3

PLATFORM GILDA DRILLING DECK EQUIPMENT LAYOUT

DAMES & MOORE

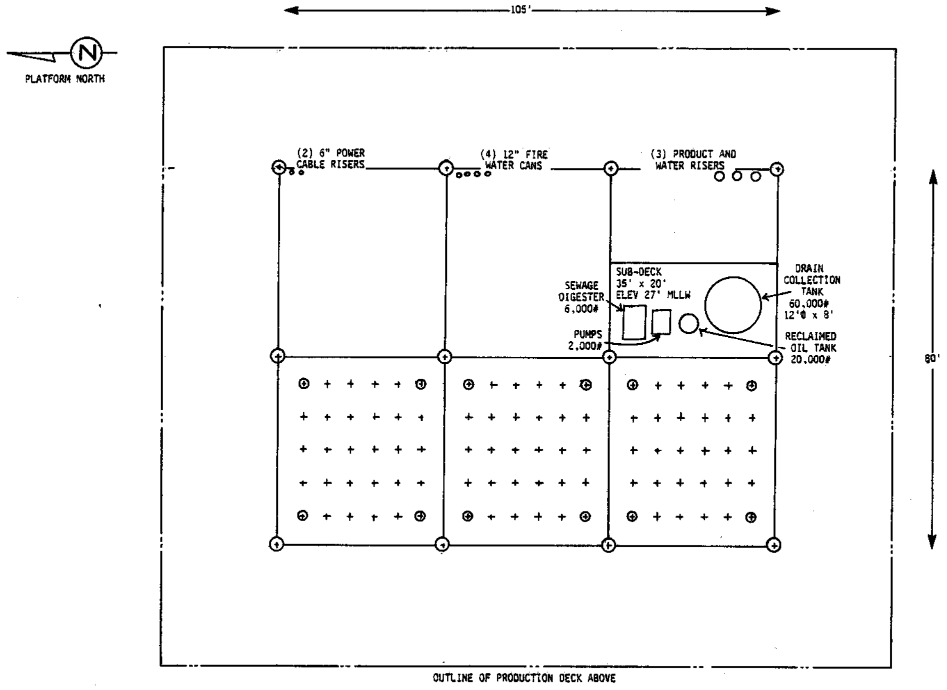
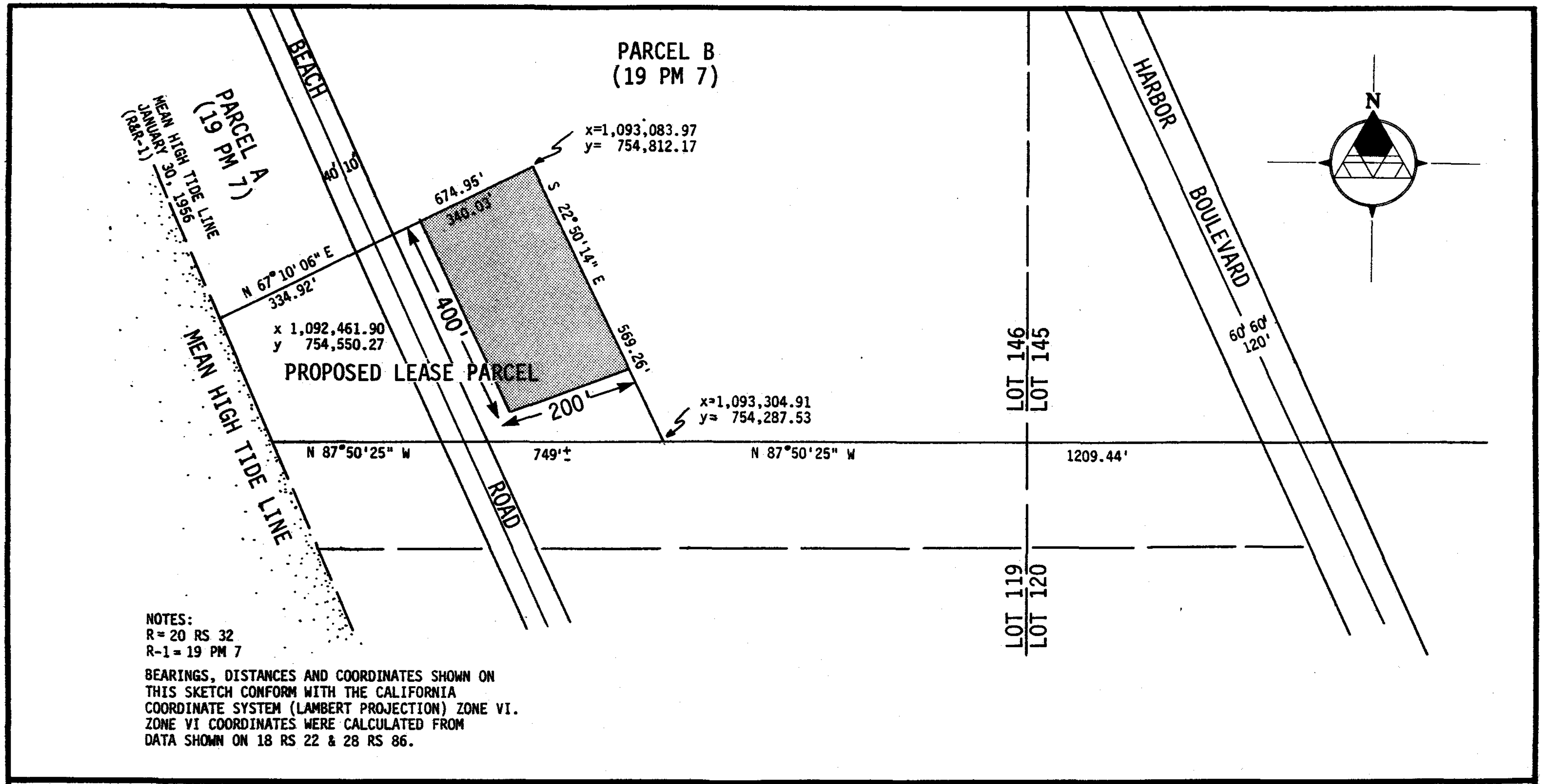


FIGURE A-4

PLATFORM GILDA SUBDECK EQUIPMENT LAYOUT

DAMES & MOORE



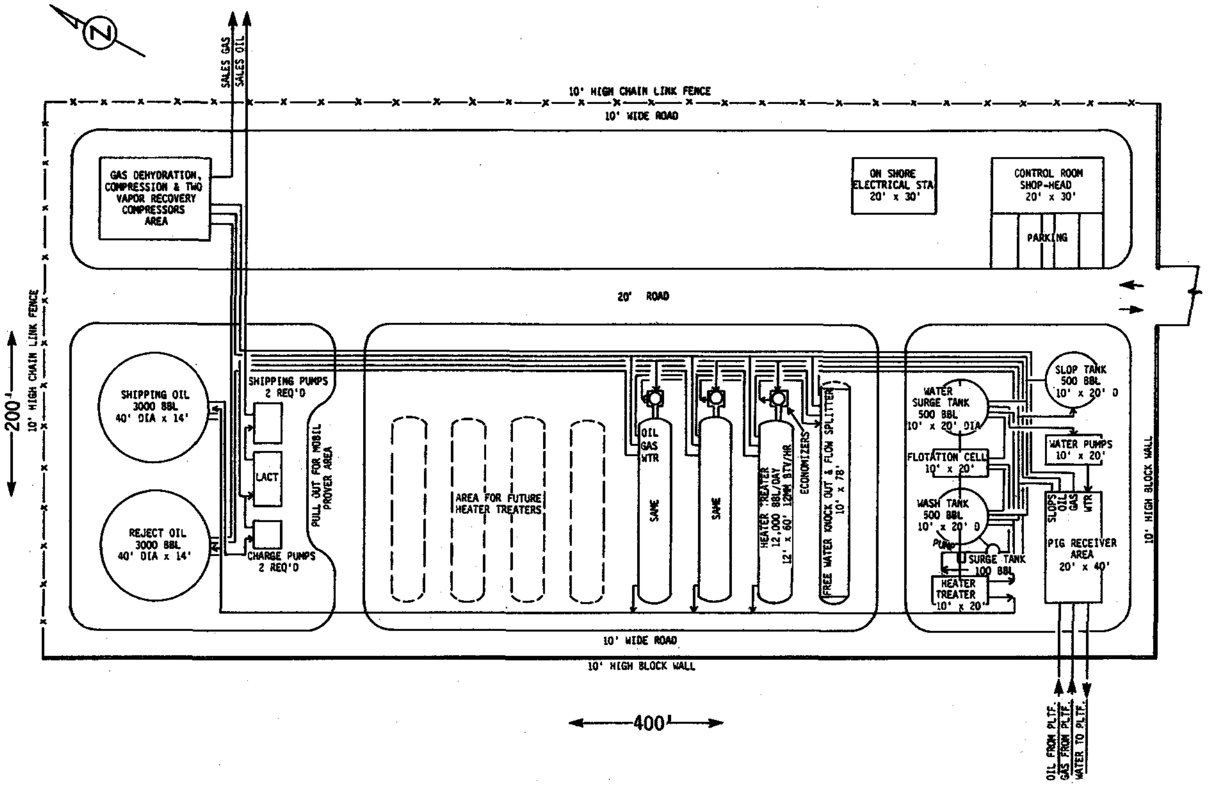
NOTES:
R = 20 RS 32
R-1 = 19 PM 7

BEARINGS, DISTANCES AND COORDINATES SHOWN ON THIS SKETCH CONFORM WITH THE CALIFORNIA COORDINATE SYSTEM (LAMBERT PROJECTION) ZONE VI. ZONE VI COORDINATES WERE CALCULATED FROM DATA SHOWN ON 18 RS 22 & 28 RS 86.

FIGURE A-5

MANDALAY SITE LOCATION

DAMES & MOORE



NOTE: ALL VESSELS AND TANKS WILL BE SEALED AND CONNECTED TO THE VAPOR RECOVERY SYSTEM.

FIGURE A-6

MANDALAY SITE PLOT PLAN

DAMES & MOORE

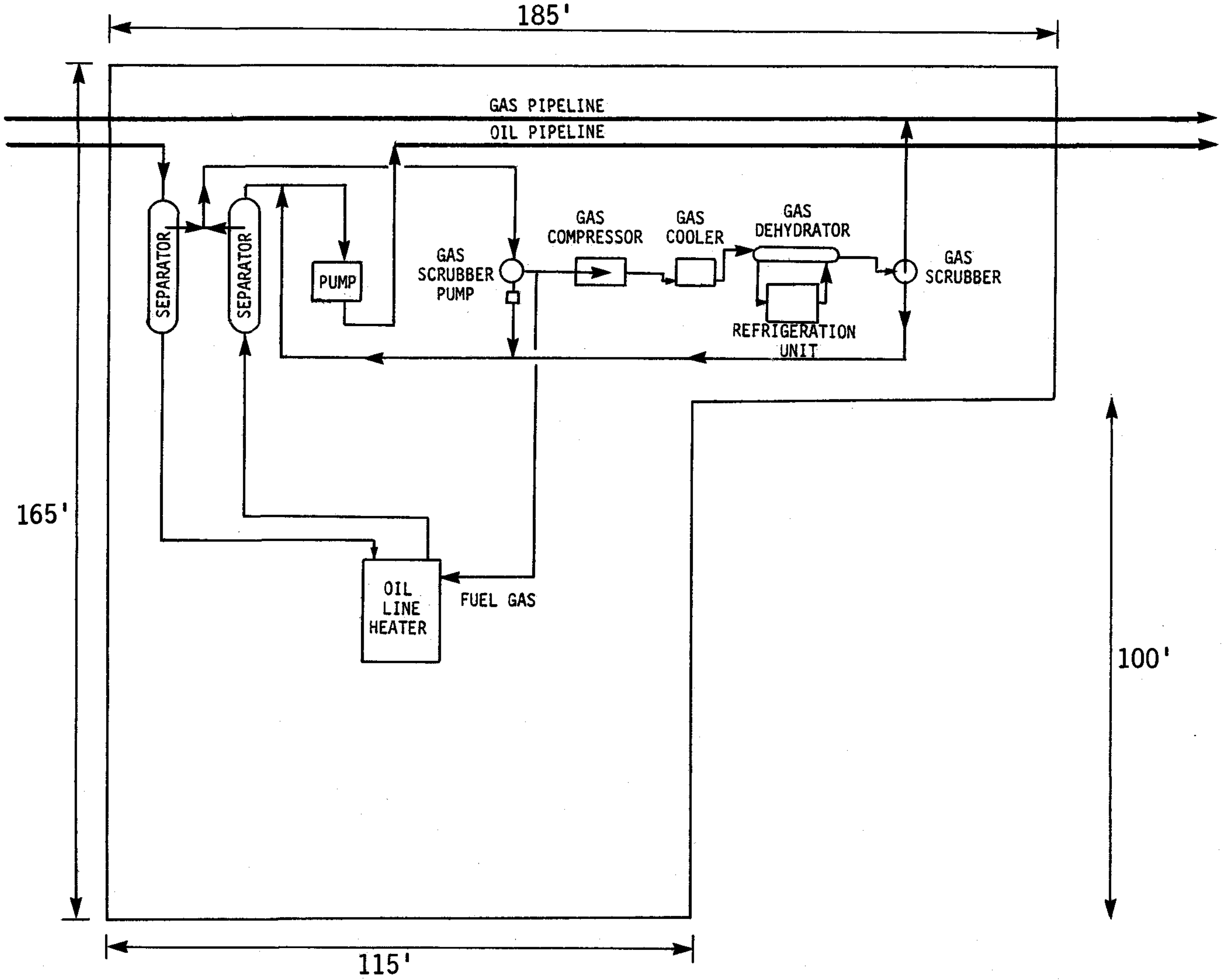


FIGURE A-7

CRUDE OIL BOOSTER PUMP STATION TYPICAL LAYOUT

DAMES & MOORE

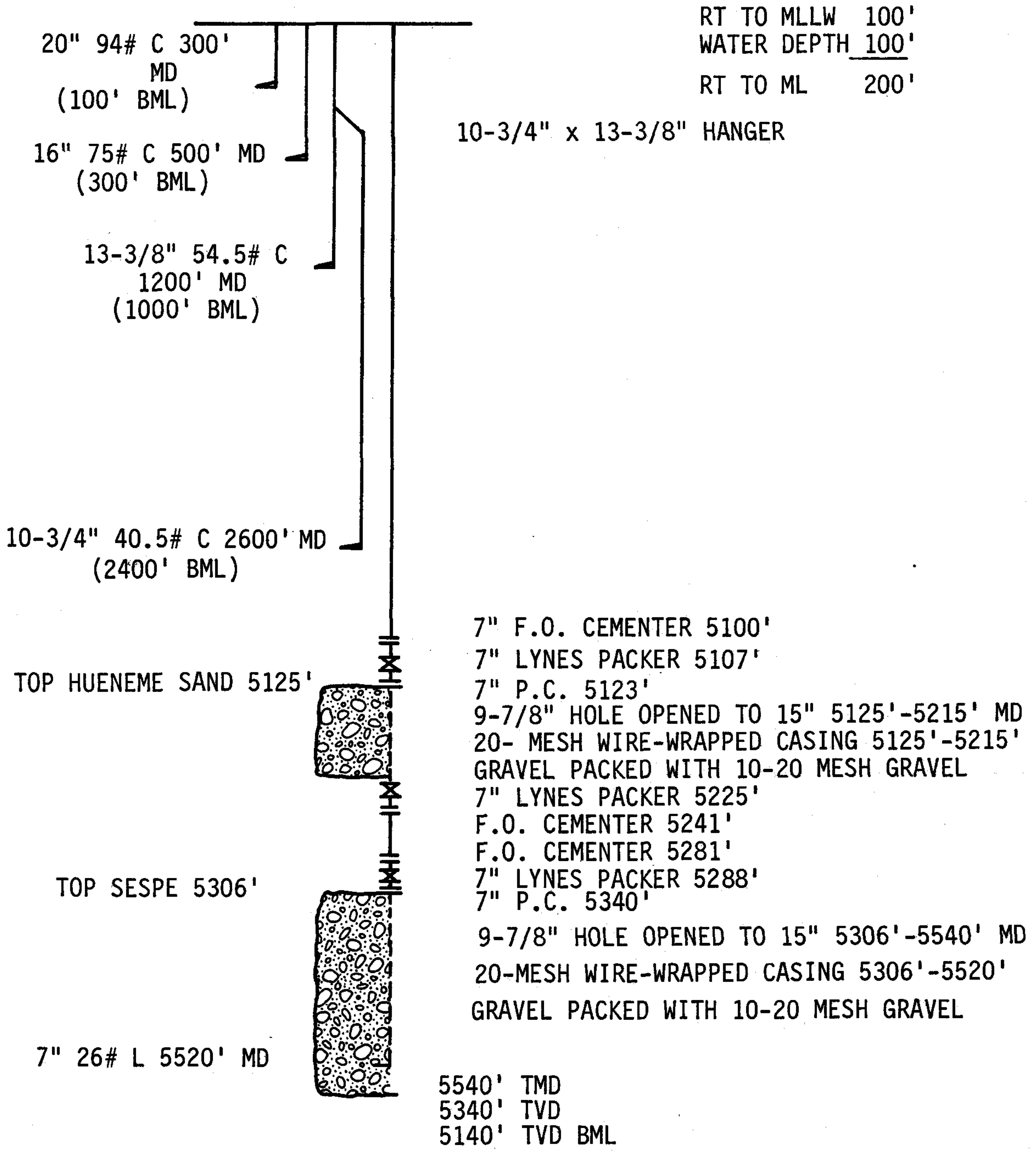


FIGURE A-8

SCHEMATIC - HUENEME FIELD
TYPICAL PRODUCTION WELL

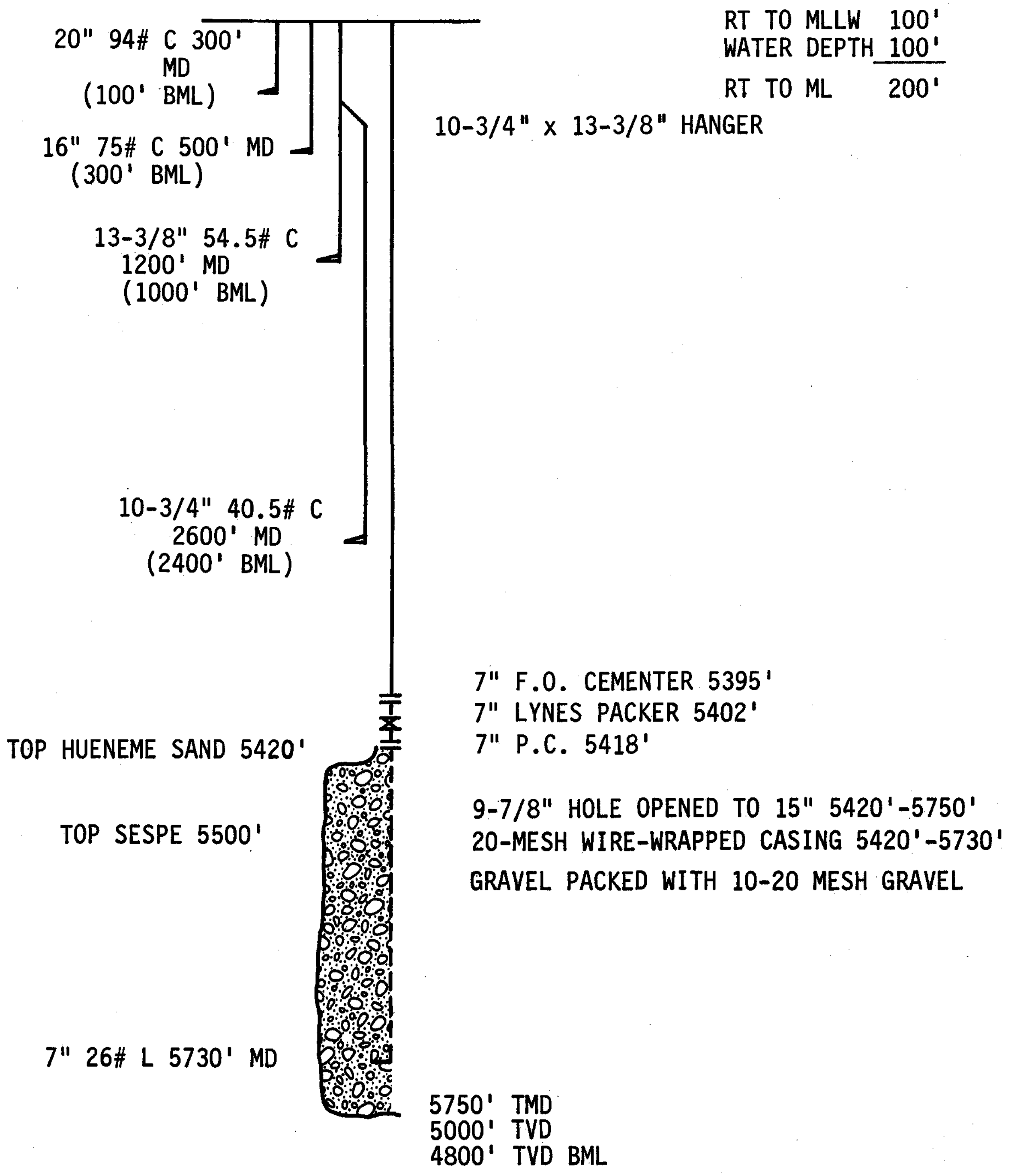


FIGURE A-9

SCHEMATIC - HUENEME FIELD
TYPICAL INJECTION WELL

DAMES & MOORE

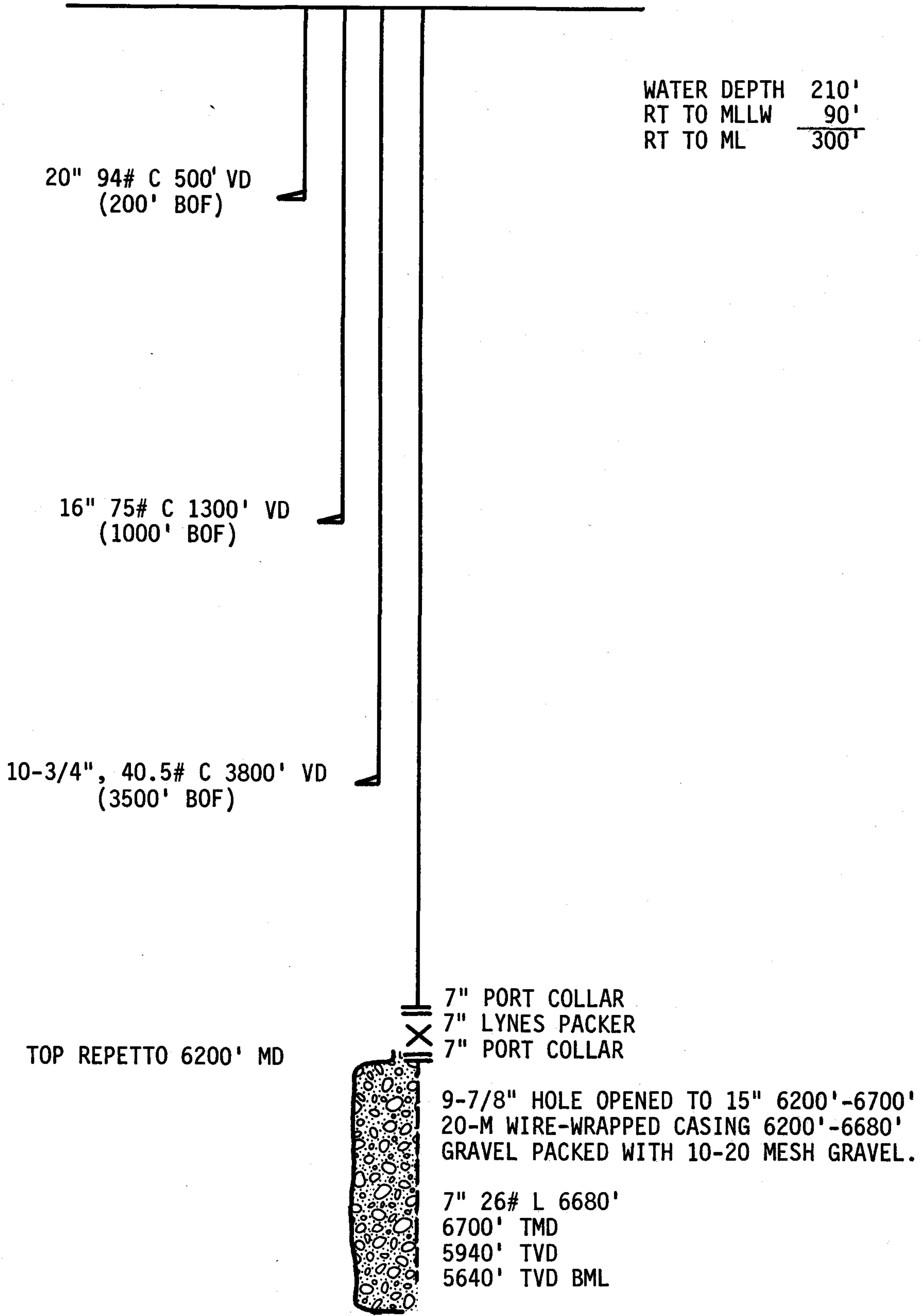


FIGURE A-10

SCHEMATIC-SANTA CLARA UNIT TYPICAL REPETTO PRODUCTION AND INJECTION WELL

DAMES & MOORE

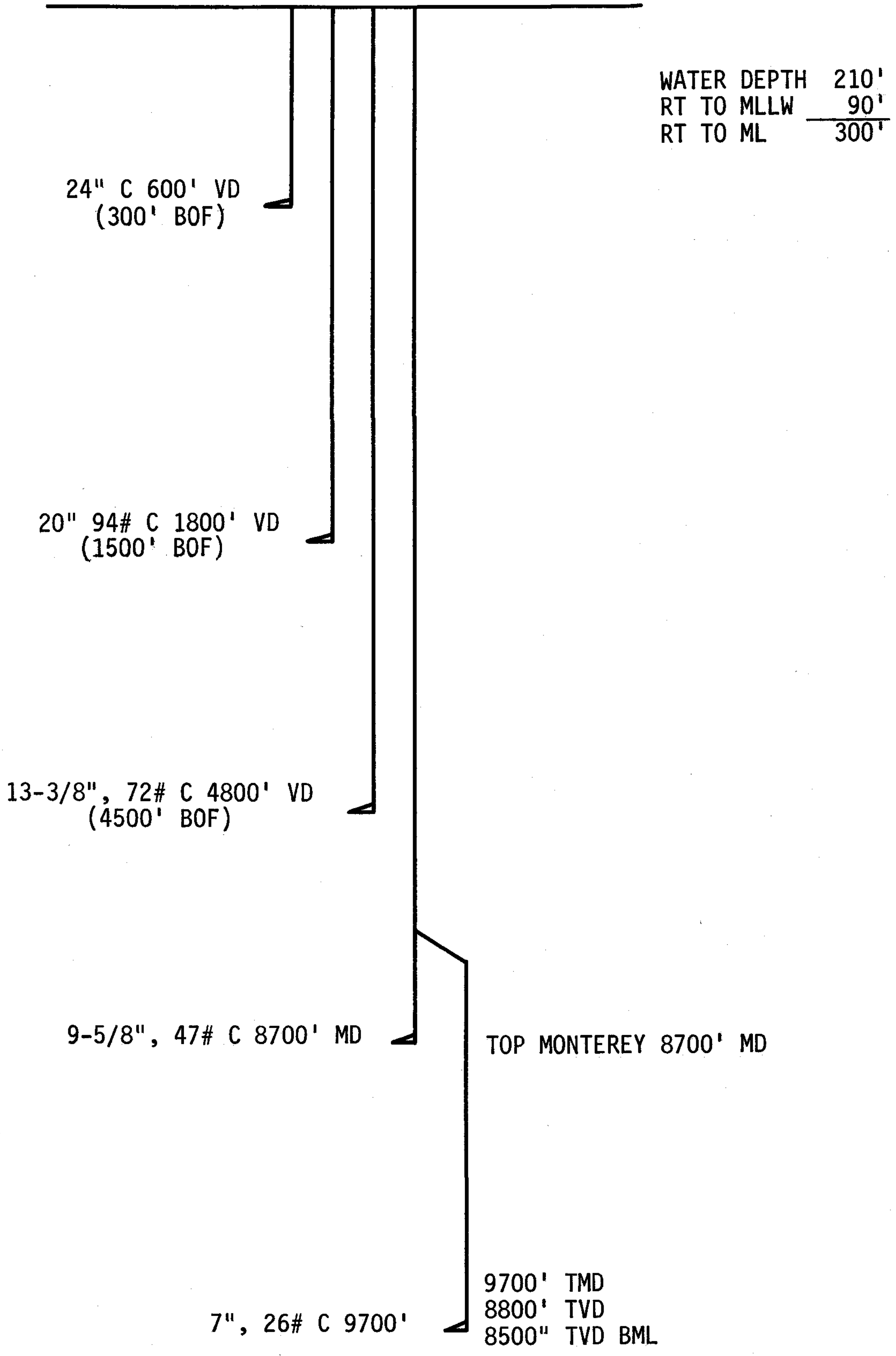


FIGURE A-II

SCHEMATIC-SANTA CLARA UNIT TYPICAL MONTEREY PRODUCTION AND INJECTION WELL

DAMES & MOORE

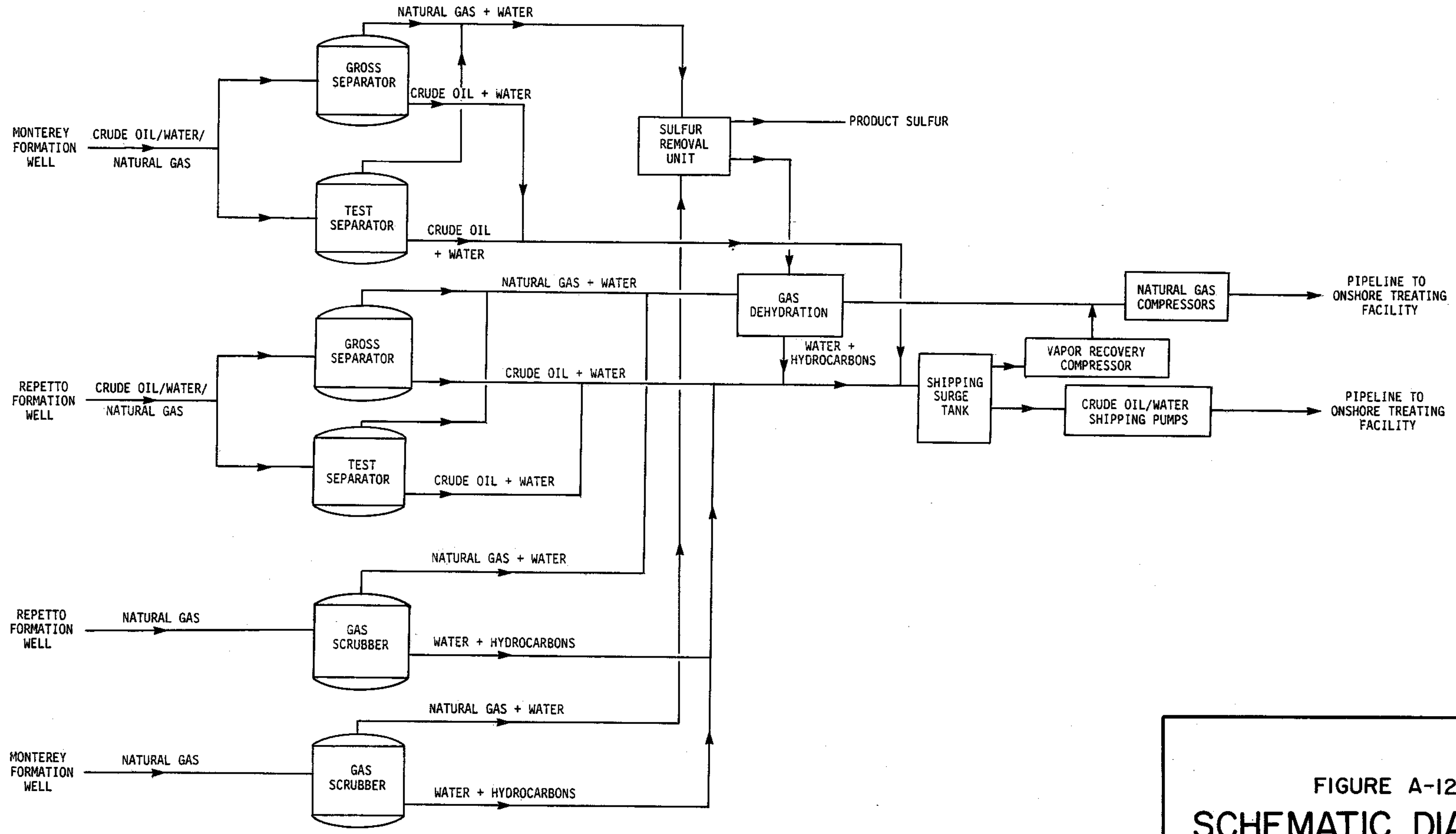
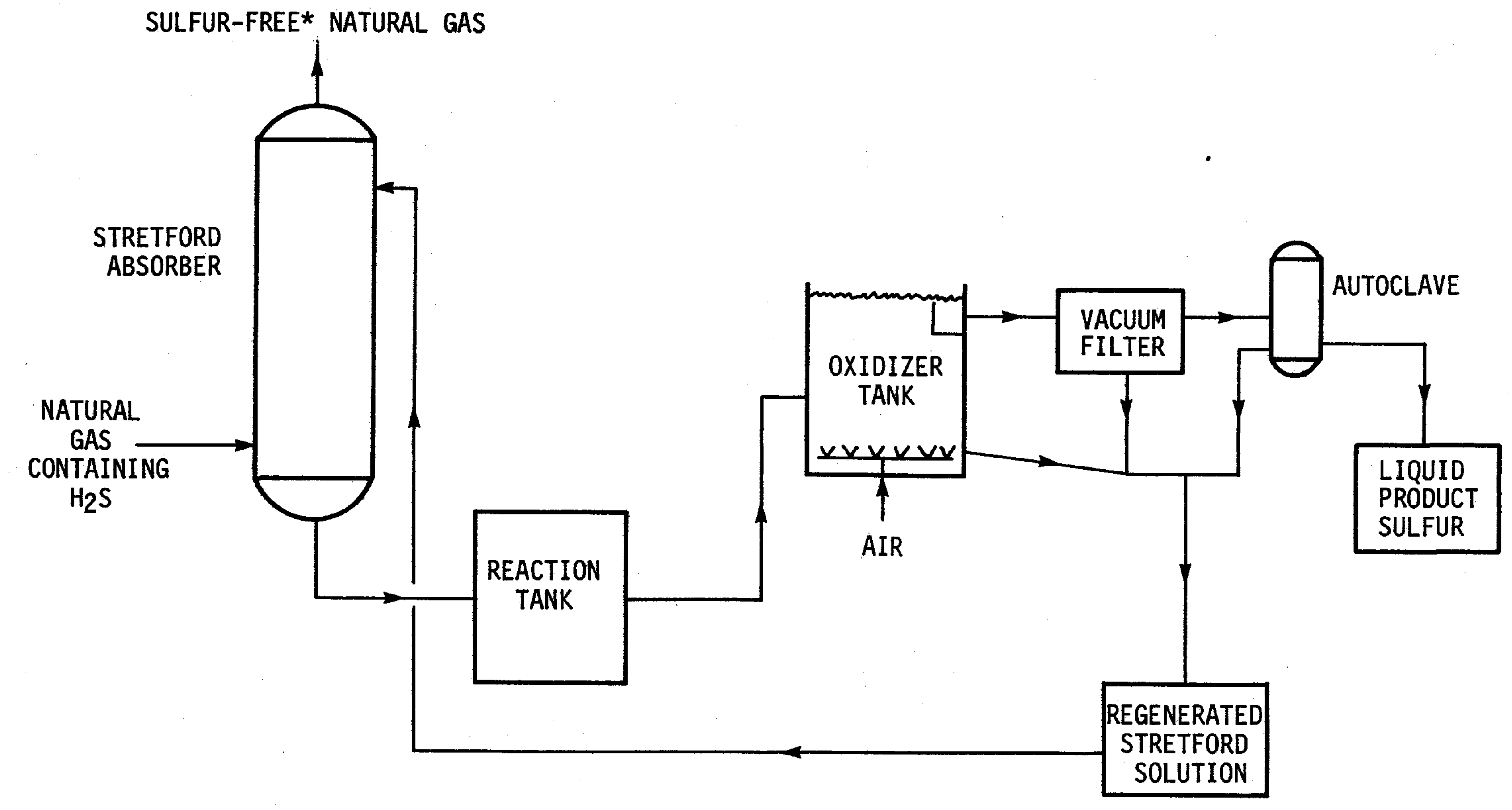


FIGURE A-12

SCHEMATIC DIAGRAM PLATFORM GILDA PROCESSING

DAMES & MOORE



*TYPICAL DESIGNS REDUCE THE H_2S CONTENT OF THIS STREAM TO APPROXIMATELY 10ppmv

FIGURE A-13

PROCESS FLOW DIAGRAM - STRETFORD PROCESS

DAMES & MOORE

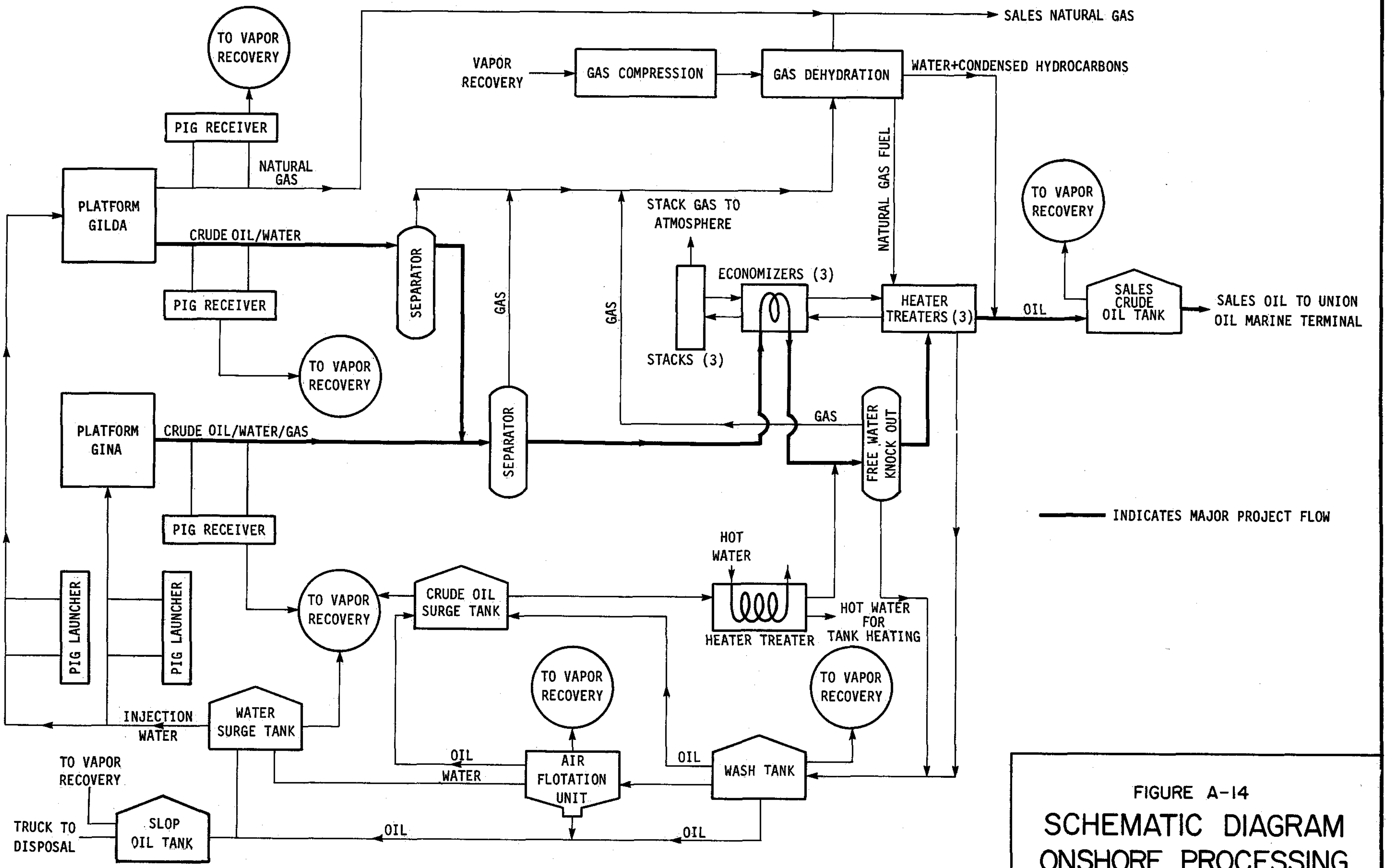


FIGURE A-14

SCHEMATIC DIAGRAM ONSHORE PROCESSING

DAMES & MOORE

APPENDIX B.1

ATMOSPHERIC EMISSIONS DATA

LIST OF TABLES

APPENDIX B.1

ATMOSPHERIC EMISSIONS DATA

This appendix contains the detailed calculations, emission factors, and information used to produce the atmospheric emissions shown in Section 4.2. The following definitions are used in this section:

NO_x: nitrogen oxides (as NO_2)
THC: total hydrocarbons
CO : carbon monoxide
PM : particulate matter
SO_2: sulfur dioxide

B.1.1 PROPOSED MANDALAY PROJECT

B.1.1.1 Construction Emissions

B.1.1.1.1 Platform Gina

Employee Transportation (Non-daily) Assume that 75% of the platform construction workforce does not commute daily.

Round Trip Commute Distance:

Ventura ◄—► Port Hueneme (40% of the workers)	25 miles x 0.4 = 10
Santa Barbara ◄—► Port Hueneme (40% of the workers)	75 miles x 0.4 = 30
Los Angeles ◄—► Port Hueneme (20% of the workers)	100 miles x 0.2 = 20
Total miles:	60

$$\frac{60 \text{ vehicles}}{\text{trip}} \times \frac{1 \text{ trip}}{14 \text{ days}} \times \frac{60 \text{ miles}}{\text{vehicle}} = 257.1 \text{ miles/day}$$

$$\frac{257.1 \text{ miles}}{\text{day}} \times \frac{2.44 \text{ g } NO_x}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 1.4 \text{ lb/day } NO_x$$

$$\frac{257.1 \text{ miles}}{\text{day}} \times \frac{1.37 \text{ g THC}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 0.8 \text{ lb/day THC}$$

$$\frac{257.1 \text{ miles}}{\text{day}} \times \frac{12.25 \text{ g CO}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 6.9 \text{ lb/day CO}$$

$$\frac{257.1 \text{ miles}}{\text{day}} \times \frac{0.13 \text{ g } SO_2}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 0.1 \text{ lb/day } SO_2$$

$$\frac{257.1 \text{ miles}}{\text{day}} \times \frac{0.35 \text{ g PM}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 0.2 \text{ lb/day PM}$$

Employee Transportation (Daily)

Assume that 25% of the platform construction workforce commutes daily.

$$\frac{20\ \text{vehicle-trips}}{\text{day}} \times \frac{60\ \text{miles}}{\text{vehicle-trip}} = 1200\ \text{miles/day}$$

$$\frac{1200\ \text{miles}}{\text{day}} \times \frac{2.44\ \text{g}\ NO_x}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 6.5\ \text{lb/day}\ NO_x$$

$$\frac{1200\ \text{miles}}{\text{day}} \times \frac{1.37\ \text{g THC}}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 3.6\ \text{lb/day THC}$$

$$\frac{1200\ \text{miles}}{\text{day}} \times \frac{12.25\ \text{g CO}}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 32.4\ \text{lb/day CO}$$

$$\frac{1200\ \text{miles}}{\text{day}} \times \frac{0.13\ \text{g}\ SO_2}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 0.3\ \text{lb/day}\ SO_2$$

$$\frac{1200\ \text{miles}}{\text{day}} \times \frac{0.35\ \text{g PM}}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 0.9\ \text{lb/day PM}$$

Supply Truck Transportation

Round Trip Distance:

Ventura ↔ Port Hueneme (80% of the trucks) 25 miles x 0.8 = 20

Long Beach ↔ Port Hueneme (20% of the trucks) 120 miles x 0.2 = 24

Total miles: 44

$$\frac{1\ \text{vehicle-trip}}{\text{day}} \times \frac{44\ \text{miles}}{\text{vehicle-trip}} = 44\ \text{miles/day}$$

$$\frac{44\ \text{miles}}{\text{day}} \times \frac{20.49\ \text{g}\ NO_x}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 2.0\ \text{lb/day}\ NO_x$$

$$\frac{44\ \text{miles}}{\text{day}} \times \frac{2.11\ \text{g THC}}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 0.2\ \text{lb/day THC}$$

$$\frac{44\ \text{miles}}{\text{day}} \times \frac{13.14\ \text{g CO}}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 1.3\ \text{lb/day CO}$$

$$\frac{44 \text{ miles}}{\text{day}} \times \frac{2.73 \text{ g } SO_2}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 0.3 \text{ lb/day } SO_2$$

$$\frac{44 \text{ miles}}{\text{day}} \times \frac{1.96 \text{ g PM}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 0.2 \text{ lb/day PM}$$

Crew Boat Transportation (Idle Mode, 600 hp boat)

Assume 25% operating factor, 75% idle time, 4 gallons per hour fuel rate.

$$\frac{24 \text{ hr}}{\text{day}} \times 0.25 \times 0.75 \times \frac{4 \text{ gal fuel}}{\text{hr}} = \frac{18 \text{ gal fuel}}{\text{day}}$$

$$\frac{18 \text{ gal}}{\text{day}} \times \frac{307.1 \text{ lb } NO_x}{1000 \text{ gal}} = 5.5 \text{ lb/day } NO_x$$

$$\frac{18 \text{ gal}}{\text{day}} \times \frac{68.0 \text{ lb THC}}{1000 \text{ gal}} = 1.2 \text{ lb/day THC}$$

$$\frac{18 \text{ gal}}{\text{day}} \times \frac{171.7 \text{ lb CO}}{1000 \text{ gal}} = 3.1 \text{ lb/day CO}$$

$$\frac{18 \text{ gal}}{\text{day}} \times \frac{29.2 \text{ lb } SO_2}{1000 \text{ gal}} = 0.5 \text{ lb/day } SO_2$$

Crew Boat Transportation (Cruise Mode, 600 hp boat)

Assume 25% operating factor, 25% cruise time, 20 gallons per hour fuel rate.

$$\frac{24 \text{ hr}}{\text{day}} \times 0.25 \times 0.25 \times \frac{20 \text{ gal fuel}}{\text{hr}} = \frac{30 \text{ gal fuel}}{\text{day}}$$

$$\frac{30 \text{ gal}}{\text{day}} \times \frac{349.2 \text{ lb } NO_x}{1000 \text{ gal}} = 10.5 \text{ lb/day } NO_x$$

$$\frac{30 \text{ gal}}{\text{day}} \times \frac{24.1 \text{ lb THC}}{1000 \text{ gal}} = 0.7 \text{ lb/day THC}$$

$$\frac{30 \text{ gal}}{\text{day}} \times \frac{77.6 \text{ lb CO}}{1000 \text{ gal}} = 2.3 \text{ lb/day CO}$$

$$\frac{30\ \text{gal}}{\text{day}} \times \frac{29.2\ \text{lb } SO_2}{1000\ \text{gal}} = 0.9\ \text{lb/day } SO_2$$

Supply Boat Transportation (Idle Mode, 900 hp boat)

Assume 10% operating factor, 75% idle time, 5 gallons per hour fuel rate.

$$\frac{24\ \text{hr}}{\text{day}} \times 0.10 \times 0.75 \times \frac{5\ \text{gal fuel}}{\text{hr}} = \frac{9\ \text{gal fuel}}{\text{day}}$$

$$\frac{9\ \text{gal}}{\text{day}} \times \frac{107.5\ \text{lb } NO_x}{1000\ \text{gal}} = 1.0\ \text{lb/day } NO_x$$

$$\frac{9\ \text{gal}}{\text{day}} \times \frac{249.1\ \text{lb THC}}{1000\ \text{gal}} = 2.2\ \text{lb/day THC}$$

$$\frac{9\ \text{gal}}{\text{day}} \times \frac{223.7\ \text{lb CO}}{1000\ \text{gal}} = 2.0\ \text{lb/day CO}$$

$$\frac{9\ \text{gal}}{\text{day}} \times \frac{29.2\ \text{lb } SO_2}{1000\ \text{gal}} = 0.3\ \text{lb/day } SO_2$$

Supply Boat Transportation (Cruise Mode, 900 hp boat)

Assume 10% operating factor, 25% cruise time, 25 gallons per hour fuel rate.

$$\frac{24\ \text{hr}}{\text{day}} \times 0.10 \times 0.25 \times \frac{25\ \text{gal fuel}}{\text{hr}} = \frac{15\ \text{gal fuel}}{\text{day}}$$

$$\frac{15\ \text{gal}}{\text{day}} \times \frac{360.0\ \text{lb } NO_x}{1000\ \text{gal}} = 5.4\ \text{lb/day } NO_x$$

$$\frac{15\ \text{gal}}{\text{day}} \times \frac{17.1\ \text{lb THC}}{1000\ \text{gal}} = 0.3\ \text{lb/day THC}$$

$$\frac{15\ \text{gal}}{\text{day}} \times \frac{80.9\ \text{lb CO}}{1000\ \text{gal}} = 1.2\ \text{lb/day CO}$$

$$\frac{15\ \text{gal}}{\text{day}} \times \frac{29.2\ \text{lb } SO_2}{1000\ \text{gal}} = 0.4\ \text{lb/day } SO_2$$

Tugboat Emissions (3000 hp boat)

Assume 10% operating factor, 30 gallons per hour fuel rate.

$$\frac{24\text{ hr}}{\text{day}} \times 0.10 \times \frac{30\text{ gal fuel}}{\text{hr}} = \frac{72\text{ gal}}{\text{day}} \times 2\text{ boats} = 144\text{ gal fuel/day}$$

$$\frac{144\text{ gal}}{\text{day}} \times \frac{572\text{ lb NO}_x}{1000\text{ gal}} = 82.4\text{ lb/day NO}_x$$

$$\frac{144\text{ gal}}{\text{day}} \times \frac{13\text{ lb THC}}{1000\text{ gal}} = 1.9\text{ lb/day THC}$$

$$\frac{144\text{ gal}}{\text{day}} \times \frac{86\text{ lb CO}}{1000\text{ gal}} = 12.4\text{ lb/day CO}$$

$$\frac{144\text{ gal}}{\text{day}} \times \frac{29.2\text{ lb SO}_2}{1000\text{ gal}} = 4.2\text{ lb/day SO}_2$$

$$\frac{144\text{ gal}}{\text{day}} \times \frac{25\text{ lb PM}}{1000\text{ gal}} = 3.6\text{ lb/day PM}$$

Helicopter Transportation (Landing-Take-off (LTO) Cycle)

Assume one helicopter trip every three days.

$$\frac{1\text{ LTO cycle}}{\text{trip}} \times \frac{1\text{ trip}}{3\text{ days}} = 1\text{ LTO cycle/3days}$$

$$\frac{1\text{ LTO cycle}}{3\text{ days}} \times \frac{3.02\text{ lb NO}_x}{\text{LTO cycle}} = 1.0\text{ lb/day NO}_x$$

$$\frac{1\text{ LTO cycle}}{3\text{ days}} \times \frac{6.78\text{ lb THC}}{\text{LTO cycle}} = 2.3\text{ lb/day THC}$$

$$\frac{1\text{ LTO cycle}}{3\text{ days}} \times \frac{13.54\text{ lb CO}}{\text{LTO cycle}} = 4.5\text{ lb/day CO}$$

$$\frac{1\text{ LTO cycle}}{3\text{ days}} \times \frac{0.44\text{ lb SO}_2}{\text{LTO cycle}} = 0.1\text{ lb/day SO}_2$$

$$\frac{1\text{ LTO cycle}}{3\text{ days}} \times \frac{0.40\text{ lb PM}}{\text{LTO cycle}} = 0.1\text{ lb/day PM}$$

Helicopter Transportation (Cruise Mode)

Assume 60 miles per hour cruise speed.

$$\frac{0.2\text{ hr}}{\text{round trip}} \times \frac{1\text{ round trip}}{3\text{ days}} = 0.07\text{ hr/day}$$

$$\frac{0.07\text{ hr}}{\text{day}} \times \frac{4.8\text{ lb }NO_x}{\text{hr}} = 0.3\text{ lb/day }NO_x$$

$$\frac{0.07\text{ hr}}{\text{day}} \times \frac{1.2\text{ lb THC}}{\text{hr}} = 0.1\text{ lb/day THC}$$

$$\frac{0.07\text{ hr}}{\text{day}} \times \frac{5.8\text{ lb CO}}{\text{hr}} = 0.4\text{ lb/day CO}$$

$$\frac{0.07\text{ hr}}{\text{day}} \times \frac{0.8\text{ lb }SO_2}{\text{hr}} = 0.1\text{ lb/day }SO_2$$

$$\frac{0.07\text{ hr}}{\text{day}} \times \frac{0.6\text{ lb PM}}{\text{hr}} < 0.1\text{ lb/day PM}$$

Construction Equipment

$$\frac{2000\text{ gal}}{\text{day}} \times \frac{469\text{ lb }NO_x}{1000\text{ gal}} = 938\text{ lb/day }NO_x$$

$$\frac{2000\text{ gal}}{\text{day}} \times \frac{37.5\text{ lb THC}}{1000\text{ gal}} = 75.0\text{ lb/day THC}$$

$$\frac{2000\text{ gal}}{\text{day}} \times \frac{102.0\text{ lb CO}}{1000\text{ gal}} = 204.0\text{ lb/day CO}$$

$$\frac{2000\text{ gal}}{\text{day}} \times \frac{31.2\text{ lb }SO_2}{1000\text{ gal}} = 62.4\text{ lb/day }SO_2$$

$$\frac{2000\text{ gal}}{\text{day}} \times \frac{33.5\text{ lb PM}}{1000\text{ gal}} = 67.0\text{ lb/day PM}$$

Fugitive Emissions (Diesel Storage Tank)

Assume diesel storage emissions include breathing, spillage, and displacement.

$$\frac{10.7 \text{ lb THC (gasoline)}}{1000 \text{ gal throughput}} \times \frac{0.3 \text{ psia RVP (diesel)}}{10.0 \text{ psia RVP (gasoline)}} = \frac{0.3 \text{ lb THC}}{1000 \text{ gal}}$$

$$\frac{0.3 \text{ lb THC}}{1000 \text{ gal}} \times \frac{2000 \text{ gal}}{\text{day}} = 0.6 \text{ lb/day THC}$$

B.1.1.1.2 Platform Gilda

Employee Transportation (Non-daily)

$$\frac{60 \text{ vehicles}}{\text{trip}} \times \frac{1 \text{ trip}}{35 \text{ days}} \times \frac{60 \text{ miles}}{\text{vehicle}} = 102.9 \text{ miles/day}$$

$$\frac{102.9 \text{ miles}}{\text{day}} \times \frac{2.44 \text{ g } NO_x}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 0.6 \text{ lb/day } NO_x$$

$$\frac{102.9 \text{ miles}}{\text{day}} \times \frac{1.37 \text{ g THC}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 0.3 \text{ lb/day THC}$$

$$\frac{102.9 \text{ miles}}{\text{day}} \times \frac{12.25 \text{ g CO}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 2.8 \text{ lb/day CO}$$

$$\frac{102.9 \text{ miles}}{\text{day}} \times \frac{0.13 \text{ g } SO_2}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} < 0.1 \text{ lb/day } SO_2$$

$$\frac{102.9 \text{ miles}}{\text{day}} \times \frac{0.35 \text{ g PM}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 0.1 \text{ lb/day PM}$$

Employee Transportation (Daily)

Emissions same as Construction, Platform Gina (on a per day basis).

Supply Truck Transportation

There are 2 vehicle trips per day; therefore, emissions are twice those for Construction, Platform Gina (on a per day basis).

4.0 lb/day NO_x
0.4 lb/day THC
2.6 lb/day CO
0.6 lb/day SO_2
0.4 lb/day PM

Crew Boat Transportation (Idle Mode)

Emissions same as Construction, Platform Gina (on a per day basis).

Crew Boat Transportation (Cruise Mode)

Emissions same as Construction, Platform Gina (on a per day basis).

Supply Boat Transportation (Idle Mode, 900 hp boat)

Emissions same as Construction, Platform Gina (on a per day basis).

Supply Boat Transportation (Cruise Mode, 900 hp boat)

Emissions same as Construction, Platform Gina (on a per day basis).

Tugboats

Emissions same as Construction, Platform Gina (on a per day basis).

Helicopter Transportation (Landing-Takeoff (LTO) cycle)

Emissions same as Construction, Platform Gina (on a per day basis).

Helicopter Transportation (Cruise Mode)

Assume 60 miles per hour cruise speed.

$$\frac{0.5 \text{ hr}}{\text{trip}} \times \frac{1 \text{ trip}}{3 \text{ days}} = 0.17 \text{ hr/day}$$

$$\frac{0.17 \text{ hr}}{\text{day}} \times \frac{4.8 \text{ lb } NO_x}{\text{hr}} = 0.8 \text{ lb/day } NO_x$$

$$\frac{0.17\text{ hr}}{\text{day}} \times \frac{1.2\text{ lb THC}}{\text{hr}} = 0.2\text{ lb/day}$$

$$\frac{0.17\text{ hr}}{\text{day}} \times \frac{5.8\text{ lb CO}}{\text{hr}} = 1.0\text{ lb/day CO}$$

$$\frac{0.17\text{ hr}}{\text{day}} \times \frac{0.8\text{ lb SO}_2}{\text{hr}} = 0.1\text{ lb/day SO}_2$$

$$\frac{0.17\text{ hr}}{\text{day}} \times \frac{0.6\text{ lb PM}}{\text{hr}} = 0.1\text{ lb/day PM}$$

Construction Equipment

Emissions same as Construction, Platform Gina (on a per day basis).

Fugutive Emissions (Diesel Storage Tank)

Emissions same as Construction, Platform Gina (on a per day basis).

B.1.1.1.3 Offshore Pipelines — Platform Gina

Employee Transportation (Offshore Pipelines)

$$\frac{44\text{ vehicle-trips}}{\text{day}} \times \frac{60\text{ miles}}{\text{vehicle-trip}} = \frac{2{,}640\text{ miles}}{\text{day}}$$

$$\frac{2{,}640\text{ miles}}{\text{day}} \times \frac{2.44\text{ g NO}_x}{\text{mile}} \times \frac{1\text{ lb}}{453.6\text{ g}} = 14.2\text{ lb/day NO}_x$$

$$\frac{2{,}640\text{ miles}}{\text{day}} \times \frac{1.37\text{ g THC}}{\text{mile}} \times \frac{1\text{ lb}}{453.6\text{ g}} = 8.0\text{ lb/day THC}$$

$$\frac{2{,}640\text{ miles}}{\text{day}} \times \frac{12.25\text{ g CO}}{\text{mile}} \times \frac{1\text{ lb}}{453.6\text{ g}} = 71.3\text{ lb/day CO}$$

$$\frac{2{,}640\text{ miles}}{\text{day}} \times \frac{0.13\text{ g SO}_2}{\text{mile}} \times \frac{1\text{ lb}}{453.6\text{ g}} = 0.8\text{ lb/day SO}_2$$

$$\frac{2{,}640\ \text{miles}}{\text{day}} \times \frac{0.35\ \text{g PM}}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 2.0\ \text{lb/day PM}$$

Employee Transportation (Power Cables)

$$\frac{12\ \text{vehicle-trips}}{\text{day}} \times \frac{60\ \text{miles}}{\text{vehicle}} = 720\ \text{miles/day}$$

$$\frac{720\ \text{miles}}{\text{day}} \times \frac{2.44\ \text{g } NO_x}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 3.9\ \text{lb/day } NO_x$$

$$\frac{720\ \text{miles}}{\text{day}} \times \frac{1.37\ \text{g THC}}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 2.2\ \text{lb/day THC}$$

$$\frac{720\ \text{miles}}{\text{day}} \times \frac{12.25\ \text{g CO}}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 19.4\ \text{lb/day CO}$$

$$\frac{720\ \text{miles}}{\text{day}} \times \frac{0.13\ \text{g } SO_2}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 0.2\ \text{lb/day } SO_2$$

$$\frac{720\ \text{miles}}{\text{day}} \times \frac{0.35\ \text{g PM}}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 0.6\ \text{lb/day PM}$$

Supply Truck Transportation

$$\frac{45\ \text{vehicle-trips}}{21\ \text{days}} = \frac{2.1\ \text{vehicle-trips}}{\text{day}}$$

$$\frac{2.1\ \text{vehicle-trips}}{\text{day}} \times \frac{44\ \text{miles}}{\text{vehicle-trip}} = \frac{92.4\ \text{miles}}{\text{day}}$$

$$\frac{92.4\ \text{miles}}{\text{day}} \times \frac{20.49\ \text{g } NO_x}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 4.2\ \text{lb/day } NO_x$$

$$\frac{92.4\ \text{miles}}{\text{day}} \times \frac{2.11\ \text{g THC}}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 0.4\ \text{lb/day THC}$$

$$\frac{92.4 \text{ miles}}{\text{day}} \times \frac{13.14 \text{ g CO}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 2.7 \text{ lb/day CO}$$

$$\frac{92.4 \text{ miles}}{\text{day}} \times \frac{2.73 \text{ g } SO_2}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 0.6 \text{ lb/day } SO_2$$

$$\frac{92.4 \text{ miles}}{\text{day}} \times \frac{1.96 \text{ g PM}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 0.4 \text{ lb/day PM}$$

Railroad Transportation

Assume:

1) Train travels 40 miles within Ventura County.
2) Train makes one trip from East Coast.
3) Average speed is 30 miles per hour.
4) Fuel Consumption Rate is 100 gallons per hour.
5) One-third of load is for platform Gina Cable.

$$\frac{40 \text{ miles}}{\text{trip}} \times \frac{1 \text{ trip}}{1 \text{ day}} \times \frac{1 \text{ hr}}{30 \text{ miles}} \times \frac{100 \text{ gal fuel}}{\text{hr}} \times 0.33 = 44.0 \text{ gal/day}$$

$$\frac{44.0 \text{ gal}}{\text{day}} \times \frac{370 \text{ lb } NO_x}{1000 \text{ gal}} = 16.3 \text{ lb/day } NO_x$$

$$\frac{44.0 \text{ gal}}{\text{day}} \times \frac{94 \text{ lb THC}}{1000 \text{ gal}} = 4.1 \text{ lb/day THC}$$

$$\frac{44.0 \text{ gal}}{\text{day}} \times \frac{130 \text{ lb CO}}{1000 \text{ gal}} = 5.7 \text{ lb/day CO}$$

$$\frac{44.0 \text{ gal}}{\text{day}} \times \frac{57 \text{ lb } SO_2}{1000 \text{ gal}} = 2.5 \text{ lb/day } SO_2$$

$$\frac{44.0 \text{ gal}}{\text{day}} \times \frac{25 \text{ lb PM}}{1000 \text{ gal}} = 1.1 \text{ lb/day PM}$$

Tugboats (Offshore pipeline construction - 2500 Hp boat)

Assume fuel consumption rate is 30 gallons per hour @ 2/3 cruise speed.

$$\frac{30\text{ gal fuel}}{\text{hr}} \times \frac{24\text{ hr}}{\text{day}} \times 0.5\text{ (operating factor)} = 360\text{ gal/day}$$

$$\frac{360\text{ gal}}{\text{day}} \times \frac{326.2\text{ lb NO}_x}{1000\text{ gal}} = 117.4\text{ lb/day NO}_x$$

$$\frac{360\text{ gal}}{\text{day}} \times \frac{14.7\text{ lb THC}}{1000\text{ gal}} = 5.3\text{ lb/day THC}$$

$$\frac{360\text{ gal}}{\text{day}} \times \frac{126.5\text{ lb CO}}{1000\text{ gal}} = 45.5\text{ lb/day CO}$$

$$\frac{360\text{ gal}}{\text{day}} \times \frac{29.2\text{ lb SO}_2}{1000\text{ gal}} = 10.5\text{ lb/day SO}_2$$

Crane

$$100\text{ hp} \times \frac{24\text{ hr}}{\text{day}} \times 0.5\text{ (operating factor)} = 1200\text{ hp-hr/day}$$

$$\frac{1200\text{ hp-hr}}{\text{day}} \times \frac{14.0\text{ g NO}_x}{\text{hp-hr}} \times \frac{1\text{ lb}}{453.6\text{ g}} = 37.0\text{ lb/day NO}_x$$

$$\frac{1200\text{ hp-hr}}{\text{day}} \times \frac{1.12\text{ g THC}}{\text{hp-hr}} \times \frac{1\text{ lb}}{453.6\text{ g}} = 3.0\text{ lb/day THC}$$

$$\frac{1200\text{ hp-hr}}{\text{day}} \times \frac{3.03\text{ g CO}}{\text{hp-hr}} \times \frac{1\text{ lb}}{453.6\text{ g}} = 8.0\text{ lb/day CO}$$

$$\frac{1200\text{ hp-hr}}{\text{day}} \times \frac{0.93\text{ g SO}_2}{\text{hp-hr}} \times \frac{1\text{ lb}}{453.6\text{ g}} = 2.5\text{ lb/day SO}_2$$

$$\frac{1200\text{ hp-hr}}{\text{day}} \times \frac{1.00\text{ g PM}}{\text{hp-hr}} \times \frac{1\text{ lb}}{453.6\text{ g}} = 2.6\text{ lb/day PM}$$

Generators

$$25 \text{ hp} \times \frac{24 \text{ hr}}{\text{day}} \times 0.5 \text{ (operating factor)} = 300 \text{ hp-hr/day}$$

$$\frac{300 \text{ hp-hr}}{\text{day}} \times \frac{14.0 \text{ g NO}_x}{\text{hp-hr}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 9.3 \text{ lb/day NO}_x$$

$$\frac{300 \text{ hp-hr}}{\text{day}} \times \frac{1.12 \text{ g THC}}{\text{hp-hr}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 0.7 \text{ lb/day THC}$$

$$\frac{300 \text{ hp-hr}}{\text{day}} \times \frac{3.03 \text{ g CO}}{\text{hp-hr}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 2.0 \text{ lb/day CO}$$

$$\frac{300 \text{ hp-hr}}{\text{day}} \times \frac{0.93 \text{ g SO}_2}{\text{hp-hr}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 0.6 \text{ lb/day SO}_2$$

$$\frac{300 \text{ hp-hr}}{\text{day}} \times \frac{1.00 \text{ g PM}}{\text{hp-hr}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 0.7 \text{ lb/day PM}$$

Welding Machine

$$12 \text{ machines} \times \frac{50 \text{ hp}}{\text{machine}} \times \frac{24 \text{ hr}}{\text{day}} \times 0.9 \text{ (operating factor)} = 12{,}960 \text{ hp-hr/day}$$

$$\frac{12{,}960 \text{ hp-hr}}{\text{day}} \times \frac{14.0 \text{ g NO}_x}{\text{hp-hr}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 400 \text{ lb/day NO}_x$$

$$\frac{12{,}960 \text{ hp-hr}}{\text{day}} \times \frac{1.12 \text{ g THC}}{\text{hp-hr}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 32 \text{ lb/day THC}$$

$$\frac{12{,}960 \text{ hp-hr}}{\text{day}} \times \frac{3.03 \text{ g CO}}{\text{hp-hr}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 86.6 \text{ lb/day CO}$$

$$\frac{12{,}960 \text{ hp-hr}}{\text{day}} \times \frac{0.93 \text{ g SO}_2}{\text{hp-hr}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 26.6 \text{ lb/day SO}_2$$

$$\frac{12{,}960 \text{ hp-hr}}{\text{day}} \times \frac{1.00 \text{ g PM}}{\text{hp-hr}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 28.6 \text{ lb/day PM}$$

Tugboat (Power Cable — assume 900 hp boat; 2/3 cruising speed)

$$\frac{30 \text{ gal fuel}}{\text{hr}} \times \frac{24 \text{ hr}}{\text{day}} \times 1.0 \text{ (operating factor)} = 720 \text{ gal/day}$$

$$\frac{720 \text{ gal}}{\text{day}} \times \frac{167.2 \text{ lb } NO_x}{1000 \text{ gal}} = 120.4 \text{ lb/day } NO_x$$

$$\frac{720 \text{ gal}}{\text{day}} \times \frac{16.8 \text{ lb THC}}{1000 \text{ gal}} = 12.1 \text{ lb/day THC}$$

$$\frac{720 \text{ gal}}{\text{day}} \times \frac{62.2 \text{ lb CO}}{1000 \text{ gal}} = 44.8 \text{ lb/day CO}$$

$$\frac{720 \text{ gal}}{\text{day}} \times \frac{29.2 \text{ lb } SO_2}{1000 \text{ gal}} = 21.0 \text{ lb/day } SO_2$$

B.1.1.1.4 Offshore Pipeline — Platform Gilda

Employee Transportation (Offshore Pipleline)

Emissions same as Offshore Pipelines, Platform Gina (on a per day basis).

Employee Transportation (Power Cables)

Emissions same as Construction, Platform Gina (on a per day basis).

Supply Truck Transportation

One additional truck trip per day is required for Construction, Platform Gilda (as compared to Platform Gina).

$$\frac{3.1 \text{ vehicle-trips}}{\text{day}} \times \frac{44 \text{ miles}}{\text{vehicle-trip}} = 136.4 \text{ miles/day}$$

$$\frac{136.4 \text{ miles}}{\text{day}} \times \frac{20.49 \text{ g } NO_x}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 6.2 \text{ lb/day } NO_x$$

$$\frac{136.4 \text{ miles}}{\text{day}} \times \frac{2.11 \text{ g THC}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 0.6 \text{ lb/day THC}$$

$$\frac{136.4 \text{ miles}}{\text{day}} \times \frac{13.14 \text{ g CO}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 4.0 \text{ lb/day CO}$$

$$\frac{136.4 \text{ miles}}{\text{day}} \times \frac{2.73 \text{ g } SO_2}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 0.8 \text{ lb/day } SO_2$$

$$\frac{136.4 \text{ miles}}{\text{day}} \times \frac{1.96 \text{ g PM}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 0.6 \text{ lb/day PM}$$

Railroad Transportation (See Platform Gina assumptions made previously).

$$\frac{40 \text{ miles}}{\text{trip}} \times \frac{1 \text{ trip}}{1 \text{ day}} \times \frac{\text{hr}}{30 \text{ miles}} \times \frac{100 \text{ gal fuel}}{\text{hr}} \times 0.67 = 89.3 \text{ gal/day}$$

$$\frac{89.3 \text{ gal}}{\text{day}} \times \frac{370 \text{ lb } NO_x}{1000 \text{ gal}} = 33.0 \text{ lb/day } NO_x$$

$$\frac{89.3 \text{ gal}}{\text{day}} \times \frac{94 \text{ lb THC}}{1000 \text{ gal}} = 8.4 \text{ lb/day THC}$$

$$\frac{89.3 \text{ gal}}{\text{day}} \times \frac{130 \text{ lb CO}}{1000 \text{ gal}} = 11.6 \text{ lb/day CO}$$

$$\frac{89.3 \text{ gal}}{\text{day}} \times \frac{57 \text{ lb } SO_2}{1000 \text{ gal}} = 5.1 \text{ lb/day } SO_2$$

$$\frac{89.3 \text{ gal}}{\text{day}} \times \frac{25 \text{ lb PM}}{1000 \text{ gal}} = 2.2 \text{ lb/day PM}$$

Tugboat (Offshore Pipeline)

Emissions same as Offshore Pipeline Construction, Platform Gina (on a per day basis).

Crane

Emissions same as Offshore Pipeline Construction, Platform Gina (on a per day basis).

Generator

Emissions same as Offshore Pipeline Construction, Platform Gina (on a per day basis).

Welding Machine

Emissions same as Offshore Pipeline Construction, Platform Gina (on a per day basis).

Tugboat

Emissions same as Construction, Platform Gina (on a per day basis).

B.1.1.1.5 Onshore Treating Facility

Employee Transportation

$$\frac{40 \text{ vehicle-trips}}{\text{day}} \times \frac{60 \text{ miles}}{\text{vehicle-trip}} = 2400 \text{ miles/day}$$

$$\frac{2400 \text{ miles}}{\text{day}} \times \frac{2.44 \text{ g } NO_x}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 12.9 \text{ lb/day } NO_x$$

$$\frac{2400 \text{ miles}}{\text{day}} \times \frac{1.37 \text{ g THC}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 7.2 \text{ lb/day THC}$$

$$\frac{2400 \text{ miles}}{\text{day}} \times \frac{12.25 \text{ g CO}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 64.8 \text{ lb/day CO}$$

$$\frac{2400 \text{ miles}}{\text{day}} \times \frac{0.13 \text{ g } SO_2}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 0.7 \text{ lb/day } SO_2$$

$$\frac{2400 \text{ miles}}{\text{day}} \times \frac{0.35 \text{ g PM}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 1.9 \text{ lb/day PM}$$

Supply Truck Transportation

Emissions same as Construction, Platform Gina (on a per day basis).

Construction Equipment

$$\frac{\text{500 gallons}}{\text{42 days}} = \text{11.9 gal/day}$$

$$\frac{\text{11.9 gal}}{\text{day}} \times \frac{\text{494 lb NO}_x}{\text{1000 gal}} = \text{5.9 lb/day NO}_x$$

$$\frac{\text{11.9 gal}}{\text{day}} \times \frac{\text{34.7 lb THC}}{\text{1000 gal}} = \text{0.4 lb/day THC}$$

$$\frac{\text{11.9 gal}}{\text{day}} \times \frac{\text{94.2 lb CO}}{\text{1000 gal}} = \text{1.1 lb/day CO}$$

$$\frac{\text{11.9 gal}}{\text{day}} \times \frac{\text{31.1 lb SO}_2}{\text{1000 gal}} = \text{0.4 lb/day SO}_2$$

$$\frac{\text{11.9 gal}}{\text{day}} \times \frac{\text{30.1 lb PM}}{\text{1000 gal}} = \text{0.4 lb/day PM}$$

Electric Power Generation

Assume a 0.9 power factor.

100 KVA x 0.9 = 90 Kwh/hr

$$\frac{\text{90 Kwh}}{\text{hr}} \times \frac{\text{2.3 lb NO}_x}{\text{1000 Kwh}} \times \frac{\text{24 hr}}{\text{day}} = \text{5.0 lb/day NO}_x$$

$$\frac{\text{90 Kwh}}{\text{hr}} \times \frac{\text{0.18 lb THC}}{\text{1000 Kwh}} \times \frac{\text{24 hr}}{\text{day}} = \text{0.4 lb/day THC}$$

$$\frac{\text{90 Kwh}}{\text{hr}} \times \frac{\text{0.2 lb CO}}{\text{1000 Kwh}} \times \frac{\text{24 hr}}{\text{day}} = \text{0.4 lb/day CO}$$

$$\frac{\text{90 Kwh}}{\text{hr}} \times \frac{\text{2.65 lb SO}_2}{\text{1000 Kwh}} \times \frac{\text{24 hr}}{\text{day}} = \text{5.7 lb/day SO}_2$$

$$\frac{\text{90 Kwh}}{\text{hr}} \times \frac{\text{0.40 lb PM}}{\text{1000 Kwh}} \times \frac{\text{24 hr}}{\text{day}} = \text{0.9 lb/day PM}$$

Fugitive Dust

Assume water spray for 50% control, 80,000 ft^2 construction area.

$$\frac{1.2 \text{ ton PM}}{\text{acre-month}} \times \frac{2000 \text{ lb PM}}{\text{ton}} \times \frac{1 \text{ month}}{30 \text{ days}} \times \frac{1 \text{ acre}}{43{,}560 \text{ ft}^2} \times 0.5$$

$$= 0.00092 \frac{\text{lb PM}}{\text{day-ft}^2} \times 80{,}000 \text{ ft}^2$$

$$= 73.5 \text{ lb/day PM}$$

B.1.1.1.6 Onshore Pipelines

Employee Transportation

$$\frac{35 \text{ vehicle-trips}}{\text{day}} \times \frac{60 \text{ miles}}{\text{vehicle-trip}} = 2100 \text{ miles/day}$$

$$\frac{2100 \text{ miles}}{\text{day}} \times \frac{2.44 \text{ g } NO_x}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 11.3 \text{ lb/day } NO_x$$

$$\frac{2100 \text{ miles}}{\text{day}} \times \frac{1.37 \text{ g THC}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 6.3 \text{ lb/day THC}$$

$$\frac{2100 \text{ miles}}{\text{day}} \times \frac{12.25 \text{ g CO}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 56.7 \text{ lb/day CO}$$

$$\frac{2100 \text{ miles}}{\text{day}} \times \frac{0.13 \text{ g } SO_2}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 0.6 \text{ lb/day } SO_2$$

$$\frac{2100 \text{ miles}}{\text{day}} \times \frac{0.35 \text{ g PM}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 1.6 \text{ lb/day PM}$$

Supply Truck Transportation

$$\frac{50 \text{ vehicle-trips}}{20 \text{ days}} \times \frac{44 \text{ miles}}{\text{vehicle-trip}} = 110.0 \text{ miles/day}$$

$$\frac{110.0 \text{ miles}}{\text{day}} \times \frac{20.49 \text{ g } NO_x}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 5.0 \text{ lb/day } NO_x$$

$$\frac{110.0 \text{ miles}}{\text{day}} \times \frac{2.11 \text{ g THC}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 0.5 \text{ lb/day THC}$$

$$\frac{110.0 \text{ miles}}{\text{day}} \times \frac{13.14 \text{ g CO}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 3.2 \text{ lb/day CO}$$

$$\frac{110.0 \text{ miles}}{\text{day}} \times \frac{2.73 \text{ g } SO_2}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 0.7 \text{ lb/day } SO_2$$

$$\frac{110.0 \text{ miles}}{\text{day}} \times \frac{1.96 \text{ g PM}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 0.5 \text{ lb/day PM}$$

Construction Equipment

$$\frac{200 \text{ gallons}}{20 \text{ days}} = 10 \text{ gal/day}$$

$$\frac{10 \text{ gal}}{\text{day}} \times \frac{494 \text{ lb } NO_x}{1000 \text{ gal}} = 4.9 \text{ lb/day } NO_x$$

$$\frac{10 \text{ gal}}{\text{day}} \times \frac{34.7 \text{ lb THC}}{1000 \text{ gal}} = 0.3 \text{ lb/day THC}$$

$$\frac{10 \text{ gal}}{\text{day}} \times \frac{94.2 \text{ lb CO}}{1000 \text{ gal}} = 0.9 \text{ lb/day CO}$$

$$\frac{10 \text{ gal}}{\text{day}} \times \frac{31.1 \text{ lb } SO_2}{1000 \text{ gal}} = 0.3 \text{ lb/day } SO_2$$

$$\frac{10 \text{ gal}}{\text{day}} \times \frac{30.1 \text{ lb PM}}{1000 \text{ gal}} = 0.3 \text{ lb/day PM}$$

Fugitive Dust

Using Table 3.3-4, there are 348,480 ft^2 of disturbed area.

$$\text{Average disturbed area} = \frac{348{,}480 \text{ ft}^2}{20 \text{ days}} = 17{,}424 \text{ ft}^2 \text{ per day}$$

$$17{,}424 \text{ ft}^2 \times \frac{0.00092 \text{ lb PM}}{\text{ft}^2 - \text{day}} = 16.0 \text{ lb/day PM}$$

B.1.1.1.7 Total Construction Emissions

Corrections associated with construction time periods for the proposed Mandalay project.

Offshore Pipeline — Platform Gina

Employee Transportation (Power Cable)

$$\frac{3.9 \text{ lb NO}_x}{\text{day}} \times \frac{2 \text{ days}}{21 \text{ days}} = 0.4 \text{ lb/day NO}_x$$

$$\frac{2.2 \text{ lb THC}}{\text{day}} \times \frac{2 \text{ days}}{21 \text{ days}} = 0.2 \text{ lb/day THC}$$

$$\frac{19.4 \text{ lb CO}}{\text{day}} \times \frac{2 \text{ days}}{21 \text{ days}} = 1.8 \text{ lb/day CO}$$

$$\frac{0.2 \text{ lb SO}_2}{\text{day}} \times \frac{2 \text{ days}}{21 \text{ days}} < 0.1 \text{ lb/day SO}_2$$

$$\frac{0.6 \text{ lb PM}}{\text{day}} \times \frac{2 \text{ days}}{21 \text{ days}} = 0.1 \text{ lb/day PM}$$

Railroad Transport

$$\frac{16.3 \text{ lb NO}_x}{\text{day}} \times \frac{1 \text{ day}}{21 \text{ days}} = 0.8 \text{ lb/day NO}_x$$

$$\frac{4.1 \text{ lb THC}}{\text{day}} \times \frac{1 \text{ day}}{21 \text{ days}} = 0.2 \text{ lb/day THC}$$

$$\frac{5.7 \text{ lb CO}}{\text{day}} \times \frac{1 \text{ day}}{21 \text{ days}} = 0.3 \text{ lb/day CO}$$

$$\frac{2.5 \text{ lb SO}_2}{\text{day}} \times \frac{1 \text{ day}}{21 \text{ days}} = 0.1 \text{ lb/day SO}_2$$

$$\frac{1.1 \text{ lb PM}}{\text{day}} \times \frac{1 \text{ day}}{21 \text{ days}} = 0.1 \text{ lb/day PM}$$

Tugboat (Power Cable)

$$\frac{120.4 \text{ lb } NO_x}{\text{day}} \times \frac{2 \text{ days}}{21 \text{ days}} = 11.5 \text{ lb/day } NO_x$$

$$\frac{12.1 \text{ lb THC}}{\text{day}} \times \frac{2 \text{ days}}{21 \text{ days}} = 1.2 \text{ lb/day THC}$$

$$\frac{44.8 \text{ lb CO}}{\text{day}} \times \frac{2 \text{ days}}{21 \text{ days}} = 4.3 \text{ lb/day CO}$$

$$\frac{21.0 \text{ lb } SO_2}{\text{day}} \times \frac{2 \text{ days}}{21 \text{ days}} = 2.0 \text{ lb/day } SO_2$$

Offshore Pipeline — Platform Gilda

Employee Transportation (Power Cable)

$$\frac{3.9 \text{ lb } NO_x}{\text{day}} \times \frac{2 \text{ days}}{49 \text{ days}} = 0.2 \text{ lb/day } NO_x$$

$$\frac{2.2 \text{ lb THC}}{\text{day}} \times \frac{2 \text{ days}}{49 \text{ days}} = 0.1 \text{ lb/day THC}$$

$$\frac{19.4 \text{ lb CO}}{\text{day}} \times \frac{2 \text{ days}}{49 \text{ days}} = 0.8 \text{ lb/day CO}$$

$$\frac{0.2 \text{ lb } SO_2}{\text{day}} \times \frac{2 \text{ days}}{49 \text{ days}} < 0.1 \text{ lb/day } SO_2$$

$$\frac{0.6 \text{ lb/PM}}{\text{day}} \times \frac{2 \text{ days}}{49 \text{ days}} < 0.1 \text{ lb/day PM}$$

Railroad Transport

$$\frac{33.0 \text{ lb } NO_x}{\text{day}} \times \frac{1 \text{ day}}{49 \text{ days}} = 0.7 \text{ lb/day } NO_x$$

$$\frac{8.4 \text{ lb THC}}{\text{day}} \times \frac{1 \text{ day}}{49 \text{ days}} = 0.2 \text{ lb/day THC}$$

$$\frac{11.6 \text{ lb CO}}{\text{day}} \times \frac{1 \text{ day}}{49 \text{ days}} = 0.2 \text{ lb/day CO}$$

$$\frac{5.1 \text{ lb SO}_2}{\text{day}} \times \frac{1 \text{ day}}{49 \text{ days}} = 0.1 \text{ lb/day SO}_2$$

$$\frac{2.2 \text{ lb PM}}{\text{day}} \times \frac{1 \text{ day}}{49 \text{ days}} < 0.1 \text{ lb/day PM}$$

Tugboat (Power Cable)

$$\frac{120.4 \text{ lb NO}_x}{\text{day}} \times \frac{2 \text{ days}}{49 \text{ days}} = 4.9 \text{ lb/day NO}_x$$

$$\frac{12.1 \text{ lb THC}}{\text{day}} \times \frac{2 \text{ days}}{49 \text{ days}} = 0.5 \text{ lb/day THC}$$

$$\frac{44.8 \text{ lb CO}}{\text{day}} \times \frac{2 \text{ days}}{49 \text{ days}} = 1.8 \text{ lb/day CO}$$

$$\frac{21.0 \text{ lb SO}_2}{\text{day}} \times \frac{2 \text{ days}}{49 \text{ days}} = 0.9 \text{ lb/day SO}_2$$

Onshore Treating Facility

Construction Equipment

$$\frac{5.9 \text{ lb NO}_x}{\text{day}} \times \frac{42 \text{ days}}{112 \text{ days}} = 2.2 \text{ lb/day NO}_x$$

$$\frac{0.4 \text{ lb THC}}{\text{day}} \times \frac{42 \text{ days}}{112 \text{ days}} = 0.2 \text{ lb/day THC}$$

$$\frac{1.1 \text{ lb CO}}{\text{day}} \times \frac{42 \text{ days}}{112 \text{ days}} = 0.4 \text{ lb/day CO}$$

$$\frac{0.4 \text{ lb } SO_2}{\text{day}} \times \frac{42 \text{ days}}{112 \text{ days}} = 0.2 \text{ lb/day } SO_2$$

$$\frac{0.4 \text{ lb PM}}{\text{day}} \times \frac{42 \text{ days}}{112 \text{ days}} = 0.2 \text{ lb/day PM}$$

Fugitive Dust

$$\frac{73.5 \text{ lb PM}}{\text{day}} \times \frac{42 \text{ days}}{112 \text{ days}} = 27.6 \text{ lb/day PM}$$

Electric Power Generation (Assume power used for 70 days).

$$\frac{5.0 \text{ lb } NO_x}{\text{day}} \times \frac{70 \text{ days}}{112 \text{ days}} = 3.1 \text{ lb/day } NO_x$$

$$\frac{0.4 \text{ lb THC}}{\text{day}} \times \frac{70 \text{ days}}{112 \text{ days}} = 0.3 \text{ lb/day THC}$$

$$\frac{0.4 \text{ lb CO}}{\text{day}} \times \frac{70 \text{ days}}{112 \text{ days}} = 0.3 \text{ lb/day CO}$$

$$\frac{5.7 \text{ lb } SO_2}{\text{day}} \times \frac{70 \text{ days}}{112 \text{ days}} = 3.6 \text{ lb/day } SO_2$$

$$\frac{0.9 \text{ lb PM}}{\text{day}} \times \frac{70 \text{ days}}{112 \text{ days}} = 0.6 \text{ lb/day PM}$$

Onshore Pipeline (5 day week — need to calculate as a 7-day week).

Using Total Emissions

$$\frac{21.2 \text{ lb } NO_x}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 15.1 \text{ lb/day } NO_x$$

$$\frac{7.1 \text{ lb THC}}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 5.1 \text{ lb/day THC}$$

$$\frac{60.8 \text{ lb CO}}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 43.4 \text{ lb/day CO}$$

$$\frac{1.6 \text{ lb } SO_2}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 1.1 \text{ lb/day } SO_2$$

$$\frac{18.4 \text{ lb PM}}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 13.1 \text{ lb/day PM}$$

TABLE B.1-1

TIME PERIODS AND CONSTRUCTION EMISSION RATES FOR PROPOSED MANDALAY SITE

Item	Week After Project Approval	Lbs/Day				
		NO_2	THC	CO	SO_2	PM
Platform Gina Erection	8-10	1054.0	88.9	270.5	69.6	72.0
Platform Gilda Erection	10.0-15.0	1055.7	88.7	268.3	69.8	72.2
Platform Gina Offshore Pipeline	12.0-15.0	594.8	51.0	222.5	43.7	34.5
Platform Gilda Offshore Pipeline	15.0-22.0	589.9	50.4	220.2	42.8	34.5
Onshore Treating Facility	4.0-20.0	20.2	7.9	66.8	4.8	30.5
Onshore Pipelines	14.0-18.0	15.1	5.1	43.4	1.1	13.1

TABLE B.1-2

AVERAGE EMISSION RATE FOR PROPOSED MANDALAY PROJECT (LBS/DAY)

Week After Project Approval		
NO_x (as NO_2)	Emissions for Each Period	Average Emission Rate
4-8	20.2	$20.2 \times \frac{4}{18} = 4.5$
8-10	20.2 + 1054	$1074.2 \times \frac{2}{18} = 119.4$
10-12	20.2 + 1055.7	$1075.9 \times \frac{2}{18} = 119.5$
12-14	20.2 + 1055.7 + 594.8	$1670.7 \times \frac{2}{18} = 185.6$
14-15	20.2 + 1055.7 + 594.8 + 15.1	$1685.8 \times \frac{1}{18} = 93.7$
15-18	20.2 + 589.9 + 15.1	$625.2 \times \frac{3}{18} = 104.2$
18-20	589.9 + 20.2	$610.1 \times \frac{2}{18} = 67.8$
20-22	589.9	$589.9 \times \frac{2}{18} = 65.5$
		Total 760.2
THC		
4-8	7.9	$7.9 \times \frac{4}{18} = 1.8$
8-10	7.9 + 88.9	$96.8 \times \frac{2}{18} = 10.8$
10-12	88.7 + 7.9	$96.6 \times \frac{2}{18} = 10.7$
12-14	88.7 + 51.0 + 7.9	$147.6 \times \frac{2}{18} = 16.4$
14-15	88.7 + 51.0 + 7.9 + 5.1	$152.7 \times \frac{1}{18} = 8.5$
15-18	50.4 + 7.9 + 5.1	$63.4 \times \frac{3}{18} = 10.6$

TABLE B.1-2 (Continued)

Week After Project Approval	Emissions for Each Period	Average Emission Rate
18-20	50.4 + 7.9	$58.3 \times \frac{2}{18} = 6.5$
20-22	50.4	$50.4 \times \frac{2}{18} = 5.6$
		Total 70.9
CO		
4-8	66.8	$66.8 \times \frac{4}{18} = 14.8$
8-10	270.5 + 66.8	$337.3 \times \frac{2}{18} = 37.5$
10-12	268.3 + 66.8	$335.1 \times \frac{2}{18} = 37.2$
12-14	268.3 + 222.5 + 66.8	$557.6 \times \frac{2}{18} = 62.0$
14-15	268.3 + 222.5 + 66.8 + 43.4	$601.0 \times \frac{1}{18} = 33.4$
15-18	220.2 + 66.8 + 43.4	$330.4 \times \frac{3}{18} = 55.1$
18-20	220.2 + 66.8	$287.0 \times \frac{2}{18} = 31.9$
20-22	220.2	$220.2 \times \frac{2}{18} = 24.5$
		Total 296.4
SO_2		
4-8	4.8	$4.8 \times \frac{4}{18} = 1.1$
8-10	69.6 + 4.8	$74.4 \times \frac{2}{18} = 8.3$
10-12	69.8 + 4.8	$74.6 \times \frac{2}{18} = 8.3$
12-14	69.8 + 43.7 + 4.8	$118.3 \times \frac{2}{18} = 13.1$

TABLE B.1-2 (Continued)

Week After Project Approval	Emissions for Each Period	Average Emission Rate
14-15	69.8 + 43.7 + 4.8 + 1.1	$119.4 \times \frac{1}{18} = 6.6$
15-18	42.8 + 4.8 + 1.1	$48.7 \times \frac{3}{18} = 8.1$
18-20	42.8 + 4.8	$47.6 \times \frac{2}{18} = 5.3$
20-22	42.8	$42.8 \times \frac{2}{18} = 4.8$
		Total 55.6
PM		
4-8	30.5	$30.5 \times \frac{4}{18} = 6.8$
8-10	72.0 + 30.5	$102.5 \times \frac{2}{18} = 11.4$
10-12	72.2 + 30.5	$102.7 \times \frac{2}{18} = 11.4$
12-14	72.2 + 34.5 + 30.5	$137.2 \times \frac{2}{18} = 15.2$
14-15	72.2 + 34.5 + 30.5 + 13.1	$150.3 \times \frac{1}{18} = 8.4$
15-18	34.5 + 30.5 + 13.1	$78.1 \times \frac{3}{18} = 13.0$
18-20	34.5 + 30.5	$65.0 \times \frac{2}{18} = 7.2$
20-22	34.5	$34.5 \times \frac{2}{18} = 3.8$
		Total 77.2

B.1.1.2 Drilling Emissions

B.1.1.2.1 Platform Gina

Employee Transportation

Assume 15 workers per shift @ 3 shifts per day.

$$\frac{45 \text{ vehicle trips}}{\text{day}} \times \frac{60 \text{ miles}}{\text{vehicle-trip}} = 2700 \text{ miles/day}$$

$$\frac{2700 \text{ miles}}{\text{day}} \times \frac{2.44 \text{ g } NO_x}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 14.5 \text{ lb/day } NO_x$$

$$\frac{2700 \text{ miles}}{\text{day}} \times \frac{1.37 \text{ g THC}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 8.2 \text{ lb/day THC}$$

$$\frac{2700 \text{ miles}}{\text{day}} \times \frac{12.25 \text{ g CO}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 72.9 \text{ lb/day CO}$$

$$\frac{2700 \text{ miles}}{\text{day}} \times \frac{0.13 \text{ g } SO_2}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 0.8 \text{ lb/day } SO_2$$

$$\frac{2700 \text{ miles}}{\text{day}} \times \frac{0.35 \text{ g PM}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 2.1 \text{ lb/day PM}$$

Crew Boat Transportation (Cruise Mode)

Assume one hour cruise time per trip.

$$\frac{1 \text{ hr}}{\text{shift}} \times \frac{3 \text{ shifts}}{\text{day}} \times \frac{20 \text{ gal fuel}}{\text{hr}} = 60 \text{ gal/day}$$

$$\frac{60 \text{ gal}}{\text{day}} \times \frac{349.2 \text{ lb } NO_x}{1000 \text{ gal}} = 21.0 \text{ lb/day } NO_x$$

$$\frac{60 \text{ gal}}{\text{day}} \times \frac{24.1 \text{ lb THC}}{1000 \text{ gal}} = 1.4 \text{ lb/day THC}$$

$$\frac{60 \text{ gal}}{\text{day}} \times \frac{77.6 \text{ lb CO}}{1000 \text{ gal}} = 4.7 \text{ lb/day CO}$$

$$\frac{60 \text{ gal}}{\text{day}} \times \frac{29.2 \text{ lb } SO_2}{1000 \text{ gal}} = 1.8 \text{ lb/day } SO_2$$

Crew Boat Transportation (Idle Mode)

Assume 1/3 hour idle time per trip.

$$\frac{0.33 \text{ hr (idle time)}}{\text{shift}} \times \frac{3 \text{ shifts}}{\text{day}} \times \frac{4 \text{ gal}}{\text{hr}} = 4 \text{ gal/day}$$

$$\frac{4 \text{ gal}}{\text{day}} \times \frac{307.1 \text{ lb } NO_x}{1000 \text{ gal}} = 1.2 \text{ lb/day } NO_x$$

$$\frac{4 \text{ gal}}{\text{day}} \times \frac{68.0 \text{ lb THC}}{1000 \text{ gal}} = 0.3 \text{ lb/day THC}$$

$$\frac{4 \text{ gal}}{\text{day}} \times \frac{171.7 \text{ lb CO}}{1000 \text{ gal}} = 0.7 \text{ lb/day CO}$$

$$\frac{4 \text{ gal}}{\text{day}} \times \frac{29.2 \text{ lb } SO_2}{1000 \text{ gal}} = 0.1 \text{ lb/day } SO_2$$

Supply Boat Transportation (Cruise Mode, 900 hp Boat)

$$\frac{15 \text{ round trips}}{30 \text{ days}} \times \frac{1 \text{ hr}}{\text{round trip}} \times \frac{25 \text{ gal}}{\text{hr}} = 12.5 \text{ gal/day}$$

$$\frac{12.5 \text{ gal}}{\text{day}} \times \frac{360 \text{ lb } NO_x}{1000 \text{ gal}} = 4.5 \text{ lb/day } NO_x$$

$$\frac{12.5 \text{ gal}}{\text{day}} \times \frac{17.1 \text{ lb THC}}{1000 \text{ gal}} = 0.2 \text{ lb/day THC}$$

$$\frac{12.5 \text{ gal}}{\text{day}} \times \frac{80.9 \text{ lb CO}}{1000 \text{ gal}} = 1.0 \text{ lb/day CO}$$

$$\frac{12.5 \text{ gal}}{\text{day}} \times \frac{29.2 \text{ lb } SO_2}{1000 \text{ gal}} = 0.4 \text{ lb/day } SO_2$$

Supply Boat Transportation (Idle Mode)

Assume 1 hour idle time per trip, 900 hp Boat)

$$\frac{15 \text{ round trips}}{30 \text{ days}} \times \frac{1 \text{ hr}}{\text{round trip}} \times \frac{5 \text{ gal}}{\text{hr}} = 2.5 \text{ gal/day}$$

$$\frac{2.5\text{ gal}}{\text{day}} \times \frac{107.5\text{ lb NO}_x}{1000\text{ gal}} = 0.3\text{ lb/day NO}_x$$

$$\frac{2.5\text{ gal}}{\text{day}} \times \frac{249.1\text{ lb THC}}{1000\text{ gal}} = 0.6\text{ lb/day THC}$$

$$\frac{2.5\text{ gal}}{\text{day}} \times \frac{223.7\text{ lb CO}}{1000\text{ gal}} = 0.6\text{ lb/day CO}$$

$$\frac{2.5\text{ gal}}{\text{day}} \times \frac{29.2\text{ lb SO}_2}{1000\text{ gal}} = 0.1\text{ lb/day SO}_2$$

Drilling Equipment

$$\frac{1.0\text{ bbls}}{\text{day}} \times \frac{42\text{ gal}}{\text{bbl}} = 42\text{ gal/day}$$

$$\frac{42\text{ gal}}{\text{day}} \times \frac{469\text{ lb NO}_x}{1000\text{ gal}} = 19.7\text{ lb/day NO}_x$$

$$\frac{42\text{ gal}}{\text{day}} \times \frac{37.5\text{ lb THC}}{1000\text{ gal}} = 1.6\text{ lb/day THC}$$

$$\frac{42\text{ gal}}{\text{day}} \times \frac{102\text{ lb CO}}{1000\text{ gal}} = 4.3\text{ lb/day CO}$$

$$\frac{42\text{ gal}}{\text{day}} \times \frac{31.2\text{ lb SO}_2}{1000\text{ gal}} = 1.3\text{ lb/day SO}_2$$

$$\frac{42\text{ gal}}{\text{day}} \times \frac{33.5\text{ lb PM}}{1000\text{ gal}} = 1.4\text{ lb/day PM}$$

Electric Power Generation

$$1500\text{ KVA} \times 0.9 = \frac{1350\text{ Kwh}}{\text{hr}}$$

$$\frac{1350\text{ Kwh}}{\text{hr}} \times \frac{2.3\text{ lb NO}_x}{1000\text{ Kwh}} \times \frac{24\text{ hr}}{\text{day}} = 74.5\text{ lb/day NO}_x$$

$$\frac{1350\ \text{Kwh}}{\text{hr}} \times \frac{0.18\ \text{lb THC}}{1000\ \text{Kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 5.8\ \text{lb/day THC}$$

$$\frac{1350\ \text{Kwh}}{\text{hr}} \times \frac{0.2\ \text{lb CO}}{1000\ \text{Kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 6.5\ \text{lb/day CO}$$

$$\frac{1350\ \text{Kwh}}{\text{hr}} \times \frac{2.65\ \text{lb SO}_2}{1000\ \text{Kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 85.9\ \text{lb/day SO}_2$$

$$\frac{1350\ \text{Kwh}}{\text{hr}} \times \frac{0.40\ \text{lb PM}}{1000\ \text{Kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 13.0\ \text{lb/day PM}$$

B.1.1.2.2 Platform Gilda

Employee Transportation

Assume 20 workers per shift @ 3 shifts per day.

$$\frac{60\ \text{vehicle-trips}}{\text{day}} \times \frac{60\ \text{miles}}{\text{vehicle-trip}} = 3600\ \text{miles/day}$$

$$\frac{3600\ \text{miles}}{\text{day}} \times \frac{2.44\ \text{g NO}_x}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 19.4\ \text{lb/day NO}_x$$

$$\frac{3600\ \text{miles}}{\text{day}} \times \frac{1.37\ \text{g THC}}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 10.9\ \text{lb/day THC}$$

$$\frac{3600\ \text{miles}}{\text{day}} \times \frac{12.25\ \text{g CO}}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 97.2\ \text{lb/day CO}$$

$$\frac{3600\ \text{miles}}{\text{day}} \times \frac{0.13\ \text{g SO}_2}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 1.0\ \text{lb/day SO}_2$$

$$\frac{3600\ \text{miles}}{\text{day}} \times \frac{0.35\ \text{g PM}}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 2.8\ \text{lb/day PM}$$

Crew Boat Transportation (Cruise Mode)

Assume 2 hours of cruise time per trip.

$$\frac{2\ \text{hr}}{\text{shift}} \times \frac{3\ \text{shifts}}{\text{day}} \times \frac{20\ \text{gal}}{\text{hr}} = 120\ \text{gal/day}$$

$$\frac{120 \text{ gal}}{\text{day}} \times \frac{349.2 \text{ lb NO}_x}{1000 \text{ gal}} = 41.9 \text{ lb/day NO}_x$$

$$\frac{120 \text{ gal}}{\text{day}} \times \frac{24.1 \text{ lb THC}}{1000 \text{ gal}} = 2.9 \text{ lb/day THC}$$

$$\frac{120 \text{ gal}}{\text{day}} \times \frac{77.6 \text{ lb CO}}{1000 \text{ gal}} = 9.3 \text{ lb/day CO}$$

$$\frac{120 \text{ gal}}{\text{day}} \times \frac{29.2 \text{ lb SO}_2}{1000 \text{ gal}} = 3.5 \text{ lb/day SO}_2$$

Crew Boat Transportation (Idle Mode)

Emissions same as Drilling, Platform Gina (on a per day basis).

Supply Boat Transportation (Cruise Mode, 900 hp Boat)

$$\frac{15 \text{ trips}}{30 \text{ days}} \times \frac{2 \text{ hr}}{\text{trip}} \times \frac{25 \text{ gal}}{\text{hr}} = 25 \text{ gal/day}$$

$$\frac{25 \text{ gal}}{\text{day}} \times \frac{360 \text{ lb NO}_x}{1000 \text{ gal}} = 9.0 \text{ lb/day NO}_x$$

$$\frac{25 \text{ gal}}{\text{day}} \times \frac{17.1 \text{ lb THC}}{1000 \text{ gal}} = 0.4 \text{ lb/day THC}$$

$$\frac{25 \text{ gal}}{\text{day}} \times \frac{80.9 \text{ lb CO}}{1000 \text{ gal}} = 2.0 \text{ lb/day CO}$$

$$\frac{25 \text{ gal}}{\text{day}} \times \frac{29.2 \text{ lb SO}_2}{1000 \text{ gal}} = 0.7 \text{ lb/day SO}_2$$

Supply Boat Transportation (Idle Mode, 900 hp Boat)

Emissions same as Drilling, Platform Gina (on a per day basis).

Drilling Equipment

$$\frac{2.0 \text{ bbls}}{\text{day}} \times \frac{42 \text{ gal}}{\text{bbl}} = 84.0 \text{ gal/day}$$

$$\frac{84.0\ \text{gal}}{\text{day}} \times \frac{469\ \text{lb NO}_x}{1000\ \text{gal}} = 39.4\ \text{lb/day NO}_x$$

$$\frac{84.0\ \text{gal}}{\text{day}} \times \frac{37.5\ \text{lb THC}}{1000\ \text{gal}} = 3.2\ \text{lb/day THC}$$

$$\frac{84.0\ \text{gal}}{\text{day}} \times \frac{102\ \text{lb CO}}{1000\ \text{gal}} = 8.6\ \text{lb/day CO}$$

$$\frac{84.0\ \text{gal}}{\text{day}} \times \frac{31.2\ \text{lb SO}_2}{1000\ \text{gal}} = 2.6\ \text{lb/day SO}_2$$

$$\frac{84.0\ \text{gal}}{\text{day}} \times \frac{33.5\ \text{lb PM}}{1000\ \text{gal}} = 2.8\ \text{lb/day PM}$$

Electric Power Generation

3500 KVA x 0.9 = 3150 Kwh/hr

$$\frac{3150\ \text{Kwh}}{\text{hr}} \times \frac{2.3\ \text{lb NO}_x}{1000\ \text{Kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 173.9\ \text{lb/day NO}_x$$

$$\frac{3150\ \text{Kwh}}{\text{hr}} \times \frac{0.18\ \text{lb THC}}{1000\ \text{Kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 13.6\ \text{lb/day THC}$$

$$\frac{3150\ \text{Kwh}}{\text{hr}} \times \frac{0.2\ \text{lb CO}}{1000\ \text{Kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 15.1\ \text{lb/day CO}$$

$$\frac{3150\ \text{Kwh}}{\text{hr}} \times \frac{2.65\ \text{lb SO}_2}{1000\ \text{Kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 200.3\ \text{lb/day SO}_2$$

$$\frac{3150\ \text{Kwh}}{\text{hr}} \times \frac{0.40\ \text{lb PM}}{1000\ \text{Kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 30.2\ \text{lb/day PM}$$

B.1.1.3 PRODUCTION EMISSIONS

B.1.1.3.1 Platform Gina

Employee Transportation

$$\frac{2\ \text{vehicle-trips}}{\text{shift}} \times \frac{3\ \text{shifts}}{\text{day}} \times \frac{60\ \text{miles}}{\text{vehicle-trip}} = 360\ \text{miles/day}$$

$$\frac{360\ \text{miles}}{\text{day}} \times \frac{2.44\ \text{g NO}_x}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 1.9\ \text{lb/day NO}_x$$

$$\frac{360\ \text{miles}}{\text{day}} \times \frac{1.37\ \text{g THC}}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 1.1\ \text{lb/day THC}$$

$$\frac{360\ \text{miles}}{\text{day}} \times \frac{12.25\ \text{g CO}}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 9.7\ \text{lb/day CO}$$

$$\frac{360\ \text{miles}}{\text{day}} \times \frac{0.13\ \text{g SO}_2}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 0.1\ \text{lb/day SO}_2$$

$$\frac{360\ \text{miles}}{\text{day}} \times \frac{0.35\ \text{g PM}}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 0.3\ \text{lb/day PM}$$

<u>Crew Boat Transportation</u> (Cruise Mode)

Emissions same as Drilling, Platform Gina (on a per day basis).

<u>Crew Boat Transportation</u> (Idle Mode)

Emissions same as Drilling, Platform Gina (on a per day basis).

<u>Supply Boat Transportation</u> (Cruise Mode, 900 hp Boat)

$$\frac{1\ \text{trip}}{7\ \text{days}} \times \frac{1\ \text{hr}}{\text{trip}} \times \frac{25\ \text{gal}}{\text{hr}} = 3.6\ \text{gal/day}$$

$$\frac{3.6\ \text{gal}}{\text{day}} \times \frac{360\ \text{lb NO}_x}{1000\ \text{gal}} = 1.3\ \text{lb/day NO}_x$$

$$\frac{3.6\ \text{gal}}{\text{day}} \times \frac{17.1\ \text{lb THC}}{1000\ \text{gal}} = 0.1\ \text{lb/day THC}$$

$$\frac{3.6\ \text{gal}}{\text{day}} \times \frac{80.9\ \text{lb CO}}{1000\ \text{gal}} = 0.3\ \text{lb/day CO}$$

$$\frac{3.6\ \text{gal}}{\text{day}} \times \frac{29.2\ \text{lb SO}_2}{1000\ \text{gal}} = 0.1\ \text{lb/day SO}_2$$

Supply Boat Transportation (Idle Mode, 900 hp Boat)

$$\frac{1 \text{ trip}}{7 \text{ days}} \times \frac{1 \text{ hr}}{\text{trip}} \times \frac{5 \text{ gal}}{\text{hr}} = 0.7 \text{ gal/day}$$

$$\frac{0.7 \text{ gal}}{\text{day}} \times \frac{107.5 \text{ lb } NO_x}{1000 \text{ gal}} = 0.1 \text{ lb/day } NO_x$$

$$\frac{0.7 \text{ gal}}{\text{day}} \times \frac{249.1 \text{ lb THC}}{1000 \text{ gal}} = 0.2 \text{ lb/day THC}$$

$$\frac{0.7 \text{ gal}}{\text{day}} \times \frac{223.7 \text{ lb CO}}{1000 \text{ gal}} = 0.2 \text{ lb/day CO}$$

$$\frac{0.7 \text{ gal}}{\text{day}} \times \frac{29.2 \text{ lb } SO_2}{1000 \text{ gal}} < 0.1 \text{ lb/day } SO_2$$

Production Equipment — diesel fuel usage

$$\frac{10{,}000 \text{ gal}}{\text{yr}} \times \frac{1 \text{ yr}}{365 \text{ days}} = 27.4 \text{ gal/day}$$

$$\frac{27.4 \text{ gal}}{\text{day}} \times \frac{469 \text{ lb } NO_x}{1000 \text{ gal}} = 12.9 \text{ lb/day } NO_x$$

$$\frac{27.4 \text{ gal}}{\text{day}} \times \frac{37.5 \text{ lb THC}}{1000 \text{ gal}} = 1.0 \text{ lb/day THC}$$

$$\frac{27.4 \text{ gal}}{\text{day}} \times \frac{102 \text{ lb CO}}{1000 \text{ gal}} = 2.8 \text{ lb/day CO}$$

$$\frac{27.4 \text{ gal}}{\text{day}} \times \frac{31.2 \text{ lb } SO_2}{1000 \text{ gal}} = 0.9 \text{ lb/day } SO_2$$

$$\frac{27.4 \text{ gal}}{\text{day}} \times \frac{33.5 \text{ lb PM}}{1000 \text{ gal}} = 0.9 \text{ lb/day PM}$$

Electric Power Generation

500 KVA x 0.9 = 450 Kwh/hr

$$\frac{450\ \text{Kwh}}{\text{hr}} \times \frac{2.3\ \text{lb NO}_x}{1000\ \text{Kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 24.8\ \text{lb/day NO}_x$$

$$\frac{450\ \text{Kwh}}{\text{hr}} \times \frac{0.18\ \text{lb THC}}{1000\ \text{Kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 1.9\ \text{lb/day THC}$$

$$\frac{450\ \text{Kwh}}{\text{hr}} \times \frac{0.2\ \text{lb CO}}{1000\ \text{Kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 2.2\ \text{lb/day CO}$$

$$\frac{450\ \text{Kwh}}{\text{hr}} \times \frac{2.65\ \text{lb SO}_2}{1000\ \text{Kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 28.6\ \text{lb/day SO}_2$$

$$\frac{450\ \text{Kwh}}{\text{hr}} \times \frac{0.40\ \text{lb PM}}{1000\ \text{Kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 4.3\ \text{lb/day PM}$$

Equipment Seal Leakage

$$62\ \text{valves (liquid)} \times \frac{0.03\ \text{lb THC}}{\text{valve-day}} = 1.9\ \text{lb/day THC}$$

B.1.1.3.2 Platform Gilda

Employee Transportation

$$\frac{3\ \text{vehicle-trips}}{\text{shift}} \times \frac{3\ \text{shifts}}{\text{day}} \times \frac{60\ \text{miles}}{\text{vehicle-trip}} = 540\ \text{miles/day}$$

$$\frac{540\ \text{miles}}{\text{day}} \times \frac{2.44\ \text{g NO}_x}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 2.9\ \text{lb/day NO}_x$$

$$\frac{540\ \text{miles}}{\text{day}} \times \frac{1.37\ \text{g THC}}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 1.6\ \text{lb/day THC}$$

$$\frac{540\ \text{miles}}{\text{day}} \times \frac{12.25\ \text{g CO}}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 14.6\ \text{lb/day CO}$$

$$\frac{540\ \text{miles}}{\text{day}} \times \frac{0.13\ \text{g SO}_2}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 0.2\ \text{lb/day SO}_2$$

$$\frac{540\ \text{miles}}{\text{day}} \times \frac{0.35\ \text{g PM}}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 0.4\ \text{lb/day PM}$$

Crew Boat Transportation (Cruise Mode)

Emissions same as Drilling, Platform Gilda (on a per day basis).

Crew Boat Transportation (Idle Mode)

Emissions same as Drilling, Platform Gina (on a per day basis).

Supply Boat Transportation (Cruise Mode, 900 hp Boat)

$$\frac{1\text{ trip}}{7\text{ days}} \times \frac{2\text{ hr}}{\text{trip}} \times \frac{25\text{ gal}}{\text{hr}} = 7.1\text{ gal/day}$$

$$\frac{7.1\text{ gal}}{\text{day}} \times \frac{360\text{ lb NO}_x}{1000\text{ gal}} = 2.6\text{ lb/day NO}_x$$

$$\frac{7.1\text{ gal}}{\text{day}} \times \frac{17.1\text{ lb THC}}{1000\text{ gal}} = 0.1\text{ lb/day THC}$$

$$\frac{7.1\text{ gal}}{\text{day}} \times \frac{80.9\text{ lb CO}}{1000\text{ gal}} = 0.6\text{ lb/day CO}$$

$$\frac{7.1\text{ gal}}{\text{day}} \times \frac{29.2\text{ lb SO}_2}{1000\text{ gal}} = 0.2\text{ lb/day SO}_2$$

Supply Boat Transportation (Idle Mode, 900 hp Boat)

Emissions same as Production, Platform Gina (on a per day basis).

Production Equipment — diesel fuel usage

$$\frac{20{,}000\text{ gal}}{\text{yr}} \times \frac{1\text{ yr}}{365\text{ days}} = 54.8\text{ gal/day}$$

$$\frac{54.8\text{ gal}}{\text{day}} \times \frac{469\text{ lb NO}_x}{1000\text{ gal}} = 25.7\text{ lb/day NO}_x$$

$$\frac{54.8\text{ gal}}{\text{day}} \times \frac{37.5\text{ lb THC}}{1000\text{ gal}} = 2.1\text{ lb/day THC}$$

$$\frac{54.8 \text{ gal}}{\text{day}} \times \frac{102 \text{ lb CO}}{1000 \text{ gal}} = 5.6 \text{ lb/day CO}$$

$$\frac{54.8 \text{ gal}}{\text{day}} \times \frac{31.2 \text{ lb } SO_2}{1000 \text{ gal}} = 1.7 \text{ lb/day } SO_2$$

$$\frac{54.8 \text{ gal}}{\text{day}} \times \frac{33.5 \text{ lb PM}}{1000 \text{ gal}} = 1.8 \text{ lb/day PM}$$

Electric Power Generation

2000 KVA x 0.9 = 1800 Kwh/hr

$$\frac{1800 \text{ Kwh}}{\text{hr}} \times \frac{2.3 \text{ lb } NO_x}{1000 \text{ Kwh}} \times \frac{24 \text{ hr}}{\text{day}} = 99.4 \text{ lb/day } NO_x$$

$$\frac{1800 \text{ Kwh}}{\text{hr}} \times \frac{0.18 \text{ lb THC}}{1000 \text{ Kwh}} \times \frac{24 \text{ hr}}{\text{day}} = 7.8 \text{ lb/day THC}$$

$$\frac{1800 \text{ Kwh}}{\text{hr}} \times \frac{0.2 \text{ lb CO}}{1000 \text{ Kwh}} \times \frac{24 \text{ hr}}{\text{day}} = 8.6 \text{ lb/day CO}$$

$$\frac{1800 \text{ Kwh}}{\text{hr}} \times \frac{2.65 \text{ lb } SO_2}{1000 \text{ Kwh}} \times \frac{24 \text{ hr}}{\text{day}} = 114.5 \text{ lb/day } SO_2$$

$$\frac{1800 \text{ Kwh}}{\text{hr}} \times \frac{0.40 \text{ lb PM}}{1000 \text{ Kwh}} \times \frac{24 \text{ hr}}{\text{day}} = 17.3 \text{ lb/day PM}$$

Equipment Seal Leakage

$$3 \text{ compressors} \times \frac{28 \text{ lb THC}}{\text{compressor-day}} = 84 \text{ lb/day THC}$$

$$541 \text{ valves (liquid)} \times \frac{0.03 \text{ lb THC}}{\text{valve-day}} = 16.2 \text{ lb/day THC}$$

$$626 \text{ valves (gas)} \times \frac{0.08 \text{ lb THC}}{\text{valve-day}} = 50.1 \text{ lb/day THC}$$

<u>Gas Turbine Compressors</u> (Monterey Formation Development)

Assume Repetto natural gas would be used in turbines at 10 ppmv H_2S content and 1000 Btu per scf.

$$\frac{200{,}000 \text{ SCF}}{\text{day-compressor}} \times 2 \text{ compressors} \times \frac{0.542 \text{ lb } NO_x}{10^6 \text{ Btu}} \times \frac{1000 \text{ Btu}}{\text{SCF}} = 216.8 \text{ lb/day } NO_x$$

$$\frac{200{,}000 \text{ SCF}}{\text{day-compressor}} \times 2 \text{ compressors} \times \frac{42 \text{ lb THC}}{10^6 \text{ SCF}} = 16.8 \text{ lb/day THC}$$

$$\frac{200{,}000 \text{ SCF}}{\text{day-compressor}} \times 2 \text{ compressors} \times \frac{115 \text{ lb CO}}{10^6 \text{ SCF}} = 46.0 \text{ lb/day CO}$$

$$\frac{200{,}000 \text{ SCF}}{\text{day-compressor}} \times 2 \text{ compressors} \times \frac{0.88 \text{ lb } SO_2}{10^6 \text{ SCF}} = 0.4 \text{ lb/day } SO_2$$

$$\frac{200{,}000 \text{ SCF}}{\text{day-compressor}} \times 2 \text{ compressors} \times \frac{14 \text{ lb PM}}{10^6 \text{ SCF}} = 5.6 \text{ lb/day PM}$$

B.1.1.3.3 Onshore Treating Facility

Heater Treater:

Assume 1000 Btu/scf as average heating value for Repetto and Hueneme natural gas.

$$\frac{12 \times 10^6 \text{ Btu}}{\text{hr}} \times \frac{\text{SCF}}{1000 \text{ Btu}} \times \frac{24 \text{ hr}}{\text{day}} = 2.88\text{x}10^5 \text{ SCF/day}$$

Per heater treater: 25.6 lb/day NO_x (from vendor data)

$$\frac{2.88\text{x}10^5 \text{ SCF}}{\text{day}} \times \frac{3.0 \text{ lb THC}}{10^6 \text{ SCF}} = 0.9 \text{ lb/day THC}$$

$$\frac{2.88\text{x}10^5 \text{ SCF}}{\text{day}} \times \frac{17.0 \text{ lb CO}}{10^6 \text{ SCF}} = 4.9 \text{ lb/day CO}$$

$$\frac{2.88\text{x}10^5 \text{ SCF}}{\text{day}} \times \frac{0.6 \text{ lb } SO_2}{10^6 \text{ SCF}} = 0.2 \text{ lb/day } SO_2$$

$$\frac{2.88\text{x}10^5 \text{ SCF}}{\text{day}} \times \frac{10 \text{ lb PM}}{10^6 \text{ SCF}} = 2.9 \text{ lb/day PM}$$

Electric Power Generation

500 KVA x 0.9 = 450 Kwh/hr

$$\frac{450 \text{ Kwh}}{\text{hr}} \times \frac{2.3 \text{ lb } NO_x}{1000 \text{ Kwh}} \times \frac{24 \text{ hr}}{\text{day}} = 24.8 \text{ lb/day } NO_x$$

$$\frac{450 \text{ Kwh}}{\text{hr}} \times \frac{0.18 \text{ lb THC}}{1000 \text{ Kwh}} \times \frac{24 \text{ hr}}{\text{day}} = 1.9 \text{ lb/day THC}$$

$$\frac{450 \text{ Kwh}}{\text{hr}} \times \frac{0.2 \text{ lb CO}}{1000 \text{ Kwh}} \times \frac{24 \text{ hr}}{\text{day}} = 2.2 \text{ lb/day CO}$$

$$\frac{450\ \text{Kwh}}{\text{hr}} \times \frac{2.65\ \text{lb}\ SO_2}{1000\ \text{Kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 28.6\ \text{lb/day}\ SO_2$$

$$\frac{450\ \text{Kwh}}{\text{hr}} \times \frac{0.40\ \text{lb PM}}{1000\ \text{Kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 4.3\ \text{lb/day PM}$$

Equipment Seal Leakage

$$304\ \text{valves} \times \frac{0.03\ \text{lb THC}}{\text{day-value}} = 9.1\ \text{lb/day THC (liquid service)}$$

$$268\ \text{valves} \times \frac{0.08\ \text{lb THC}}{\text{day-valve}} = 21.4\ \text{lb/day THC (gaseous service)}$$

$$9\ \text{pump seals} \times \frac{0.2\ \text{lb THC}}{\text{day-seal}} = 1.8\ \text{lb/day THC (single mechanical seal centrifugal pump)}$$

$$4\ \text{compressors} \times \frac{28\ \text{lb THC}}{\text{day-compressor}} = 112\ \text{lb/day THC}$$

B.1.2 EAST MANDALAY ALTERNATIVE

B.1.2.1 Construction Emissions — Onshore Pipelines

Fugitive Dust

Using Table 3.3.-4, there are 411,840 ft^2 of disturbed area

$$\frac{411{,}840\ \text{ft}^2}{20\ \text{days}} = 20{,}592\ \text{ft}^2 \text{ average disturbed area per day}$$

$$\frac{20{,}592\ \text{ft}^2 \times 0.00092\ \text{lb PM}}{\text{ft}^2\text{-day}} = 18.9\ \text{lb/day PM}$$

B.1.2.2 Total Construction Emissions

All construction emissions the same as proposed Mandalay project, except for PM.

PM:

Week After Project Approval	Emissions for each Period	Avg. Emission Rate
4-8	30.5	30.5 x 4/18 = 6.8
8-10	72.0 + 30.5	102.5 x 2/18 = 11.4
10-12	72.0 + 30.5	102.5 x 2/18 = 11.4
12-14	72.2 + 34.5 + 30.5	137.2 x 2/18 = 15.2
14-15	72.2 + 34.5 + 30.5 + 15.2	152.4 x 1/18 = 8.5
15-18	34.5 + 30.5 + 15.2	80.2 x 3/18 = 13.4
18-20	34.5 + 30.5	65.0 x 2/18 = 7.2
20-22	34.5	34.5 x 2/18 = 3.8
	Total:	77.7

B.1.2.2 Drilling Emissions (Same as Proposed Project)

B.1.2.3 Production Emissions (Same as Proposed Project)

B.1.3 UNION OIL MARINE TERMINAL ALTERNATIVE

B.1.3.1 Construction Emissions

B.1.3.1.1 Onshore Pipelines

Employee Transportation (Onshore Pipelines)

$$\frac{85 \text{ vehicle-trips}}{\text{day}} \times \frac{60 \text{ miles}}{\text{vehicle trip}} = 5100 \text{ miles/day}$$

$$\frac{5100 \text{ miles}}{\text{day}} \times \frac{2.44 \text{ g } NO_x}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 27.4 \text{ lb/day } NO_x$$

$$\frac{5100 \text{ miles}}{\text{day}} \times \frac{1.37 \text{ g THC}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 15.4 \text{ lb/day THC}$$

$$\frac{5100 \text{ miles}}{\text{day}} \times \frac{12.25 \text{ g CO}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 137.7 \text{ lb/day CO}$$

$$\frac{5100 \text{ miles}}{\text{day}} \times \frac{0.13 \text{ g } SO_2}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 1.5 \text{ lb/day } SO_2$$

$$\frac{5100 \text{ miles}}{\text{day}} \times \frac{0.35 \text{ g PM}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 3.9 \text{ lb/day PM}$$

Employee Transportation (Booster Station)

Emissions same as Construction, Platform Gina — Proposed Mandalay Project.

Supply Truck Transportation (Pipelines and Booster Stations)

Assume the number of supply truck trips is proportional to the miles of pipeline in the system. (Ratio the alternative to the proposed project).

$$\frac{15.0 \text{ miles}}{3.7 \text{ miles}} \times 50 \text{ truck trips} = 203 \text{ truck trips}$$

$$\frac{203 \text{ truck trips}}{80 \text{ days}} = 2.5 \text{ truck trips per day}$$

$$\frac{2.5\ \text{vehicle-trips}}{\text{day}} \times \frac{44\ \text{miles}}{\text{vehicle-trip}} = 110.0\ \text{miles/day}$$

$$\frac{110.0\ \text{miles}}{\text{day}} \times \frac{20.49\ \text{g}\ NO_x}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 5.0\ \text{lb/day}\ NO_x$$

$$\frac{110.0\ \text{miles}}{\text{day}} \times \frac{2.11\ \text{g THC}}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 0.5\ \text{lb/day THC}$$

$$\frac{110.0\ \text{miles}}{\text{day}} \times \frac{13.14\ \text{g CO}}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 3.2\ \text{lb/day CO}$$

$$\frac{110.0\ \text{miles}}{\text{day}} \times \frac{2.73\ \text{g}\ SO_2}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 0.7\ \text{lb/day}\ SO_2$$

$$\frac{110.0\ \text{miles}}{\text{day}} \times \frac{1.96\ \text{g PM}}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 0.5\ \text{lb/day PM}$$

Construction Equipment

Emissions same as Construction, Onshore Pipeline — Proposed Mandalay Project (on a per day basis).

Fugitive Dust (Onshore Pipeline)

Using Table 3.3.-4, there are 3,960,000 ft^2 of disturbed area.

$$\frac{3{,}960{,}000\ ft^2}{80\ \text{days}} = 49{,}500\ ft^2\ \text{per day}$$

$$49{,}500\ ft^2 \times \frac{0.00092\ \text{lb-PM}}{ft^2\text{-day}} = 45.5\ \text{lb/day PM}$$

Fugitive Dust (Booster Station)

$$\frac{0.00092\ \text{lb PM}}{ft^2 - \text{day}} \times 0.7\ \text{acres} \times \frac{43{,}560\ ft^2}{\text{acre}} = 28.0\ \text{lb/day PM}$$

B.1.3.1.2 Total Construction Emissions

Table B.1-3 shows the time periods and construction emission rates for the Union Marine Terminal alternative.

Table B.1-4 shows the average construction emissions for this alternative.

Correction of onshore pipeline construction emissions:

$$\frac{37.3 \text{ lb } NO_x}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 26.6 \text{ lb/day } NO_x$$

$$\frac{16.2 \text{ lb THC}}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 11.6 \text{ lb/day THC}$$

$$\frac{141.8 \text{ lb CO}}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 101.3 \text{ lb/day CO}$$

$$\frac{2.5 \text{ lb } SO_2}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 1.8 \text{ lb/day } SO_2$$

$$\frac{50.1 \text{ lb PM}}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 35.8 \text{ lb/day PM}$$

Correction of onshore pipeline Booster Station emissions:

$$\frac{6.5 \text{ lb } NO_x}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 4.6 \text{ lb/day } NO_x$$

$$\frac{3.6 \text{ lb THC}}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 2.6 \text{ lb/day THC}$$

$$\frac{32.4 \text{ lb CO}}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 23.1 \text{ lb/day CO}$$

$$\frac{0.3 \text{ lb } SO_2}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 0.2 \text{ lb/day } SO_2$$

$$\frac{0.9 \text{ lb PM}}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 0.6 \text{ lb/day PM}$$

TABLE B.1-3

TIME PERIODS AND CONSTRUCTION EMISSION RATES FOR UNION OIL MARINE TERMINAL SITE

Source	Weeks Involved	(Lbs/Day)				
		NO_2	THC	CO	SO_2	PM
Platform Gina Erection	8.0-10.0	1054.0	88.9	270.5	69.6	72.0
Platform Gilda Erection	10.0-15.0	1055.7	88.7	268.3	69.8	72.2
Platform Gina Offshore Pipeline	12.0-15.0	594.8	51.0	222.5	43.7	34.5
Platform Gilda Offshore Pipeline	15.0-22.0	589.9	50.4	220.2	42.8	34.5
Onshore Treating Facility	4.0-20.0	20.2	7.9	66.8	4.8	30.5
Onshore Pipelines	4.0-20.0	26.6	11.6	101.3	1.8	35.8
Onshore Booster Stations	8.0-20.0	4.6	2.6	23.1	0.2	8.1

TABLE B.1-4

CALCULATION OF AVERAGE CONSTRUCTION EMISSION RATES FOR UNION OIL MARINE TERMINAL SITE

NO_x	THC	CO	SO_2	PM
$46.8 \times \frac{4}{18} = 10.4$	$19.5 \times \frac{4}{18} = 4.3$	$168.0 \times \frac{4}{18} = 37.3$	$6.6 \times \frac{4}{18} = 1.5$	$66.3 \times \frac{4}{18} = 14.7$
$1105.4 \times \frac{2}{18} = 122.8$	$111.0 \times \frac{2}{18} = 12.3$	$461.7 \times \frac{2}{18} = 51.3$	$76.4 \times \frac{2}{18} = 8.5$	$146.4 \times \frac{2}{18} = 16.3$
$1107.1 \times \frac{2}{18} = 123.0$	$110.8 \times \frac{2}{18} = 12.3$	$459.5 \times \frac{2}{18} = 51.1$	$76.6 \times \frac{2}{18} = 8.5$	$146.6 \times \frac{2}{18} = 16.3$
$1701.9 \times \frac{3}{18} = 283.7$	$161.8 \times \frac{3}{18} = 27.0$	$682.0 \times \frac{3}{18} = 113.7$	$120.3 \times \frac{3}{18} = 20.1$	$181.1 \times \frac{3}{18} = 30.2$
$641.3 \times \frac{5}{18} = 178.1$	$72.5 \times \frac{5}{18} = 20.1$	$411.4 \times \frac{5}{18} = 114.3$	$49.6 \times \frac{5}{18} = 13.8$	$108.9 \times \frac{5}{18} = 30.3$
$589.9 \times \frac{2}{18} = 65.5$	$50.4 \times \frac{2}{18} = 5.6$	$220.2 \times \frac{2}{18} = 24.5$	$42.8 \times \frac{2}{18} = 4.8$	$34.5 \times \frac{2}{18} = 3.8$
Total 783.5	81.6	392.2	59.6	111.6

Booster Station Fugitive Dust

Assume the grading activities last 22.5 days.

$$\frac{22.5 \text{ days}}{60 \text{ days}} \times \frac{28.0 \text{ lb PM}}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 7.5 \text{ lb/day PM}$$

B.1.3.3 Production Emissions

B.1.3.3.1 Onshore Pipelines

Booster Station Heaters

Assume 60% NO_x emission control.

$$\frac{18\text{x}10^6 \text{ Btu}}{\text{hr}} \times \frac{\text{SCF}}{1000 \text{ Btu}} \times \frac{24 \text{ hr}}{\text{day}} = 4.32\text{x}10^5 \text{ SCF/day}$$

$$\frac{4.32\text{x}10^5 \text{ SCF}}{\text{day}} \times \frac{230 \text{ lb } NO_x}{10^6 \text{ SCF}} = \frac{99.4 \text{ lb } NO_x}{\text{day}} \times 0.4 = 39.8 \text{ lb/day } NO_x$$

$$\frac{4.32\text{x}10^5 \text{ SCF}}{\text{day}} \times \frac{3.0 \text{ lb THC}}{10^6 \text{ SCF}} = 1.3 \text{ lb/day THC}$$

$$\frac{4.32\text{x}10^5 \text{ SCF}}{\text{day}} \times \frac{17.0 \text{ lb CO}}{10^6 \text{ SCF}} = 7.3 \text{ lb/day CO}$$

$$\frac{4.32\text{x}10^5 \text{ SCF}}{\text{day}} \times \frac{0.6 \text{ lb } SO_2}{10^6 \text{ SCF}} = 0.3 \text{ lb/day } SO_2$$

$$\frac{4.32\text{x}10^5 \text{ SCF}}{\text{day}} \times \frac{10 \text{ lb PM}}{10^6 \text{ SCF}} = 4.3 \text{ lb/day PM}$$

Electric Power Generation

The net power requirements in addition to the proposed project are:

320 KVA x 0.9 = 288 Kwh/hr

$$\frac{288\ \text{Kwh}}{\text{hr}} \times \frac{2.3\ \text{lb NO}_x}{1000\ \text{Kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 15.9\ \text{lb/day NO}_x$$

$$\frac{288\ \text{Kwh}}{\text{hr}} \times \frac{0.18\ \text{lb THC}}{1000\ \text{Kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 1.2\ \text{lb/day THC}$$

$$\frac{288\ \text{Kwh}}{\text{hr}} \times \frac{0.2\ \text{lb CO}}{1000\ \text{Kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 1.4\ \text{lb/day CO}$$

$$\frac{288\ \text{Kwh}}{\text{hr}} \times \frac{2.65\ \text{lb SO}_2}{1000\ \text{Kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 18.3\ \text{lb/day SO}_2$$

$$\frac{288\ \text{Kwh}}{\text{hr}} \times \frac{0.4\ \text{lb PM}}{1000\ \text{Kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 2.8\ \text{lb/day PM}$$

Equipment Seal Leakage (Booster Station)

$$1\ \text{compressor} \times \frac{28\ \text{lb THC}}{\text{compressor-day}} = 28\ \text{lb/day THC}$$

$$2\ \text{pump seals} \times \frac{0.2\ \text{lb THC}}{\text{seal-day}} = 0.4\ \text{lb/day THC}$$

$$60\ \text{valves (liquid)} \times \frac{0.03\ \text{lb THC}}{\text{valve-day}} = 1.8\ \text{lb/day THC}$$

$$60\ \text{valves (gas)} \times \frac{0.08\ \text{lb THC}}{\text{valve-day}} = 4.8\ \text{lb/day THC}$$

B.1.4 ORMOND BEACH ALTERNATIVE

B.1.4.1 Construction Emissions

B.1.4.1.1 Offshore Pipelines - Option A and B

Supply Truck Transportation

Use 145 truck trips for duration of construction period.

$$\frac{145 \text{ vehicle-trips}}{63 \text{ days}} = \frac{2.3 \text{ vehicle-trips}}{\text{day}}$$

$$\frac{2.3 \text{ vehicle-trips}}{\text{day}} = \frac{44 \text{ miles}}{\text{vehicle-trip}} = 101.2 \text{ miles/day}$$

$$\frac{101.2 \text{ miles}}{\text{day}} = \frac{20.49 \text{ g } NO_x}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 4.6 \text{ lb/day } NO_x$$

$$\frac{101.2 \text{ miles}}{\text{day}} \times \frac{2.11 \text{ g THC}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 0.5 \text{ lb/day THC}$$

$$\frac{101.2 \text{ miles}}{\text{day}} \times \frac{13.14 \text{ g CO}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 2.9 \text{ lb/day CO}$$

$$\frac{101.2 \text{ miles}}{\text{day}} \times \frac{2.73 \text{ g } SO_2}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 0.6 \text{ lb/day } SO_2$$

$$\frac{101.2 \text{ miles}}{\text{day}} \times \frac{1.96 \text{ g PM}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 0.4 \text{ lb/day PM}$$

B.1.4.1.2 Onshore Pipelines (and Booster Stations) - Option A

Employee Transportation (Onshore Pipeline)

$$\frac{95 \text{ vehicle-trips}}{\text{day}} \times \frac{60 \text{ miles}}{\text{vehicle-trip}} = 5700 \text{ miles/day}$$

$$\frac{5700 \text{ miles}}{\text{day}} \times \frac{2.44 \text{ g } NO_x}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 30.7 \text{ lb/day } NO_x$$

$$\frac{5700\text{ miles}}{\text{day}} \times \frac{1.37\text{ g THC}}{\text{mile}} \times \frac{1\text{ lb}}{453.6\text{ g}} = 17.2\text{ lb/day THC}$$

$$\frac{5700\text{ miles}}{\text{day}} \times \frac{12.25\text{ g CO}}{\text{mile}} \times \frac{1\text{ lb}}{453.6\text{ g}} = 153.9\text{ lb/day CO}$$

$$\frac{5700\text{ miles}}{\text{day}} \times \frac{0.13\text{ g SO}_2}{\text{mile}} \times \frac{1\text{ lb}}{453.6\text{ g}} = 1.6\text{ lb/day SO}_2$$

$$\frac{5700\text{ miles}}{\text{day}} \times \frac{0.35\text{ g PM}}{\text{mile}} \times \frac{1\text{ lb}}{453.6\text{ g}} = 4.4\text{ lb/day PM}$$

Employee Transportation (Booster Station)

$$\frac{80\text{ vehicle-trips}}{\text{day}} \times \frac{60\text{ miles}}{\text{vehicle-trip}} = 4800\text{ miles/day}$$

$$\frac{4800\text{ miles}}{\text{day}} \times \frac{2.44\text{ g NO}_x}{\text{mile}} \times \frac{1\text{ lb}}{453.6\text{ g}} = 25.8\text{ lb/day NO}_x$$

$$\frac{4800\text{ miles}}{\text{day}} \times \frac{1.37\text{ g THC}}{\text{mile}} \times \frac{1\text{ lb}}{453.6\text{ g}} = 14.5\text{ lb/day THC}$$

$$\frac{4800\text{ miles}}{\text{day}} \quad \frac{12.25\text{ g CO}}{\text{mile}} \quad \frac{1\text{ lb}}{453.6\text{ g}} = 129.6\text{ lb/day CO}$$

$$\frac{4800\text{ miles}}{\text{day}} \times \frac{0.13\text{ g SO}_2}{\text{mile}} \times \frac{1\text{ lb}}{453.6\text{ g}} = 1.4\text{ lb/day SO}_2$$

$$\frac{4800\text{ miles}}{\text{day}} \times \frac{0.35\text{ g PM}}{\text{mile}} \times \frac{1\text{ lb}}{453.6\text{ g}} = 3.7\text{ lb/day PM}$$

Supply Truck Transportation (Booster Stations and Pipelines)

Assume the number of supply truck trips is proportional to the miles of pipeline in the system (ratio the alternative to the proposed project).

$$\frac{44.7 \text{ miles}}{3.7 \text{ miles}} \times 50 \text{ truck trips} = 604 \text{ truck trips}$$

$$\frac{604 \text{ truck trips}}{120 \text{ days}} = 5.0 \text{ truck trips per day}$$

$$\frac{5.0 \text{ vehicle-trips}}{\text{day}} \times \frac{44 \text{ miles}}{\text{vehicle-trip}} = \frac{220.0 \text{ miles}}{\text{day}}$$

$$\frac{220.0 \text{ miles}}{\text{day}} \times \frac{20.49 \text{ g } NO_x}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 9.9 \text{ lb/day } NO_x$$

$$\frac{220.0 \text{ miles}}{\text{day}} \times \frac{2.11 \text{ g THC}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 1.0 \text{ lb/day THC}$$

$$\frac{220.0 \text{ miles}}{\text{day}} \times \frac{13.14 \text{ g CO}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 6.4 \text{ lb/day CO}$$

$$\frac{220.0 \text{ miles}}{\text{day}} \times \frac{2.73 \text{ g } SO_2}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 1.3 \text{ lb/day } SO_2$$

$$\frac{220.0 \text{ miles}}{\text{day}} \times \frac{1.96 \text{ g PM}}{\text{mile}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = 1.0 \text{ lb/day PM}$$

Construction Equipment (Emissions same as Construction, Onshore Pipelines — Mandalay Proposed Project on a per day basis.)

Fugitive Dust (Onshore Pipelines)

Using Table 3.3-4, there are 2,634,720 ft^2 of disturbed area.

$$\frac{2{,}634{,}720 \text{ ft}^2}{120 \text{ days}} = 21{,}956 \text{ ft}^2 \text{ per day}$$

$$21{,}956 \text{ ft}^2 \times 0.00092 \frac{\text{lb-PM}}{\text{ft}^2 \text{ day}} = 20.2 \text{ lb/day PM}$$

Fugitive Dust (Booster Station)

$$\frac{0.00092\ \text{lb PM}}{\text{ft}^2\text{-day}} \times 0.7\ \text{acres} \times \frac{43{,}560\ \text{ft}^2}{\text{acre}} = 28.1\ \text{lb/day PM}$$

2 Booster Stations = 56.2 lb/day PM

B.1.4.1.3 Onshore Pipelines (and Booster Stations) — Option B

Employee Transportation (Onshore Pipeline)

$$\frac{115\ \text{vehicle-trips}}{\text{day}} \times \frac{60\ \text{miles}}{\text{vehicle-trip}} = 6900\ \text{miles/day}$$

$$\frac{6900\ \text{miles}}{\text{day}} \times \frac{2.44\text{g NO}_x}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 37.1\ \text{lb/day NO}_x$$

$$\frac{6900\ \text{miles}}{\text{day}} \times \frac{1.37\ \text{g THC}}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 20.8\ \text{lb/day THC}$$

$$\frac{6900\ \text{miles}}{\text{day}} \times \frac{12.25\ \text{g CO}}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 186.3\ \text{lb/day CO}$$

$$\frac{6900\ \text{miles}}{\text{day}} \times \frac{0.13\ \text{g SO}_2}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 2.0\ \text{lb/day SO}_2$$

$$\frac{6900\ \text{miles}}{\text{day}} \times \frac{0.35\ \text{g PM}}{\text{mile}} \times \frac{1\ \text{lb}}{453.6\ \text{g}} = 5.3\ \text{lb/day PM}$$

Employee Transportation (Booster Stations)

Emissions same as Construction, Ormond Beach-Option A on a per day basis.

Supply Truck Transportation (Onshore Pipelines and Booster Stations)

Assume the number of supply truck trips is proportional to the miles of pipeline in the system (ratio the alternative to the proposed project).

$$\frac{78.2\text{ miles}}{3.7\text{ miles}} \times 50\text{ truck trips} = 1057\text{ truck trips}$$

$$\frac{1057\text{ truck trips}}{140\text{ days}} = 7.5\text{ truck trips per day}$$

$$\frac{7.5\text{ vehicle-trips}}{\text{day}} \times \frac{44\text{ miles}}{\text{vehicle-trip}} = 330\text{ miles/day}$$

$$\frac{330\text{ miles}}{\text{day}} \times \frac{20.49\text{ g }NO_x}{\text{mile}} \times \frac{1\text{ lb}}{453.6\text{ g}} = 14.9\text{ lb/day }NO_x$$

$$\frac{330\text{ miles}}{\text{day}} \times \frac{2.11\text{ g THC}}{\text{mile}} \times \frac{1\text{ lb}}{453.6\text{ g}} = 1.5\text{ lb/day THC}$$

$$\frac{330\text{ miles}}{\text{day}} \times \frac{13.14\text{ g CO}}{\text{mile}} \times \frac{1\text{ lb}}{453.6\text{ g}} = 9.6\text{ lb/day CO}$$

$$\frac{330\text{ miles}}{\text{day}} \times \frac{2.73\text{ g }SO_2}{\text{mile}} \times \frac{1\text{ lb}}{453.6\text{ g}} = 2.0\text{ lb/day }SO_2$$

$$\frac{330\text{ miles}}{\text{day}} \times \frac{1.96\text{ g PM}}{\text{mile}} \times \frac{1\text{ lb}}{453.6\text{ g}} = 1.4\text{ lb/day PM}$$

Construction Equipment

Emissions same as Construction, Onshore Pipelines - Proposed Mandalay Project on a per day basis.

Fugitive Dust (Onshore Pipelines)

Using Table 3.3-4, there are 4,356,000 ft^2 of disturbed area.

$$\frac{4{,}356{,}000\text{ ft}^2}{140\text{ days}} = 31{,}114\text{ ft}^2\text{ per day}$$

$$31{,}114\text{ ft}^2 \times 0.00092\ \frac{\text{lb-PM}}{\text{ft}^2\text{ day}} = 28.6\text{ lb/day PM}$$

Fugitive Dust (Booster Stations)

$$\frac{0.00092 \text{ lb-PM}}{\text{ft}^2 - \text{day}} \times 0.7 \text{ acres} \times \frac{43{,}560 \text{ ft}^2}{\text{acre}} = 28.1 \text{ lb/day PM}$$

3 Booster Stations = 84.3 lb/day PM

B.1.4.1.4 Total Construction Emissions

Corrections associated with construction time periods for the Ormond Beach Alternative.

Offshore Pipelines (Options A and B)

Employee Transport (Power Cable)

$$\frac{3.9 \text{ lb } NO_x}{\text{day}} \times \frac{2 \text{ days}}{63 \text{ days}} = 0.1 \text{ lb/day } NO_x$$

$$\frac{2.2 \text{ lb THC}}{\text{day}} \times \frac{2 \text{ days}}{63 \text{ days}} = 0.1 \text{ lb/day THC}$$

$$\frac{19.4 \text{ lb CO}}{\text{day}} \times \frac{2 \text{ days}}{63 \text{ days}} = 0.6 \text{ lb/day CO}$$

$$\frac{0.2 \text{ lb } SO_2}{\text{day}} \times \frac{2 \text{ days}}{63 \text{ days}} < 0.1 \text{ lb/day } SO_2$$

$$\frac{0.6 \text{ lb PM}}{\text{day}} \times \frac{2 \text{ days}}{63 \text{ days}} < 0.1 \text{ lb/day PM}$$

Railroad Transport

$$\frac{16.3 \text{ lb } NO_x}{\text{day}} \times \frac{1 \text{ day}}{63 \text{ days}} = 0.3 \text{ lb/day } NO_x$$

$$\frac{4.1 \text{ lb THC}}{\text{day}} \times \frac{1 \text{ day}}{63 \text{ days}} = 0.1 \text{ lb/day THC}$$

$$\frac{5.7 \text{ lb CO}}{\text{day}} \times \frac{1 \text{ day}}{63 \text{ days}} = 0.1 \text{ lb/day CO}$$

$$\frac{2.5 \text{ lb SO}_2}{\text{day}} \times \frac{1 \text{ day}}{63 \text{ days}} < 0.1 \text{ lb/day SO}_2$$

$$\frac{1.1 \text{ lb PM}}{\text{day}} \times \frac{1 \text{ day}}{63 \text{ days}} < 0.1 \text{ lb/day PM}$$

Tugboat (Power Cable)

$$\frac{120.4 \text{ lb NO}_x}{\text{day}} \times \frac{2 \text{ days}}{63 \text{ days}} = 3.8 \text{ lb/day NO}_x$$

$$\frac{12.1 \text{ lb THC}}{\text{day}} \times \frac{2 \text{ days}}{63 \text{ days}} = 0.4 \text{ lb/day THC}$$

$$\frac{44.8 \text{ lb CO}}{\text{day}} \times \frac{2 \text{ days}}{63 \text{ days}} = 1.4 \text{ lb/day CO}$$

$$\frac{21.0 \text{ lb SO}_2}{\text{day}} \times \frac{2 \text{ days}}{63 \text{ days}} = 0.7 \text{ lb/day SO}_2$$

Onshore Pipelines (Option A)

Onshore Pipelines

$$\frac{45.5 \text{ lb NO}_x}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 32.5 \text{ lb/day NO}_x$$

$$\frac{18.5 \text{ lb THC}}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 13.2 \text{ lb/day THC}$$

$$\frac{161.2 \text{ lb CO}}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 115.1 \text{ lb/day CO}$$

$$\frac{3.2 \text{ lb SO}_2}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 2.3 \text{ lb/day SO}_2$$

$$\frac{25.9 \text{ lb PM}}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 18.5 \text{ lb/day PM}$$

Onshore Booster Station (Option A)

$$\frac{25.8 \text{ lb } NO_x}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 18.4 \text{ lb/day } NO_x$$

$$\frac{14.5 \text{ lb THC}}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 10.4 \text{ lb/day THC}$$

$$\frac{129.6 \text{ lb CO}}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 92.6 \text{ lb/day CO}$$

$$\frac{1.4 \text{ lb } SO_2}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 1.0 \text{ lb/day } SO_2$$

$$\frac{3.7 \text{ lb PM}}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 2.6 \text{ lb/day PM}$$

$$\frac{56.2 \text{ lb PM}}{\text{day}} \times \frac{22.5 \text{ days}}{60 \text{ days}} \times \frac{5 \text{ days}}{7 \text{ days}} = 15.1 \text{ lb/day PM}$$

Onshore Pipelines (Option B)

Onshore Pipelines

$$\frac{56.9 \text{ lb } NO_x}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 40.6 \text{ lb/day } NO_x$$

$$\frac{22.6 \text{ lb THC}}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 16.1 \text{ lb/day THC}$$

$$\frac{196.8 \text{ lb CO}}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} \times 140.6 \text{ lb/day CO}$$

$$\frac{4.3 \text{ lb } SO_2}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 3.1 \text{ lb/day } SO_2$$

$$\frac{35.6 \text{ lb PM}}{\text{day}} \times \frac{5 \text{ days}}{7 \text{ days}} = 25.4 \text{ lb/day PM}$$

Onshore Booster Station

$$\frac{25.8\ \text{lb NO}_x}{\text{day}} \times \frac{5\ \text{days}}{7\ \text{days}} = 18.4\ \text{lb/day NO}_x$$

$$\frac{14.5\ \text{lb THC}}{\text{day}} \times \frac{5\ \text{days}}{7\ \text{days}} = 10.4\ \text{lb/day THC}$$

$$\frac{129.6\ \text{lb CO}}{\text{day}} \times \frac{5\ \text{days}}{7\ \text{days}} = 92.6\ \text{lb/day CO}$$

$$\frac{1.4\ \text{lb SO}_2}{\text{day}} \times \frac{5\ \text{days}}{7\ \text{days}} = 1.0\ \text{lb/day SO}_2$$

$$\frac{3.7\ \text{lb PM}}{\text{day}} \times \frac{5\ \text{days}}{7\ \text{days}} = 2.6\ \text{lb/day PM}$$

$$\frac{84.3\ \text{lb PM}}{\text{day}} \times \frac{37.5}{100\ \text{days}} \times \frac{5\ \text{days}}{7\ \text{days}} = 22.6\ \text{lb/day PM}$$

Table B.1-5 shows the time periods and construction emissions rates for the Ormond Beach (Option A) alternative.

Table B.1-6 shows the average construction emissions for this alternative (Option A).

Table B.1-7 shows the time periods and construction emissions rates for the Ormond Beach (Option B) alternative.

Table B.1-8 shows the average construction emissions for this alternative (Option B).

B.1.4.2 Drilling Emissions - Same as the Proposed Project

B.1.4.3 Production Emissions

B.1.4.3.1 Onshore Pipelines (and Booster Stations) - Option A

Booster Station Heaters

Emissions for Booster Station Heaters and Equipment Seal Leakage would be twice those of the Union Marine Terminal site, on a per day basis.

79.6 lb/day NO_x
2.6 lb/day THC
14.6 lb/day CO
0.6 lb/day SO_2
8.6 lb/day PM

Equipment Seal Leakage

Compressors	- 56 lb/day THC
Pump Seals	- 0.8 lb/day THC
Valves (Liquid)	- 3.6 lb/day THC
Valves (Gas)	- 9.6 lb/day THC

TABLE B.1-5

TIME PERIODS AND CONSTRUCTION EMISSION RATES FOR ORMOND BEACH SITE, OPTION A

		Lbs/Day				
Source	Weeks Involved	NO_2	THC	CO	SO_2	PM
Platform Gina Erection	14.0-16.0	1054.0	88.9	270.5	69.6	72.0
Platform Gilda Erection	16.0-21.0	1055.7	88.7	268.3	69.8	72.2
Platform Gina Offshore Pipeline	12.0-21.0	586.7	50.1	218.4	42.3	34.3
Platform Gilda Offshore Pipeline	21.0-28.0	589.9	50.4	220.2	42.8	34.5
Onshore Treating Facility	12.0-28.0	20.2	7.9	66.8	4.8	30.5
Onshore Pipelines	4.0-28.0	32.5	13.2	115.1	2.3	18.3
Onshore Booster Stations	16.0-28.0	18.4	10.4	92.6	1.0	17.7

TABLE B.1-6

CALCULATION OF AVERAGE CONSTRUCTION EMISSION RATE FOR ORMOND BEACH SITE, OPTION A

	NO_x	THC	CO	SO_2	PM
	$32.5 \times \frac{8}{24} = 10.8$	$13.2 \times \frac{8}{24} = 4.4$	$115.1 \times \frac{8}{24} = 38.4$	$2.3 \times \frac{8}{24} = 0.8$	$18.3 \times \frac{8}{24} = 6.1$
	$639.4 \times \frac{2}{24} = 53.3$	$71.2 \times \frac{2}{24} = 5.9$	$400.3 \times \frac{2}{24} = 33.4$	$49.4 \times \frac{2}{24} = 4.1$	$83.1 \times \frac{2}{24} = 6.9$
	$1693.4 \times \frac{2}{24} = 141.1$	$160.1 \times \frac{2}{24} = 13.3$	$670.8 \times \frac{2}{24} = 55.9$	$119.0 \times \frac{2}{24} = 9.9$	$155.1 \times \frac{2}{24} = 12.9$
	$1713.5 \times \frac{5}{24} = 357.0$	$170.3 \times \frac{5}{24} = 35.5$	$761.2 \times \frac{5}{24} = 158.6$	$120.2 \times \frac{5}{24} = 25.0$	$173.0 \times \frac{5}{24} = 36.0$
	$661.0 \times \frac{7}{24} = 192.8$	$81.9 \times \frac{7}{24} = 23.9$	$494.7 \times \frac{7}{24} = 144.3$	$50.9 \times \frac{7}{24} = 14.8$	$101.0 \times \frac{7}{24} = 29.5$
Totals	755.0	83.0	430.6	54.6	91.4

TABLE B.1-7

TIME PERIOD AND CONSTRUCTION EMISSION RATES FOR ORMOND BEACH SITE, OPTION B

Source	Weeks Involved	(Lbs/Day) NO_2	THC	CO	SO_2	PM
Platform Gina Erection	18.0-20.0	1054.0	88.9	270.5	69.6	72.0
Platform Gilda Erection	20.0-25.0	1055.7	88.7	268.3	69.8	72.2
Platform Gina Offshore Pipeline	16.0-25.0	586.7	50.1	218.4	42.3	34.3
Platform Gilda Offshore Pipeline	25.0-32.0	589.9	50.4	220.2	42.8	34.5
Onshore Treating Facility	16.0-32.0	20.2	7.9	66.8	4.8	30.5
Onshore Pipelines	4.0-32.0	40.6	16.1	140.6	3.1	25.4
Onshore Booster Stations	12.0-32.0	18.4	10.4	92.6	1.0	25.2

TABLE B.1-8

CALCULATION OF AVERAGE CONSTRUCTION EMISSION RATE
FOR ORMOND BEACH SITE, OPTION B

NO_x	THC	CO	SO_2	PM
$40.6 \times \frac{8}{28} = 11.6$	$16.1 \times \frac{8}{28} = 4.6$	$140.6 \times \frac{8}{28} = 40.2$	$3.1 \times \frac{8}{28} = 0.9$	$25.4 \times \frac{8}{28} = 7.3$
$59.0 \times \frac{4}{28} = 8.4$	$26.5 \times \frac{4}{28} = 3.8$	$233.2 \times \frac{4}{28} = 33.3$	$4.1 \times \frac{4}{28} = 0.6$	$50.6 \times \frac{4}{28} = 7.2$
$665.9 \times \frac{2}{28} = 47.6$	$84.5 \times \frac{2}{28} = 6.0$	$518.4 \times \frac{2}{28} = 37.0$	$51.2 \times \frac{2}{28} = 3.7$	$115.4 \times \frac{2}{28} = 8.2$
$1719.9 \times \frac{2}{28} = 122.9$	$173.4 \times \frac{2}{28} = 12.4$	$788.9 \times \frac{2}{28} = 56.4$	$120.8 \times \frac{2}{28} = 8.6$	$187.4 \times \frac{2}{28} = 13.4$
$1721.6 \times \frac{5}{28} = 307.4$	$173.2 \times \frac{5}{28} = 30.9$	$786.7 \times \frac{5}{28} = 140.5$	$121.0 \times \frac{5}{28} = 21.6$	$187.6 \times \frac{5}{28} = 33.5$
$669.1 \times \frac{7}{28} = 167.3$	$84.8 \times \frac{7}{28} = 21.2$	$520.2 \times \frac{7}{28} = 130.1$	$51.7 \times \frac{7}{28} = 12.9$	$115.6 \times \frac{7}{28} = 28.9$
Totals 665.2	78.9	437.5	48.3	98.5

Electric Power Generation

The net power requirements in addition to those for the proposed project are:

935 kva x 0.9 = 841.5 kwh/hr

$$\frac{841.5\ \text{kwh}}{\text{hr}} \times \frac{2.3\ \text{lb}\ NO_x}{1000\ \text{kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 46.5\ \text{lb/day}\ NO_x$$

$$\frac{841.5\ \text{kwh}}{\text{hr}} \times \frac{0.18\ \text{lb THC}}{1000\ \text{kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 3.6\ \text{lb/day THC}$$

$$\frac{841.5\ \text{kwh}}{\text{hr}} \times \frac{0.2\ \text{lb CO}}{1000\ \text{kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 4.0\ \text{lb/day CO}$$

$$\frac{841.5\ \text{kwh}}{\text{hr}} \times \frac{2.65\ \text{lb}\ SO_2}{1000\ \text{kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 53.5\ \text{lb/day}\ SO_2$$

$$\frac{841.5\ \text{kwh}}{\text{hr}} \times \frac{0.4\ \text{lb PM}}{1000\ \text{kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 8.1\ \text{lb/day PM}$$

B.1.4.3.2 Onshore Pipelines (and Booster Stations) — Option B

Booster Station Heaters

Emissions for the Booster Station and Equipment Seal Leakage would be a factor of 3 times those of the Union Marine Terminal site, on a per day basis).

119.4 lb/day NO_x
3.9 lb/day HC
21.9 lb/day CO
0.9 lb/day SO_2
12.9 lb/day PM

Equipment Seal Leakage

Compressors - 84 lb/day THC
Pump Seals - 1.2 lb/day THC
Valves (Liquid) - 5,4 lb/day THC
Valves (Gas) - 14.4 lb/day THC

Electric Power Generation

The net power requirements in addition to those for the proposed project are:

1555 kva x 0,9 = 1399.5 kwh/hr

$$\frac{1399.5\ \text{kwh}}{\text{hr}} \times \frac{2.3\ \text{lb}\ NO_x}{1000\ \text{kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 77{,}3\ \text{lb/day}\ NO_x$$

$$\frac{1399.5\ \text{kwh}}{\text{hr}} \times \frac{0.18\ \text{lb THC}}{1000\ \text{kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 6.0\ \text{lb/day THC}$$

$$\frac{1399.5\ \text{kwh}}{\text{hr}} \times \frac{0.2\ \text{lb CO}}{1000\ \text{kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 6{,}7\ \text{lb/day CO}$$

$$\frac{1399.5\ \text{kwh}}{\text{hr}} \times \frac{2.65\ \text{lb}\ SO_2}{1000\ \text{kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 89.0\ \text{lb/day}\ SO_2$$

$$\frac{1399.5\ \text{kwh}}{\text{hr}} \times \frac{0.4\ \text{lb PM}}{1000\ \text{kwh}} \times \frac{24\ \text{hr}}{\text{day}} = 13.4\ \text{lb/day PM}$$

TABLE B.1-9

TIME PERIOD AND TOTAL EMISSION RATES FOR THE PROPOSED MANDALAY PROJECT (AND E. MANDALAY ALTERNATIVE)

Months Involved	Pollutant, (lbs/day)				
	NO_x	THC	CO	SO_2	PM
1 - 2.5	760.2	70.9	296.4	55.6	77.2 (77.7)
2.5 - 4.0	895.9	89.0	387.1	146.0	93.7 (94.2)
4.0 - 4.5	1181.0	120.9	520.6	354.3	129.5 (130.0)
4.5 - 5.5	1345.3	277.7	558.1	415.1	148.0 (148.5)
5.5 - 6.0	585.6	206.8	261.7	359.5	70.8
6.0 - 15.5	759.4	372.1	301.3	479.7	90.3
15.5 - 40.0	623.7	354.0	210.6	389.3	73.8
40.0 - 58.0	840.5	426.8	256.6	389.7	79.4
58.0 - 20 yrs	555.4	394.9	123.1	181.4	43.6

(   ) indicates changes for E. Mandalay alternative site

TABLE B.1-10

TIME PERIODS AND TOTAL EMISSION RATES FOR THE UNION OIL MARINE TERMINAL ALTERNATIVE

Months Involved	Pollutant, (lbs/day)				
	NO_x	THC	CO	SO_2	PM
1 - 2.5	783.5	81.6	392.2	59.6	111.6
2.5 - 4.0	919.2	99.7	482.9	150.0	128.1
4.0 - 4.5	1204.3	131.6	616.4	358.3	163.9
4.5 - 5.5	1424.7	325.9	662.6	419.1	182.4
5.5 - 6.0	641.2	244.3	270.4	359.5	70.8
6.0 - 15.5	815.0	409.6	310.0	479.7	90.3
15.5 - 40.0	679.3	391.5	219.3	389.3	73.8
40.0 - 58.0	896.1	464.3	265.3	389.7	79.4
58.0 - 240	611.0	432.4	131.8	181.4	43.6

TABLE B.1-11

TIME PERIOD AND TOTAL EMISSION RATES FOR THE ORMOND BEACH ALTERNATIVE (OPTIONS A AND B)

	Pollutant, (lbs/day)				
Time Period, Months	NO_x	THC	CO	SO_2	PM
Option A					
1.0 - 4.0	755.0	83.0	430.6	54.6	91.4
4.0 - 6.0	890.7	101.1	521.3	145.0	107.9
6.0 - 7.0	1175.8	133.0	654.8	353.3	143.7
7.0 - 8.0	711.	283.0	280.3	413.6	87.5
8.0 - 17.0	885.3	448.3	319.9	533.8	107.0
17.0 - 42.0	749.6	430.2	229.2	443.4	90.5
42.0 - 60.0	966.4	503.0	275.2	443.8	96.1
60.0 - 240	681.3	471.1	141.7	235.5	60.3
Option B					
1.0 - 4.0	665.2	78.9	437.5	48.3	98.5
4.0 - 6.0	800.9	97.0	528.2	138.7	115.0
6.0 - 7.0	1086.0	128.9	661.7	347.0	150.8
7.0 - 8.0	782.0	321.7	290.3	449.4	97.1
8.0 - 17.0	955.8	487.0	329.9	569.6	116.6
17.0 - 42.0	820.1	468.9	239.2	479.2	100.1
42.0 - 60.0	1036.9	541.7	285.2	479.6	105.7
60.0 - 240	751.8	509.8	151.7	271.3	69.9

TABLE B.1-12

EMISSION FACTORS

Item	NO_x (as NO_2)	THC	CO	SO_2	PM
Automobile, g/mile[a]	2.44	1.37[a]	12.25	0.13	0.35
Supply Truck, g/mile[b]	20.49	2.11	13.14	2.73	1.96
Crew Boat (Idle), lb/1000 gal[c]	307.1	68.0	171.7	29.2[d]	N/A
Crew Boat (Cruise), lb/1000 gal[c]	349.2	24.1	77.6	29.2[d]	N/A
Supply Boat (Idle), lb/1000 gal[c]	107.5	249.1	223.7	29.2[d]	N/A
Supply Boat (Cruise), lb/1000 gal[c]	360.0	17.1	80.9	29.2[d]	N/A
Tugboat (3000 hp) lb/1000 gal[e]	572.0	13.0	86.0	29.2[d]	25.0
Helicopter (LTO cycle), lb/LTO cycle[f]	3.02	6.78	13.54	0.44	0.4
Helicopter (Cruise), lb/hr[f]	4.8	1.2	5.8	0.8	0.6
Diesel Industrial Equipment lb/1000 gal[g]	469.0	37.5	102.0	31.2	33.5
Gasoline Storage Emission, lb/1000 gal thruput[h]	-	10.7	-	-	-
Railroad Transport, lb/1000 gal[i]	370.0	94.0	130.0	57.0	25.0
Tugboat (2500 hp), lb/1000 gal[c]	326.2	14.7	126.5	29.2[d]	N/A
Crane, Generator, Welding Machine, g/hp-hr[g]	14.0	1.12	3.03	0.93	1.0
Tugboat (900 hp), lb/1000 gal[c]	167.2	16.8	62.2	29.2[d]	N/A
Construction Equipment, lb/1000 gal[j]	494.0	34.7	94.2	31.1	30.1
Electric Power Generation, lb/1000 kwh[k]	2.3	0.18	0.2	2.65	0.4
Fugitive Dust, Tons/acre-month[l]	-	-	-	-	1.2
Liquid Hydrocarbon Valves, lb/day-valve[m]	-	0.03	-	-	-
Gaseous Hydrocarbon Valves, lb/day-valve[m]	-	0.08	-	-	-
Pump Seals, lb/day-seal[m]	-	0.02	-	-	-
Compressor Seals, lb/day-seal[n]	-	28.0	-	-	-
Turbine Compressors, lb/10^6 SCF[o]	0.542[p]	42.0	115.0	0.88	14.0
Heater Treaters and Booster Station Heaters, lb/10^6 SCF[q]	230.0	3.0	17.0	0.6	10.0

TABLE B.1-12 (Continued)

[a] Composite Emission Factors (Stabilized at 45mph); THC includes crankcase emissions Light Duty Passenger Vehicle, CARB 1979.

[b] Composite Emission Factors (Stabilized at 45mph); Heavy Duty Diesel Trucks, CARB 1979.

[c] Compilation of Air Pollutant Emission Factors, AP-42(1/75); Table 3.2.3-3.

[d] Assumed Diesel Fuel Sulfur Content of 2000 ppm (by weight); 7.3 lb/gal diesel fuel.

[e] SOHIO Pipeline Project Environmental Impact Report, 1976.

[f] Air Pollution Emission Factors for Military and Civil Aircraft; EPA 450/3-78-117; October 1978; Table B.1-10 and 5-2.

[g] Compilation of Air Pollutant Emission Factors, AP-42(1/75); Table 3.3.3-1.

[h] Compilation of Air Pollutant Emission Factors, AP-42(7/79); Table 4.4-4.

[i] Compilation of Air Pollutant Emission Factors, AP-42(4/73); Table 3.2.2-1.

[j] Compilation of Air Pollutant Emission Factors, AP-42(1/75); Table 3.2.7-1.

[k] Air Quality Handbook for Environmental Impact Reports; SCAQMD, July 1976, Table XLVIII (Adjusted for 0.25 wt % S fuel oil).

[l] Compilation of Air Pollutant Emission Factors, AP-42(12/75); Section 11.2.4 Heavy Construction Operations.

[m] Joint District, Federal and State Project for the Evaluation of Refinery Emissions, 1957. Emission Factor reflect implementation of an inspection and maintenance program.

[n] Air Pollutant Emission Factors Petroleum Production and Marketing; VCAPCD, Jan 1979, Section 4.6, Page 18.

[o] Compilation of Air Pollutant Emission Factors, AP-42(12/77); Table 3.3.1-2 (used 9.4 ppm S content natural gas).

[p] Federal New Source Performance Standard (150 ppmv NO_x).

[q] Air Pollutant Emission Factors Petroleum Production and Marketing; VCAPCD, Jan 1979, Table 2.1, Page 4.

N/A: Emission factor not available.

APPENDIX B.2

OIL SPILL MOVEMENT ANALYSIS

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APPENDIX B.2

OIL SPILL MOVEMENT ANALYSIS

INTRODUCTION

An oil spill movement analysis was conducted for the proposed Platform Gina and Platform Gilda Project to identify the location and extent of possible shoreline contamination in the event of an accidental crude oil spill from an offshore or nearshore location (platform or pipeline). This information can be used in conjunction with data on the probability of occurrence for a spill event of a given size to provide perspective on the potential for exposure to spilled oil within the Santa Barbara Channel and associated shoreline areas.

Several factors influence oil transport in the marine environment, including spill volume, physical and chemical properties of the oil, meteorological conditions (primarily wind speed and direction), oceanographic conditions (principally current speed and direction), and biological processes. Currently available analytical methods for predicting oil spill movement have varying limitations on their usefulness related to their ability to take into account the preceding factors. For this study, three methods of analysis were used to address the range of potential spills that might occur: (1) a trajectory analysis for a spill volume less than 10,000 barrels (bbl; 1,590 m^3); (2) a shoreline model for a spill source in the nearshore zone; and (3) a qualitative analysis for a spill volume substantially larger than 10,000 bbl (1,590 m^3).

The trajectory analysis was used to model the movement of the centroid of an oil spill with the objective of identifying the area of shoreline that would be impacted, and the estimated time for the oil slick to reach the impact point. In this model, the slick centroid is assumed to move at the same instantaneous velocity as the vectoral sum of the underlying oceanic and tidal currents, as well as 3 percent of the wind speed. Trajectory results are not dependent on oil spill volumes or mass-dependent effects of oil. However, the applicability of the results is related to spill volume. The maximum spreading diameter for a 10,000-bbl (1,590 - m^3) spill under calm conditions is about 3.5 miles (5.6 km).

The trajectory analysis predicts a range of shoreline impact areas substantially larger than would be expected for this spreading diameter. Predictive errors increase substantially with larger volume spills and associated greater spreading diameters. For this reason, the trajectory analysis is considered valid for spill volumes of 10,000 bbl (1,590 m^3) or less.

A shoreline model was used to predict the movement of oil with an assumed release point in the nearshore zone (i.e., accidental spillage from a pipeline). The shoreline model includes a dependence on spill volume. It predicts the position and diameter of a slick as a function of time as it travels along the coast. The model indicates estimated lengths of contaminated coastline for various combinations of spill volumes, deposition loads (volume per unit area), and longshore currents.

There is general agreement among experts in the field that the state-of-the-art for modeling is inadequate for application of a quantitative dispersion analysis to oil spills substantially in excess of 10,000 bbl (1,590 m^3). Current oil spill modeling efforts are limited by an insufficient understanding of the basic phenomena and the difficulties associated with accurately specifying the dominant environmental driving forces over a large area. For these reasons, a qualitative analysis was used to estimate the possible extent of shoreline contamination for a very large spill. The analysis incorporated consideration of known parameters influencing spill behavior and data available concerning the 1969 Santa Barbara oil spill.

OIL SPILL MODELS

TRAJECTORY ANALYSIS

The method used to calculate the oil spill trajectories employs a vectoral addition of wind and current forces to drive the centroid of a two-dimensional surface oil slick. Movement of the spill centroid in the model is governed by the independent effects of wind and water currents.

The effect of wind on a marine oil slick is poorly understood (Stolzenbach, 1977). Nevertheless, published results from experiments and observations (Van Dorn, 1953; Stewart et al., 1974; and, Oceanographic Institute of Washington, 1977) indicate that, in the absence of surface currents, the centroid of an oil slick moves in the direction of the wind at about 3 percent of the wind velocity.

A surface slick on a moving stream of water in the absence of waves moves with the currents at the surface current velocity (Stolzenbach, 1977). For purposes of this analysis, surface currents in the portion of the Santa Barbara Channel studied have been divided into two components: an oceanic surface current and a tidally induced surface current. The net oceanic surface current component is assumed to remain constant in time, while the tidal current component is phased with the tide.

In the oil slick trajectory model, the slick centroid is calculated to move at the same instantaneous velocity as the vectoral sum of the underlying oceanic surface and tidal currents, while the wind-induced velocity vector of the centroid is taken to be collinear with the wind direction and proportional to the wind speed. Hence, the centroidal velocity vector can be written as:

$$\overline{U}_{oil} = 0.03\ \overline{U}_{wind} + \overline{U}_{tidal} + \overline{U}_{oceanic} \qquad (1)$$

Second order forces, such as waves and wind-wave-current interaction, were not considered in this study. Physicochemical processes affecting a marine oil spill also have not been modeled. These include evaporation, sinking, dissolution, emulsification, and others. While these processes may play important roles in determining the ultimate fate of an oil spill, they were assumed to be secondary to the primary transport mechanisms.

Operational implementation of the oil spill model is based on a grid system superimposed on the study area (Figure B.2-1). The grid system is used as the basis for input of wind and current information, interpolation and definition of the Santa Barbara Channel geometry, and definition of shoreline impact locations. A 1.9-mile (3-km) was used for this study, based primarily on the scale of variation of the wind and current driving forces.

With the environmental input available to the model, a trajectory is generated by evaluating Equation (1) over a sequence of finite time steps until the centroid reaches a shoreline or grid boundary, or a time limit of 8 days (192 hours) is reached.

Results of the trajectory model are presented in two forms. A frequency distribution is used to show the percentage and distribution of impact points along the shoreline. In addition, the minimum time to impact is tabulated in each shoreline grid location.

NEARSHORE MODEL

A nearshore oil spill model was developed to describe the behavior of an oil slick in the event of a nearshore pipeline break. The model predicts the position and diameter of the resultant slick as a function of time and distance as it travels along the coast as a result of advection, deposition, and spreading forces. The model incorporates parameters such as volume of oil spilled, beach deposition load (volume of oil per unit area), and longshore current to assess the maximum length of coastline contaminated and the length of time required for this contamination to occur. The nearshore oil spill model assumes that the wind direction is onshore and the oil, once deposited on the beach, remains in place.

Modeling approaches to the various influences on a nearshore slick are described below:

(1) Advection: The slick is modeled as moving along the coast at a velocity equal to the longshore current. This velocity is assumed to be uniform over the width of the slick and constant in space and time.

(2) Deposition: As a slick moves along the coastline, oil is generally deposited over the intertidal zone of the beach. The deposition

model uses a constant deposition load in expressed in cubic meters of oil per kilometer of beach to simulate the beach contamination process.

3) Spreading: The physical processes of oil spreading on an open sea have been studied and modeled by many authors (Hoult, 1972; Fay, 1971; Wang, 1974; Jeffery, 1973). The most commonly used model is the constant volume model (Fay, 1971) that predicts the size of an oil slick by means of three growth regimes. The different slick growth regimes and their dominant physical forces are illustrated below:

	Regime		
Physical Force	I	II	III
Spreading	gravitational	gravitational	surface tension
Retarding	inertial	viscous	viscous

Fay's (1971) formulas for the different regimes are:

Regime I

$$D=2k_1\left[\left(\frac{\rho w-\rho}{\rho w}\right)g\right]^{\frac{1}{4}}V^{\frac{1}{4}}T^{\frac{1}{2}} \qquad (2)$$

Regime II

$$D=2k_2\left[\left(\frac{\rho w-\rho}{\rho w}\right)g\gamma^{-\frac{1}{2}}\right]^{\frac{1}{6}}V^{\frac{1}{3}}T^{\frac{1}{4}} \qquad (3)$$

Regime III

$$D=2k_3\left[\left(\sigma wa\underbrace{-\sigma wo-}_{fr}\sigma ao\right)^2\rho w^{-2}\gamma^{-1}\right]^{\frac{1}{4}}T^{\frac{3}{4}} \qquad (4)$$

where;

ρ_w = density of water
ρ = density of oil
γ = kinematic viscosity of water
g = gravitational acceleration
σi, fr = surface tension forces
V = spill volume
D = oil slick diameter
T = time after initial spill
$k_{1,2,3}$ = dimensionless constants

Spreading of the oil terminates when the oil slick diameter (D) reaches a maximum size in Regime III. This maximum slick diameter occurs when:

$$D = 2k_4 V^{3/8}$$

The nearshore oil spill spreading model incorporates a modified version of Fay's model that takes into account the presence of the coastline and the loss of oil by deposition.

The presence of the coastline in the model affects the rate of the spreading per unit volume of oil. For an open sea spill of given volume $2V_o$, the oil spreading is in a radial direction with each diameter being a streamline (Figure B.2-2, Case 1). If one of the streamlines is considered to be a solid boundary, the physical processes of spreading and flow will not change and each side will contain the volume of oil, V_o (Case 2). Therefore a coastal oil spill of volume V_o will have the same spreading rate as an open sea spill of volume $2V_o$ (Case 3).

After this modification of Fay's model for a spill of initial release volume (V_o), depositional load (C), and longshore current (V), the centroid of the slick will have a position (X) at a time (T) given by:

$$X = VT \qquad (5)$$

The volume (V) of the spill at that time is:

$$V = V_o - CX \qquad (6)$$

The slick diameter (D) is computed using Fay's formula for the given spreading regime for a spill volume of 2V. The spreading regime is dependent on the length of time (T) since the initial spill. A diagram of this model is shown on Figure B.2-3.

Values used in formulas 2, 3, and 4 were obtained from various sources. A numerical value of 30 dynes/cm was used for the surface tension force based on studies by Berridge, Dean, Fallows, and Fish (1968). A value for of 943 kg/m^3 was used as the average oil density expected at the platform drilling sites. Values for the constants k_1, k_2, k_3, and k_4 are given by various authors (Fay, 1971; Hoult, 1972; Fannelop and Waldman, 1971). The values derived by Fay (1.14, 1.45, 2.30, and 178.42, respectively), are the most conservative and were used in this model. Based on these values, formulas 2, 3, and 4 become

Regime I $D=2.19(2V)^{1/4}T^{1/2}$

Regime II $D=8.92(2V)^{1/3}T^{1/4}$

Regime III $D=0.787T^{3/4}$

Maximum Diameter $D=356.82(2V)^{3/8}$

ENVIRONMENTAL DATA

WIND FORCES

The prevailing winds in the Santa Barbara Channel region are from the northwest and blow generally parallel to the coastline. Because of the heating of the land surface during the day and its subsequent cooling at night, there is daily alternation of wind along the California coast. The typical wind pattern in the Santa Barbara Channel is an onshore wind (sea breeze) in the afternoon and evening hours, and an offshore wind (land breeze) during the night and early morning hours (Aldrich, 1966). The sea breeze is much stronger than the land breeze, with the strongest afternoon wind occurring during the summer months.

The strongest winds observed in the Santa Barbara Channel generally result from two different processes. Strong pre-frontal southeasters can cause strong general winds of 24 to 36 knots (12 to 18 m/s) with locally stronger gusts. More localized, strong Santa Ana winds are caused by a building of high pressure on the eastern side of the Sierra Nevada.

Five meteorological scenarios were chosen to represent wind conditions in the study area: (1) the summer stratus regime; (2) the winter land-sea breeze regime; (3) the Santa Ana; (4) the pre-storm southeaster; and (5) the calm regime. Sources used in gathering information to determine wind patterns for these scenarios included Rosenthal and Swinton (1966), de Violini (1967), DeMarrais (1965), and Strange (1979). Meteorological scenarios 1 through 5 are characterized below.

SCENARIO 1 - STRATUS REGIME (SUMMER)

The stratus regime, the prevalent summertime condition occurring about 50 percent of the time between May and September, is associated with coastal fog and stratus clouds. It is influenced primarily by local topography and the semipermanent "Pacific High" pressure system over the Pacific Ocean to the west. A typical nighttime wind pattern is one of southeasterly winds along the coast and northwesterly winds in the outer Channel (Figure B.2-4). The sea breeze moves in along the coast from the south-southwest at 4 to 10 knots (2 to 5 m/sec) during mid-morning (Figures B.2-5 and B.2-6). By early afternoon, the wind direction becomes more westerly, especially in the Oxnard/Ventura coastal area, and the wind speed increases to about 10 knots (5 m/sec) (Figure B.2-7). The wind direction remains relatively constant throughout the afternoon, but the wind speed generally decreases in the late afternoon and often becomes near calm by sunset (Figure B.2-8). At night, offshore wind patterns are influenced by land breezes from coastal areas and by counterclockwise eddy formations in the Santa Barbara Channel. The transition between the late afternoon and night pattern is shown on Figure B.2-9.

SCENARIO 2 - WIND LAND-SEA BREEZE REGIME

In winter, wind patterns are more variable than in summer (Figures B.2-10 through B.2-13). The most common pattern is the land-sea breeze regime, a seasonal variation of the summer stratus regime which is also influenced primarily by the "Pacific High" pressure system and local topography. The major difference between the winter and summer regimes is that the sea breeze is weaker and the land breeze stronger during winter. The wind is generally from the west during the afternoon, although there is greater directional variability than in summer. After sunset, the land breeze becomes dominant causing the wind to shift to the northeast in nearshore areas. Wind speeds throughout the day range from 4 to 10 knots (2 to 5 m/sec).

The winter land-sea breeze regime is the most common winter wind pattern and occurs about half of the time from November to February.

SCENARIO 3 - SANTA ANA WIND REGIME

The Santa Ana is a dry offshore wind associated with high pressure over the western states (Figures B.2-14 through B.2-16). The Santa Ana usually establishes itself between about 0300 and 0900 as a northeast wind in the Oxnard area (Figure B.2-15). The northeast pattern often remains throughout the day, although a westerly sea breeze sometimes appears in the afternoon hours during weak to moderate Santa Ana conditions (Figure B.2-16). Wind speeds may reach 28 knots (14 m/sec) or more during the morning hours in the offshore area between Oxnard and Anacapa Island. During the afternoon hours, when the northeast winds are countered by the westerly sea breeze, speeds of about 14 knots (7 m/sec) are not uncommon in this area. Wind speeds in the Channel west of Ventura are somewhat less that those between Oxnard and Anacapa Island (Figure B.2-16).

True Santa Ana conditions do not generally extend to the Santa Barbara area. When Santa Ana conditions prevail in the Oxnard area, winds in the Santa Barbara area are likely to be from the southwest during the afternoon as the sea breeze sets in and from the east during the night and morning hours.

Winds in the outer Channel are likely to remain from the east to northeast throughout the day during Santa Ana conditions.

Santa Anas occur on the average about 10 to 15 percent of the time from November to March and rarely during the other months. The duration for a single occurrence ranges from 1 to 3 days depending on the strength of the onshore pressure gradient.

SCENARIO 4 - PRE-STORM (SOUTHEASTER) REGIME

Southeast winds are often associated with migratory low pressure systems prior to frontal passage. The southeast wind pattern is of relatively large scale and extends south of Anacapa Island (Figures B.2-17 and B.2-18). Wind speeds range from about 20 to 30 knots (10 to 15 m/sec) with highest speeds occurring during the afternoon hours and lowest speeds occurring during the morning hours.

The duration of the southeaster is dependent on the speed of the migrating pressure system, but is generally on the order of 1 day. Frequency of occurrence is generally in the range of 5 to 10 percent from November to April. These conditions are rare during the other months of the year.

SCENARIO 5 - CALM REGIME

Periods of calm winds 0 to 3 knots (0 to 1.5 m/sec) occur during all seasons of the year. In order to model this condition, trajectories were run with a wind speed of zero. The calm wind regime occurs approximately 15 percent of the time annually.

SURFACE CURRENT

In general, the surface currents in the eastern half of the Santa Barbara Channel flow northwesterly into the Channel between Port Hueneme and Anacapa Island; this is called the Anacapa Current. As the current nears the shoreline, it forms eddies and flows east-southeasterly along the coastline. Near the center of the Channel, the Anacapa Current encounters a counterclockwise circulation pattern, termed the western gyre, that creates eddies and a complex current pattern along the perimeter of the Channel (Figure B.2-19).

The current that creates the Anacapa Current is the inshore edge of the Southern California Eddy and is referred to as the Southern California Countercurrent. This eddy is a nearly permanent feature of the flow pattern in the Southern California Bight region and has been found to be well developed in winter and weak in the spring (Schwartzlose, 1963; Jones, 1971).

The oceanic surface current data used in this study are based on previously published information (Kolpack, 1971; Jones, 1971; Schwartzlose, 1963; and, Wyllie, 1966) and represent the annual surface current flow pattern. Because this pattern is weak in the spring, a second oceanic surface current pattern was developed to represent springtime conditions. The oceanic surface current direction was derived primarily from the drift card studies of Kolpack (1971), while the current velocities of 0.2 to 0.3 knot (0.1 to 0.15 m/sec) were obtained from Wyllie (1966) and Cooke (1979).

To represent these two oceanic surface current conditions in the study area, a surface current pattern with velocities of 0.2 to 0.3 knot (0.1 to 0.15 m/sec) was used in the model with all the wind scenarios. An identical surface current pattern with reduced velocities of 0.02 to 0.03 knot (0.01 to 0.015 m/sec) was used in conjunction with the Summer, Pre-Storm, and Calm Wind scenarios that are predominant during springtime conditions.

TIDAL CURRENT

The tidal current is generated by the rising and falling action of the tide. In general, the tidal range and accompanying tidal current have a maximum amplitude at the coastline and decrease progressively seaward.

Tidal current data for this region are minimal. Available data from 25, 50, 65, and 90 feet (7.5, 15, 20, and 27 m) of water show a strong tidal current component that flows parallel to the shore (Kolpack and Straughan, 1972; Dames & Moore, 1977; EQA, 1975). Data were unavailable for depths greater than 90 feet.

The flow pattern used to represent this behavior consists of an elliptical tidal current cycle rotating clockwise in which the current flows upcoast during flood tide and downcoast during ebb tide with a slight downcoast net drift. A 24.7-hour time history of the tide, representative of the study area, was used (NOAA, 1978).

The tidal phase difference is small (20 minutes) across the study area; therefore, it was modeled to be constant throughout the area. An average maximum tidal current velocity of 0.5 knot (0.26 m/sec) was used as the current velocity just prior to the mean higher high water (flood tide) and mean lower low water stages of the tidal cycle (NOAA, 1978).

The 0.5 knot (0.26 m/sec) velocity was assumed to apply in the Port Hueneme/Santa Barbara Shelf area from the coastline to a water depth of 90 feet (27 m) (Figure B.2-20). Beyond this, the average maximum velocity was decreased linearly to a zero value at the edge of the shelf (300 feet, 91 m). In water deeper than 300 feet (91 m), the tidal current was assumed to be zero.

LONGSHORE CURRENT

According to Bruno and Gable (1976), longshore drift at the breakwater at Port Hueneme varies between 0.4 to 1.3 knot (0.18 and 0.66 m/sec). Studies made at Hollywood Beach just north of Port Hueneme after the 1969 Santa Barbara oil spill showed a longshore current between 0.03 to 1.1 knot (0.15 and 0.56 m/sec) with an average of 0.6 knot (0.30 m/sec) (Kolpack, 1971). Based on this information, a longshore current of 0.5 knot (0.25 m/sec) was used for this study.

COASTLINE DEPOSITION

The initial deposition of oil on a beach depends on the type and amount of oil washed ashore, the environmental condition at the time of deposition, and the physical features (slope, sediment grain size, etc.) of the beach. During the Santa Barbara oil spill of 1969, beach accumulations initially ranged from thin, irridescent slicks to massive layers several centimeters thick (Allen, 1969; Foster et al., 1971).

As the tide ebbs, following the initial contact between the beach and spilled oil, an irregular coating of oil will normally be left as a patchy covering over much of the intertidal zone with the major concentration at the highest swash line. Such coverings were investigated by Foster et al. (1971) following the Santa Barbara oil spill of 1969, and found to consist of oil areal concentrations averaging 3.4 to 5.6 kg/m^2. The highest areal concentration measured was 10.6 kg/m^2. The average volume of oil deposited per unit distance along the coast during the Santa Barbara oil spill was approximately 50 m^3/km. (A value of 50 m^3/km corresponds to a 0.5 cm thick layer of oil 10 m wide and 1 km long, an amount equivalent to about 600 bbl/mile).

Another study of beach oil deposition loads was conducted after The Torrey Canyon shipwreck by Foster et al. (1971). This study found deposition loads ranging from 65 to 185 m^3/km. Based primarily on the studies of the Santa Barbara oil spill, a deposition load of 50 m^3/km was used in the model.

RESULTS

The oil spill analyses were divided into three categories: (1) offshore spills of 10,000 bbl (1,590 m^3) or less; (2) nearshore spills from a pipeline break; and, (3) offshore spills substantially larger than 10,000 bbl (1,590 m^3). The results of these analyses in relation to potential shoreline impact areas in the Santa Barbara Channel area are discussed below.

SMALL OFFSHORE (LESS THAN 10,000 BBL)

Using the trajectory analysis model, trajectories were calculated for five spill release points. These spill sites are Platform Gina, Platform Gilda, and the mid-pipeline point along their proposed and alternative pipeline routes.

For this study, 36 trajectories were generated for each combination of spill site, wind scenario, and oceanic current condition for a total of 1,140 trajectories. Each trajectory was calculated using a data combination of:

(1) 5 wind scenarios (summer, winter, Santa Ana, pre-storm, and calm)

(2) 2 oceanic surface current patterns (strong and weak)

(3) 1 tidal current pattern

(4) 6 wind starting times (4-hour interval)

(5) 6 tidal current starting times (4-hour interval)

(6) 5 oil spill sites.

The potential oil spill sites that were studied have been numbered 1 through 5. Sites 1 and 2 are Platforms Gina and Gilda, respectively. Site 3 is the midpoint of the proposed Mandalay pipeline route. Site 4 is the midpoint of the proposed Platform Gilda pipeline route. Site 5 is the midpoint of Ormond Beach alternative pipeline route.

The shoreline impact frequency distributions shown in Figures B.2-21 through B.2-45 are illustrated in three-dimensional columns along the affected segments of coastline. The percentage given at the top of the columns represents the frequency with which the 36 trajectories impacted the given 1.9-mile (3-km) segment of coastline. The shading of the columns represents the minimum number of hours the oil slick traveled until impact and is given in five ranges (less than 1/2 day, 1/2 to 1 day, 1 to 3 days, 3 to 6 days, and greater than 6 days).

In addition to the shoreline impact distribution and minimum time until impact ranges, Figures B.2-21 through B.2-45, each illustrate a sample oil spill trajectory calculated for each case.

The results of this trajectory analysis are discussed below in relation to wind scenarios because wind has the greatest effect on determining the direction and speed of the oil movement.

SUMMER CONDITION

During the summer season wind conditions, the oil spill trajectories for all sites generally traveled northeastward and impacted along the coastline between the City of Ventura and Port Hueneme. The length of time the oil spill traveled between time of spill and time of coastline impact ranged from 6 to 60 hours.

During the summer season wind condition and for normal surface current conditions, the oil spill trajectories from Platform Gina impacted the Port Hueneme area (Figure B.2-21). The highest percentage of impacts (64 percent) occurred in the immediate vicinity of Port Hueneme after a 28- to 49-hour travel time. For the springtime low surface current condition, the oil spill trajectory distribution was shifted slightly downcoast, although the primary impact area remained the same. The oil spill travel time was slightly longer for the low surface current condition, ranging from 31 to 61 hours.

The trajectories from Platform Gilda show an impact frequency distribution almost entirely within the Ventura area (Figure B.2-22). After a 44- to 66-hour travel time, 97 percent of the trajectories impacted a 3.7-mile (6-km) segment of coastline at Ventura. The springtime low surface current set of trajectories also gave a high frequency of impacts at Ventura with a distribution shifted slightly down coast and a slightly longer time period until impact. In general, trajectories using the low surface current (springtime) condition take longer to reach the shore than the normal surface current conditions because of the weaker onshore current velocities.

The mid-pipeline spill sites associated with Platform Gina have impact distributions similar to that of Platform Gina (Figures B.2-23 and B.2-25). The area most frequently impacted (67 percent) for a Site 3 spill is located 3.7 miles (6 km) upcoast of Port Hueneme with a travel time of 10 to 25 hours. For spill Site 5, half the trajectories impacted Port Hueneme while most of the others hit within 3.7 miles (6 km) upcoast of it. The travel time for the Site 5 trajectories was 6 to 25 hours. The trajectories calculated for the springtime low surface current condition for spill Sites 3 and 5 gave distribution patterns similiar to those under normal surface current conditions. The time until impact range for Site 3 was 10 to 37 hours, while the travel time for Site 5 remained unchanged.

From the mid-pipeline spill site for the proposed Platform Gilda pipeline route, the oil traveled in a west-northwesterly direction for 17 to 46 hours and impacted the coastline between Port Hueneme and the City of Ventura (Figure B.2-24). A small percentage of the trajectories hit the Ventura area; however, the vast majority reached the shore southeast of the city. The distribution of impacts for a springtime low surface current condition was shifted slightly downcoast so that the Ventura segment of coastline was not affected. The time until impact range for the springtime current condition was 29 to 48 hours.

WINTER CONDITION

During the winter season wind condition, the oil spill trajectories for the spill sites generally traveled southeastward along the coast and did not impact the coastline within the study area. The exception to this is spill Site 5, which is the closest site to the coastline and impacted the coastline 11 percent of the time.

Trajectories for Sites 1, 2, 3, and 4 (Figures B.2-26, -27, -28, and -29) all traveled southeastward, parallel to the coastline until the eastern boundary of the study area or the trajectory time limit of 8 days was reached. The amount of time required to reach the eastern boundary was greater than six days for these sites.

Site 5, the closest spill site to the coast, impacted the Port Hueneme area for 11 percent of the trajectories (Figure B.2-30). The amount of time it took the oil to reach shore was 6 to 12 hours. The remaining 89 percent of the trajectories traveled southeastward parallel to the coast in a pattern similiar to Sites 1, 2, 3, and 4.

SANTA ANA CONDITIONS

Oil spilled at the five sites during Santa Ana wind conditions generally traveled southwestward, away from the coast and impacted the coastline of the Santa Barbara Channel Islands. The length of time the oil spill traveled between time of spill and time of impact at the islands ranged from 14 to 51 hours.

For a spill at Site 1 (Platform Gina), the oil traveled 14 to 21 hours in a southwestward pattern and impacted Anacapa Island and the eastern side of Santa Cruz Island (Figure B.2-31). The trajectories show the oil impacting Anacapa Island 36 percent of the time, while reaching Santa Cruz Island 64 percent of the time.

The oil spill trajectories for Site 2 (Platform Gilda) impacted the northwestern corner of Santa Cruz Island (Figure B.2-32). The oil needed 40 to 47 hours to reach the island.

An oil spill from Site 3 would impact most of the north and west sides of Santa Cruz Island. The distribution of impacts was widely spread and a 19- to 51-hour travel time was required until impact (Figure B.2-33).

The trajectory coastline impacts for Site 4 were distributed along the northern shore of Santa Cruz Island (Figure B.2-34). The area of highest impacts was at the northwest side, near Painted Cave. The oil traveled from 31 to 51 hours before reaching the coastline of the island.

Spill Site 5 had a wide impact distribution that reached Anacapa Island and the north and west shores of Santa Cruz Island. The time range for impacts at Anacapa Island was 18 to 22 hours. The Santa Cruz impact range was 20 to 40 hours (Figure B.2-35).

PRE-STORM WIND CONDITIONS

For Pre-Storm wind conditions in the Santa Barbara Channel, the oil spilled at the five sites generally traveled northwestward up the coast and impacted along the coastline between Ventura and Santa Barbara. The time difference between the spill and coastline impact ranged between 14 and 41 hours.

The trajectories for the platforms (Sites 1 and 2) impacted at the City of Santa Barbara (Figures B.2-36 and B.2-37). For Site 1, the oil spill travel time ranged from 32 to 38 hours, while the spill travel time for Site 2 ranged from 24 to 28 hours. For the low oceanic surface current (springtime) condition, the trajectory distributions for both sites were shifted upcoast just west of the City of Santa Barbara. The time ranges for the sites were also extended by 2 to 3 hours.

The trajectory distributions for mid-pipeline spills associated with Platform Gina (Sites 3 and 5) show impacts approximately 7.4 to 20.5 miles (12 to 33 km) upcoast of Ventura (Figures B.2-38 and B.2-40). The trajectories had a wide distribution pattern that impacted approximately 11.2 miles (18 km) of coastline. Site 3 had a 14- to 25-hour until impact range, while Site 5 had a 16- to 23-hour range. The springtime low oceanic surface current condition spread the distribution of impacts for the two sites slightly upcoast, but generally impacted the same areas and had nearly the same time ranges as those for the normal oceanic surface current conditions.

The trajectories for spill Site 4 impacted in two different localities (Figure B.2-39). While 81 percent of the trajectories impacted just east of the City of Santa Barbara, 19 percent impacted near Carpinteria, located between the cities of Santa Barbara and Ventura. The impacts just east of the City of Santa Barbara reached the area in a 27- to 31-hour time range. The impacts located near Carpinteria arrived in 17 to 22 hours. The same trajectories, calculated for a springtime low surface current condition, impacted the Santa Barbara area in 28 to 34 hours.

CALM WIND CONDITIONS

Movement of the oil spill centroid, being wind dominated, is very slow when the wind force is removed. The trajectories for the five spill sites illustrate this in Figures B.2-41 through B.2-45. Generally, the oil spill trajectories for this condition follow the oceanic surface current flowing downcoast, parallel to the shore until the 8-day time limit is reached. Sites 3 and 5 are the exceptions to this case. These two sites are the mid-pipeline spill sites associated with Platform Gina and are the closest spill sites to the coast. Because the trajectories lie so close to the coastline and the tidal current has an ellipical pattern, 66 percent of the Site 3 trajectories impacted the Port Hueneme area in 6.5 to 7 days. Site 5 had 50 percent of the trajectories impacting the Port Hueneme area in 6 to 7 days.

Trajectories for low oceanic surface current conditions for the most part remained offshore for the 8-day simulation period. Only spill Site 5 showed impacts; 17 percent of the trajectories impacted the shoreline in the Port Hueneme area after 6.5 days.

ALL WINDS

The shoreline impact distributions discussed above were combined to produce a summary distribution of impact points for all sites and all wind conditions. This was done by assuming that a spill was equally likely to occur at any of the five spill sites and by using the frequency of occurrence of the various wind conditions. The resulting shoreline impact distribution is shown in Figure B.2-46.

The most frequently impacted area was in the vicinity of Port Hueneme, where approximately 26 percent of the trajectories reached the coast in a period of less than one-half day.

Within the predominantly impacted area, the north-south-oriented segments are impacted more frequently than the east-west segments. This is due to the eastwardly summer season wind pattern and the nearshore downcoast flowing surface currents. On a smooth, non-gridded coast, the frequency distribution for the shoreline segments would be smoother. The two 1.9-mile (3-km) segments downcoast of Port Hueneme that have a greater than 6-day minimal time until impact were generated by the calm wind condition at spill Site 5. The large time difference between these two segments is due to the absence of a wind driving the oil ashore.

Near the City of Santa Barbara, nearly 5 percent of the trajectories impacted the shoreline. These impacts occurred after an oil spill travel time of 1 to 3 days.

Approximately 9 percent of the oil spill trajectories impacted the shorelines of Santa Cruz Island and Anacapa Island. At Anacapa Island and the eastern side of Santa Cruz Island, this occurred after a minimum time of one-half to one day. At the western end of Santa Cruz Island, the minimum time until impact was 1 to 3 days.

Fifty percent of the oil spill trajectories calculated from the model impacted along the mainland between the City of Santa Barbara and Point Mugu. Nine percent of the trajectories impacted Santa Cruz Island and Anacapa Island, while 41 percent did not impact at all within the study area.

NEARSHORE

The following results relate to the cause of a pipeline break at the coastline. The release volumes were calculated by combining the entire amount of oil contained in an offshore pipeline and in a small section of its onshore component. Because the proposed Mandalay pipeline route and Platform Gilda pipeline route cross the nearshore zone in a common corridor, a break of the Platform Gilda pipeline was addressed as a worst case since the maximum spill volume would be greater. The Ormond Beach alternative pipeline route was also evaluated. For the proposed Platform Gilda and Ormond Beach alternative pipelines, the spill volumes calculated were 4,000 bbl (636 m^3) and 9,000 bbl (1,431 m^3), respectively. From the data in Figures B.2-47 and B.2-48, the total length (miles; km) of coastline contaminated by oil and the duration (days) of the active phenomena can be calculated, for deposition loads varying from 15 to 100 m^3/km and longshore currents varying from 0.125 to 1.0 m/sec. For example, at the Ormond Beach alternative pipeline, a current of 0.5 knots (0.25 m/sec) and a deposition load of 600 bbl/mile (50 m^3/km) would result in the contamination of approximately 7.8 miles (12.5 km) of coast in a time of 14 hours (Figure B.2-47). For the proposed Platform Gilda pipeline, the same current and deposition load would cause the contamination of 18 miles (29 km) in 32 hours (Figure B.2-48). Several deposition loads identified from previously studied oil spills are also shown on Figures B.2-47 and B.2-48. The deposition loads identified from the Santa Barbara and Torrey Canyon oil spills are discussed in the section on large offshore spills that follows. The Metula and Dames & Moore heavy dosage rates are based on studies by Gunnerson and Peter (1976) and Chiyoda Dames & Moore (1975), respectively.

The longshore current direction is southward about 70 percent of the time. A coastal spill of 4,000 bbl (636 m^3) at Port Hueneme could contaminate the coast to Point Laguna if the current direction was southeast, or to the Ventura Marina if the current was northwest. A spill from a break of the proposed Platform Gilda pipeline at the coastline could contaminate beaches up to 3 miles (5 km) southeast of Point Mugu or as far as Rincon Point 2.5 miles (4 km) southeast of Carpinteria.

Figures B.2-49 and B.2-50 show the decrease in the volume of oil still involved in spreading and advection, as well as the slick width, measured from X_1 to X_2, at time T, at a distance point X along the coast. The time measurement is given in hours since the spill and the distance are measured in miles (km) from the initial spill point.

For the 4,000 bbl (636 m^3) spill, the oil slick would spread to a maximum diameter of approximately 1.5 miles (2.5 km) after 11 hours and then decrease and be completely deposited along the shoreline after 14 hours at 7.7 miles (12.5 km) from the release point.

For the 9,000 bbl (1,431 m^3) spill, the oil slick would reach a maximum diameter of 2.4 miles (4 km) after one day 13.3 miles (22 km) from the starting point. It would then shrink, becoming completely deposited along the shoreline after 32 hours at a distance of about 17.5 miles (29 km) from the starting point.

LARGE OFFSHORE SPILL (GREATER THAN 10,000 BBL)

This discussion of a large offshore spill consists of a qualitative discussion of the predominant mechanisms involved in oil spill fate and behavior and an assessment of the potential range of shoreline contamination. A large offshore oil spill is defined as a spill substantially larger than 10,000 bbls (1,590 m^3).

The mechanisms involved in oil spill movement are surface transport (drift) and the mass-dependent effects of the oil. The surface transport mechanism is controlled by physical oceanographic currents, sea state, and meteorologic conditions (primarily winds). Mass-dependent effects (spreading, evaporation, dissolution, dispersion, emulsification, sedimentation, biodegradation and photooxidation) depend not only on environmental conditions, but also the physical and chemical properties of the oil. Each of these processes is discussed below with respect to its role in the fate of an oil slick.

Figure B.2-51 shows the relative magnitude of these processes through time and their relation to the other processes. On this figure, the line length indicates the probable timespan of any process, while the line width indicates the relative magnitude of the process through time and other contemporary processes. It should be noted that the timespan and magnitude of the processes on this graph assume "average" environmental conditions. Other conditions could exist that could substantially change the timespan and magnitude of some or all of the processes.

SPREADING

Fay (1969) defined four principal forces or processes that affect spreading of oil on a calm sea: gravitational, surface tension, inertial, and frictional. The first two forces enhance spreading, while the second two retard the spreading process. The gravitational force is proportional to the film thickness, the thickness of the gradient, and the density difference between the water and oil. It causes lateral spreading in the direction of decreasing film thickness. The surface tension forces of air-water, air-oil, and oil-water also work to enhance the spreading process. Fay (1971) stated that spreading ends when the volatile fraction of the slick is removed, thus making the difference between the air-water surface tension force and the sum of the air-oil and oil-water surface tension forces equal to zero.

Retardation of the spreading process is caused by inertia of the oil body and oil-water friction. The inertia force is a function of the thickness, density, and acceleration of the oil slick and rapidly diminishes as spreading proceeds. Friction between the slick and surface water increases the thickness of the viscous boundary layer beneath the slick, thus retarding spreading.

Wind and wave action dominate the distortion and distribution of the spreading slick (Stolzenback et al., 1977). For example, slicks rapidly become elongate parallel to the prevailing wind direction. Also, wind tends to pile up the oil at the downwind slick edge.

Spreading increases the slick surface area, thus accelerating the rates of weathering and degradation. Other conditions, such as temperature and oil type, can affect the spreading rate. Cold water temperatures cause oil to spread more slowly. Lighter density petroleum products, such as gasoline and diesel fuel, will have a substantially greater spreading rate.

DRIFT

Drift or advection is defined as the movement of the center of mass of an oil slick. The drift process is controlled by wind, waves, and surface currents and is somewhat independent of spreading and spill volume. The major parameters governing oil movement are wind shear stress at the oil-water interface, wind-induced and geostrophic surface currents and wave action. Geostrophic currents include tidedriven currents and currents derived from a density differential among water masses. The combined effects of wind and waves are not simply additive. A portion of the surface shear stress is involved in wave generation, and wave action appears to retard wind-driven slick movement (Stewart et al., 1975).

EVAPORATION

Evaporation is the mass transfer of petroleum hydrocarbons from the liquid oil to the vapor phase. Hydrocarbon evaporation rates are affected by the oil composition, surface area, physical properties of the oil, wind velocity, air and sea temperatures, sea state, and the intensity of solar radiation (Fallah and Stark, 1976).

Wind velocity and the resulting sea state are the principal environmental factors, while the hydrocarbon vapor pressure is the principal oil property that influences evaporation. McAuliffe (1966) found wind velocity and sea state more critical than water temperature in the removal rate of hydrocarbons from a slick. Vapor pressures within each hydrocarbon class tend to increase with decreasing molecular weight. Isoalkanes generally have the highest vapor pressures while aromatics have the lowest (Rossini et al., 1975). The distribution of aromatics in a crude oil is concentrated at the high-boiling end of the spectrum. Therefore, an oil slick will be depleted in light, low-boiling fractions and enriched in aromatics as evaporation proceeds.

Evaporation is the most substantial initial degradative process to an oil slick (Wheeler, 1978). Up to 50 percent of an oil spill volume may be evaporated within the first 24 hours (Rostad, 1976). Also, the evaporation and dissolution processes can remove over 90 percent of the hydrocarbons lighter than C_{10} within several hours (McAuliffe, 1976). By the time the oil has formed semisolid emulsions or tar lumps, evaporation rates become extremely slow. However, the evaporation process remains the significant compositional alteration process on the floating petroleum residues (Butler, 1975).

DISSOLUTION

Dissolution is the mass transfer of hydrocarbons from the floating or suspended petroleum in the water column. The composition and physical properties of the oil, extent of spreading, water temperature, turbulence, and amount of dispersion determine the rate and extent of dissolution. Physical processes such as spreading, turbulence, and dispersion, or oil-in-water emulsification enhance dissolution by increasing the oil surface area exposed to water. As low-boiling liquid fractions are removed, changes in physical properties of the oil slick, such as increased density and viscosity, inhibit spreading and molecular diffusion of the remaining volatile components. The most volatile and toxic hydrocarbons, such as benzene and toluene, are the most soluble in the water column.

Dissolution is a chemical degradative process that can be of significant magnitude at the onset of an oil spill. The process continues throughout the lifetime of the slick, but becomes increasingly insignificant relative to evaporation.

DISPERSION

Dispersion, or oil-in-water emulsion, is the incorporation of small particles or globules of oil into the water column. Under open-water conditions turbulence plays the most significant role in dispersion (Forrester, 1971). Dispersion progresses as the oil drifts from the source and is greatest in areas of high wave energy, especially the surf zone.

Oil components with hydrophilic groups such as acids, alcohols, aldehydes, sulfates, and sulfonates act as natural surface active agents called surfactants. High surfactant concentrations enhance slick breakup, increasing the oil-in-water interfacial area.

The increased oil surface area caused by dispersion increases the rates of dissolution and biodegradation. High dissolved hydrocarbon concentrations in the water column may exist for a short time from the initial dispersion process following an oil spill. The dispersion process may continue for a year, after which other long-term processes, such as biodegradation and sedimentation, interact with the residues.

EMULSIFICATION

Water-in-oil emulsions consist of a viscous cream or floating coherent semisolid lumps. As in the case with dispersion, the water-in-oil emulsification rate depends on oil composition and sea state. The type of emulsification, water-in-oil or oil-in-water (dispersion), is largely determined by the abundance of the agents. Mackay et al. (1973) have found that the asphaltene fraction of crude oil contains emulsifying agents. These agents are essential for the formation and stability of water in oil emulsions.

Sea state also influences the formation rate of emulsions. However, cresting and sea spray exhibit turbulence many times greater than that required for emulsification. The ultimate water content of an emulsion is independent of turbulence. The water content of a water-in-oil emulsion is commonly 80 to 90 percent. Higher water and/or asphaltene content results in greater density and viscosity.

Emulsification inhibits the degradation and weathering of petroleum by limiting the amount of exposed surface area. The amount of water contained in the emulsion is not sufficient to provide enough oxygen and nutrients for extensive degradation (Gibbs, 1975). The degradation, weathering, and incorporation of detrital or biogenic skeletal material into emulsions increases the specific gravity sufficiently to cause the emulsions to sink through the water column.

SEDIMENTATION

Sedimentation of petroleum is the result of increasing the specific gravity of petroleum or petroleum residues over that of seawater (1.025). The three dominant processes that act on floating and dispersed oil to increase its specific gravity are: (1) adhesion onto suspended detrital materials; (2) sorption of dissolved species onto suspended particulate matter; and, (3) increased specific gravity due to evaporation and dissolution.

The dominant process of petroleum sedimentation is the adhesion of the petroleum to detrital mineral particles, such as suspended silts and clays, or to the exoskeletons of planktonic protozoans and algae. Sedimentation from this process increases in shallow, nearshore areas where runoff-related or storm-resuspended sediments result in high turbidity and particulate loading in the water column.

The sorption process is enhanced by suspended clays found in the water column. Bentonite and kaolinite are the most absorptive common marine minerals, followed by illite, montmorillonite, and calcite. Petroleum sorption by mineral particles is inhibited in the presence of indigenous organic materials and is positively correlated with salinity (Meyers and Quinn, 1973).

The other sedimentation process is the depletion of the petroleum's lighter fractions by evaporation, oxidation, and dissolution. Processes such as autooxidation, photooxidation, and biological oxidation break down the hydrocarbons into lighter acids, alcohols, hydroperoxides, and phenols that are more soluble than the hydrocarbons from which they were derived (Perry and Chilton, 1973).

BIODEGRADATION

At the onset of an oil spill, the principal processes acting on the spill are all physical, involving distribution of the oil and partitioning of its com components on the sea surface, air, water column, and sediments. As the slick ages, the biological and chemical degradative processes become increasingly significant. Marine microorganisms and macroorganisms ingest, metabolize, and utilize the petroleum as a carbon source. The rate and extent of biodegradation depend on the nature and abundance of the indigenous microbial assemblage, predators, available inorganic nutrients and oxygen, ambient temperature, and oil distribution and composition. Petroleum-consuming microbes are commonly more abundant in chronically polluted waters than in non-polluted waters (Seki et al., 1973; Tagger et al., 1976). Also, marked differences exist in microbial diversity and abundance between a chronic natural seep area and adjacent uncontaminated water (Atlas et al., 1976). The bacteria, yeast, filamentous fungi and algae that are known to degrade hydrocarbons are not present everywhere in the oceans, nor do they all attack the same oil components. Therefore, the biodegradative effects depend on the available assemblages and the composition of the crude oil spilled.

AUTOOXIDATION

Autooxidation is the degradative process of floating and dispersed oils in which hydrocarbons react with oxygen molecules in the water column. The extent and products of oxidation reactions vary, depending on petroleum properties and composition, water temperature, solar radiation intensity, abundance of various inorganic components in the water or oil, and extent of diffusion and spreading of the oil. The photooxidation process does not play a major degradative role as do the weathering processes (such as evaporation and dissolution that act more rapidly than oxidative reactions).

Oxidative reactions follow one of two principal pathways. The first is the oxygenation or dehydrogenation of paraffin or alkyl groups on cycloalkanes and aromatics, resulting in the successive formation of alcohols, aldehydes, or ketones, and eventually carboxylic acid. The other oxidative pathway is the formation of higher molecular weight compounds either by polymerization of radicals and condensation of aldehydes and ketones by phenols or by esterification between alcohols and carboxylic acids (Parker et al., 1971).

The types of hydrocarbon compounds in an oil influence the extent and rate of autooxidation. Besides influencing the solubility of components from an oil spill, oxidation enhances dispersion and emulsification. The autooxidation process is difficult to describe because the rates are prohibitively complex to calculate due to the various controlling conditions and multiple pathways for degradation reactions.

ANALYSIS

All the previously discussed parameters are degradative processes within themselves, but physical and chemical alterations are interdependent. The physical processes dominate earliest, with spreading and drift as the most critical. Intermediate-time processes, such as evaporation, emulsification, and dispersion, alter the composition and physical state of the oil. Sedimentation and biodegradation largely determine the ultimate fate of the oil and may be active for years after the spill.

By relating the known information on oil spill behavior as discussed above to the Santa Barbara Channel area, a qualitative analysis can be developed that yields reasonable estimates on the extent of shoreline contamination should a large oil spill occur. The studies on the Santa Barbara oil spill of 1969 provide insight on the extent of spreading. Estimates can be made, based on studies cited previously, of the amount of oil lost through the degradation processes.

One primary controlling factor in determining the actual extent of shoreline contamination is the oil spill volume. The direction in which the oil slick travels is primarily dependent on the wind velocity and direction and secondarily on the net oceanic currents. Studies, such as of the 1969 Santa Barbara oil spill, provide information on slick extent and shoreline impacts in relation to spill volume. The Santa Barbara oil spill reportedly impacted over 100 miles (160 km) of shoreline from as far north as Oceano to as far south as Newport Beach (Allen, 1969).

If a spill substantially greater than 10,000 bbl (1590 m^3) should occur at Platform Gina or Platform Gilda during typical wind conditions, the resulting slick would generally impact the shoreline between Carpinteria and Santa Monica Bay in one to three days. After three days, the oil slick would continue to travel downcoast, reaching perhaps Newport Beach or beyond. Weathered segments of the slick could be circulated in the eastern Santa Barbara Channel current gyre and impact the eastern Santa Barbara Channel Islands and the mainland, possibly to Point Conception.

For a large spill occurring during severe weather conditions, such as a pre-storm southeaster wind or Santa Ana conditions, the slick would travel away from the spill area at a relatively fast rate. A Santa Ana wind condition would move the slick away from either of the platforms southwestward, causing all sides of the Santa Barbara Channel Islands to be impacted in a time of less than one to just over two days. If, after this time, the Santa Ana conditions end and typical wind patterns resume, the prevailing wind and current conditions could push segments of the slick southeasterly, impacting San Nicolas, Santa Catalina, and San Clemente islands. Other slick portions may be driven to the mainland, impacting the shoreline from Point Conception to Santa Monica.

A pre-storm southeaster would move the slick from either of the platform sites northwesterly up the coast. In this case, the area of greatest initial impact would be the Santa Barbara area. The time until impact would be up to two days. During this time, the oil could possibly travel upcoast, north of Point Conception. It is assumed that the slick would not be pushed further north because a southeaster wind condition is not expected to last more than two days. After the southeaster condition ended and if prevailing winds resumed, the oil slick would probably travel back downcoast and contaminate the shoreline to perhaps Santa Monica; it could possibly reach some of the Santa Barbara Channel Islands.

Overall, a large oil slick could result in shoreline impacts from approximately Point Conception to Newport Beach during typical prevailing winds. The coastline of the Santa Barbara Channel Islands and outer Channel Islands, along with the mainland coastline, would be contaminated during Santa Ana conditions. During a pre-storm southeaster wind condition, the most severe shoreline impact would be in the Santa Barbara vicinity. The slick would impact from approximately Point Conception to Santa Monica and perhaps reach some of the Santa Barbara Channel Islands.

Throughout the lifetime of the slick, the degradative processes discussed previously would be operating to reduce the volume and composition of oil that could impact the coastline. The rates of these processes would primarily depend on environmental conditions that would exist during, and just prior to, the spill.

Allen (1969) stated that within 48 hours after the initial Santa Barbara oil spill, at least 25 percent of the oil was evaporated. The evaporative process is enhanced by winds and spreading. Therefore, a strong wind, such as a Santa Ana or pre-storm southeaster, could cause a higher evaporative rate and lessen the coastline impact. The spreading process, under strong wind conditions, may be impeded because of increased oil viscosity caused by the rapid evaporation of the lighter oil fractions.

High wind velocities and turbulent sea states that occur during times of pre-storm southeaster and Santa Ana wind conditions would increase the dissolution, dispersion, and emulsification processes. However, because of the relatively short time until initial impact on respective mainland and island shorelines, their degradative effects on the slick volume probably would be minimal.

Flooding in the southern California area during the spring of 1969 contributed abnormally large quantities of detrital material along the Santa Barbara Channel mainland coast (Kolpack, 1971). The presence of this material dramatically increased the sedimentation process of the slick from the Santa Barbara oil spill when it was transported into areas of high suspended sediment concentrations in the surface water. If a similar condition were to exist in the event of a spill at Platform Gina or Platform Gilda, a slick under pre-storm, calm, or winter wind conditions could lose a substantial amount of oil before the slick initially reached shore; however, this would not happen for the Santa Ana and summer wind conditions. This circumstance would occur most efficiently if the slick underwent sufficient evaporation and dissolution to increase its specific gravity in order to enhance the sedimentation process. For the summer wind condition, there is not enough time for sufficient oil evaporation and subsequent sedimentation of oil loss to occur before initial shoreline impact. The Santa Ana wind conditions allow time for sufficient evaporation but the Channel Islands, where the oil initially would impact, have very little sediment runoff.

APPENDIX B.2

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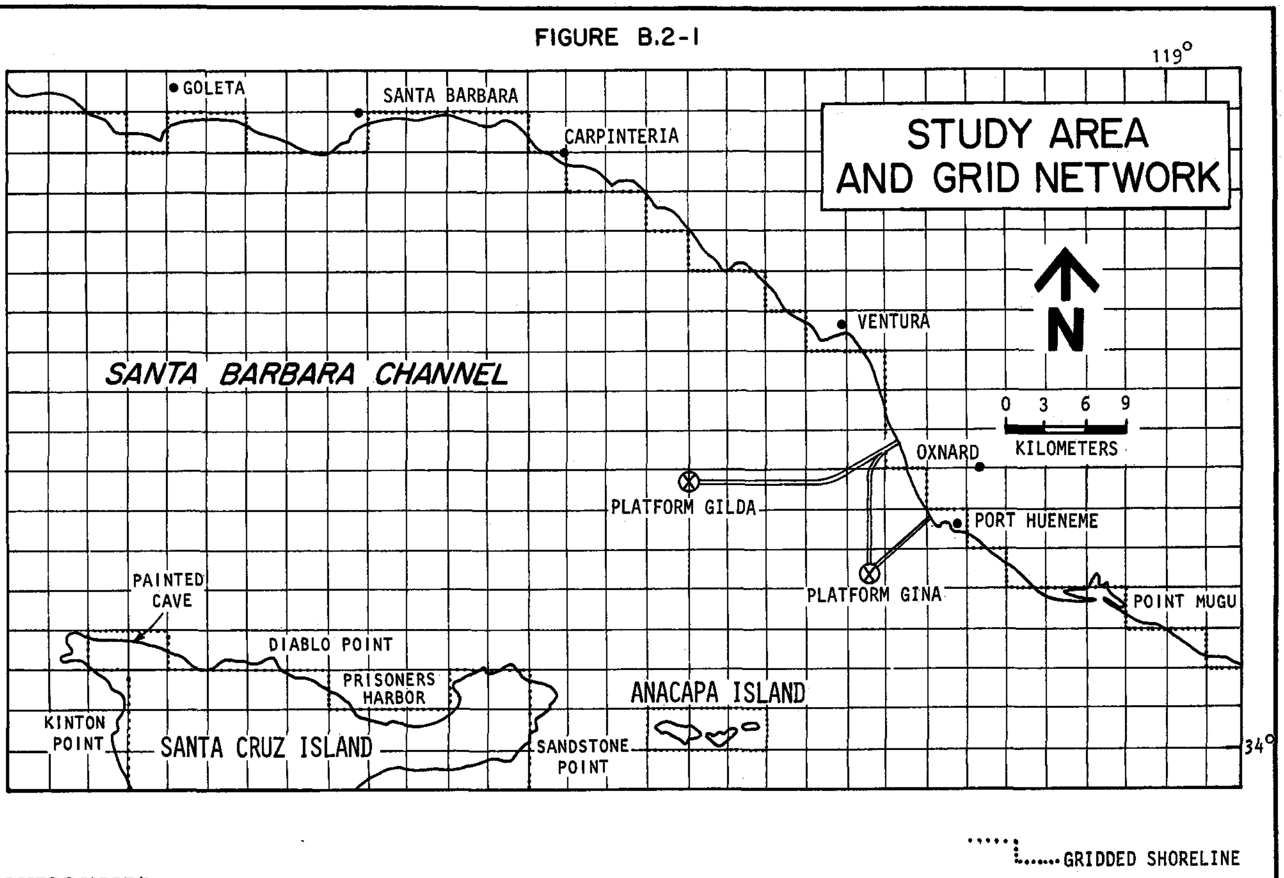
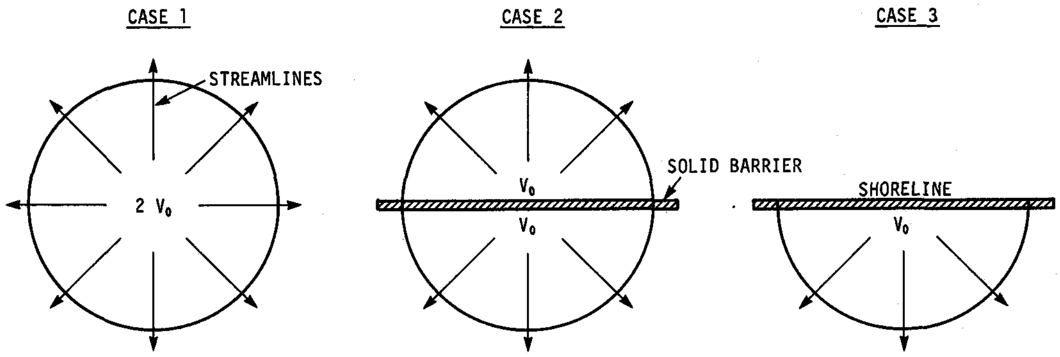
FIGURE B.2-1



STUDY AREA AND GRID NETWORK

DAMES & MOORE

FIGURE B.2-2

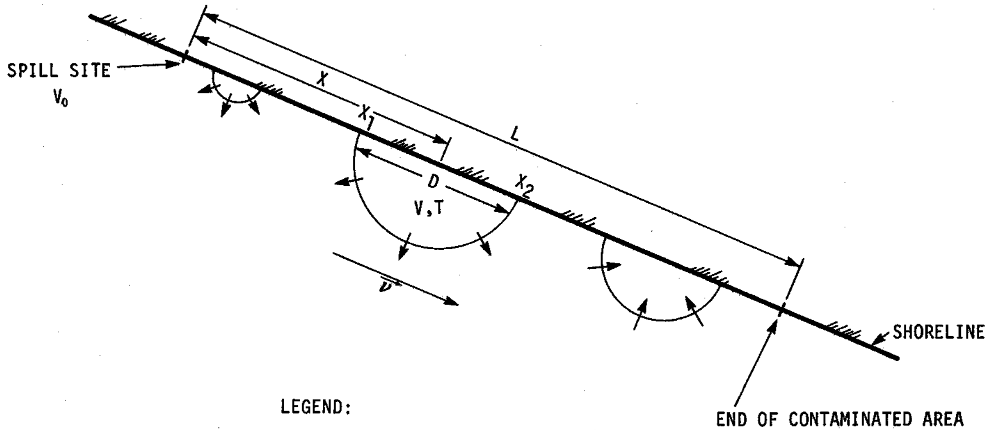


NOTE: THE OIL SLICK DIAMETER FOR THE 3 CASES IS EQUAL
FOR ANY GIVEN TIME.

OIL SPREADING AND VOLUME CHANGES BETWEEN AN OPEN SEA AND NEAR COAST OIL SPILL

DAMES & MOORE

FIGURE B.2-3



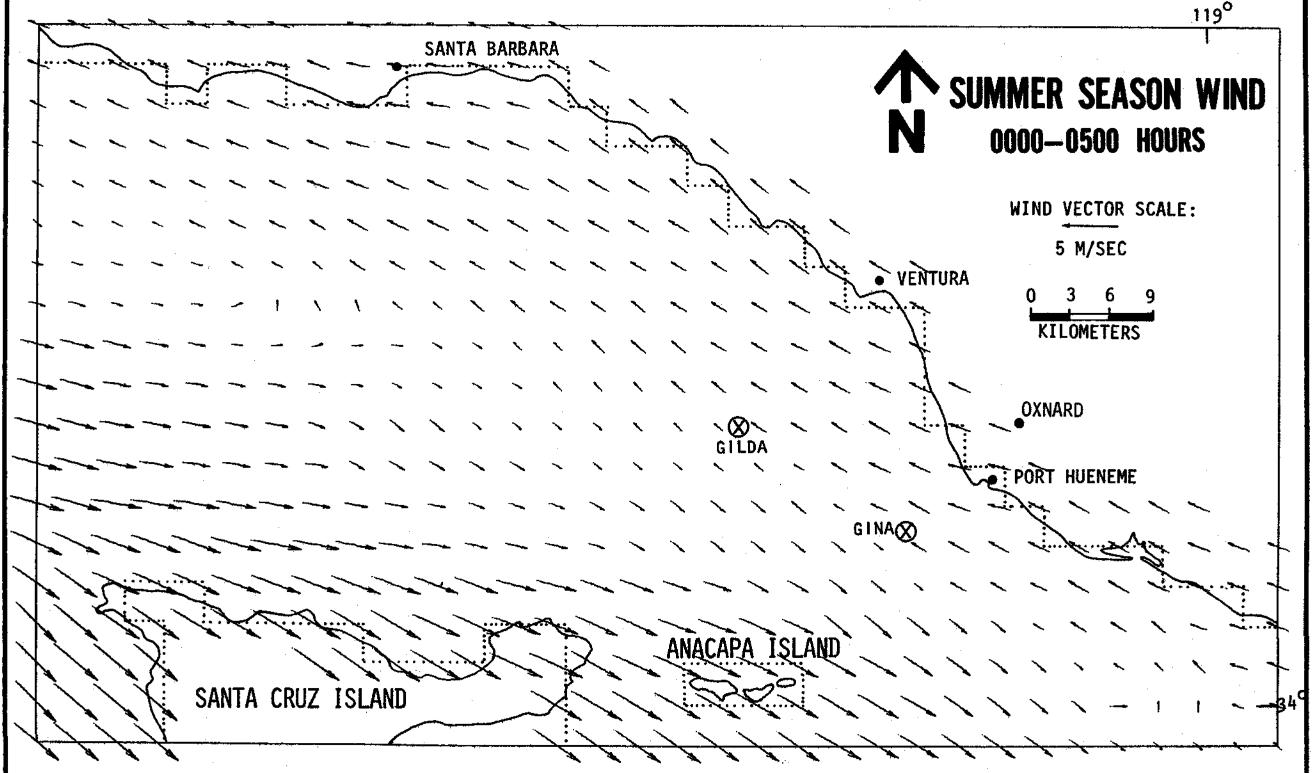
LEGEND:

LONGSHORE CURRENT : $\vec{v}$
INITIAL SPILL : V_0
SLICK VOLUME : V
SLICK DIAMETER : D
TIME : T
TOTAL LENGTH CONTAMINATED : L
SLICK POSITION : X

NEARSHORE OIL SPILL MODEL

DAMES & MOORE

FIGURE B.2-4

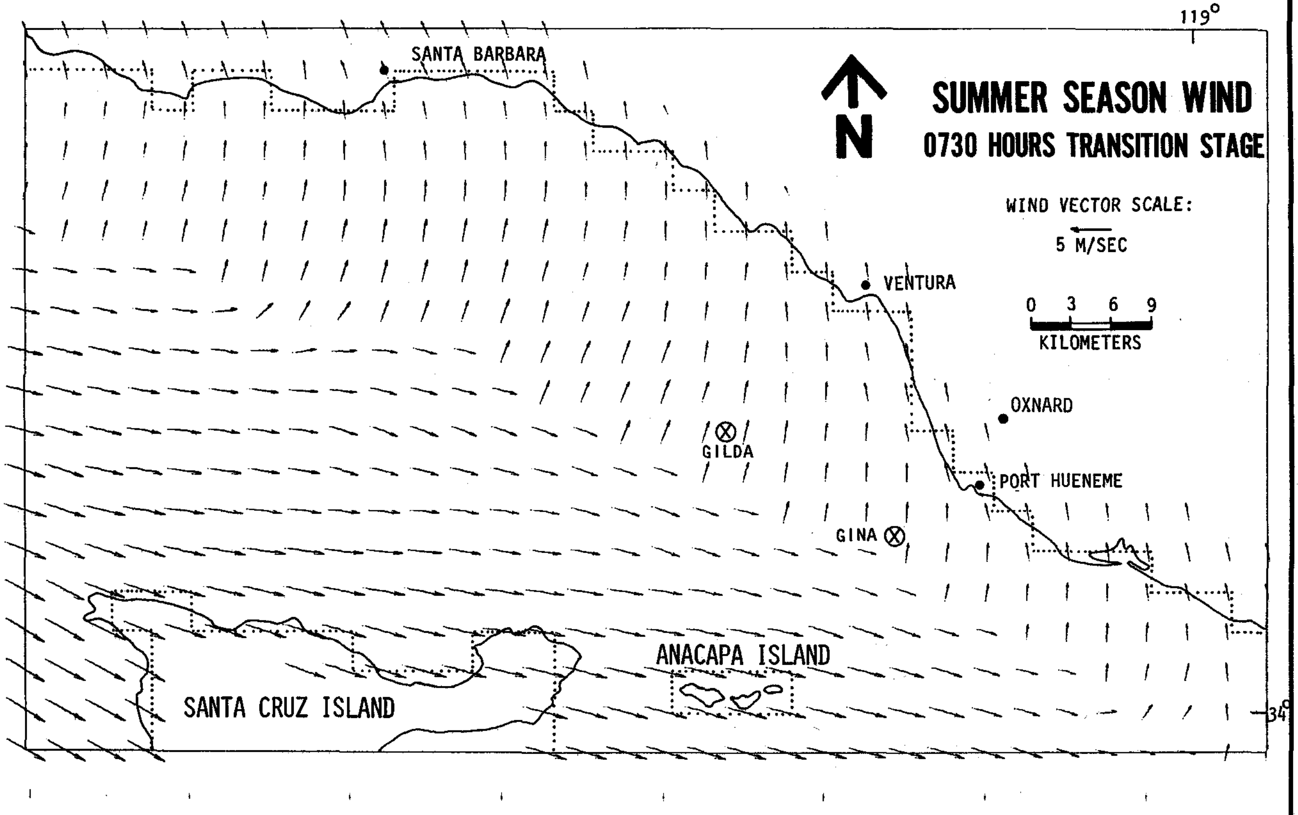


SUMMER SEASON WIND

0000–0500 HOURS

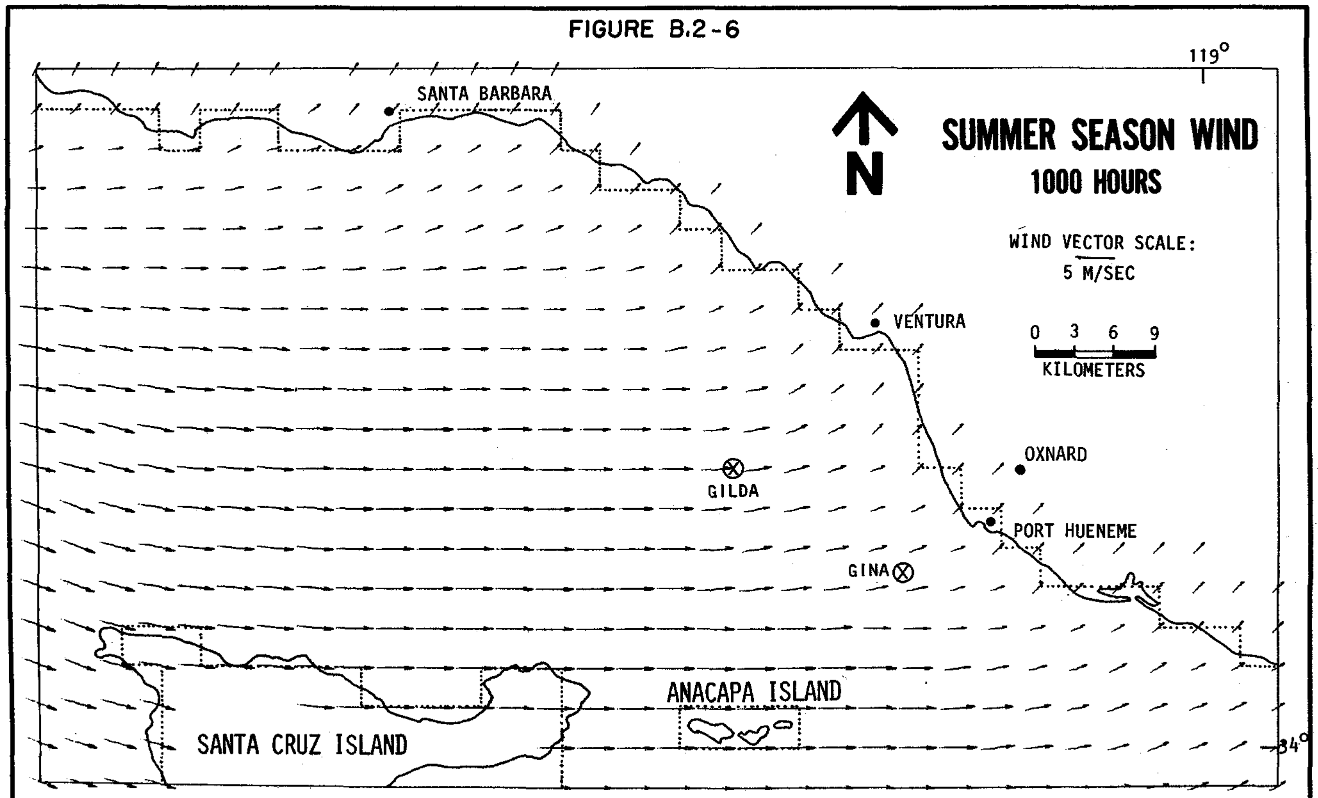
DAMES & MOORE

FIGURE B.2-5



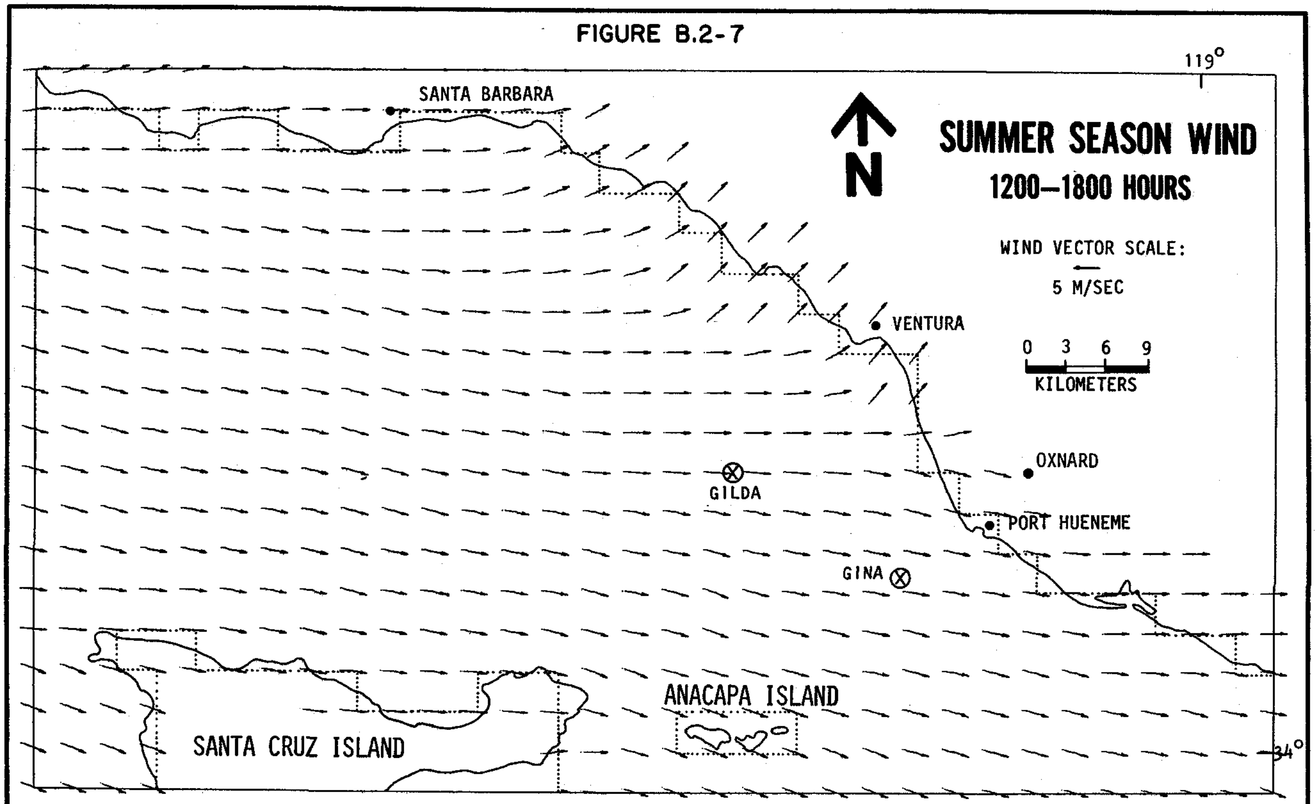
DAMES & MOORE

FIGURE B.2-6



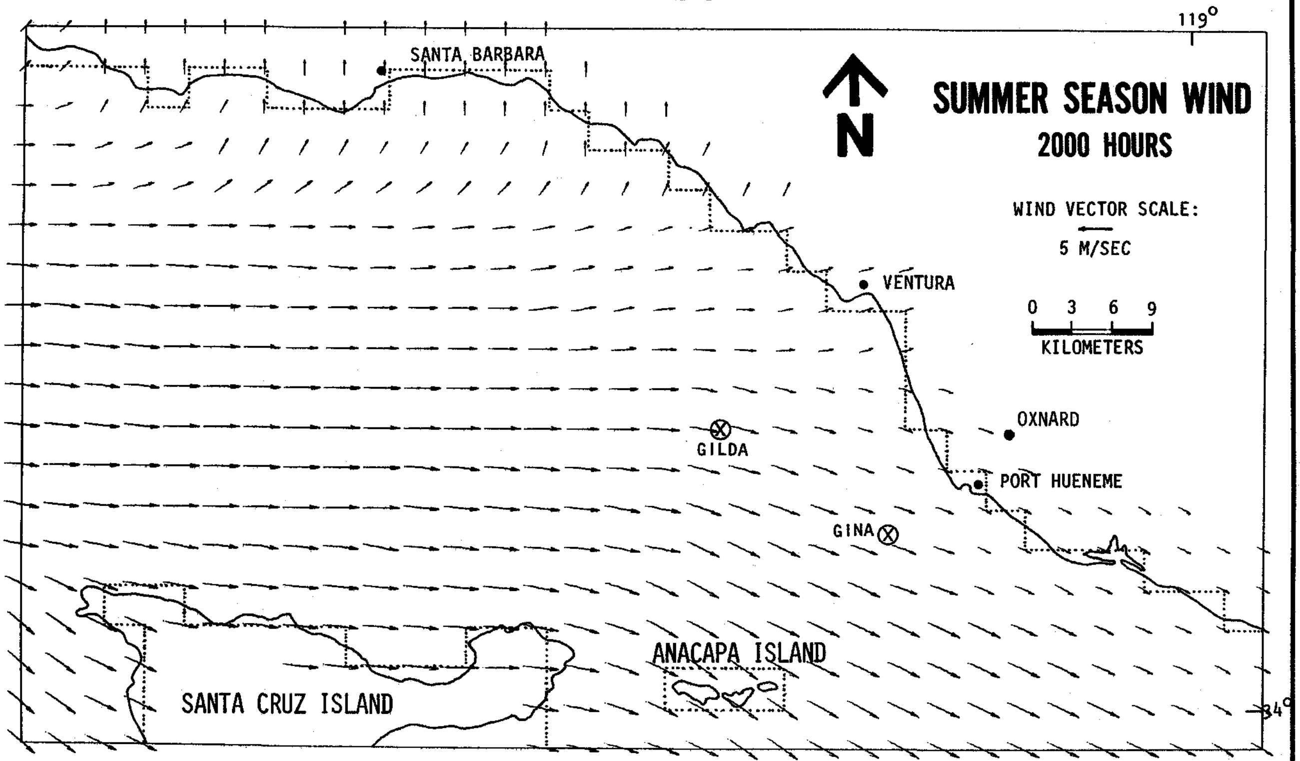
DAMES & MOORE

FIGURE B.2-7



DAMES & MOORE

FIGURE B.2-8



DAMES & MOORE

FIGURE B.2-9

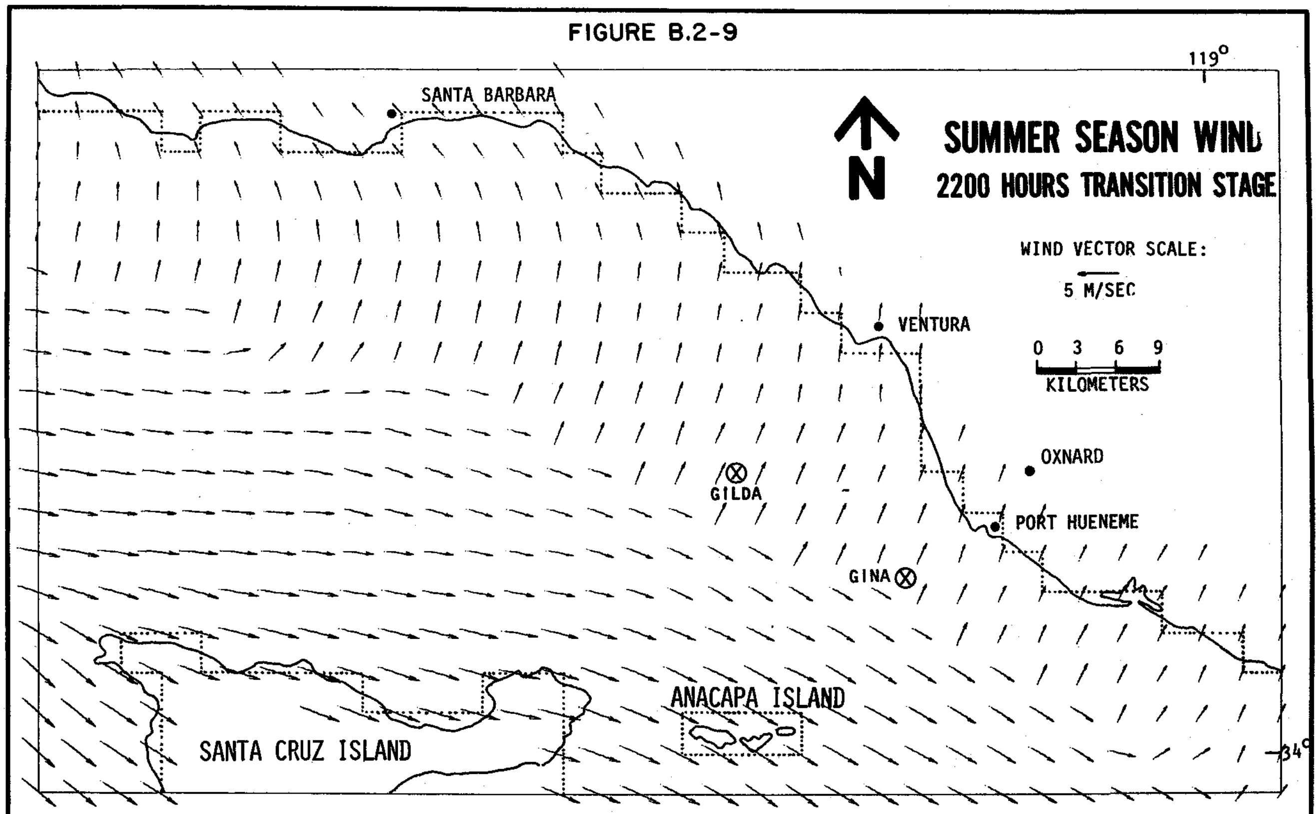


FIGURE B.2-10

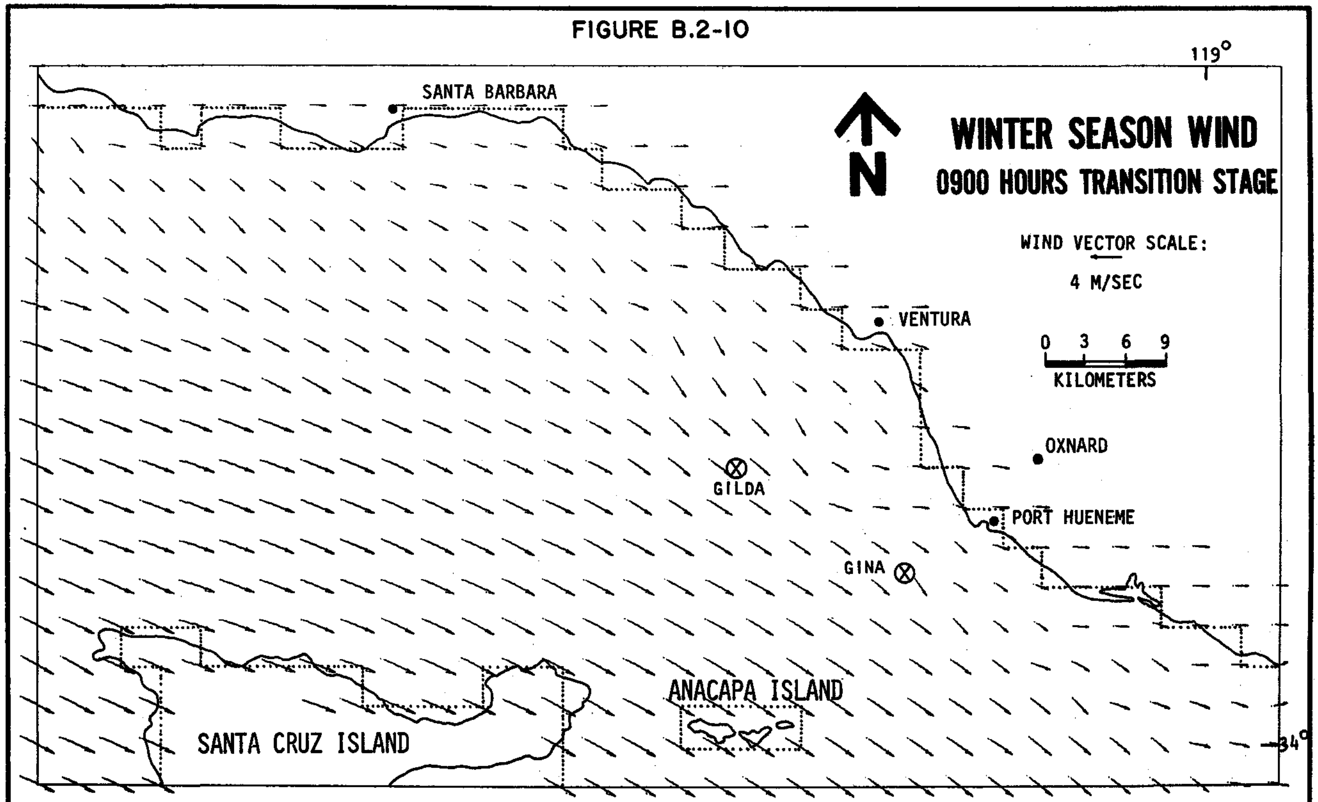
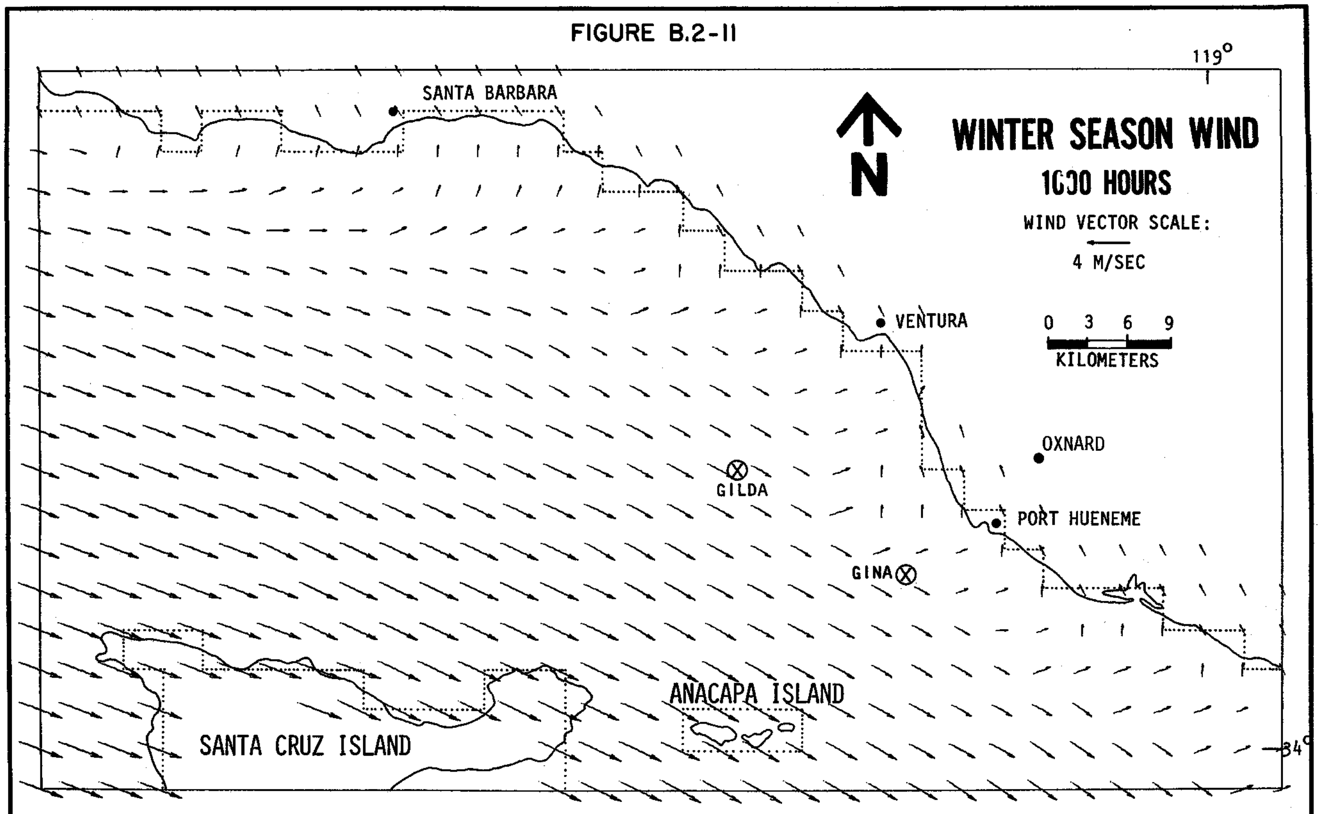
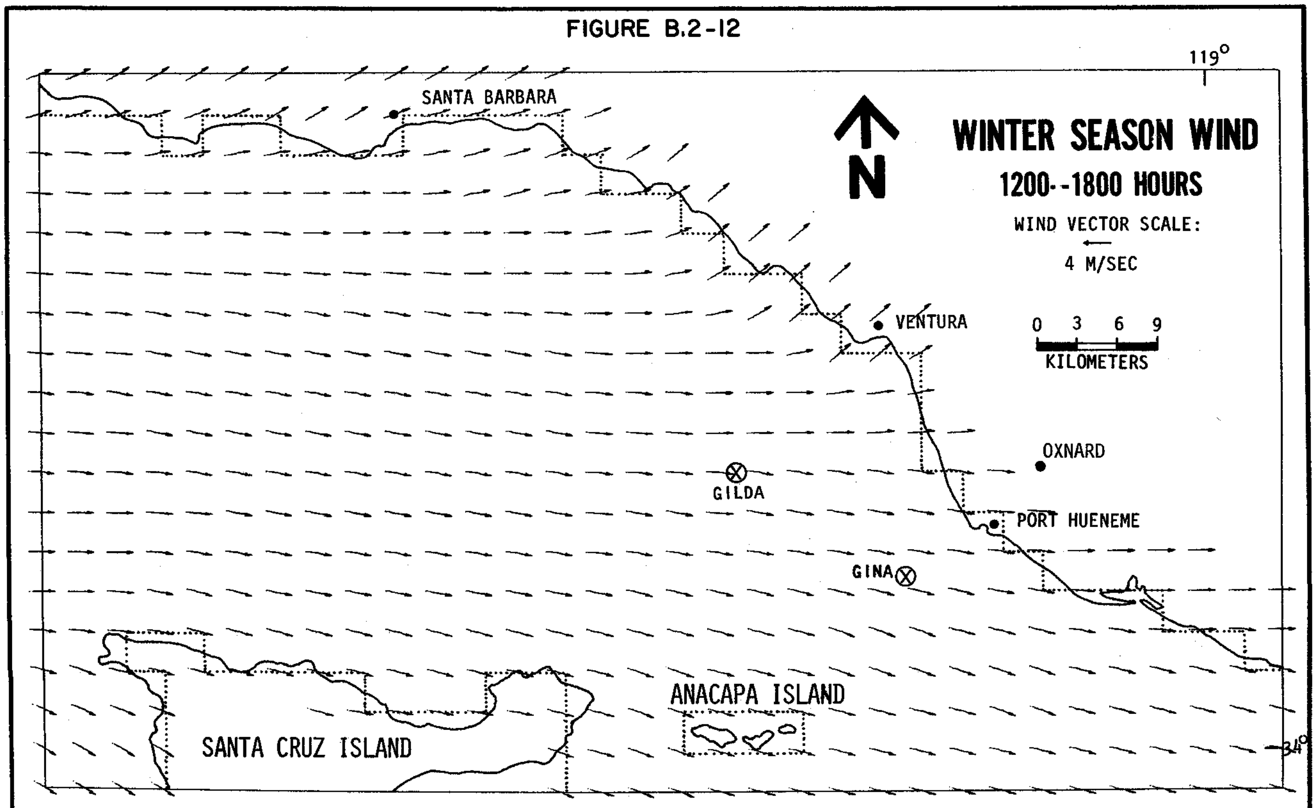


FIGURE B.2-11



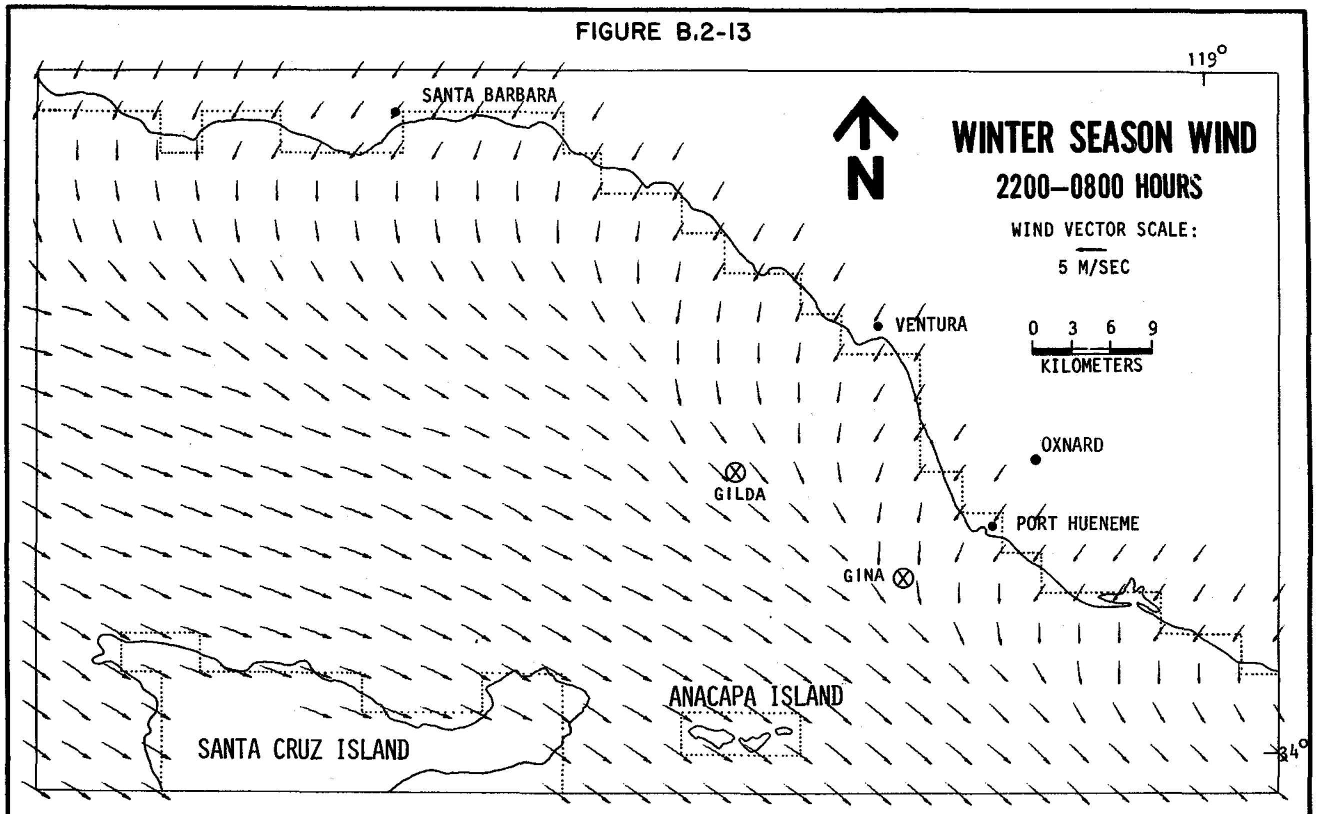
DAMES & MOORE

FIGURE B.2-12



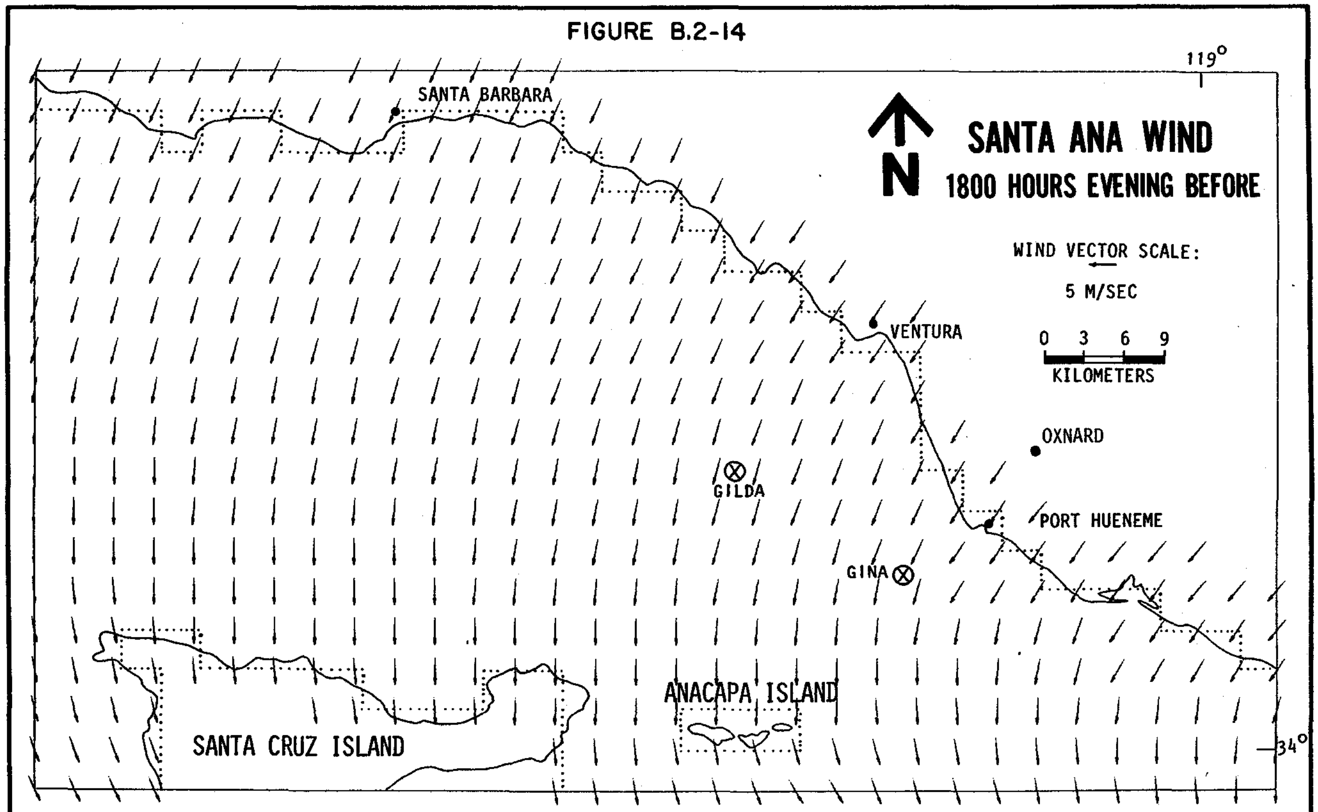
DAMES & MOORE

FIGURE B.2-13



DAMES & MOORE

FIGURE B.2-14



DAMES & MOORE

FIGURE B.2-15

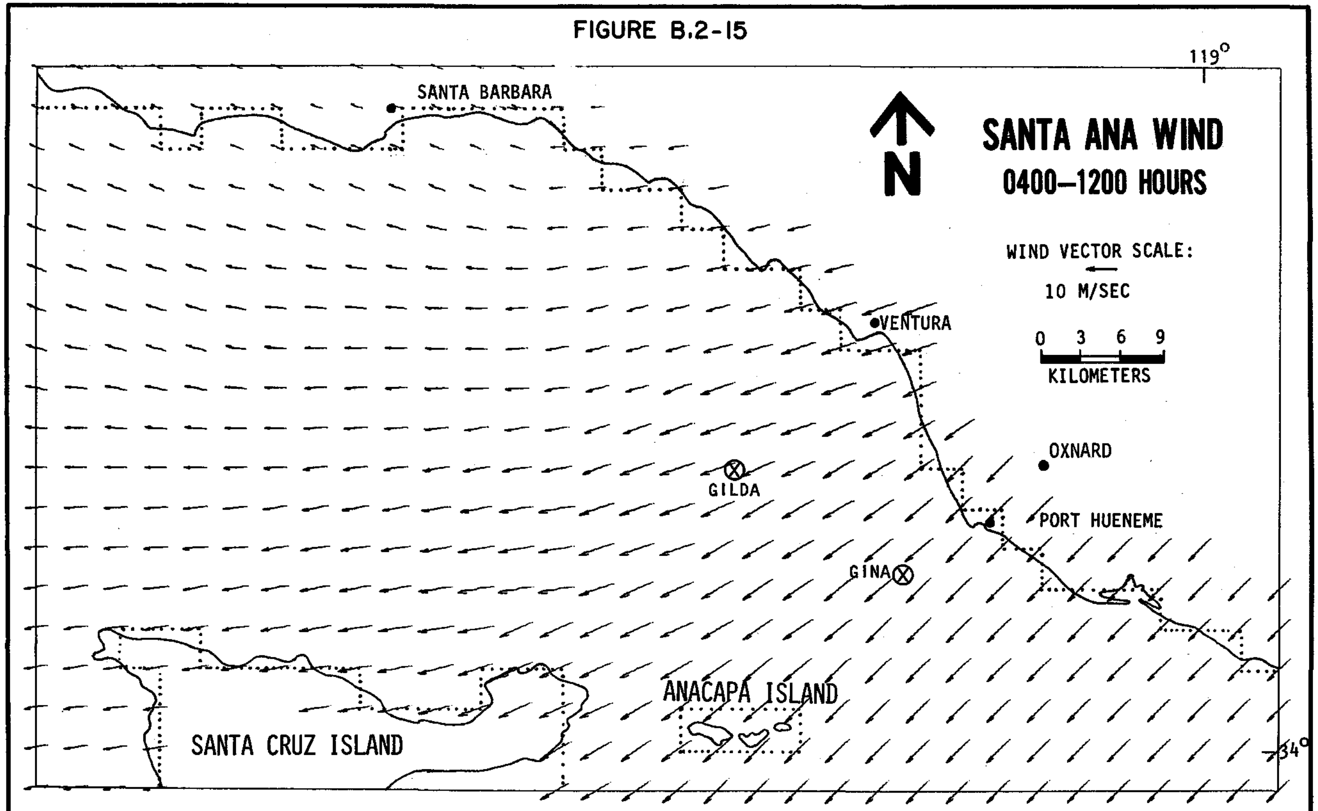


FIGURE B.2-16

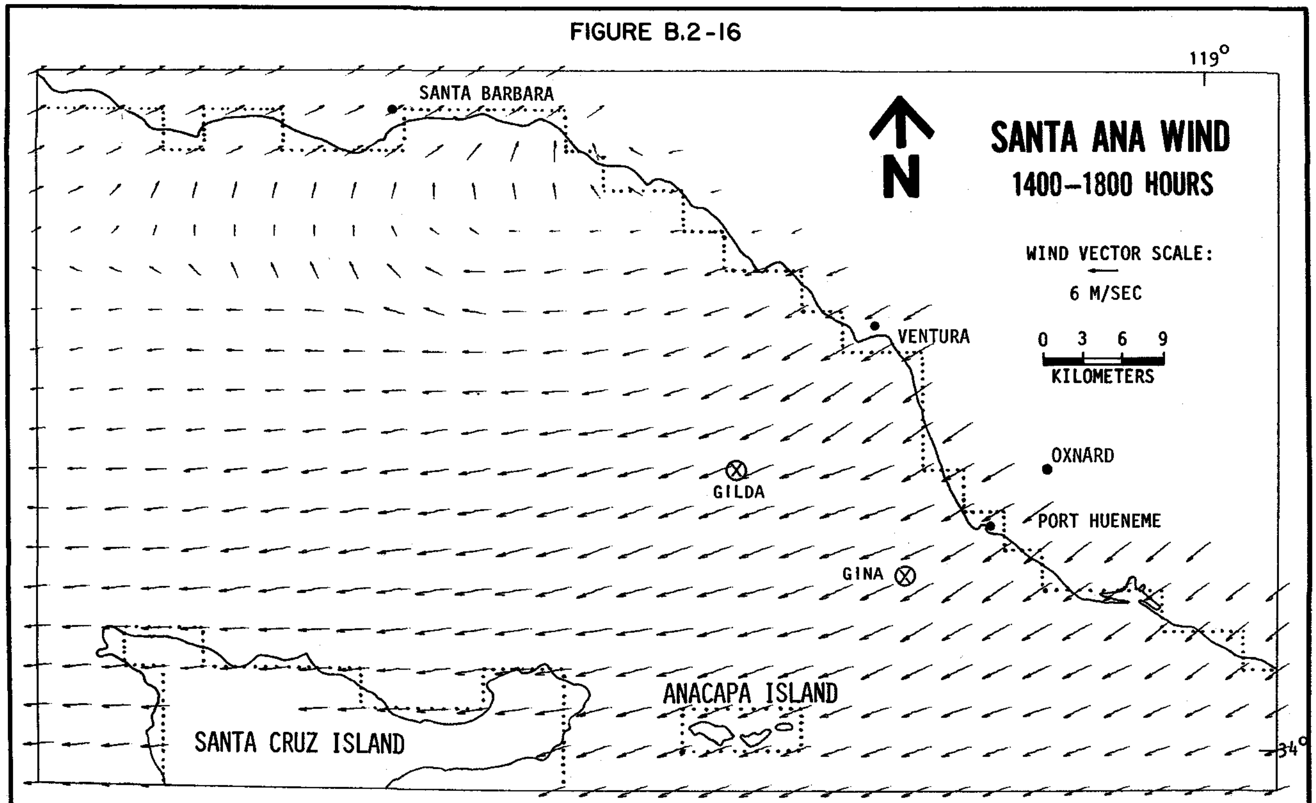
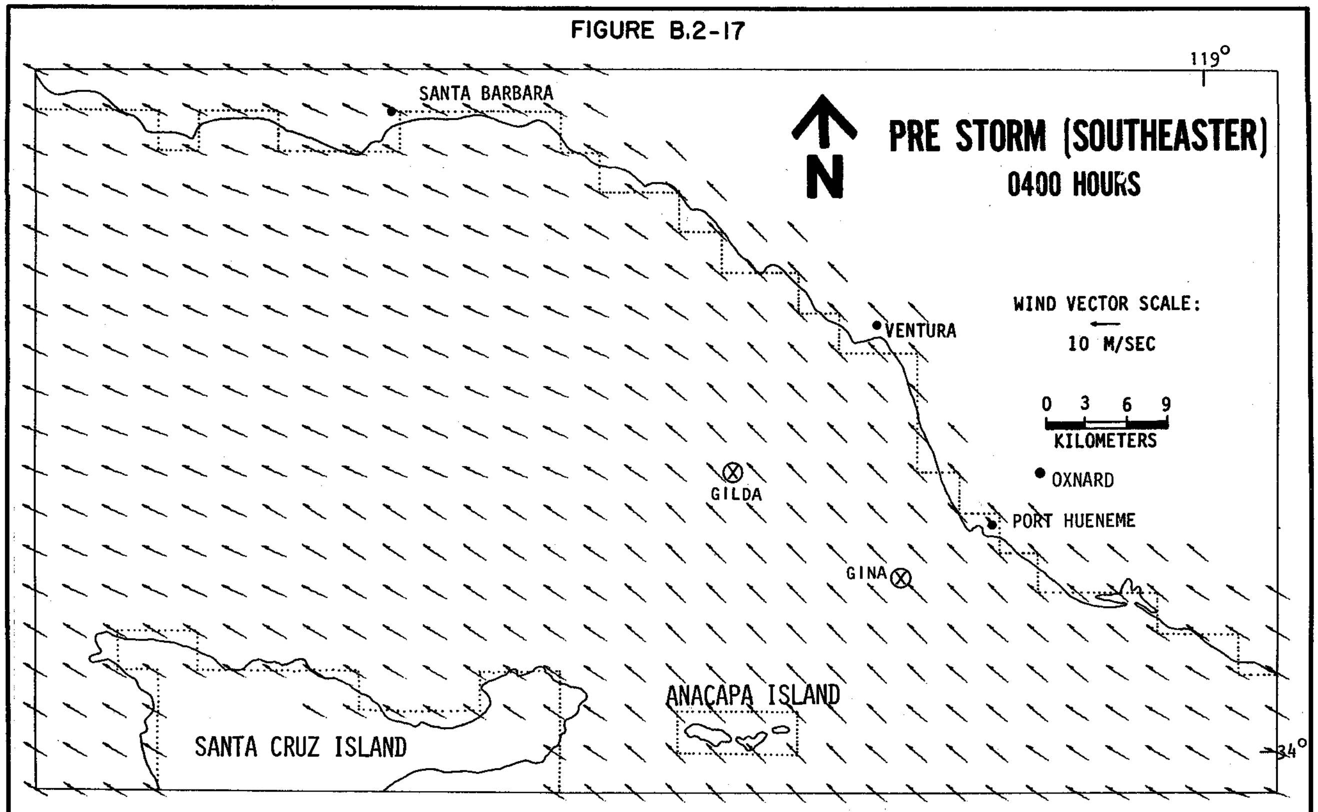
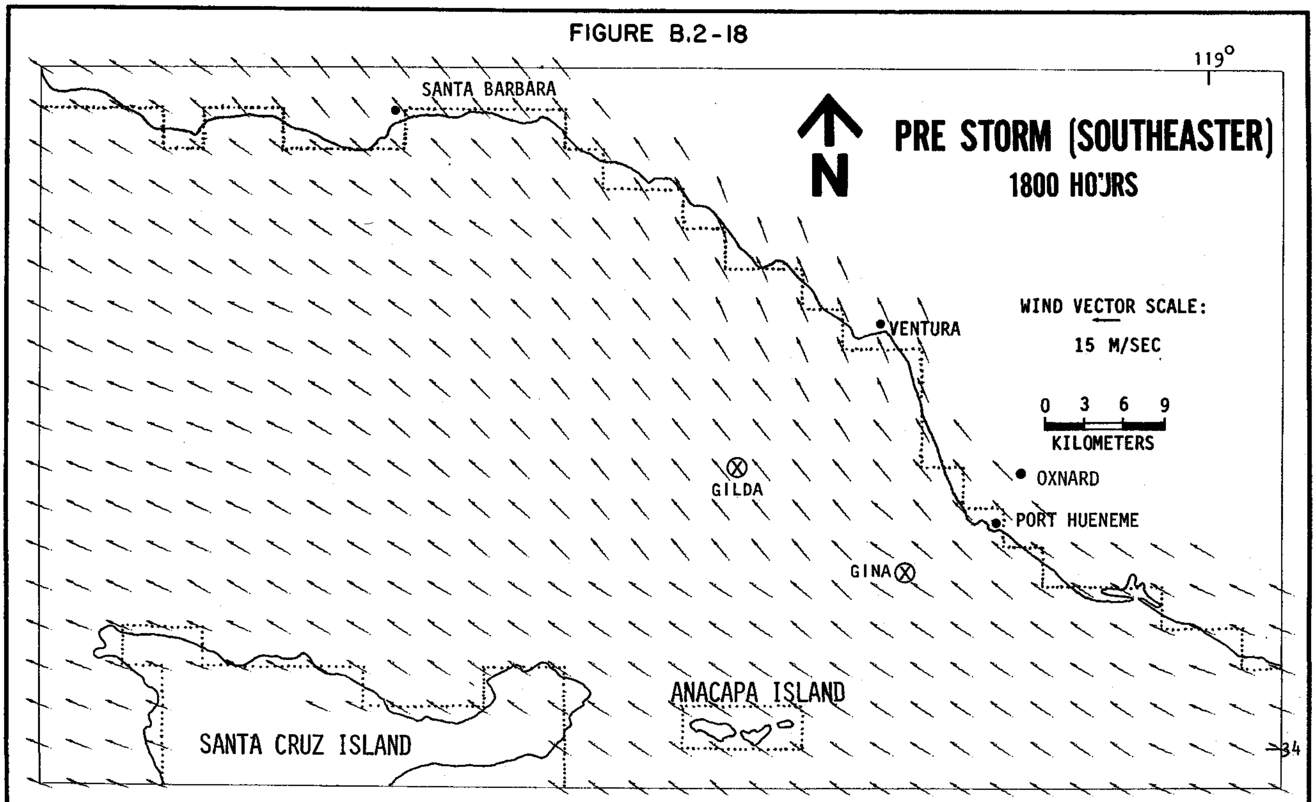


FIGURE B.2-17



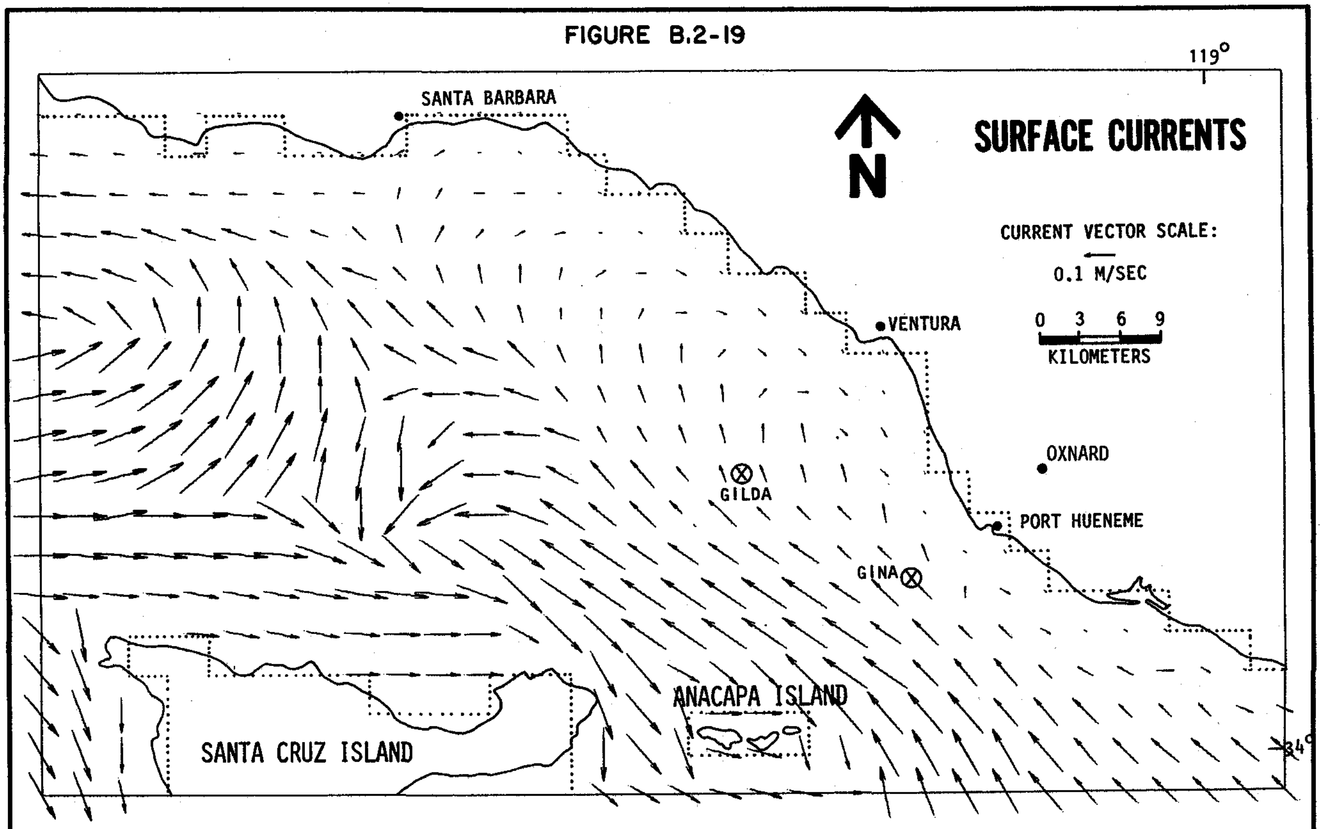
DAMES & MOORE

FIGURE B.2-18



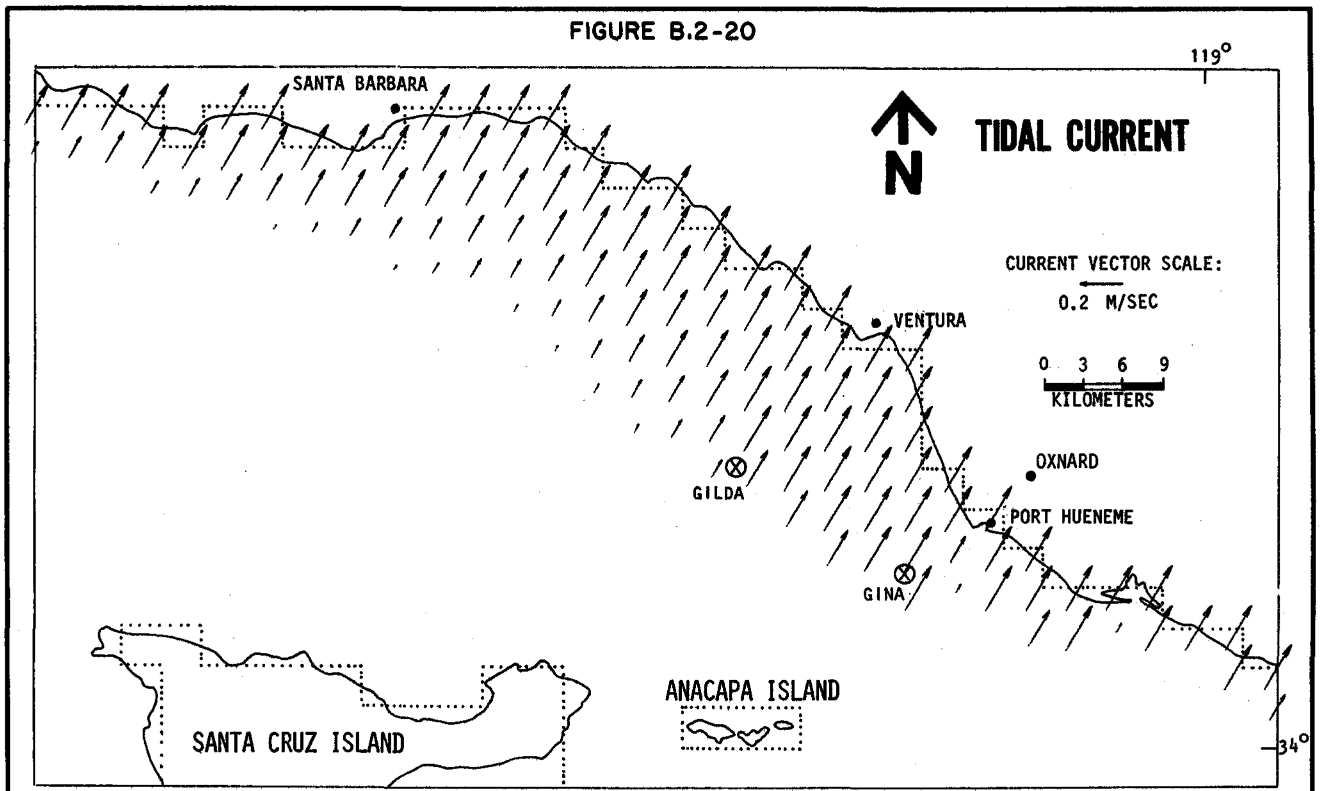
DAMES & MOORE

FIGURE B.2-19



DAMES & MOORE

FIGURE B.2-20



DAMES & MOORE

FIGURE B.2-21

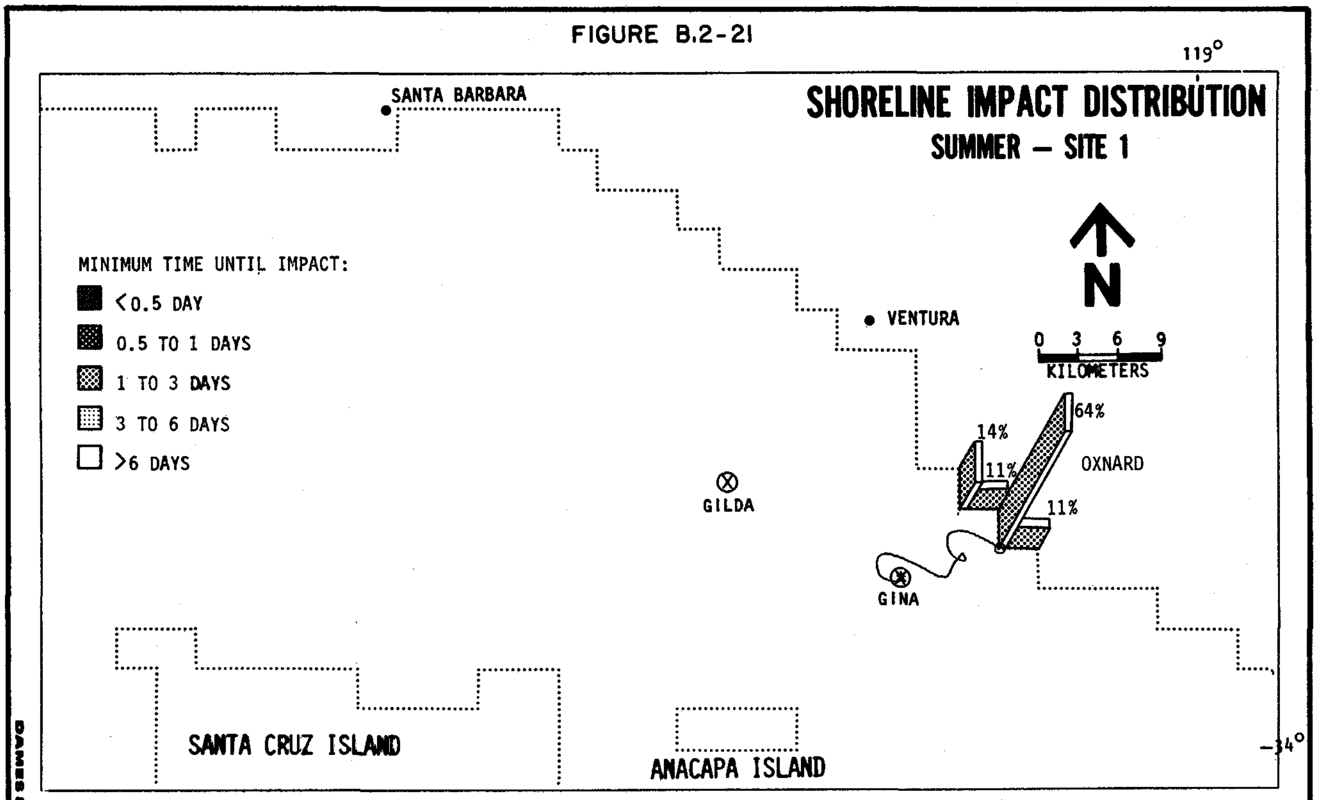


FIGURE B.2-22

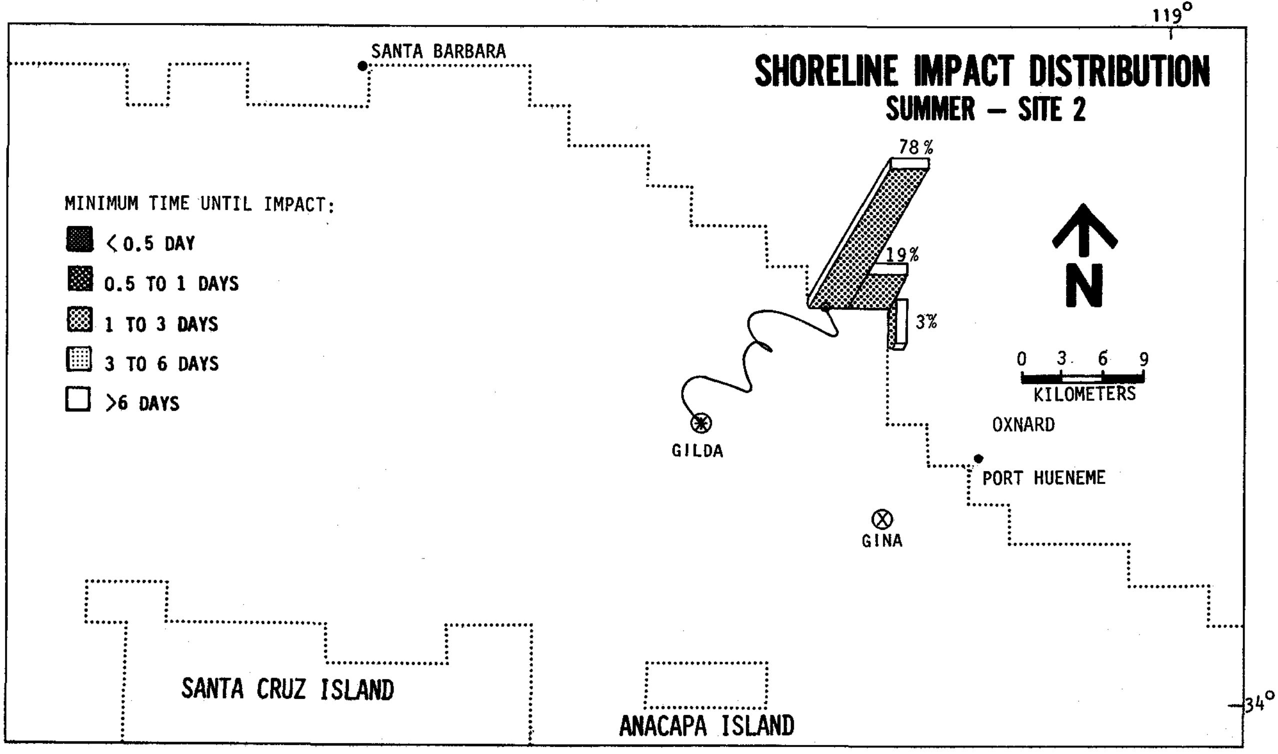
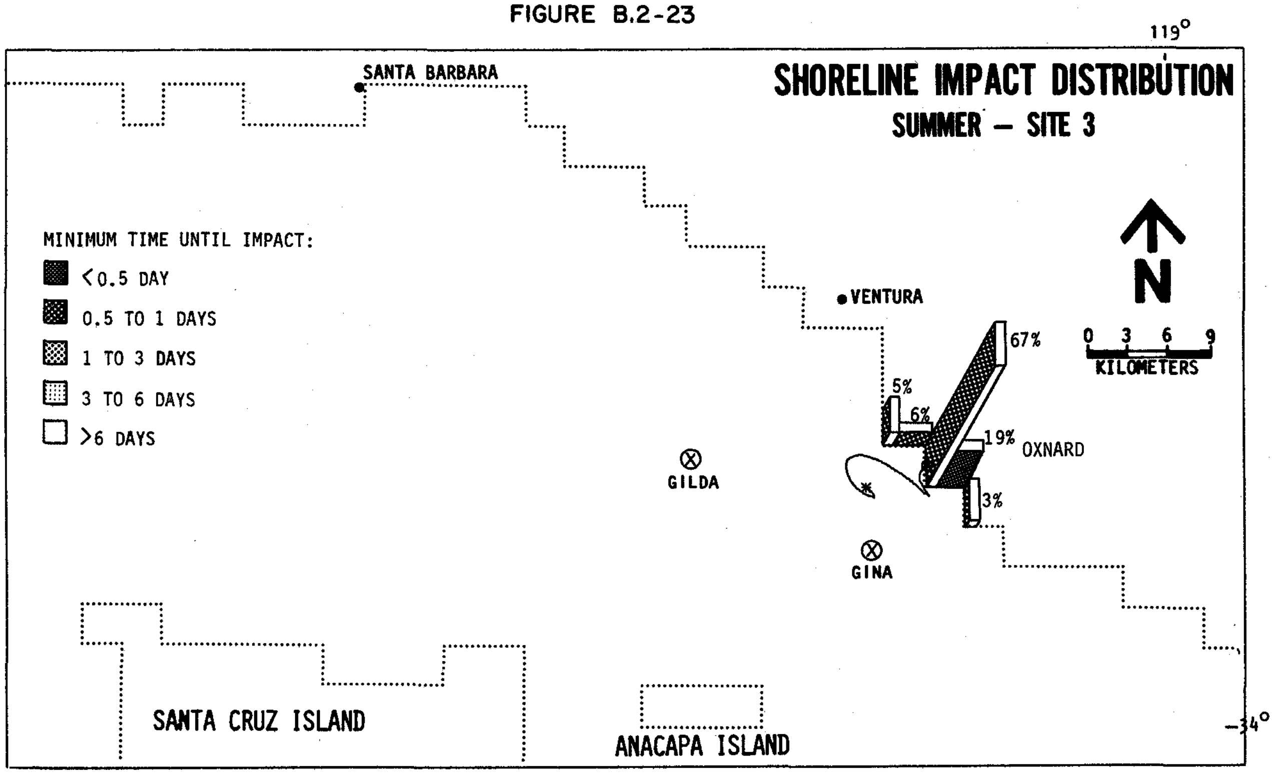
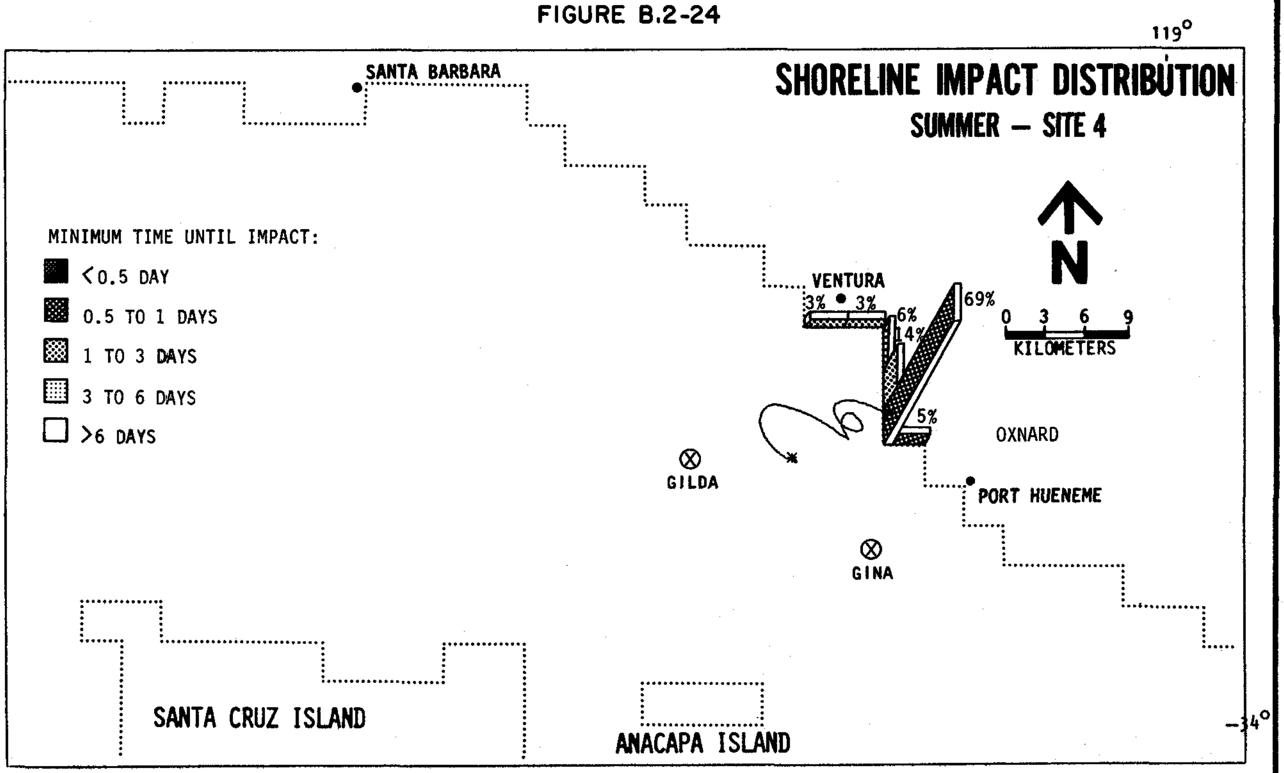


FIGURE B.2-23



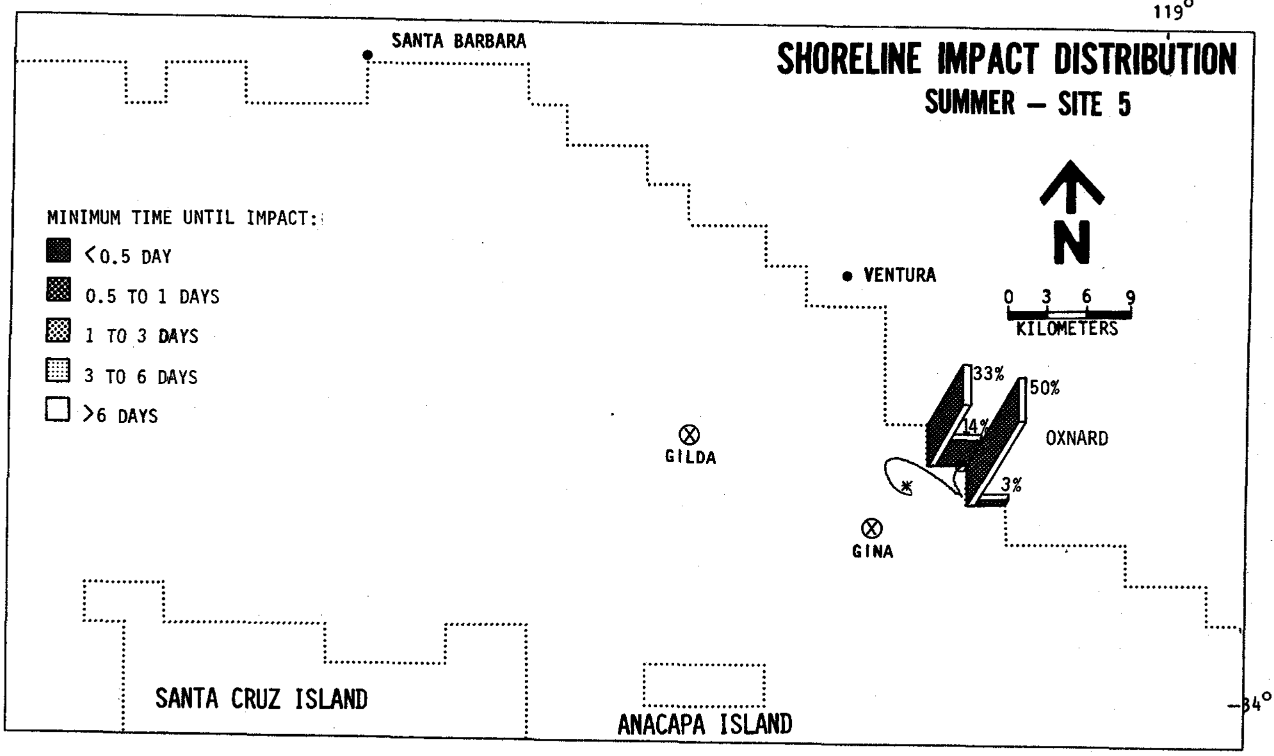
DAMES & MOORE

FIGURE B.2-24



DAMES & MOORE

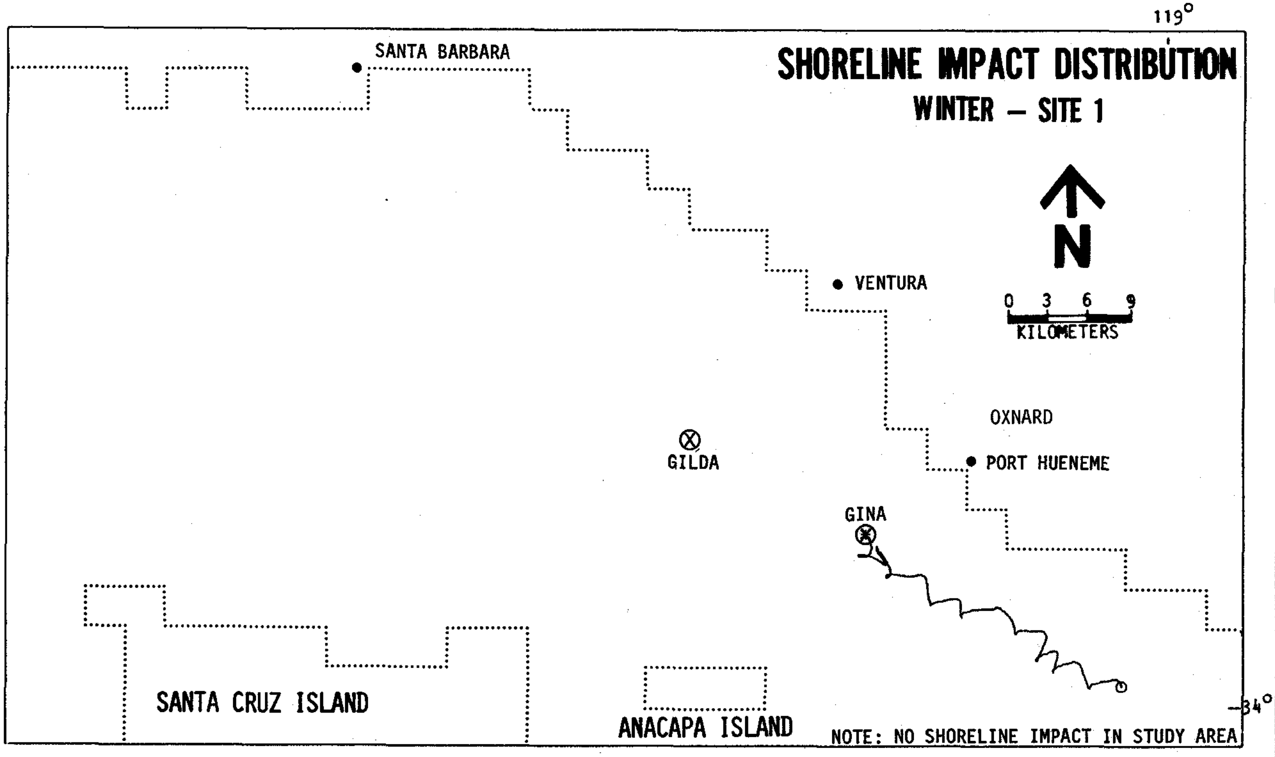
FIGURE B.2-25


SHORELINE IMPACT DISTRIBUTION

SUMMER – SITE 5

DAMES & MOORE

FIGURE B.2-26


SHORELINE IMPACT DISTRIBUTION

WINTER – SITE 1

NOTE: NO SHORELINE IMPACT IN STUDY AREA

DAMES & MOORE

FIGURE B.2-27

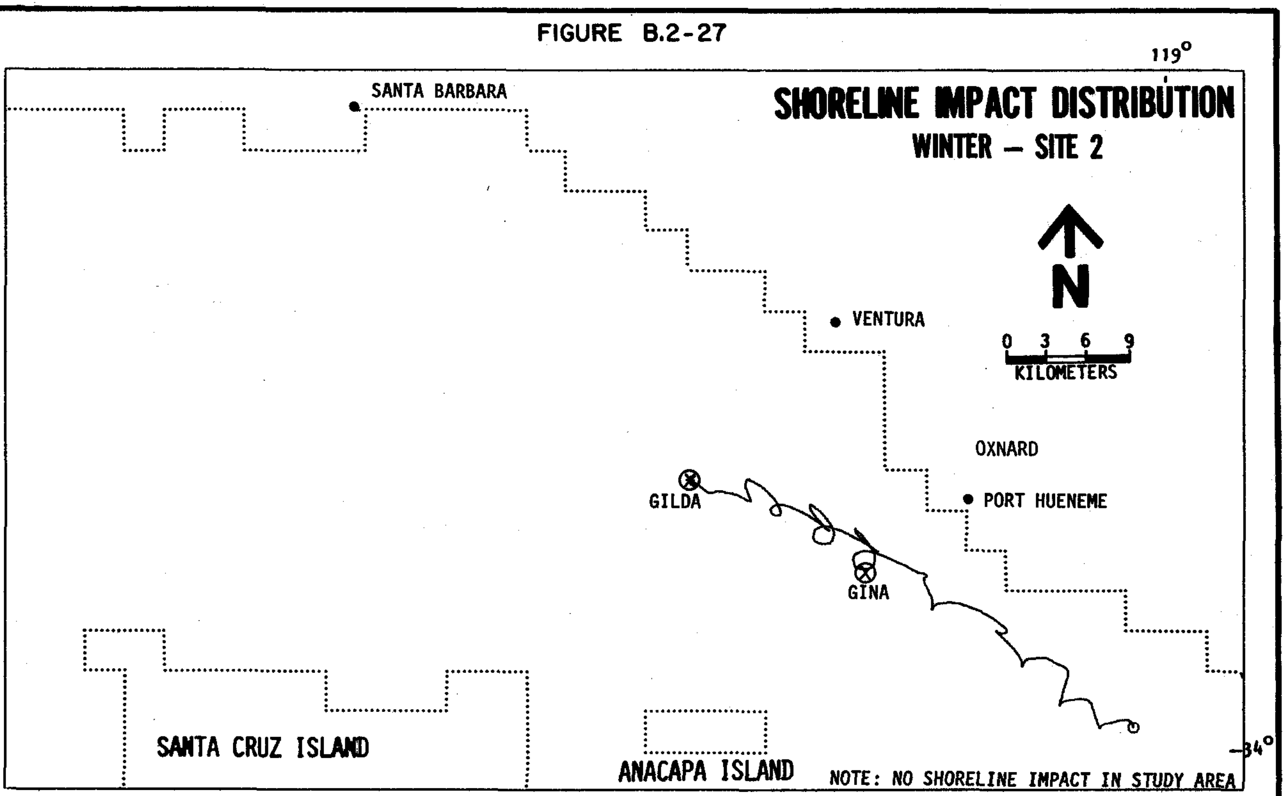


FIGURE B.2-28

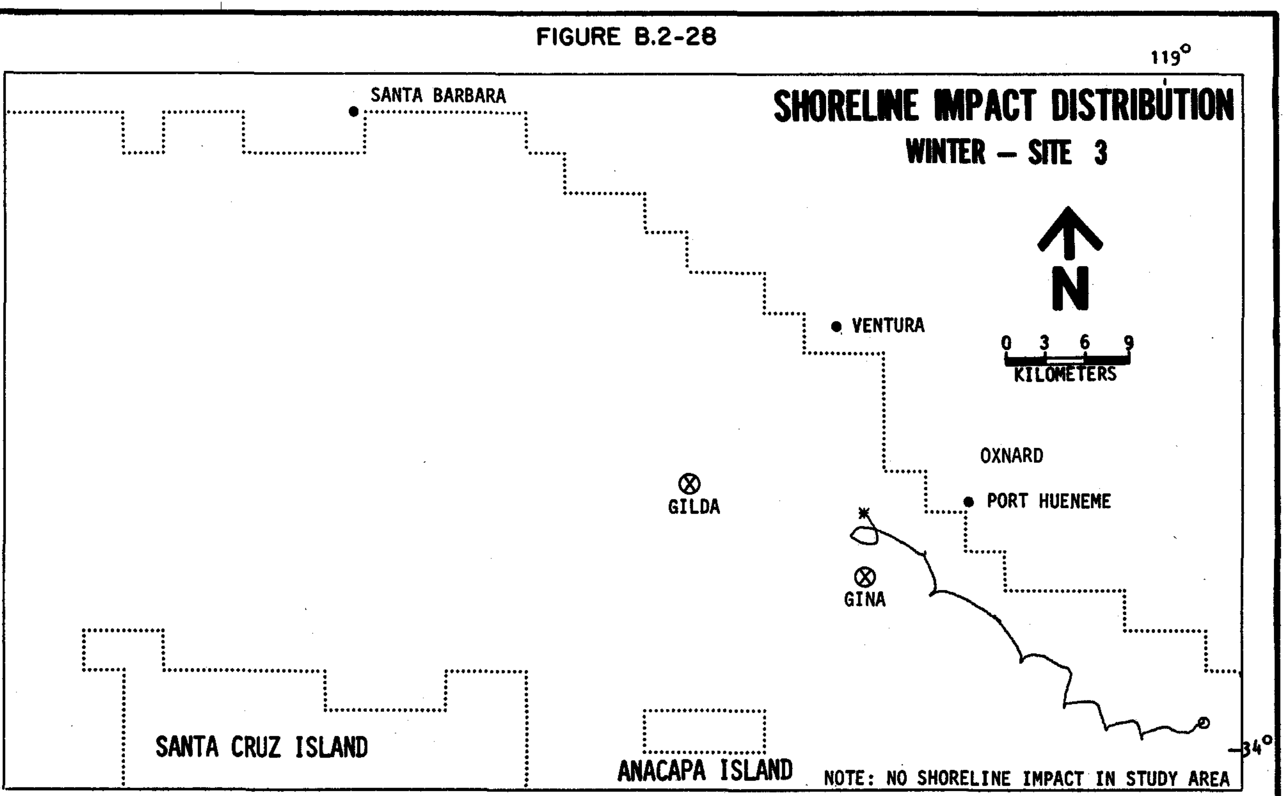
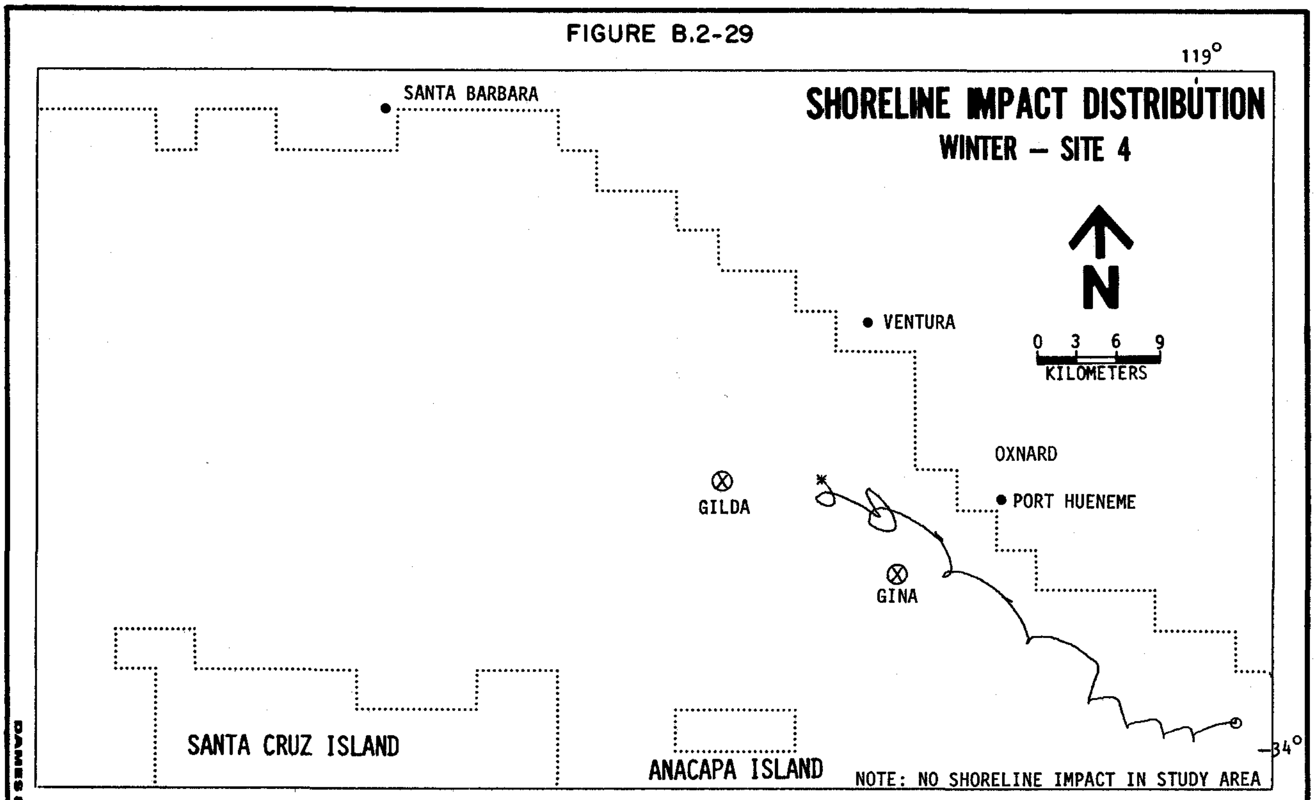


FIGURE B.2-29

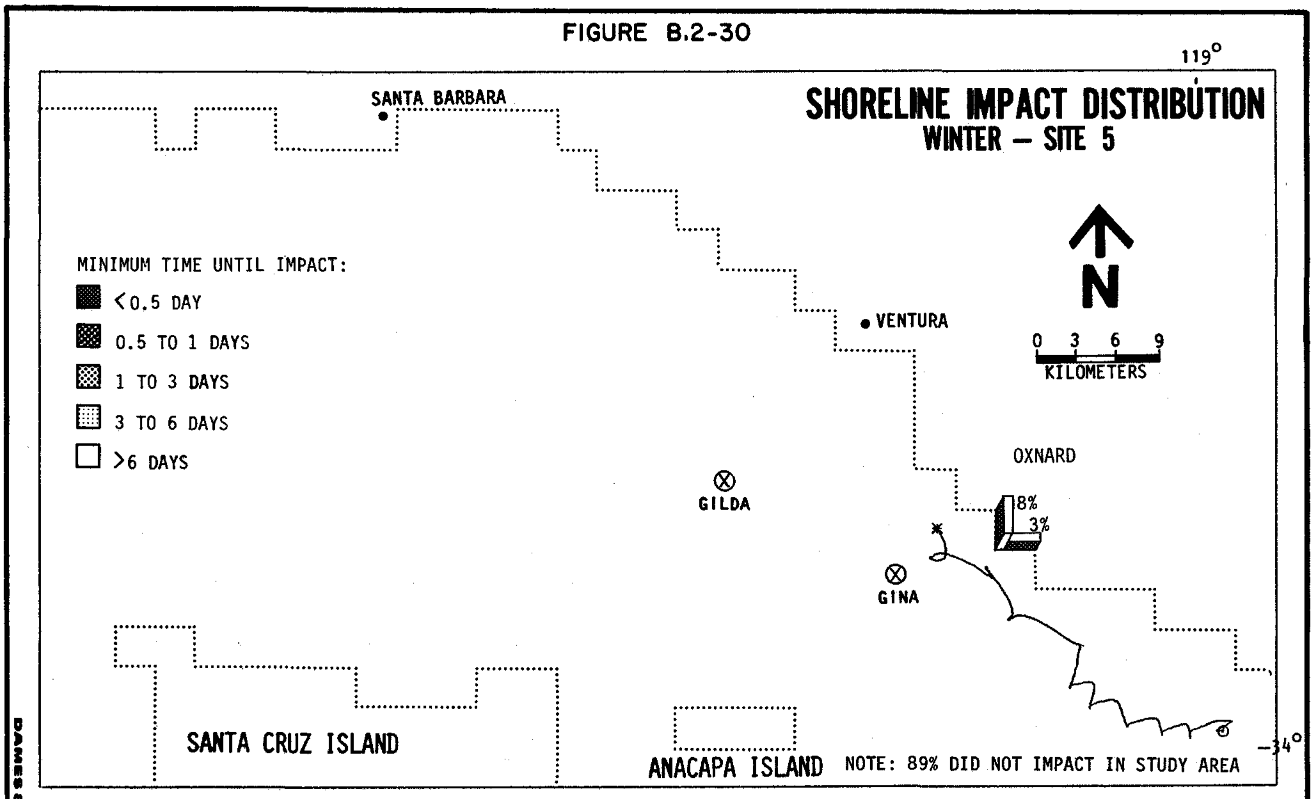


SHORELINE IMPACT DISTRIBUTION
WINTER – SITE 4

NOTE: NO SHORELINE IMPACT IN STUDY AREA

DAMES & MOORE

FIGURE B.2-30



SHORELINE IMPACT DISTRIBUTION
WINTER – SITE 5

NOTE: 89% DID NOT IMPACT IN STUDY AREA

DAMES & MOORE

FIGURE B.2-31

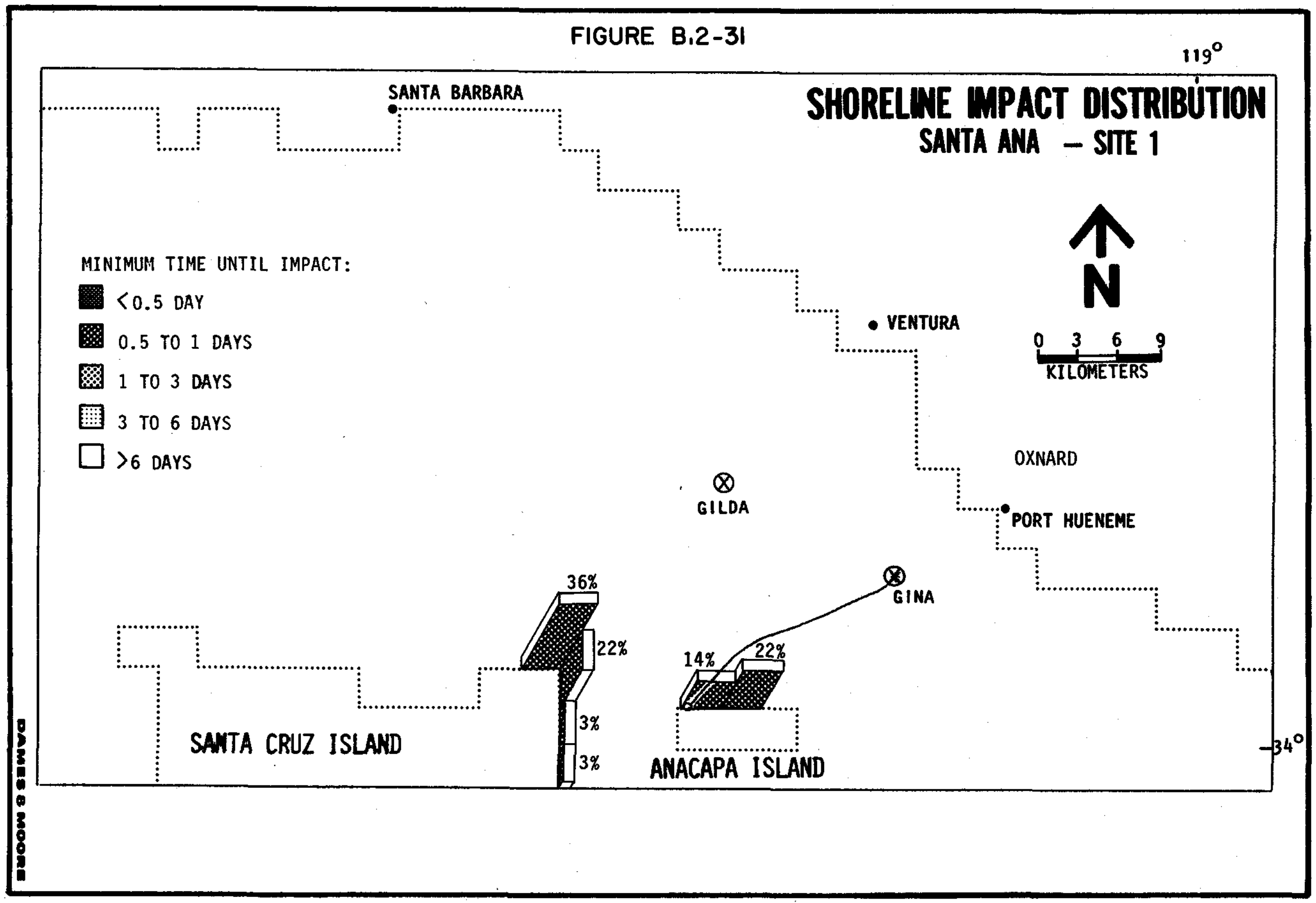


FIGURE B.2-32

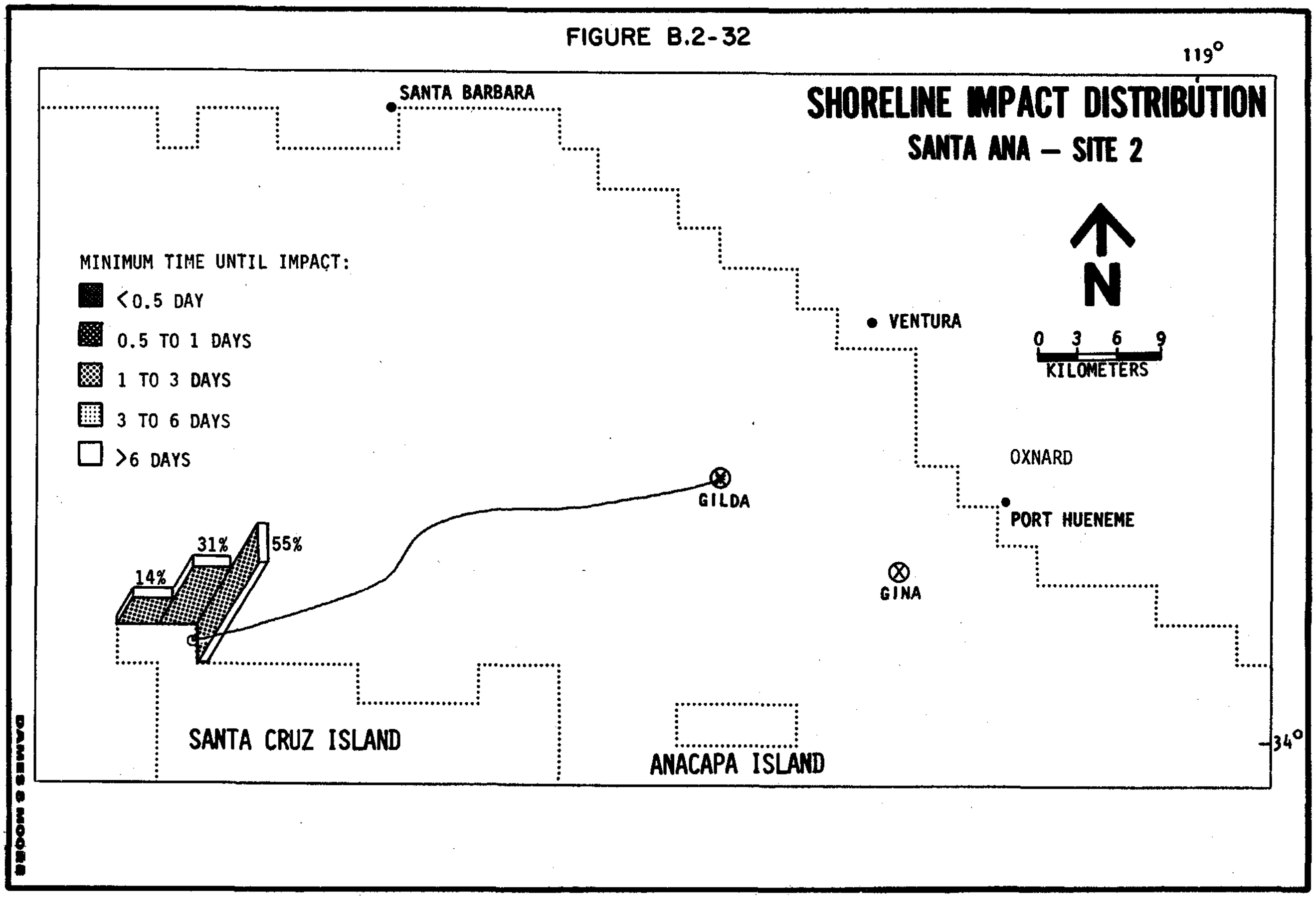


FIGURE B.2-33

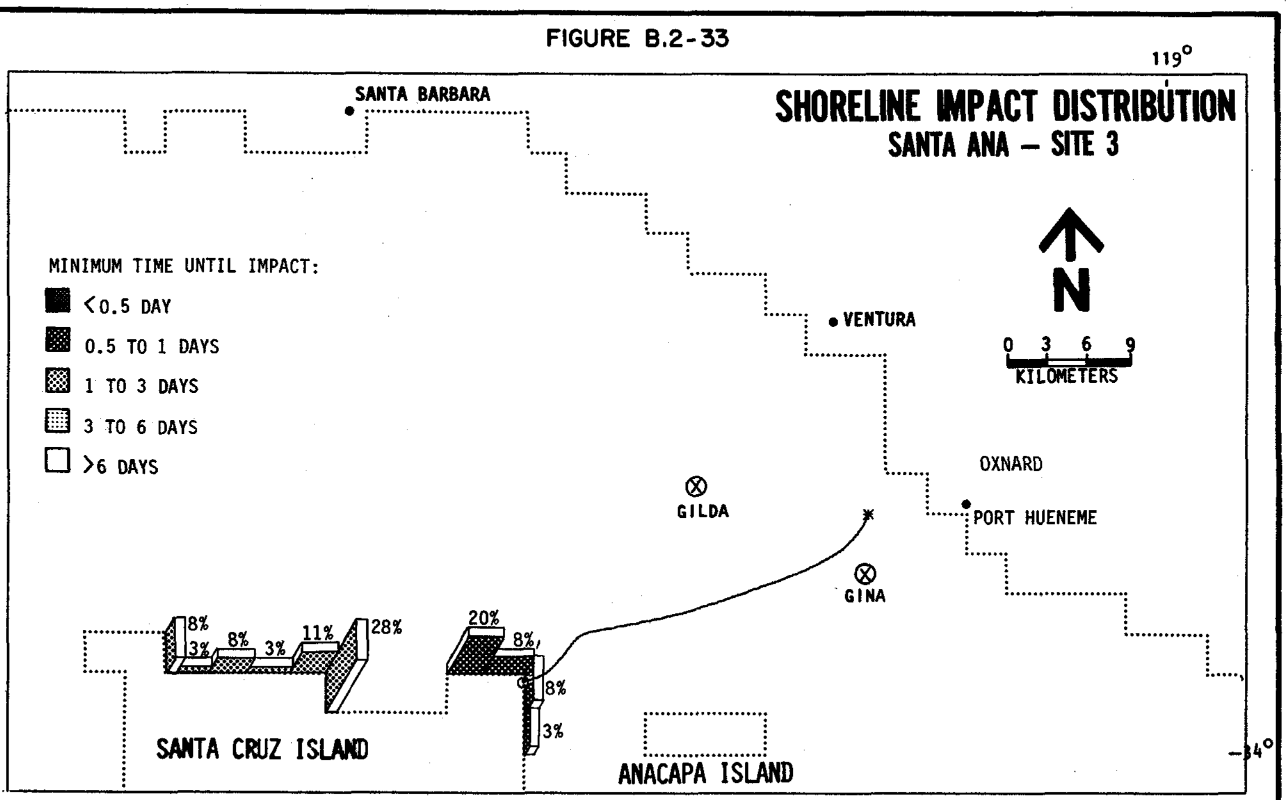


FIGURE B.2-34

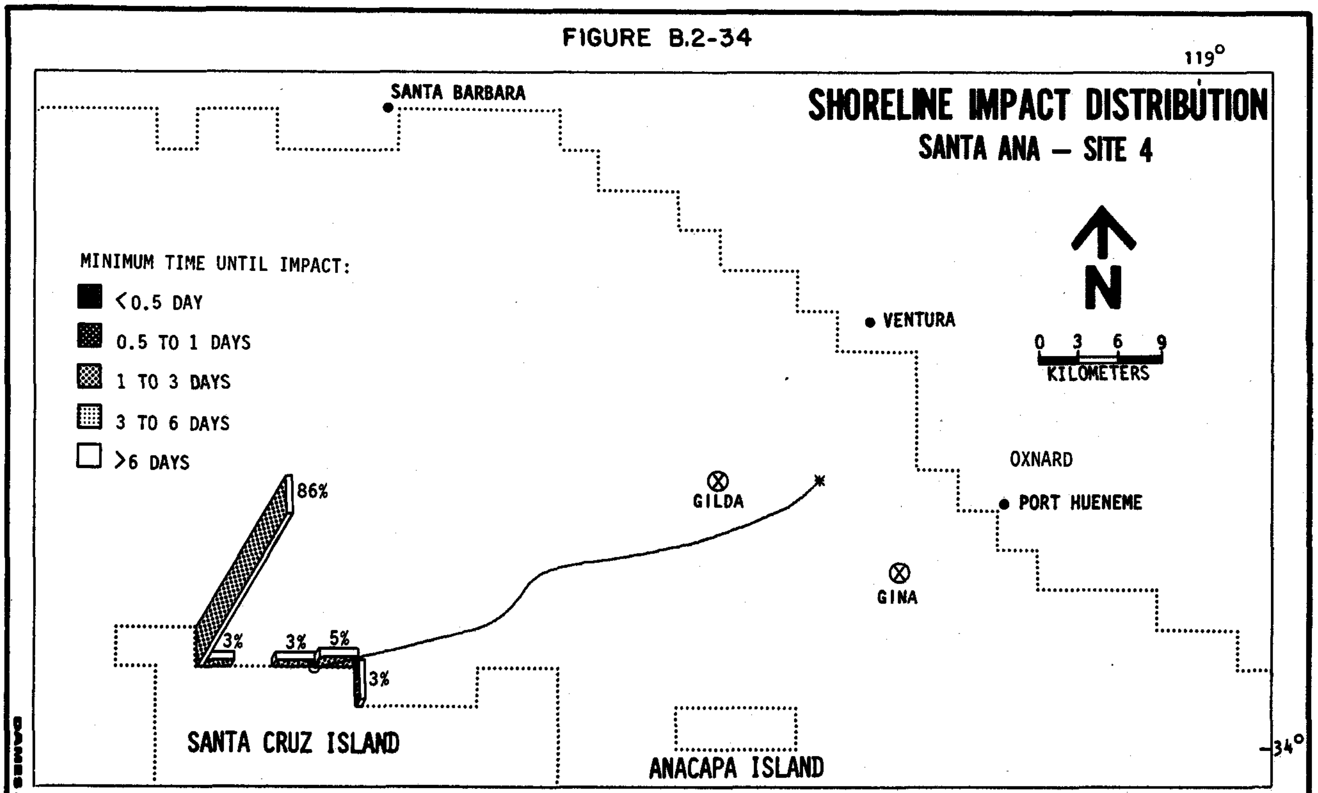


FIGURE B.2-35

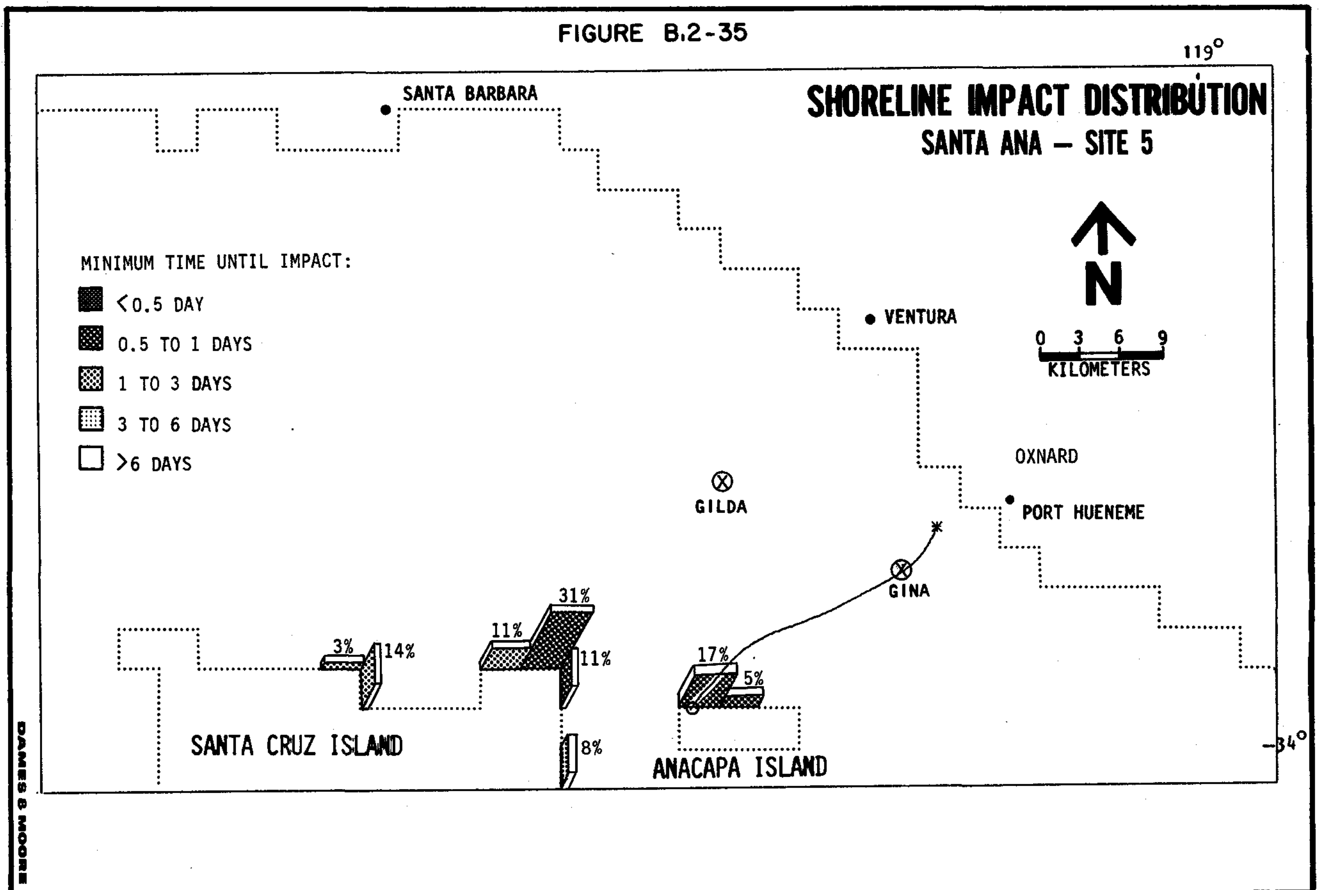


FIGURE B.2-36

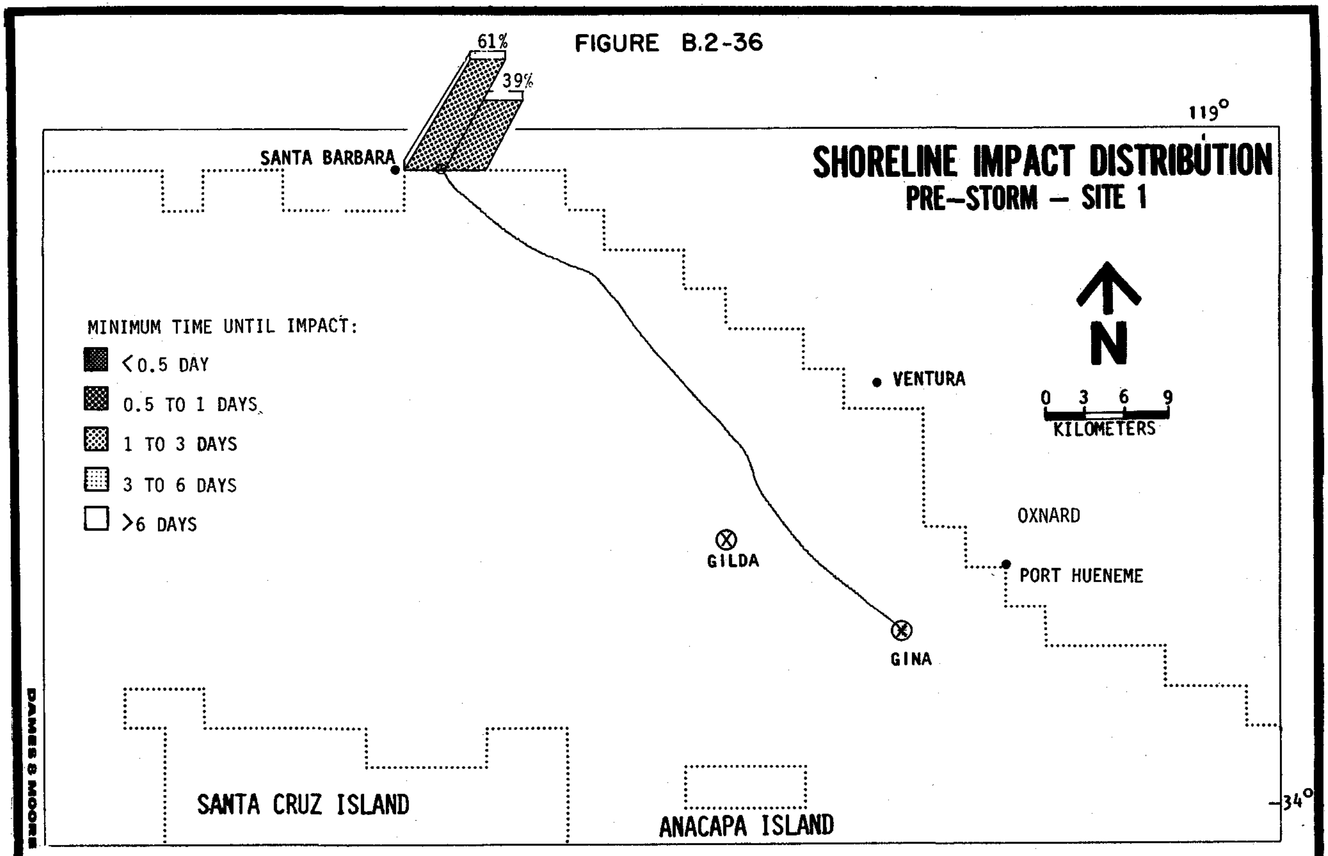


FIGURE B.2-37

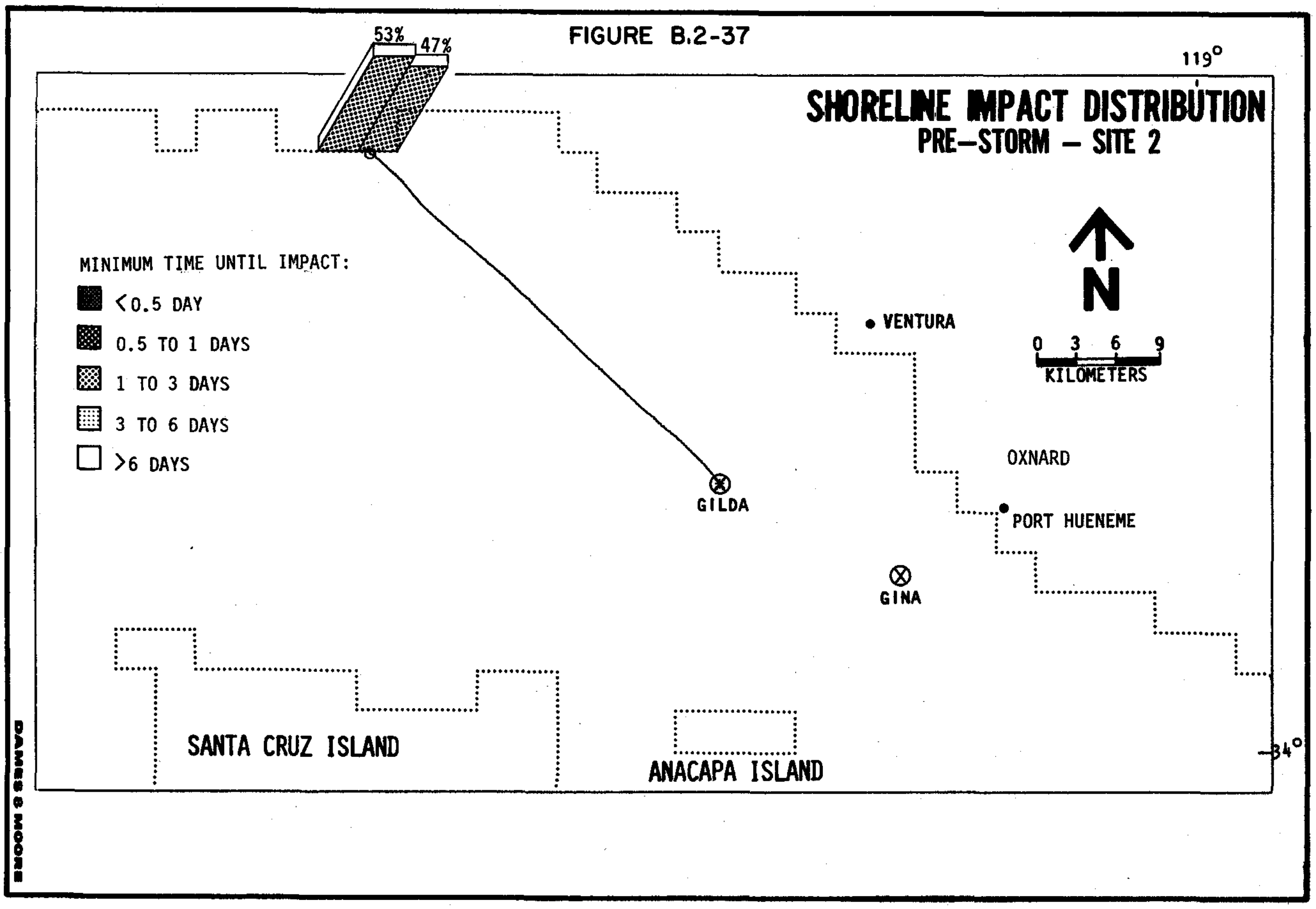


FIGURE B.2-38

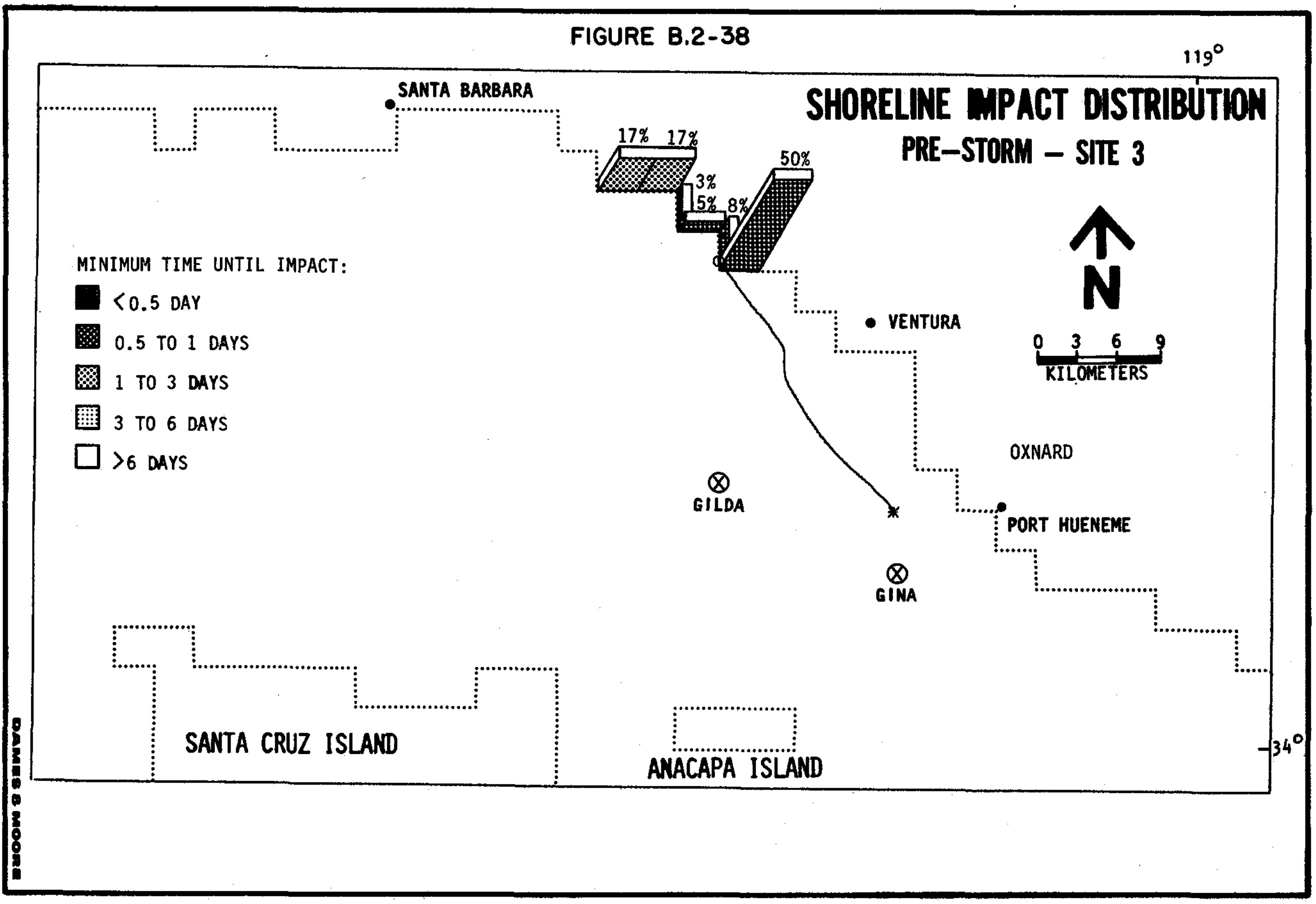


FIGURE B.2-39

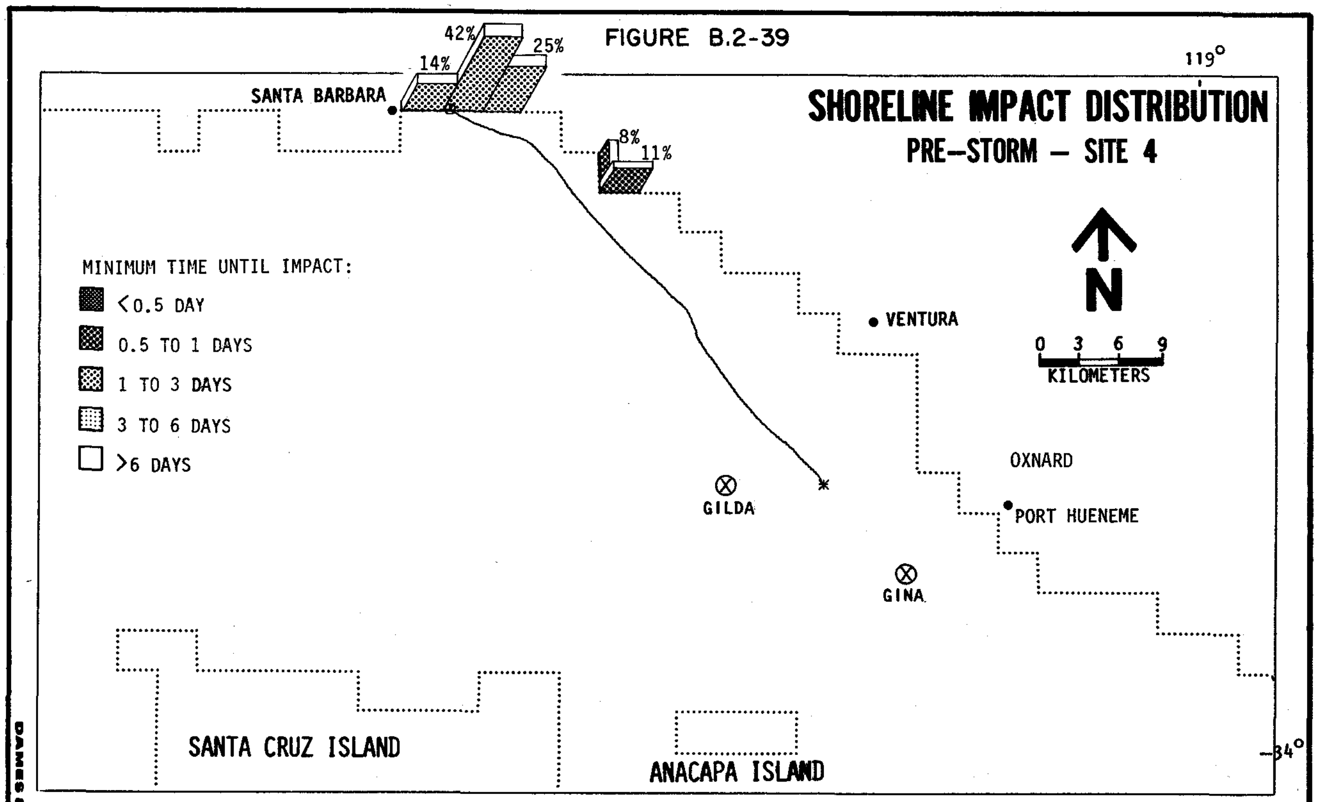


FIGURE B.2-40

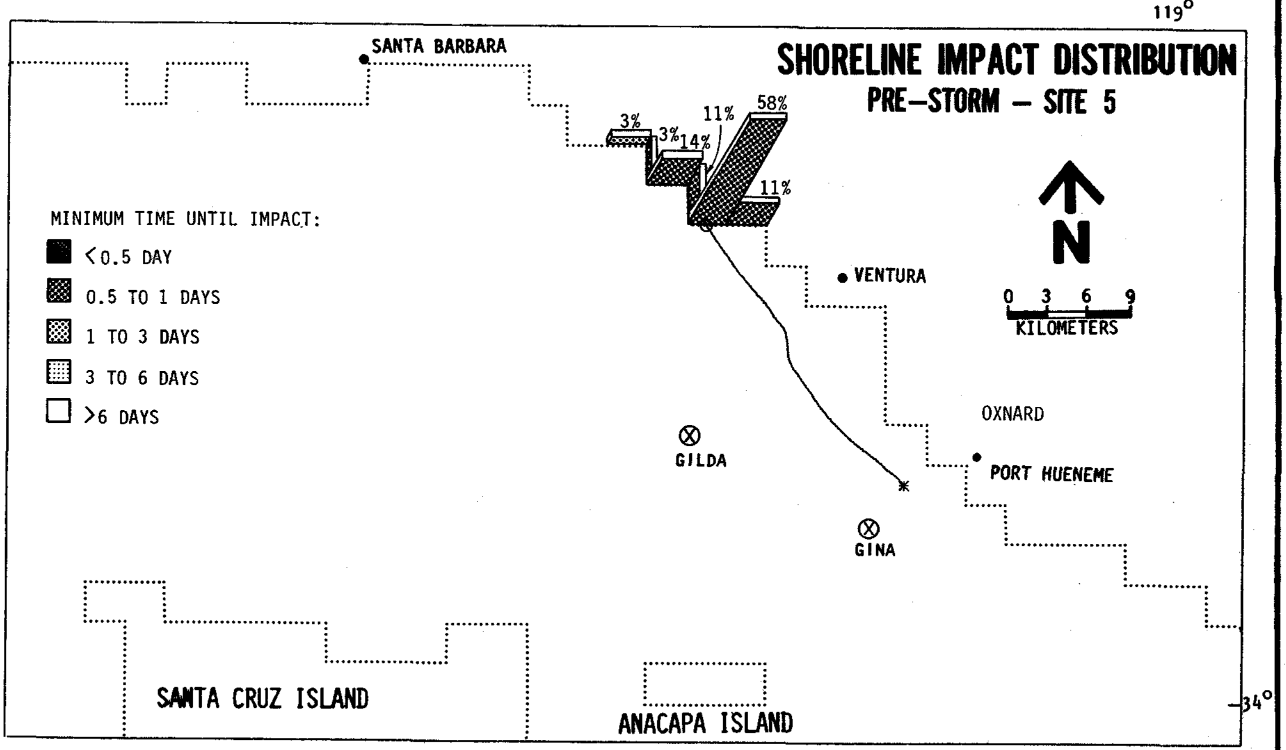
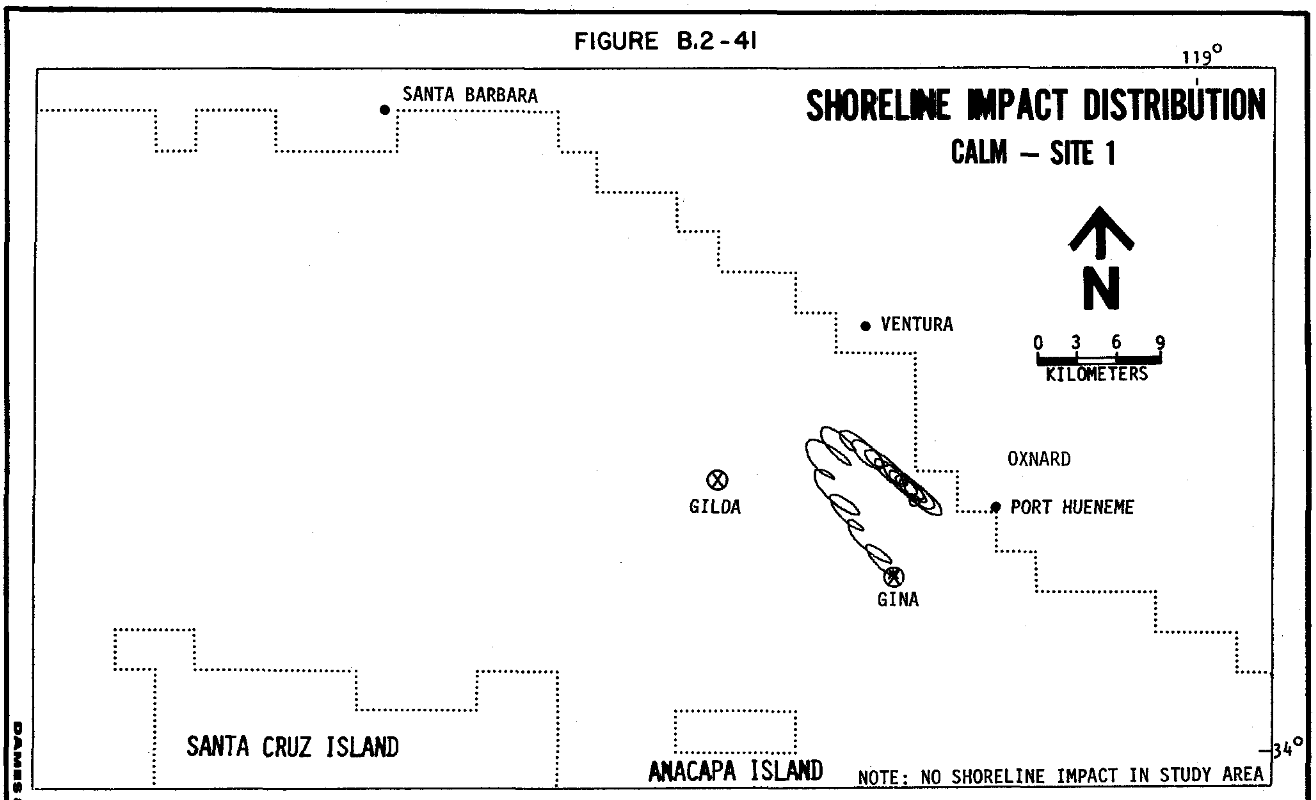
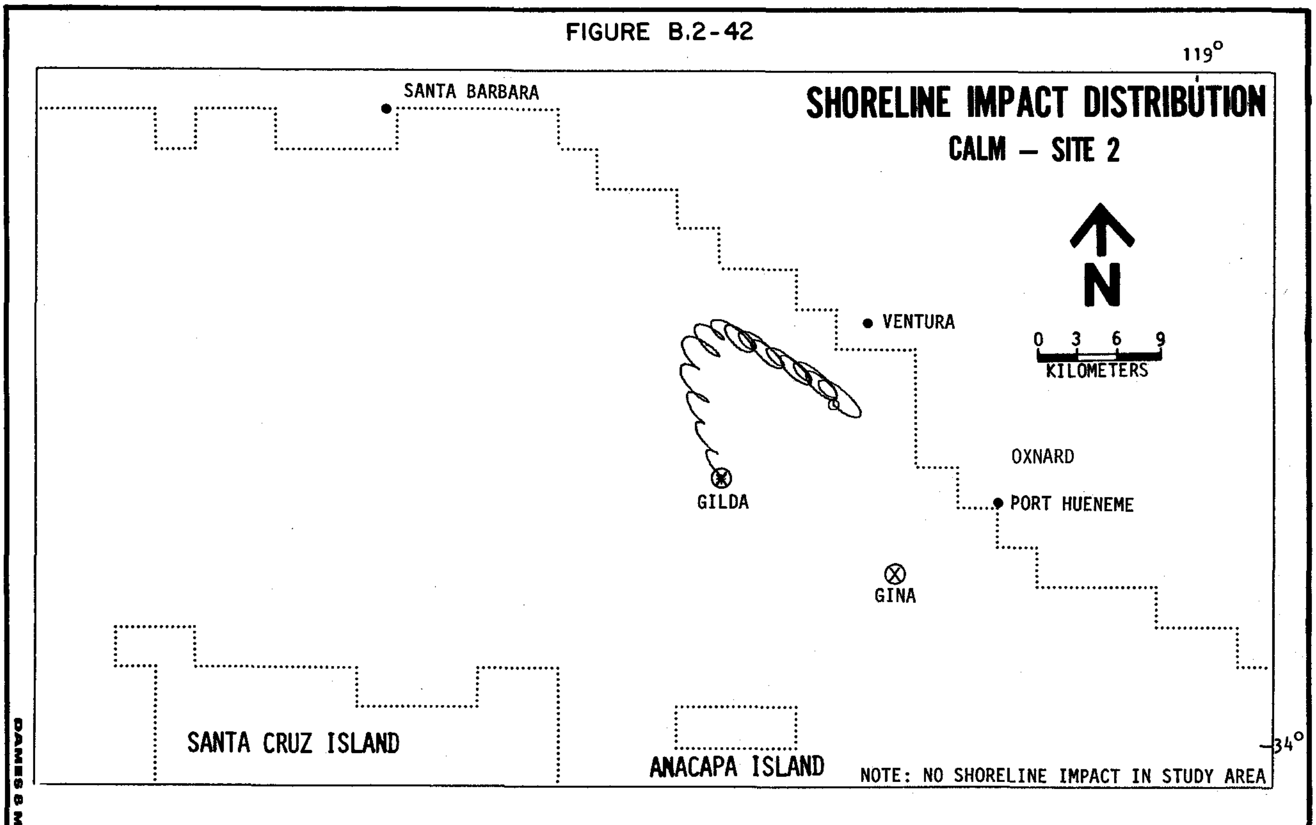


FIGURE B.2-41



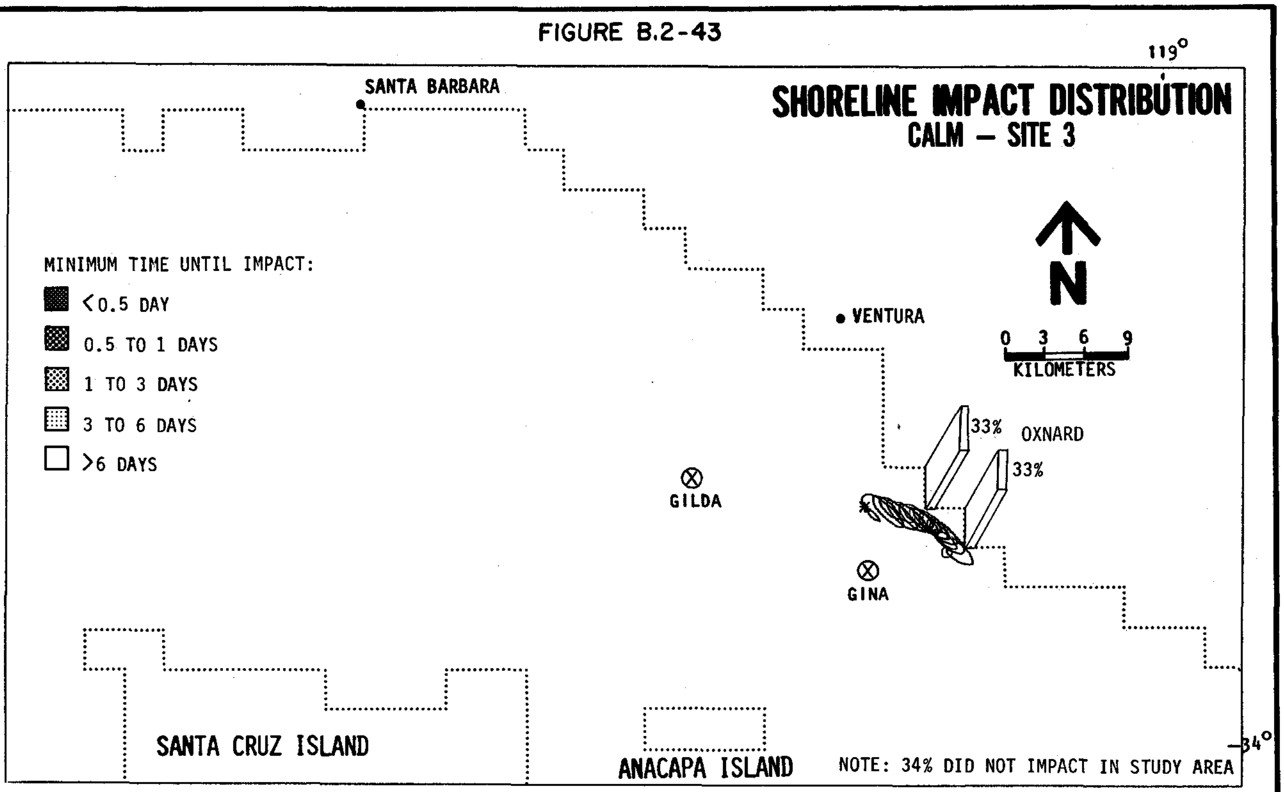
DAMES & MOORE

FIGURE B.2-42



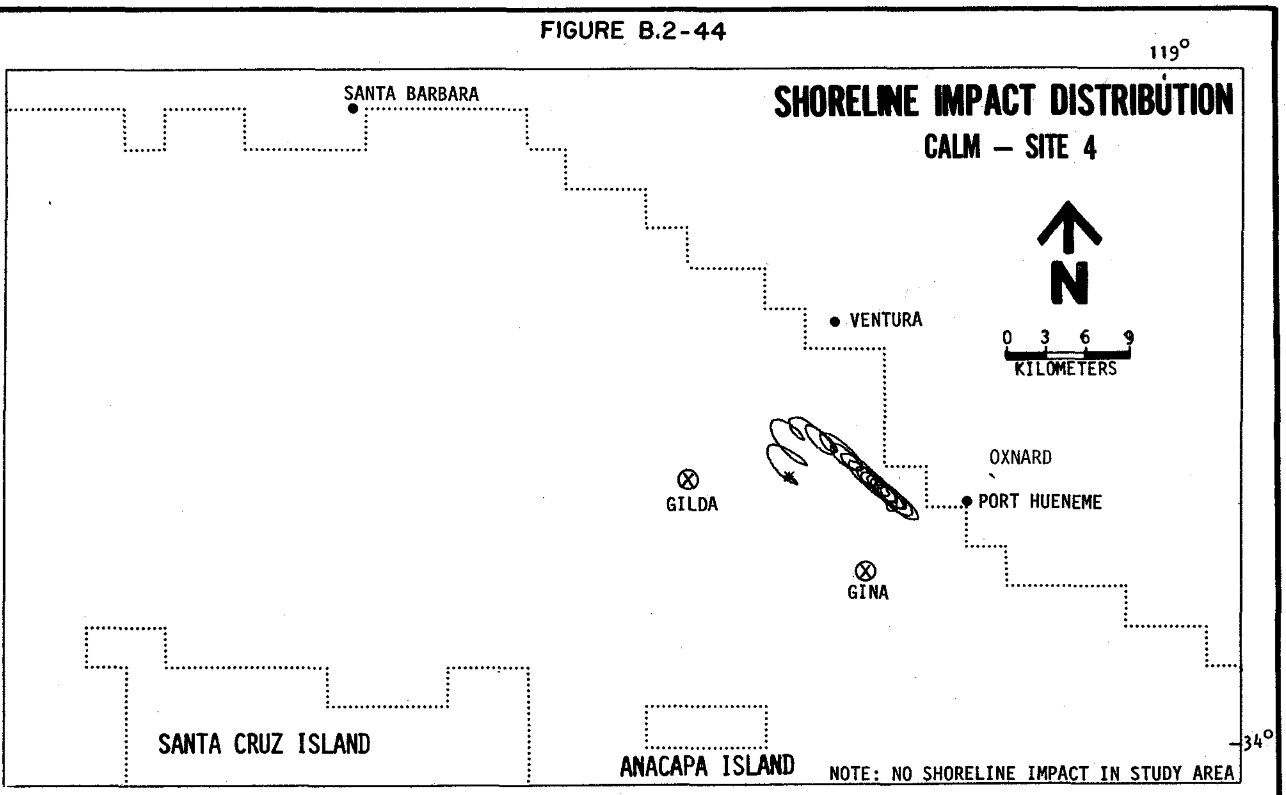
DAMES & MOORE

FIGURE B.2-43



DAMES & MOORE

FIGURE B.2-44



DAMES & MOORE

FIGURE B.2-45

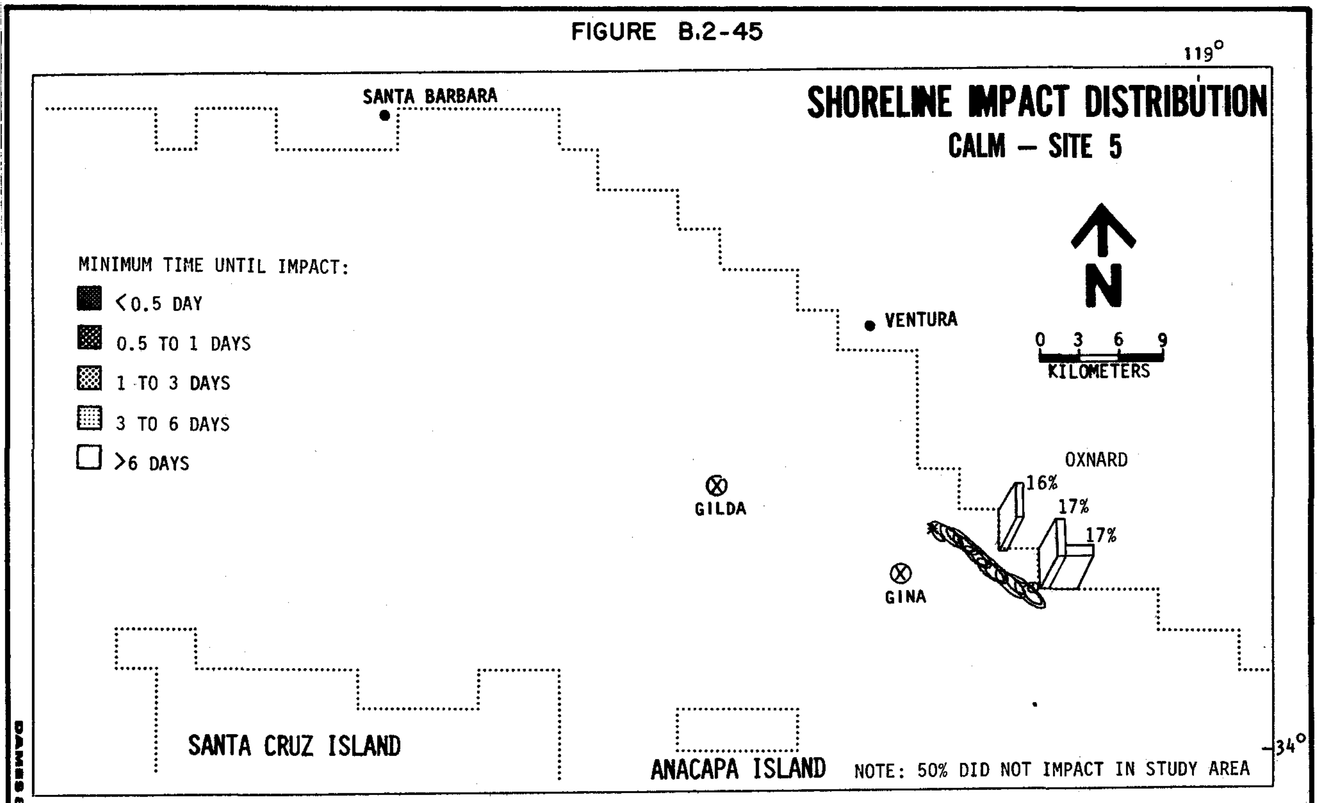
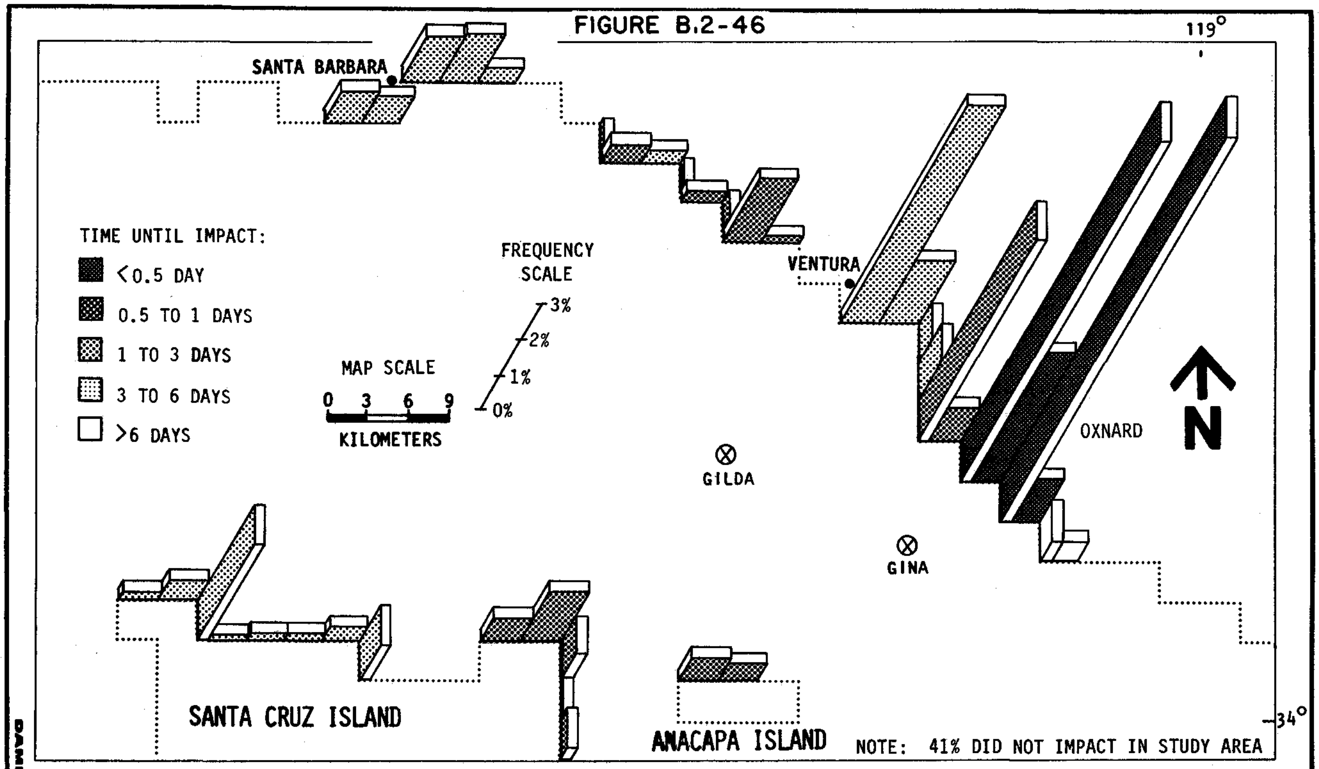
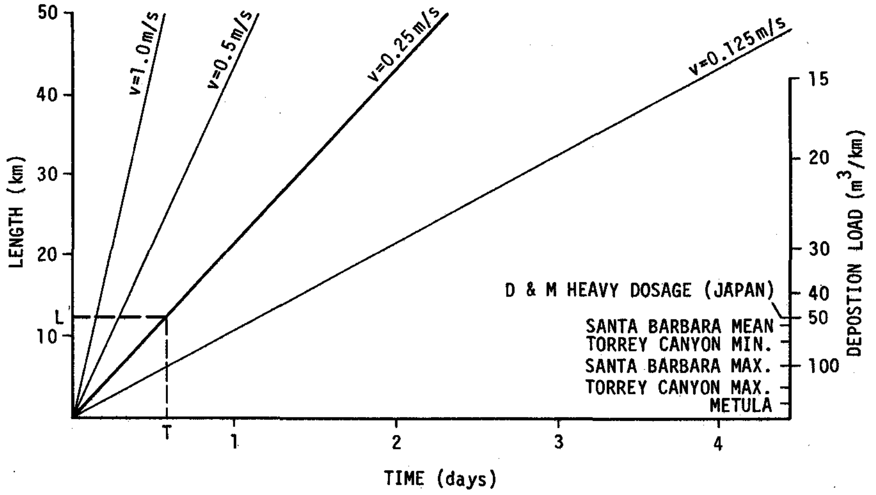


FIGURE B.2-46



SHORELINE IMPACT DISTRIBUTION
ANNUAL - ALL SITES

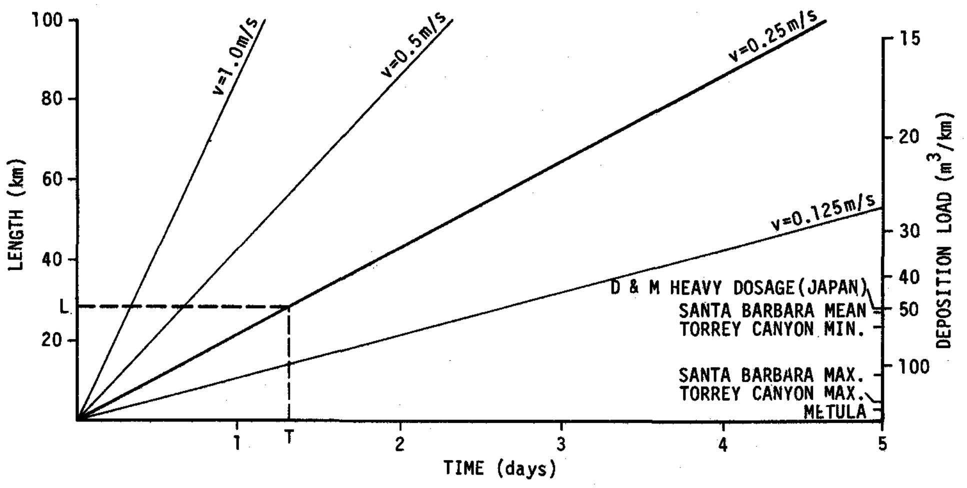
FIGURE B.2-47



LENGTH OF CONTAMINATED COASTLINE

V_O = 4000 bbl ORMOND BEACH ALTERNATIVE

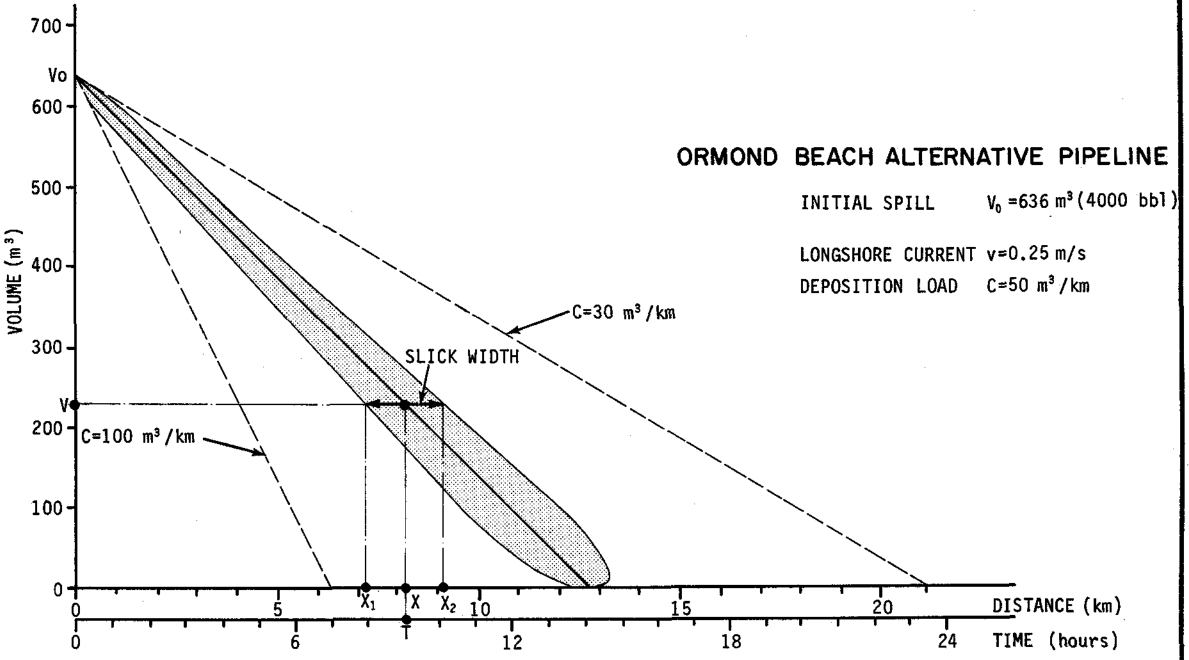
FIGURE B.2-48



LENGTH OF CONTAMINATED COASTLINE

V_O = 9000 bbl PROPOSED PLATFORM GILDA PIPELINE

FIGURE B.2-49

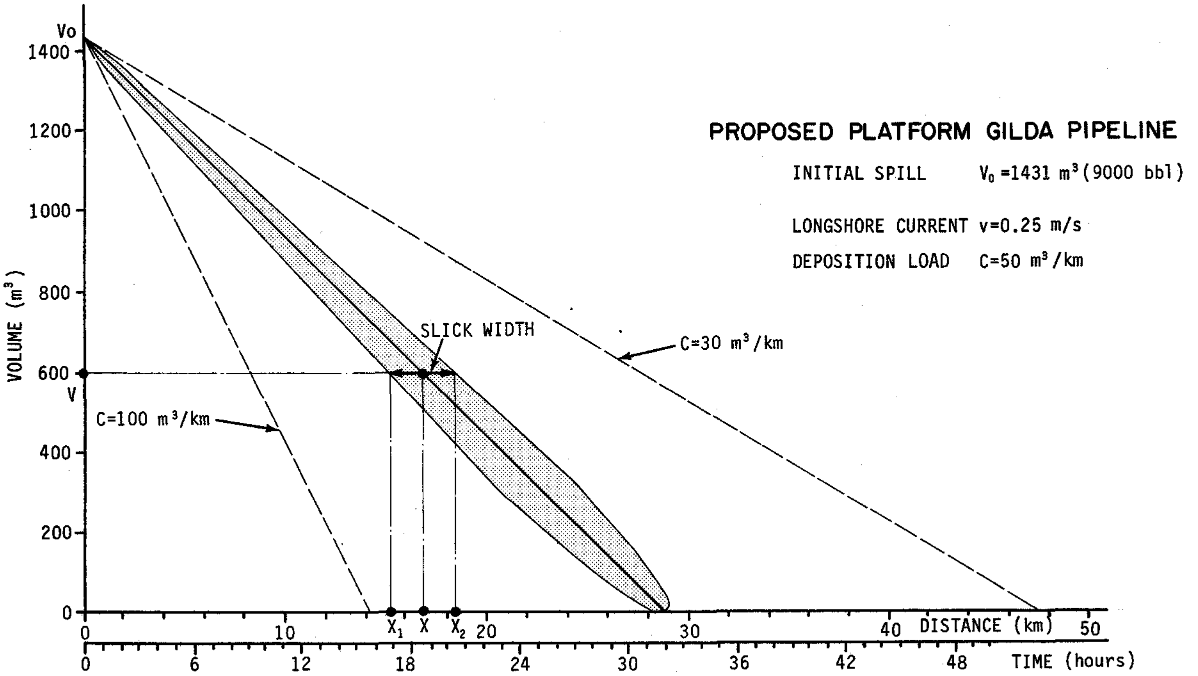


OIL SLICK SPREADING AND BEACH DEPOSITION

VOLUME AND LENGTH OF THE SLICK AS
A FUNCTION OF TIME AND DISTANCE

DAMES & MOORE

FIGURE B.2-50



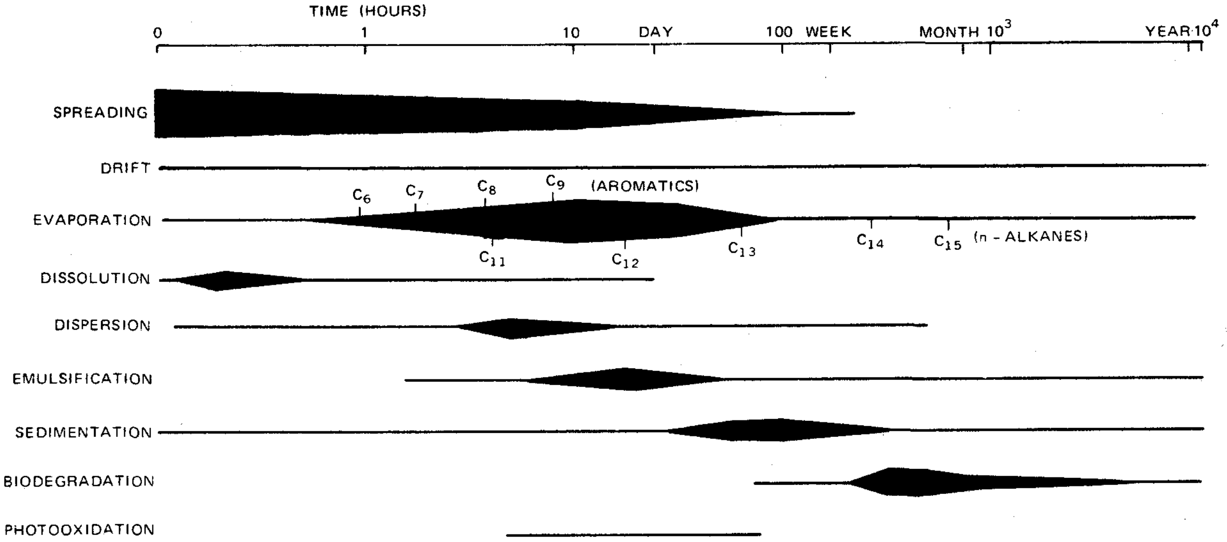
OIL SLICK SPREADING AND BEACH DEPOSITION

VOLUME AND LENGTH OF THE SLICK AS
A FUNCTION OF TIME AND DISTANCE

DAMES & MOORE

FIGURE B.2-51

TIME HISTORY OF PHYSICAL AND CHEMICAL OIL SPILL DEGRADATION PROCESSES



NOTE: THE LINE LENGTH INDICATES THE PROBABLE ELAPSED TIMESPAN, SINCE THE SPILL, OF ANY PROCESS. THE LINE WIDTH INDICATES THE RELATIVE MAGNITUDE OF THE PROCESS THROUGH TIME AND OTHER CONTEMPORARY PROCESSES.

REFERENCE: WHEELER, 1978.

APPENDIX B.3

U.S. GEOLOGICAL SURVEY TECHNICAL MATERIALS

Appendix

USGS Materials

Union Oil Company submitted to the USGS a Plan of Development for Platform Gina, Lease OCS-P 0202 (Block 46 N., 58 W., Hueneme Field) on January 31, 1979. The Plan was "deemed received" on May 7, 1979.

On December 6, 1979, Union Oil Company submitted to the USGS a Plan of Development for Platform Gilda on Lease OCS-P 0216 (Block 48 N., 61 W., Santa Clara Unit). Chevron U.S.A., Inc., Unit Operator for the Santa Clara Unit, designated Union Oil Company as agent to conduct operations on Lease OCS-P 0216. This Plan was "deemed received" on December 12, 1979.

The USGS is processing each Plan of Development separately to fulfill its obligations. Because of (1) the proximity of the platforms, (2) the similar and cumulative impacts in the vicinity of the City of Oxnard, and (3) the desire of the State agencies involved to cover the environmental impacts of both platforms in a single document, the USGS entered into such an agreement.

Accompanying each Plan of Development were: an environmental report, oil spill contingency plan, hazardous operations plan, and hydrogen sulfide contingency plan. These materials may be examined at the Los Angeles office of the United States Geological Survey (1340 West Sixth Street, Los Angeles, California 90017).

Copies of the proposed Plan of Development and Environmental Report submitted by Union Oil Company were sent to:

National Park Service

Heritage Conservation and Recreation Service

Bureau of Land Management

U. S. Fish and Wildlife Service

State of California Governor's Office of Planning and Research

U. S. Office of Coastal Zone Management

Environmental Protection Agency

National Marine Fisheries Service

U. S. Coast Guard

California Coastal Commission

Comments on the Plans of Development and the Environmental Reports were considered and utilized in the preparation of this EIR-EA. This EIR-EA supercedes Union Oil Company's Environmental Report. Because of the voluminous, routine non-controversial or resolvable nature of the correspondence, it is not reproduced in this appendix. A review and comment period, as well as public hearings, will follow the distribution of this report. Forthcoming review comments and significant hearing testimony will be reproduced and addressed in the finalizing EIR-EA addendum.

Information concerning biological and endangered species surveys, cultural surveys, as well as maps and photographs appear in the text of the EIR-EA. On June 5 to 7, 1979, the USGS met with National Marine Fisheries Service and the U. S. Fish and Wildlife Service pursuant to Section 7 of the Endangered Species Act. The biological opinion concluded that the identified activities were not likely to jeopardize the continued existence of listed species. Endangered Species Act determination pages follow.

Reports requested from the USGS are the two environmental geology analyses which also follow.

Previous related Environmental Impact Statements include: Santa Barbara Oil and Gas Development EIS (USGS 1976), OCS Lease Sale 48 EIS (BLM 1979), and OCS Lease Sale 35 EIS (BLM 1975).

United States Department of the Interior

GEOLOGICAL SURVEY

160 FEDERAL BUILDING
1340 W. SIXTH STREET
LOS ANGELES, CALIFORNIA 90017

An environmental review for the following activity has been conducted in accordance with Section 402.04 of Part 402, Chapter IV, Endangered Species Act of 1973 (16 U.S.C. 1531, et seq.):

UNION OIL COMPANY
PLAN OF DEVELOPMENT
OCS-P 0202 (BLOCK 46 N. 58 W.)
PLATFORM GINA, HUENEME FIELD
SANTA BARBARA CHANNEL - OFFSHORE CALIFORNIA

The following determination has been made for this activity:

> The above activity will not jeopardize the continued existence of any endangered species or result in the destruction or adverse modification of critical habitat

F. J. Schambeck
F. J. Schambeck
Oil and Gas Supervisor
Pacific Region

2/28/80
(Date)

ONE HUNDRED YEARS OF EARTH SCIENCE IN THE PUBLIC SERVICE

United States Department of the Interior

GEOLOGICAL SURVEY

160 FEDERAL BUILDING
1340 W. SIXTH STREET
LOS ANGELES, CALIFORNIA 90017

An environmental review for the following activity has been conducted in accordance with Section 402.04 of Part 402, Chapter IV, Endangered Species Act of 1973 (16 U.S.C. 1531, et seq.):

UNION OIL COMPANY
PLAN OF DEVELOPMENT
OCS-P 0216 (BLOCK 48 N., 61 W.)
PLATFORM GILDA, SANTA CLARA UNIT
SANTA BARBARA CHANNEL - OFFSHORE CALIFORNIA

The following determination has been made for this activity:

> The above activity will not jeopardize the continued existence of any endangered species or result in the destruction or adverse modification of critical habitat.

F. J. Schambeck
F. J. Schambeck
Oil and Gas Supervisor
Pacific Region

2/28/80
(Date)

United States Department of the Interior

GEOLOGICAL SURVEY

1340 W. Sixth Street
Suite 100
Los Angeles, California 90017

February 28, 1980

NOTED ADAMS

NOTED - SCHAMBECK

Memorandum

To: Oil and Gas Supervisor, Pacific OCS Region

From: Acting District Geologist, Pacific OCS Region

Subject: Environmental Geology for proposed Platform Gina, OCS Lease P-0202, and related pipeline corridor to Oxnard Beach and alternate pipeline corridor to Ormond Beach.

INTRODUCTION

Union Oil Company of California has submitted a plan of development proposing the construction of a drilling and production platform, Gina, on OCS Lease P-0202 and related pipelines to run from the platform to onshore facilities. Lease P-0202 is in the Hueneme Offshore Field (fig. 1). The project is located 7.2 km southwest of Port Hueneme in the Santa Barbara Channel. The proposed Platform Gina is located at Lambert Coordinates X = 1,084,062 and Y = 723,005, at a water depth of 29-30 m. Two pipeline routes to shore are under consideration: the proposed Mandalay route and the Ormond Beach alternate route (fig. 1). The proposed Mandalay pipeline route extends about 8.8 km north-northeast from the platform to the proposed Mandalay facility. The Ormond Beach alternate pipeline route extends 5.6 km east-northeast from the site.

The Hueneme field is located in the southeast corner of the Santa Barbara Channel in OCS Leases P-0202 and P-0203. Mobil and Union were equal partners in these leases acquired in the Federal Lease sale in April, 1968. On October 19, 1978, Mobil assigned their interests to Union. The initial discovery in the Hueneme field was Mobil's OCS P-0202 No. 1-A in July, 1969.

REGIONAL SETTING

The Santa Barbara Channel is located off the southern California coast south of the City of Santa Barbara. The Santa Barbara Channel is a west-trending silled-basin about 128 km in length and 40 km in width with a maximum depth of 625 m. The Channel is physiographically bounded on the north and east by the mainland shorelines of Santa Barbara and Ventura Counties, on the south by the Channel Islands (San Miquel, Santa Rosa, Santa Cruz, and Anacapa Islands), and on the west by the open waters of the Pacific Ocean (fig. 2).

The Santa Barbara Channel is a regional tectonic depression that forms the western extension of the Ventura basin (Greene and others, 1978). The Channel is the submerged southwestern extension of the Transverse Ranges structural and geomorphic

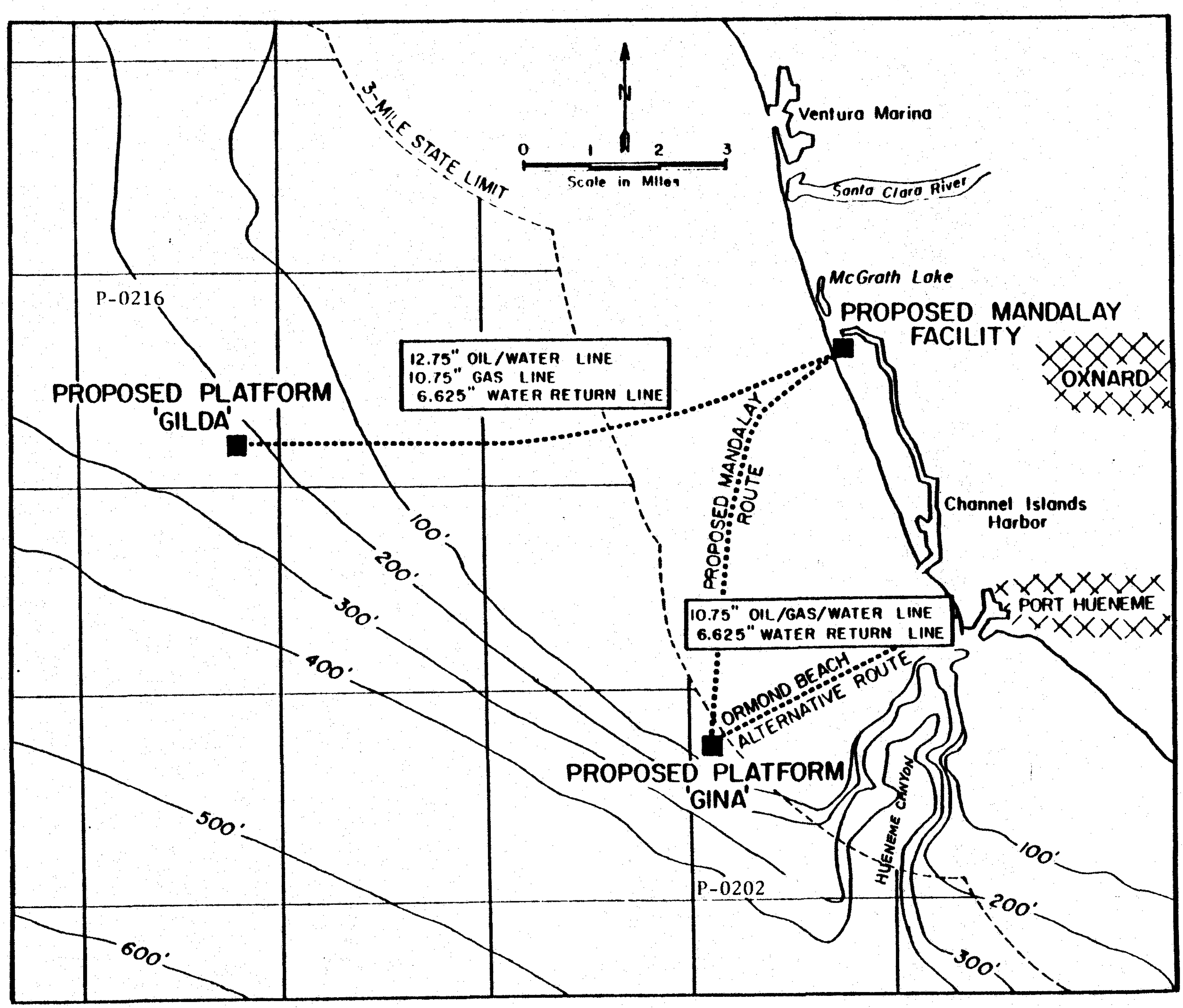


FIGURE 1. LOCATION OF PROPOSED PLATFORM GINA AND ASSOCIATED PIPELINES.

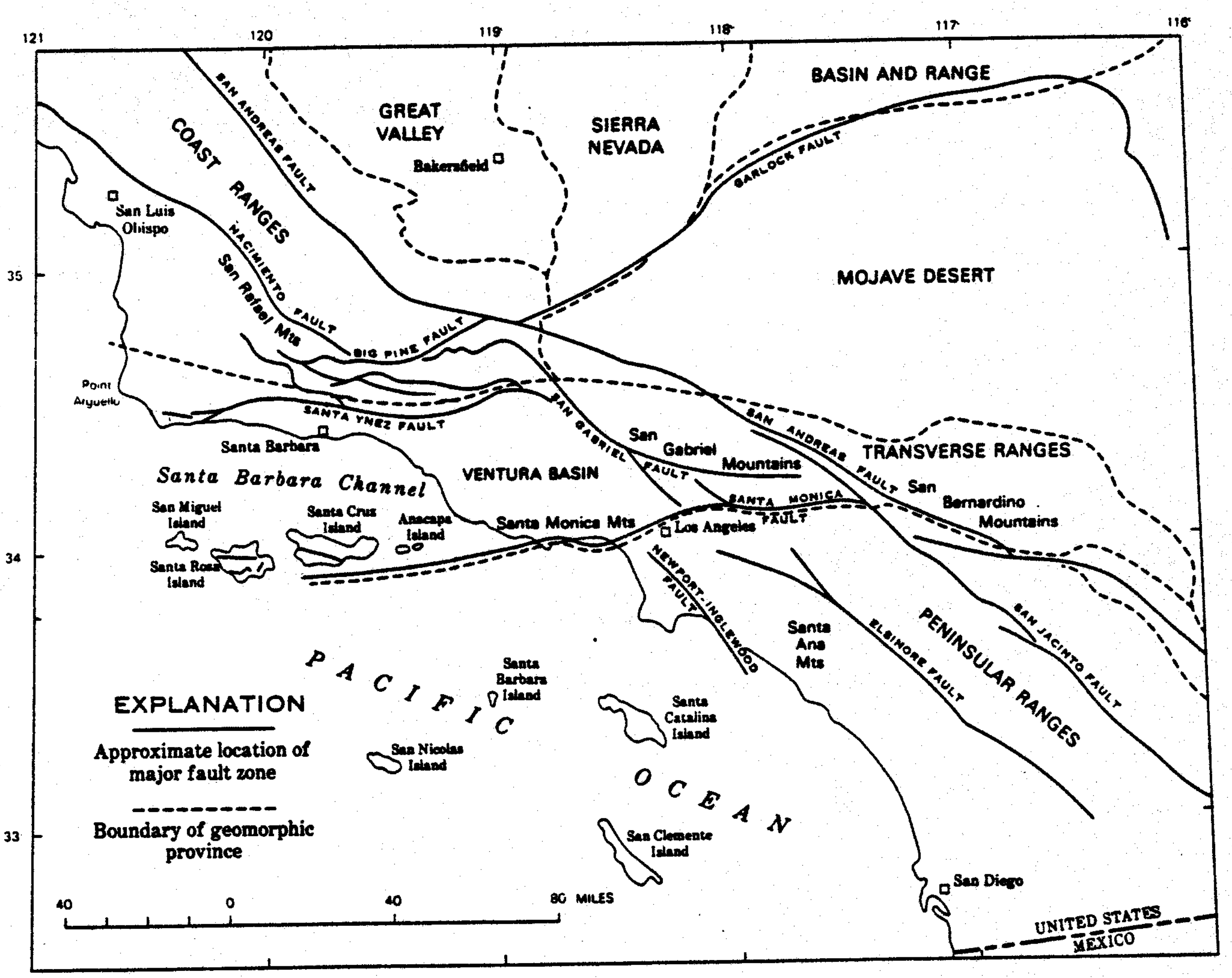


FIGURE 2. MAJOR STRUCTURAL AND GEOMORPHIC PROVINCES OF SOUTHERN CALIFORNIA. (FROM: VEDDER AND OTHERS, 1969).

province (Vedder and others, 1969; fig. 2). The characteristic east-west structural trend of the Transverse Ranges is reflected in the Santa Barbara Channel by major structures formed as a result of north-south compression (Greene and others, 1978). The Channel is structurally bounded by the Santa Ynez fault, a left-lateral oblique-slip fault, to the north and the possible west extension of the northeast-trending faults of the Santa Monica/Malibu Coast fault system on the south. On the east, the Channel shoals gradually to the shoreline of the Oxnard Plain.

The basin is floored by mildly folded and faulted Quaternary sediments that reach a maximum thickness of 1,200 m (Greene and others, 1978). The shelves and upper slopes of the basin have only a thin veneer of sediment. More than 15,240 m of highly folded and faulted Cretaceous and Tertiary strata underlie the Quaternary basin fill (Vedder and others, 1974).

Structure

The proposed Gina Platform and pipeline are located in the eastern Santa Barbara Channel on the southeastern edge of the Oxnard Plain. The geologic structure of the offshore area consists of gently folded and considerably faulted Cenozoic strata beneath alluvial cover. The generalized geologic trends are depicted on Figure 3. Structures in the southern Oxnard Plain that have been active from Pliocene (?) through Pleistocene time are within the west-trending "Oak Ridge foldbelt," which is composed of the Santa Clara and Oxnard synclines, the Montalvo anticline, and the Oak Ridge and McGrath faults (Greene and others, 1978). All of these structures are the result of north-south compression.

The Santa Clara and Oxnard synclines and the Montalvo anticline are west-trending structural features to the north of the proposed platform site. The Santa Clara syncline, 18 km northwest of the site, extends at least 25 km westward from the shoreline. The Montalvo anticline, 13 km northwest of the proposed platform location, is the structurally complex westward extension of the onshore anticline underlying the south side of the Santa Clara Valley (Greene and others, 1978) and is bounded on the north by north-dipping normal faults. The Oxnard syncline is a broad seaward-plunging structure extending offshore 10.5 km north-northwest of the platform site. A northeast-trending anticline extending from Anacapa Island is located 5 km south of the project area.

Two major faults cut late Cenozoic strata of the Oxnard Shelf. The Oak Ridge fault strikes west from the onshore Montalvo Oil Field 16 km northwest of the proposed Platform Gina location (fig. 3). The Oak Ridge fault, also called the Montalvo "thrust" fault, is a high-angle, south-dipping, thrust (?) fault between the Santa Clara syncline and the Montalvo anticline. No sea-floor displacement is observed anywhere above the fault's trace (Greene and others, 1978). The McGrath fault, on the southside of the Montalvo anticline, is approximately 12.5 km north-northwest of the platform site and 3 km south of the Oak Ridge fault (fig. 3). The McGrath fault strikes parallel to the Oak Ridge fault and is a south-dipping zone of faulting and folding. The structural similarities between the McGrath and Oak Ridge faults suggests they are probably en echelon faults of the same tectonic zone (Greene and others, 1978). The youngest strata cut by the McGrath fault are of late Pleistocene age.

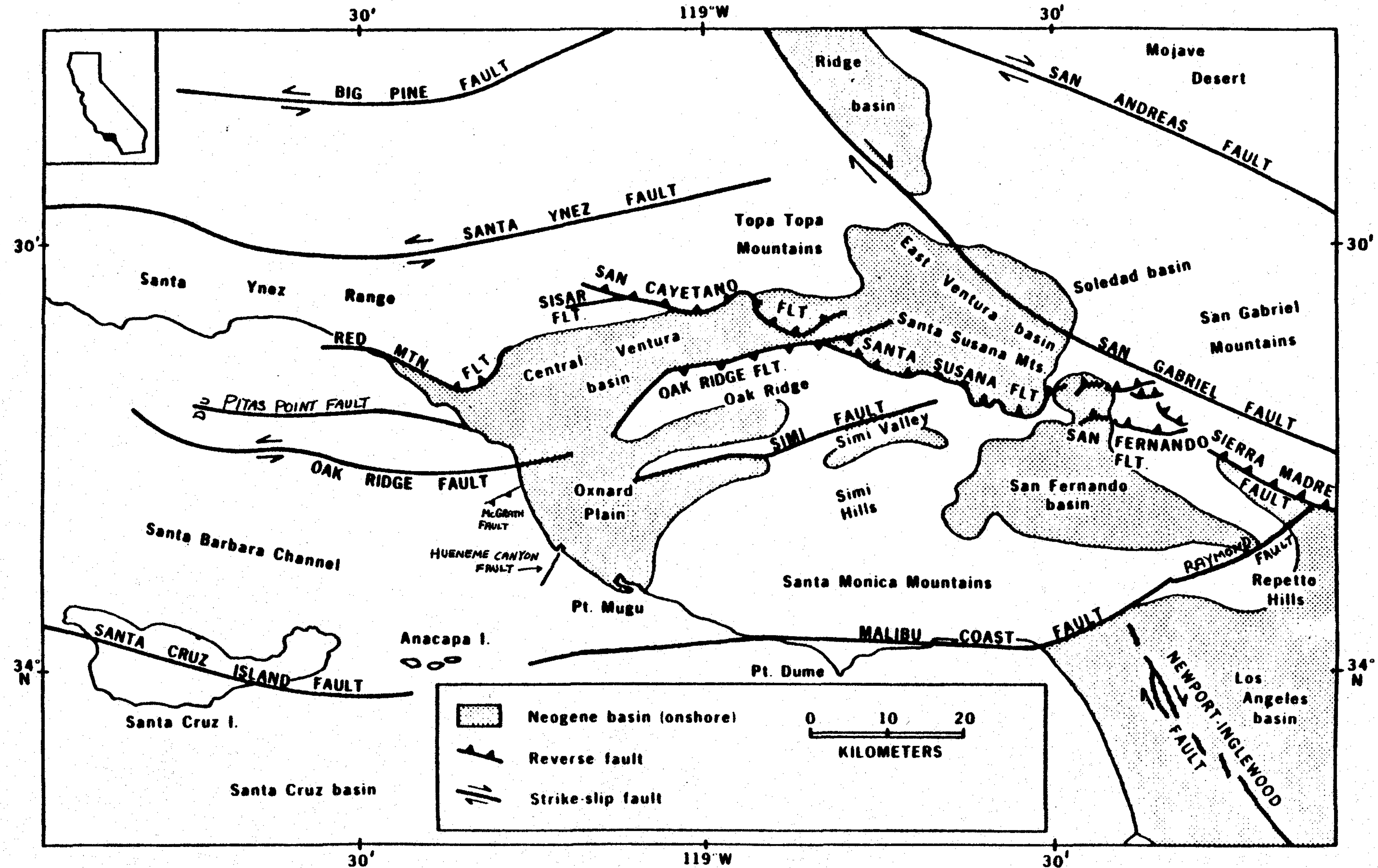


FIGURE 3. TECTONIC MAP OF EASTERN SANTA BARBARA CHANNEL AND ADJACENT ONSHORE AREAS. (FROM: YEATS, 1976).

The Hueneme Canyon fault trends northeast for 5 km through the Hueneme submarine Canyon 10.5 km northeast of the proposed Platform Gina site (fig. 3). Miocene (?) sedimentary and volcanic rocks are truncated against the fault but strata immediately beneath the canyon floor do not appear to be displaced (Greene and others, 1978).

STRATIGRAPHY

Strata in the Santa Barbara Channel region range in age from Early Cretaceous to Holocene and overlie, or are faulted against, basement rocks that are dominantly pre-Cretaceous in age. The Cretaceous succession is 6,100 m to 9,100 m thick in places and the Cenozoic succession may be as much as 9,100 m to 12,200 m thick in the northeastern part of the Channel. These thicknesses have been calculated on the assumption that those measured in outcrops on basin flanks are similar along basin axes where they are deeply buried by younger strata. Interpretations of the stratigraphy of the Santa Barbara Channel area are made even more speculative by the possibility of large-scale lateral displacement on west-trending faults. Sedimentological evidence has given rise to speculations that the pre-Miocene rocks of San Miquel, Santa Rosa, and Santa Cruz Islands have moved tens of miles westward or northwestward relative to those north of the Channel. If the rocks of the northern and southern parts were originally deposited long distances from one another and were later brought more closely together by tectonic displacements, then the character of the pre-Miocene rocks beneath the Channel cannot be estimated by simple interpolation between the outcrops on the edges of the Channel.

STRATIGRAPHIC COLUMN IN THE PLATFORM AREA

Age	Formation	Lithology
Recent-Pleistocene		Unconsolidated sand and mud
Pliocene	Pico	Marine sand, clays, siltstones
Miocene	Santa Margarita	Siltsone and shale
Miocene	Monterey	Marine chert, fractured siliceous shale with limestone to siltstones and sands at base
Miocene	Rincon	Mudstones, and sandstone
Oligocene	Sespe	Nonmarine sands, shales, and conglomerates

SEA-FLOOR SEDIMENTS

Holocene deposits on the seafloor of the Oxnard Shelf area reach a maximum thickness of 60 m and have been described as alluvial deposits of clay, silt and sand. The sediment distribution on the Oxnard Shelf grades from sand near shore to mud on the outer shelf. The source of sediments is the Santa Clara River (USGS, 1976). More than 15 cm of newly deposited sediments have been measured on the inner part of the Oxnard Shelf during major floods of the Santa Clara River, but such deposits are later redistributed by wave and current action (Drake and others, 1972). Surface currents flow southeast along the eastern Santa Barbara Channel Coast (Kolpack, 1971).

Below the surface deposits are upper Pleistocene deposits of marine and nonmarine sands, gravels, and clays up to 60 m thick on the Outer Oxnard Shelf. Onshore these deposits form extensive terraces. Lower Pleistocene strata, the San Pedro Formation, consists of marine and nonmarine mudstone, sandstone, silstone, and conglomerate with a maximum thickness of 460 m on the outer Oxnard Shelf (USGS, 1976).

SEISMICITY

The seismic history of Southern California is one of the best documented of the modern world, dating back to July 28, 1769. From that date to the present, there is an extensive historical record of felt earthquakes, and more recently, instrumental recordation (Wood, and others, 1966).

The Santa Barbara Channel region has a record of considerably strong seismic activity. Since 1900 two earthquakes of magnitude 6 have been generated offshore from Santa Barbara and it is believed the historic 1812 Santa Barbara shock, estimated at magnitude 7, was generated in the west Channel area. Additionally, the Santa Barbara region has been strongly shaken from several earthquakes generated in the nearby regions, especially the 1857 Fort Tejon, 1933 Long Beach, and 1971 San Fernando earthquakes. A list of the significant earthquakes, and their modified Mercalli intensity (estimated prior to 1902), is contained in Table 1.

The historic record of seismic activity in the channel area documents at least six periods of frequent low mangitude seismic shocks characterized as "earthquake swarms." The most recent and best documented swarm occurred in 1968 when 63 minor earthquakes (maximum amplitude 5.2) occurred in the Santa Barbara Channel during the period June 26 to August 3, 1968. The epicenters of the swarms cluster in the channel midway between Santa Cruz Island and the mainland. Focal mechanism studies indicate that oblique-slip movement occurred along a northwest-striking fault even though the major folds and faults strike nearly west (Sylvester and others, 1970). The studies of the areal hydrocarbon production data show no compelling evidence for a causal relationship with the swarm (i.e., hydrocarbon production in the Channel neither increased nor decreased after the swarm.)

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LIST OF SIGNIFICANT EARTHQUAKES

Year	Date	Location	N. Lat.	W. Long.	Epicentral MMI
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1857	Jan 9	Fort Tejon	35	119	X-XI
1893	Jun 1	Santa Barbara	34.5	119.5	VII
1902	Jul 27-31	Santa Barbara County	34.5	120.5	IX
1912	Dec 14	Oxnard	34	119	VI-VII
1925	Jun 29	Santa Barbara	34.3	119.8	VIII-IX
1926	Jun 29	Santa Barbara	34.5	119.5	VII
1927	Nov 4	Off Pt. Arguello	34.5	121.5	IX-X
1930	Aug 5	Santa Barbara	34.5	119.5	VII
1933	Mar 3	Long Beach	33	118	VIII
1941	Jun 30	Santa Barbara Channel	34.3	119.6	VIII+
1952	Aug 21	Kern County	35	119	X-XI
1968	Jun 26	Off Santa Barbara	34.2	119.7	V
1968	Jul 4	Off Santa Barbara	34.1	119.7	VI
1971	Feb 9	San Fernando	34.4	118.4	VIII-IX
1973	Feb 21	Off Point Mugu	34.1	119	VII

SUBMARINE LANDSLIDES AND SLUMPS

Many extensive submarine slumps and landslides are present on the sea-floor slopes of the Santa Barbara Channel. Most of these features are located along the mainland slope and are especially prominent between Point Conception and Goleta Point and in Hueneme Canyon (U.S. Dept. of Interior, 1975; Greene, 1976). In addition, buried disturbed strata observed in seismic profiles at the foot of the Channel Islands platform suggest probable landsliding in the past (U.S. Dept. of Interior, 1975). More recent investigations have shown that scattered minor slumps and slides exist almost throughout the borderlands and the basin deeps of the Channel.

GEOLOGIC HAZARDS: PLATFORM GINA, PLATFORM SITE

Slope Stability

Slope at the proposed platform site is approximately 0.6° SW. Slope increases to 2.9° SW 610 m southwest of the site. The proposed platform site is located at the southwest edge of the Oxnard Shelf. The shelf break is defined by 30 m isobath and trends northwest through the surveyed area 762 m southwest of the proposed location.

Shallow-penetration data indicate that surficial sediments thin to the southwest within the surveyed area from a maximum of 40 m in the northern portion to less than 1 m in the southwest corner. Surficial sediments are about 34 m thick at the proposed platform location. Soil borings indicate the surficial sediments to be

Holocene-age and underlain by Pleistocene terrace deposits to a depth of 69 m. Unconsolidated sediments extend beneath the terrace deposits to at least the depth of the soil borings (90 m).

Slumping

No indication of mass movement is found on the Oxnard Shelf near the proposed platform location. Geophysical data indicate that mass movement is possible on the steeper slopes beyond the shelf break 762 m southwest of the proposed location.

Faulting

The only fault observed on the geophysical data is in the southwest corner of the surveyed area along the shelf break. The fault is located approximately 1,220 m southwest of the proposed platform site and strikes northwest. The fault appears to offset Holocene beds but not the seafloor.

Seeps and Shallow Gas

Water column anomalies (possible seepage) are common in the surveyed area. A water column anomaly at the proposed platform site has been identified on the geophysical profiles.

Shallow gas in the vicinity of the proposed location was not observed on the geophysical profiles.

GEOLOGIC HAZARDS: PLATFORM GINA, MANDALAY PIPELINE ROUTE

Slope Stability

The seafloor along the proposed Mandalay Pipeline Route is flat (<0.5°). Maximum slope along the corridor is 0.4° SW just north of the proposed Platform Gina location.

Geophysical profiles indicate 35-40 m of surficial sediments along the proposed corridor. Soil borings indicate the surficial sediments to be Holocene-age and underlain by Pleistocene terrace deposits to a depth of 69 m. Unconsolidated sediments underlie the terrace deposits to at least the maximum depth of the soil borings (90 m). In areas of shallow water (<18 m), the seafloor multiple on the geophysical profiles partially obscures the data rendering determination of the thickness of the Holocene deposits uncertain.

Slumping

No evidence of mass movement along the proposed pipeline route was observed on the geophysical profiles.

Faulting

No evidence of faulting along the proposed pipeline route was observed on the geophysical profiles.

Seeps and Shallow Gas

Numerous side scan sonar targets, indicating possible seepage, were identified along the northern third of the proposed pipeline corridor. Water column anomalies (possible seepage) observed on other geophysical profiles were common in this area and were also observed along the entire proposed pipeline route.

Evidence of shallow gas along the proposed pipeline route was not observed on the geophysical profiles.

GEOLOGIC HAZARDS: PLATFORM GINA, ORMOND BEACH ALTERNATE PIPELINE ROUTE

Slope Stability

The seafloor along the proposed Ormond Beach Alternate Pipeline Route ranges in slope from horizontal to 1°. The slope at the southwest end of the corridor, in the vicinity of proposed Platform Gina, is 0.4° SW. The seafloor becomes horizontal to the northeast for most of the length of the route. The northeast end of the corridor has maximum slope of 1° SW. The south-trending Hueneme Canyon is 320 m south of the northeast end of the proposed pipeline route. Slope along the wall of the canyon is 6° S.

Geophysical profiles indicate 35-40 m of surficial sediments along the proposed pipeline route. Soil borings indicate the surficial sediments to be Holocene-age and underlain by Pleistocene terrace deposits to a depth of 69 m. Soil borings also indicate that the terrace deposits are underlain by unconsolidated sediments to at least the maximum depth of the borings (90m). In areas of shallow water (18 m), the seafloor multiple on the geophysical profiles partially obscures the data making determination of the thickness of the Holocene deposits uncertain.

There is a southeast-trending buried channel through the south central part of the proposed pipeline route. Geophysical profiles show at least 25 m of horizontal bedding overlying the channel.

Slumping

No evidence of mass movement along the proposed corridor was observed on the geophysical profiles. Slumping on the steeper wall of Hueneme Canyon, 320 m south of the proposed pipeline, is evident on the geophysical profiles.

Faulting

No evidence of faulting along the proposed alternate pipeline route was observed on the geophysical profiles.

Seeps and Shallow Gas

Numerous side scan sonar targets, indicating possible seepage, were identified along the northeastern end of the corridor. Scattered water column anomalies (possible seepage) along the proposed route were identified on geophysical profiles.

Geophysical data indicate shallow gas, 3 m below the seafloor, in the northeast quarter of the proposed corridor.

Erick V Kaarlela

Erick V. Kaarlela

DJB/sds

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United States Department of the Interior

GEOLOGICAL SURVEY

1340 W. Sixth Street
Suite 100
Los Angeles, California 90017

February 28, 1980

NOTED · SCHAMBECK

NOTED · ADAMS

Memorandum

To: Oil and Gas Supervisor, Pacific OCS Region

From: Acting District Geologist, Pacific OCS Region

Subject: Environmental Geology for proposed Platform Gilda, OCS Lease P-0216, and related pipeline corridor to Mandalay Beach Site.

INTRODUCTION

Union Oil Company has submitted a plan of development proposing the construction of a platform, Gilda, on OCS Lease P-0216, and the installation of related pipelines to run from the platform to the Mandalay Beach area. Lease P-0216 is the central north lease of the Santa Clara Unit, a unitization of eight contiguous leases located within the eastern limits of the Santa Barbara Channel (fig. 1). The proposed Platform Gilda will be located on OCS Lease P-0216, Lambert Coordinates: X = 1,041,760 and Y = 747,980. The platform will be installed at a water depth of 63 m, approximately 16 km offshore west of the City of Oxnard. The proposed pipeline, which will be approximately 16 km in length, will extend east from Platform Gilda, cross OCS Leases P-0215 and P-0361, then veer slightly northeast to the proposed Mandalay Facility onshore.

Industry had been aware for a number of years of the presence of an anticlinal trend in the north unit area from seismic and drilling investigations conducted in the early 1960's under State permits. Although no discoveries had been made or announced by the time of the initial OCS lease in 1968, high bids were proffered for the leases involved. The initial discovery in the unit area was made in 1971 in lease P-0216 and in 1973 the leases were unitized for development. As presently proposed, Union will develop Lease P-0216, and Chevron will be responsible for development of the adjoining leases, P-0217 on the west and P-0215 on the east. Chevron plans to install Platform Grace on P-0217 and, if undertaken, utilize assigned slots on Gilda for development of P-0215.

Union anticipates the completion of the permit procedure by July 1980 and installation of the platform in October 1980. The fabrication of the platform was commenced in January and the first spud is expected in December 1980.

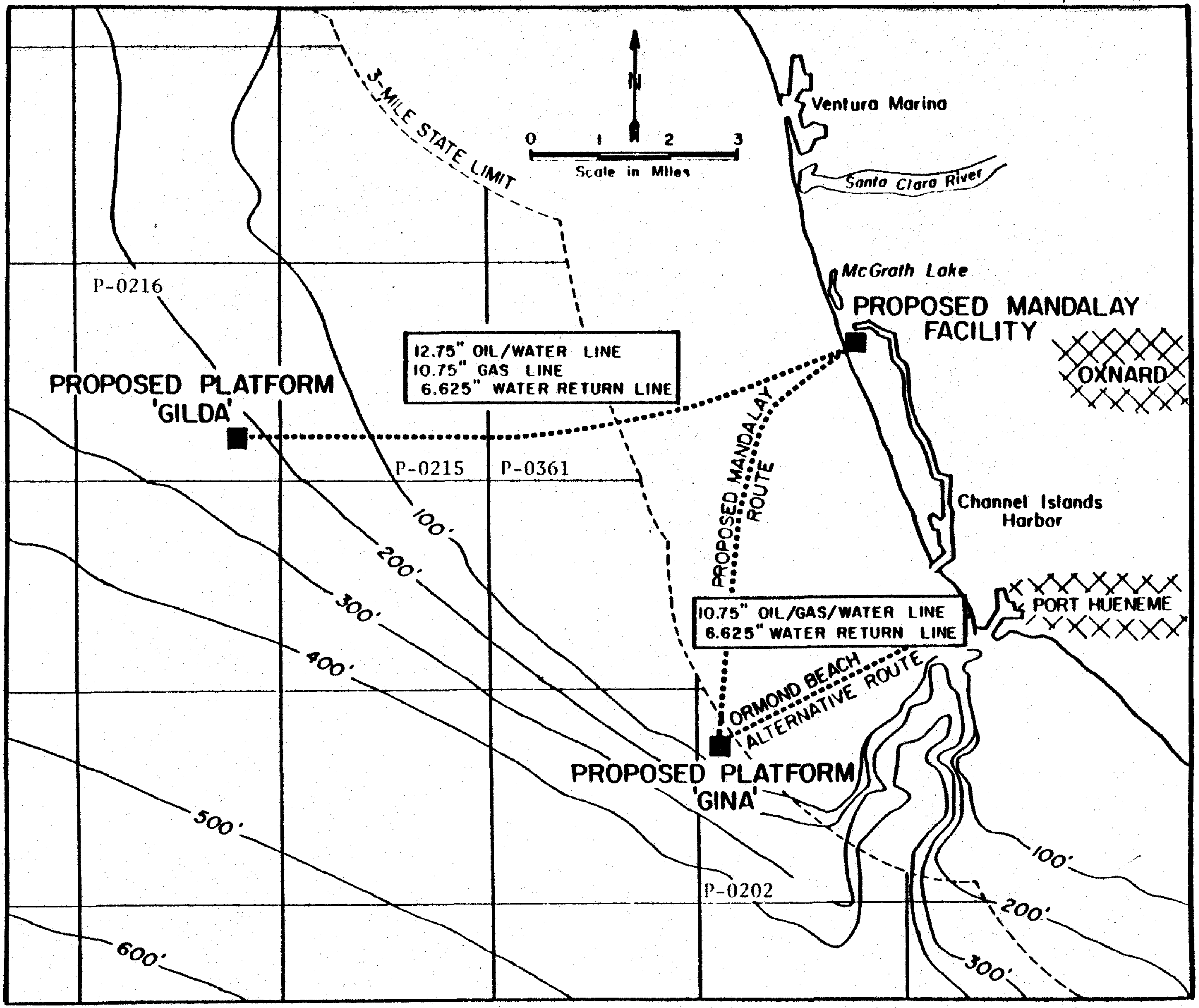


FIGURE 1. LOCATION OF PROPOSED PLATFORM GILDA AND ASSOCIATED PIPELINE.

REGIONAL SETTING

The Santa Barbara Channel is located off the southern California coast south of the City of Santa Barbara. The Santa Barbara Channel is a west-trending silled-basin about 128 km in length and 40 km in width with a maximum depth of 625 m. The Channel is physiographically bounded on the north and east by the mainland shorelines of Santa Barbara and Ventura Counties, on the south by the Channel Islands (San Miguel, Santa Rosa, Santa Cruz, and Anacapa Islands), and on the west by the open waters of the Pacific Ocean (fig. 2).

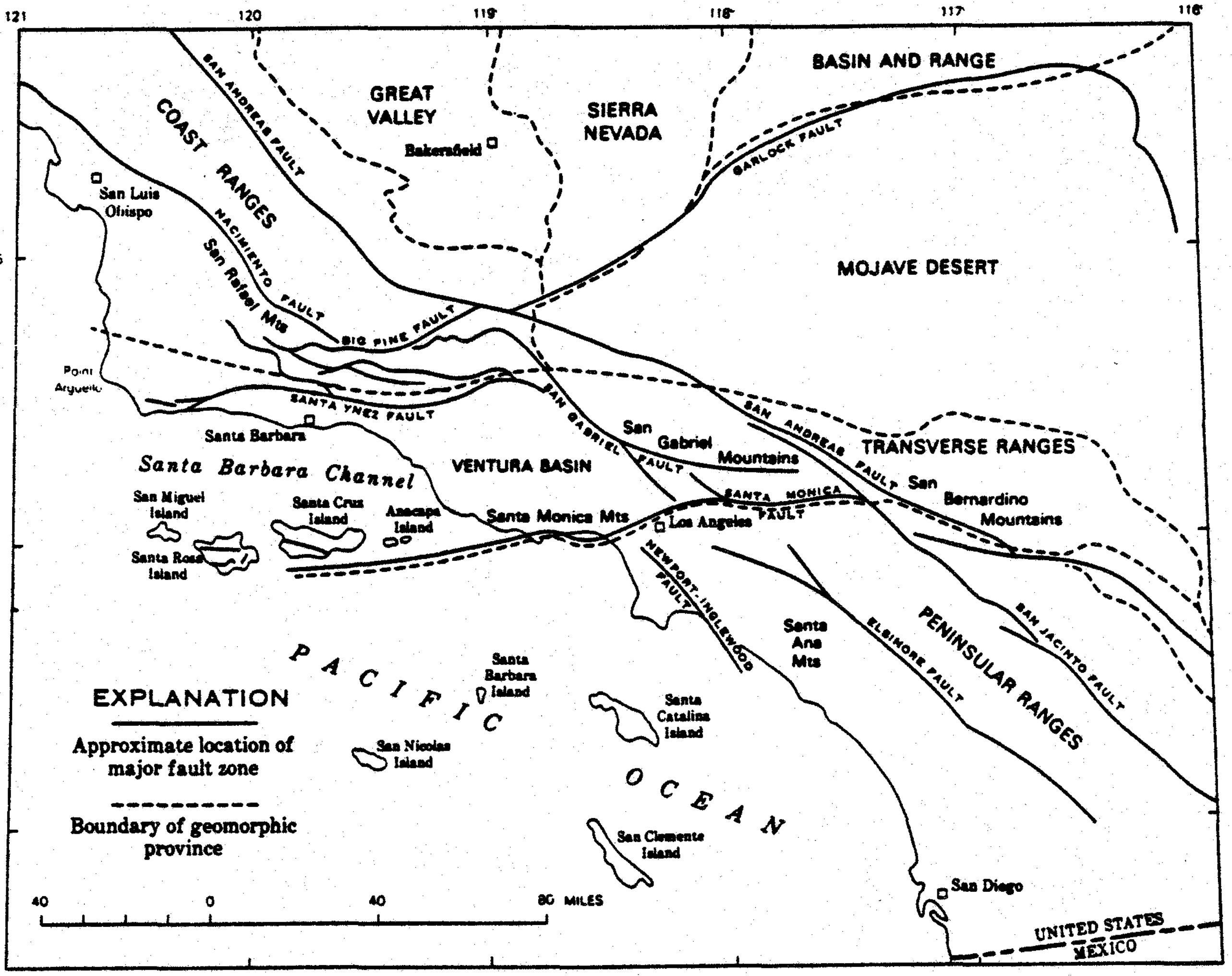
The Santa Barbara Channel is a regional tectonic depression that forms the western extension of the Ventura basin (Greene and others, 1978). The Channel is the submerged southwestern extension of the Transverse Ranges structural and geomorphic province (Vedder and others, 1969; fig. 2). The characteristic east-west structural trend of the Transverse Ranges is reflected in the Santa Barbara Channel by major structures formed as a result of north-south compression (Greene and others, 1978). The Channel is structurally bounded by the Santa Ynez fault, a left-lateral oblique-slip fault, to the north and the possible west extension of the northeast-trending faults of the Santa Monica/Malibu Coast fault system on the south. On the east, the Channel shoals gradually to the shoreline of the Oxnard Plain.

The basin is floored by mildly folded and faulted Quaternary sediments that reach a maximum thickness of 1,200 m (Greene and others, 1978). The shelves and upper slopes of the basin have only a thin veneer of sediment. More than 15,240 m of highly folded and faulted Cretaceous and Tertiary strata underlie the Quaternary basin fill (Vedder and others, 1974).

STRUCTURE

The proposed Gilda Platform and pipeline are located in the eastern Santa Barbara Channel on the northern part of the western slope of the Oxnard Shelf. The geologic structure of the offshore area consists of gently folded and considerably faulted Cenozoic strata beneath alluvial cover. The generalized geologic trends are depicted on Figure 3. Structures in the Oxnard Shelf that have been active from Pliocene (?) through Pleistocene time are the Pitas Point fault and the west-trending "Oak Ridge foldbelt," which is composed of the Santa Clara and Oxnard synclines, the Montalvo anticline, and the Oakridge and McGrath faults (Greene and others, 1978). All of these structures are the result of north-south compression.

The Santa Clara and Oxnard synclines and the Montalvo anticline are west-trending structural features to the north and east of the proposed platform site. The Santa Clara syncline, 7 km north of the site, extends at least 25 km westward from the shoreline. The Montalvo anticline, 3 km north of the proposed platform location, is the structurally complex westward extension of the onshore anticline underlying the south side of the Santa Clara Valley (Greene and others, 1978) and is bounded on the north by north-dipping normal faults. The Oxnard syncline is a broad seaward-plunging structure extending offshore to within 8.5 km east of the platform site. A west-trending anticline lies 1 km north and west of the site and a parallel syncline is 1 km north of the anticline.



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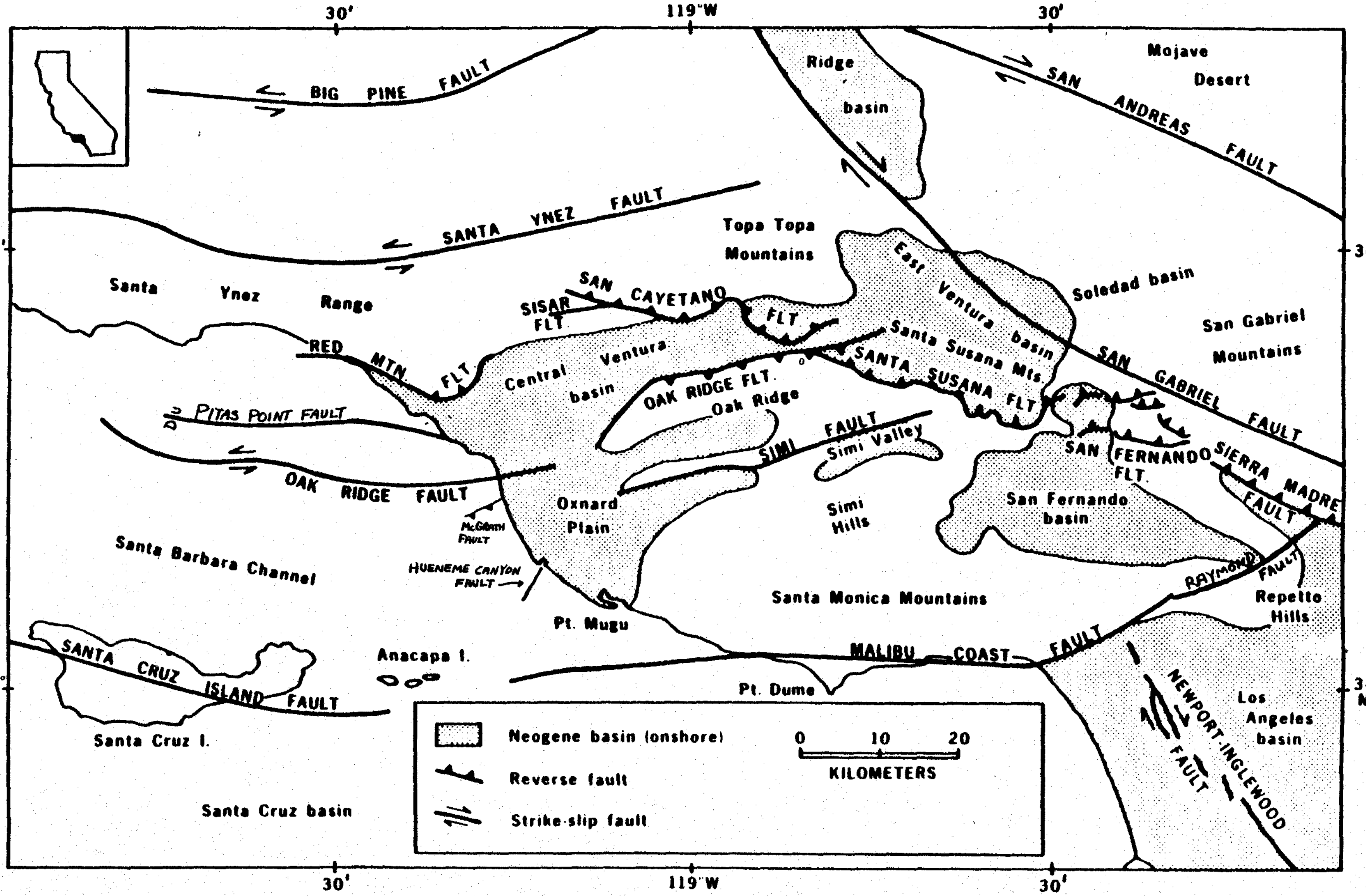

FIGURE 3. TECTONIC MAP OF EASTERN SANTA BARBARA CHANNEL AND ADJACENT ONSHORE AREAS. (FROM: YEATS, 1976).

Three major west-striking faults cut late Cenozoic strata of the Oxnard Shelf (fig. 3). The Pitas Point fault is 13.7 km north of the platform site. The Pitas Point fault appears to be a north-dipping reverse or thrust fault which has had about 25 m of vertical displacement since late Pleistocene time (Greene and others, 1978). The Oak Ridge fault, also called the Montalvo "thrust" fault, is a high-angle, south-dipping, thrust (?) fault between the Santa Clara syncline and the Montalvo anticline. No sea-floor displacement is observed anywhere above the fault's trace (Greene and others, 1978). The McGrath fault, on the south side of the Montalvo anticline, is over 12 km west of the platform site and 3 km south of the Oak Ridge fault. The McGrath fault strikes parallel to the Oak Ridge fault and is a south-dipping zone of folding and faulting. The structural similarities between the McGrath and Oak Ridge faults suggests they are probably en echelon faults of the same tectonic zone (Greene and others, 1978). The youngest strata cut by the McGrath fault are of late Pleistocene age. A questionable fault, mapped by Greene and others (1978), lies 1 km south of the platform site and trends parallel to the anticline and syncline north of the site.

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1893	Jun 1	Santa Barbara	34.5	119.5	VII
1902	Jul 27-31	Santa Barbara County	34.5	120.5	IX
1912	Dec 14	Oxnard	34	119	VI-VII
1925	Jun 29	Santa Barbara	34.3	119.8	VIII-IX
1926	Jun 29	Santa Barbara	34.5	119.5	VII
1927	Nov 4	Off Pt. Arguello	34.5	121.5	IX-X
1930	Aug 5	Santa Barbara	34.5	119.5	VII
1933	Mar 3	Long Beach	33	118	VIII
1941	Jun 30	Santa Barbara Channel	34.3	119.6	VIII+
1952	Aug 21	Kern County	35	119	X-XI
1968	Jun 26	Off Santa Barbara	34.2	119.7	V
1968	Jul 4	Off Santa Barbara	34.1	119.7	VI
1971	Feb 9	San Fernando	34.4	118.4	VIII-IX
1973	Feb 21	Off Point Mugu	34.1	119	VII

SUBMARINE LANDSLIDES AND SLUMPS

Many extensive submarine slumps and landslides are present on the sea-floor slopes of the Santa Barbara Channel. Most of these features are located along the mainland slope and are especially prominent between Point Conception and Goleta Point and in Hueneme Canyon (U.S. Dept. of Interior, 1975, Greene, 1976). In addition, buried disturbed strata observed in seismic profiles at the foot of the Channel Islands platform suggest probable landsliding in the past (U.S. Dept. of Interior, 1975). More recent investigations have shown that scattered minor slumps and slides exist almost throughout the borderlands and the basin deeps of the Channel.

GEOLOGIC HAZARDS: PLATFORM GILDA, PLATFORM SITE

Slope Stability

Average slope at the proposed platform site is 1° SW. Slope increases in the southern portion of the lease to a maximum of 1.7° SW.

Penetration of surficial sediments by subbottom profiler is limited to 4.5-9 m due to gas-charged sediments at this depth. Soil borings indicate at least 122 m of silts and clays in the area of the proposed platform location.

Slumping

No evidence of slumping in the vicinity of the proposed platform site was observed on the geophysical profiles.

Faulting

Limited resolution of shallow sediments by high-resolution seismic systems precludes any definative identification of surface faulting. Evidence on the geophysical profiles indicates possible northwest-striking faults 122 m northeast and southwest of the proposed platform site. The data indicate that the faults are at least 7.5 m below the seafloor.

Seeps and Shallow Gas

No evidence of seepage in the area of the proposed platform was observed on the geophysical profiles.

Shallow interstitial gas is indicated by the geophysical profiles throughout the surveyed area. The top of the gas-charged sediment zone is 4.5-9 m below the seafloor.

Anomalous high-amplitude reflections (bright spots) on processed relative amplitude profiles indicate several possible gas zones 25-500 m below the seafloor. A zone of possible gas indicate by bright spot data is 320 m below the seafloor 152 m south of the proposed platform location.

GEOLOGIC HAZARDS: PLATFORM GILDA, PIPELINE ROUTE

Slope Stability

Seafloor slope along the proposed pipeline corridor is to the southwest ranging from horizontal at the east end of the route to 0.7° SW at the west end.

Penetration of surficial sediments by subbottom profiler is limited to 4.5-9 m due to gas-charged sediments at this depth. Deepest penetration of surficial sediments by subbottom profiler is 23 m along the eastern 5 km of the corridor. Geophysical profiles from USGS Data Set 17200 indicate that surficial sediments are up to 18 m thick along the proposed pipeline in OCS Lease P-0361.

Slumping

No evidence of mass movement along the proposed pipeline route was observed on the geophysical profiles.

Faulting

A northeast-striking fault, 18 m below the seafloor, was identified on the geophysical profiles of USGS Data Set 17200. The fault extends through the center of OCS Lease P-0361 into the southeast corner of OCS Lease P-0215.

Other surface or shallow faults along the proposed pipeline corridor were identified on the geophysical records.

Seeps and Shallow Gas

High-resolution geophysical data indicate scattered water column anomalies indicating possible seeps.

Shallow interstitial gas zones, 4.5-9 m below the seafloor, are indicated on geophysical profiles. The gas-charged sediment zones occur along the western 10 km of the proposed pipeline route.

Side scan sonar records show numerous seafloor features of unknown origin within the eastern 10 km of the proposed corridor.

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