EXXON COMPANY, U.S.A.
(A DIVISION OF EXXON CORPORATION)
ENVIRONMENTAL REPORT (EXPLORATION)

FOR

EXPLORATORY WELLS ON TWO LEASES IN THE
SANTA MARIA BASIN OFFSHORE OCS AREA
OCS-P 0438 (Tract No. 53-223, Block 288)
OCS-P 0440 (Tract No. 53-228, Block 331)

February 7, 1983

Prepared by:

HOOKS, McCLOSKEY & ASSOCIATES
1149 LANCASTER AVENUE
ROSEMONT, PENNSYLVANIA 19010
(215) 525-0573

TABLE OF CONTENTS

Page

FIGURES

FIGURES (cont.)

TABLES

TABLES

ENGLISH/METRIC CONVERSION FACTORS

1 foot = 0.305 meters

1 mile = 1.61 kilometers

1 gallon = 3.79 liters

1 cubic yard = 0.76 cubic meters

1 inch = 2.54 centimeters

INTRODUCTION

This document has been prepared to comply with the Minerals Management Service (MMS) requirement of 30 CFR § 250.34-3(a) that an Environmental Report be submitted with each proposed Plan of Exploration prepared for Outer Continental Shelf (OCS) leases.

The Environmental Report describes the environmental setting and the environmental, economic, social, and other effects associated with planned exploration activities on leases OCS-P 0438 and 0440 located in the southeastern portion of the Santa Maria Basin offshore OCS area. These leases are operated by Exxon Company, U.S.A., a Division of Exxon Corporation.

The Exploration Plan which accompanies this Environmental Report describes six possible exploratory well locations on the subject leases. The number of wells drilled will be contingent on factors such as initial drilling results, continuing geological interpretation refinement, and the results of exploratory activities by other OCS lessees on leases near these Exxon leases.

Even though it is unlikely that exploratory wells will be drilled at each of the six locations identified in this report, the site-specific impacts of all six wells have been described. This comprehensive approach has been adopted to: 1) ensure that all federal, state, and local agencies are aware of Exxon's tentative, maximum long-range exploration plans for leases OCS-P 0438 and 0440; 2) avoid the necessity of filing repetitive Environmental Reports as Exxon proceeds with its exploration program; and 3) avoid redundancies in separate descriptions of the many environmental parameters that are common to the subject leases and to the basic drilling activities constant with the drilling of any deepwater OCS well.

Information applying specifically to this project has been furnished by the professional staffs of Exxon Company, U.S.A. or its affiliated companies. Information on the environmental setting has been obtained from other documents which pertain to offshore oil and gas activities in the Santa Maria Basin offshore area. Copies of referenced materials are available, for the most part, at the MMS and BLM libaries in Los Angeles. If not, they are available at many university and college libraries in California, the library of Exxon, or the library of Hooks, McCloskey & Associates. In the event any reviewing agency has difficulty in obtaining a copy of a particular reference, the party listed on the Title Page should be contacted.

The impact of the proposed exploratory drilling operations on the environment, as analyzed in the following presentation, is concluded to be negligible in magnitude and temporary in nature. If these operations result in the discovery and/or confirmation of a commercially developable accumulation of oil or gas, or both, then a plan for the development of the resource will be required. In this event, another Environmental Report for the development phase will be prepared under § 30 CFR 250.34-3(b).

(I) TITLE PAGE

PROJECT NAME:	Environmental Report (Exploration) for Exxon Company, U.S.A. exploratory wells on OCS leases OCS-P 0438 and 0440
AREA NAME:	Santa Maria Basin, Offshore California

BLOCK NUMBER AND FIELD:

Lease	Tract	Block
P 0438	53-223	288
P 0440	53-228	331

DATE: February 7, 1983

CONTACT:

Mr. Otto C. Rath
Exxon Company, U.S.A.
P.O. Box 4279
Suite 201-B
Houston, Texas 77001
(713) 591-5154

RELATED ENVIRONMENTAL DOCUMENTS:

Final EIS for OCS Lease Sale No. 53, BLM, September 1980.

OCS Environmental Studies, Central and Northern California, BLM, 1977.

Environmental Reports (Exploration) and Environmental Assessments for Santa Maria Basin Offshore and Santa Barbara Channel OCS Leases (1975-1982).

Environmental Reports (Development and Production) and Environmental Assessments for Santa Barbara Channel OCS Leases (1972-1982).

(II) DESCRIPTION OF THE PROPOSED ACTION

A. OPERATOR AND LESSEE

OPERATOR: EXXON COMPANY, U.S.A., DIVISION OF EXXON CORPORATION

LESSEE: EXXON COMPANY, U.S.A.

B. LEASE NUMBERS AND LOCATIONS

The lease numbers, tract numbers, and block numbers for the two leases covered by this report are presented on the Title Page.

Leases OCS-P 0438 and 0440 are located in federal waters in the Santa Maria Basin Offshore area. Lease OCS-P 0438 is located ± 6 km (4 miles)* northwest of Point Perdenales and lease OCS-P 0440 is located ± 9 km (6 miles) west of Point Perdenales (see Figure II-1).

C. OBJECTIVE OF THE PROPOSED ACTIVITY

The objective of the proposed exploration activities described in this Environmental Report is to evaluate and define potential sources of commercial hydrocarbon resources on leases OCS-P 0438 and 0440. These leases were acquired by Exxon Company, U.S.A. in Lease Sale No. 53.

D. DESCRIPTION AND LOCATION OF THE VESSEL TO BE USED TO CONDUCT THE PROPOSED EXPLORATORY DRILLING ACTIVITIES

(1) DESCRIPTION OF THE VESSEL

Exxon Company, U.S.A. plans to use the GLOMAR PACIFIC or a comparable vessel to drill the proposed wells. The PACIFIC is a

---

* English/Metric Conversion Factors used herein are shown on page ix.

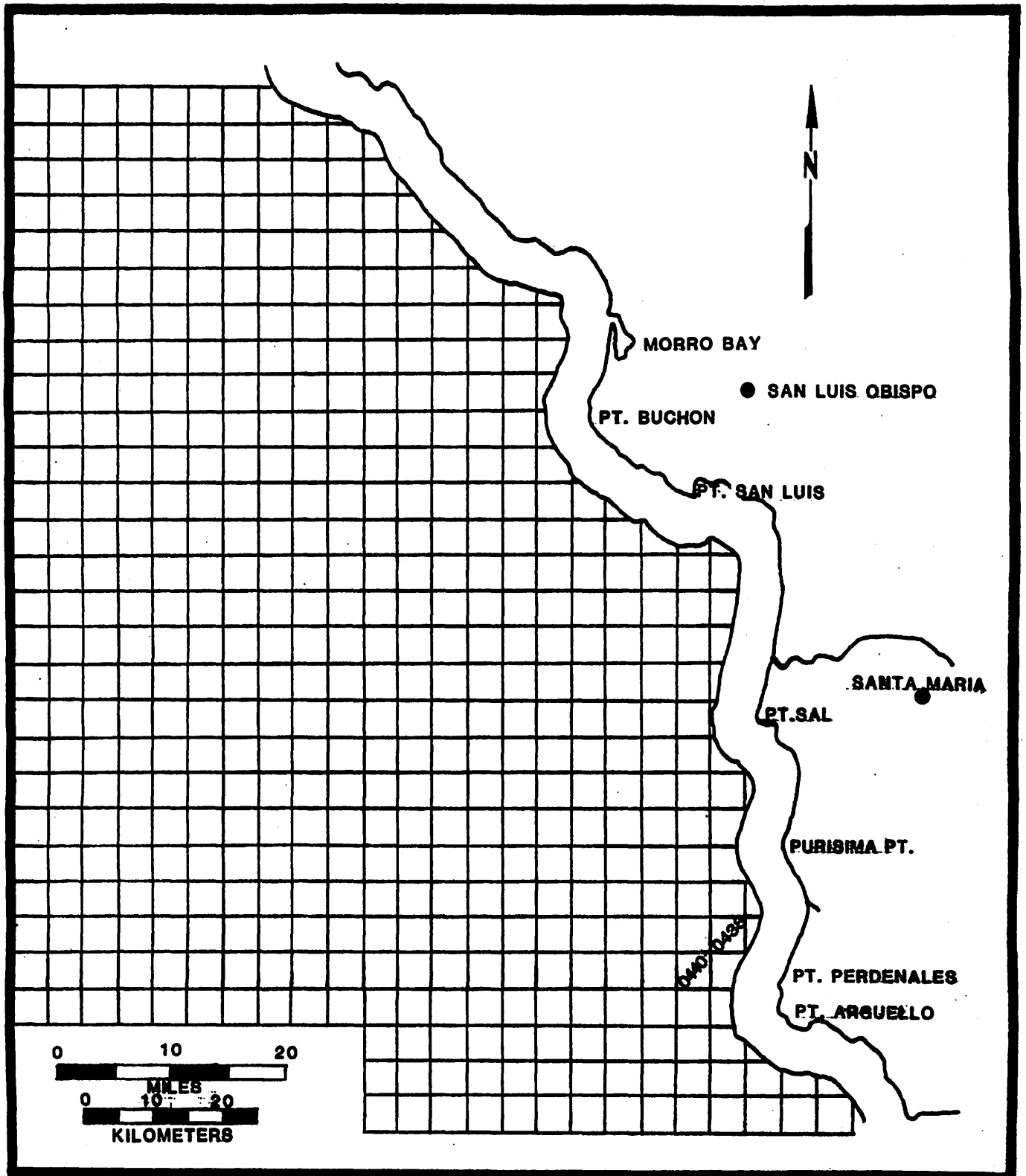


FIGURE II-1

LOCATION OF LEASES
OCS-P 0438 AND OCS-P 0440

self-propelled, 452-foot drilling vessel capable of drilling to 25,000 feet (7,625 m). It is currently outfitted for water depths to 2,000 feet (610 m). The vessel is moored with an eight point wire line system or can be dynamically positioned. The latter capability will not be required at the locations proposed in this report. Propulsion for the vessel is provided by twin propellers driven by three General Electric 1,600 horsepower electric motors. A detailed description of the GLOMAR PACIFIC is contained in Appendix A of this report. In the unlikely event that simultaneous drilling activities on both leases are undertaken, a drilling vessel identical or very similar to the GLOMAR PACIFIC will be used.

(2) LOCATION OF THE DRILLING SITES

The surface locations, Lambert Zone Coordinates, water depths, and proposed permit depths for each of the described wells on leases OCS-P 0438 and 0440 are given in Table II-1. Table II-2 presents the latitude and longitude. Loran C Coordinates for each described well location and for the corners of the two leases are also shown for the benefit of interested commercial fishing groups.

E. APPROXIMATE TIMEFRAMES AND SCENARIO FOR CONDUCTING ACTIVITIES

The exploration activities proposed by Exxon are of temporary duration. The spud date for Exxon's first well, OCS-P 0440(A), is now estimated to be as early as March 1983. The well would require up to 40 days to drill and abandon and 20 days to test (if necessary). Within approximately three to twelve months after completion of the first well, the drilling vessel will most likely drill well OCS-P 0438(A).

All of the six proposed wells may not be drilled. Also, although specific well locations and the presently viewed priorities for drilling the six wells are provided (see Tables II-1 and II-2), the specific well locations and the order of drilling may change as information obtained through exploration activities at the first two

TABLE II-1

LOCATION OF PROPOSED WELLS

WELL NO.	WELL LOCATIONS (feet)	LAMBERT COORDINATES (UTM Zone 10) X (meters)	Y	WATER DEPTHS (meters)	(feet)	PROPOSED PERMIT DEPTH (feet)
OCS-P 0440(A)	750 WELL 750 SNLL	706,171.3	3,834,971.4	79	259	8,000
OCS-P 0438(A)	500 EWLL 500 NSLL	706,552.4	3,835,352.4	75	246	8,000
OCS-P 0438(B)	2850 EWLL 6550 NSLL	707,268.6	3,837,196.4	72	235	8,000
OCS-P 0440(B)	350 WELL 4600 SNLL	706,293.3	3,833,797.9	80	263	8,000
OCS-P 0440(C)	1850 WELL 6150 NSLL	705,836.1	3,832,274.5	90	295	8,000
OCS-P 0440(D)	2800 WELL 2050 NSLL	705,546.5	3,831,024.8	96	315	8,000

TABLE II-2

LATITUDE AND LONGITUDE AND LORAN C COORDINATES FOR THE CORNERS OF THE LEASES AND EACH PROPOSED WELL LOCATION

LEASE OCS-P 0440

LEASE CORNERS	LATITUDE	LONGITUDE	LORAN C (ft.) W	X	Y
NW	34°38'26.425"	120°48'01.947"	16503.3	27798.1	41901.4
NE	34°38'22.985"	120°44'53.549"	16507.0	27807.8	41889.9
SW	34°35'50.704"	120°48'06.056"	16503.9	27797.7	41889.0
SE	34°35'47.270"	120°44'57.755"	16507.6	27807.3	41877.6
WELL A	34°38'15.734"	120°45'02.722"	16506.9	27807.3	41889.9
WELL B	34°37'37.578"	120°44'58.965"	16507.1	27807.4	41886.6
WELL C	34°36'48.488"	120°45'18.238"	16506.9	27806.4	41883.7
WELL D	34°36'08.157"	120°45'30.690"	16506.9	27805.6	41881.2

LEASE OCS-P 0438

LEASE CORNERS	LATITUDE	LONGITUDE	LORAN C (ft.) W	X	Y
NW	34°40'58.698"	120°44'49.334"	16506.4	27808.1	41902.4
NE	34°40'55.172"	120°41'40.847"	16510.2	27817.7	41890.9
SW	34°38'22.985"	120°44'53.549"	16507.0	27807.8	41889.9
SE	34°38'19.464"	120°41'45.160"	16510.7	27817.2	41878.4
WELL A	34°38'27.818"	120°44'47.434"	16507.1	27808.1	41889.9
WELL B	34°39'27.118"	120°44'17.695"	16507.5	27809.7	41893.0

sites and on other nearby leases becomes available. The most likely operating scenario would be to drill two wells per year on the leases. It is possible, though unlikely, that Exxon will utilize more than one drilling vessel to conduct exploratory drilling operations in the Santa Maria Basin Offshore OCS area. If this occurs, it obviously would expedite the above drilling schedule.

F. DESCRIPTION OF PROPOSED TRAVEL MODES AND ROUTES; FREQUENCY FOR MOVING SUPPLIES AND PERSONNEL TO AND FROM OFFSHORE ACTIVITY SITES

Helicopters, a crewboat, and workboats will be used to move personnel and supplies to and from the proposed drilling sites.

(1) HELICOPTERS

Helicopter support services for Exxon's proposed activities will be provided by Petroleum Helicopters, Inc. from a base of operations located in Goleta or Oceano. For Exxon's exploration activities, a Bell 212 will be used. The Bell 212 is a fourteen-passenger vehicle with average fuel usage of 100 gal/hr and an average speed of 100 miles/hour. It is estimated that the helicopter will travel to the drilling site approximately once per day, except on crew change days (every 7 days) when as many as three roundtrips may be necessary. Calculations for total airtime and fuel usage (see Table II-3) and air emissions (see Appendix B of this report) are based on an estimated 80 roundtrips during the drilling, testing, and abandonment period for each well. This is a very conservative estimate since it is likely that some crew changes will be conducted by crewboat instead of by helicopter.

Petroleum Helicopters, Inc. may occasionally use a six-passenger 206 Bell L-1 (35 gal/hr; 110 miles/hr) in lieu of the Bell 212.

TABLE II-3

TRAVEL TIME AND FUEL USAGE INFORMATION FOR SUPPORT VEHICLES

Vehicle and Base of Operations	OCS Lease Number	Approximate Distance From Onshore Base to Each Lease (miles and kilometers)	Roundtrip Travel Time (hrs)	Total Fuel Used Per Roundtrip (gallons)	Number of Roundtrips	Total Fuel Usage Per Well (gallons)
Helicopter[1]						
Goleta	0438	50 mi (80 km)	1.0	100	80	8,000
	0440	53 mi (84 km)	1.1	110	80	8,800
Oceano	0438	29 mi (47 km)	0.6	58	80	4,640
	0440	33 mi (53 km)	0.7	66	80	5,280
Crewboat[2]						
Port Hueneme	0438	108 mi (173 km)	13.5	540	20	10,800
	0440	105 mi (169 km)	13.1	525	20	10,500
Ellwood Pier	0438	45 mi (72 km)	5.6	224	N/A[4]	N/A[4]
	0440	47 mi (75 km)	5.8	232	N/A[4]	N/A[4]
Port San Luis	0438	33 mi (53 km)	4.1	165	N/A[4]	N/A[4]
	0440	36 mi (58 km)	4.5	180	N/A[4]	N/A[4]
Workboat[3]						
Port Hueneme	0438	108 mi (173 km)	16.6	1994	30	59,820
	0440	105 mi (169 km)	16.2	1938	30	58,140

1 Based on the use of a Bell 212 using an estimated 100 gal/hr of fuel and traveling at an average speed of 100 miles/hour.

2 Based on the use of a 65-foot crewboat using an estimated 40 gal/hr of fuel and traveling at an average speed of 16 miles/hour.

3 Based on the use of a 210-foot workboat using an estimated 120 gal/hr of fuel and traveling at an average speed of 13 miles/hour.

4 Impossible to determine because these facilities will be used only in inclement weather.

The most direct route to the well locations will be followed and helicopters will comply with all existing or future altitude restrictions designed to protect sensitive habitats.

(2) SURFACE VESSELS

a. Crewboat: One 65-foot crewboat, operated by B. Leppaluoto, will be used approximately once every three days (20 times) during the drilling, testing, and abandonment period for each well. The crewboat will usually operate from the Port Hueneme harbor facilities; pickup and drop off of crew during inclement weather will be at Ellwood Pier or, with agreement and approval (under an appropriate use permit) of the Harbor Commission, from the Port San Luis Public Pier. The latter is a highly desireable safety measure to reduce crew exposure time during inclement weather. Based on a fuel usage rate of 40 gallons per hour, the approximate roundtrip travel time and fuel usage per well for the crewboat have been calculated for each lease and appear in Table II-3. The air emissions associated with this support service are provided in Appendix B of this report. Fuel consumed and associated air emissions will be reduced in proportion to the use of the Ellwood or Port San Luis facilities.

b. Workboats: Any one of three vessels operated by Sea Horse, Inc. will be used to transport materials and supplies to the drilling vessel and to carry wastes required to be disposed of at approved onshore disposal sites. Sea Horse, Inc. operates two 210' sister ships, the Atlantic Seahorse and Pacific Seahorse, and one 185' ship, the Brazos Seahorse. One of these three workboats will be used approximately once every two days (30 times) during the drilling, testing, and abandonment period for each well. The workboats will use harbor facilities at Port Hueneme and will follow the most direct route to the well sites. The Atlantic Seahorse and Pacific Seahorse use an average of 120 gallons of diesel fuel per hour and travel at an average speed of 13 nautical miles per hour. The Brazos Seahorse operates on an average of 48 gallons of fuel per hour and travels at an average speed of 11 nautical miles per hour.

The approximate roundtrip travel time and fuel usage per well for the workboats has been calculated for each lease, based on use of the 210' boat (Table II-3). The air emissions associated with this support service are provided in Appendix B of this report.

G. PERSONNEL REQUIRED TO CONDUCT ACTIVITIES

Approximately 142 people will be directly involved in the proposed exploration activities at each well site:

(1) OFFSHORE

. The GLOMAR PACIFIC has a permanent crew of 100 individuals working on a 21 days on/21 days off schedule. One half (50 members) of the crew is onboard at all times.

. Nine permanent staff people from Exxon and service companies will be present on the drilling vessel at all times.

. A transportation crew of 10 on the workboats and crewboat will be used as needed.

(2) ONSHORE

. Six Exxon personnel based at Ventura and Houston will be involved in the drilling program.

. Fifteen people from service companies, including standby transportation personnel, will be used as needed.

. Small numbers of local contractors and service personnel will be used as needed.

. Two pilots and one mechanic will be available to provide helicopter services.

H. DESCRIPTION OF EQUIPMENT TO BE USED AND GENERAL LAYOUT; SAFETY SYSTEMS; MONITORING SYSTEMS; AND ONSHORE SUPPORT SYSTEMS

(1) EQUIPMENT AND GENERAL LAYOUT

a. Drilling Vessel: A complete description of the GLOMAR PACIFIC appears in the Exploration Plan. The GLOMAR ATLANTIC or the GLOMAR CORAL SEA, which are nearly identical sister ships of the PACIFIC, may also be used for certain of the proposed drilling activities. It is possible that other drilling vessels of comparable size and design may also be used to conduct exploration activities in the area.

b. Support Equipment: The support equipment which will be used by Exxon has been described in detail above. It includes:

- Two 210' and one 185' workboats
- One 65' crewboat
- One Bell 212 helicopter
- Docking, loading, and servicing equipment facilities for the workboats and crewboat at Port Hueneme
- Helicopter service equipment and facilities at Goleta
- Storage equipment and facilities at:
  1) Romines Trucking Yard, Port Hueneme (a 5.3 acre yard with open storage area of 217,800 square feet)
  2) Ponoma Street Warehouse, Port Hueneme (two storage bays with total covered storage area of 4,800 square feet)

(2) SAFETY SYSTEMS

The principal safety systems are related to assessment of drilling hazards, blowout prevention, hydrogen sulfide contingency planning, fire-fighting, and evacuation and life-saving. At the re-

quest of the California Coastal Commission, an automatic radar surveillance warning system has been installed on the GLOMAR PACIFIC. Pending further Commission assessment of this requirement, this system or an equivalent system, will be in 24-hour operation while the drilling vessel is anchored at locations considered in the Exploration Plan.

a. Drilling Hazards: All geophysical work preparatory to the initiation of exploratory drilling operations has been completed and has been submitted to the MMS. The high resolution geophysical data (sparker), seismic CDP and bright spot information, velocity data, and structural interpretations have been examined and there are no shallow drilling hazards which pose an obstacle to the drilling of the proposed wells. Other than the evaluation logging programs, no other geophysical work is planned on leases OCS-P 0438 and 0440 unless data obtained from drilling operations necessitates additional definition detail from conventional reflection seismic methods.

b. Blowout Prevention: The GLOMAR PACIFIC and all comparable vessels which may be used during this proposed drilling program are adequately equipped with the necessary diverters - blowout prevention equipment to maintain complete well control. The blowout prevention system includes: (1) the surface diverter, controlled by a hydraulic diverter control manifold; (2) the marine riser system; (3) a 16 3/4" blowout preventer system; (4) a 10,000 PSI choke manifold; (5) a BOP kill and choke line system; and (6) a hydraulic BOP actuation and control system. A complete description of the BOP equipment onboard the drilling vessel appears in the Exploration Plan.

The drilling fluid, casing, and cementing programs proposed by Exxon are described in the Application for Permit to Drill (APD) for each proposed well.

c. Curtailment of Drilling Operations: If an emergency situation arises during the drilling of an exploratory well, and control over the well cannot be restored, Exxon has a contingency plan for abandoning the drillsite. If a possible broaching situation is imminent, anchor chains on the down-wind side of the vessel will be slackened or dropped and anchors on the up-wind side will be tightened and the rig moved off the location. Transportation is available to evacuate personnel from the drilling vessel if necessary.

d. Hydrogen Sulfide (H_2S): The GLOMAR PACIFIC is equipped with adequate H_2S detectors, alarms, and protective equipment. A complete description of the H_2S detection and protection equipment appears in the Exploration Plan.

A complete MMS-approved H_2S and SO_2 Contingency Plan for Exxon's operations on the California OCS has been approved by the MMS and will be put into operation under the appropriate conditions.

e. Fire: The GLOMAR PACIFIC is equipped with a Coast Guard approved fire-fighting system consisting of fire and deluge pumps; CO_2 systems in the engine and generator room, pump and propulsion room, and paint locker; a foam system for the helicopter deck; and 67 CO_2 and dry chemical extinguishers.

f. Evacuation and Lifesaving: Drilling vessel evacuation procedures would vary depending on the situation. For immediate evacuation, the GLOMAR PACIFIC is equipped with two 64-person lifeboats, two 42-person lifeboats, and four 20-person inflatable life rafts. Life jackets and preservers and other miscellaneous emergency equipment are onboard in accordance with U.S. Coast Guard regulations. In addition, workboats, as they are on location, will be available for emergency evacuation purposes.

(3) MONITORING SYSTEMS

The mud used during the drilling program will be monitored by a 24-hour continuously-manned mud logging unit. The evaluation and logging programs are referenced in the Exploration Plan.

The GLOMAR PACIFIC is equipped with hot wire gas sensing devices installed on the rig floor, in the mud pump room, under the rig just below the mezzanine deck, and three feet above the shale shaker. These systems will continuously scan for the presence of gas in the mud as it circulates through the system. These devices are also referenced in the Exploration Plan.

Exxon will also monitor the fuel consumption and electromotive requirements (watts-hours) of the drilling vessel and keep continual records of wind speed and direction.

(4) ONSHORE SUPPORT SYSTEMS

Exxon will maintain an onshore communications base which will operate 24 hours a day. Global Marine, Inc. owner of the GLOMAR PACIFIC, or owners of comparable drilling vessels, will maintain a separate onshore communications base.

I. NEW OR UNUSUAL TECHNOLOGY

None of the equipment or procedures to be used are new or unusual. The GLOMAR PACIFIC has been used frequently for exploration activities on nearby locations in the Pacific OCS.

J. DISCUSSION OF THE USE OF THE OIL SPILL CONTINGENCY PLAN

(1) DESCRIPTION OF OIL POLLUTION PREVENTION PROCEDURES

It is the policy of Exxon to take all proper and appropriate actions to avoid oil spills and, in the unlikely event that a

spill occurs, to contain, cleanup, and dispose of oil and oily debris as quickly and safely as possible. Best state-of-the-art equipment will be used by Exxon and its contractors, and all activities will be conducted in a carefully planned and orderly fashion so as to prevent non-permitted discharges.

Prevention of oil spills during exploratory activities will be maximized through the full compliance by Exxon and its drilling contractors with the requirements of Pacific OCS Orders No. 2 and 7. Order No. 2 establishes casing and casing-cement requirements; blowout prevention equipment specifications; mud program, testing, and control requirements; and a mandatory program for the supervision and surveillance of activities and the training of personnel. Order No. 7 establishes requirements for liquid and solid waste disposal; personnel training and drills for pollution prevention; and pollution inspections and reports.

The primary system used to prevent an oil spill is composed of a mud and casing program, and the diverter-blowout system described in Section (H)(2) of this report and the Exploration Plan. The usual pressure integrity test procedure (PIT) will be followed before drilling more than 15 m (49 feet) immediately below the surface and intermediate casing shoes. All horizons which contain oil, gas, or fresh water will be fully protected by casing and/or cement. Equipment which meets or exceeds the standards set forth in OCS Order No. 2 will be used. The casing program will be described in detail in the Application for a Permit to Drill for each well.

If an oil spill should occur, either from surface transfer operations or loss of well control, and does not endanger the lives of the Onsite Response Team (ORT), containment and cleanup equipment on the drilling vessel will immediately be deployed by the ORT under the direction of the Drilling Supervisor. A description of the spill equipment that will be onboard the GLOMAR PACIFIC is presented in Table II-4. This equipment is designed primarily to contain and cleanup small spills (OCS Order No. 7). This cleanup equipment will

TABLE II-4

SPILL EQUIPMENT ABOARD GLOMAR PACIFIC

The oil spill containment and cleanup equipment and other supplies listed below are available on-site for immediate deployment and use in the event of an oil spill. A boat to deploy the Expandi-Boom is maintained onboard the GLOMAR PACIFIC. A supply boat or crewboat will be near the drilling vessel most of the time and also can be used to assist in the deployment of equipment.

1500 ft. of 43" Expandi-Boom, assembled with accessories on storage pallet (Whittiker)	Works in waves up to 5 ft. and winds up to 20 knots
1 Komara miniskimmer, pump, and engine	Works in waves up to 2 ft.
1 Dunlop A-1 1200-gallon Dracone floating storage tank	Within capabilities of skimmer operations
20 Cyalume lightsticks	Night slick marking
15 bales of 3M sorbent type 156	For contained spills only
1 drum of Corexit "9527" dispersant	Requires permission of OSC for use
1 drum of Corexit C-5 surface collecting agent	Requires permission of OSC for use
1 Hudson hand spayer	Chemical application
1 19' Zodiac Boat-125 HP engine	Within capabilities of skimmer operations

be inspected monthly and maintained in a constant state of readiness. Results of the inspection will be recorded and maintained on-site. Workboats will be on location or near the vessel, weather permitting, to assist in the deployment of equipment.

If additional equipment is needed, it can be obtained from several sources, including Cleans Seas (CS), an oil spill cooperative which maintains supplies of containment and cleanup equipment at its Carpinteria yard and in strategically placed vans along the coast (see Figure II-2). Appendix D of this report contains an inventory of CS equipment, including an oil storage barge--the Tide Mar VII. Clean Seas maintains a fully equipped oil spill response vessel, MR. CLEAN II, which is berthed at Port San Luis. A similar vessel, MR. CLEAN I, is berthed in Santa Barbara Harbor. Should other equipment be required, Exxon also has access to Clean Coastal Waters (CCW) equipment located in San Pedro and on Santa Catalina Island. Further, Exxon has containment and cleanup equipment available on the Hondo Platform and the Exxon SANTA YNEZ (OS&T) vessel, both located in the western portion of the Santa Barbara Channel.

The latest revision of Exxon's Oil Spill Contingency Plan for California Operations was submitted to the MMS on September 9, 1982. The Plan includes a description of the immediate actions to be taken and the notification procedures to be followed in the event that a spill occurs during exploration operations. It also contains a list of the manpower, equipment, and materials maintained by or available to Exxon Company, U.S.A. for use in the event of a spill. This Plan will be updated by February 28, 1983 to comply with the oil spill containment and recovery planning guidelines published by the MMS on July 29, 1982.

(2) PERSONNEL INVOLVED IN IMPLEMENTATION OF THE CONTINGENCY PLAN

a. Personnel Training: All Exxon personnel involved in the proposed activities, the GLOMAR PACIFIC's supervisory personnel,

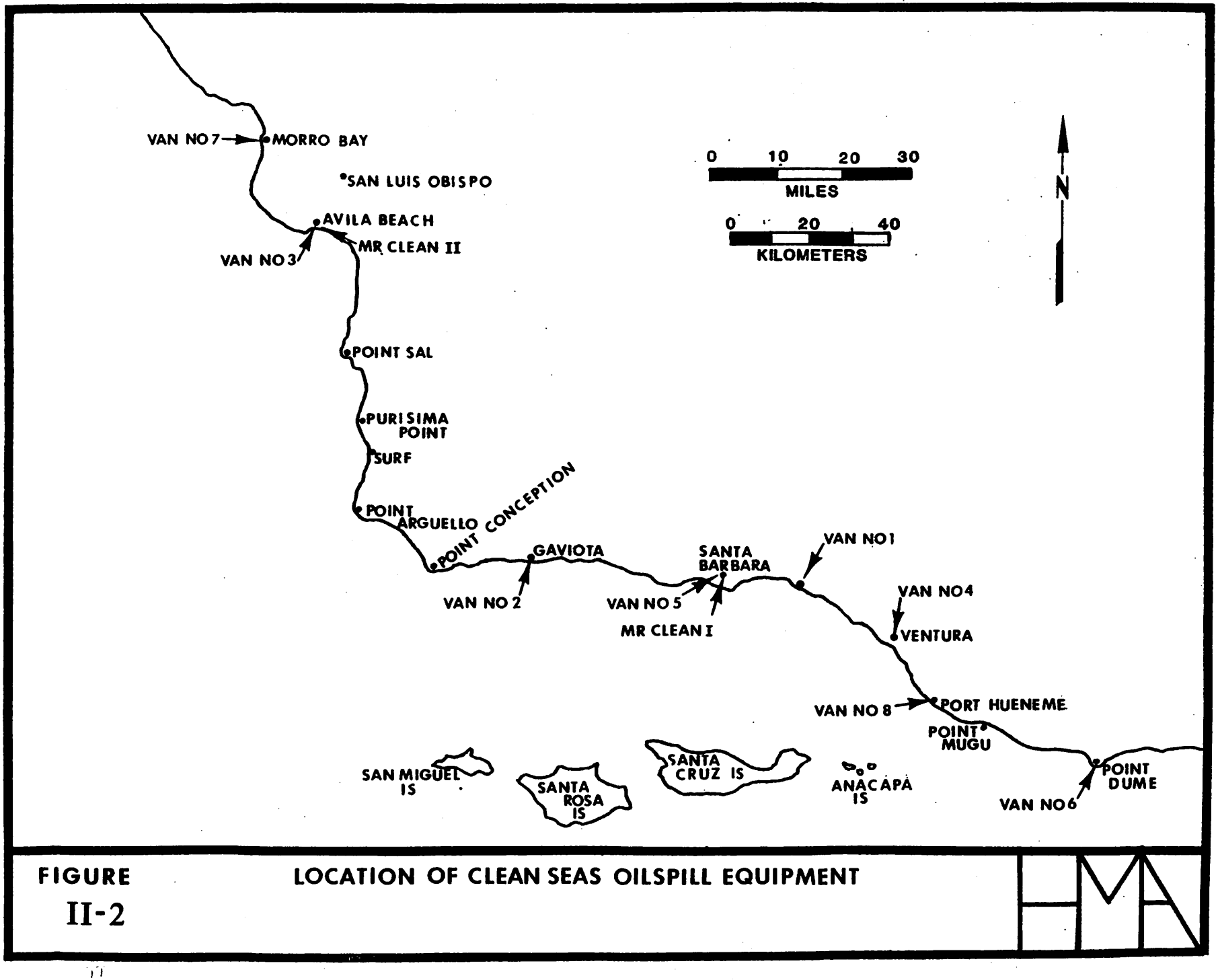


FIGURE II-2 LOCATION OF CLEAN SEAS OILSPILL EQUIPMENT

and the drilling crew will complete all the well control training and other requirements established by MMS OCS Standard No. T-1 (GSS-OCS-T-1).

A detailed description of the oil spill training program is included in Appendix C of the Oil Spill Contingency Plan (Revisions of September, 1982). Training exercises are conducted monthly for personnel designated to deploy the oil spill containment and cleanup equipment. Initial training sessions include deployment and operation of the cleanup equipment by assigned drilling vessel personnel and the crews of the workboats. An annual drill (consistent with the requirements of OCS Order No. 7) involving the deployment of the onboard equipment will be conducted by personnel designated as the ORT. Sufficient advance notice of the drill will allow participation by MMS witnesses. Communications training is provided by weekly radio communication checks conducted with CS, using an onboard CS portable radio.

b. Personnel Involved in Activating Key Phases of the Contingency Plan: A detailed description of the Exxon and Global Marine personnel to be involved in implementation of the contingency plan is contained in Sections 200 (Notification) and 400 (Offshore Spill Response Organization) of Exxon's Oil Spill Contingency Plan which has been approved by the MMS. For exploration activities, the Exxon Drilling Superintendent serves as the Site Superintendent who is responsible for immediately activating the Onsite Response Team. This Team will initiate the appropriate control actions. The Exxon Site Superintendent will also notify the Exxon Operations Superintendent, who will in turn notify all appropriate government agencies and the District Manager. If the spill cannot be contained by ORT efforts, the District Manager will then immediately notify the Division Operations Manager in Los Angeles. The Division Operations Manager will activate all or part of the Emergency Response Team and

notify the appropriate oil spill cooperative. The Oil Spill Contingency Plan should be consulted for details concerning these procedures.

(3) DESCRIPTION OF CLEANUP ACTIVITIES, RESPONSE TIME, CAPACITY, AND LOCATION OF EQUIPMENT

A detailed explanation of the equipment, techniques, methods, and capacity for containment and cleanup is found in Exxon's Oil Spill Contingency Plan, Sections 300 (Offshore Spill Response), 400 (Offshore Spill Response Organization), 500 (Offshore Containment and Cleanup), 600 (Offshore Site Information), and 700 (Offshore Spill Equipment Resources). These sections describe containment and cleanup activities, the location of all available equipment, and the limitations on capability and capacity of the equipment. Figure II-3 shows the location of oil spill recovery equipment along the central and southern California Coast.

In the unlikely event that an oil spill occurs, containment and cleanup equipment on the drilling vessel will be immediately deployed. If the oil spill is beyond the means of onsite personnel and equipment, MR. CLEAN II, berthed at Port San Luis, will be called to the site. The oil spill response vessel MR. CLEAN II can be underway from Port San Luis within one to two hours of notification. Once it arrives on site, the boom can be deployed in approximately ten minutes and recovery initiated within one hour. Proceeding from Port San Luis in average seas, MR. CLEAN II should be at lease OCS-P 0438 in about 3.25 hours and at lease OCS-P 0440 in about 3.5 hours (assuming an average speed of 12 mph). Thus, in average seas, the maximum response time from Port San Luis to lease OCS-P 0438 would be about 6.25 hours and from Port San Luis to lease OCS-P 0440 about 6.5 hours. MR. CLEAN I, which is kept at Santa Barbara Harbor, is also available if needed.

Additional equipment may be obtained from other sources and transported to the site either by helicopter or vessel from staging areas at Port San Luis and Santa Barbara. The approximate

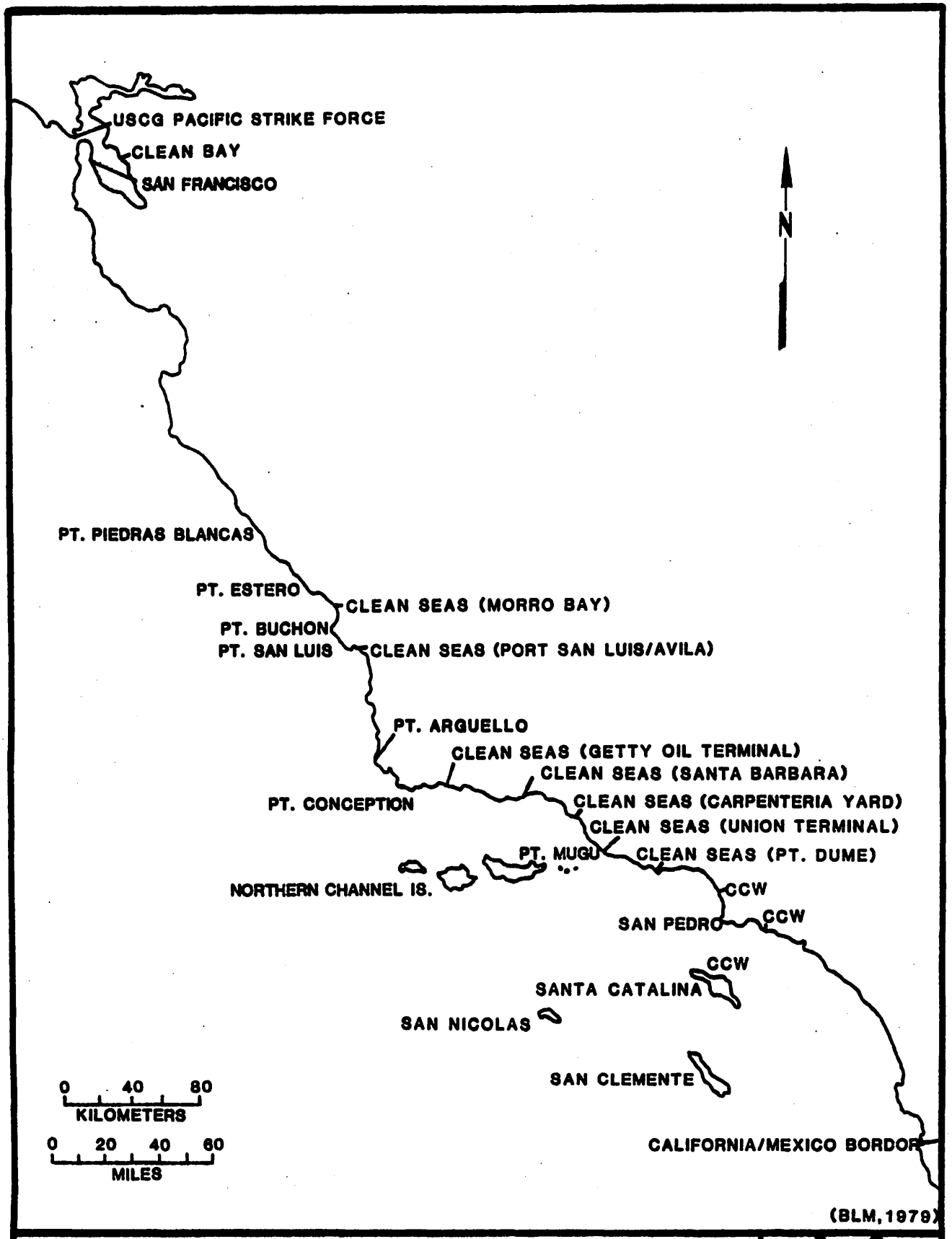


FIGURE II-3 LOCATION OF OIL SPILL RECOVERY EQUIPMENT MAINTAINED BY OIL SPILL COOPERATIVES IN CALIFORNIA

response times for moving oil spill containment and cleanup equipment to the drilling sites on OCS-P 0438 and 0440 are as follows:

Mode	Lease	from Santa Barbara	from Port San Luis
Helicopter (at 90 mph)	0438	45 min	22 min
	0440	45 min	24 min
Vessel (at 16 mph)	0438	4.2 hrs	2.00 hrs
	0440	4.2 hrs	2.25 hrs

A discussion of Clean Seas equipment, its use, and location appears in Appendix C of this report.

(4) RELATIONSHIP TO THE NATIONAL AND REGIONAL OIL SPILL CONTINGENCY PLANS

The National Oil & Hazardous Substances Contingency Plan, established pursuant to the Clean Water Act, is the basis for federal action to minimize pollution damage from discharges of oil or hazardous substances. The national plan is actually a master plan composed of various regional plans; the area of Exxon's proposed activities is part of Federal Region IX, 11th Coast Guard District in Long Beach, California. In case of an oil spill, the Captain of the Port at Long Beach will become the Federal On-Scene Coordinator (OSC). The OSC has a Regional Response Team (RRT) composed of numerous federal agencies for his immediate call up.

Any oil spill, no matter what its size, will be reported to the U.S. Coast Guard and the MMS District Engineer by the Exxon Operations Superintendent. The Regional Response Team will be alerted and, in the event of a major discharge, will be activated automatically. However, the purpose of the RRT is not to unilaterally take over containment and cleanup activities from Exxon. When the discharger is financially capable, and takes appropriate remedial actions voluntarily, the principal thrust of the federal activi-

ties will be to observe and monitor the progress of response actions and to provide advice and counsel. Only if the discharger does not act promptly or does not take appropriate actions will the RRT undertake the cleanup activities.

K. WASTE MATERIALS

Solid wastes, such as containers and scrap metal, will be transported to shore by workboat. Other wastes, which are discussed below, will be discharged into the marine environment at the drilling site. These wastes fall into two categories: (1) gaseous pollutants and (2) solid and liquid wastes.

(1) GASEOUS POLLUTANTS

Information on the nature and quantity of emissions, the characteristics and operating frequency of significant emission sources on the drilling vessel, and the calculations associated with the air quality analysis requirements of the MMS regulations is summarized in Section IV of this report and is presented in detail in Appendix B of this report.

(2) SOLID AND LIQUID WASTES

In compliance with the provisions of the Federal Water Pollution Control Act, as amended (33 USC 1251 et. seq.), the U.S. Environmental Protection Agency (EPA) regulates the discharge of liquid and solid wastes into ocean waters. The GLOMAR PACIFIC is allowed to discharge wastes under a General Permit issued by EPA Region IX on February 18, 1982. The permit sets forth effluent limitations, standards, and other conditions on discharges for oil and gas drilling vessels. The General Permit covers oil and gas drilling operations conducted offshore on the California OCS. A copy of the permit appears as Appendix D of this report.

Nature of Discharged Materials

A description of the quantity, rate of discharge, and composition of wastes that will be discharged from the GLOMAR PACIFIC, the basis for this information, and plans for treating, storing, and transporting each discharge are given below. The discussion is organized to be consistent with the discharge categories set forth in the General NPDES Permit. Applicable effluent limitations and prohibitions for each discharge category are described therein.

Drilling fluids, called "muds", are used during exploratory drilling to transport drill cuttings to the surface, to control formation pore pressures, to maintain borehole stability, to protect productive formations, to protect against corrosion, and to cool and lubricate the bit and drill string. For a detailed description of a typical mud circulating system for an offshore drilling vessel, see Exxon, 1981.

The simplest and most economical drilling fluid is clear water; however, a fluid with higher viscosity and density is usually needed. These characteristics are obtained by adding known quantities of a few basic ingredients such as barite, bentonite, chrome lignosulfonate, lignite, sodium hydroxide and calcium hydroxide to the drilling fluid. The proprietary copy of the Exploration Plan which accompanies this report contains a complete description of the mud program to be used for the proposed wells and the names of each component and additive. Biocides will not be used (other than residual chlorine required for and resulting from sewage treatment).

During the drilling of an offshore well, intermittent bulk discharges of drilling mud often are made at a rate of 500 bbl/hr. For occasional small discharges, the discharge time might be 0.1 to 0.2 hours. Large volume discharges may take 1 to 3 hours. Large volume discharges occur when spud mud is discharged, after setting each casing string, and at the end of the drilling operations (Simpson, 1981). Drilling mud discharges of approximately 29,100 barrels

are estimated for each 8,000 foot well proposed on leases OCS-P 0438 and 0440. The drilling muds will contain up to 90% seawater and/or freshwater.

Liquid drilling muds will be stored onboard the drilling vessel in mud tanks. The mud constituents will be transported from Port Hueneme to the drilling vessel by workboat.

Drill cuttings are natural rock particles generated by drilling into subsurface geologic formations. Drill cuttings are carried to the surface of the well with the circulation of the drilling muds and separated from the fluids on the platform by solid separation equipment (centrifugal devices, screens, and shakers). In typical offshore drilling operations, cuttings are customarily discharged at a rate of 1 to 10 bbl per hour while drilling. Total quantities depend upon the size and depth of the hole drilled; for the 8,000-foot wells discussed in this report, about 2,400 barrels of cuttings will be discharged.

The discharge of drilling muds and cuttings will be in accordance with the General NPDES Permit. Seven generic types of drilling muds have been approved for discharge under the permit. The permit prohibits the discharge of these drilling muds in a volume and/or concentration which, after allowance for initial dilution, would exceed permissible concentrations (LPC) as defined in the permit. Variations from the list of approved muds or additives will require the facility owner or operator to conduct bioassay tests and submit the analyses to the Regional Administrator of EPA within six months of the commencement of discharge. The discharge of oil-based drilling muds is prohibited.

Produced Waters (Formation Water or Brine) includes water and suspended particulate matter brought to the surface in conjunction with the recovery of oil and gas from underground geologic formations.

The General NPDES Permit includes effluent limitations for heavy metals in produced waters. These limitations, which are specified in Part I.A.2a of the permit, are the daily maximum concentrations in the California Ocean Plan.

Produced Sands includes sands and other solids removed from the produced waters. The permit imposes no limitation on the quantity of produced sands discharged, but requires that the quantity of discharged sands be estimated and reported monthly.

Deck Drainage includes all water resulting from platform washings, deck washings, tank cleaning operations, and runoff from curbs, gutters, and drains including drip pans and work areas. This drainage consists of water, lubricating oils, biodegradable detergents and, in some cases, general grime. From past experience, it is estimated that 1,500 gallons of deck drainage and washwater will be discharged each day.

Drainage from the drill floor and contaminated deck areas flows into a 1,000-gallon capacity settling tank and then all water is processed through a SAREX oil/water separator. Clean water from the tank is discharged into the ocean waters. Oil and sludge are separated and retained in collection drums for transport to shore and disposal at an EPA-approved onshore site. An estimated 50 gallons per well of oil and oil emulsion sludge will be disposed of in this manner. These wastes will be trucked from Port Hueneme to the Casmalia disposal site located in Santa Barbara County for disposal.

The General NPDES Permit sets no volumetric limitation on the discharge of deck drainage.

Sanitary wastes includes human body waste discharges from toilets and urinals. An estimated 5,000 gallons per day of sanitary wastes will be generated. Sewage on the GLOMAR PACIFIC is collected by two separate gravity systems fabricated from galvanized Schedule 80 steel pipe. Water closets and urinals are discharged to a U.S.

Coast Guard approved DEMCO Model 5000 three-stage marine biological sewage treating unit with a 100-man capacity. As required by the General NPDES Permit, the treatment will result in sewage effluent with a minimum chlorine residual of 1.0 mg/l and will be maintained as close to this concentration as possible.

Domestic wastes includes materials discharged from sinks, showers, laundries, and galleys and consists of food, soap, biodegradable detergents, and cleaning agents. An average of 50 gallons per day per individual of domestic wastes is generated on the drilling vessel. Discharges from the showers, lavatories and laundries are collected in a second system and dumped overboard. Trash and garbage will be placed in suitable portable containers and transferred to shore at Port Hueneme for disposal at an approved dumping site.

Seven miscellaneous discharges are also identified in the General NPDES Permit. These effluents, which are identified below, may be discharged in unlimited amounts; however, no free oil may be released as a result of these discharges.

Desalinization unit discharge is any wastewater associated with the process of creating fresh water from seawater. The seawater distillation process on the GLOMAR PACIFIC involves the use of two Triton waste heat type units which result in the discharge of approximately 14,000 gallons per day of concentrated brine (manufacturer's estimate). The water produced by this process will be supplemented by fresh water transported by boat from Port Hueneme.

Cooling water is non-contact seawater used to cool down engines and other equipment. Temperature increases in seawater used for cooling purposes are minimal (2°-4°F).

Bilge water is seawater which collects in the vessel's hold. The removal of bilge water is manually controlled. Clean bilge water is pumped directly overboard and oily bilge water is directed through the oily water tank to the SAREX unit for cleansing prior to disposal.

Ballast water is used to maintain the stability of the drilling vessel. It is non-contact seawater which does not come in contact with pollutants.

Excess cement is unused cement discharged after a well cementing operation.

Blow-out preventer fluid is a mixture of water and 1-2% hydraulic fluid vented at the ocean floor during periodic testing of the blow-out preventer system as required by MMS.

Fire system test water is seawater discharged during periodic testing of the fire control system.

L. SUITABLE MAPS AND DIAGRAMS SHOWING DETAILS OF THE PROPOSED PROJECT LAYOUT

Detailed maps and diagrams of the layout and equipment on the GLOMAR PACIFIC are referenced in the Exploration Plan. The project area appears in Figure II-1 of this report and the well locations are described in Tables II-1 and II-2 of this report.

M. CERTIFICATION OF COASTAL ZONE CONSISTENCY

The proposed activities comply with the State of California Coastal Management Program and will be conducted in a manner consistent with such program. A discussion of the relevant coastal policies and how consistency with these policies is achieved may be found in Appendix E of this report.

N. A DESCRIPTION OF MEASURES PROPOSED TO COMPLY WITH OCS ORDERS AND OTHER PERTINENT REGULATIONS

Exxon's proposed drilling activities satisfy all requirements of current Pacific OCS Orders and Notices to Lessees. This will insure total compliance with all MMS standards, criteria, and requirements for overall well control programs (including the casing, mud, and cement programs and the installation and testing of BOP equipment), personnel training, monitoring, surveillance and reporting, well surveys and testing, and hydrogren sulfide detection and safety measures.

Exxon's activities will also satisfy all requirements imposed by specific lease stipulations appearing in the Lease Sale Number 53 contract. The Fisheries Training Program required by Stipulation No. 8 has been approved by the MMS and will be presented to all personnel involved in vessel operations and shorebased supervisors. A cultural resource survey, as described by Stipulation No. 2, was not required. Lease Stipulation No. 1 has been invoked by the MMS for lease OCS-P 0440 and, under current MMS policy, a biological survey will be required if any proposed well location is within 1,000 meters of a "hard bottom" area. Military Stipulations 4 and 5 will be complied with, as will Stipulation No. 7 concerning the shrouding of subsea well heads and temporary abandonments.

O. NEARBY PENDING ACTIONS

The following exploration activities were taking place in the Santa Barbara Channel OCS area or the Santa Maria Basin offshore OCS area as of January 10, 1983:

Location (OCS-P)	Drilling Vessel	Operator
0187	Glomar Pacific	Exxon
0318	Key Singapore	Chevron
0322	Glomar Atlantic	Conoco

(III) DESCRIPTION OF THE AFFECTED ENVIRONMENT

A. GEOLOGY

(1) BATHYMETRY

a. General: The Santa Maria Basin offshore extends from Point Arguello northwest to Point Sur just south of Monterey, California. It measures 40 kilometers (km) (24.6 miles) by 230 km (143 miles) and is elongate in a northwest direction parallel to the coastline (USGS, 1980). Leases OCS-P 0438 and OCS-P 0440 are located within the Santa Maria Basin offshore OCS area 6 and 9 km (4 and 6 miles) northwest and west of Point Perdenales, respectively. See Figure III-1 for a map depicting the location of the leases.

The first major offshore physiographic feature from the mainland coastline in the Santa Maria Basin offshore area is a submarine terrace known as the mainland shelf which parallels the coastline between Point Arguello and Point Buchon. Due west of Point Arguello, the shelf is 9 km (6 miles) wide and it rapidly widens northward to 18 km (11 miles) just south of Purisima Point. At this point, the shelf gradually narrows to 10 km (6 miles) due west of Point Sal and then widens to 19 km (12 miles) due west of the city of Oceano. North of Oceano, the shelf narrows again to 9.5 km (6 miles) west of Point San Luis and 5 km (3 miles) west of Point Buchon.

Overall, the mainland shelf is characterized by a gentle westerly slope. Water depths on the shelf range from sea level to 100 meters (m) (328 feet).

Due west of Point Arguello the mainland shelf gives way to the Arguello Slope which, in turn, gives way to the Arguello Plateau. The Arguello Slope is narrow in width; however, water depths increase rapidly along the slope to 200 m (656 feet). The Arguello

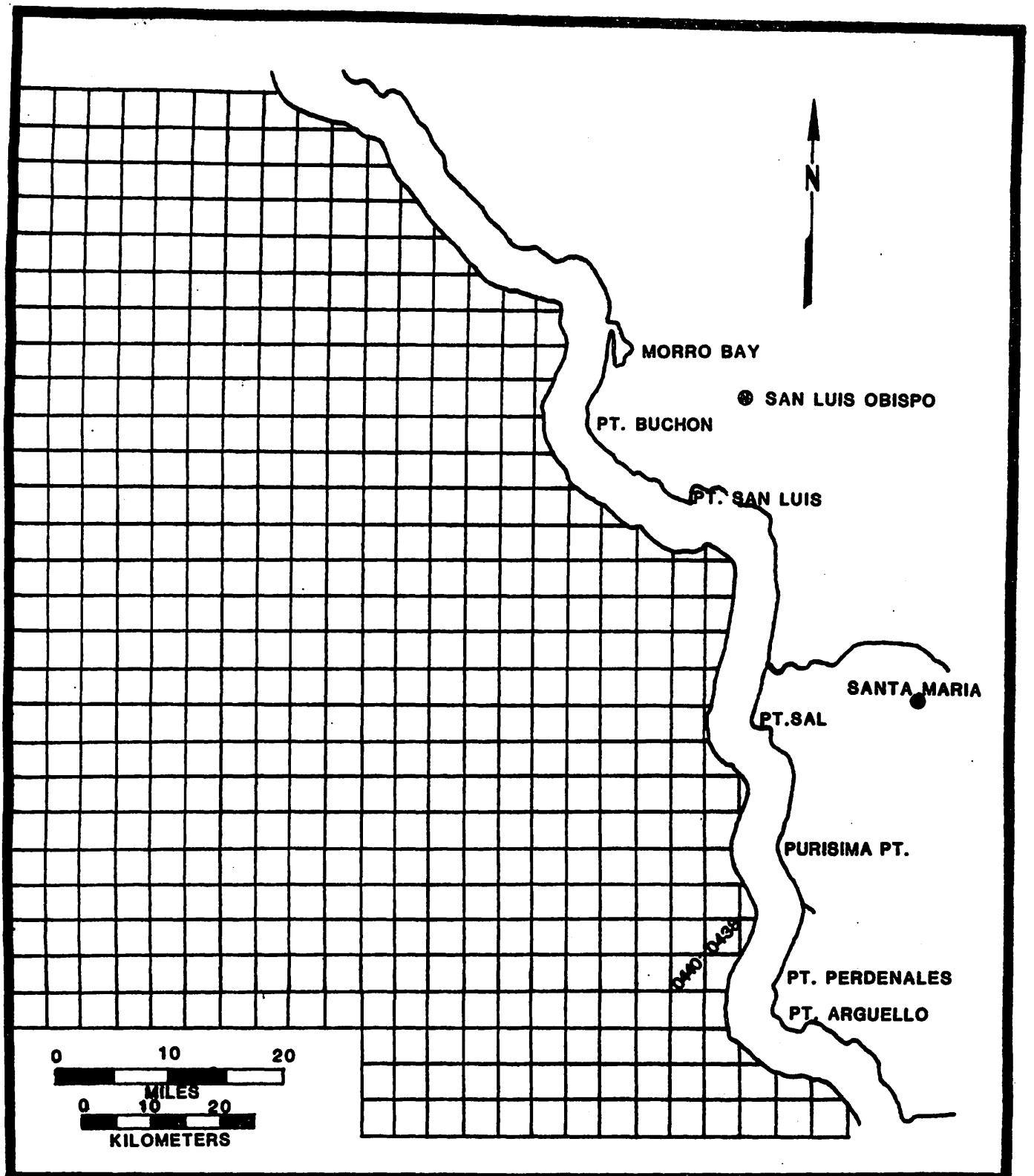


FIGURE III-1

LOCATION OF LEASES OCS-P 0438 AND OCS-P 0440

Location (OCS-P)	Drilling Vessel	Operator
0409	Penrod 73	Oxy
0435	JFP-3	Shell
0441	Diamond M General	Union
0446	Diamond M Eagle	Chevron
0450	Sedco 702	Chevron
0450	Zapata Concord	Chevron
0451	Coral Sea	Chevron

No development drilling is underway in the Santa Maria Basin offshore OCS area at this time. In the Santa Barbara Channel, development drilling by Exxon is underway on several leases from the Hondo facility on lease OCS-P 0188 (Santa Ynez Unit) in the western part of the Channel. Exxon recently submitted a new Plan of Development for the Unit which has been deemed complete by the MMS. Development wells are also being drilled on Platform Henry (lease OCS-P 0240), Platform Grace (lease OCS-P 0217), Platform Gina (lease OCS-P 0202), and Platform Gilda (lease OCS-P 0216). Texaco set Platform Habitat on lease OCS-P 0234 in the Pitas Point Unit in early September 1981 and began drilling in early 1982.

P. MEANS FOR TRANSPORTING OIL AND GAS TO SHORE

Because the proposed drilling activities are exploratory in nature, no transportation of produced oil and gas will be required. If commercially producible hydrocarbon reserves are discovered, an Environmental Report (Development/Production), containing detailed information about oil and gas transportation methods and routes, will be submitted.

If a well test occurs during the proposed drilling program, small quantities of oil may be recovered. This produced oil will be transported to Port Hueneme by workboat for appropriate disposal or reclaiming.

Fuel oil which will be needed for drilling operations will be delivered by workboat to the GLOMAR PACIFIC from Port Hueneme.

Q. EXISTING OR PLANNED MONITORING SYSTEMS

All the H_2S, mud, and oil pollution monitoring systems and the automatic radar surveillance system described in this document will be in full operation throughout the drilling program.

R. OTHER ENVIRONMENTAL PROTECTION MEASURES

The discussions in other sections of the report accurately document the environmental protection measures which will be taken to insure that Exxon's drilling operations are conducted in a prudent and skillful manner.

Slope is broken by four prominent submarine canyons [maximum relief >100 m) (328 feet)] which extend onto the Arguello Plateau where they eventually converge to form the Arguello Canyon.

North of the Point Arguello headlands, the transition between the mainland shelf and the central deep of the Santa Maria Basin offshore is more gradual. However, areas with comparatively steep slopes can be found west of Purisima Point and between Point San Luis and Point Buchon.

The central deep of the Santa Maria Basin offshore is bounded on the south by the Arguello Plateau [where water depths range from 200 m (656 feet) to 1,000 m (3,280 feet)], on the east by the gentle slope which marks the break between the mainland shelf and the central deep, and on the west by the Santa Lucia Bank [where water depths decrease to 400 m (1,312 feet)]. Water depths in the central deep range from 600 m (1,968 feet) to 650 m (2,132 feet).

Figure III-2 is a map depicting the physiographic and bathymetric features described above.

b. Site Specific: Site specific bathymetric information on the two leases covered by this report is provided in a geologic hazards report prepared for Exxon by Sea Tales in May, 1982. The following bathymetric features were reported on the leases:

OCS-P 0438: This lease is located in the southeastern portion of the Santa Maria Basin offshore OCS area approximately 5.6 km (3.5 miles) northwest of Point Perdenales. The seafloor on lease OCS-P 0438 slopes gently to the southwest at a gradient of about fifty feet per mile. Water depths on this lease range from about 46 m (150 feet) in the northeast corner to approximately 76 m (250 feet) in the southwest corner of the lease (Sea Tales, 1982). Exxon has identified two proposed well locations on lease OCS-P 0438 (see the Exploration Plan which accompanies this report). Wa-

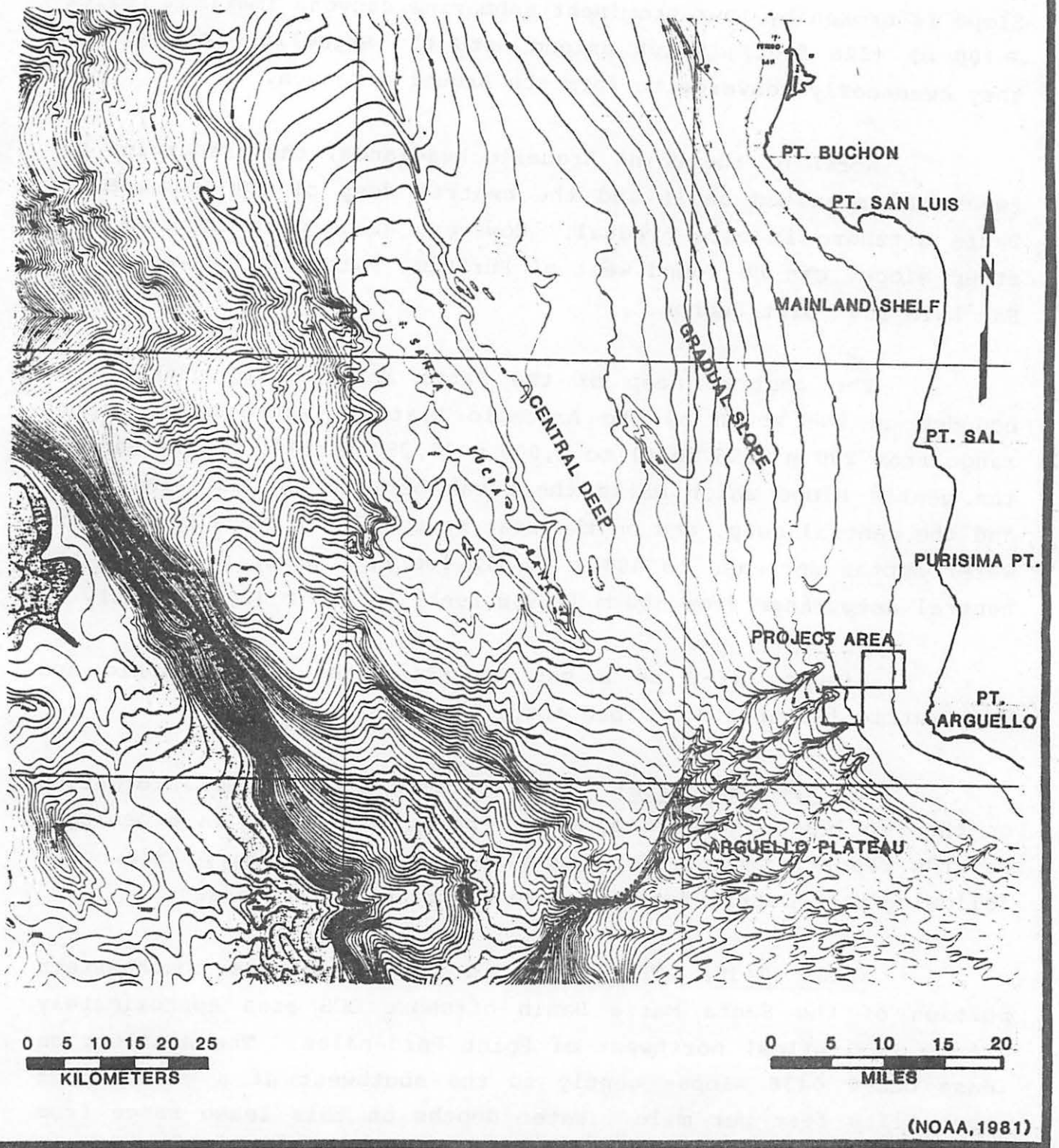


FIGURE III-2 PHYSIOGRAHIC AND BATHYMETRIC FEATURES OF THE SANTA MARIA BASIN OFFSHORE

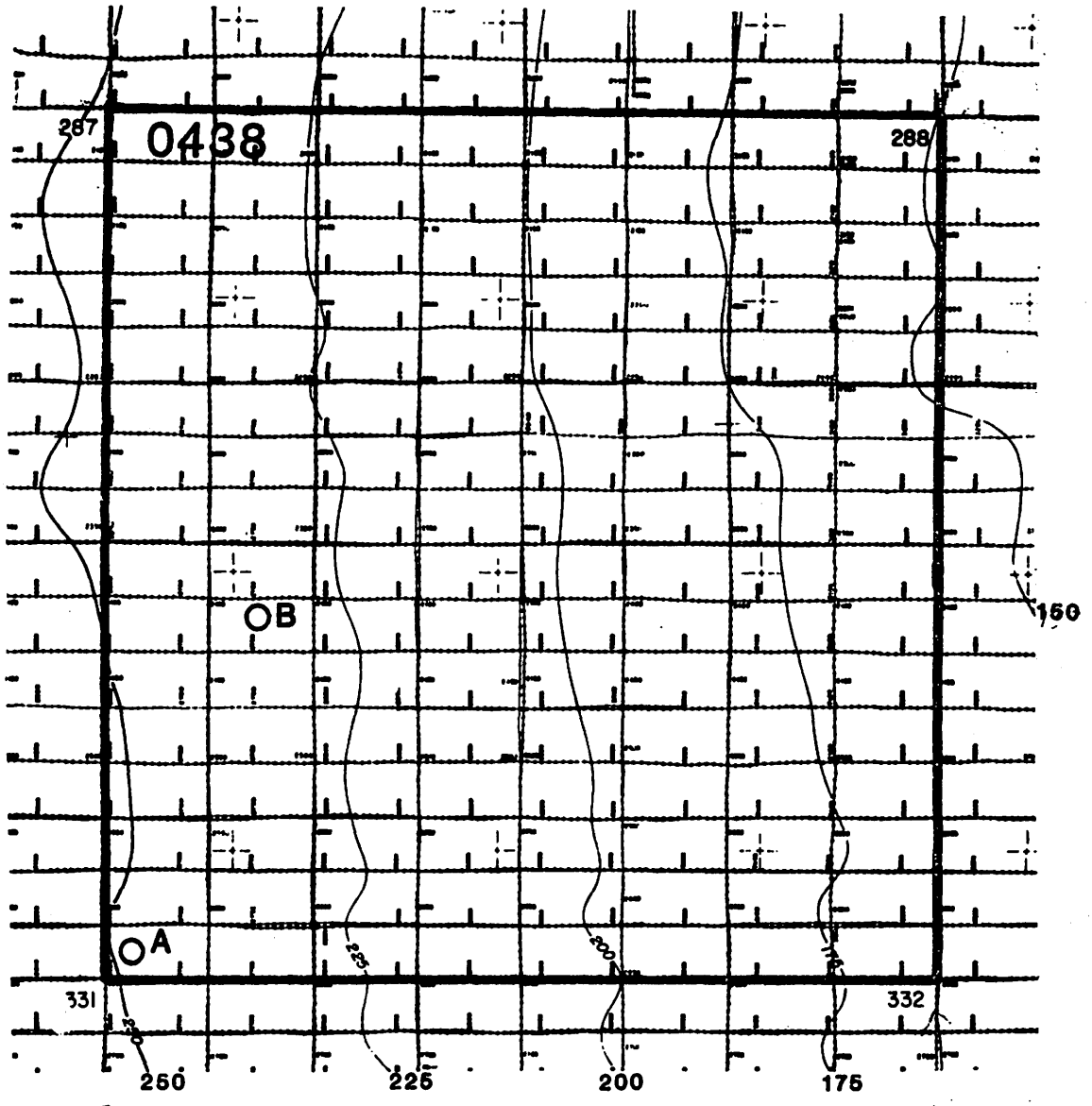
ter depths at these proposed sites would be 75 m (246 feet) for location OCS-P 0438(A) and 72 m (235 feet) for location OCS-P 0438(B) (see Figure III-3).

OCS-P 0440: This lease is located in the southeastern portion of the Santa Maria Basin offshore OCS area approximately 9.6 km (6 miles) west of Point Perdenales. This lease is characterized by a steeper, southwest slopping seafloor than that of lease OCS-P 0438. Two steep-walled canyons, oriented in a near southwesterly direction (about 225°), incise the otherwise featureless, smooth seafloor on lease OCS-P 0440. Slopes in the canyon areas are as great as forty-five degrees. Water depths range from approximately 76 m (250 feet) in the northwest corner of the lease to 275 m (900 feet) at the bottom of the deepest canyon which is located in the southwestern corner of the lease (Sea Tales, 1982). Exxon's Exploration Plan describes four possible well locations on this lease. Water depths for these proposed sites would range from 79 m (259 feet) to 96 m (315 feet) (see Figure III-4).

(2) STRATIGRAPHY, SURFACE SEDIMENTS, AND STRUCTURE

a. General Geology: The Pacific Shelf from Point Reyes to the Mexican border is comprised of three distinct physiographic provinces: the California Coast Ranges, the Western Transverse Ranges, and the Southern California Continental Borderland. Leases OCS-P 0438 and 0440 are located in the Santa Maria Basin offshore, an elongate marine feature that parallels the coastline. The Santa Maria Basin offshore is in the California Coast Ranges Province.

The Santa Maria Basin offshore is bounded on the northeast by the Hosgri fault zone, and on the southwest by the Santa Lucia High. The northwest end of the basin continues onto the continental



FIGURE

III-3 BATHYMETRY ON LEASE OCS-P 0438

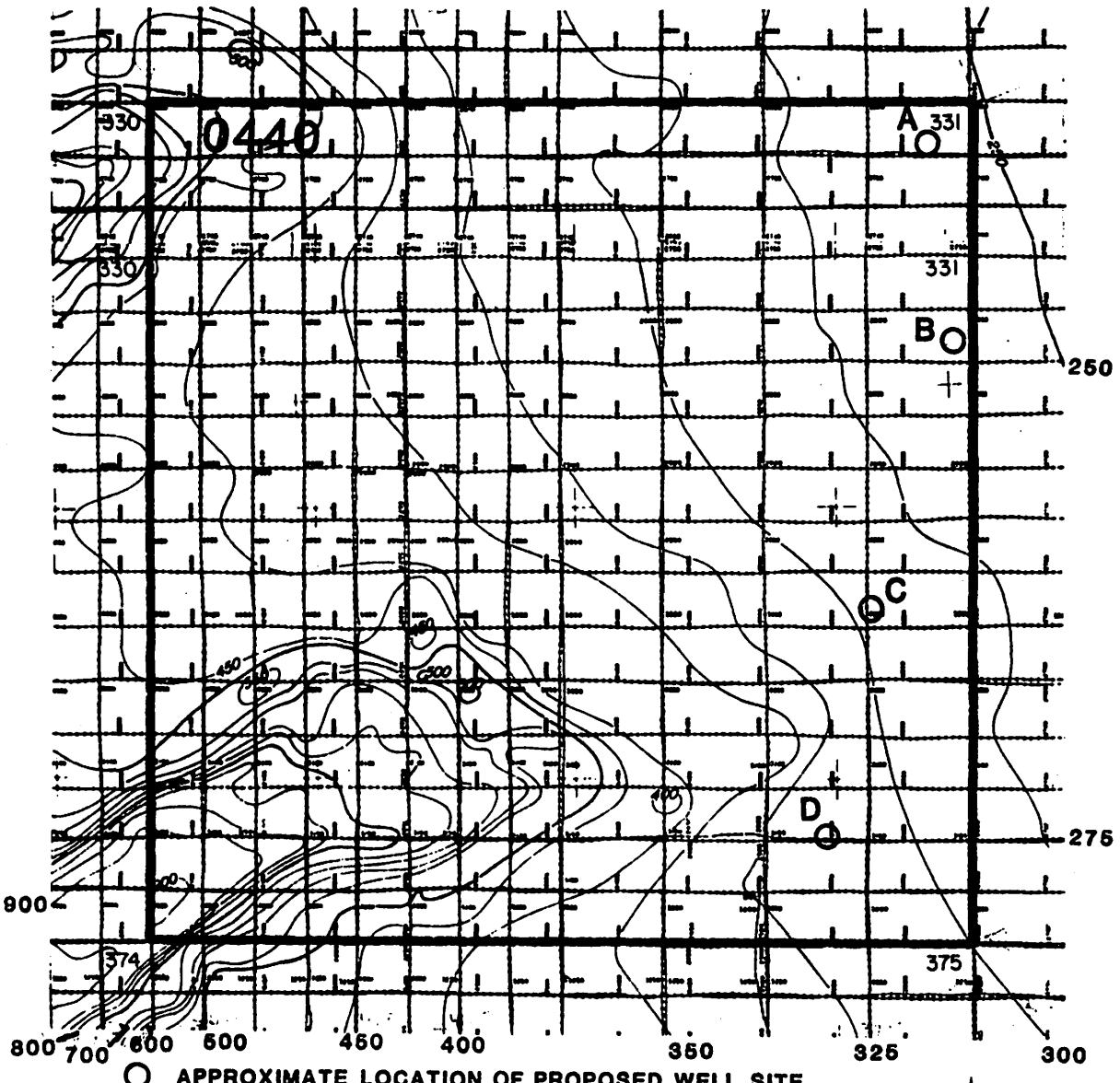


FIGURE III-4 BATHYMETRY ON LEASE OCS-P 0440

slope, and the southern part of the basin extends onshore in southern San Luis Obispo and western Santa Barbara Counties (BLM, 1980) (see Figure III-5).

b. Stratigraphy: Six geologic units have been identified in the Santa Maria Basin offshore. Basement rocks are thought to be equivalent to rocks of the Franciscan complex, but to differ in origin. The thickness of the basement rocks is unknown. Basement rocks, and overlying Cretaceous and early Tertiary sedimentary rocks of possible Eocene and Oligocene age are deformed and eroded, leaving only small remnants of the early Tertiary deposits in topographic depressions (USGS, 1980).

In the late Oligocene and early Miocene, pyroclastic rocks were deposited on the remnants of the early Tertiary deposits, and in the middle and early part of the late Miocene, well-bedded siliceous marine shales and cherts were deposited in relatively deep marine water over the shelf. These rocks are referred to as the Monterey Formation onshore (USGS, 1980), and are up to 854 m (2,801 feet) thick in the Santa Maria Basin offshore (BLM, 1980).

Lower and middle Miocene rocks were deformed sometime in the late Miocene by folding and numerous faults. Most faults are east dipping and moderately steep. Some faults offset basement rocks which suggests reactivation of older faults. The late Miocene folding and faulting is probably the result of some compressional component related to the interval of plate margin subduction during which the adjacent oceanic plate was being driven under the edge of the North American Plate along the base of what is now the Santa Lucia Escarpment. Erosion removed some of the tops of the folded lower and middle Miocene rocks before the deposition of marine silt and clay. These sediments are referred to as the late Miocene and early Pliocene Sisquoc and Pico Formations onshore (USGS, 1980), and are up to 976 m (3,200 feet) thick in the Santa Maria Basin offshore (BLM, 1980).

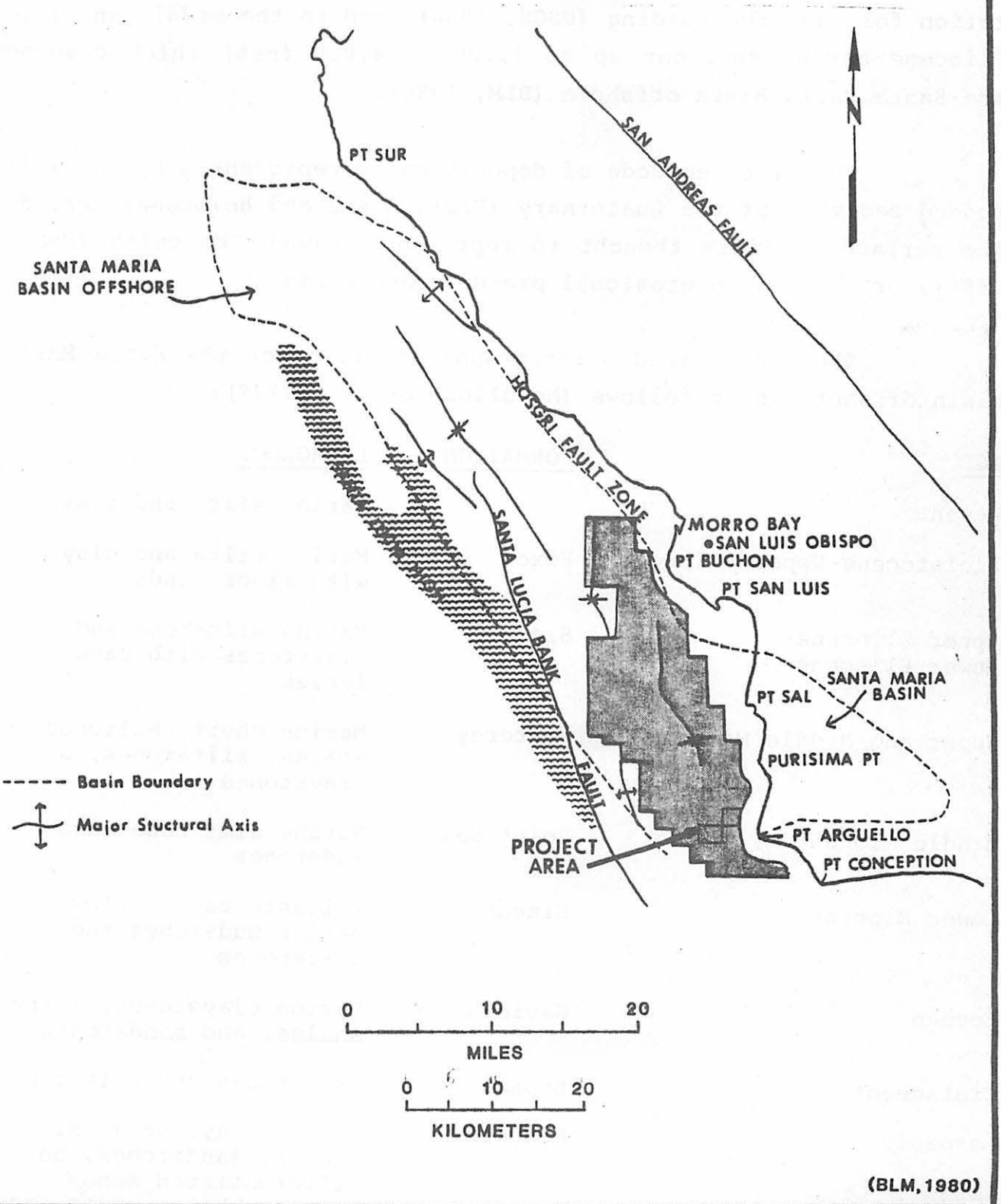


FIGURE
III-5

SANTA MARIA BASIN OFFSHORE

Folding occurred once more in the area but this time without the faulting that accompanied the earlier deformation. Sedimentation followed the folding (USGS, 1980), and in the middle and late Pliocene marine sediment up to 1,220 m (4,000 feet) thick covered the Santa Maria Basin offshore (BLM, 1980).

The final episode of deposition is represented by the well bedded sediment of the Quaternary (Pleistocene and Holocene) period. The surface layer is thought to represent Holocene deposits (USGS, 1980), or locally an erosional pre-Holocene surface.

The generalized stratigraphic section for the Santa Maria Basin offshore is as follows (McCulloch et al., 1977):

AGE	FORMATION	LITHOLOGY
Recent		Marine silts and clays
Pleistocene-Upper Pliocene	Foxen	Marine silts and clays with minor sands
Upper Pliocene-Lower Pliocene	Sisquoc	Marine siltstone and claystones with sand lenses
Upper and Middle Miocene	Monterey	Marine chert, siliceous shales, siltstones, and claystones
Middle Miocene	Point Sal	Marine siltstones and mudstones
Lower Miocene	Rincon	Volcanic tuffs, flows, marine mudstones and siltstones
Eocene	Gaviota	Marine claystones, silty shales, and sandstones
Cretaceous	Espada	Sandstones and siltstone
Mesozoic	Franciscan	Marine claystones, silty shales, sandstones, undifferentiated sandstones, shales, meta-sediments, and altered igneous rocks

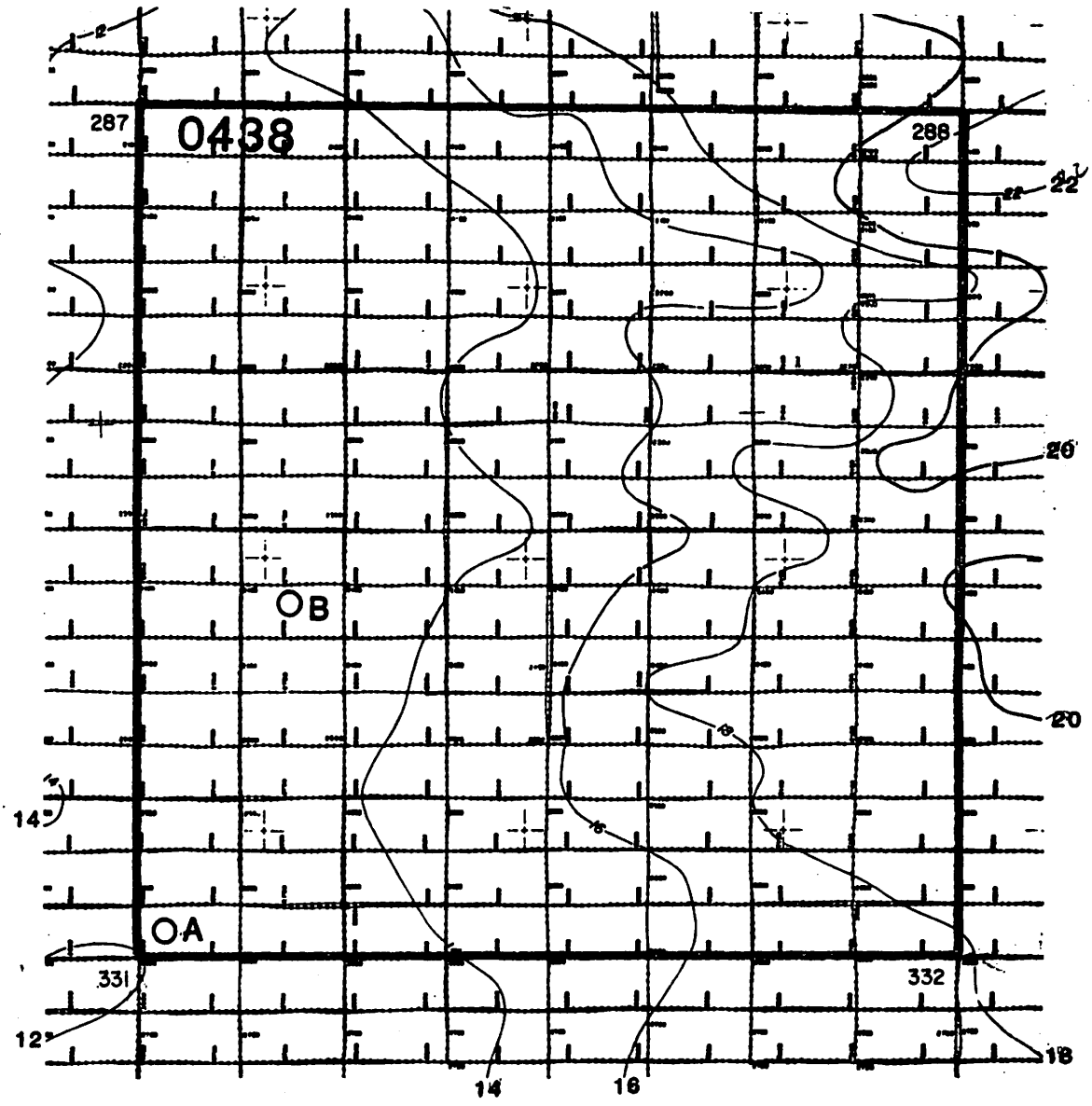
c. Site Specific Surface Sediments: Information on site specific near-surface sediments on leases OCS-P 0438 and 0440 are contained in the geolophysical survey report prepared by Sea Tales (1982), and is summarized below:

OCS-P 0438: The BLM has classified the surface sediments on this lease as mud (BLM, 1980). The surficial layer is composed of unconsolidated sediments which range from 3.6 m (12 feet) in the southwest corner to 6.7 m (22 feet) in the northeast corner of the lease (Sea Tales, 1982). The two described well locations would be located in the southwest quadrant of the lease where surface sediments range from 3.6 m to 4.2 m (12 to 14 feet) (see Figure III-6).

OCS-P 0440: The BLM has classified the surface sediments on this lease as mud (BLM, 1980). The surficial layer is composed of unconsolidated sediments which thicken to the northeast and pinch out at the break in slope at the edges of the two submarine canyons which intersect the western border of the lease (Sea Tales, 1982). The four described wells would be located along the eastern border of the lease where surface sediments range from 3.6 m to 4.2 m (12 to 14 feet) (see Figure III-7).

d. Structure: The physiography of the California Coast Ranges Province exhibits a strong northwest-southeast fabric. The northwest-southeast orientation of the Province is reflected in the major fault zones which bound the Santa Maria Basin offshore--the Hosgri fault zone and the Santa Lucia Bank fault zone.

Geophysical surveys across the Hosgri fault zone show a number of faults exhibiting considerable down-to-the-west vertical separation. The westernmost faults in the zone generally do not extend as close to the surface as those on the east, but all the faults in the zone are nearly vertical or they dip steeply to the east, suggesting some element of compression. There is considerable controversy as to the displacement history of this fault zone, and as to whether or not, or for how long, it has acted as part of the



○ APPROXIMATE LOCATION OF PROPOSED WELL SITE

CONTOUR INTERVAL: 2 FT

SCALE

0 1000 2000

METERS

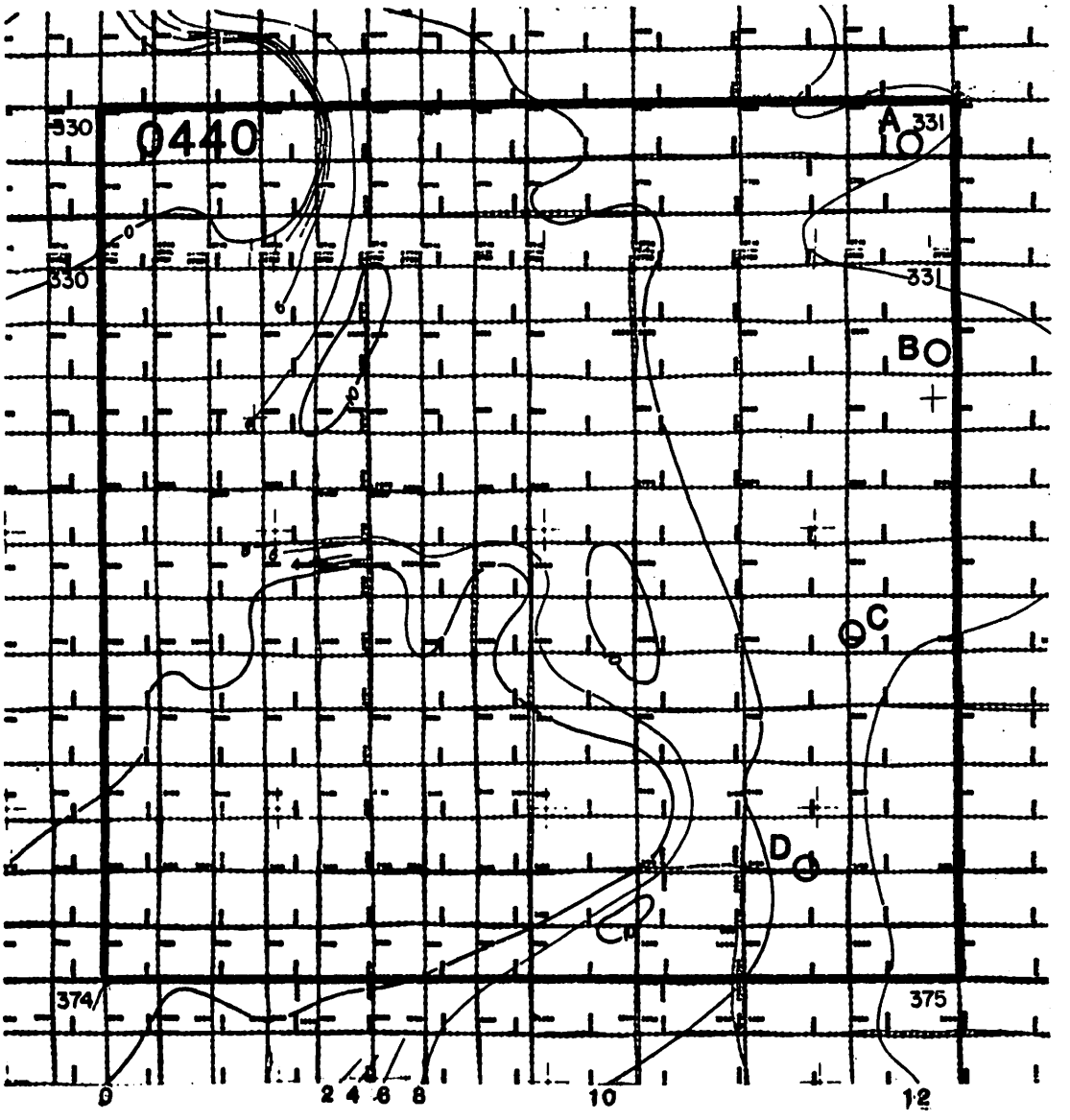
0 2000 4000

FEET

N

FIGURE III-6

SURFACE SEDIMENTS ON LEASE OCS-P 0438



○ APPROXIMATE LOCATION OF PROPOSED WELL SITE

CONTOUR INTERVAL: 2 FT

N

SCALE

0 1000 2000

METERS

0 2000 4000

FEET

FIGURE III-7

SURFACE SEDIMENTS ON LEASE OCS-P 0440

major coastal fault system that continues north and joins or approaches the San Andreas fault in the Gulf of the Farallones. Investigations conducted to date advocate large right-lateral, strike-slip displacement, and recent mapping has demonstrated a possible offshore connection between an eastern strand of the Hosgri fault zone and the San Simeon fault to the northwest. This mapping tends to support the possibility of a through-going fault system to the San Andreas fault.

The Hosgri fault zone is represented by two strands at its southern end that are approximately 3 and 10 km (1.8 to 6.2 miles) offshore and can be mapped to about 10 km (6.2 miles) south of Point Sal. These faults lie within parallel, northwest-trending anticlines. The westernmost of the two strands has been called the "Offshore Lompoc Fault."

To the southeast, off Point Arguello, the trend of the faults changes from north-northwest to northwest and the faults are discontinuous. Further to the west the faults turn and parallel the northwest trend of the faults associated with the Santa Lucia Bank.

The Santa Lucia Bank, which bounds the Santa Maria Basin offshore on the west, is a fault-bounded structural high. Differences in the thickness of the Miocene and Pliocene aged sections across the Santa Lucia Bank fault zone suggest that the vertical separation of the Santa Lucia Bank fault was accompanied by considerable strike-slip displacement. Northwestward transport of this structural high is consistent with the suggestion from the Bank's physiography and gross structure that this part of the shelf resembles the California Borderland Province (which also exhibits a strong northwest-southeast fabric) to the south.

The Santa Lucia Bank fault zone is composed of two or more strands which approach but do not break the surface. West of the zone there are numerous steeply dipping faults, most of which show

vertical separation, and some of which have displaced the seafloor to lengths of 30 to 40 km (19 to 25 miles) (USGS, 1980).

Leases OCS-P 0438 and 0440 are located off Point Perdenales in the extreme southeastern portion of the Santa Maria Basin offshore. None of the dominant faults discussed above pass directly through the leases.

The general northwest-southeast fabric of the California Coast Ranges Province is reflected in the structural folds found in the immediate vicinity of leases OCS-P 0438 and 0440. The subbottom section penetrated by the high-resolution seismic systems displays three major fold systems: a northwesterly striking anticline which crosses the northeast corner of the lease OCS-P 0440; a broad, northwesterly striking syncline which crosses the southwest corner of the lease OCS-P 0438; and a south plunging anticline located in the eastern part of lease OCS-P 0438 (Sea Tales, 1982).

(3) GEOLOGIC HAZARDS

a. Site Specific Anomalies: Information on potential shallow drilling hazards on leases OCS-P 0438 and 0440 was compiled by Sea Tales from a geophysical survey conducted by Marine Technical Services from December 15, 1981 to January 14, 1982. This information is summarized below:

OCS-P 0438: All of the shallow anomalies mapped on this lease are gas-related.

Three "chaotic reflectors" zones have been identified along the eastern border of the lease, with the largest area occurring in the northeast corner. In these zones, acoustic returns are distorted and incoherent, suggesting the presence of gas in near-surface sediments (Sea Tales, 1982). Described wells OCS-P

0438(A) and (B) are more than 3,050 m (10,000 feet) from the closest "chaotic reflectors" zone (see Figure III-8).

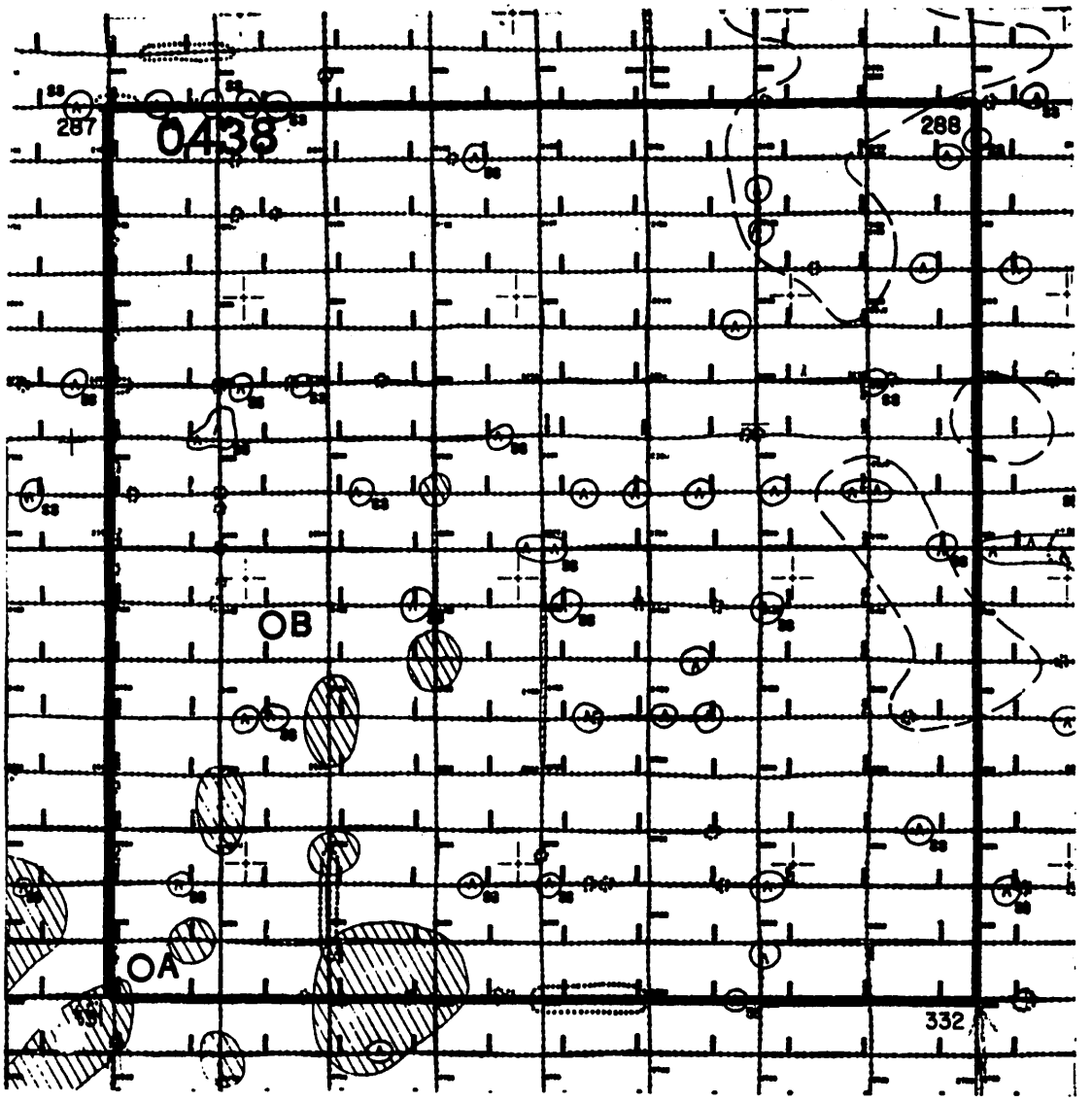
A number of small, isolated high amplitude reflecting zones have been mapped in the southwestern quadrant of this lease. The character of the seismic reflections from these zones suggests they represent shallow gas accumulations (Sea Tales, 1982). Described well OCS-P 0438(A) would be located approximately 183 m (600 feet) west-southwest of an area underlain by a shallow gas accumulation, and described well OCS-P 0438(B) would be located about 366 m (1,200 feet) north-northwest of a similar area (see Figure III-8).

Sea Tales identified numerous locations of possible gas vents on this lease. Most of the vents are small in areal extent. There is no apparent pattern of distribution of the vents although some seem to be associated with zones of "chaotic reflectors" or with the shallow subbottom gas accumulations (Sea Tales, 1982). Neither of the described well locations would be located near a gas vent (see Figure III-8).

No faults were mapped on this lease.

OCS-P 0440: Sea Tales mapped a single zone of "chaotic reflectors" [near-surface gassified sands(?)] in the northcentral portion of this lease. The zone, which is small in areal extent (Sea Tales, 1982), is approximately 1,830 m (6,000 feet) west-southwest of described well location OCS-P 0440(A) (see Figure III-9).

Shallow gas accumulations, as evidenced by the character of the seismic reflections, are present across the eastern two-thirds of the lease, and are particularly prominent along the eastern boundary of the lease (Sea Tales, 1982). Described wells OCS-P 0440(A), (B), and (C) would be located in areas underlain by shallow gas accumulations, and described well OCS-P 0440(D) would be located about 91 m (300 feet) southwest of such an area (see Figure III-9).



O APPROXIMATE LOCATION OF PROPOSED WELL SITE

LEGEND

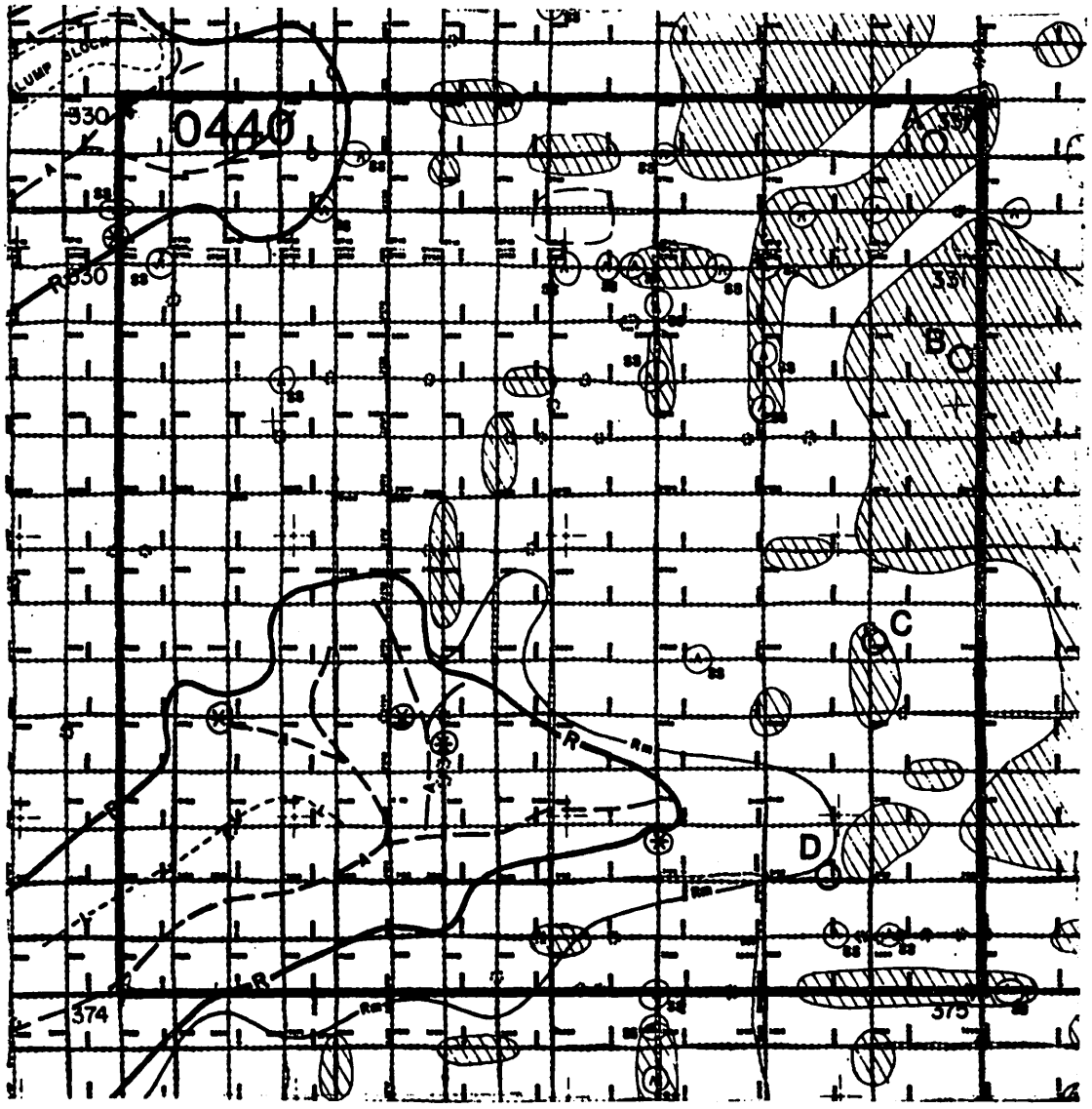
- B — CANYON RIM
- A — CANYON AXES
- GAS CONCENTRATION ABOVE HORIZON B- Subbottom Profiler
- CHAOTIC REFLECTORS
- POSSIBLE GAS VENTS SIDE SCAN SONAR DATA
- MAGNETIC ANOMALY
- SIDE SCAN SONAR ANOMALY (NON-GAS)
- ISOLATED PINNACLE

N

0 1000 2000
METERS

0 2000 4000
FEET

FIGURE III-8 POTENTIAL SHALLOW DRILLING HAZARDS ON LEASE OCS-P 0438



○ APPROXIMATE LOCATION OF PROPOSED WELL SITE

LEGEND

- R — CANYON RIM
- A — CANYON AXES
- GAS CONCENTRATION ABOVE HORIZON B- Subbottom Profiler
- CHAOTIC REFLECTORS
- POSSIBLE GAS VENTS
- SIDE SCAN SONAR DATA
- MAGNETIC ANOMALY
- SIDE SCAN SONAR ANOMALY (NON-GAS)
- ISOLATED PINNACLE

N

0 1000 2000
METERS

0 2000 4000
FEET

FIGURE III-9

POTENTIAL SHALLOW DRILLING HAZARDS ON LEASE OCS-P 0440

Numerous gas vents have been identified along the northern boundary of the lease, and in other isolated areas on the lease. Some of these vents appear to be associated with the shallow subbottom gas accumulations (Sea Tales, 1982). None of the described well locations would be located near a gas vent (see Figure III-9).

Two prominent submarine canyons incise the seafloor in the western portion of the lease. One canyon is located in the northwest corner and the other is located in the southwest corner of the lease. Bottom slopes as great as forty-five degrees exist within these canyon areas. There are a number of features within the canyons or associated with the margins of the canyons which seem to be related to a dynamic system of complex slumps (see Figure III-9). The expressions of these slumps vary from changes in slope, to terraces, to bathymetric highs with as much as 18 m (60 feet) of relief (Sea Tales, 1982). Described well OCS-P 0440(D) would be located approximately 61 m (200 feet) southeast of the rim of the canyon located in the southwest corner of the lease (see Figure III-9).

b. Seismicity: The Santa Maria Basin offshore is located within the circum-Pacific seismic and volcanic belt which has been tectonically active throughout much of the Cenozoic era. This tectonism seems to have been accelerated during the latter part of the Cenozoic era with maximum activity having occurred in the Quaternary period (i.e. during the past 2 million years including the Holocene which covers the last 11,000 years) (USGS, 1974).

Tectonic activity in the Santa Maria Basin offshore area can be attributed to some adjustment to the motion between the North American and Pacific plates which appears to be taking place west of the San Andreas fault. In this area, movement between the plates is thought to be approximately 5.5 cm/yr, and more than half (3.0 cm/yr) of this displacement may be involved in deformation and faulting west of the San Andreas fault. Because this relative plate motion can be expected to continue, the Santa Maria Basin offshore area will continue to be seismically active. Indeed, earthquake epicen-

ters (see Figure III-10) indicate that the Hosgri fault zone is seismically active, and is undergoing right-lateral displacement with some north-south compression (USGS, 1980).

The Santa Maria Basin offshore should be expected to experience seismic shaking from earthquakes that occur beneath the basin and its active fault margins and also from onshore earthquakes to the east, including those on the San Andreas fault [± 35 km (56 miles) northeast of the two leases covered in this report]. Earthquakes occurring within the Basin can be expected to produce more severe shaking than those with epicenters outside the area (USGS, 1980). Recent estimates of the maximum probable earthquake for the Hosgri fault range from magnitude 6.5 Richter (Smith, 1974) to 7.3 Richter (McCulloch et al., 1977).

The earthquake history of the Santa Maria Basin offshore can be divided into two periods: 1) The historic period, and 2) the period following the introduction of instruments designed to locate earthquake epicenters. During the historic period, more than 116 earthquakes were reported. The most severe earthquake during this time, and as yet the most severe in the area, was the November 4, 1927 Lompoc earthquake. It was the first and the most severe shock of a long sequence of strong earthquakes that occurred on November 4, 5, 6, 8, 18, and December 5 and 13. Local accounts placed the epicenter of the main shock off Point Arguello, and the most recent analyses have placed the epicenter nearly on the Hosgri fault 24 and 29 km (15 and 18 miles) northeast of leases OCS-P 0438 and 0440. There was probably some vertical displacement of the seafloor associated with this earthquake, since it generated a tsunami that reached 1.5 m (5 feet) at Port San Luis.

North of Point Conception, 258 instrumentally located epicenters have been recorded between 1932 and 1978. Of these, 33 are magnitude 4.0 to 4.9 Richter or greater, and of these nearly half (15) lie at the southwestern end of the Santa Lucia Bank. The largest events on the Santa Lucia Bank suggest either very low angle

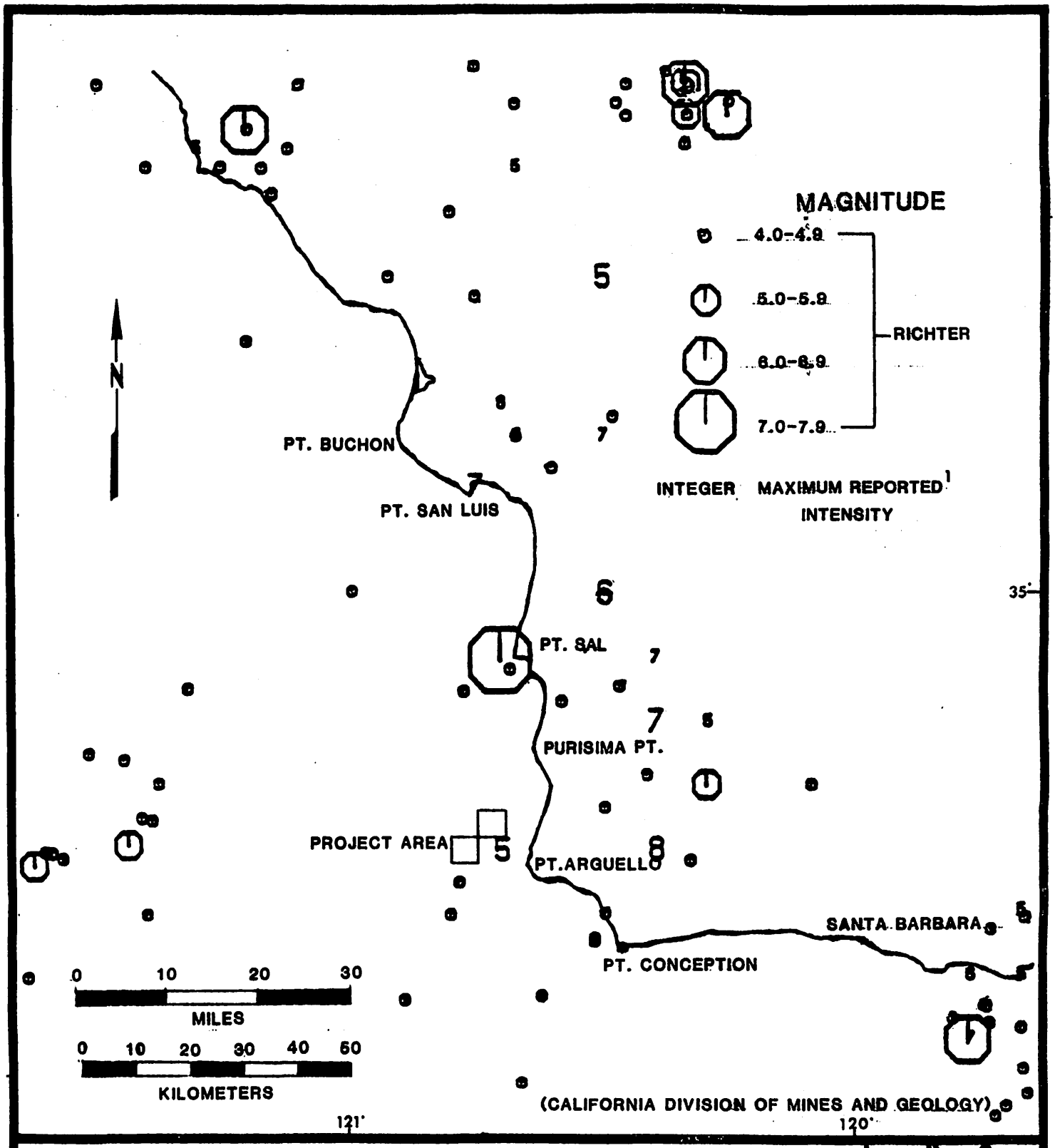


FIGURE III-10

EARTHQUAKE EPICENTER MAP
SANTA MARIA BASIN OFFSHORE

1—(ONLY FOR EARTHQUAKES OF UNKNOWN MAGNITUDE)

thrusting with the northeast side up. Most of the magnitude 4.0 to 4.9 Richter or greater offshore earthquakes lie within 40 km (25 miles) of Point Conception and showed some component of right lateral slip on northwest trending planes that parallel the mapped faults. The remaining magnitude 4.0 to 4.9 Richter or greater earthquakes (18) were located along the coast. Four of these earthquakes had epicenters between Point Sal and Morro Bay and were probably associated with displacement along the Hosgri fault zone. These earthquakes also indicated a component of right lateral slip.

In summary, the large offshore events in and adjacent to the Santa Maria Basin offshore fall into two principal groups: those that suggest high angle faulting on the Santa Lucia Bank, and those that suggest northwest striking, right lateral slip with northeast-southwest directed compression that are related to the Hosgri fault and similar faults on approximately the same trend in the Point Conception area (USGS, 1980).

The ground motion along the eastern margin of the Santa Maria Basin offshore can be expected to be strong in the event of a repeat of an earthquake of the magnitude of the 1927 event on the Hosgri fault zone. Strong ground motion could also be produced along the western margin of the Basin as the result of faulting on the Santa Lucia Bank. Fault offsets in this area (up to 40 km) have been associated with earthquakes of magnitude 7.0 Richter (USGS, 1980).

The most recent (M = 4.0 Richter) earthquake in the Santa Maria Basin offshore was a magnitude 4.7 Richter event on May 28, 1980. The epicenter for this earthquake was approximately 8 km (4.9 miles) northwest of Point Sal (USGS, 1980).

(4) KNOWN MINERAL DEPOSITS

a. Petroleum: The southern third of the Santa Maria Basin offshore is similar to the onshore part and is considered to have

the same type of hydrocarbon potential. However, the offshore continuation of the Santa Maria Basin may be offset right laterally 80 km (50 miles). The northern two thirds of the Basin is only slightly explored. The entire Basin contains approximately 2,500 km^3 of Miocene and younger marine beds which are 3 km (1.9 miles) thick locally. The Basin probably contains hydrocarbons with a volume ratio of oil-in-place similar to that found in the onshore part of the Basin. The predominant structural grain of the Basin is parallel with the basinal trend. Ample structural traps, both large and small, are present throughout most of the Basin. The structure generally is complex, like that in California's producing basins (Andrews, 1977). The estimated low and high resource potential of the Santa Maria Basin offshore OCS area is 89 to 784 million barrels of oil and 89 to 795 billion cubic feet of natural gas (BLM, 1980).

b. Non-petroleum: Due to the past low economic interest paid to offshore non-petroleum mineral resources, data needed to properly identify and evaluate non-petroleum resources in the Santa Maria Basin offshore does not exist. The most prolific sedimentary deposits in this area are the sand deposits found west of Santa Maria and Lompoc. Each of these deposits cover an average area of approximately 2 km^2. Since the origin of authigenic phosphorite may be associated with upwelling, the area between Point Arguello and Point Buchon may be a potential site for submarine phosphorite formation (Andrews, 1977).

(5) FRESH WATER AQUIFERS

At present, a major portion of the water supply of the coastal area of central California comes from local groundwater basins. Aquifers in coastal plains may continue offshore and the freshwater they contain could be an integral part of an area's water resources. For example, groundwater in the Arroyo Grande Area [48 km (30 miles) north-northeast of lease OCS-P 0438] appears to extend offshore beneath the Santa Maria Basin offshore. There are no known

fresh water aquifers which extend offshore in the vicinity of the two leases covered by this report. However, any freshwater zones encountered during drilling will be fully protected by casing and/or cement.

B. METEOROLOGY

(1) GENERAL WEATHER PATTERNS

Climatic patterns in the coastal areas of central California are dominated by the Pacific semi-permanent anticyclone (high pressure system). The position of the high pressure system creates prevailing northwesterly winds throughout the year all along the coast.

During the summer months, this high pressure system is located off the north coast of California, and generally prevents north Pacific storms from affecting the area. In the winter, the Pacific semi-permanent anticyclone weakens and generally moves south of 35°N. At the same time, the Aleutian low-pressure area in the general vicinity of the Gulf of Alaska intensifies spawning cyclonic storms whose tracks move through central and southern California (Jenkins, 1977).

During the summer, an inversion is created as warm air aloft traps cool marine air below. Summer inversion heights are typically about 305 m (1,000 feet) along the central California coastline (BLM, 1980).

(2) TEMPERATURE

The prevailing westerlies, combined with the modifying influence of the ocean, bring moderate and equable temperatures to the coast of California (BLM, 1979). Mean annual temperatures generally increase from north to south; however, differences are not great primarily because seasonal and diurnal temperature differences aver-

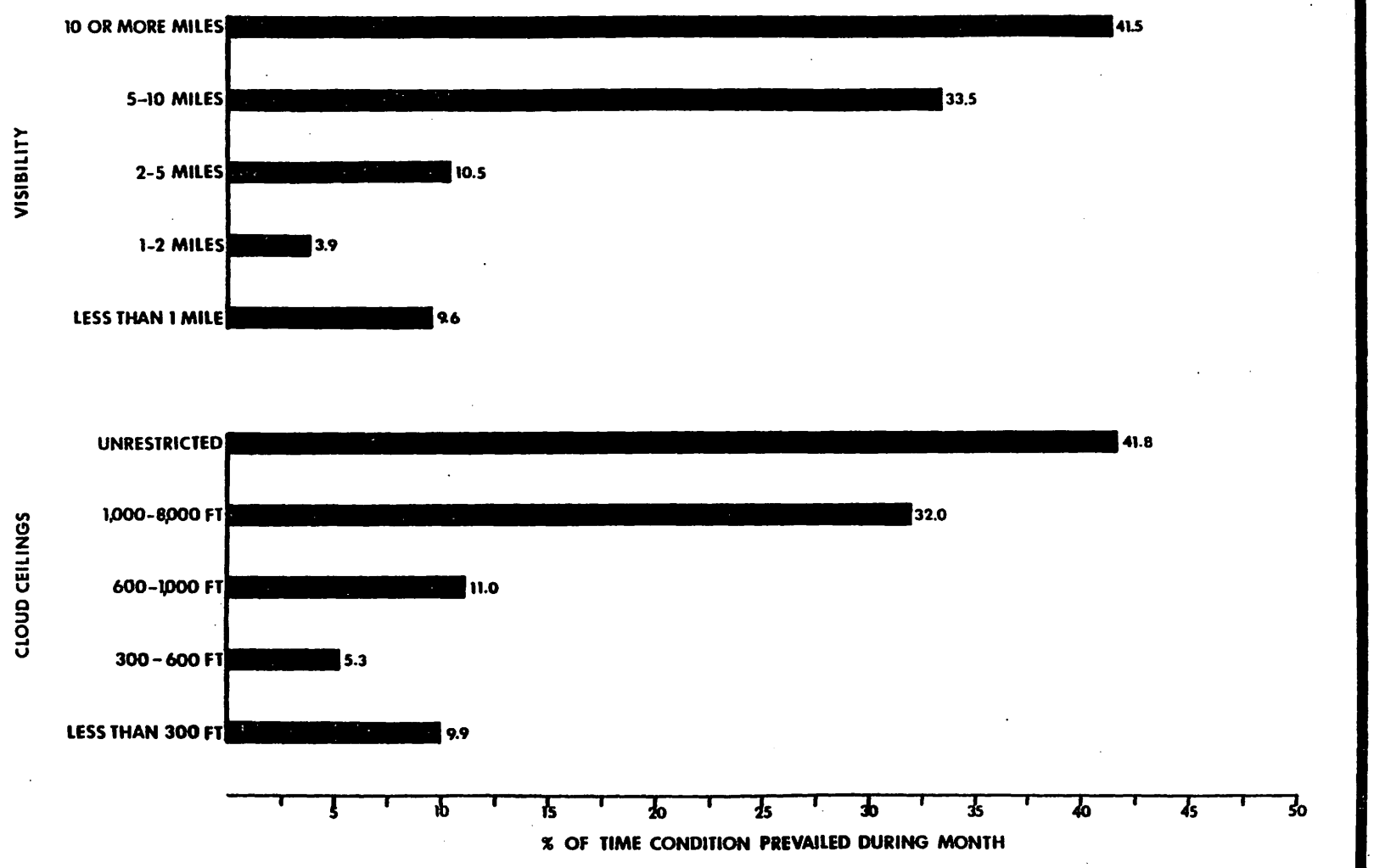
age out over the annual period (Jenkins, 1977). The mean temperature in the area of leases OCS-P 0438 and 0440 is 54°F to 56°F in January and 60°F in July (NOAA, 1982a). Mean temperatures offshore are only 4°F to 6°F cooler in January than in July, reflecting the moderating effect of the ocean. Conversely, onshore temperatures in southern San Luis Obispo and western Santa Barbara Counties fluctuate 10°F to 15°F between January and July. Temperature extremes are essentially non-existent along the entire coastline north of Point Conception (Jenkins, 1977).

(3) SKY COVER AND VISIBILITY

Low clouds and fog are the most frequent type of cloud cover along the coast, particularly during the summer. Both are formed when the comparatively warm, moist Pacific air mass drifts over the semi-permanent band of cold water that forms immediately offshore central California during the summer. The clouds and fog are then swept onshore by the prevailing winds. This onshore flow of air is reinforced by a summertime thermal low-pressure area located over the Central Valley and southeast desert areas of California (Jenkins, 1977).

Typically, the low clouds and fog move inland during the late afternoon and night hours, only to retreat as soon as the sun reaches a high-enough angle to evaporate it the following morning. Unless the prevailing northwesterly winds are overcome, the low clouds and fog usually remain off the coast most of the day. The greatest incidence of this weather pattern occurs in June, July, and August. It occurs only occasionally in the spring and fall and infrequently during the winter (Jenkins, 1977).

In 1976, the Naval Weather Service Detachment published a report entitled "Climatic Study of the Near Coastal Zone, West Coast of the United States," which indicated the amount of time in the month of July that visibility was reduced, and to what degree. That information is summarized in Table III-1 for a one-degree quadrangle



(NAVAL WEATHER SERVICE DETACHMENT, 1976)

TABLE III-1 VISIBILITY AND RESTRICTED CEILING HEIGHT :JULY

encompassing the location of leases OCS-P 0438 and 0440. The Naval Weather Service Detachment also reported on restricted ceiling heights [less than 183 m (600 feet)] for July within the same one-degree quadrangle. That information is also summarized in Table III-1.

(4) WIND SPEED AND DIRECTION

Wind flow in the Santa Maria Basin offshore is from the northwest much of the year, and winds from this direction predominate during the summer. The usual summer pattern is broken occasionally when the inland thermal low pressure area, located over the Central Valley, is displaced by broad area high pressure, suppressing the normal onshore flow and creating stagnant, hot conditions over much of central California.

During the winter months, wind direction and speeds are frequently overcome by storm fronts that pass over or near the coast. With a strong high-pressure system approaching the coast from the west, strong and sometimes damaging winds, usually from an easterly or southeasterly direction, occur along the coast. Between frontal systems, however, winter wind speeds off the central California coast tend to be somewhat lighter than in the summer (Jenkins, 1977).

Wind patterns along the coast are also influenced by diurnal pressure gradients, due to diurnal heating and cooling. The unequal daytime solar heating over the land and ocean, in conjunction with the Pacific high pressure system, give rise to a consistent and prevailing westerly sea breeze during most afternoons, with the winds generally decreasing to a calm by sundown (NOAA, 1982b). Sea breezes are strongest from June through August, light and variable during the spring and fall, and infrequent during the winter (Jenkins, 1977).

From January to December in an average year, the mean speed of winds in the area of the two leases covered by this report is less than 6 knots 20 percent of the time, between 11 and 21 knots 44 percent of the time, and greater than 34 knots 1 percent of the time (California Coastal Commission, 1981). However, wind speeds greater than 30 knots are frequently encountered in the wind jet created off and to the south of Point Arguello southeast of leases OCS-P 0438 and 0440 (Jenkins, 1977).

(5) STORMS

There are two types of storms which affect coastal areas in central California--frontal storms from the north and tropical storms from the south. As frontal storms approach the coast, strong winds, usually from an east or southeasterly direction, develop along the coast. As the storms move inland, winds become southerly or southwesterly. After the passage of the storms, high pressure usually builds creating north or northwesterly winds (Jenkins, 1977). Wind and waves associated with these storms can cause damage to unprotected coastal facilities. For example, the County of San Luis Obispo reports that 3 to 10 boats are damaged each year at Port San Luis by winds associated with frontal storms (SLO County Planning Department, 1982).

Tropical storms rarely reach as far north as central California. They emanate off the west coast of Mexico and usually turn westward, veer northeastward across northwestern Mexico, or dissipate offshore. When tropical storms turn eastward they usually do so before reaching latitude 30°N. On occasion, however, they reach as far north as central California (USGS, 1974). There is no record of tropical storms that have reached California with extreme winds; however, heavy precipitation has resulted from the few storms that have reached California (Jenkins, 1977).

The coastal areas of the Pacific states normally have the smallest number of thunderstorms per year of any area in the United States. Although they can occur any time during the year, they are most prevalent during middle and late winter. Only one or two tornados are reported in California each year, but these are smaller and weaker than those that occur in the Midwest (BLM, 1979).

(6) PRECIPITATION

The rainfall season is in the winter. About three-forths of the total annual rainfall occurs between December and March (NOAA, 1982b). The spring and fall months of April-May and October-November receive a significant amount of rainfall, although substantially less than during the winter. Precipitation between June and September is very small. Annual average precipitation in the coastal area east of leases OCS-P 0438 and 0440 is 16 inches per year. There can, however, be dramatic differences in the amount of rain recorded from one year to the next. Snow falls are rare in coastal areas. In fact, freezing temperatures are seldom, if ever, recorded offshore (USGS, 1974 and Jenkins, 1977).

(7) AIR QUALITY

The air quality analysis, performed in conformance with the MMS regulations, is summarized in Section IV of this report and is attached as Appendix B of this report.

a. Onshore: The closest onshore areas with recorded air quality measurements are Santa Barbara and San Luis Obispo Counties. These Counties are located in the South Central Coast Air Basin (see Figure III-11); ambient air quality standards for emissions in this Basin have been promulgated (see Table III-2) and are enforced by the U.S. Environmental Protection Agency, the California Air Resources Board, and the San Luis Obispo and Santa Barbara County Air Pollution Control Districts. In 1981, Santa Barbara and San Luis

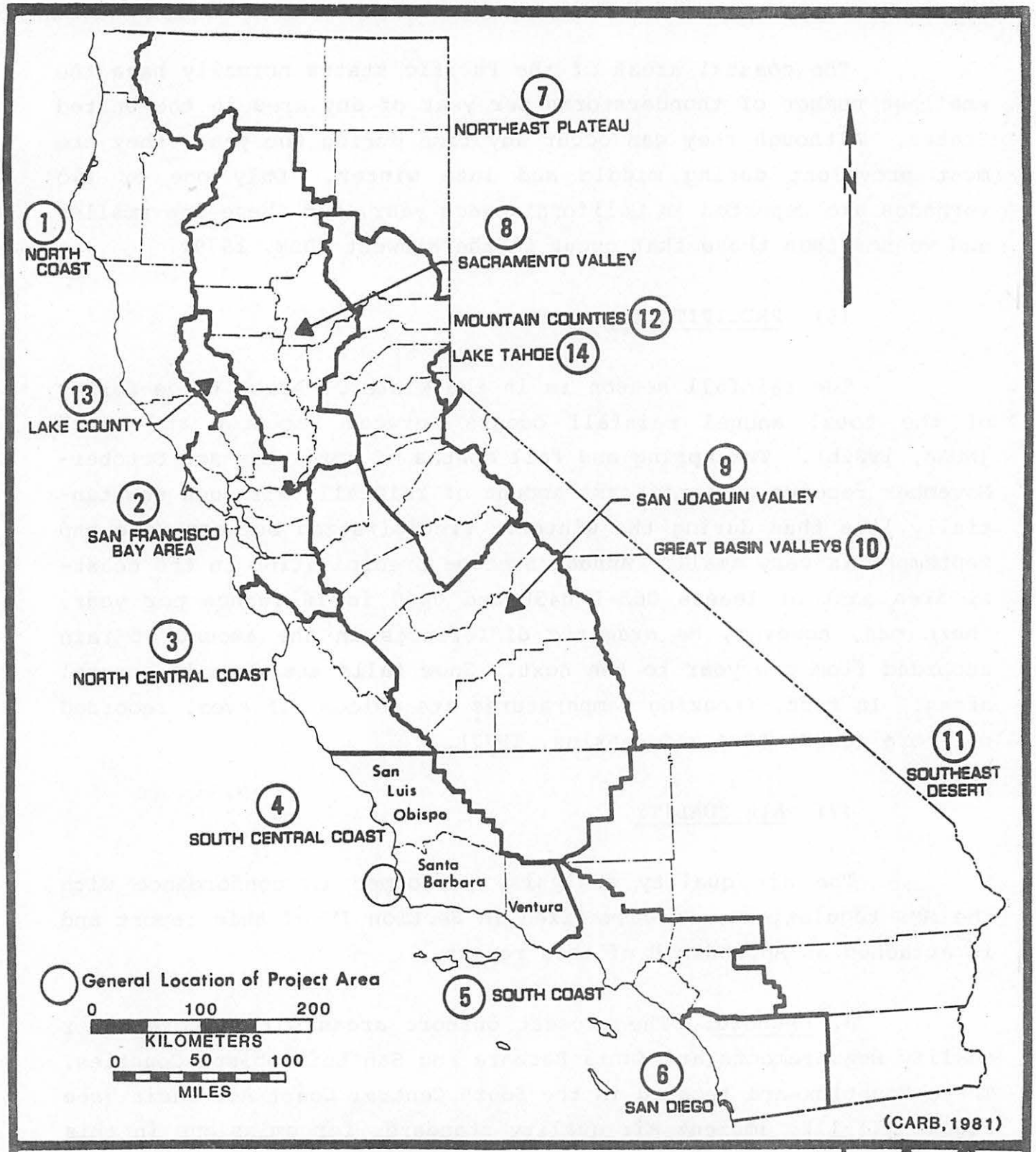


FIGURE III-11

LOCATION OF THE SOUTH CENTRAL COAST AIR BASIN

Pollutant	Averaging Time	California Standards[1]		National Standards[2]		
		Concentration[3]	Method[4]	Primary[3,5]	Secondary[3,6]	Method[7]
Oxidant[10]	1 hour	0.10 ppm (200 ug/m³)	Ultraviolet Photometry	—	—	—
Ozone	1 hour	—	—	240 ug/m³ (0.12 ppm)	Same as Primary Standard	Chemiluminescent Method
Carbon Monoxide	12 hour	10 ppm (11 mg/m³)	Non-Dispersive Infrared Spectroscopy	—	Same as Primary Standards	Non-Dispersive Infrared Spectroscopy
	8 hour	—		10 mg/m³ (9 ppm)		
	1 hour	40 ppm (46 mg/m³)		40 mg/m³ (35 ppm)		
Nitrogen Dioxide	Annual Average	—	Saltzman Method	100 ug/m³ (0.05 ppm)	Same as Primary Standards	Gas Phase Chemiluminescence
	1 hour	0.25 ppm (470 ug/m³)		—		
Sulfur Dioxide	Annual Average	—	Conductimetric Method	80 ug/m³ (0.03 ppm)	—	Pararosaniline Method
	24 hour	0.05 ppm (131 ug/m³)[9]		365 ug/m³ (0.14 ppm)	—	
	3 hour	—		—	1300 ug/m³ (0.5 ppm)	
	1 hour	0.5 ppm (1310 ug/m³)		—	—	
Suspended Particulate Matter	Annual Geometric Mean	60 ug/m³	High Volume Sampling	75 ug/m³	60 ug/m³	High Volume Sampling
	24 hour	100 ug/m³		260 ug/m³	150 ug/m³	
Sulfates	24 hour	25 ug/m³	AIHL Method No. 31	—	—	—
Lead	30 day Average	1.5 ug/m³	AIHL Method No. 54	—	—	—
	Calendar Quarter	—	—	1.5 ug/m³	1.5 ug/m³	Atomic Absorption
Hydrogen Sulfide	1 hour	0.03 ppm (42 ug/m³)	Cadmium Hydroxide Stracten Method	—	—	—
Hydrocarbons (Corrected for Methane)	3 hour (6-9 a.m.)	—	—	160 ug/m³ (0.24 ppm)	Same as Primary Standards	Flame Ionization Detection Using Gas Chromatography
Vinyl Chloride (Chloroethene)	24 hour	0.010 ppm (26 ug/m³)	Gas Chromatography (ARB staff report 78-8-3)			
Ethylene	8 hour	0.1 ppm	—	—	—	—
	1 hour	0.5 ppm				
Visibility Reducing Particles	1 observation	In sufficient amount to reduce the prevailing visibility to less than 10 miles when the relative humidity is less than 70% (8)		—	—	—

(CARB,1982a)

TABLE III-2

NATIONAL AND CALIFORNIA AMBIENT AIR QUALITY STANDARDS

1. California standards are values that are not to be equaled or exceeded.

2. National standards, other than those based on annual averages or annual geometric means, are not to be exceeded more than once per year.

3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 mm of mercury. All measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 mm of Hg (1,013.2 millibar); ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4. Any equivalent procedure which can be shown to the satisfaction of the Air Resources Board to give equivalent results at or near the level of the air quality standard may be used.

5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health. Each state must attain the primary standards no later than three years after that state's implementation plan is approved by the Environmental Protection Agency.(EPA).

6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. Each state must attain the secondary standards within a "reasonable time" after implementation plan is approved by the EPA.

7. Reference method as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.

8. Prevailing visibility is defined as the greatest visibility which is attained or surpassed around at least half of the horizon circle, but not necessarily in continuous sectors.

9. At locations where the state standards for oxidant and/or suspended particulate matter are violated. National standards apply elsewhere.

10. Measured as ozone.

TABLE III-2

NATIONAL AND CALIFORNIA AMBIENT AIR QUALITY STANDARDS (FOOTNOTES)

Obispo Counties operated 23 air monitoring stations (see Figure III-12), which contributed to the State's air quality data bank.

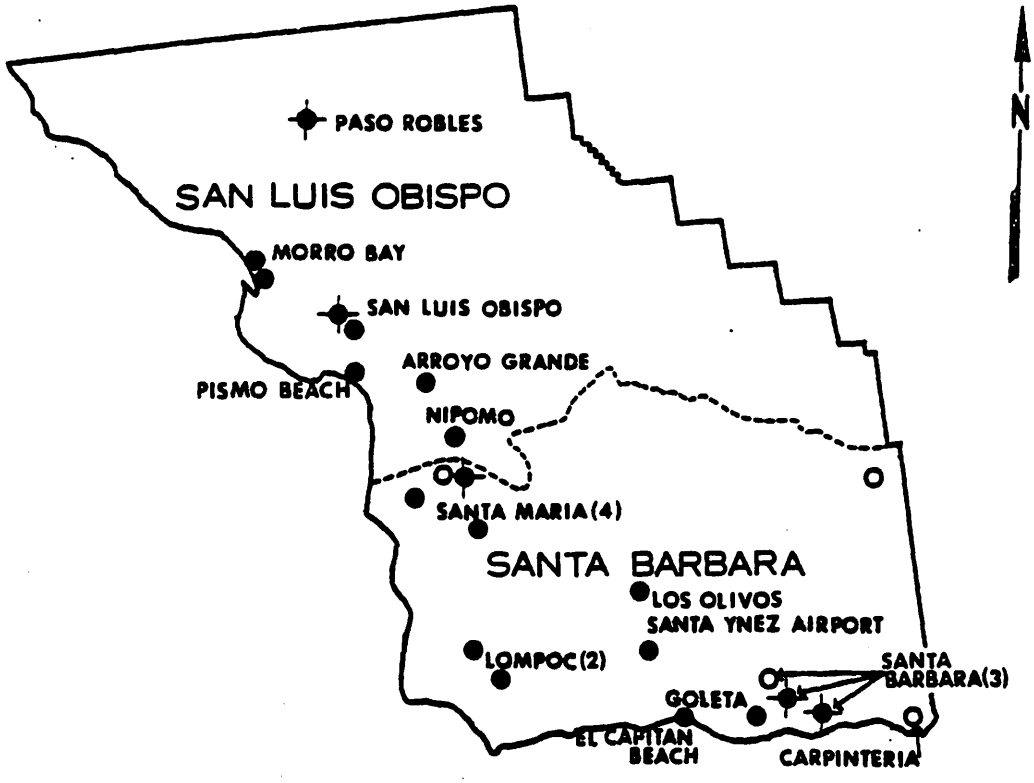
Prevailing northwesterly winds in the Santa Maria Basin offshore would carry emissions from Exxon's proposed exploratory drilling operations toward southwestern Santa Barbara County. However, because wind directions vary considerably over any three to four month period or may meander minute by minute, emissions from Exxon's proposed drilling activities could be carried into other coastal areas as well. Table III-3 contains monitoring data on the ambient air quality of Santa Barbara and San Luis Obispo Counties and the City of Lompoc in relation to national and state ambient air quality standards. The data for Lompoc are included because the monitoring stations in the city are the closest ones to the onshore area most likely to be affected by emissions from the proposed activities.

b. Offshore: No information is currently available on the quality of the ambient air in the immediate vicinity of leases OCS-P 0438 and 0440. However, because of the prevailing winds in the Basin, the absence of any major sources operating upwind of the leases, and the intermittent and dispersed nature of the proposed exploratory drilling operations by other companies operating in the Basin, ambient air quality in the area is expected to be well within all applicable standards.

C. PHYSICAL OCEANOGRAPHY

(1) TEMPERATURE AND SALINITY

Data on mean surface and near surface [down to 10m (33 feet)] temperature fields indicate that isotherms tend to parallel the coast with the lowest temperatures occurring inshore. Along the central California coastline, temperatures range from 13°C in nearshore waters [within 96 km (60 miles) of the coast] to more than 15°C offshore [greater than 161 km (100 miles) from the coast]. The



● Gaseous pollutant or multipollutant monitoring site
○ High volume particulate sampling only
✦ ARB operated site

0 10 20 30 40 50
MILES
0 20 40 60
KILOMETERS

(CARB,1982)

FIGURE III-12

AIR MONITORING STATIONS

TABLE III-3

COMPLIANCE WITH NATIONAL AND CALIFORNIA AMBIENT AIR QUALITY STANDARDS--SAN LUIS OBISPO AND SANTA BARBARA COUNTIES AND THE CITY OF LOMPOC, 1981 (CARB, 1982)

Pollutant	Standards		Standards Met (M) or Exceeded (E) in 1980			
	Averaging Time	Standard	San Luis Obispo	Santa Barbara	Lompoc "G" St.	Lompoc Jalama Rd.
Ozone	Nat. 1-hr	.12 ppm	M[1]	E[3]	M[5]	-
	CA. 1-hr	.10 ppm	E[2]	E[4]	M[5]	-
CO	Nat. 8-hr	9 ppm	M[6]	M[8]	-	-
	Nat. 1-hr	35 ppm	M[7]	M[9]	-	-
	CA. 12-hr	10 ppm	-	-	-	-
	CA. 1-hr	40 ppm	M[7]	M[9]	-	-
NO_2	Nat. annual	.05 ppm	M[10]	M[12]	-	-
	CA. 1-hr	.25 ppm	M[11]	M[13]	-	-
SO_2	Nat. annual	.03 ppm	M[14]	M[17]	M[20]	M[23]
	Nat. 24-hr	.14 ppm	M[15]	M[18]	M[21]	M[24]
	Nat. 3-hr (secondary)	.50 ppm	-	-	-	-
	CA. 24-hr	.05 ppm	M[15]	M[18]	M[21]	M[24]
	CA. 1-hr	.50 ppm	M[16]	M[19]	M[22]	M[25]
TSP	Nat. annual (primary)	75μg/m^3	M[26]	E[28]	M[33]	M[36]
	Nat. annual (secondary)	60μg/m^3	E[26]	E[29]	E[34]	M[36]
	Nat. 24-hr (primary)	260μg/m^3	M	E[30]	M	M
	Nat. 24-hr (secondary)	150μg/m^3	M	E[31]	M	M
	CA. annual	60μg/m^3	M[26]	E[29]	E[34]	M[36]
	CA. 24-hr	100μg/m^3	E[27]	E[32]	E[35]	E[37]

FOOTNOTES FOR TABLE III-3

1. The highest recorded 1-hour concentration in San Luis Obispo County was .10 ppm. This concentration, which was reported at the Morro Bay-Baywood, Nipomo, and Paso Robles air monitoring stations, represents 83 percent of the national 1-hour standard.

2. The California 1-hour ozone standard was exceeded a total of 3 times on one day at the Morro Bay-Baywood station, two times on one day at the Nipomo station, and three times on one day at the Paso Robles station. At all three stations, the highest recorded concentration was .10 ppm or 100 percent of the California 1-hour standard.

3. The highest recorded 1-hour concentration recorded in the County was .24 ppm. This concentration, which represents 200 percent of the national 1-hour standard, was recorded at the Santa Barbara-State air monitoring station. Overall, the national standard was exceeded 5 times on one day at the Santa Barbara-State station in 1981. In addition, the national standard was exceeded 6 times on 2 separate days at the Santa Barbara-Satellite station (the highest concentration was .17 ppm or 141 percent of the standard), and 9 times on 3 separate days at the Goleta station (the highest concentration was .18 ppm or 150 percent of the standard).

4. The highest recorded 1-hour concentration recorded in the County was .24 ppm. This concentration, which represents 240 percent of the California 1-hour standard, was recorded at the Santa Barbara-State air monitoring station. Overall, the California 1-hour standard was exceeded a total of 7 times on 3 separate days at the Santa Barbara-State station, a total of 37 times on 12 separate days at the Goleta station, and 18 times on 5 separate days at the Santa Barbara-Satellite station. The highest recorded concentration was .18 ppm, or 180 percent of the standard, at the Goleta station, and .17 ppm, or 170 percent, at the Santa Barbara-Satellite station.

5. The highest recorded 1-hour concentration at the Lompoc G-Street air monitoring station was .08 ppm or 66 percent of the national and 80 percent of the California 1-hour standards.

6. The highest 8-hour mean concentration recorded in San Luis Obispo County was 6.6 ppm or 73 percent of the national standard.

7. The highest 1-hour concentration recorded in San Luis Obispo County was 10.0 ppm or 28.6 percent of the national standard and 25 percent of the California standard.

FOOTNOTES FOR TABLE III-3 (con't)

8. The highest 8-hour mean concentration recorded in Santa Barbara County was 8.70 ppm or 96 percent of the national standard.

9. The highest 1-hour concentration recorded in Santa Barbara County was 15.0 ppm or 43 percent of the national standard and 37 percent of the California standard.

10. The highest recorded annual mean concentration (all hours) recorded in San Luis Obispo County was .012 ppm or 24 percent of the national standard.

11. The highest recorded 1-hour concentration recorded in San Luis Obispo County was .11 ppm or 44 percent of the California standard.

12. The highest recorded annual mean concentration (all hours) recorded in Santa Barbara County was .023 ppm or 46 percent of the national standard.

13. The highest 1-hour concentration recorded in Santa Barbara County was .15 ppm or 60 percent of the California standard.

14. The highest annual mean concentration (all hours) recorded in San Luis Obispo County was .004 ppm or 13 percent of the national standard.

15. The highest 24-hour mean concentration recorded in San Luis Obispo County was .038 ppm or 27 percent of the national standard and 76 percent of the California standard.

16. The highest 1-hour concentration recorded in San Luis Obispo County was .27 ppm or 54 percent of the California standard.

17. The highest annual mean concentration (all hours) recorded in Santa Barbara County was .002 ppm or 6 percent of the national standard.

18. The highest 24-hour mean concentration recorded in Santa Barbara County was .018 ppm or 13 percent of the national standard and 36 percent of the California standard.

19. The highest 1-hour concentration recorded in Santa Barbara County was .09 ppm or 18 percent of the California standard.

20. The highest annual mean concentration (all hours) recorded was .000 ppm.

21. The highest 24-hour mean concentration recorded was .002 or 1 percent of the national standard and 4 percent of the state standard.

FOOTNOTES FOR TABLE III-3 (con't)

22. The highest 1-hour concentration recorded was .01 ppm or 2 percent of the state standard.

23. The highest annual mean concentration (all hours) was .001 ppm or 3 percent of the national standard.

24. The highest 24-hour mean concentration recorded was .012 ppm or 8 percent of the national standard and 24 percent of the state standard.

25. The highest 1-hour concentration recorded was .04 ppm or 8 percent of the state standard.

26. The highest annual geometric mean value recorded in San Luis Obispo was 58.2 $\mu g/m^3$ or 78 percent of the national standard.

27. The California 24-hour standard was exceeded a total of 9 times in San Luis Obispo County (3 times at the Morro Bay station, 4 times at the Nipomo station, and 2 times at the Pismo Beach station).

28. The national annual standard (primary) was exceeded at the El Capitan Beach (97.8 $\mu g/m^3$ or 130 percent of the standard) and the Santa Maria-Library (91.7 $\mu g/m^3$ or 122 percent of the standard) stations.

29. The national annual standard (secondary) and the California annual standard were exceeded at the Carpinteria (60.1 $\mu g/m^3$ or 100 percent of the standards), El Capitan Beach (97.8 $\mu g/m^3$ or 163 percent of the standards), Maricopa-Ventura St. (64.3 $\mu g/m^3$ or 107 percent of the standards), Santa Barbara State (67.6 $\mu g/m^3$ or 112 percent of the standards), and Santa Maria-Briarwood (64.7 $\mu g/m^3$ or 107 percent of the standards) and Santa Maria-Library (91.7 $\mu g/m^3$ or 153 percent of the standards) stations.

30. The national 24-hour standard (primary) was exceeded 1 time at the El Capitan Beach station, 4 times at the Santa Maria-Briarwood station, and 2 times at the Santa Maria-Library station.

31. The national 24-hour standard (secondary) was exceeded 6 times at the El Capitan Beach station, 2 times at the Maricopa-Ventura St. station, 1 time at the Santa Barbara-State, 9 times at the Santa Maria-Briarwood station, and 7 times at the Santa Maria-Library station.

32. The California 24-hour standard was exceeded 3 times at the Carpinteria station, 31 times at the El Capitan Beach station, 1 time at the Goleta station, 11 times at the Maricopa-Ventura St. station, 4 times at the Santa Barbara station, 4 times at the Santa Barbara-State station, 23 times at the Santa Maria-Briarwood station, and 25 times at the Santa Maria-Library station.

FOOTNOTES FOR TABLE III-3 (con't)

33. The highest annual geometric mean value recorded at the Lompoc "G" Street station was 68.1 $\mu g/m^3$ or 90.8 percent of the national standard.

34. The annual geometric mean value recorded at this station was 62.8 ug/m^3 or 104 percent of the national secondary and California annual standard.

35. The California 24-hour standard was exceeded 4 times.

36. The highest annual geometric mean value recorded at the Lompoc-Jamala Road station 38.2 $\mu g/m^3$ or 51 percent of the national annual standard (primary) and 64 percent of the national annual standard (secondary) and the California annual standard.

37. The California 24-hour standard was exceeded 3 times.

standard deviation from the nearshore temperature mentioned above is less than 1.5°C in the coastal upwelling area between Point Conception and Point Arena (Bourke et al., 1977).

With regard to near surface salinity, the data indicate that the offshore range along the California coastline is small. For example, near Cape Mendocino salinity levels are 32.60 parts per thousand (ppt), and near Point Conception they are 33.30 ppt. Along the coast, salinity levels are high and nearly uniform--33.40-33.50 ppt. In the Santa Maria Basin offshore, the mean seasonal salinity range is small. Along the coast, minimum salinities occur in winter and early spring. Almost the entire offshore region reaches a salinity maximum of 33.40 ppt in late summer. In coastal upwelling regions maximum salinities in excess of 33.60 ppt occur in June-July (Bourke et al., 1977).

(2) CURRENTS

The California Current is a broad, sluggish current which flows offshore from Cape Mendocino generally southeastward until it reaches a point off northern Baja California where the main portion of the current turns eastward and divides into two branches, one moving north and the other south (BLM, 1979). More than 90 percent of the water mass associated with the current occurs within 800 km (497 miles) of the coast of central California at depths above 300 m (984 feet). The mean speed of the current is about 12.5 to 25.0 cm/sec. The flow pattern is complex with loops and eddies migrating southeastward at about 12.5 cm/sec (Bourke et al., 1977).

The branch of the California Current which turns northward becomes the California Countercurrent. The Countercurrent flows over the continental shelf-slope region inshore and beneath the California Current further offshore. It is relatively narrow in width and carries tropical water, anomalously high in temperature

and salinity, northward. When the California Countercurrent is submerged, it is called the California Undercurrent; when it surfaces, it is called the Davidson Current (Bourke et al., 1977).

The inshore circulation patterns along the central California coastline are influenced by cyclic changes in atmospheric pressure and can, therefore, be categorized by seasons. Three seasons, or periods, have been identified: the Davidson Current period; the Upwelling period; and the Oceanic period. Information on each of these periods is summarized in Table III-4.

Generally, nearshore currents in the vicinity of leases OCS-P 0438 and 0440 flow in a southwesterly direction during the Davidson Current and Upwelling periods (see Figures III-13 and III-14). During the Oceanic period, nearshore surface currents in the vicinity of Point Arguello are generally parallel the coastline and flow in a southeasterly direction offshore (see Figure III-15).

Bottom currents along the central California coast are produced by wind, tides, gravity, and local advection of currents. Locally, the flux of a bottom current is periodically affected by river discharge or turbidity flows. Studies indicate that bottom currents increase in velocity as the bottom topography expands into basins like the Santa Maria Basin offshore and decrease as the flow encounters a ridge or escarpment (Bourke et al., 1977).

(3) TIDES

Tides along the central California coast are of the mixed semi-diurnal type. The tidal cycle is 25 hours long. For a period of approximately ten days, each cycle has two high tides and two low tides. This is followed by a 3 to 4 day period in which the 25-hour cycle is composed of only one high-water and one low-water. The

TABLE III-4

INSHORE CIRCULATION PERIODS
(Bourke et al., 1977)

PERIOD	DURATION	CHARACTERISTICS
Davidson Current	Middle of November until middle of February	. Upper mixed layer is relatively thick with temperatures at 50 m (164 feet) only slightly less ($<1°C$) than at the surface
Upwelling	Middle of February until the end of August	. Upwelling process usually occurs in bursts due to the unsteadiness of the wind. As a result, temperatures and salinities vary considerably during this period . Cold, saline water wells upward from mid-depths, thereby cooling the water column above . Lowest surface temperatures of the year typically occur early in the Upwelling Period
Oceanic	September until the middle of November	. Thin film of warm surface water flows shoreward . Temperatures increase at the surface and at depth, with the former reaching their highs of the year

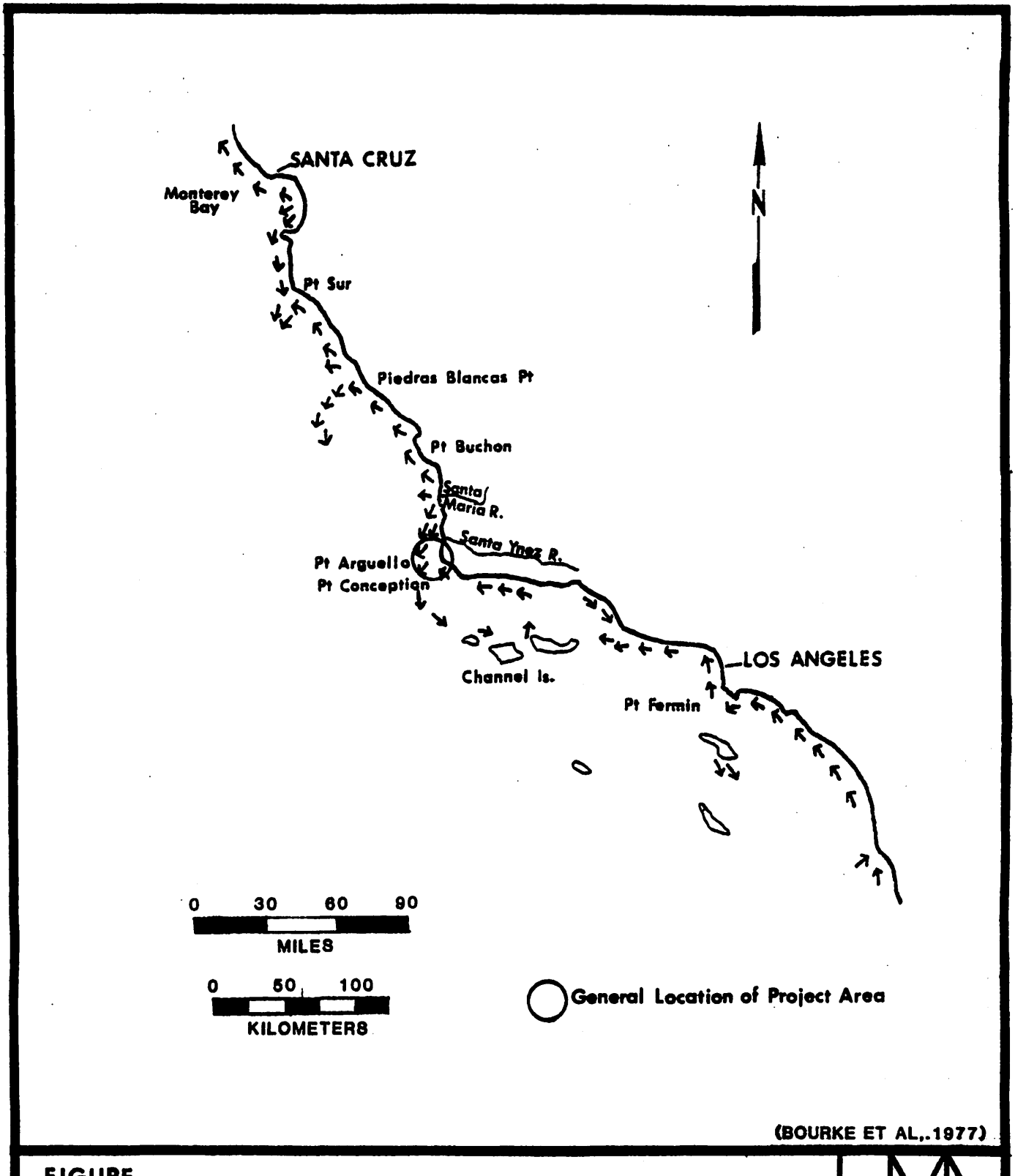
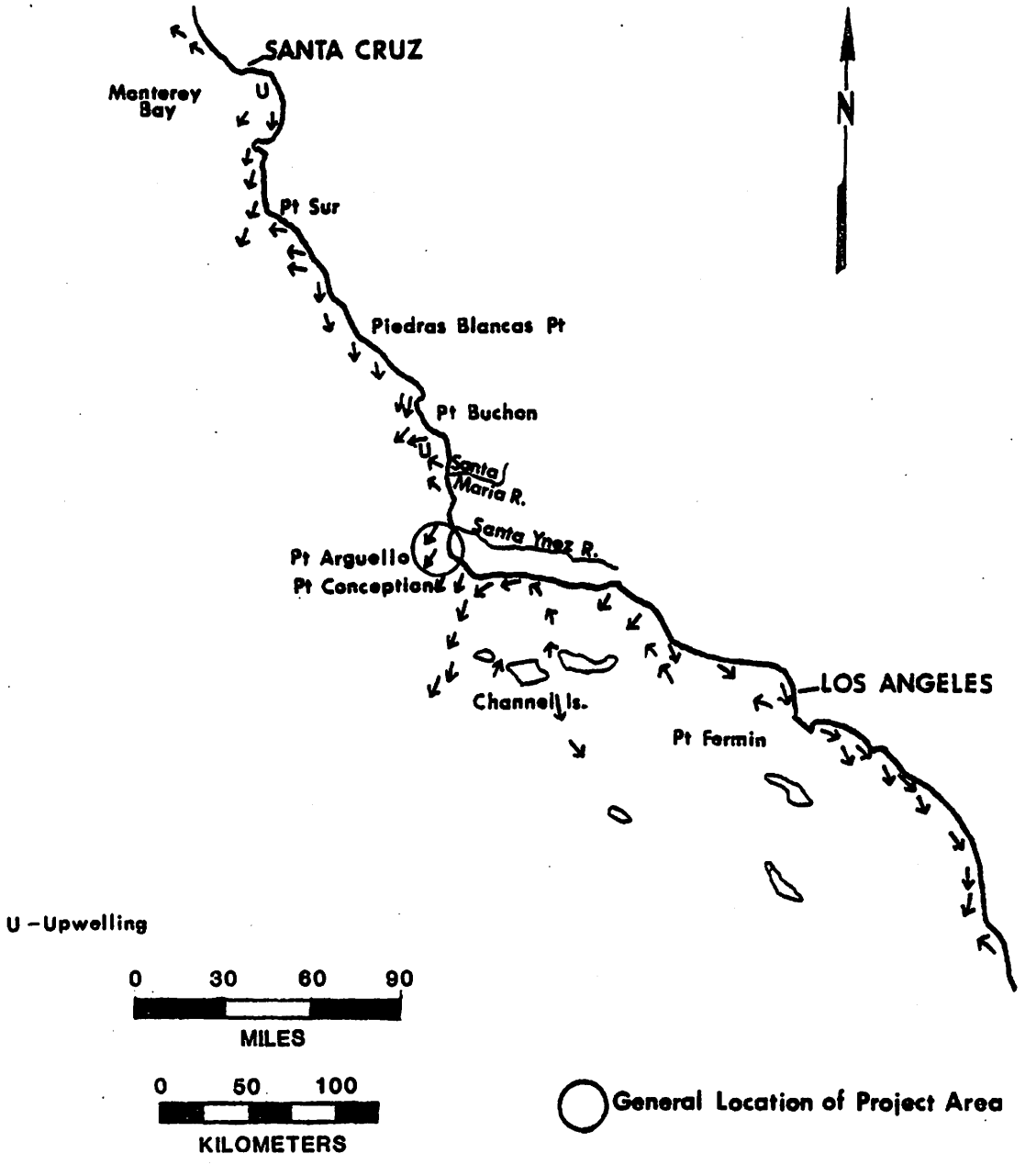


FIGURE III-13

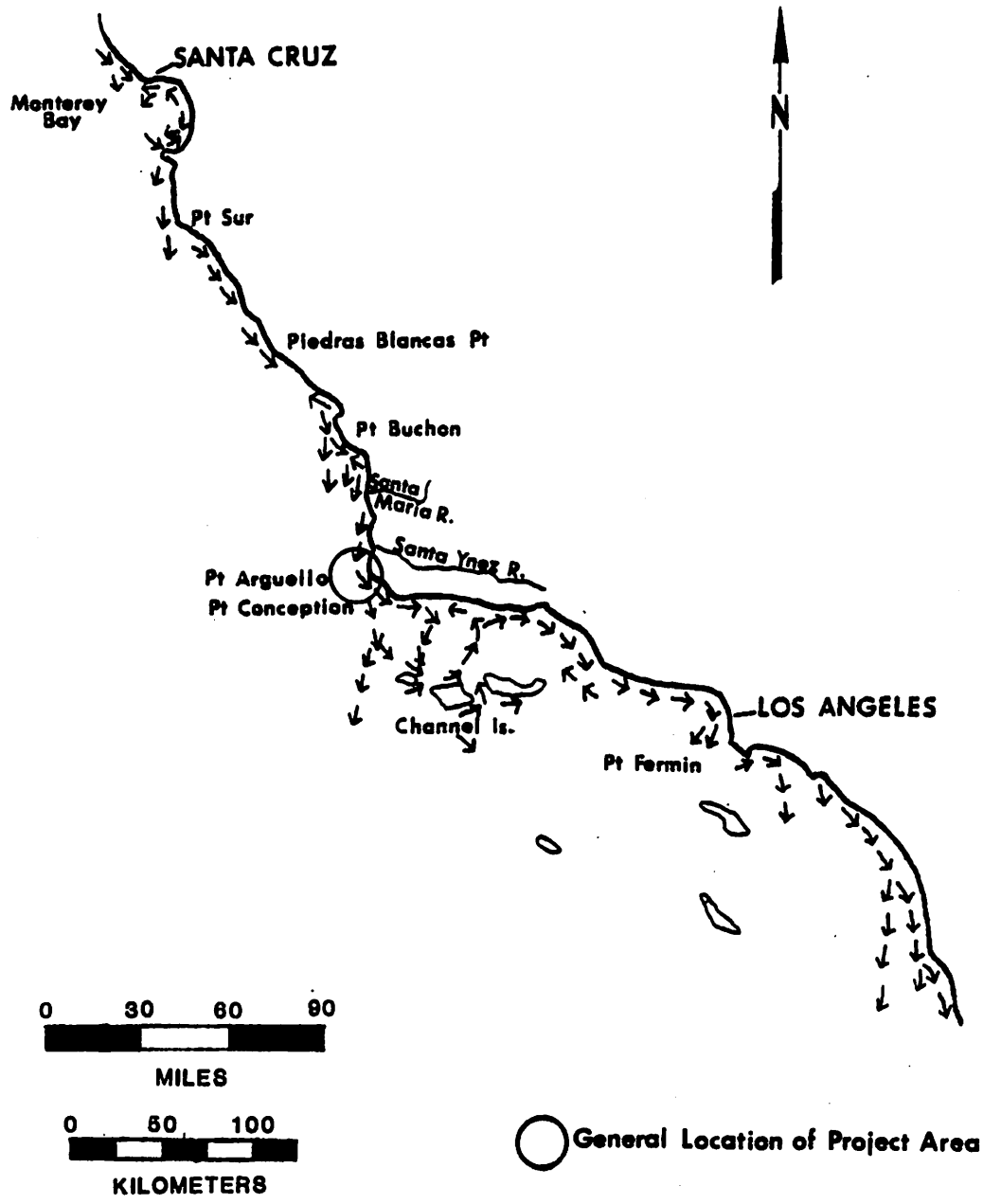
NEARSHORE CURRENTS DURING THE DAVIDSON PERIOD



(BOURKE ET AL., 1977)

FIGURE III-14

NEARSHORE CURRENTS DURING THE UPWELLING PERIOD



(BOURKE ET AL., 1977)

FIGURE III-15

NEARSHORE CURRENTS DURING THE OCEANIC PERIOD

mean tide level at Point Arguello is 0.8 m (2.7 feet). Generally, tidal ranges increase to the north of Point Conception, but not substantially (Bourke et al., 1977).

(4) SEA STATE

The Pacific semi-permanent anticyclone plays an important role in the generation of waves along the California coast. During the summer, the predominant wave action is almost invariably generated by the prevailing northwesterly winds along the coast. Over fifty percent of the waves approach this area from the northwest.

Frontal storms may give rise to severe wind and wave conditions along the central California coast. Studies indicate a relatively high frequency of wave heights above 1.8 m (6 feet) during the winter when frontal storms are most common. These frontal storms develop in the form of rapidly moving intense frontal systems or low pressure centers which occur with an average frequency of two to three times per month from November to May.

Tropical storms regularly occur on the west coast of Mexico during the summer and fall. Only about one or two of these storms per year generate swells that affect central California, and these waves are usually well masked by local waves by the time they reach the area. Long period waves (13-20 seconds) originating from large storms in the southern hemisphere impinge on the California coast during the summer. These waves are referred to as "southern hemisphere swell" (Bourke et al., 1977).

Wave heights between Point Arguello and Point Buchon are greater than 2 feet 74 percent of the time, greater than 6 feet 20 percent of the time, and greater than 9 feet 6 percent of the time. The worst period of the year for waves greater than 6 feet is in the

spring (i.e. April and May), and the calmest seas are experienced in the late summer and fall (California Coastal Commission, 1981).

Waves generated by severe storms can be significantly higher than the waves normally hitting the central California coast. For example, it is estimated that the 25-year significant wave height for the area encompassing the two leases covered by this report is 7 m (23 feet) (NOAA, 1980a).

Finally, because the Santa Maria Basin offshore is located within the circum-Pacific seismic and volcanic belt, the area may be affected by tsunamis, or seismic sea waves. Studies indicate that an earthquake of a magnitude of 6.3 or greater with an epicenter within 100 km (62 miles) of the surface will have to occur to produce a potentially hazardous tsunami. Faults in the Santa Maria Basin offshore have the potential for earthquakes of this magnitude. This type of wave is not, however, considered to be a threat to floating drilling vessels operating offshore.

(5) WATER QUALITY

Overall, the oceanic water quality along the central California coast is considered to be very good (BLM, 1980).

The surface waters of the California Current are saturated with oxygen to about 100 percent, down to the thermocline. The oxygen content of the water generally declines with depth to an oxygen minimum layer found between 700 to 1,000 m (2,295 and 3,279 feet). Beneath the minimum layer there is a gradual increase in oxygen content with depth. A subsurface maximum of oxygen develops in late spring and summer and continues through the fall and the early winter. It is usually found at depths corresponding to the lower part of the wind mixed layer [i.e. around 50 m (164 feet)]. The subsurface maximum values exceed the surface concentrations by more than 1.0 ml/l in some instances (Traganza et al., 1977).

The hydrogen ion concentration (pH) within the coastal waters of central California ranges from a minimum pH of 7.8 to a maximum pH of 8.2 (Traganza et al., 1977).

Inorganic nutrients, which are essential to the growth of phytoplankton, are primarily supplied from advection of currents, upwelling, and discharges from land sources. The three essential nutrients are phosphorus, nitrogen, and silicon. Thousands of nutrient determinations have been made off the coast of lower central California since 1949. In 1969, a suite of nutrient measurements were obtained in almost every month of the year. This information is summarized below. In each instance, concentrations data are presented for surface [i.e. 10 m (33 feet)] waters during four timeframes: 1. January 1969; 2. May-June 1969; 3. July 1969; and 4. August-October 1969 (Traganza et al., 1977).

NUTRIENT	TIMEFRAMES (see above) (ug-at/l)			
	1.	2.	3.	4.
phosphate	0.50-0.75	0.75-1.00	±0.25	.50
nitrate	±2	±10	0.10	0.10
silicate	5	10-15	±2	5

Trace metals, such as mercury, lead, cadmium, copper, zinc, arsenic, vanadium, and other metals are found in the waters off the central California coast. Some of the metals are essential to biological productivity. Information on the specific concentrations of these metals in the waters of the Santa Maria Basin offshore is limited. In 1978, studies conducted on mussels (i.e. Mytilus sp.) along the California coast, indicated that the levels of lead, silver, and zinc found in the mussels were influenced by the amount of these metals entering the waters from the activities of

man. These metals showed little seasonal variability in the waters off Point Arguello, with lead ranging from 1.41-2.99 µg/g DRY WEIGHT, silver ranging from 0.10-0.99 µg/g DRY WEIGHT, and zinc ranging from 140-169 µg/g DRY WEIGHT. In a separate analysis conducted in 1979, the following trace metal levels for surface oceanic waters along central California were recorded:

manganese	100-300 nannograms/kilogram (ng/kg)
nickel	approximately 200 ng/kg
cadmium	4-25 ng/kg
lead	5-15 ng/kg
zinc	5-30 ng/kg
copper	approximately 100 ng/kg

These figures were derived from samples taken from surface waters outside the influence of ocean waste discharges (BLM, 1980).

D. OTHER USES OF THE AREA

(1) COMMERCIAL FISHING

California's coastline is rich in fish life. Over 560 species of nearshore fishes have been identified off California and, although some of these are restricted to warm waters south of Point Conception, the majority are found in waters off central California. The eleven largest families are: Scorpaenidae (scorpionfishes and rockfishes), 57 species; Cottidae (sculpins), 44 species; Pleuronectidae (righteye flounders), 19 species; Liparididae (snailfishes), 19 species; Embiotocidae (surfperches), 18 species; Agonidae (poachers), 17 species; Zoarcidae (eelpouts), ± 17 species; Stichaeidae (pricklebacks), 14 species; Gobiidae (gobies), 13 species; Clinidae (clinids), 12 species; and Myctophidae (lanternfishes), ± 11 species (BLM, 1980). Three of these families--rockfishes, righteye flounders, and surfperches--have great commercial and sport importance (DeWitt et al., 1977).

Worldwide fishery production ranges from as low as 10 kg/km² to as high as 3,000 kg/km². Production over the whole California shelf, which is on the order of 500-700 kg/km², is intermediate from a world standpoint (DeWitt et al., 1977). However, in parts of the Santa Maria Basin offshore it exceeds 2,500 kg/km². Information on the estimated total commercial catch in 1981 for boats operating out of Morro Bay and Avila is presented in Table III-5.

The commercial fishing industry is a mainstay of the local economies of most central California coastal communities. Using current (March, 1982) prices per pound paid to fishermen and preliminary data on the commercial catch for Morro Bay and Avila in 1981, the value of commercial fish landings to San Luis Obispo County was more than $3.8 million (i.e. nearly $2.7 million at Morro Bay and $1.1 million at Avila) (Lehtonen, 1982).

The California Department of Fish and Game has designated commercial fish blocks that encompass all of California's marine waters (see Figure III-16). Leases OCS-P 0438 and 0440 are located within block 644, and are in the vicinity of blocks 637, 638, 639, 643, and 645. During 1975 (the last year for which information is available) 533,038 pounds of fish were taken on block 644; 19,418 pounds of fish were taken on block 637; 71,789 pounds of fish were taken on block 638; 230,649 pounds of fish were taken on block 639; and 58,746 pounds of fish were taken on block 643. No 1975 catch statistics are available for block 645. The principal species taken (>1000 lbs/yr) on each block were:

644

Species	Pounds
Bocaccio	201,025
Petrale Sole	165,440
Rockfish	53,344
Lingcod	42,307
Sand Sole	33,070
Yelloweye Rockfish	10,008
Dover Sole	9,970

644 (cont.)

Species	Pounds
Dungeness Crab	7,963
Rex Sole	3,640
Sablefish	3,190

637

Species	Pounds
Red Abalone	13,037
Yelloweye Rockfish	2,462
Brown Rockfish	1,132

638

Species	Pounds
California Halibut	19,628
Brown Rockfish	18,608
Rockfish	10,175
English Sole	6,190
Flounder	5,726
Lingcod	2,882
Petrale Sole	2,597
Sand Sole	1,485

639

Species	Pounds
Bocaccio	119,052
Rockfish	50,933
Petrale Sole	18,945
Lingcod	14,102
Sablefish	8,290
Rex Sole	7,390
Dover Sole	5,785
English Sole	3,725

643

Species	Pounds
Rockfish	41,327
Bocaccio	13,195
Red Abalone	3,239

TABLE III - 5

ESTIMATED TOTAL COMMERCIAL
FISH CATCH FOR
MORRO BAY AND AVILA, 1981
(Lehtonen, 1982)

	MORRO BAY	AVILA
SPECIES	POUNDS	POUNDS
Albacore	1,674,066	446,517
Salmon	3,573	27
Rockfish	1,971,014	1,370,302
California Halibut	68,119	66,339
Petrale Sole	85,582	92,262
English Sole	65,830	80,906
Rex Sole	86,568	12,109
Dover Sole	62,759	11,109
Lingcod	125,162	148,394
Sablefish	35,344	34,154
Abalone	N.A.	N.A.
Dungeness Crab	5,785	595
Rock Crab	28,337	25,421
All others	974,488	310,657
Total	5,186,627	2,598,795

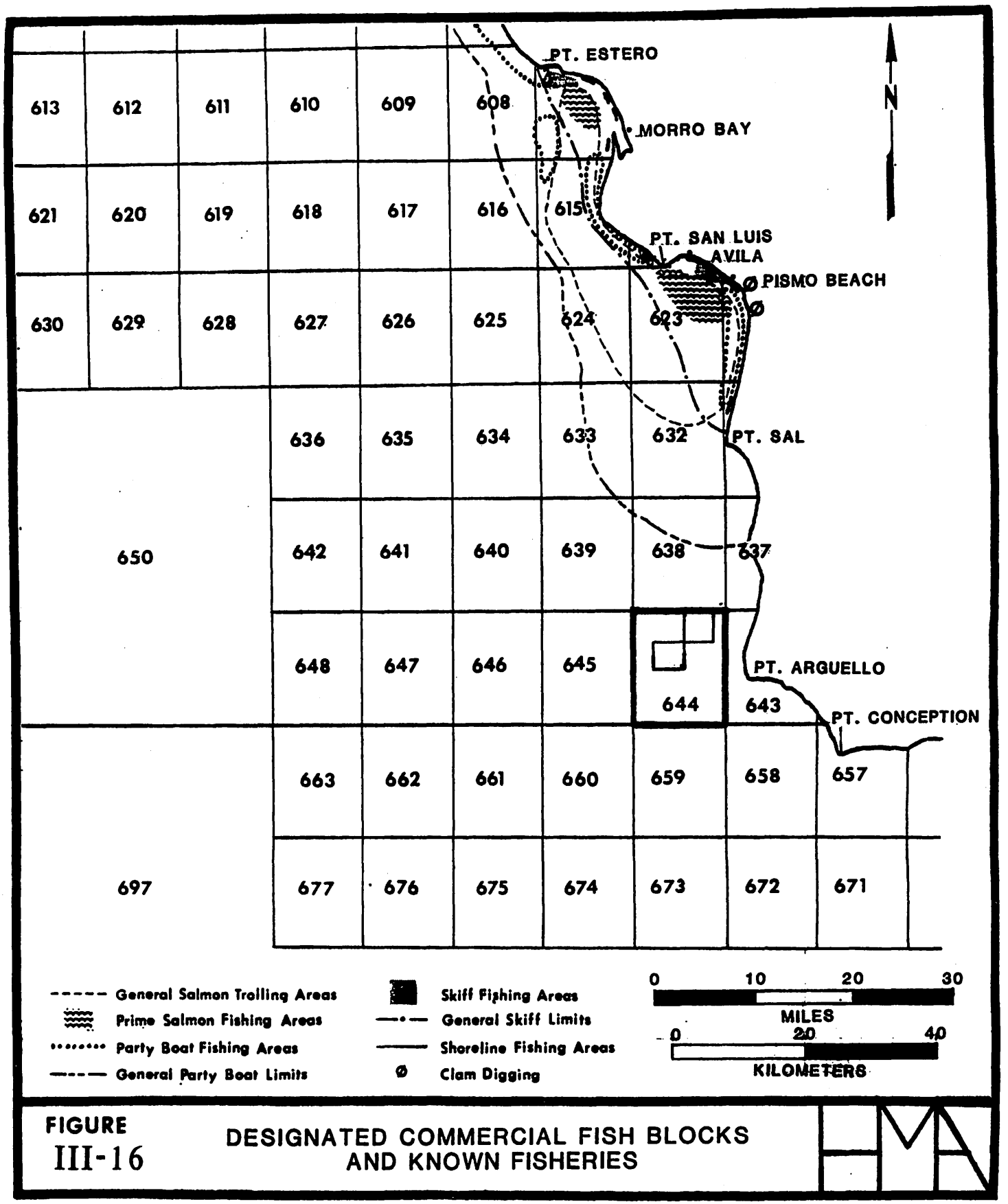


FIGURE III-16 DESIGNATED COMMERCIAL FISH BLOCKS AND KNOWN FISHERIES

(CALIFORNIA DEPARTMENT OF FISH & GAME, AND BLM, 1980)

Overall, 24 different species of fish were recorded on block 644; 12 different species were recorded on block 637; 21 different species were recorded on block 638; 15 different species were recorded on block 639; and 10 different species were recorded on block 643 (CDF& G, 1982a).

Commercial fishing activities in the Santa Maria Basin offshore area include flatfish, rockfish, shrimp, and inshore trawling; hook and line fishing; crab pot fishing; salmon trolling; set net fishing; and sablefish trap fishing. Specific information about the location of these fisheries within the Santa Maria Basin offshore area, target species, fishing seasons, fishing techniques, and the approximate number of vessels currently engaged in each type of operation is presented in Table III-6, and is elaborated on below.

a. Flatfish trawl: Leases OCS-P 0438 and 0440 are located within a known flatfish trawling ground which extends from the headlands between Point Conception and Point Arguello to a point 12.9 to 16.1 km (8 to 10 miles) north of Point Piedras Blancas. The traditional trawling grounds extend from 4.8 to 24.2 km (3 to 15 miles) offshore; however, new vessels with deep water gear are expected to extend the fishery to 64.4 km (40 miles) offshore.

The heaviest flatfish trawling currently takes place between Point Arguello and Point Sal. In this area and throughout the fishery, the fishermen have identified obstruction-free trawl "tows" or routes along which they drag their trawling equipment. The tows tend to follow contour lines and vary in length. Some tows are reported to be 16.1 to 19.3 km (10 to 12 miles) long. Each vessel skipper has a number of tows of varying productivity and the exact location of tows generally are closely held secrets.

The size of the vessels operating in the flatfish trawl fishery varies from 40 to 85 feet. Trawlers are usually recognized either by an A-frame, or gentry, on the stern or by a boom located midship. Most present day west coast trawlers are stern trawlers.

TABLE III-6

INFORMATION ON COMMERCIAL FISHERIES WITHIN
THE SANTA MARIA BASIN OFFSHORE AREA

Fishery	Approximate Location	Method	Number Vessels	Target Species	Season
flatfish trawl	From Point Arguello to a point 12.9 to 16.2 km (8-10 miles) North of Piedras Blancas; currently extends 4.8 to 24.3 km (3-15 miles) offshore	Drag trawling equipment along "tows" [some up to 16.2 to 19.4 km (10-12 miles long] at depths of up to 457.3 m (1,500 feet)	20-22 trawlers	Petrale sole (Eopsetta jordani) English sole (Parophrys vetulus) Dover sole (Microstomus pacificus)	Throughout year; most productive during the summer
rockfish trawl	Same as flatfish	Same as flatfish trawling	N/A	Rockfish (Sebastes)	Same as flatfish
inshore trawl	Between Point Arguello and Point San Luis; in nearshore waters as shallow as 31.1 m (102 feet)	Same as flatfish trawling	N/A	California halibut (Paralichthys californicus)	Same as flatfish
commercial hook and line	Throughout basin; concentrated off Point Sal and Point Arguello	Setting hooks and lines	N/A	Vermilion rockfish (Sebastes miniatus)	Throughout the year

TABLE III-6 (cont.)

Fishery	Approximate Location	Method	Number Vessels	Target Species	Season
shrimp trawl	From Purisima Point to a point due west off Morro Bay	Trawling in 118.9-256.1 m (390-840 feet) of water	20-21	Ocean shrimp (Pandulus jordani) Spot prawn (Pandulus platyceros)	Ocean shrimp: April-October; Spot prawn: throughout year
crab pot	Between Point Sal and Point Estero; also off Point Arguello	Traps anchored to bottom at 91.5-109.7 m (300-360 foot) depths; marked by bouys	4-6	Rock crab (Cancer antennarius) Dungeness crab (Cancer magister)	Throughout year
salmon troll	Northern portion of the Santa Maria Basin offshore	Trolling from nearshore out 16.2 to 19.4 km (10-12 miles); throughout water column to depths of 30.5 m (100 feet)	N/A	King salmon (Oncorhynchus tshawytscha) Silver salmon (O. kisutch)	May-September with 2 week closing in June
set net	Inshore areas of Santa Maria Basin offshore, particulary between Point Arguello and Point San Luis	Gill and trammel nets set out at 185-275 m (603-901 foot) depth	9-10	California halibut (Paralichthys californicus) sharks	N/A
sablefish trap	Santa Lucia Bank	Steel traps, usually 10 traps per string	1	Sablefish (Anoplopoma fimbria)	N/A

The trawl has otter boards, or "doors", that attach to each side of a net keeping the mouth open and drag the seafloor. When the net is towed, the doors are pulled outward, both by the angle at which they are connected to the towline and also by the water pressure exerted against them. The doors may be rectangular, oval, or convex; made of wood, metal, or both; measure 4 to 10 feet long and 3 to 6 feet high; and weigh 600 to 1,500 pounds each. The net is basically a large bag made from nylon netting and dipped in tar to preserve it. The mouth of the net can reach from 30 to 200 feet across and 4 to 20 feet high. From the mouth, the net funnels back towards the codend, where the catch is collected. The length from the mouth to the codend can be up to 150 feet. A trawler has limited maneuverability while fishing. It can move slowly to one side or another; however, this is not easy especially in deep water with long towlines hanging off the stern (WOGA, 1981).

Most of the vessels operating in the Santa Maria Basin offshore have traditional trawling equipment and are limited to fishing in depths under 458 m (1,500 feet). However, two vessels operating in the fishery have deep water drag capabilities and can trawl in waters up to 1,098 m (3,600 feet) (Lehtonen, 1982).

The target species in the "traditional" trawling area are the Petrale sole (Eopsetta jordani) and the English sole (Parophrys vetulus) (Lehtonen, 1982). Petrale sole feed on euphausiids, shrimp, and small fish. To a lesser degree, they also feed on bottom-dwelling organisms. Petrale sole enter the fishery at 3 years of age, but the bulk of the Petrale catch is made up of females 5 to 7 years old, 14 to 17 inches long. The eggs are pelagic. English sole range to about a 366 m (1,200 feet) depth. Peak spawning is in the winter and eggs are pelagic for 6 to 10 weeks. Young fish of adult form are commonly found nearshore and in bays and estuaries. English sole feed on a variety of small bottom-dwelling organisms, including small fish (DeWitt et al., 1977).

The target species in the deep water trawling area is the Dover sole (Microstomus pacificus) (Lehtonen, 1982). Dover sole prefer mud bottoms and range in depth from 55 to 1,190 m (180 to 3,900 feet). In late summer and early fall, Dover sole begin to move seaward to depths below 256 m (840 feet). This migration is apparently triggered by spawning. Fish are caught in deep water from 256 to 1,098 m (840 to 3,600 feet) throughout the winter. In the spring and summer, the fishery shifts shoreward to depths less than 256 m (840 feet). Fish 6 to 10 years old and 14 to 18 inches long comprise most of the commercial catch. Dover sole eggs are pelagic and buoyant, and young sole are particularly abundant off Point San Luis. Dover sole feed on all types of mud-inhabiting invertebrates (DeWitt et al., 1977).

Flatfish trawling activities take place throughout the year; however, because of better weather and greater effort, landings tend to go up during the summer. The average trawl trip lasts 5 days and skippers generally trawl during the day (Lehtonen, 1982). The number of tows per day depends on the size of the catch, the distance traveled between schools, the depth, and the weather (WOGA, 1981).

b. Rockfish trawl: Rockfish are also target species for trawling activities within the Santa Maria Basin offshore area. The rockfish fishery is identical to the flatfish fishery; however, the heaviest rockfish trawling currently takes place between Point Estero and an area 13 to 16 km (8 to 10 miles) north of Point Piedras Blancas.

c. Inshore trawl: Point Arguello and Point San Luis serve as the geographic boundaries of the inshore trawl fishery for California halibut (Paralichthys californicus). This fishing occurs in nearshore waters as shallow as 31 m (102 feet). Between Point Conception and Point Arguello boats operating in this fishery are allowed to fish up to one mile from shore. North of Point Arguello

boats operating in the fishery must fish outside the State imposed 3 mile limit for trawling.

d. Commercial hook and line: A significant commercial hook and line fishery also exists in the Santa Maria Basin offshore. Unlike trawling activities, hook and line activities generally take place in high relief (rocky) areas. Hook and line trips usually last 2 to 3 days.

e. Shrimp trawl: A shrimp trawl fishery has developed in the Santa Maria Basin offshore during the past 3 years. In 1979 and 1981, most shrimp were caught off Point Sal, and in 1980 most were caught between Point San Luis and Point Buchon. Shrimp are caught in waters between 184 to 275 m (604 to 902 feet). Because of the shifting nature of the shrimp fishery, fishermen must "find" shrimp on each trip and shrimp tows are correspondingly shorter.

Currently, the shrimp trawl fleet consists of 20 or 21 vessels, with the majority of the vessels (13 out of 20 in 1980) operating from ports outside the Basin. Two types of shrimp are taken: ocean shrimp (Pandalus jordani) and spot prawn (Pandalus platyceros). The season for ocean shrimp lasts from April through October, while spot prawn are taken throughout the year. During the ocean shrimp season, some flatfish and rockfish trawlers shift to shrimp.

f. Crab: A small crab fishery exists in the Santa Maria Basin offshore. The fishery extends between Point Sal and Point Estero, and there is some activity off Point Arguello. Rock crab (Cancer antennarius) are caught subtidally out to 91.5 or 110 m (300 or 360 feet) and Dungeness crab (Cancer magister) are caught in slightly deeper water.

The vessels operating in the crab fishery are generally small to moderate in size, with enough room to stack traps and with some type of boom and hoist to lift filled traps. Crab traps con-

sist of a low, square, metal frame enclosed with vinyl-covered steel mesh. The traps have two 4½-inch escape openings for undersize crabs and a destruct panel which will corrode or rot, allowing animals to escape a lost trap. The number of traps per string (usually 20 to 80) varies, as does the number of strings set (4 to 12), both depending on the abundance of crabs in the area. Buoys are used to mark the location of traps which are anchored to the bottom. Fishermen set traps throughout the year, but landings drop off during the summer (WOGA, 1981).

g. Pacific salmon: The Santa Maria Basin offshore is at the southern end of the Pacific salmon fishery. Salmon are pelagic fish and are found throughout the water column down to 30.5 m (100 feet). Currently, one to four percent of the California commercial catch comes from the Basin.

h. Set net: A significant set net fishery exists in the inshore areas of the Santa Maria Basin offshore, particularly between Point Arguello and Point San Luis. Two types of nets--gill and trammel--are used by the nine or ten vessels which operate out of Avila and Morro Bay. Primary species caught with set nets in shallow [< 184 meters (603 feet)] areas include California halibut, white seabass, California barracuda, leopard sharks, gray smoothhound sharks, soupfin sharks, and angel sharks. Rockfish (Sebastes) are caught with set nets in deeper [184-275 meters (603-901 feet)] waters (Cohen, Personal Communication, 1983).

i. Sablefish trap: In 1978, a sablefish trap fishery developed in the waters over the Santa Lucia Bank. Activities flourished for two years and then all but ended as the export market dried up (Lehtonen, 1982). The traps used in the fishery are large steel-frame rectangles, 3 x 3 x 8 feet, and covered with nylon netting. They are strung together on a ground line which is buoyed at both ends. When fished, there are usually 10 traps per string, with 12 strings set at a time. Fishing activities take place 24 hours per day (WOGA, 1981). One vessel, which does not land local-

ly, still operates in the fishery. Activities could increase in the future if the export market changes (Lehtonen, 1982).

(2) SHIPPING

With the exception of tankers entering and departing marine terminals in Estero Bay and Port San Luis, commercial vessel traffic passing through the Santa Maria Basin offshore originates in or is bound for ports in southern California. These vessels are bound toward or originate in foreign ports or ports along the North American coast. This traffic is currently at a level of 12 to 13 vessels per day in each direction. The transiting traffic is comprised of 30 percent tankers, 20 percent containerships, 25 percent freighters, 13 percent dry bulk carriers, and 12 percent ships of other classes (NMRC, 1981). As for the marine terminals in the basin, over 265 petroleum tankers per year service the five terminals in Estero Bay [approximately 82 km (51 miles) north-northwest of lease OCS-P 0438] and over 90 tankers service the terminal at Port San Luis [about 53 km (33 miles) north of lease OCS-P 0438] (BLM, 1980).

In evaluating commercial vessel traffic patterns north of Point Conception, the U.S. Coast Guard concluded that no coastwise traffic lanes exist per se. In recent comments before the California Coastal Commission, a spokesman for the Coast Guard indicated that most coastwise shipping passes well to the west of current oil and gas leases, including Exxon's, in the Santa Maria Basin offshore OCS area.

Because of the volume of vessel traffic through and within the Santa Maria Basin offshore area, the U.S. Coast Guard, District 12, is considering the establishment of a vessel traffic separation scheme (VTSS) which would extend from Port Conception to the San Francisco Bay area. Two hypothetical schemes are currently under review. One of the two is similar to the scheme which currently exists in the Santa Barbara Channel--i.e. two 1-nautical mile wide

traffic lanes, a 2-nautical mile wide separation zone between the lanes, and a 500 meter buffer zone on each side of the lanes. The other scheme would consist of a single 4-mile wide lane with 500 meter buffer zones on each side of the lane (USCG, 1981). Both proposed schemes would pass seaward of the Lease Sale No. 53 area and the leases covered by this report.

(3) MILITARY USE

The coastal waters of central California are used extensively for military-related operations. Current operations include all weather flight training; air intercepts; air to air, air to surface, surface to air, and surface to surface missile launches; bomb drop exercises; dumping operations; and submarine activities. Additional military operations planned for the near future are those in conjunction with the Air Force Space Shuttle Vehicle Flight System.

Leases OCS-P 0438 and 0440 lie under the general umbrella of activities scheduled by the Western Space and Missile Center (SAMTEC) located at Vandenberg Air Force Base and the Pacific Missile Test Center (PMTC) located at Point Mugu. Leases OCS-P 0438 and 0440 are within the Point Arguello Warning Area W-532. This area encompasses approximately 10,000 square miles of open ocean forming the northern portion of the Pacific Missile Range. Aircraft and target flights, missile launches, bomb drops, and antisubmarine warfare weapons firings and gunnery are authorized in this area. The floor of the warning area is at the sea surface, and scheduling within this area is coordinated by PMTC.

The southeast corner of lease OCS-P 0438 is located immediately adjacent to Vandenberg Missile Area Restricted Area R-2516. The overwater portion of this area, which is designated a restricted intercontinental ballistic and orbital missile launch and test area, extends 3 nautical miles from and parallel to the shore between Point Sal and Point Arguello. Short range surface to air missile

firing and fallout of launching hardware from intercontinental ballistic and orbital missiles occur in this area. A similar area (i.e. Vandenburg Missile Area Restricted Area R-2517) extends from Point Arguello to Point Conception. The floor for both of these restricted areas is at the sea surface, and SAMTEC is the scheduling authority for these areas.

Lease OCS-P 0440 is 65 km (40 miles) east of military dumping area "Charlie" which was established in 1959 to handle explosives, toxic chemical ammunition, and radioactive wastes. Dumping activities were discontinued in 1971. Finally, lease OCS-P 0440 is 50 km (31 miles) northeast of the Sierra Venus Submarine Transit Lane (Dornhelm, 1977). Because of the level of these activities, all operators of vessels associated with the exploration activities covered by this report must, under Lease Sale No. 53, Stipulations 4 and 5, coordinate and comply with instructions from the commanders of SAMTEC and PMTC, or any other appropriate military agency. Exxon is a signatory of industry/military agreements addressing notifications, multiuse electromagnetic emissions, and communications in the California OCS area.

(4) RECREATION

The onshore coastal recreation resources of San Luis Obispo and western Santa Barbara Counties tend to be small (less than 100 acres) to moderate (between 100 and 7,000 acres) in size. Montana de Oro State Park [64 km (40 miles) north-northwest of lease OCS-P 0438] is located just north of Point Buchon. The park is 6,956 acres in size and has 19,200 feet of shoreline. Activities in this State Park include picknicking, camping, fishing, nature observation, hiking, and water-based sports. Avila Beach State Park [55 km (34 miles) north of lease OCS-P 0438] is located east of Point San Luis. The park is 10 acres in size and has 2,040 feet of shoreline. Pismo Beach State Park [51 km (31.5 miles) north-northeast of lease OCS-P 0438] is located west and south of the city of Pismo Beach. The park is 2,182 acres in size and has 38,470 feet of

shoreline. Activities in this state park include fishing and nature observation. Point Sal Beach State Park [located 24 km (15 miles) north-northeast of lease OCS-P 0438] is closed to the public due to military operations (Johnson et al., 1977). See Figure III-17 for a map depicting the location of these parks.

Between Point Buchon and Point Conception there are six diving areas and 14 recognized surfing areas. Also, the area between Point San Luis and the San Luis Obispo/Santa Barbara Countyline is an area of boating concentration (BLM, 1980).

Sportfishing is important in the coastal areas east of the two leases covered by this report. Party boats operate year round out of the Avila area. Boat catches are primarily salmon, bonito, barracuda, and white seabass taken during the summer and fall. Pier fishing takes place at the county pier at Avila and from a commercial pier near the breakwater. Skindiving from skiffs for fish and abalones is conducted along the coast between Point San Luis and Point Buchon. Skindiving from shore and shore fishing (mostly from rocks) are conducted between Avila and Shell Beach. Between Pismo Beach and the San Luis Obispo/Santa Barbara Countyline, pismo clamming is the main attraction. Pier fishing takes place on the Pismo Beach pier throughout the year with the best months in the fall when good runs of jacksmelt and, at times, barracuda are present. Barred surfperch are taken between Pismo Beach and the San Luis Obispo/Santa Barbara Countyline, but surfperch fishing is especially good from Oceano to the countyline (CDF&G, 1981).

Over 135 species representing 41 families have been recorded in the central California sport catch. However, only about 20 are caught in large numbers. The species of most importance in the fishery as a whole include blue rockfish, lingcod, striped bass, king salmon, silver salmon, white croaker, jacksmelt, barred surfperch, redtail surfperch, yellowtail rockfish, black rockfish, shiner perch, vermilion rockfish, and walleye surfperch. During the

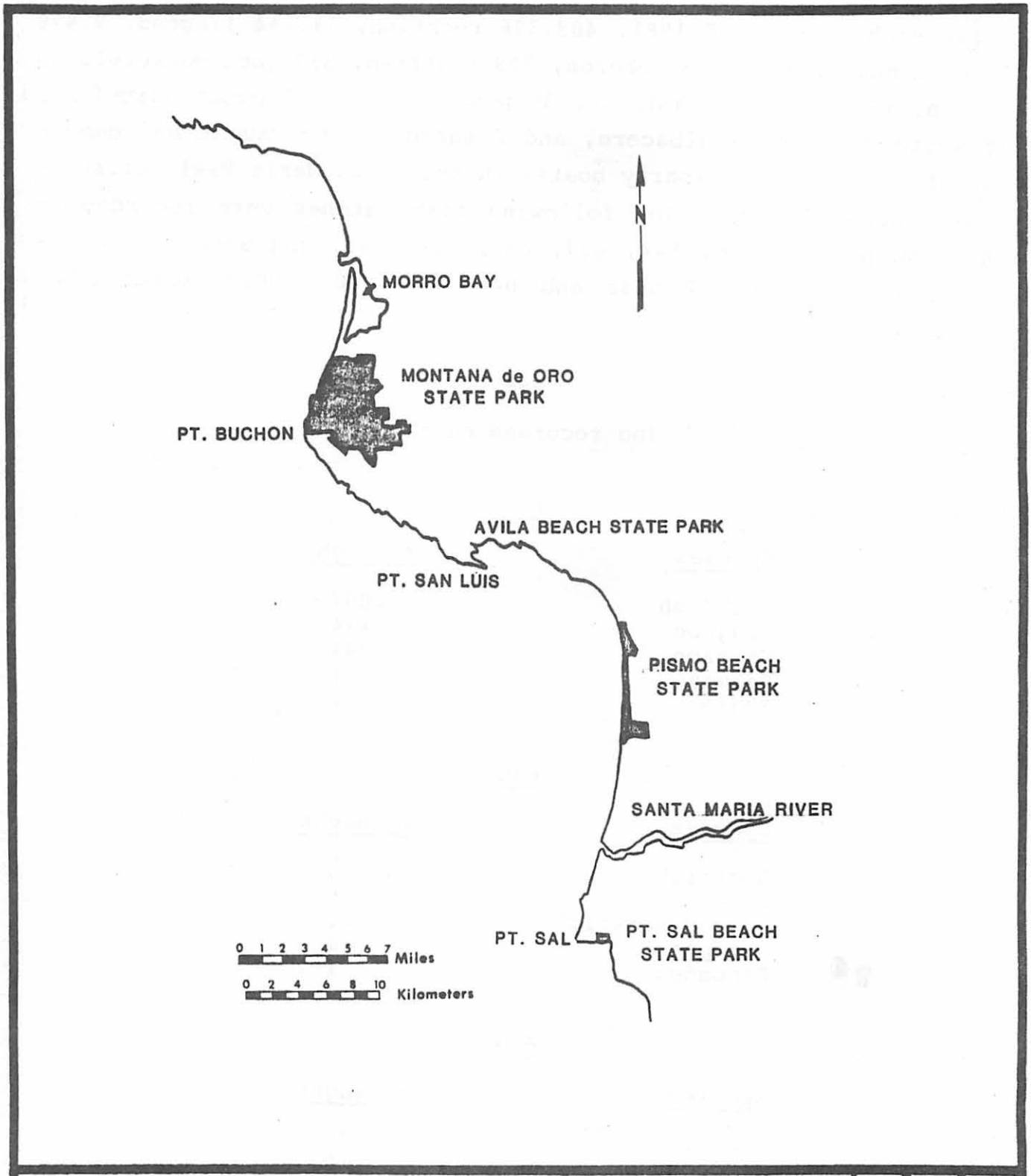


FIGURE
III-17

LOCATION OF STATE PARKS

first eight months of 1981, 403,326 rockfish, 11,244 lingcod, 9,978 Pacific mackerel, 1,173 cabezon, 709 flatfish, 317 jack mackerel, 75 salmon, 67 California halibut, 30 petrale sole, 23 ocean whitefish, 15 white croaker, 3 albacore, and 2 sanddab were caught on commercial fishing vessels (party boats) in the Santa Maria Basin offshore area (CDF&G, 1982c). The following fish catches were recorded on the fish blocks (i.e. 644, 637, 638, 639, 643, and 645) in the vicinity of lease OCS-P 0438 and 0440 in 1978 (CDF&G, Unpublished Data).

644

(no recorded catch)

637

Species	# Caught
Rockfish	8,807
Lingcod	174
Cabezon	244
Salmon	1
Skate	1

638

Species	# Caught
Rockfish	4,213
Lingcod	78
Cowcod Rockfish	13
Octopus	3
Flounder	1

639

Species	# Caught
Rockfish	605
Lingcod	12

643

(no recorded catch)

645

(no recorded catch)

(5) MARICULTURE

Kelp harvesting, primarily for the giant kelp Macrocystis pyrifera is an important multi-million dollar industry in California. Although the principal harvest is taken from southern California, significant commercial kelp harvests are conducted as far north as Point Ano Nuevo in Santa Cruz County. The closest kelp beds to leases OCS-P 0438 and 0440 are between Point Arguello and Point Conception [approximately 8 and 10 km (5 and 6 miles) southeast of leases OCS-P 0438 and 0440, respectively] with the heaviest concentrations around Jalama. The dominant types of kelp in this area are the giant kelp Macrocystis pyrifera and the palm kelp Pterygophora californica. Commercial mariculture activities take place in this area on Kelp Bed Lease Number 33.

(6) CULTURAL RESOURCES

Archaeological and historic sites are afforded protection under a number of federal laws, the most important of which is the National Historic Preservation Act of 1966. This act established the National Register of Historic Places and a system of State Historic Preservation Offices. Currently, San Luis Obispo County has 8 sites on the National Register of Historic Places, 69 Historic Sites, and 725 Archaeological Sites. Santa Barbara County has 12 sites on the National Register of Historic Places, 72 Historic Sites, and 1,353 Archaeological Sites. All of these sites are onshore (BLM, 1980).

The offshore region of California is thought to have potential cultural resources, including aboriginal remains and sunken ships and aircraft. Little is known, however, about the distribution of cultural resources along the central California coastline.

Under federal law, the MMS must take steps to identify and protect cultural resources which may exist in the Santa Maria Basin offshore OCS area. To do this, the MMS has the authority under OCS Lease Sale No. 53, Stipulation No. 2 to require lessees to conduct remote sensing surveys to determine the potential existence of any cultural resource that may be affected by offshore oil and gas activities. The MMS has not elected to invoke this authority for leases OCS-P 0438 and 0440, but does require notification of any discoveries made incidental to petroleum operations.

(7) REFUGES, PRESERVES, MARINE SANCTUARIES

Figure III-18 depicts the locations of refuges, preserves, marine sanctuaries and other sensitive areas in proximity to leases OCS-P 0438 and 0440.

a. Refuges: The California Department of Fish and Game has established the California Sea Otter Game Refuge along the central California coast (i.e. Monterey and San Luis Obispo Counties). The southern boundary of this Refuge, which was created to protect sea otters, extends into the northern portion of the Santa Maria Basin offshore approximately 51 km (31.5 miles) north-northeast of lease OCS-P 0438. No other refuges exist in the Santa Maria Basin offshore area.

b. Reserves (also referred to as Preserves, Ecological Reserves, or Marine Reserves): Table III-7 lists the locations of the Ecological Reserves and Preserves in proximity to leases OCS-P 0438 and 0440.

c. Marine Sanctuaries: The closest marine sanctuary to the two leases covered by this report is the Channel Islands Marine Sanctuary, the boundary of which is located 53 km (33 miles) south-southeast of lease OCS-P 0440.

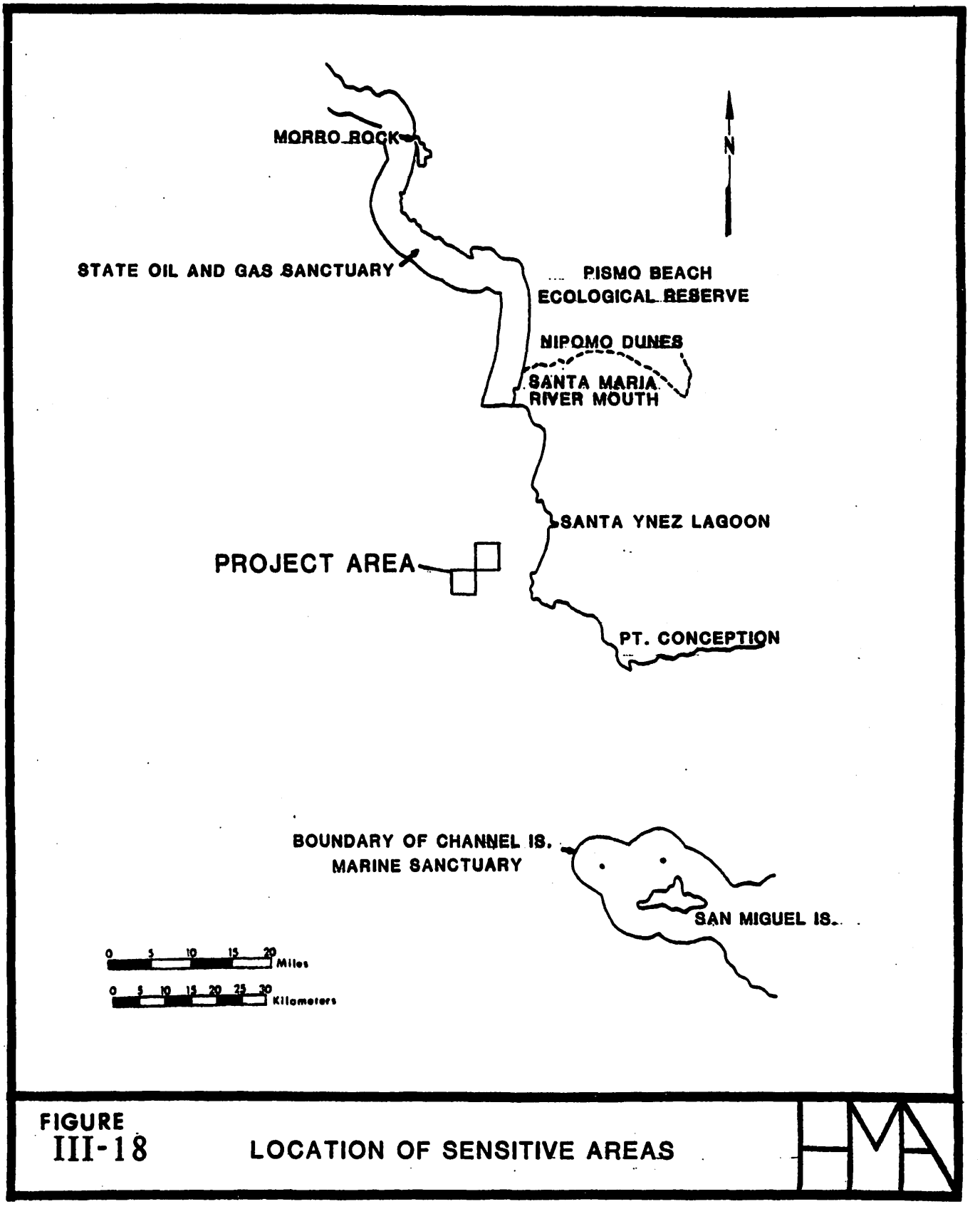


FIGURE
III-18 LOCATION OF SENSITIVE AREAS

TABLE III-7

ECOLOGICAL RESERVES AND PRESERVES
(U.S. Fish and Wildlife Service, 1981)

Name of Reserve or Preserve	Approximate Location Relative to Leases OCS-P 0438 and P 0440	Principal Species
San Miguel Island Ecological Reserve	67 km (42 miles) south-southwest of lease OCS-P 0440	Northern fur seals, California sea lions, Stellar sea lions, harbor seals, northern elephant seals, Guadalupe fur seals, and numerous nesting shorebirds and seabirds
Pismo-Oceano Beach Pismo Clam Preserve	33 km (20 miles) north-northeast of lease OCS-P 0438	Pismo clams
Pismo Lake Ecological Reserve	51 km (31.5 miles) north-northeast of lease OCS-P 0438	Herons, egrets, and rails; overwintering and migrating sandpipers, plovers, and yellowlegs; and overwintering grebes, dabbling and diving ducks
Pismo Invertebrate Reserve	34.5 km (55.5 miles) north-northeast of lease OCS-P 0440	Pismo clams
Morro Beach Pismo Clam Preserve	68 km (42 miles) north-northwest of lease OCS-P 0438	Pismo clams
Atascadero Beach Pismo Clam Preserve	79 km (49 miles) north-northwest of lease OCS-P 0438	Pismo clams
Morro Rock Ecological Reserve	48 km (50 miles) north-northwest of lease OCS-P 0438	The "endangered" American peregrine falcon nests in this area. Other nesting birds include the black oystercatcher, western gull, pelagic cormorant, and pigeon guillemot

d. Areas of Special Biological Significance (ASBS): No ASBS have been designated by the California State Water Resources Control Board in the Santa Maria Basin offshore area. San Miguel Island and waters extending 1.9 km (1 nautical mile) in all directions around the island are designated as an Area of Special Biological Significance.

e. Biologically Sensitive Areas: Point Conception, located 29 km (18 miles) southeast of lease OCS-P 0438, has been identified by the BLM as a biologically sensitive area because of its rich intertidal communities and its importance as a major marine biogeographic boundary between cold and warm temperature biotic provinces.

f. Sensitive Habitat Areas: The Nipomo Dunes and the Santa Maria River Mouth [located 32 km (20 miles) north-northeast of lease OCS-P 0438] is one of the largest areas of coastal dunes and lake habitat in California. Habitats include coastal dunes, freshwater lakes, freshwater marshes, beach riparian woodland, and small areas of tidal flat, salt marsh, and woodland. Further to the south, the Santa Ynez Lagoon [located 10 km (6 miles) east-northeast of lease OCS-P 0438] is the most important wetland for waterbirds in northern Santa Barbara County.

g. Oil and Gas Sanctuaries: The California State Legislative has designated state waters between Point Sal and Point Ano Nuevo a State Oil and Gas Sanctuary. Lease OCS-P 0438 is 24 km (15 miles) south of the southern end of this sanctuary.

(8) PIPELINES AND CABLES

There are no pipelines in the vicinity of the two leases covered by this report.

(9) OTHER MINERAL RESOURCES

There are no other known commercially extractable mineral resources in the vicinity of the two leases covered by this report.

(10) OCEAN DUMPING

There are no active dumping activities taking place in the vicinity of the two leases covered by this report.

E. FLORA AND FAUNA

(1) PELAGIC ENVIRONMENT

a. Phytoplankton: The term phytoplankton is generally used to collectively refer to the vast array of free-floating plants found suspended within a body of water. These plants are almost exclusively microscopic algae and comprise both the net plankton and the nannoplankton. Horizontal surface currents carry plankton from one region to another. Of particular importance are regions of upwelling, where vertical currents bring nutrient-rich cooler waters to the surface resulting in large standing stocks of phytoplankton.

Although representatives of the algae divisions Chlorophyta (green algae), Cyanophyta (blue-green algae), and Euglenophyta (euglenoids) may occur in the marine phytoplankton of central California, the principal components are members of the Chrysophyta (diatoms, coccolithophorinae, silico-flagellatophycidae) and Pyrrophyta (dinoflagellida). Of these latter two divisions, the diatoms and the dinoflagellates are by far the most prevalent although they may often be outnumbered by other kinds of nannoplankton (Riznyk, 1977). In the coastal waters of California, 160 diatom, 112 dinoflagellate, and 6 silicoflagellate species have been identified (BLM, 1979).

There have been very few investigations of the phytoplankton off the central California coast. In a study conducted in 1971, nannoplankton and net plankton primary productivity and standing crop (measured in chlorophyll a concentrations) were measured between latitudes 35°N (the approximate latitudinal location of the two leases covered by this report) and 50°N at 17 stations. In July and August, during coastal upwelling, phytoplankton productivity and chlorophyll a concentrations were high in inshore areas and decreased markedly with distance from land. However, the pattern observed in November, during the Davidson Current Period, was quite different. Levels of net plankton productivity and standing crop were quite low along the entire transect. Production data gathered in 1969 indicated that nearshore waters have by far the greatest production per day. Standing crop measurements in the vicinity of leases OCS-P 0438 and 0440 ranged from 20 ug/m² during October through December to 90 ug/m² during April through June (BLM, 1979).

b. Zooplankton: Zooplankton are small marine animals which are vital for the transfer of energy from the phytoplankton and other lower levels of the marine food web to the higher levels including fish, marine mammals, and birds. There are both temporary (meroplankton) and permanent (holoplankton) members of the zooplankton community. Zooplanktonic species encountered off of California are from three zooplankton distribution provinces (subartic, transitional, or central). They may also be warm water cosmopolities or endemic nearshore forms. In the California Current there are estimated to be at least 546 invertebrate zooplankton species and about 1,000 vertebrate species of fish larvae (icthyoplankton) (BLM, 1979).

Information derived from studies conducted by the California Cooperative Fisheries Investigations (CalCOFI) indicates that the dominant offshore [20 miles (32 km) offshore] species of zooplankton include:

Sagitta scrippsae (chaetognath)
Calanus tenuicornis (calanoid copecod)

Ctenocalanus vanus (calanopoid copecod)
Oithona similis (cyclopoid copecod)
Abraliopsis felis (squid)
Atlanta peroni (heteropod)
Salpa fusiformis (thaliacean)
Thalia democratica (thaliacean)

Other sources add the following to the above list:

Aurelia aurita (scyphozoan)
Tomopterus septentrionalis (polychaete)
Naides cantrainii (polychaete)
Parathemisto pacifica (hyperid amphipod)
Streetsia challengeri (hyperid amphipod)
Euphausia pacifica (euphausiid)
starfish larvae (branchiolaria)
Syncoryne eximia (hydromedusae)
Phialidium gregarium (hydromedusae)
most crab larvae, like Pugettia producta (zoeal)

Fish larvae extruded from demersal eggs are common fauna of nearshore waters. The most abundant are:

Osmeridae (smelt)
Parophrys vetulus (English sole)
Isopsetta isolepis (butter sole)
Microgadus proximus (Pacific tomcod)

Other commercially important larval species found in nearshore waters include:

Cancer magister (Dungeness crab)
Pandalus jordani (pink shrimp)

These are most abundant within 24 km (15 miles) of shore. Crangon larvae are abundant in trawl collections within 5 km (3 miles) of shore. Also abundant in nearshore (1.6-4.9 miles) waters are:

Acartia clausi (copecod)
Pseudocalanus sp. (copecod)
Euphausia pacifica larvae and juveniles
Thysanoessa spinifera (euphausiid)
most mysid shrimp
Pleurobrachia bachei (ctenophore)
Hyperia medusarum (hyperid amphipod)
Parathemisto pacifica (hyperid amphipod)

Sagitta elegans (chaetognath)
S. euneritica (chaetognath)

Depth distribution in waters off California have been classified as epipelagic [0 to 150 m (0 to 492 feet)], mesopelagic [150 to 500 or 600 m (492-1,640 or 1,967 feet)], and bathypelagic [500 or 600 to 1,000 m (1,640 or 1,967-5,280 feet)]. Vertical migration up to 1,000 m (3,280 feet) in a 24-hour period is a phenomenon which occurs in many zooplankton in addition to juvenile shrimp. It has been noted for euphausiids such as Euphausia pacifica, the anthomedusae Leuckaritiara octona, the siphonophore Roseacea plicata, the ostracods Halocypria brevirostris and H. globosa, the heteropod Carinaria japonica and the thaliacean Salpa fusiformis. A large number of copecod species migrate including those from the genera Euchirella, Haloptilus, Lophothrix, Pleuromamma, and Calanus. Other copecods and species of protozoans, chaetognaths, pelagic polychaetes, cladocerans, pteropods, and larvaceans also complete vertical migrations (Holton et al., 1977).

Current zooplankton volumes for ocean waters between Point Arguello and Point Buchon can be inferred from CalCOFI data collected in 1958 and 1959. In the CalCOFI data, twelve larval types (species or genus) comprised 90-93 percent of all larvae collected. The northern anchovy (Engraulis mordax) and Pacific hake (Merluccius productus) represented 40-60 percent of the catch. Larvae of deep sea pelagic fish composed 20-40 percent of all larvae taken. Of the deep sea pelagic fishes, three families represented 90 percent of the deep sea fishes and were the most important species in offshore oceanic waters. These were the larvae of the myctophid laternfishes, the gonostomatid lightfishes, and the deep sea smelts (Bathylagidae) (Holton et al., 1977).

(2) BENTHIC ENVIRONMENT

a. Fauna: Central California marks a region of transition between species of southern and northern affinities. In the Point

Conception area (33-34°N), some intertidal and nearshore marine species meet the northern and southern limits of their ranges. This faunal "breakpoint" is recognized for a number of nearshore marine taxa and corresponds most closely to differences in water temperature that occur above and below this latitude (Horn and Allen, 1976). Although there is little information on species inhabiting the continental shelf in this region, the constancy of temperature at deeper depths suggests that geophysical gradients in species composition will be much reduced from those of nearshore taxa.

Benthic Communities in the Vicinity of Leases OCS-P 0438 and 0440

Several recent surveys have provided information about faunal assemblages in the offshore area between Point Conception and Point San Luis. No biological surveys have been conducted on leases OCS-P 0438 and 0440.

In 1981, Chambers Consultants and Planners performed a diving reconnaissance survey of the area between Point Conception and Point Arguello (State Lands Commission, 1982). The 18 survey sites were 8 to 29 km (5 to 18 miles) southeast of lease OCS-P 0438; water depths at the 18 locations ranged from the intertidal area to 37 m (120 feet). The areas surveyed included five main habitat types: shallow inshore rocks; lush algae-dominated offshore reefs; deeper rocky areas; shallow sand; and deeper sand.

In general, most of the sites surveyed were similar for a given depth throughout the study area. Dominant species appear to be common throughout the area between Point Arguello and Point Conception. The most abundant and widespread kelps observed were the giant kelp, Macrocystis pyrifera and the palm kelp, Pterygophora californica. The kelp beds were thickest in the region around Esplada Bluff and Jalama. Further upcoast toward Point Arguello the kelp was patchy on offshore reefs. The most common red algae ob-

served throughout the region were Botryoglossum farlowianum, Cryptopleura violacea, Stenogramme interrupta, and Neoagardhiella baileyi (State Lands Commission, 1982).

Most of the abundant infaunal species in the core samples taken during the survey were species which are common on offshore sand bottoms throughout southern California. These common species include the crustaceans Anchicolurus occidentalis, Cyclaspis sp., Mandibulophoxus gilesi, Eohaustorius spp., and Rhepoxynius epistomus, and the polychaetes Magelona sacculata, Prionospio pygmaea, Chaetozone setosa, and Paraonella platybranchia. Some new species, which have not yet been described, were found in the core samples taken during the survey. These included an amphipod of the genus, Eohaustorius, and polychaetes of the genus Streptosyllis and the genus Scolelepis (State Lands Commission, 1982).

The most conspicuous widespread invertebrates on the reefs were the same as the most common species found in rocky areas throughout southern California. They included the sea stars, Patiria miniata and Pisaster giganteus; the jewel anemone, Corynactis californica; the red sea urchin, Strongylocentrotus franciscanus; the cancer crab, Cancer antennarius; and the tunicate Styela montereyensis (State Lands Commission, 1982).

The most common fishes observed during the survey were the striped seaperch, Embiotoca lateralis, the convict fish Oxylebius pictus, and the pile perch, Rhacochilus vacca. The only one of these species which is not generally abundant on southern California reefs is the striped seaperch. In southern California rocky areas the striped seaperch's congener the black perch, Embiotica jacksoni, is generally more abundant (State Lands Commission, 1982).

Information on the faunal assemblages present on or near hard substrate features was collected during a biological survey conducted by ARCO in late 1981 (ARCO Biological Survey, 1981). Water depths in the study area [leases OCS-P 0425 and OCS-P 0430 lo-

cated about 6.75 and 4.5 km (11 and 7 miles) northwest, respectively of lease OCS-P 0438] ranged from approximately 98 to 137 meters (320 to 450 feet).

Through analysis of videotapes and stereophotographs, the bottom terrain and the epibenthic invertebrates and fish inhabiting the bottom were characterized. Benthic sediment samples provided information about the presence of animals inhabiting the sediments.

Four general types of terrain were encountered: flat plains of clay and sand; flat plains with rocky patches interspersed; gradual rocky slopes; and steeper rocky slopes. Two distinct types of biological communities were encountered, one associated with the flat sandy plains and one with the rocky areas. Animals of both of these communities were observed in the area of flat plains with interspersed patches of rocky outcrops.

Major invertebrate organisms and fish observed in the flat plains of clay and sand were:

Invertebrates

Sea pen (?Stachyptilum sp. and ?Ptilosarcus gurneyi)
Sea star (Mediaster ?aequalis and Luidia foliolata)
Sea cucumber (Parastichopus californicus)

Fish

Sanddab (Citharichthys sp.)
Tapertail ribbonfish (Trachipterus fukuzakii)

Major invertebrate organisms and fish observed in the rocky areas, where the dominant organisms were extremely abundant, included:

Invertebrates

Brittle star (Ophiuroidea)
Tunicate (Halocynthia hilgendorfi igaboja)
Crinoida (Florometra serratissima)
Assorted encrusting sponges (?Leucetta losangelensis, Suberites sp. and Hemectyon hyle)
Brachiopod (Glottidia albida)
Cup coral (Caryophyllis arnoldi and Astrangia sp.)

Sea star (Mediaster ?aequalis and Pycnopodia helianthoides
Sea anemone (Tealia spp.)
Sea urchin (Allocentrotus fragilis)
Basket star (Gorgonocephalus caryi)
Large sponge (Staurocalyptus downlingii and an unidentified species)
Gastropod (Nassarius insculptus, Neptunea tabulata, and Fusinus sp.)
Sheep crab (Loxorhynchus crispatus)
Spider crab (Paralithodes rathbuni)
Cerianthid (Cerianthus spp.)

Fish

Rosethorn rockfish (Sebastes helvomaculatus)
Chilipepper rockfish (Sebastes goodei)
Silvergray rockfish (Sebastes brevispinis)
Flag rockfish (Sebastes rubrivinctus)
Greenstriped rockfish (Sebastes elongatus)
Lingcod (Ophiodon elongatus)
California rattail (Nezumia stelgidolepis)
Sculpin (Scorpaenidea)

The occasional solitary boulders encountered in the flat plains areas were inhabited by:

Crinoid (Florometra serratissima)
Assorted sponge (Staurocalyptus dowlingii, Poecillastra compressa, Suberites sp., Tethys sp.)
Brittlestar (Ophiuroidea)
Basket star (Gorgonocephalus)
Box crab (Lopholithoides foraminatus)

In addition, 72 species representing 14 taxa were identified from benthic sediment samples and 1,113 individuals representing 22 species were identified from rock samples collected. The most abundant invertebrates collected in both the benthic samples and on the rock samples were Polychaeta (annelid worms) and amphipoda (amphipods). Lists of all taxa collected by sampling appear in Tables 4 and 5 of the ARCO Biological Survey.

Exxon also conducted a biological survey in the Santa Maria Basin offshore OCS area in 1981. Video-tapes, color stills, and movie clips were taken of the megafaunal species on lease OCS-P 0411 which is about 31 km (19.5 miles) northwest of leases OCS-P

0438 and 0440. The results of this survey are presented in a report entitled "Biological Survey of Megafaunal Species on or in the Vicinity of Leases OCS-P 0404, 0405, 0410, and 0411 in the Santa Maria Basin Offshore Lease Sale Area, January 6, 1982" which is available for review in the MMS library in Los Angeles.

Information on the shallow water benthic invertebrate species (< 100 meters) in the Diablo Canyon area immediately north of Point San Luis (approximately 51.5 km (32 miles) north of lease OCS-P 0438) was provided by a study conducted in 1977. The species identified in this survey are listed in Table III-8.

Nearshore Communities in the Vicinity of Leases OCS-P 0438 and 0440:

Approximately 60 percent of the coastline between Point Arguello and Point Buchon is composed of sandy beaches; the remainder is composed of rocky shorelines. Sandy beaches are unstable, with patchy and highly variable invertebrate populations. Most of the species are members of the infauna.

Little information on invertebrate species found in the sandy intertidal zone is available for the coast between Point Arguello and Point Buchon. However, information is available for species found in the sandy intertidal zone in Estero Bay (see Table III-9) which is immediately north of Point Buchon (Hancock, 1977). The pismo clam (Tivela stultorum), which is found in abundance in the sandy coastal area between the city of Pismo Beach and the San Luis Obispo/Santa Barbara Countyline, is an important member of the sandy intertidal habitat in the area south of Point Buchon (BLM, 1980).

b. Flora: The cool waters along the California coast north of Point Conception favor a rich growth of marine algae with some of the most abundant stands of seaweeds in the world. The coastal area between Point Arguello and Point Buchon is part of the Temperate Zone for algae flora. This zone extends from Point Con-

TABLE III-8

INVERTEBRATES OBSERVED IN THE DIABLO CANYON AREA DURING 1970 AND 1971
(Hancock, 1977)

Scientific Name	Common Name
COELENTERATA	
Allopora porphyra	staghorn coral
**Anthopleura xanthogrammica*	solitary anemone
**Balanophyllia elegans*	solitary coral
**Corynactis californica*	aggregate anemone
Metridium senile	white anemone
Tealia lofotensis	anemone
Tealia sp.	anemone
ARTHROPODA	
**Balanus sp.*	barnacle
**Callianassa affinis*	ghost shrimp
**Cancer antennarius*	rock crab
Cryptolithodes stichensis	umbrella-backed crab
Hapalogaster cavicauda	crab
**Loxorhynchus crispatus*	masking crab
**Pagurus samuelis*	hermit crab
**Pugettia producta*	kelp crab
MOLLUSCA	
**Acmaea mitra*	white cap limpet
**Astraea gibberosa*	red turban
Calliostoma annulatum	purple ring top shell
C. canaliculatum	channeled top shell
C. gloriosum	glorious top shell
**C. ligatum*	top shell
**Cornus californicus*	California cone
**Crepidula adunca*	hooked slipper shell
Cryptochiton stelleri	gumboot chiton
**Diodora aspera*	rough keyhole limpet
**Haliotis cracherodii*	black abalone
Haliotis kamtschatkana	pinto abalone
**Haliotis rufescens*	red abalone
Haliotis walallensis	flat abalone
**Hinnites multirugosus*	rock scallop
Homolopoma luridum	turban shell
Lithopaga plumula	date mussel
Mitra idae	Ida's miter
Olivella biplicata	purple olive snail
Penitella penita	flat-tipped piddock
**Pododesmus cepio*	abalone jingle
Pteropurpura trialata	three-winged murex

TABLE III-8 (cont.)

Scientific Name	Common Name
MOLLUSCA (cont.)	
*Tegula brunnea	brown turban
*T. funebralis	black turban
T. montereyi	turban snail
T. pulligo	turban snail
Trivia californiana	California trivia
ECHINODERMATA	
Dendraster excentricus	sand dollar
Henricia leviuscula	sea star
Orthasterias koekleri	sea star
*Patiria miniata	bat star
Pisaster brevispinus	sea star
P. giganteus	sea star
*P. ochraceus	orcher seastar
*Pycnopodia helianthoides	sunflower star
Stichopus californicus	sea cucumber
*Strongylocentrotus franciscanus	red urchin
*S. purpuratus	purple urchin
UROCHORDATA	
*Styela montereyensis	tunicate

* also found in intertidal area

TABLE III-9

INVERTEBRATE BENTHIC SPECIES FOUND IN THE SANDY INTERTIDAL ZONE IN ESTERO BAY (Hancock, 1977)

Scientific Name	Common Name
ANNELIDA	
Polychaeta	
Eteone californica	polychaete worm
Eteone dilatae	polychaete worm
Euzonus dillonensis	blood worm
Euzonus mucronata	blood worm
Glycera capitata	polychaete worm
Glycera convoluta	polychaete worm
Haloscoloplos elongatus	polychaete worm
Hemipodus borealis	polychaete worm
Hemipodus californiensis	polychaete worm
Lumbrineris zonata	polychaete worm
Lumbrineris erecta	polychaete worm
Lumbrineris spp.	polychaete worm
Magelona pitelkai	polychaete worm
Nephtys californiensis	polychaete worm
Nephtys ferruginea	polychaete worm
Nerinides acuta	polychaete worm
Nerinides sp.	polychaete worm
Orbinia johnsoni	polychaete worm
Pygospio californica	polychaete worm
Phyllodocidae	polychaete worm
Spio filicornis	polychaete worm
Oligochaeta	oligochaete worm
NEMERTEA	
Nemertea sp. A	ribbon worm
Nemertea sp. B	
MOLLUSCA	
Tivela stultorum	Pismo clam
Solen sicarius	razor clam
Siliqua patula	razor clam
Saxidomus nuttalli	Washington clam
Olivella biplicata	olive snail
Olivella baetica	olive snail

TABLE III-9 (cont.)

Scientific Name	Common Name
ARTHROPODA	
Insecta	
Staphylinid Larvae (several sp.)	
Coleoptera	
Staphylinidae	
Curculionidae	
Chrysomelidae	
Hymenoptera	
Diptera	
Hemiptera	
Crustacea	
Orchestoidea californiana	beach hopper
Orchestoidea minor	beach hopper
Orchestoidea benedicti	beach hopper
Orchestoidea corniculata	beach hopper
Euhaustorius washingtonianus	amphipod
Exocirolana chiltoni	isopod
Emerita analoga	sand crab
Synchelidium sp.	
Archaeomysis grehnitzkii	mysid
Blepharipoda occidentalis	spiny sand crab
Cancer magister	market crab
Crago nigricanda	shrimp
Crangon stylirostris	shrimp

ception to the Strait of Juan de Fuca. Macroalgae found in this zone provide food for herbivores and play an important part in the overall ecology of the nearshore region (Hardy, 1977).

Two types of marine algae found along the central California coast are both biologically and commercially significant. These are the kelps Macrocystis and Nereocystis which frequently occur in almost pure stands in rough, rocky bottom areas. The giant kelp or Macrocystis is a perennial and the individual plants of the forests tend to remain for periods of over a year. The bull kelp or Nereocystis is an annual, and the forest formed by this species is almost completely replaced every year.

The inner limit of the kelp beds is reportedly controlled by wave action. For example, in calm protected areas, Macrocystis beds occur in water as shallow as 2 or 3 m (7 or 10 feet), or even appear intertidally. Along open coasts, the inner limit usually is at depths of 5 to 10 m (16 to 33 feet). The role of competitors in limiting the inner distribution of kelp beds is also a factor.

The outer limit of the kelp beds is probably determined by light intensity at the bottom. In turbid waters, beds are limited to depths of 15 to 20 m (49 to 66 feet), while in clear waters they often occur at depths of 25 to 30 m (82 to 98 feet). Due to the general steepness of the shoreline along the central California coastline, kelp beds tend to form narrow bands paralleling the shoreline.

Although the Macrocystis beds look very much alike at the surface, there are usually striking differences on the seafloor. The composition of associated algae species varies with location in accord with environmental factors including substrate, exposure, upwelling, temperature, and depth. Where the surface canopy is not extremely thick or where there are open patches within the bed, there occurs a multilayered vegetative cover which is very broadly similar to a multilayered tropical forest. Below the thin surface

canopy there is an intermediate layer consisting of species that are stalked or tree-like, having heavy, erect stripes which hold the fronds off the bottom. The third or bottom layer consists of short forms of brown, green and red algae in varying degrees of profusion and array of forms.

The "hard" substrate augmented by kelp plants greatly increases the habitat available to filter feeding animals (invertebrates). The Macrocystis assemblage is unusual in having large surface areas throughout the water column for the attachment of sessile invertebrates. Because the lifespan of a kelp blade is only two to four months, the sessile fauna colonizing these surfaces are also short lived.

The closest kelp beds to leases OCS-P 0438 and 0440 are between Point Arguello and Point Conception, with the heaviest concentrations around Jalama. The dominant types of kelp in this area are the giant kelp Macrocystis pyrifera and the palm kelp Pterygophora californica.

(3) BREEDING HABITATS AND MIGRATION ROUTES

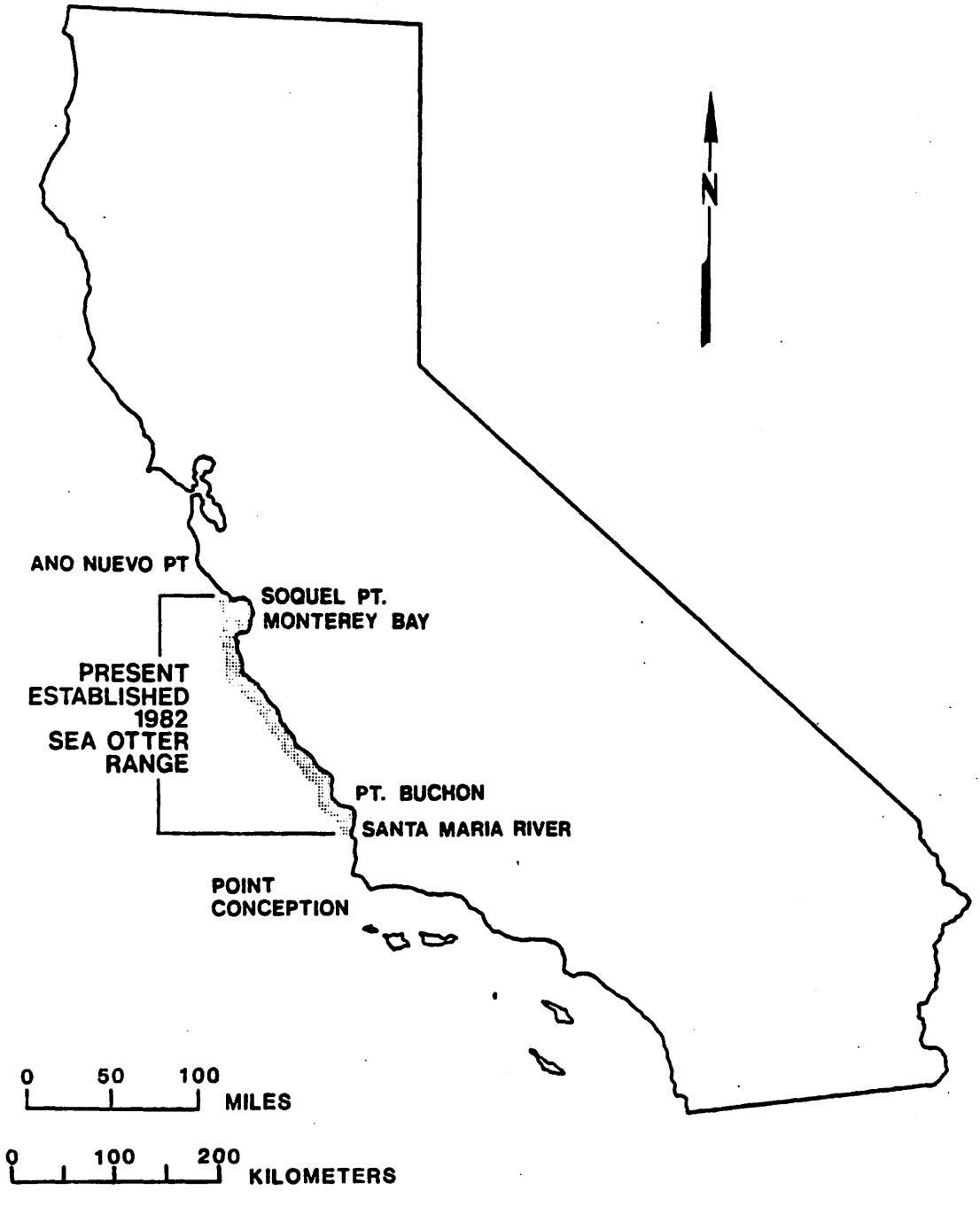
There is a great diversity of marine mammals existing off central and northern California. Representatives of the fissiped carnivores (sea otters), pinniped carnivores (seals and sea lions), and cetaceans (toothed porpoises and whales, and baleen whales) exist in appreciable numbers in the rich oceanic waters off California. The three main marine mammal groups--otters, pinnipeds and cetaceans--are distributed off California largely according to where their preferred food is found, and in some instances seasonally, strongly related to breeding area predelection (Morejohn, 1977) or the presence of kelp (WOGA, 1983).

a. Otters: Current information on the sea otter is available from the U.S. Fish and Wildlife Service which is in the process of developing a "Southern Sea Otter Recovery Plan" and reassessing

its "threatened" status. The information presented below is largely taken from a draft of the recovery plan prepared by Carl T. Benz and Gail C. Kobetich, employees of the U.S. Fish and Wildlife Service.

Sea otter (Enhydra lutris) numbers and range have generally increased in California since the rediscovery of 50 animals near Point Sur in 1938. In 1976, the sea otter population count showed 1,561 individuals (including dependent pups). Rafts were seen between Pecho Rock [located approxiately 55 km (34 miles) north-northwest of lease OCS-P 0438] northward to near Santa Cruz, a distance of about 307 km (191 miles). By 1982, the range had extended to the Santa Maria River mouth on the south and Soquel Point on the north (see Figure III-19). The November 1982 census was 1,094 adults with 144 obviously dependent pups (WOGA, 1983). Both the range and population now appear to have stabilized. Small rafts are occasionally seen as far north as Ano Nuevo Point and as far south as Point Sal. Wanderers from this population have been recorded as far north as Cape Mendocino, and south of Point Conception (UCSC, 1982).

The sea otter exhibits a dumbbell-shaped distribution pattern along the California coast. Generally, they are found within a half mile of the shore and average about one otter per ten miles of coastline. The largest concentrations are located at the peripheries of the range and number up to twenty per mile. At the peripheries (fronts), large rafts of animals, mostly adult and subadult males (Peterson and Odemar, 1969; Vandevere, 1970; Wild and Ames, 1974), forage along the coast. Figure III-20 is a map depicting the area where foraging occurs along the southern front of the range. Numbers vary seasonally, increasing in the winter and early spring to about 170 individuals (mostly bachelor mates) at the southern end of the range. The center of the range supports a less dense population where females and pups predominate (Benech, 1982).



(TETRA TECH, 1983)

FIGURE III-19

PRESENT ESTABLISHED RANGE OF THE SEA OTTER IN CALIFORNIA

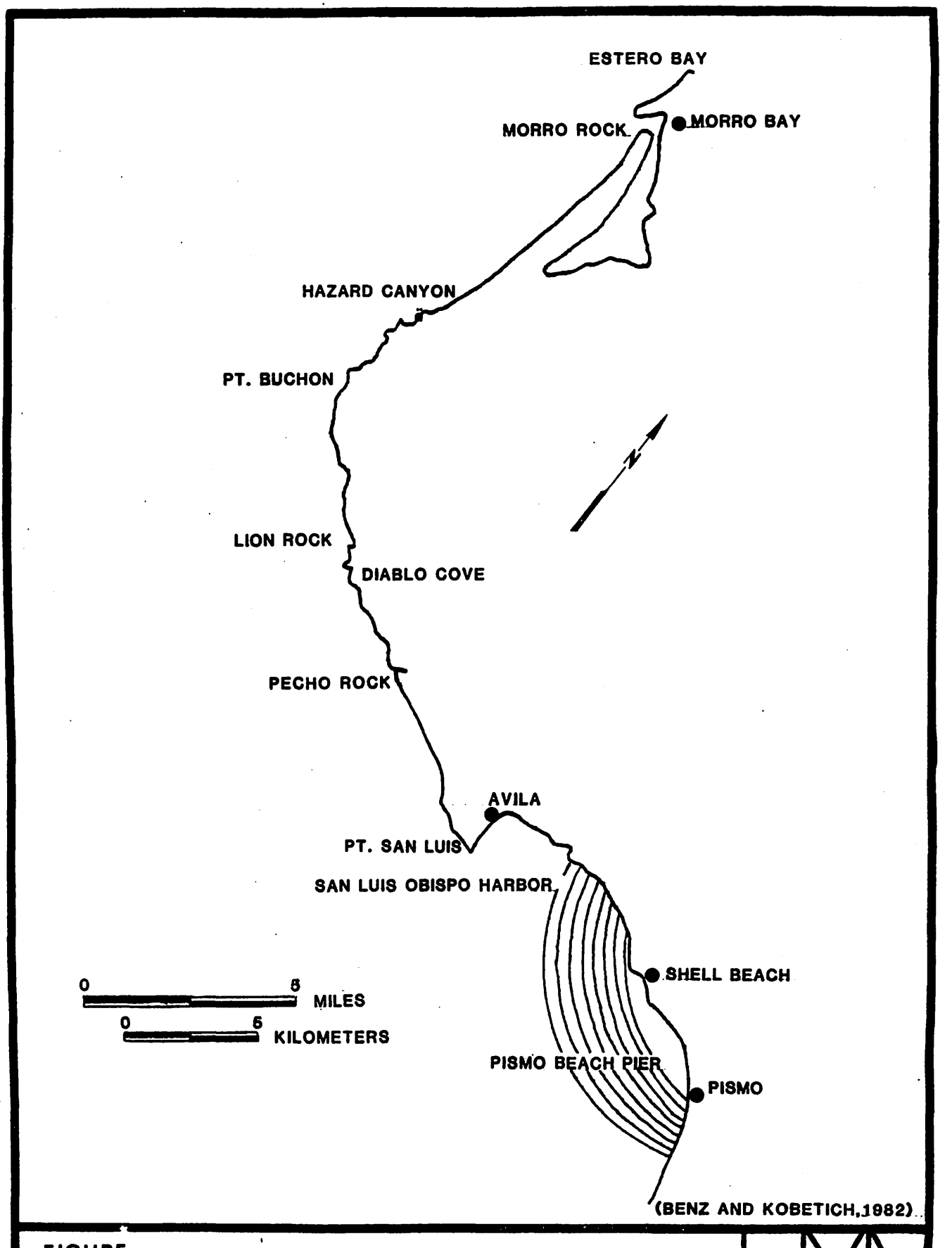


FIGURE III-20

LOCATION OF FORAGING AREA FOR SOUTHERN FRONT GROUP

Sea otters consume a broad array of prey items with a preference for abalone, lobster, sea urchin and crab. They forage in both rocky and soft-sediment communities, on or near the bottom, as well as in the kelp understory and canopy. Foraging occurs in both the intertidal and subtidal zones, but seldom below a depth of 20 meters (66 feet) (Kenyon, 1969). In rocky habitats, availability of food items diminishes at greater depths and is probably a major factor in foraging depth. Foraging activity occurs both day and night.

Food studies (Fisher, 1939; Limbaugh, 1961; Hall and Schaller, 1964; Ebert, 1968; Vandevere, 1969; Wild and Ames, 1974) have shown that the diet of the sea otter varies according to location and length of time an area is occupied by sea otters. Sea urchins (Strongylocentrotus spp.), abalone (Haliotis spp.), rock crab (Cancer spp.), clams (several species), and lobster appear to be preferentially preyed upon whenever they are available and whenever sea otters occupy new habitats.

Breeding and pupping occur throughout the year; however, the predominant time for birth in California is from January to March. Gestation in wild populations is estimated to last seven and one-half to nine months (Lensink, 1962; Schneider, 1972). Information is accumulating that indicates that females may give birth to one pup each year (Jamison and Johnson, 1979; and Vandevere, 1978 and 1979). No birth in the wild has been witnessed, though it is presumed that pupping usually occurs in water.

b. Pinnipeds: Five species of pinnipeds are commonly found on or offshore of the central California coast. They are:

California sea lion (Zalophus californianus)
Harbor seal (Phoca vitulina)
Steller sea lion (Eumetopias jubatas)
Northern fur seal (Callorhinus ursinas)
Elephant seal (Mirounga augustirostris)

Also, a sixth species, the Guadalupe fur seal (Arctocephalus philippii), has been sighted near San Miguel Island. Table III-10 provides information on the six species listed above.

c. Cetaceans: More than 22 species of cetaceans are found off the central California coast. Seven of these species are classified as "endangered" species by the federal government. The non-endangered cetaceans which are most likely to occur in the waters of central California are:

Minke whale (Balaenoptera acutorostrata)
Risso's dolphin (Grampus griseus)
Baird's-beaked whale (Berardius bairdii)
Killer whale (Orcinus orca)
Pacific white-sided dolphin (Lagenorhynchus obliquidens)
Common dolphin (Delphinus delphis)
Harbor porpoise (Phocoena phocoena)
Dall's porpoise (Phocoenoides dallii)
Northern right-whale dolphin (Lissodelphis borealis)

Information on the range, breeding range and season, migration pattern, and estimated population for each of these species is presented in Table III-11. The seven "endangered" cetaceans likely to occur in central California coastal waters are:

Gray whale (Eschrichtius robustus)
Sperm whale (Physeter catodon)
Blue whale (Balaenoptera musculus)
Sei whale (B. borealis)
Humpback whale (Megaptera novaeangliae)
Northern right whale (Eubalena glacialis)
Fin whale (Balaenoptera physalus)

See item 5 below ("Endangered" or "Threatened" Species) for a discussion of these species.

d. Birds: The Santa Maria Basin offshore area is located along the Pacific Flyway. As a result, the population of marine birds in this area tends to fluctuate seasonally, with peaks occurring during the fall and winter. Few species remain in the area throughout the year. Instead, most are nonbreeding transients. Table III-12 identifies the areas of major bird concentrations in

TABLE III-10

INFORMATION ON PINNIPEDS COMMONLY FOUND OFFSHORE THE CENTRAL CALIFORNIA COAST
(U.S. Fish and Wildlife Service, 1981; Morejohn, 1977; BLM, 1980; BLM, 1981; NOAA, 1980)

Species	Location Relative to Leases	Activity	Description
Northern fur seal (*Callorhinus ursinus*)	San Miguel Island 69 km (43 miles) south-southeast of lease OCS-P 0440	nursery and adults	Population (totalling 4,000) on San Miguel Island is only one outside Alaska; population is increasing in size Breeding Season: Mid-June to mid-July Migration: South in winter
California sea lion (*Zalophus californianus*)	San Miguel Island	nursery and adults	Summer breeding population (totalling 50,000) in Southern California Bight represents over 40% of world total
	Point Sal State Beach 24 km (15 miles) north-northeast of lease OCS-P 0438	adults	Breeding Season: May through August Migration: North in late July and early August; remain over Continental Shelf
Stellar sea lion (*Eumetopias jubatus*)	San Miguel Island	nursery and adults	Population in Southern California Bight in 1976 estimated to be 5 to 20 and decreasing Breeding season: late May to early July Migration: unknown

TABLE III-10 (cont.)

Species	Location Relative to Leases	Activity	Description
Harbor seal (*Phoca vitulina*)	Rocky Point, 12 km (7.5 miles) southeast of both leases	adults	Approximately 3,000 animals in Southern California
	Point Perdenales, 4 km (2.5 miles) southeast of lease OCS-P 0438	adults	Breeding season: January to May Migration: No published evidence of a seasonal north-south migration
	Point Sal State Beach	adults	
	Shell Beach 48 km (30 miles) north of lease OCS-P 0438	nursery and adults	
	Mallagh Landing 53 km (33 miles) north of lease OCS-P 0438	nursery and adults	
	Cayucas Point 87 km north-northwest of lease OCS-P 0438	nursery and adults	
Northern elephant seal (*Mirounga augustirostris*)	San Miguel Island; Inhabits all of California shores of Channel Islands	nursery and adults	Total number of animals in Southern California Bight is estimated at 28,000 (44% of world total) Breeding season: December to March Migration: No evidence of seasonal north-south migratory behavior

TABLE III-10 (cont.)

Species	Location Relative to Leases	Activity	Description
Guadalupe fur seal (Arctocephalus philippii)	San Miguel Island	adults	World population of 2,000 animals is all associated with Isla de Guadalupe, Mexico. A rare visitor to San Miguel Island Breeding season: summer months Migration: unknown Endangered Species

TABLE III-11

INFORMATION ON NON-"ENDANGERED" CETACEANS MOST LIKELY TO OCCUR IN THE WATERS OFF CENTRAL CALIFORNIA (Morejohn, 1977; BLM, 1980; and BLM, 1981)

SPECIES	DESCRIPTION
Minke Whale (Balaenoptera acutorostrata)	. Range: Chukchi Sea, Alaska to south of Baja California . Breeding Range: Throughout range . Breeding Season: Throughout the year (two calving peaks: December and June) . Migration: South during the winter . Estimated Population: In 1972, 10,000 in north Pacific
Risso's Dolphin (Grampus griseus)	. Range: Worldwide (infrequently observed off California) . Breeding Range: Unknown . Breeding Season: All year, particularly December and January . Migration: Unknown . Estimated Population: Unknown
Baird's Beaked Whale (Barardius bairdii)	. Range: Bering Sea, Alaska to southern California . Breeding Range: Unknown . Breeding Season: Unknown . Migration: Unknown . Estimated Population: Unknown

TABLE III-11 (cont.)

SPECIES	DESCRIPTION
Killer Whale (*Orcinus orca*)	. Range: Worldwide . Breeding Range: Probably throughout range . Breeding Season: Probably year round, with a peak period from May to July . Migration: Unknown . Estimated Population: Unknown, may be large
Pacific White-sided Dolphin (*Lagenorhynchus obliquidens*)	. Range: Unknown (occurs throughout central and northern California) . Breeding Range: Unknown . Breeding Season: Late spring through autumn . Migration: Unknown . Estimated Population: Unknown
Common Dolphin (*Delphinus delphis*)	. Range: Distinct population off central California between Channel Islands and Santa Cruz, California . Breeding Range: Occurs in warmer, southern waters . Breeding Season: Peaks in spring and fall . Migration: Inshore and offshore, southward and northward with changes in water temperature . Estimated Population: 10,000 to 15,000

TABLE III-11 (cont.)

SPECIES	DESCRIPTION
Harbor Porpoise (Phocoena phocoena)	. Range: Point Barrow, Alaska to San Pedro, California . Breeding Range: Unknown (presumably in inshore areas . Breeding Season: Unknown . Migration: Unknown . Estimated Population: Unknown
Dall's Porpoise (Phocoenoides dallii)	. Range: Northern Bering Sea to northern Baja California . Breeding Range: Throughout the range . Breeding Season: Unknown . Migration: During winter, moves inshore . Estimated Population: 30,000 to 50,000 in western north Pacific population
Northern Right-Whale Dolphin (Lissodelphis borealis)	. Range: British Columbia, Canada to San Clemente Island, California . Breeding Range: Unknown (assumed to breed in waters off central California . Breeding Season: Unknown . Migration: Unknown . Estimated Population: Over 10,000

Highway 101 is also the main highway access route to Santa Barbara Airport, Ellwood Pier, Port San Luis and Oceano Airport. Personnel using Port San Luis would be bused to the Port area from a parking lot near Highway 101 to avoid congestion in the Port's parking lot.

(6) SUPPLY OF COASTAL RESOURCES

Aside from food and domestic goods for 50 to 60 persons per day, the approximate levels of the following goods and services that will be required for each proposed well are summarized below:

WELL DEPTH (feet)	CEMENT (sacks)	BENTONITE (sacks)	BARITE (sacks)	DRILL BITS	TUBULARS (feet)
8,000	2,500	4,000	8,000	15	7,000

Helicopter support service activities will utilize existing facilities at the Santa Barbara Airport and/or Oceano.

The existing facilities described above are adequate to accommodate the activities described in Section II of this report.

(4) PUBLIC OPINION

Some anti-drilling sentiment has been expressed (see comments on EIS for Lease Sale No. 53); however, because of the limited number of vessels associated with Exxon's proposed exploratory operations, the short duration of exploratory drilling activities, and the minimal environmental and socioeconomic impacts associated with these activities, it is anticipated that exploratory drilling activities proposed on leases OCS-P 0438 and 0440 will not encounter significant unfavorable public opinion.

(5) EXISTING TRANSPORTATION SYSTEMS AND FACILITIES

The principal highway access route to the Port Hueneme Harbor is U.S. Highway 101, which is a four lane, divided, limited access freeway. This highway serves as a major transportation link between Oxnard and Los Angeles. Another highway, State Highway 1, serves as a minor link between Oxnard and coastal areas to the south.

The four main approaches to Port Hueneme Harbor are: Route 1/Hueneme Road; Pleasant Valley Road/Saviers Road; Oxnard Boulevard/Saviers Road; and Ventura Road/Hueneme Road. Three of these roads--Pleasant Valley, Ventura, and Hueneme--are designated truck routes. The additional truck traffic associated with the proposed activities will have a negligible impact of the area.

The total vessel movement activities in and out of Port Hueneme Harbor is approximately 940 movements per month, or 30 movements per day. This consists of approximately 24 deep draft vessel movements per month; 450 vessel movements for offshore oil-related purposes; 450 commercial and sportfishing boat movements; and 16 Navy-related movements.

Ellwood Pier is located in tide and submerged land of the State of California in the Santa Barbara Channel area adjacent to Rancho Dos Pueblos in the vicinity of Ellwood, Santa Barbara County. The pier is approximately 1,450 feet in length. Crewboat tie up at the pier for the transfer of personnel. There are no berthing facilities at the pier. When not in use, the crewboats lay off the pier and tie up to mooring buoys. Access to the pier is gained from Highway 101 by a private road.

Port San Luis consists of a breakwater extending about 2,400 feet southward from the shoreline. Three wharfs are located within the sheltered area. The first is a private wharf used by commercial and sport fishermen. This wharf has about 300 moorings for boats (no berths or slips). About 60 percent of the moorings are used by commercial fishermen. All of the moorings are privately owned, not rented. In addition, there are 50 to 60 skiff moorings for boats, and competition for these spaces is intense. Both on-loading and off-loading activities take place at this wharf. The second wharf is also private and services deep-draft petroleum vessels. The third wharf is public and supports sportfishing facilities, a restaurant, a fish market, a diesel fuel facility, and a boat launch facility. The harbor is not an all-weather harbor and vessels mooring in the breakwater are exposed to winds and waves approaching from the south and southwest. The harbor is used by numerous commercial fishing boats and recreational small craft, and between three and six oil tankers per month.

In 1981, the population of the cities in the immediate vicinity of the facilities identified above were (Secretary of State, 1981):

FACILITY	CITY	POPULATION
Port Hueneme	Ventura	70,000
	Oxnard	102,000
	Port Hueneme	18,500
Santa Barbara Airport	Goleta	69,000
Ellwood Pier	Goleta	69,000
Port San Luis	San Luis Obispo	34,550
Oceano Airport	Oceano	4,200

(3) EXISTING COMMUNITY SERVICES

The Port Hueneme Harbor is used jointly by the U.S. Navy Construction Battalion Center and the Oxnard Harbor District. About 70 percent of the berthing space within the port is operated by the U.S. Navy. The Oxnard Harbor District currently owns and operates 59 acres of waterfront and terminal facilities. In addition, port tenants lease over 30 acres of land from the U.S. Navy. Berthing facilities include an 1,800 foot-long commercial deep water berth as well as slips for smaller commercial and sportfishing craft.

The harbor is manmade. Its nine acres of waterway are connected to the open sea by a jetty-protected entrance channel which is 300 feet wide at its narrowest point. The harbor's interior turning basin is 366 meters (1,200 feet) by 396 meters (1,300 feet).

Major commercial activities at the port include Masda Shipping and Storage, Del Monte Banana Shipping, and offshore oil industry storage and supply areas. Approximately 1,000 persons are employed by businesses directly engaged in using the port's facilities.

COUNTY	TOTAL WORK FORCE	CIVILIAN WORK FORCE	UNEMPLOYMENT (Percent)
Ventura	268,600	233,700	13.0
Santa Barbara	161,900	149,000	7.9
San Luis Obispo	73,050	66,750	8.6

Approximately 100 persons will be employed on the drilling vessel. These individuals are part of the existing labor force of Global Marine, service companies, and Exxon. Therefore, no new employment is expected to be created at the drilling site. Materials shipment and marshaling activities at Port Hueneme and helicopter support services at the Santa Barbara Municipal Airport are expected to be conducted by existing service and support organizations. In short, there will be no significant new employment related to the proposed activities.

(2) LOCATION AND SIZE OF RELATED POPULATION AND INDUSTRY CENTERS

The principal onshore support facilities will be located at Port Hueneme in Ventura County and the Santa Barbara Municipal Airport in Santa Barbara County. Information on the distance and direction of these facilities from leases OCS-P 0438 and 0440 is presented below. Also, Exxon has identified other onshore facilities in this report which may be used during operations on the leases. Distances from these facilities is presented below, as well.

FACILITY	DISTANCE				DIRECTION FROM OCS-P 0438 AND 0440
	OCS-P 0438		OCS-P 0440		
	km	miles	km	miles	
Port Hueneme	173	108	169	105	ESE
Santa Barbara Airport	80	50	84	53	ESE
Ellwood Pier	72	45	75	47	ESE
Port San Luis	53	33	58	36	N
Oceano	47	29	53	33	NNE

TABLE III-13 (cont.)

SPECIES	DESCRIPTION
Gray Whale (Eschrichtius robustus)	. Distribution: Chukchi Sea, Alaska to Baja California, Mexico . Breeding Season: Mid-December through mid-April . Breeding Areas: Baja California, Gulf of California, mainland Mexico . Migration: South along California coast from October through January . Estimated Population: 11,000-12,000
Pacific Right Whale (Eubalaena glacialis japonica)	. Distribution: California and Mexico . Breeding Season: Unknown . Breeding Areas: Unknown, but presumed to be on their wintering grounds somewhere in warmer waters . Migration: North in summer, south in winter . Estimated Population: 250
Southern Sea Otter: (Enhydra lutris)	. See discussion in Section III E(3) of this Report
Leather-backed Turtle (Dermochelys coriacea	. Distribution north of Baja California uncertain
Green Sea Turtle (Chelonia mydas)	. Distribution north of Baja California uncertain
Sea Turtle (Caretta caretta)	. Distribution north of Baja California uncertain

TABLE III-13 (cont.)

SPECIES	DESCRIPTION
	. Migration: North from Baja California in spring. Peak numbers occur off California in early summer
	. Estimated Population: 9,000
Sei Whale (Balaenoptera borealis)	. Distribution: Across north Pacific to Baja California, Mexico
	. Breeding Season: October through March
	. Breeding Areas: Throughout range
	. Migration: North during the spring
	. Estimated Population: Stable; 28,000(?)
Humpback Whale (Megaptera novaeangliae)	. Distribution: Chukchi Sea, Alaska to central Mexico
	. Breeding Season: October to March
	. Breeding Areas: Baja California and Central Mexico
	. Migration: South during the fall
	. Estimated Population: A few hundred
Sperm Whale (Physeter catodon)	. Distribution: Mainly south of 40 degrees north latitude
	. Breeding Season: Spring
	. Breeding Areas: Throughout range
	. Migration: North in spring
	. Estimated Population: Unknown (male population 50% above maximum sustainable yield; female population 60% above MSY level)

TABLE III-13 (cont.)

SPECIES	DESCRIPTION
	. Migration: North after breeding
	. Estimated Population: ± 1500 in California
California Least Tern (Sterna antillarum browni)	. Distribution: San Francisco Bay to Mexico
	. Breeding Season: April through September
	. Breeding Sites: ± 25 in California
	. Nesting Habits: Mud flat, bare sand-gravel area
	. Migration: South in winter (October-March)
	. Estimated Population: 1200 in California
Blue Whale (Balaenoptera musculus)	. Distribution: Bering Sea, Alaska to Baja California, Mexico
	. Breeding Season: Many months during year; peak period during January
	. Breeding Areas: Throughout range of distribution
	. Migration: North from Baja California in late spring; south in September arriving off central California during late September and October
	. Estimated Population: Uncertain; possibly 100 in north Pacific
Fin Whale (Balaenoptera physalus)	. Distribution: Chukchi Sea, Alaska to Mexico
	. Breeding Season: September through March
	. Breeding Areas: Throughout range

TABLE III-13

FEDERALLY LISTED "ENDANGERED" OR "THREATENED" SPECIES THAT MIGHT POSSIBLY BE AFFECTED BY EXPLORATORY DRILLING OPERATIONS IN THE SANTA MARIA BASIN OFFSHORE (Morejohn, 1977; BLM, 1980; and BLM, 1981)

SPECIES	DESCRIPTION
American Peregrine Falcon (*Falco peregrinus anatum*)	. Distribution: 13 territories along coastal California . Breeding Season: Unknown . Breeding Sites: 8 in California . Nesting Habits: Scrape on ledge high on cliffs or rocks (solitary) . Migration: Yes . Estimated Population: ± 30 (16 adults) in California
Southern Bald Eagle (*Halieaeetus l. leucocephalus*)	. Distribution: Mainly in the interior of California; some found along the coast . Breeding Season: Unknown . Breeding Sites: 18 in California . Nesting Habits: Sticks high in a tree or on a ledge usually in some shade (solitary) . Migration: Unknown . Estimated Population: ± 53 (36 adults) in California
California Brown Pelican (*Pelecanus occidentalis californicus*)	. Distribution: Statewide along the coast . Breeding Season: February through August . Breeding Sites: Anacapa Island and Scorpion Rock in southern California . Nesting Habits: Sticks on ground

Blue whale (Balaenoptera musculus)
Fin whale (B. physalus)
Sei whale (B. borealis)
Humpback whale (Megaptera novaeangliae)
Sperm whale (Physeter catodon)
Gray whale (Eschrichtius robustus)
Pacific right whale (Eubalaena glacialis japonica)
Southern sea otter (Enhydra lutris)
Leather-backed turtle (Dermochelys coriacea)*
Sea turtle (Caretta caretta)*
Green sea turtle (Chelonia mydas)*

See Table III-13 for information on the distribution, breeding season and areas, migration pattern, and estimated population of each of these species. In addition, certain species of concern to the State of California might possibly be affected by exploratory drilling activities in the Santa Maria Basin offshore. These are: the California rakish water snail, the California black rail, and the Guadalupe fur seal (BLM, 1980).

In the biological opinions written by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service for Lease Sale No. 53, the federal government determined that activities during the exploratory phases will not significantly affect "rare", "threatened", or "endangered" species.

F. SOCIO-ECONOMICS

(1) RELATED EMPLOYMENT AND AREA UNEMPLOYMENT

Exxon will use existing facilities in Ventura, Santa Barbara, and San Luis Obispo Counties for the shipment of material and marshaling activities. According to the Los Angeles Office of California Department of Employment Development (August, 1982) the following statistics exemplify the employment and unemployment profiles of these counties:

* distribution north of Baja California uncertain

the vicinity of leases OCS-P 0438 and 0440, provides a description of the types of birds common to each area, and the type of activity that takes place in each area.

Along the coastline between Point Conception and Cayucos Point, the greatest diversity of species is found in the Santa Ynez Lagoon [located approximately 10 km (6 miles) east-northeast of lease OCS-P 0438], the Guadalupe area [located about 32 km (20 miles) north-northeast of lease OCS-P 0438 and includes the Santa Maria River Mouth and Nipomo Dunes] and Morro Bay [located approximately 77 km (48 miles) north-northwest of lease OCS-P 0438] are coastal wetlands which are representative of a type of habitat that is diminishing in acreage throughout California. Coastal wetlands provide seasonal or year-round habitat for numerous species of waterbirds, and often serve as the only habitat for certain bird species during critical life stages such as breeding and nesting.

Santa Ynez Lagoon includes salt marsh, tidal flat, and open water areas and encompasses about 400 acres at the mouth of the Santa Ynez River. A sand bar that prevents the ocean from entering the lagoon is opened by Santa Barbara County during part of each year to allow ocean water to enter the lagoon (Page et al., 1977). According to Mahrdt et al. (1976) this lagoon is deemed the most important wetland for waterbirds in northern Santa Barbara County. In addition to supporting many species of shorebirds, wading birds, waterfowl, and raptors during winter and on migration, it supports a small breeding colony of the "endangered" California least tern (Bender, 1974; U.S. Fish and Wildlife Service, 1981).

The Santa Maria River Mouth and Nipomo Dunes is one of the largest areas of coastal dunes and lake habitat in California. Coastal dunes, freshwater lakes, freshwater marshes, beach, riparian woodland, and small areas of tidal flat, salt marsh, and woodland are found in this area. Among the many waterbird species that have been reported in winter and during migration are four "endangered"

species: the California least tern, the California brown pelican, the southern bald eagle, and the peregrine falcon (Smith, 1976).

Morro Bay's 2,519 acres of wetland habitat is comprised of salt marsh, tidal flats, and open water at low tide. Eelgrass beds cover 484 acres of low intertidal and subtidal baylands. The bay is protected from the ocean by a sand spit except for a narrow channel at the north end of the inlet. Morro Rock stands just outside the entrance and is connected to the north shore of the channel entrance by low dunes (Gerdes et al., 1974). Gerdes et al. (1974) list a total of 92 waterbird species in Morro Bay. "Endangered" and rare bird species identified in the area include the bald eagle and California condor; the "endangered" peregrine falcon rests at Morro Rock.

The tentatively proposed well locations on leases OCS-P 0438 and 0440 are well away from the more sensitive areas for marine mammals and marine birds. No special habitat, which might attract marine mammals or marine birds, is known to exist on or near the leases. However, cetaceans and pinnipeds may pass through the ocean area encompassed by the leases during migration.

(4) LIVE BOTTOM AREAS, FISH BANKS

No known live bottom areas or fish banks are known to exist on or in the vicinity of the two leases covered by this report.

(5) "ENDANGERED" OR "THREATENED" SPECIES

The following federally listed "endangered" or "threatened" species might possibly be affected by exploratory drilling activities in the Santa Maria Basin offshore:

American peregrine falcon (Falco peregrinus anatum)
Southern bald eagle (Halieaeetus l. leucocephalus)
California brown pelican (Pelecanus occidentalis californicus)
California least tern (Sterna antillarum browni)

(IV) ENVIRONMENTAL CONSEQUENCES

A. GEOLOGIC HAZARDS

The following shallow anomalies have been identified on leases OCS-P 0438 and 0440: possible gasified surface sediments; shallow gas accummulations; gas vents; and steep slopes. Specific information on these anomalies is presented in Section III(a)(3) (Geologic Hazards) of this report.

Both of the proposed well sites on lease OCS-P 0438, and one of the proposed well sites on lease OCS-P 0440 (site D) have been selected so that drilled, straight-hole well bores would penetrate desired geological targets and, at the same time, not intersect any of the anomalies detected on the leases. Proposed wells OCS-P 0440(A), (B), and (C) would be drilled in areas underlain with shallow gas accummulations. If gas is present in these areas, it may affect the load bearing capacity of the sediments.

Exploratory drilling operations could be adversely impacted by an earthquake within or in the vicinity of the Santa Maria Basin offshore. However, the earthquake risk is considered small because of the temporary nature of the proposed drilling operations and the absence of any major active faults on leases OCS-P 0438 and 0440. Even if an earthquake occurs during the proposed operations, little significant damage to the drilling facilities is expected because all the wells will be drilled from a floating vessel.

Impacts on the geologic environment that are expected to occur as a result of the proposed drilling operations include: the short-term, minor alteration of bottom topography; the localized redistribution of surface sediments; the alteration of the bedrock structure in the vicinity of the proposed drill holes; and an insignificant loss of hydrocarbon resources (should hydrocarbons be encountered and production tested). Although unavoidable, the impacts associated with this project on the geologic environment are expect-

ed to be minor and short-term. The wells will be plugged and abandoned at the completion of exploratory drilling operations in accordance with MMS regulations.

B. METEOROLOGY

(1) WEATHER

No significant impact on the proposed drilling operations should result from the normal weather patterns found in the vicinity of the two leases covered by this report. Reduced visibility could cause temporary delays for the workboats and crewboat and reduced visibility and ceilings could cause delays for the helicopter or require substitution of air service by surface transport. Visibility is less than one nautical mile in the area only 11% of the year (California Coastal Commission, 1981). However, during the summer and fall months, visibility may be reduced by heavy fog up to 12 days per month (NOAA, 1973). In addition, a severe storm could temporarily disrupt activities; however, severe storms rarely occur in this area. Exxon's Critical Operations and Curtailment Plan (see the Exploration Plan which accompanies this report) describes the procedures that will be followed for shutting down activities under extreme operating conditions.

There is a very small potential for a conflict between the drilling vessel or vessels described in Section II of this report and commercial and sportfishing vessels operating in the project area during periods of reduced visibility. However, this potential conflict is mitigated to the maximum extent possible through the identification of drilling locations in a Notice to Mariners issued by the U.S. Coast Guard, actions that make the drilling vessel or vessels substantially more detectable than a typical moored vessel (e.g. lighting on the derrick, radar reflectors, fog signals, etc.), and radio warnings to vessels operating near the project area. At the request of the California Coastal Commission, an automatic radar proximity warning device was installed on the GLOMAR PACIFIC (Radar

Device Inc. "Radar Watch Collision Avoidance Mark III"). This, or a similar device, will be in operation on a 24-hour basis while the drilling vessel is anchored on the locations described in the Exploration Plan.

Visibility is also a crucial factor in tracking the movement of an oil spill. Foggy conditions could reduce the effectiveness of oil spill containment and cleanup efforts. Given the low probability of an oil spill, however, this is not considered to be a major factor militating against the proposed drilling activities.

(2) AIR QUALITY

No significant impacts on onshore air quality are anticipated from the proposed drilling activities which will occur 6-9 km (4-6 miles) from the closest onshore area. Studies of wells closer to shore have been shown to have concentrations at the shoreline similar to that of two small automobile engines. The major sources of gaseous emissions from the proposed activities are the large diesel engines (4 G.E., 7 HPD-16CC2 diesel generator sets) on the GLOMAR PACIFIC. Very small amounts of pollutants also may be produced if natural gas is flared during the testing phase. Projected emissions in tons per well for each 8,000-foot well proposed by Exxon are as follows:

NO_x	SO_x	TSP	THC	CO
51.7	2.9	2.4	6.5	8.7

In every case, the projected emissions for each pollutant are well below the emission exemption level established by the Minerals Management Service. A detailed description of the nature and quantity of the emissions and an explanation of how they were calculated appears in Appendix B of this report.

Emissions from associated support activities, while not considered in determining the exemption status of the drilling vessel, are very minor and will not significantly affect any onshore area. These emissions are also presented in Appendix B of this report.

At the request of the California Coastal Commission, wind speed and direction will be recorded while drilling vessels are on the sites discussed in the Exploration Plan.

C. PHYSICAL OCEANOGRAPHY

(1) EFFECT OF SEA TEMPERATURE, CURRENTS, TIDES, WATER DEPTH ON THE PROPOSED ACTIVITIES

These factors are not expected to significantly affect the proposed exploratory drilling activities; however, wind, wave, and current conditions can affect the spread of an oil spill, the deployment and effectiveness of oil spill response equipment, and the safety of the personnel using response equipment. Wind speed and near-surface currents affect the movement and rate of dispersal of oil slicks on the water's surface. For example, local, short-period seas (choppy water) can adversely affect equipment performance, and when wave heights exceed six feet, only large booms and skimmers can be used. In the area between Point Arguello and Point Buchon, wind speed is less than 6 knots 20% of the year, between 11 and 21 knots 44% of the year, and greater than 34 knots only 1% of the year. Wave heights in this area are greater than 6 feet only 20% of the year (California Coastal Commission, 1981).

Containment and cleanup equipment capable of operating in moderate to heavy sea states are onboard the MR. CLEAN II, an oil spill response vessel berthed at Port San Luis.

(2) EFFECTS OF OPERATIONS ON WATER QUALITY

The impact of the proposed activities on water quality will be minor and short-term. The liquid and solid wastes generated from drilling at each proposed site are described in detail in Section II (K) of this Report. In summary, these wastes are:

Wastes	Estimated Quantity
Drilling Fluids	29,100 bbl (90% water)
Cuttings	2,400 bbl
Sanitary Wastes	5,000 gallons/day
Domestic Wastes	50 gallons/day/person
Seawater Distillation Brine	14,000 gallons/day
Deck Drainage & Washwater	1,500 gallons/day

All of these wastes will be discharged in accordance with the effluent limitations and monitoring requirements set forth in the General NPDES Permit issued for oil and gas operations on the Southern California OCS by the Environmental Protection Agency, Region IX on February 18, 1982.

Discharges of visible oil and floating solids are prohibited. Oil contaminated substances will be transported to shore for disposal at approved disposal sites.

The water column in the vicinity of the proposed drilling operations will experience short-term degradation as a result of the dumping of excess drilling muds and cuttings. These discharges are composed mostly of water. The solids contained in the water cause intermittent turbidity but settle rapidly. Studies of the dispersion and dilution of drilling fluids discharged from offshore exploratory rigs reveal that drilling mud solids normally reach very low or background levels within between 350 and 1,000 m (1,148 and 3,280 feet) of the discharge pipe (Ray and Shinn, 1975; Zingula, 1975; Ecomar, 1978; Ray and Meek, 1980; Ayers et al., 1980; and Ayers, 1981; National Academy of Science, 1982).

Trace concentrations of heavy metals such as chromium, barium, lead, zinc, vanadium, nickel, mercury, and cadmium are sometimes associated with drilling muds and may be introduced into the water column as a result of mud discharges. These metals are generally present in very low concentrations in a highly insoluble and nonbioavailable form. Studies have shown that metal concentrations rapidly reach background levels within a short [1,000 m (3,280 feet)] distance of the discharge point (Meek and Ray, 1980; Ayers, 1981). A more detailed description of the impact of drilling muds and cuttings on marine flora and fauna appears in Part E (Flora and Fauna) of this section.

All sanitary water will be treated prior to release with chlorine maintained at approximately 1.0 mg/l and thus will have a minimum impact on water quality. Domestic waste water from the kitchen, showers, and washing machines will not permanently alter water quality because it consists of natural or biodegradable substances.

Deck drainage and wash down water normally contain no toxic substances. If contaminated by hydrocarbons, they will be processed through the oil-water separator to insure that no visible sheen will occur when they are discharged into the ocean.

Ocean water used for engine cooling and ballast will not be contaminated by any foreign materials. The temperature of discharged cooling waters will be 2°F to 4°F above the normal seawater temperatures, but well below the range and volume thought harmful to marine biota.

Most formation waters are residuals from ancient seas and have a composition very similar to present day seawater. Should they be produced during testing and contain visible oil, they will either be cleansed by an oil-water separator and discharged or transported to shore for disposal at appropriate sites.

In summary, the impact on water quality of discharges of waste and liquid effluents is minor, short-term, and insignificant.

D. OTHER USES OF THE AREA

(1) SHIPPING ACTIVITIES

The proposed exploration activities will have little if any impact on shipping activities in the area. Commercial ships moving between major west coast ports travel well to the west of leases OCS-P 0438 and P 0440. No vessel separation scheme has yet been established in or in the vicinity of the Santa Maria Basin offshore OCS area. Under hypothetical schemes currently under consideration by the Twelfth Coast Guard District for the area between Point Conception and the San Francisco Bay Area, vessel traffic lanes would pass seaward of the leases. If these lanes are established, the small risk of a collision between drilling vessels and other vessels in the area of the leases could be further reduced. Regardless of the Coast Guard's action on the proposed shipping lanes, Exxon will mitigate the risks of vessel collisions by complying with all Coast Guard safety, navigation, and notice requirements. Further, at the request of the California Coastal Commission, an automated radar warning device will be operational while drilling vessels are at anchor.

(2) COMMERCIAL AND SPORTFISHING

There is some potential for conflicts offshore and onshore between commercial fishing operations and the vessels necessary for offshore exploration activities. Both leases OCS-P 0438 and P 0440 are within known flatfish, rockfish, and inshore trawl fisheries. The heaviest trawling currently takes place between Point Arguello and Point Sal up to 24.3 km (15 miles) offshore. Within this area, experienced fishermen have established trawl "tows" (routes with few bottom obstructions) along which they drag their trawling equipment. Tow lines vary in length [some are reported to be up to 19.4 km (12

miles) long] and tend to follow bottom contour lines. Each vessel skipper has numerous tows which vary in their productivity. A single structure (like a drilling vessel) located along a tow could possibly temporarily eliminate a short tow. On the average, the offshore space removed from fishing is at least twice the area actually taken up by the obstruction or within the area of the anchor scope radius (see Figure IV-1). Because of the short duration of exploration activities at any one site, the physical interference to boats operating in the flatfish, rockfish, and inshore trawl fisheries will be minor and short term.

Although other fisheries (e.g. hook and line, shrimp, crab, salmon, set net, and sablefish trap) exist in the Santa Maria Basin offshore area, none of the areas of concentrated activity currently correspond to the ocean area encompassed by the two leases covered by this report. Therefore, the drilling vessel should not unduly interfere with these commercial fishing operations.

Exxon has supplied representatives of commercial fishermen operating in the Santa Maria Basin offshore with Loran C Coordinates and other information depicting the exact location of the lease and the proposed wells to be drilled and will, to the maximum extent feasible, coordinate its proposed activities with commercial fishermen operating in the area.

Competition between the fishing and oil industry for onshore berthing space and marine services is also a possible area of conflict. However, this conflict should not occur as a result of Exxon's proposed activities on leases OCS-P 0438 and P 0440 since existing berthing space at Port Hueneme already dedicated to offshore oil and gas exploration and development activities will be used. Infrequent emergency use of the Port of San Luis during in-

5) Stipulation No. 7 of the Lease Sale No. 53 agreement which requires that subsea well heads and temporary abandonments, or suspended operations that leave protrusions above the sea floor be protected, if feasible, so as to allow commercial trawling gear to pass over the structure without damaging the structure or the fishing gear; and

6) The fact that only a very small percent of exploratory wells will be temporarily abandoned and such abandonments will be for a short period of time. Most exploratory wells are permanently plugged and abandoned immediately upon completion of drilling and testing activities. All casing is cut and removed well below the seafloor and therefore leave no obstructions to fishing devices.

The greatest impacts on commercial fishing operations and sportfishing could be from oil spills. In the event of a spill it would be necessary for fisherman to temporarily avoid the area because: 1) their boats and gear may be contaminated; 2) the oil spill containment booms would preclude fishing in the area; and 3) the commercial organisms could be tainted. If sexually mature commercial animals are killed as a result of a spill, the size and reproductive potential of the population (and available stock) could be reduced. For example, future economic losses for the salmon fishery in the Santa Maria Basin offshore resulting from a spill greater than 1,000 barrels is estimated to be $292,000 (BLM, 1980).

These impacts are mitigated by the various MMS regulations, orders, and NTL's designed to minimize oil spills, including OCS Order No. 7 which requires that each oil company develop an Oil Spill Contingency Plan and have ready access to pollution control equipment. Also, under Title III of the OCS Lands Act Amendments of 1978, an "Offshore Oil Spill Pollution Fund" has been established to compensate claimants for economic losses arising out of or directly

resulting from oil pollution. Money in this fund can be used to: 1) pay for the removal of oil; 2) cover damages resulting from injury to or destruction of real or personal property; 3) cover damages resulting from injury to or destruction of natural resources; 4) cover the loss of use of natural resources; 5) cover the loss of profits or impairment of earning capacity due to injury to or destruction of real or personal property or natural resources; and 6) cover the loss of tax revenue.

One of the newest innovations employed as a mitigation measure for the impacts to commercial fisheries in leases issued in Sale No. 53 is Lease Stipulation No. 8. This stipulation requires lessees to develop a fisheries training program for all personnel involved in vessel operations and for platform and shore-based supervisors. The purpose of the training program is to familiarize these personnel with: 1) the value of the fishing industry; 2) the methods of offshore fishing operations; 3) the potential subjects of conflicts between fishing operations and offshore oil and gas activities; 4) the locations of marine mammal and bird rookery sites in the area; 5) the seasonal abundance and sensitivities of these animals to disturbance; and 6) the federal laws that have been established to protect endangered and threatened species from harassment and injury. The MMS Regional Supervisor, Offshore Field Operations has reviewed and approved the training program and it will be in use prior to the initiation of exploration activities on leases OCS-P 0438 and P 0440.

(3) MILITARY USE

The proposed exploration activities will not interfere with military operations in the area because of implemented industry/military agreements and restrictions imposed on Exxon by lease stipulations and implementing agreements.

Under these stipulations, all boat and vessel traffic into individual designated warning areas must coordinate and comply with instructions from the Commander of the Space and Missile Test Center (SAMTEC) and the Commander of the Pacific Missile Test Center (PMTC), or any other appropriate military agency. Also, the United States reserves the right to temporarily suspend operations on the leases in the interest of national security. In addition, under these stipulations, electromagnetic emissions must be controlled in accordance with requirements specified by the Commander of PMTC to prevent damage to, or unacceptable interference with Department of Defense flight, testing or operational activities conducted within individual designated warning areas. Finally, under these stipulations, the lessee assumes all risks of damage or injury to persons or property which occur in, on, or above the OCS if such damage or injury results from programs conducted by or in connection with the activities of SAMTEC, PMTC, or any other appropriate military agency.

Exxon is familiar with these stipulations, has signed an industry/military agreement regarding their implementation, and will comply with such.

(4) EXISTING PIPELINES AND CABLES

There are no known pipelines or cables which cross the two leases covered in this report. An AT&T Submarine Cable (California to Hawaii), which originates onshore north of Point Buchon and passes 48 km (30 miles) to the west of lease OCS-P 0440, will not be affected by activities on the leases nor will the cable have any impact on such activities.

(5) MINERAL RESOURCE DEVELOPMENT OTHER THAN OIL AND GAS

Neither Exxon nor any other entity has plans to explore for any mineral resources, other than oil and gas, on leases OCS-P

0438 and P 0440. The proposed exploratory operations will not interfere with future foreseeable mineral resource development.

(6) CULTURAL RESOURCES

The MMS has not required Exxon to conduct remote sensing surveys for the purpose of determining the potential existence of cultural resources. The MMS did, however, require Union Oil Company to conduct a cultural resource investigation on lease OCS-P 0441 which is immediately south of lease OCS-P 0438 and immediately east of lease OCS-P 0440. The investigation included a review of published and unpublished (available) literature concerning prehistoric archaeological sites and historic (shipwrecks) information. In addition, lease OCS-P 0441 was systematically surveyed utilizing side scan sonar, magnetometer, and subbottom profile instrumentation. The results obtained from Union's investigation included information on six side-scan sonar and/or magnetometer "targets" in the southeast corner of Exxon's lease OCS-P 0440. In its evaluation of these "targets", Union concluded that four of the sites are likely isolated rocks, and the other two are man-made objects (jetsam) lost or discarded at sea. None were identified as valuable cultural resources. A copy of Union's analysis is available in the office of the MMS.

If a cultural resource, like a shipwreck of historic significance, is discovered during the drilling program, the MMS will be notified and immediate steps will be taken to protect the resource.

(7) MARICULTURE ACTIVITIES

No mariculture activities take place on leases OCS-P 0438 and 0440. The closest kelp beds in the Santa Maria Basin offshore to the lease are between Point Arguello and Point Conception approx-

imately 8 km (5 miles) southeast of lease OCS-P 0438, with the heaviest concentrations around Jalama. Drilling activities will not affect these kelp beds.

E. FLORA AND FAUNA

The drilling, testing, and abandonment activities will be conducted in a way that minimizes impacts on the flora and fauna of the area.

(1) IMPACTS ON FLORA AND FAUNA FROM ROUTINE (NON-ACCIDENT) EXPLORATION ACTIVITIES

The specific impacts on the major groups of flora and fauna of day-to-day, non-accident, exploration activities are summarized in Table IV-1 and discussed below:

a. Phytoplankton: Local, temporary increased turbidity caused by the discharge of drill cuttings, drilling muds, and sewage waste could decrease phytoplankton photosynthesis by obstructing light penetration in the plume area. The decreased photosynthesis effect could cause minor, short-term impacts on the phytoplankton populations that pass through a plume extending 200 meters (656 feet) from the discharge point (Ecomar, 1978). However, Hester (1981) indicates that the effect of such a plume on solar energy availability for photosynthesis is not significant compared to the day/night variation in the environment, the seasonal changes in water transparency due to coastal runoff and primary productivity, and typical cloud cover. The total productivity of the phytoplankton population would not be affected.

Extensive research has demonstrated that drilling fluids could have adverse impacts on marine organisms only at very high concentrations. Such concentrations of drilling fluids could occur only in the immediate vicinity of the discharge point (Ayers, 1981).

TABLE IV-1

SUMMARY OF POSSIBLE IMPACTS ON
FLORA AND FAUNA FROM ROUTINE
(NON-ACCIDENT) EXPLORATION ACTIVITIES

FLORA OR FAUNA TYPE	POSSIBLE IMPACT	REASON WHY IMPACT IS MINIMAL
Phytoplankton	Decrease in photosynthesis caused by increased turbidity due to discharge of drilling muds and cuttings	. Occurs in limited area, no more than 1,000 meters (3,280 feet) from discharge point.
	Toxic effect of drilling muds	. Drilling muds toxic only at very high concentrations and then only in the immediate vicinity of the discharge point; total phytoplankton population of area unaffected.
Zooplankton	Smothering or decrease in filter feeding efficiency caused by increased turbidity	. Occurs only in the immediate vicinity of discharge point and for short time.
	Toxic effect of drilling muds	. Drilling muds are toxic only at very high concentrations and then only in the immediate area of the discharge point; total zooplankton population of area unaffected.

TABLE IV-1 (cont.)

FLORA OR FAUNA TYPE	POSSIBLE IMPACT	REASON WHY IMPACT IS MINIMAL
	Entrainment and death in cooling systems of drilling units	. Entrainment will cause negligible impact on zooplankton populations because of temporary nature of activities and high number of larvae.
Benthic (Bottom-Dwelling) Animals	Smothering or burial by settled mud and cuttings	. Happens only in small areas within few hundred meters of drilling site and occurs only where current energy is so low that discharges settle rapidly; does not occur in high-energy areas like the Santa Maria Basin offshore area. Recovery begins immediately and area is repopulated in a short time.
	Crushing or burial by rig legs and base plate.	. Occurs in a very limited area and recovery begins immediately upon removal of equipment.
Nekton (swimming or mobile animals)	None	. Smothering and clogging unlikely because animals can move away from disturbances. . Drilling muds and cuttings have very low level of toxicity and nektonic organisms will, for the most part, avoid areas with highly toxic concentrations.

TABLE IV-1 (contd.)

FLORA OR FAUNA TYPE	POSSIBLE IMPACT	REASON WHY IMPACT IS MINIMAL
Pelagic Birds	Collision with rig structures during high fog conditions	. Exploration activities occur away from onshore nesting and breeding areas. . Collisions would affect only an insignificant portion of the population.
Marine Mammals (pinnipeds and cetaceans)	. Collision of animals with boats	. Exploration activities occur away from hauling out and breeding areas; chance of collisions remote.
	. Normal patterns of movement of cetaceans through area may be altered temporarily	. Movement patterns will return once exploration is completed.

Any adverse effects on the phytoplankton would be concentrated locally around the drilling vessel and would have an insignificant impact on the total phytoplankton population.

b. Zooplankton: The local increased turbidity caused by the discharge plume could have a smothering effect on some zooplankton species in the surface layer of the water column in the plume area. Temporary clogging of the filter feeding mechanisms of some zooplankton could occur, resulting in decreased filtering and feeding efficiency. However, this effect would probably last only a few minutes for a given water parcel passing by the discharge point and would have a minor, short-term effect on the total zooplankton population.

Tagatz et al. (1982) have reported that their data from testing a simulated estuarine situation with estuarine drilling muds indicate that muds could adversely affect colonization of estuarine areas by planktonic larvae. However, any adverse effects of the drilling fluids on zooplankton would be concentrated locally around the drilling vessel and would have an insignificant impact on the total zooplankton population of the area. For example, Benech, et al. (1980) noted that there was no discernable impact on a fouling community 10 m (33 feet) downstream of a mud discharge source.

c. Benthos: The settling of drilling muds and cuttings could result in the smothering and burial of some benthic species inhabiting the ocean bottom in the immediate vicinity of the discharge pipeline. Evidence indicates that smothering effects are limited to small areas where current energy is sufficiently low to allow the muds to settle rapidly and are not detectable in high-energy locations, like the central deep of the Santa Maria Basin offshore, where mud is rapidly dispersed. Smothering either does not occur or the effects are limited to the bottom within a few hundred meters of the drilling site (Hester, 1981). This smothering effect will be most pronounced in bottom areas firm enough to sup-

port an epifaunal community. Recovery within the smothered area begins within days and the bottom should be repopulated within a short time.

Use of anchors from the drilling vessel will adversely affect the bottom community within the immediate area of placement. This effect will be rapidly mitigated once the anchors are removed.

d. Nekton: The free-swimming fish and invertebrates, including larvae, are mobile and generally can avoid localized adverse conditions. Thus the impact of the discharge plume on these marine organisms will be minimal.

Since used drilling fluids of the type permitted for offshore disposal have a very low order of acute toxicity and show rapid dispersal, nekton are not expected to be adversely affected by the discharged fluids. Even in the most sensitive species, studies show that deleterious sublethal responses are observed only following protracted exposure to whole suspended mud concentrations in the range of 100ppm (Neff, 1981). Such exposures are unlikely.

e. Marine and Coastal Birds: Day-to-day exploration activities will have little impact on marine and coastal bird species because the six proposed well sites are located away from the sensitive biological areas where these species are concentrated. It is unclear whether the temporary presence of a drilling vessel and the vessel and helicopter traffic associated with exploration activities have any impact on bird species flying over the sea. Onshore, human disturbances can severely impact onshore seabird nesting colonies during breeding season; however, since leases OCS-P 0438 and P 0440 are over 6 km (4 miles) from the closest onshore area, and because established facilities will be used for support services, the proposed activities should have no impact on breeding or nesting areas.

Table IV-2 contains a list of the seabird species which show sensitivity to impacts related to petroleum development. Species which have been observed in the Santa Maria Basin offshore area are noted by an asterisk. Most of the identified impacts are associated with a relatively large oil spill; because such a spill is a very unlikely occurrence, the risk of adverse impacts on seabirds is minimal.

f. Marine Mammals: The impacts of day-to-day exploration activities on marine mammals in the project area will be minimal. Concentrations of California sea lions and harbor seals occur at Point Sal [24 km (15 miles) from lease OCS-P 0438] while concentrations of harbor seals occur at Point Arguello [8 km (5 miles) from lease OCS-P 0438]. Further to the north, harbor seal concentrations are present and breeding occurs at or in the vicinity of Mallagh Landing [53 km (33 miles) north of lease OCS-P 0438]. These areas are too far from the lease to be affected by the proposed exploration activities. The closest sea lion rookery is Point Piedras Blancas, located in San Luis Obispo County about 120 km (74 miles) north-northwest of the two leases covered by this report. The nearest breeding colony of northern fur seals is on San Miguel Island, which is over 69 km (43 miles) south-southeast of lease OCS-P 0440. As of 1982, the southernmost boundary of the sea otter range was the Santa Maria River Mouth which is approximately 32 km (20 miles) north-northeast of lease OCS-P 0438, however individuals and small groups of sea otters have been observed south of Point Conception. The only possible impact of routine (non-accident) operations on sea otters is harrassment or deaths due to collisions with boats (U.S. Fish and Wildlife Service, 1980). Support vessels generally will be traveling to the sites from bases south of the sites and only rarely from Port San Luis or Ellwood. Thus, the areas that most of the sea otter population inhabits will be largely avoided.

The movement of cetaceans in the exploration area could be temporarily altered by the presence of a drilling vessel, but these movement patterns should return to normal shortly after completion

TABLE IV-2

SEABIRD SPECIES MOST VULNERABLE
TO IMPACTS RELATED TO PETROLEUM DEVELOPMENT

Species	Comments
Migratory waterfowl, loons, grebes	Most are divers and are very susceptible to oiling of feathers; many species forage in large groups in restricted areas of shallow water nearshore.
Cormorants*	Very susceptible to disturbance of colonies; roost ashore in large groups and forage in flocks.
Brown Pelicans*	Endangered species susceptible to oiling of feathers.
Phalaropes	Very numerous and wide-ranging but susceptible to oiling of feathers.
Western Gulls*	May contaminate eggs by bringing oil to nests on breast feathers.
Nesting Alcids* (Cassin's Auklet, Pigeon Guillemot)	Very susceptible to oiling of feathers; gather in large groups near colonies; vulnerable to disturbance of colonies.
Wintering Alcids	Very susceptible to oiling of feathers; may concentrate in restricted offshore areas for feeding.

* Observed in the Santa Maria Basin area

Taken from Draft Environmental Report Statement for OCS Lease Sale No. 53, Table IV.B.2.d-2 (BLM, 1980).

of drilling. A summary of potential hazards to marine mammals and seabirds arising from exploration activities is presented in Table IV-3.

(2) CONCERNS ABOUT THE EFFECT OF DRILLING FLUIDS ON MARINE FLORA AND FAUNA GROUPS

Many studies have been conducted to determine whether drilling fluids discharged into the ocean waters have adverse impacts on marine flora and fauna. The three principal areas of concern are that: 1) dispersion may not be rapid enough to accommodate the discharges; 2) the drilling fluids may be acutely toxic or produce deleterious sublethal responses in sensitive marine species; and 3) the heavy metals present in some drilling muds may be accumulated by marine organisms to concentrations that may be harmful to the organisms themselves or to the consumers, including man, of fish products.

a. Dispersion of Discharges: Several studies have been done examining drilling mud plume dynamics and the water-column fate of drilling fluid discharges (Ray and Shinn, 1975; Zingula, 1975; ECOMAR, 1978; Environmental Devices Corporation, 1976; Dames and Moore, 1978; Ayers et al., 1980; Ray and Meek, 1980). The dilution of the drilling discharge plume is dependent on the type and characteristics of the mud used, its discharge rate, the water depth, surface and subsurface currents, and physical oceanographic characteristics. Ray and Shinn, 1975 found that drilling fluid discharged at rates of 40 bbl/hr and 250 bbl/hr may be diluted by 1,000 to 1 and 100 to 1 (parts ocean water to parts discharged drilling fluid), respectively, in the direction of the prevailing current approximately 305 m (1,000 feet) from the discharge point.

In most of the studies done to date, all contaminant components of drilling fluids investigated have either settled to the bottom or diffused to near background levels within 1 to 2 hours af-

TABLE IV- 3

POTENTIAL SOURCES OF HAZARDS
TO MARINE MAMMALS AND
SEABIRDS RESULTING FROM
OFFSHORE EXPLORATION ACTIVITIES

ACTIVITY OR FACILITY	POTENTIAL HAZARDS
Seismic Profiling	Noise; "startle" effects
Drilling	Siltation; downstream pluming; opacity increases
Crew and supply boats	Prop hits, subsurface noise
Aircraft	Mid-air collisions
Oil Spill Cleanup: Skimmers Burn-off Chemicals Grounded Oil	Boat activity; air pollution; water pollution; disturbance to sensitive marine mammal populations on islands by human intrusion and aircraft activity

Taken from information provided in the EIS for Lease Sale No. 53 (BLM, 1980).

ter discharge and background levels of total solids content have been reached between 350 to 1,500 m (1,148 to 4,918 feet) from the discharge point (NAS, 1982).

The toxicity of more than 20 used offshore-type drilling fluids have been evaluated to date with 58 species of marine animals from the Atlantic and Pacific Oceans, the Gulf of Mexico, and the Beaufort Sea (Carls and Rice, 1980; ERCO, Inc., 1980; Gerber et al., 1980, 1981; Houghton et al., 1980; McLeay, 1976; Neff, 1980; Neff et al., 1981; Tornberg et al., 1980). Five major marine animal phyla were represented among the bioassay organisms, including Chordata (8 species of fish), Arthropoda (31 species of crustaceans), Mollusca (12 species of molluscs), Annelide (6 species of polychaetes), and Echinodermata (one species of sea urchin). Larvae and other early life stages were included.

Although bioassay methods and conditions varied considerably, the results were consistent. All but a few of the 96-hour LC_{50} values were above 10,000 ppm drilling mud added. The lowest LC_{50} value was 500 ppm whole mud for larvae of dock shrimp Pandalus damae exposed to a high-density lignosulfonate mud from Cook Inlet (Carls and Rice, 1980). The investigators, in most cases, attributed the sensitivity of these species to their intolerance of high concentrations of suspended particulates.

A number of investigations of sublethal responses of marine animals to drilling muds have been conducted. Sublethal responses include impairment of chemosensory responses in lobsters (Derby and Atema, 1981), alterations in patterns of embryological or larval development of grass shrimp, lobsters, sand dollars and killifish (Crawford and Gates, 1981; Gerber et al., 1981; Neff, 1980; Sharp et al., 1982), decreased food assimilation and growth efficiency in mysid shrimp (Carr et al., 1980), decreased shell growth and condition in oysters, mussels, and scallops (Gerber et al., 1980, 1981; Neff, 1980; Rubinstein et al., 1980), alternations in rates of filtration, respiration, and nitrogen excretion in mussels (Gerber

et al., 1980), changes in enzyme activity in tissues of several species of marine animals (Gerber et al., 1980, 1981), histopathological lesions in coonstripe shrimp and salmon fry (Houghton et al., 1980) and polyp retraction and reduced growth rate in corals (Thompson and Bright, 1980; Hudson and Robbin, 1980). These studies show that even in the most sensitive species, significant deleterious sublethal responses occur only at drilling fluid concentrations nearly as high as those that are acutely toxic and that damage is probably caused by intolerance to the high concentrations of suspended particulates, concentrations in the range of 100 to 1.

The field studies published to date on effects of drilling mud discharges on demersal, benthic, and biofouling communities around offshore exploratory drilling vessels and production platforms tend to corroborate conclusions derived from laboratory studies that the ecosystem effects of mud discharges to the ocean are minimal, and when detected, are of short duration and restricted to the benthos (Zingula, 1975; Gettleson, 1978; Lees and Houghton, 1980; Houghton et al., 1980; Menzie et al., 1980; Maurer et al., 1981; and Benech et al., 1980).

Heavy Metals Accumulation: The metals of major concern in drilling fluids are chromium, barium, lead, zinc, mercury, cadmium, copper, and iron. Laboratory investigations of the bioaccumulation of some of these metals from drilling muds or drilling mud ingredients by a wide variety of species of marine animals have been performed by Brannon and Rao (1979), Carr et al. (1982), Espy, Huston & Associates (1981), Gerber et al. (1981), Liss et al. (1980), McCulloch et al. (1980), Page et al. (1980), Rubinstein et al. (1980), and Tornberg et al. (1980). These studies show that heavy metals associated with used drilling muds have a limited bioavailability to marine animals. Chromium appears to be the most readily accumulated of the mud-associated metals. Organically bound and particle-absorbed heavy metals usually are much less bioavailable than the metal ions in solution. The available evidence indicates that there is little likelihood that heavy metals would be accumulated from envi-

ronmentally realistic levels of used drilling muds in edible portions of shell and finfish to concentrations that would pose a health hazard to human consumers of such products.

(3) IMPACTS ON FLORA AND FAUNA OF OIL SPILLS

The statistical probability of a major spill occurring during the proposed exploration program is quite small. In the unlikely event that such a spill did occur, it could have serious impacts on the marine flora and fauna. Oil spills may be responsible for lethal effects (e.g. direct chemical toxicity and suffocation), for sublethal effects (e.g. interference with chemically mediated behavior, tainting, carcinogenicity, and mechanical coating), and for habitat alteration. Physical damage can be caused by oil coating marine organisms, the feathers of seabirds, the fur of marine mammals, and the respiratory apparatus of fish.

Floating oil may adversely affect pinnipeds by fouling their fur, and through ingestion, inhalation, and irritation of their eyes and membranes.

The "southern" sea otter, which has occasionally been observed south of Point Conception, is among the marine animals potentially affected by oil spills. The otter depends on air trapped in its fur for warmth and bouyancy. Oil contamination of 30% or more of the otter's body surface may result in death (Kooyman and Costa, 1979). The ability of otters to detect oil in their environment is unclear. Barabash-Nikiforov (1947) reported that otters may react to the odors of petroleum products and avoid them. However, investigations by Williams (1978) and Sinniff et al. (unpublished) showed that sea otters in captivity do not avoid oil contaminated areas.

Although the impacts on cetaceans are not well understood, there is concern over the direct or indirect ingestion of oil or oily substances, irritation of their eyes, harm to their breathing apparatus, and possible permanent alterations in their migratory routes.

Finally, floating oil affects marine birds by fouling their feathers (the primary cause of mortality) and through ingestion, inhalation, and irritation of eyes and membranes.

The effects of oil spills may be acute or chronic in nature. Acute effects on the biota are those resulting from a single exposure of the marine environment from an accidental spill. Mortality may occur at the time of the spill or for some period thereafter. Chronic effects occur from continuous or intermittent releases of oil which may cause various sublethal effects on individuals or populations. A major accident involving an exploratory well may have a discernible acute impact, while less is known of possible chronic effects.

Although it was a production phase accident, the Santa Barbara oil spill of 1969 provides the only pertinent data for analyzing the possible impacts on marine flora and fauna of a large spill in the area covered by this report. Marine bird populations were the most severely impacted by this spill; the California Department of Fish and Game estimates that over 3,600 individuals were killed (Department of Fish and Game, 1971). The impact of all other groups of animals was apparently short-term and did not affect community relationships or population size. Straughan (1970) noted a lack of acute catastrophic effects on plankton, benthos, or marine mammals. No fish kills were observed (University of California, Santa Barbara, 1971).

While Nicholson (1972) observed the smothering of some sessile rocky intertidal organisms, Straughan (1973) detected no change in species distribution and abundance of sandy intertidal

biota as a result of the Santa Barbara oil spill. Additionally, no long-term effects on commercial fisheries could be attributed to the spill, however, decreases in catches after the spill were probably caused by loss of fishing time and oil fouling of gear (BLM, 1979).

Although these impacts of an oil spill could be substantial, the likelihood of such an occurrence is very low. Furthermore, the GLOMAR PACIFIC equipment includes all of that required under the MMS OCS Orders to prevent oil spills (see discussion of pollution prevention procedures in Section II). In the unlikely event that a spill occurs, the drilling vessel is equipped with containment and cleanup equipment and, if necessary, the services of Clean Seas, Clean Coastal Waters, and other oil spill cooperatives will be obtained to assist in the containment and cleanup efforts.

F. ONSHORE IMPACTS

(1) SOCIO-ECONOMIC

The proposed drilling program will have virtually no impact on onshore socio-economic conditions because of the presence of an existing supply infrastructure and the temporary nature of the activities. Although some supplies and equipment will be purchased locally, these purchases will not increase the number, size, or complexity of vendors in the area.

Effect on Local Employment: This project is not expected to provide any new employment opportunities to local residents in San Luis Obispo, Santa Barbara, or Ventura Counties.

Effect Upon Local Population Centers and Industry: There will be no appreciable effect on local population centers or area industry as a result of the proposed drilling program.

Increased Demand on Community Services: Demands on community services will be minimal. A slight increase in the use of facilities at Port Hueneme, and air service facilities at the Santa Barbara or Oceano Airport could occur depending on the overall level of offshore oil and gas activities during the life of the project.

Public Opinion Concerning the Proposed Activities: Public opinion is mixed. There are some groups that are absolutely opposed to any oil and gas development in offshore California waters and expressed strong disapproval of OCS Lease Sale No. 53. Others appreciate the national interest to be served in developing domestic offshore energy resources and do not oppose development activities which are conducted in an orderly and environmentally sound fashion.

Effect of Increased Boat Traffic: The existing frequency of vessel traffic in and out of Port Hueneme, Ellwood, or Port San Luis is not expected to appreciably increase as a result of Exxon's proposed activities. Also, there will be no need to expand these port facilities to accommodate the subject planned activities.

Increased Competition for Scarce Coastal Resources: Dock space will be required only for vessels which are currently occupying berths at Port Hueneme.

In the event of a fuel supply shortage, the availability of diesel fuel oil could become a problem. However, supplies of diesel fuel oil currently are abundant and it is unlikely that the limited amount of diesel fuel oil required to conduct the proposed activities will unduly tax local supplies.

(2) DEMAND FOR GOODS AND SERVICES

Supplies and Equipment: It is expected that the following goods and services will be required for the proposed wells:

. 4,000 sacks of bentonite
. 8,000 sacks of barite

. 2,500 sacks of cement
. 15 drill bits
. approximately 7,000 feet of tubular field goods
. one sub-sea well head
. food to prepare 3 meals per day for 50-60 people
. linen supplies for 50-60 people
. soap and laundry detergent
. miscellaneous items to maintain vessels

Water: The GLOMAR PACIFIC has the capability to distill water to meet all drilling and crew requirements for fresh water. The system will be supplemented by fresh water shipped from shore by workboat.

Aggregate Energy: Electricity will be produced through the use of onboard generators.

Fuel requirements include approximately:

. 2,250-3,250 gallons of fuel/day for drilling vessel
. 8,000-8,800 gallons of jet fuel per well
. 10,500-10,800 gallons of diesel fuel per well for crew-boat
. 58,100-59,820 gallons of diesel fuel per well for work-boat

Other Resources: No other resources will be used.

(3) ENVIRONMENTAL IMPACTS

Onshore Construction Activities: No onshore facility construction will be needed to support the proposed exploratory drilling program. If commercially producible hydrocarbon reserves are found, new onshore facilities may be needed. Such facilities would be described in detail in the Environmental Report for the related Development and Production Plan.

Other Impacts not Previously Discussed: The proposed locations are approximately 6 to 9 km (4 to 6 miles) from the shoreline and will be used individually only for a short period of time. The aesthetic impact is, therefore, considered insignificant.

G. ACCIDENTS

(1) POTENTIAL IMPACTS OF MAJOR ACCIDENT

The chance of a major oil spill occurring as a result of Exxon's proposed drilling activities is remote. Exploratory drilling operations began in waters off California more than 75 years ago. Since that time there has never been a major spill of crude oil anywhere in U.S. waters as a result of exploratory drilling--with more than 6,000 exploratory wells drilled to date. Out of the estimated 12,000 to 15,000 offshore wildcat wells drilled worldwide, there has been only one major spill, Mexico's Ixtoc #1; control of that well was lost as a result of practices which are not followed in U.S. offshore operations. The statistical probability that the drilling of a particular exploratory well will both penetrate an oil bearing formation and then be involved in a major oil spill cannot be estimated with any certainty but, based on the above statistics, can be roughly approximated at 1 in 6,000 (0.00017) for an offshore exploratory well and more likely 1 in 12,000 (0.00008) (American Association of Petroleum Geologists, 1980). Spill frequency rates are showing continuing reductions (Nakassis, 1982).

A description of possible impacts of oil spills on each major group of marine flora and fauna is provided in Section IV(E) of this report. The studies done to date indicate that a major spill could severely impact plankton, finfish, larvae, pelagic and benthic crustaceans, gastropods, bivalves, benthic invertebrates, marine mammals, and marine birds in the immediate vicinity of the spill. If the oil reached the intertidal zone, a spill could also have adverse effects in that area. The severity of these effects would depend upon temporal variations in the abundance of marine

organisms, seasonal cycles of reproductive phases, the degree of oil weathering, type, rate, and volume of oil, weather and oceanographic conditions at the time of the spill, and the effectiveness of oil containment, dispersant, and mechanical recovery measures. These parameters would determine how much oil is dispersed into the water column, the degree of settling, weathering, and scattering before impacting a shoreline, and the final amount, concentration, and composition of the hydrocarbons at the time of impact.

A major oil spill could also have a significant short-term adverse effect on air quality due to the sudden escape of uncontrolled hydrocarbon vapors into the atmosphere. The results of detailed studies of the impact of oil spills and blowouts on air quality are contained in the Final Environmental Impact Statement for Lease Sale Nos. 53, 68 and 48. The EIS for Lease Sale No. 53 concludes that a major oil spill during adverse meteorological conditions could have a significant impact upon ozone levels onshore for a short period of time after the spill (BLM, 1980).

The impact of a major spill on water quality has also been analyzed extensively during the past decade and most recently in the final Environmental Impact Statement for Lease Sale #53. The EIS concludes that the water quality in the immediate vicinity of the spill will be degraded. The degradation will decrease with distance and no significant decrease in water quality should occur at distances greater than a few kilometers from the discharge points. The short-term acute effects of OCS activities in the marine environment, except for immediately around platforms, should not result in significant change in OCS benthic fauna. However, long-term, chronic impacts are unknown at this time and some studies indicate that they could produce elevated trace metals and hydrocarbon concentrations in marine organisms (BLM, 1980).

(2) IMPACTS FROM HYDROCARBON DISCHARGE RESULTING FROM ROUTINE OPERATIONS

Every effort will be made to avoid hydrocarbon discharges into the ocean waters. Accidental discharges could occur during operations through the release of diesel oil during refueling operations or the release of waste waters containing oil. The quantities of oil associated with such spills would be quite small and could probably be contained and cleaned up by equipment maintained onboard the GLOMAR PACIFIC. It is highly unlikely that a spill of this nature would have a significant effect on water or air quality, or the marine biota.

(V) ALTERNATIVES TO THE PROPOSED ACTION

(1) NO PROJECT

Under this alternative, Exxon would forego in part or in whole exploration of the leases. Although this approach could result in increased protection of the environment, it is neither a viable or reasonable alternative for the lessee. Under existing law and the terms of the leases, Exxon is obligated to promptly and efficiently explore the leases. Furthermore, the company has already paid a substantial bonus to the federal government for the right to explore the leases, and it has accrued other related evaluation and research expenses.

(2) RELOCATE DRILLING SITES

Under this alternative, drilling sites would be relocated. The proposed drilling sites were selected after a careful review of available geophysical and geologic survey work, and no other locations are presently interpreted to offer any noteworthy advantage with respect to improved possibilities of encountering hydrocarbons or avoidance of hazardous conditions, nor afford significant differences in potentially negative environmental impacts.

(3) USE A DIFFERENT VESSEL

There is no environmental advantage to using another type of drilling vessel. It is possible that another "floating" drilling unit or a jack-up rig will be used in lieu of the GLOMAR PACIFIC. If an alternative drilling unit is used, Exxon will submit any necessary additional information on such a unit to the MMS.

(4) DISPOSE OF DRILLING MUDS, CUTTINGS, AND EXCESS CEMENT AT A DIFFERENT OCEAN LOCATION OR ONSHORE

Two alternatives to the on-site disposal of oil-free muds and cuttings are disposal at different ocean locations or disposal

onshore. Both of these alternatives have major drawbacks because they require the accumulation, transfer, and bulk discharge of wastes. The potential for adverse environmental and personnel safety impacts from either of these approaches is considered far greater than that associated with on-site disposal. Furthermore, additional air emissions and costs would result from the increased use of vessels to transport these wastes away from the site.

(5) REINJECTION OR TRANSPORT OF NATURAL GAS TO SHORE INSTEAD OF FLARING

This alternative would involve reinjecting or transporting to shore the small volumes of natural gas which may be produced during testing operations. This alternative is not feasible because the volume and rate of flow of such produced gas are small and the effect on ambient air is expected to be insignificant.

(VI) UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

Very few unavoidable and irreversible impacts are expected as a result of the proposed drilling program. The unavoidable environmental effects which may occur are:

1. The short-term disturbance of the seafloor (bottom sediments) from anchors, drilling apparatus, and settled mud and drill cuttings.

   The anchors and drilling apparatus will be removed as soon as the drilling operations are completed and the bottom is expected to return to normal within a short time. In the relatively fast moving currents of the Santa Maria Basin offshore area, much of the muds and cuttings will dissipate without settling. Those that settle should be dispersed rapidly.

2. The smothering of non-mobile benthic organisms over the small area where the excess mud and drill cuttings might settle.

   The rate of accumulation of cuttings and muds on the bottom in Santa Maria Basin offshore area should be minimal because of the currents.

3. The permanent removal of minute amounts of the bedrock structure and an insignificant withdrawal of hydrocarbon resources if such resources are encountered and production tested.

   These effects are minor and insignificant.

4. An adverse localized impact on plankton and other filterfeeders due to the increased turbidity associated with the discharge of mud, cuttings, and cement.

   This effect will be temporary and very localized. A return to background turbidity levels should occur within 1,000 m (3,279 feet) of the drilling discharge site.

5. A localized and short-term impact on water quality due to discharge of drilling mud.

   The overall impact on water quality from the temporary drilling activities is expected to be insignificant because all discharges will be in accordance with conditions and limitations imposed by EPA through the NPDES permit process.

6. A minor, localized, short-term impact on offshore air quality.

The air emissions impact analysis performed as required by the MMS regulations indicates that the air emissions arising from the temporary exploration activities will not have a significant impact on any onshore area. Studies of wells closer to shore have been shown to have concentrations at the shoreline similar to those of two small automobile engines.

7. The temporary preclusion of commercial fishing activities from the immediate area around the drilling vessel and possibly along a "tow" in the flatfish, rockfish, and inshore trawl fishery.

This temporary removal of ocean waters from commercial fishing operations will affect only a small area for a limited amount of time.

8. The possible temporary disruption of uses, activities, and resources in the unlikely event of an accidental spill.

As discussed in detail in this report and Exxon's Oil Spill Contingency Plan, the possibility of a major spill for the proposed exploratory drilling activities is extremely remote. In the unlikely event that a spill occurs, prompt containment and cleanup actions will be initiated which will minimize or negate the impact of the spill on water quality, marine flora and fauna, and shoreline areas.

9. A temporary, minor impact on shipping and navigation due to the fixed location of the drilling vessel and increased service boat traffic.

Because the drilling vessel will operate under established rules of the sea and U.S. Coast Guard regulations, and will be well marked with lights and other navigation equipment, navigation hazards resulting from the exploration activities should be minimized.

(VII) REFERENCES AND CITATIONS

American Association of Petroleum Geologists. 1980. 1980 Petroleum Information Package.

Andrews, R. S. 1977. Geologic Features. In a Summary of Knowledge of the Central and Northern California Coastal Zone and Offshore Areas. Volume I: Physical Conditions. Prepared for the Bureau of Land Management.

ARCO Oil & Gas Company. 1981. Biological Survey of a Hard Bottom Feature Santa Maria Basin California. Prepared by Nekton, Inc.

Ayers, R. C. Jr. 1981. The Fate and Effect of Offshore Drilling Discharges. Presented to Second Meeting of the United Nations Environmental Consultative Committee on the Petroleum Industry. Paris, France. June 2-4, 1981.

Ayers, R. C. Jr., Meek, R. P., Sauer, T. C. Jr., and Stuebner, D. O. 1980. An Environmental Study to Assess the Effect of Drilling Fluids on Water Quality Parameters During High Rate, High Volume Discharges to the Ocean. In Symposium Research on Environmental Fate and Effects of Drilling Fluids and Cuttings. January 21-24, 1980. Lake Buena Vista, Florida.

Barabash-Nikiforov, I. I. et al. 1947. The Sea Otter (Kalan). [Translated from Russian by A. Birron and Z. S. Cole, 1962. National Science Foundation and U.S. Department of the Interior, Washington, D.C. (Israel Program for Scientific Translation, 1962)].

Bender, K. 1974. California Least Tern Census and Nesting Survey, 1973. California Department of Fish and Game Spec. Wildlife Investment. W-54-R-7 Job II-II, Final Report, 21 pp.

Benech, S., Bowker, R., and Pimental, B. 1980. Chronic Effects of Drilling fluids Exposure to Fouling Community Composition on a Semi-submersible Exploratory Drilling Vessel. Proc. Symposium Research on Environmental Fate and Effects of Drilling Fluids and Cuttings. Washington, D.C. Courtesy Associates.

Benz, C. T., and Kobetich, G. C. 1982. Southern Sea Otter Recovery Plan. U.S. Fish and Wildlife Service (Agency Review Draft).

Brannon, A. C., and Rao, K. R. 1979. Barium, strontium and calcium levels in the exiskeleton, hepatopancreas and abdominal muscle of the grass shrimp Paneomonetes pugio: relation to molting and exposure to barite. Comp. Biochem. Physiol., 63A:261-274.

Bourke, R. H., et al. 1977. Physical Oceanography. In A Summary of Knowledge of the Central and Northern California Coastal Zone and Offshore Areas. Volume I: Physical Conditions. Prepared for the Bureau of Land Management.

Bureau of Land Management. 1979. Final Environmental Impact Statement OCS Sale No. 48. Volumes 1-5. Washington, D.C. U.S. Government Printing Office.

Bureau of Land Management. September 1980. Final Environmental Impact Statement, Proposed 1981 Outer Continental Shelf Oil and Gas Lease Sale Offshore Central and Northern California, OCS Sale No. 53. Volumes 1 and 2.

Bureau of Land Management. 1981. POCS Technical Paper No. 81-9: Summary Report 1975-78 Marine Mammals and Seabirds Surveys of the Southern California Bight Area. BLM-YN-PT-81-010-1972.

CalCOFI. 1963. CalCOFI Atlas of 10-Meter Temperatures and Salinities 1949 Through 1950. California Cooperative Oceanic Fisheries Investigation Atlas No. 1.

California Air Resources Board. 1982. California Air Quality Data, Summary of 1980 Air Quality Data Gaseous and Particulate Pollutants. Volume XII.

California Coastal Commission. April 1981. Oil Spill Response Capability Study, Phase I: Clean Seas. Preliminary Draft Report.

California Department of Fish and Game. 1981. Ocean Fishing Map of Monterey and San Luis Obispo Counties.

California Department of Fish and Game. 1982a. Unpublished Data on Commercial Fish Block Landings, 1975.

California Department of Fish and Game. 1971. Unpublished Data on infauna and epifauna within Hueneme Harbor.

California Department of Fish and Game. 1982b. Unpublished Data, Preliminary Report on Fish Caught by the California Commercial Passenger Fishing Vessel Fleet, January through August, 1981.

California Department of Fish and Game. 1982c. Unpublished Data on Sportfishing on Commercial Fish Blocks, 1978.

California Division of Mines and Geology. 1978. Earthquake Epicenter Map of California 1900 through 1974. Compiled by Charles R. Real et al.

Carls, M. G. and Rice, S. D. 1980. Toxicity of Oil Well Drilling Muds to Alaskan Larval Shrimp and Crabs. Research Unit 72. Final Rept. Proj. No. R7120822. OCSEAP.

Carr, R. S., McCullock, W. L., and Neff, J. M. 1982. Bioavailability of Chromium from a used Chrome-lignosulfonate Drilling Mud to Five Species of Marine Invertebrates. Mar. Environ. Res., 6:189-204.

Carr, R. S., Raitsema, R. A., and Neff, J. M. 1980. Influence of a used Chrome-lignosulfonate Drilling Mud on the Survival, Respiration, Growth, and Feeding Activity of the Opposum Shrimp Mysidopsis almyra. Proc. Symposium Research on Environmental Fate and Effects of Drilling Fluids and Cuttings. Washington, D.C. Courtesy Associates.

Cohen, R. 1983. Biologist at California Department of Fish and Game. Personal Communication.

Crawford, R. B. and Gates, J. D. 1981. Effects of Drilling Fluid on the Development of a Teleost and an Echinoderm. Bull. Environ. Contam. Toxico., 26:207:212.

Dames & Moore. 1978. Drilling Fluid Dispersion and Biological Effects Study for the Lower Cook Inlet C.O.S.T. Well. Report prepared for Atlantic Richfield Company.

Derby, C. D., and Atema, J. 1981. Influence of Drilling Muds on the Primary Chemosensory Neurons in Walking Legs of the Lobster, Homarus americanus. Can. J. Fish. Aquat. Sci., 18:268-274.

DeWitt, J. W. et al., 1977. Fisheries. In A Summary of Knowledge of the Central and Northern California Coastal Zone and Offshore Areas. Volume II: Biological Conditions. Prepared for the Bureau of Land Management.

Dornhelm, R. B. 1977. Summary of Conflicts and Hazards. In A Summary of Knowledge of the Central and Northern California Coastal Zone and Offshore Areas. Volume I: Physical Conditions. Prepared for the Bureau of Land Management.

Ebert, E. E. 1968. A food habits study of the southern sea otter, Enhydra lutris nereis. California Department of Fish and Game.

Ecomar, Inc. 1978. Tanner Bank Mud and Cuttings Study. Conducted for Shell Oil Company.

Environmental Devices Corporation. 1976. Special Water Monitoring Study. C.O.S.T. Atlantic G-1 Well 14, July 1976. Prepared for Ocean Production Company.

ERCO, Inc. 1980. Results of Joint Bioassay Monitoring Program. Houston, Texas: Final Report to the Offshore Operators Committee under Direction of Exxon Production Research Co.

Espy, Huston & Associates, Inc. 1981. Bioassay and Depuration Studies on Two Types of Barite. Document No. 81123. Report to Magcobar Group, Dresser Industries, Inc. Houston, Texas.

Exxon Company, U.S.A. 1982. Biological Survey of Megafaunal Species on or in the Vicinity of Leases OCS-P 0404, 0405, 0410 and 0411 in the Santa Maria Basin Offshore Lease Sale Area. Prepared by Hooks, McCloskey & Associates.

Exxon Company, U.S.A. 1981. Environmental Report (Exploration) for Exploratory Wells on Four OCS Sale No. 53 Leases in the Santa Maria Basin Offshore California, OCS-P 0404, 0405, 0410, and 0411. Prepared by Hooks, McCloskey & Associates.

Fisher, E. M. 1939. Habits of the Southern Sea Otter. J. Mammal.

Gerber, R. P., Gilfillan, E. S., Page, B. T., Page, D. S., and Hotham, J. B. 1980. Short and Long Term Effects of Used Drilling Fluids on Marine Organisms. Proc. Symposium on Research and Environmental Fate and Effects of Drilling Fluids and Cuttings. Washington, D.C. Courtesy Associates.

Gerber, R. P., Gilfillan, E. S., Hotham, J. R., Galletto, L. J., and Hanson, S. A. 1981. Further Studies on the Short and Long Term Effect of Used Drilling Fluids on Marine Organisms. Unpublished Final Report (Year II) to the American Petroleum Institute.

Gerdes, E. R., Primbs, J., and Browning, B. M. 1974. Natural Resources of Morro Bay: Their Status and Future. California Department Fish and Game Coastal Wetlands Series Report Number 8.

Gettleson, D. A. 1978. Ecological Impact of Exploratory Drilling: A Case Study. Energy/Environment '78. Soc. of Petroleum Industry Biologists Symposium August, 22-24, 1978. Los Angeles, California.

Hall, K. R. L., and Schaller, G. B. 1964. Tool-using Behavior of the California Sea Otter. J. Mammal.

Hancock, D. 1977. Benthic Fauna. In A Summary of Knowledge of the Central and Northern California Coastal Zone and Offshore Areas. Volume II: Biological Conditions. Prepared for the Bureau of Land Management.

Hardy, J. T. 1977. Benthic Flora. In A Summary of Knowledge of the Central and Northern California Coastal Zone and Offshore Areas. Volume II: Biological Conditions. Prepared for the Bureau of Land Management.

Hester, Frank. 1981. Testimony, EPA Evidentiary Hearing on Lease Sale 48 NPDES Permits.

Holton, R. L. et al. 1977. Zooplankton. In A Summary of Knowledge of the Central and Northern California Coastal Zone and Offshore Areas. Volume II: Biological Conditions. Prepared for the Bureau of Land Management.

Horn, M. H. and Allen, L. G. 1978. A Distributional Analysis of California Coastal Marine Fishes. Journal of Biogeography, Vol. 5. Blackwell Scientific Publications.

Houghton, J. P., Beyer, D. L., and Thielk, E. D. 1980. Effects of Oil Well Drilling Fluids on Several Important Alaskan Marine Organisms. Proc. Symposium on Research and Environmental Fate and Effects of Drilling Fluids and Cuttings. Washington, D.C. Courtesy Associates.

Hudson, J. H. and Robbin, D. M. 1980. Effects of Drilling Mud on the Growth Rate of the Reef-Building Coral, Montastrea Annularis. Proc. Symposium Research on Environmental Fate and Effects of Drilling Fluids and Cuttings, January 21-24, 1980.

Jamison, R. J., and Johnson, A. L. 1979. Evidence of Annual Reproduction Among Sea Otters. Third Conference on the Biology of Marine Mammals. Seattle, Washington. October 7-11, 1979.

Jenkins, J. D. 1977. Climate. In A Summary of Knowledge of the Central and Northern California Coastal Zone and Offshore Areas. Volume I: Physical Conditions. Prepared for the Bureau of Land Management.

Johnson, L. A. et al. 1977. Recreational Site Vulnerability. In A Summary of Knowledge of the Central and Northern California Coastal Zone and Offshore Areas. Volume III Socioeconomic Conditions. Prepared for the Bureau of Land Management.

Kenyon, K. W. 1969. The Sea Otter in the Eastern Pacific Ocean. North Am. Fauna. 68. Washington, D.C. U.S. Government Printing Office.

Kooyman, G. L. and Costa, D. P. 1979. Effects of Oiling on Temperature Regulation in Sea Otters. Yearly Progress Report. Outer Continental Shelf Energy Assessment Program.

Lees, D. C., and Houghton, J. P. 1980. Effects of Drilling Fluids on Benthic Communities at the Lower Cook Inlet C.O.S.T. Well. Proc. Symposium on Research and Environmental Fate and Effects of Drilling Fluids and Cuttings. Washington, D.C. Courtesy Associates.

Lehtonen, P. March, 1982. California Department of Fish and Game. Personal Communication.

Limbaugh, C. 1961. Observations on the California Sea Otter. J. Mammal.

Lensink, C. J. 1962. The History and Status of Sea Otters in Alaska. PhD. Thesis, Purdue University.

Liss, R. G., Knox, F., Wayne, D., and Gilbert, T. R. 1980. Availability of Trace Elements in Drilling Fluids to the Marine Environment. Proc. Symposium on Research and Environmental Fate and Effects of Drilling Fluids and Cuttings. Washington, D.C. Courtesy Associates.

Los Angeles Office, California Department of Employment Development. 1982. Personal Communication.

Mahrdt, C. R., Oberbauer, T. A., Rieger, J. P., Verfaillie, J. R. 1976. Natural Reources of Coastal Wetlands in Northern Santa Barbara County. California Department Fish and Game Coastal Wetlands Series Number 14.

Maurer, D., Leathem, W., and Menzie, C. 1981. The Impact of Drilling Fluid and Well Cuttings on Polychaete Feeding Guilds From the U.S. Northeastern Continental Shelf. Mar. Pollut. Bull., 12:342-347.

McCulloch, O. S., Clarke, S. H., Jr., Field, M. E., Scott, E. W., and Utter, P. M. 1977. A Summary Report on the Regional Geology, Petroleum Potential, and Environmental Geology in the Area of Proposed Lease Sale No. 53, Central and Northern California Outer Continental Shelf. U.S. Geological Survey Open-File Report 77-593.

McCulloch, W. L., Neff, J. M. and Carr, R. S. 1980. Bioavailability of Heavy Metals from Used Offshore Drilling Muds to the Clam Rungia cuneata and the Oyster Crassostrea gigas. Symposium Research on Environmental Fate and Effects of Drilling Fluids and Cuttings. Lake Buena Vista, Florida. January 21-24, 1980.

McLeay, D. J.. 1976. Marine Toxicity Studies on Drilling Fluid Wastes. Vol. 10, Yellowknife, N.W.T., Canada: Industry/Government Working Group on Disposal of Waste Fluids from Petroleum Exploratory Drilling in the Canadian Arctic.

Meek, R. P., and Ray, J. P. 1980. Induced Sedimentation, Accumulation, and Transport Resulting from Exploratory Drilling Discharge of Drilling Fluids and Cuttings. Symposium Research on Environmental Fate and Cuttings. Washington, D.C. Courtesy Associates.

Menzie, C. A., Maurer, D., and Leathem, W. A. 1980. An Environmental Monitoring Study to Assess the Impact of Drilling Discharges in the Mid-Atlantic IV. The Effects of Drilling Discharges on the Benthic Community. Symposium, Research on Environmental Fate and Effects of Drilling Fluids and Cuttings. Washington, D.C. Courtesy Associates.

Morejohn, G. V. 1977. Marine Mammals. In A Summary of Knowledge of the Central and Northern California Coastal Zone and Offshore Areas. Volume II: Biological Conditions. Prepared for the Bureau of Land Management.

Nakassis, A. 1982. Has Offshore Oil Production Become Safer? U.S. Geological Survey Open File Report 82-232. 27 pp.

National Academy of Science. 1982. National Research Council Working Papers on Drilling Fluids and Cuttings. Unpublished.

National Oceanic and Atmospheric Administration. 1982a. Climatological Data, Annual Summary, California, 1981.

National Oceanic and Atmospheric Administration. 1982b. Local Climatological Data, 1981, Santa Maria, California.

National Oceanic and Atmospheric Administration. 1980a. Climatology and Oceanography of the California Shelf Region.

National Oceanic and Atmospheric Administration. 1980b. Final Environmental Impact Statement Prepared on the Proposed Channel Islands Marine Sanctuary. Office of Coastal Zone Management. Washington, D. C.

National Oceanic and Atmospheric Administration. 1973. Local Climatology Data, Annual Summary with Cooperative Data. Santa Maria, California.

National Maritime Research Center. 1981. Santa Barbara Channel Risk Management Program. Prepared for the California Coastal Commission.

Naval Weather Service Command, Fleet Weather Facility, San Diego. 1976. Climatological Study Southern California Operating Area NWSED.

Neff, J. M. 1981. Rebuttal Testimony on the Toxicity and Biological Effects of Used Offshore Drilling Fluids to Marine Animals.

Neff, J. M. 1980. Effects of used Drilling Muds on Benthic Marine Animals. American Petroleum Institute. Washington, D.C.

Neff, J. M., Carr, R. S., and McCulloch, W. L. 1981. Acute Toxicity of a used Chrome Lignosulfonate Drilling Mud to Several Species of Marine Invertebrate. Mar. Environ. Res., 4:251-266.

Nicholson, N. L. 1972. The Santa Barbara Oil Spill in Perspective. California Marine Research Committee CalCOFI Report No. 16.

Page, G. W. et al. 1977. Marine and Shore Birds. In A Summary of Knowledge of the Central and Northern California Coastal Zone and Offshore Areas. Volume II: Biological Conditions. Prepared for the Bureau of Land Management.

Page, D. S., Page, B. T., Hotham, J. R., Gilfillan, E. S., and Gerber, R. P. 1980. Bioavailability of Toxic Constituents of used Drilling Muds. Proc. Symposium Research on Environmental Fate and Effects of Drilling Fluids and Cuttings. Washington, D.C. Courtesy Associates.

Peterson, R. S., and Odermar, M. W. 1969. Population Growth of the Sea Otter in California: Results of Aerial Censuses and Behavioral Studies. Menlo Park: Annual Conference on Biol. Sonar and Diving Mammals, Stanford Res. Inst.

Ray, J. P. and Meek, R. P. 1980. Water Column Characterization of Drilling Fluids Dispersion from an Offshore Exploratory Well on Tanner Bank. In Symposium Research on Environmental Fate and Effects of Drilling Fluids and Cuttings. Lake Buena Vista, Florida. January 21-24, 1980.

Ray, J. P. and Shinn, E. A. 1975. Environmental Effects of Drilling Muds and Cuttings. Presented in the Conference Proceedings of the Environmental Aspects of Chemical Use in Well-Drilling Operations, Sponsored by the U.S. Environmental Protection Agency. Houston, Texas. May 21-23, 1975.

Riznyk, R. Z. 1977. Phytoplankton. In A Summary of Knowledge of the Central and Northern California Coastal Zone and Offshore Areas. Volume II: Biological Conditions. Prepared for the Bureau of Land Management.

Rubinstein, N. I., Rigby, R., and D'Asaro, C. N. 1980. Acute and Aublethal Effects of Whole Used Drilling Fluids on Representative Estuarine Organisms. Proc. Symposium Research on Environmental Fate and Effects of Drilling Fluids and Cuttings. Washington, D.C. Courtesy Associates.

San Luis Obispo County Planning Department. January, 1982. Comments on Draft ARCO Environmental Report (Exploration) OCS-P 0420, 0425, and 0430.

Schneider, K. B. 1972. Reproduction in the Female Sea Otter. Alaskan Department of Fish and Game, Project Progress Report, Federal Aid in Wildlife Restoration, Project W-17-4.

Sea Tales. May, 1982. An Interpretation of a Geophysical Engineering Survey Offshore California Santa Maria Area; NI 10-6, OCS Blocks 288 and 331 for Exxon Company, U.S.A.

Secretary of State. 1981. Personal Communication.

Sharp, J. R., Carr, R. S., and Neff, J. M. 1982. Influence of Used Chrome Lignosulfonate Drilling Mud of the Early Life History of the Mummichog Fundulus heteroclitus. In Proc. Ocean Dumping Symposium. New York. Plenum Press.

Simpson, Jay P. April 17, 1981. Testimony Prepared for EPA Evidentary Hearing.

Siniff, D. B. et al. Unpublished ms. Experiments on the Response of Sea Otters (Enhydra lutris) to Oil Contamination.

Smith, K. A. 1976. The Natural Resources of Nipomo Dunes and Wetlands. California Department of Fish and Game. Coastal Wetlands Series Number 15. 106 pp. and append.

Smith, S. W. 1974. Analysis of Offshore Seismicity in the Vicinity of the Diablo Canyon Nuclear Plant. Report prepared for Pacific Gas and Electric Company.

State Lands Commission. April 1982. Program Environmental Impact Report, Leasing Exploration and Development of Oil and Gas Resources on State Tide and Submerged Lands, Point Conception to Point Arguello, Santa Barbara County, California. Prepared by Chambers Consultants and Planners.

Straughan, D. 1970. Ecological Effects of the Santa Barbara Oil Spill. Santa Barbara Oil Symposium. University of California, Santa Barbara.

Straughan, D. 1973. The Influence of the Santa Barbara Oil Spill (January-February, 1969) on the Intertidal Distribution of Marine Organisms. USC publication to Western Oil and Gas Association.

Tagatz, M. E., Ivey, J. M., DalBo, C. E., and Oglesby, J. L. 1982. Responses of Developing Estuarine Macrobenthic Communities to Drilling Muds. Estuaries 5:131-137.

Thompson, J. H. and Bright, T. J. 1980. Effects of an Offshore Drilling Mud on Selected Corals. Symposium Research on Environmental Fate and Effects of Drilling Fluids and Cuttings. Lake Buena Vista, Florida. January 21-24, 1980.

Tornberg, L. D., Thielk, E. D., Nakatoni, R. E., Miller, R. C., and Hillman, S. O. 1980. Toxicity of Drilling Fluids to Marine Organisms in the Beaufort Sea, Alaska. Proc. Symposium Research on Environmental Fate and Effects of Drilling Fluids and Cuttings. Washington, D.C. Courtesy Associates.

Traganza, E. D., et al. 1977. Chemical Oceanography. In A Summary of Knowledge of the Central and Northern California Coastal Zone and Offshore Areas. Volume I: Physical Conditions. Prepared for the Bureau of Land Management.

University of California, Santa Barbara. 1971. Santa Barbara Oil Spill: Short-Term Analysis of Macroplankton and Fish. EPA Publication 15080EAL02/71.

University of California-Santa Cruz. 1982. Marine Mammal and Seabird Study-Central and Northern California Annual Progress Report. Bureau of Land Management.

U.S. Coast Guard. Draft. 1981. Notice of Proposed Rulemaking: San Francisco-Santa Barbara Channel Vessel Routing System.

United States Fish and Wildlife Service. 1981. Pacific Coast Ecological Inventory, Santa Maria, California. Map.

United States Fish & Wildlife Service. 1980. Biological Opinion Regarding Outer Continental Shelf Leasing and Exploration Offshore Central and Northern California.

United States Geological Survey. 1980. A Summary Report of the Geology and Geologic Hazards in Proposed Lease Sale No. 53, Central California Outer Continental Shelf. USGS Open-File Report No. 80-1095.

United States Geological Survey. 1974. Final Environmental Impact Statement Proposed Plan of Development Santa Ynez Unit Santa Barbara Channel, Off California. (FES 74-20). Volumes 1-3. Washington, D.C. U.S. Government Printing Office.

Vandevere, J. E. 1969. Feeding Behavior of the Southern Sea Otter. Proc. 6th Annual Conf. Biol. Sonar and Diving Mammals. Stanford Research Institute.

Vandevere, J. E. 1970. Reproduction in the Southern Sea Otter. Proc. 7th Ann. Conf. Biol. Sonar and Diving Mammals. Stanford Research Institute. 1970.

Vandevere, J. E. 1978. Gestation Period. Otter Raft No. 19.

Vandevere, J. E. 1979. Gestation and Dependency Period Update. The Otter Raft No. 21.

Western Oil and Gas Association. 1981. Fisheries and Environmental Training Program. Prepared by Interstate Electronics Corporation.

Western Oil and Gas Association. 1983. An Overview of Sea Otter Oil Spill Risk Analysis, prepared by TetraTech, Inc. (see references for Wendell, F. pers. comm.).

Wild, P. W. and Ames, J. A. 1974. A Report on the Sea Otter, Enhydra lutris, in California. Calif. Dept. of Fish and Game, Resources Agency, Mar. Res. Tech. Rept. No. 20.

Williams, T. D. 1978. Chemical Immobilization, Baseline Hematological Parameters and Oil Contamination in the Sea Otter. Final Report to U.S. Marine Mammal Commission in Fulfillment of Contract MM7ADO94. Report No. MMC-77/06. U.S. Department of Commerce, National Technical Information Service PB-283 969.

Zingula, R. P. 1975. Effects of Drilling Operations in the Marine Environment. Environmental Aspects of Chemical Use in Well Drilling Operations. EPA-560/1-75-004. U.S. Environmental Protection Agency.

APPENDIX A

DESCRIPTION OF THE GLOMAR PACIFIC

VESSEL AND EQUIPMENT DESCRIPTION

GLOMAR PACIFIC

GLOBAL MARINE INC.

JUNE 1977

VESSEL AND EQUIPMENT DESCRIPTION
GLOMAR PACIFIC

CONTENTS

Contents
Page 2

Page

5. VESSEL PLANS

VESSEL AND EQUIPMENT DESCRIPTION
GLOMAR PACIFIC

1. VESSEL DESCRIPTION

The Glomar Pacific is a completely outfitted and equipped self-propelled offshore drillship capable of drilling to 25,000'. It is currently outfitted for water depths to 2,000'. With the addition of riser pipe, BOP control line, and guide lines, the maximum water depth can be increased to 3,000'. The vessel is moored with an eight point wire line system or can be dynamically positioned. Computer control permits simultaneous use of the dynamic positioning with the wire line system to automatically minimize mooring line tensions. Structural and sea keeping components of the vessel are designed to withstand winds exceeding 100 knots and waves greater than 100'.

1.1 Certification

This vessel is designed and constructed for U. S. Flag Registration. It meets all requirements of the American Bureau of Shipping (✠ A1 Ⓔ ✠ AMS Drilling Unit). It also complies with United States Coast Guard, United States Public Health Service, Federal Communications Commission, and other regulatory agency requirements for U. S. Flag Registration.

1.2 Design Features

Length	452' 0"
Beam	72' 0"
Depth	35' 0"
Draft, Loaded	23' 6"
Center Well	26' 0" x 26' 0"
Propulsion	Twin screw, each driven by 3 GE5CD9582 electric motors, each motor rated at 1600 horsepower
Thrusters	5 Thrusters, 1675 horsepower each, 3 Fwd, 2 Aft
Estimated Speed	14.0 knots

1.3 Loading Data

Lightship Displacement	8,153 long tons
Maximum Loaded Displacement	14,751 long tons
Maximum Variable Load	6,598 long tons

1.4 Storage Capacity

Sack material, mud, chemicals, cement, etc.	15,000 cubic feet
Bulk mud	16,890 cubic feet
Liquid mud	
a) Active	594 barrels
b) Reserve	3,044 barrels
Bulk Cement	7,415 cubic feet
Tubular Goods	
a) Casing rack, (nominal)	400 long tons
b) Casing hold, (nominal)	600 long tons
General Cargo	200 long tons
Potable Water	1,140 barrels
Drilling Water	19,163 barrels
Fuel, Diesel	15,751 barrels
Lube Oil	407 barrels
Pipe Racker	23,580 feet

1.5 Heliport

Dimensions	83' 0" x 90' 0"
Load Capacity	12,300 pounds per square foot equal to Sikorsky S-61 helicopter
Jet Refueling System	2,208 gallon capacity

1.6 Living Quarters

Air conditioned quarters and dining facilities for eighty-one (81) men aft and twenty (20) men forward.

1.7 Meteorological Instruments

Barometer
Psychrometer (wet and dry bulb)
Anemometer
Current Meter
Weather facsimile

1.8 Communications Equipment

Radio-telephone - single side band
High seas radio-telegraph system
VHF transceiver - bridge to bridge
Sound powered telephone system
PA system
Lifeboat radios

1.9 Electronic Navigational Aids

Radar
Fathometer

1.9 Electronic Navigational Aids (continued)

Radio direction finder
Gyro-compass
Automatic fog signal
Omega

1.10 Power Plants

Main Power Plants

AC power - 4-2750 KW generators, 600V, 3 phase, 60 cycle, driven by four diesel engines, rated capacity 3900 HP continuous.
DC power - 9-SCR AC to DC power conversion units. Rated capacity 1800 amps, 750V.

Emergency Power

1 - 600KW AC emergency generator driven by diesel engine.

1.11 Air Compressors

2 - 685 cfm, 125 psi air compressors, with aftercoolers. System includes air dryer.

1.12 Water Distillation Units

2 - waste heat distillation units. Rated capacity 14,400 gallons per day total.

1.13 Ship's Pumps

Two each for fuel, drill water, fresh water circulating system, salt water cooling system, fire, bilge. One pump for sanitary system.

1.14 Cranes

1 - Bucyrus Erie MK 35 crane, powered by GM 8V-71 diesel engine, rated capacity 63 tons, port, or equal.
1 - Unit Mariner 300 crane, powered by GM 3-71 diesel engine, rated capacity 19.7 tons, port, or equal.
1 - Unit Mariner 300 crane, powered by GM 3-71 diesel engine, rated capacity 19.7 tons, starboard side at casing rack, or equal.

1.15 Welding Machines

2 - Lincoln, 300 amp, electric welding machines.
6 - Welding outlets.

2. VESSEL MOORING SYSTEM

Vessel is moored with an eight point wire line system designed for a water depth of 2,000'. The computer controlled dynamic positioning system on board can be used to minimize mooring line stresses during severe weather conditions.

2.1 Winches and Fairleaders

Skagit Model ETW-300 mooring winches with 350 hp (575V/3/60) Harnischfeger electric drive system.

Skagit Model DWF-48 deck mounted fairleads.

2.2 Mooring Lines and Anchors

3" x 6,000' 6 x 37 IWRC IPS PRL galvanized mooring lines
Vicinay Type II Offdrill 30,000 lb anchors

2.3 Pendant Line System and Anchor Buoys

2-1/8" 6 x 37 Bright IPS RRL FS IWRC wire rope pendants.

Welded steel cylindrical anchor buoys, 10' 6" long x 8' diameter. Their net buoyancy is 24,780 lbs each.

3. SAFETY SYSTEMS

3.1 Fire Protection Systems

Fire water is provided by two 425 gpm centrifugal pumps. One pump is located in the engine room and the other is located in the mud pump room. Fire water outlets are located at 29 points over the vessel.

A seawater deluge system is also provided for the rig floor, mud pits, mezzanine deck, and moon pool. The water for this system is furnished by a centrifugal pump rated at 1100 gpm. Piping for both systems is galvanized steel with steel body valves and fittings.

Equipment

Fire Pumps

2 - Ingersoll-Rand Model HC 3 x 2 x 9 centrifugal pumps powered by 40 hp electric motors. Pump capacities are 420 gpm each at 255' TDH.

Deluge Pump

1 - Ingersoll-Rand Model SC 4 x 11 centrifugal pump powered by a 125 hp electric motor. Pump capacity is 1100 gpm at 320' TDH. (This pump also supplies the foam system.)

In addition to these water systems, other modes of fire suppression are provided in the following areas.

Engine and Generator Room - Ansul 3,100 lb. CO_2 system. Manually actuated.

Pump and Propulsion Room - Ansul 2,000 lb. CO_2 system. Manually actuated. These two CO_2 systems may be interconnected if necessary.

Point Locker - Ansul 150 lb. CO_2 system. Manually actuated.

Helicopter Deck - National Foam Company foam system consisting of a 175 gal. proportioner and a 1100 gal. centrifugal pump (which is also used for the deluge system). Foam is supplied to one monitor nozzle and four hose reels. A 75 lb. CO_2 extinguisher and a 150 lb. dry chemical extinguisher are also installed at the helicopter deck.

A total of 67 CO_2 and dry chemical extinguishers are installed at various locations onboard as required by U. S. Coast Guard regulations.

3.2 Breathing Air System

This system provides emergency breathing air at four stations. These are located in the forward and aft quarters, main deck machinery room, and the rig floor. Each station consists of a seven outlet breathing air manifold and three 300 cf storage bottles. Air for the system is supplied by two compressors. These units, each rated at 15 cfm at a working pressure of 3,600 psi, are located in the aft switchgear room and the forward machinery house. The compressors are equipped with air receivers and connectors for recharging the air storage bottles. System piping connecting the compressors and breathing air stations is one half inch diameter stainless steel with a 3,600 psi working pressure.

3.3 Survival Systems

Survival equipment inclues two MASECO 64-person lifeboats, two MASECO 42-person lifeboats, and four Elliot 20-man inflatable life rafts. The lifeboats are constructed of fiber-glass reinforced plastic. They are fully enclosed and are provided with a self-contained water spray system. These boats are carried in a gravity operated davit with wire rope falls. A water spray system at each lifeboat station protects the boats and personnel during loading. Life jackets, preservers, and other miscellaneous emergency equipment are provided as per U. S. Coast Guard regulations.

3.4 Gas Detection and Alarm System

This system continuously monitors the presence of gas in four locations with hot wire sensing devices installed (1) on the rig floor, (2) in the Mud Pump Room, (3) under the rig just below the mezzanine deck, and (4) 3' above the shale shaker. Each sensor is connected directly to an individual electronic monitoring device located in the Engine Control Room. A remote alarm panel is also provided in the Drillers House. Alarms are provided simultaneously in both locations by an indicator light at 45 percent of the Lower Explosive Level (LEL), by a bell at 80 percent LEL, and by a horn at 95 percent LEL. This system was furnished by the E. D. Bullard Company.

3.5 H_2S Detection and Alarm System

Detectors are installed at nine locations to monitor the presence of H_2S gas. Each detector is connected to a separate monitoring device which provides a continuous recording of the H_2S concentration as well as visual and audible alarms. Alarm lights in the monitoring units indicate when H_2S concentrations of 5 and 10 ppm have been reached. An alarm bell also sounds at the higher level.

3.5 H2S Detection and Alarm System (continued)

System equipment is installed at the following locations.

Detector	Monitoring Unit	Alarm
Diverter Housing Above Flowline	Mud Logging Unit	Rig Floor
Shale Shaker	Mud Logging Unit	Rig Floor and Mud Logging Unit
Flowline	Mud Logging Unit	Rig Floor and Mud Logging Unit
Driller's Stand	Rig Floor	Rig Floor and Mud Logging Unit
Mud Pit Area	Mud Logging Unit	Mud Pit Area, Rig Floor and Mud Logging Unit
Trip Tank	Mud Logging Unit	Rig Floor and Mud Logging Unit
Inside Port Entrance to Aft Quarters on Main Deck	Aft Quarters	Galley
Inside Starboard Entrance to Aft Quarters on Main Deck	Aft Quarters	Galley
Inside Entrance to Forward Quarters	Mud Logging Unit	Forward Quarters and Mud Logging Unit

3.6 Contaminated Drain System

The drill floor and contaminated deck areas drain to a two compartment 11 bbl settling tank. Effluent from this tank flows to a 165 bbl Oily Water Tank. The discharge from this tank is pumped through a Separation and Recovery Systems, Inc. 10 gpm oil/water separator before discharge into the ocean. Flow, both in and out of the oily water tank, can be manually directed through Demco Hydrocyclone centrifugal separators as necessary for the removal of solids.

The removal of bilge water is manually controlled. This water is pumped directly overboard if clean or may be directed through the Oily Water Tank if necessary for oil removal.

Oil extracted by the SRS oil/water separator is centrifuged and returned to the diesel oil day tank for the main engines.

3.7 Sanitary Sewage Collection and Disposal System

Sewage is collected by two separate gravity systems fabricated from galvanized Sch 80 steel pipe. Discharge from the showers, lavatories, laundries, is collected in one system and dumped overboard. Water closets discharge through a separate system to a USCG approved DEMCO Model 5000 3-Stage Marine Biological Sewage treating unit with a 100 man capacity. Solids are removed and incinerated in the unit. The electrolytic action in the secondary holding tank in the unit generates sufficient chlorine to maintain a 1.0-2.0 mg/l residual in the treated effluent which is discharged to the ocean. All discharges from this system meet the requirements of the EPA NPDES discharge permit.

4. DRILLING EQUIPMENT

4.1 Major Drilling Components

4.1.1 Drawworks: National 1625 DE drawworks, with Elmagco type 7838 eddy current brake; equipped with 1-1/2", 6 x 19, improved plow steel drilling line and 20,000 feet of 9/16", 6 x 7, galvanized steel sand line; powered by three GE752 electric motors.

4.1.2 Driller Command Capsule:

a. One each Shifter console assembly

1) Rat hole control
2) Secondary motion compensator control panel
3) Hydraulic cat head control
4) Water to rims pressure gauge
5) Water to auxilliary brake gauge
6) Oil pressure gauge
7) Drum on-off
8) High-neutral low
9) Catshaft on-off

b. One each Drawworks Control and Throttle Box Console

1) Kelley spinner control valve
2) Core reel clutch
3) Intercom to moon pool
4) Intercom to test separator
5) Telephone

4.1 Major Drilling Components (continued)

c. One each Driller's Console consisting of the following:

1) Elmagco brake control
2) Elmagco brake selector switch
3) Crownomatic control valve
4) Lo-drum RPM
5) Hi-drum RPM
6) Core reel and cat head panel

d. One each Throttle box consisting of the following:

1) RT/PS throttle
2) Mud pump No. 1 throttle
3) Mud pump No. 2 throttle
4) Drawworks throttle

e. One each Main Driller Console

1) SPM system complete with generator
2) Tong torque
3) Mud gauge system
4) Rotary table RPM
5) Mud flow system with indicating and alarm console, flow sensor, and pump stroke switches
6) Mud volume totalizer system for four pits
7) Weight indicator
8) Rotary torque
9) Primary motion compensator control panel

4.1 Major Drilling Components (continued)

f. One each Pipe Racker and Stabber console

g. One each Recorder Console

1) Recorder, mud volume
2) Recorder, mud flow and pump strokes
3) Mud density recorder
4) B.O.P. and diverter control panel
5) DPS scope
6) TV monitor and control unit

h. One each Choke control console

1) Swaco choke control console

i. One each Tensioner control console

1) Riser tensioner console
2) Guide line tensioner

j. One each Other Equipment and Instrumentation

1) Record-o-graph (7 channel) including weight, mud pressure, electric torque, RPM, 2 SPM and rate of penetration

2) Continuous drilling rate logger

4.1.3 Derrick: 142' x 61' x 38' bolted, galvanized steel derrick - 1,000,000 lbs. hook load capacity - Global Marine design.

4.1.4 Sub-Base: Global Marine design, 1,200,000 lbs. casing load capacity.

4.1.5 Mud Pumps: 1600 HP, 7" x 12" triplex power pumps; each pump powered by two GE752RI electric motors.

4.1.6 Rotary Table: National C-495, 49-1/2" table opening, independently driven by one GE752RI electric motor.

4.1.7 Crown Block: 650 ton capacity, designed for use with single-piston motion compensator.

4.1.8 Hook-Block: 650 ton capacity, designed for use with single-piston motion compensator.

4.1 Major Drilling Components (continued)

4.1.9 Motion Compensator: 20-foot stroke, 400,000 lbs. single-piston unit, complete with all associated equipment.

4.1.10 Traveling Block Guide System: Two rail system, Global Marine design, including spare rail.

4.1.11 Swivel: National P-650, bail capacity 650 tons.

4.1.12 Rotary Hose: Two each 3-1/2" I.D., wire braid, 10,000 PSI - test with 4" male thread coupling.

4.1.13 Kelly: Two each 6" x 48' square, with 10,000 psi upper and lower Kelly valves as follows:

a. 2 each - Upper Kelly full opening ball valves (one installed)
b. 2 each - Hydril (or equivalent) full opening lower Kelly valve (one installed).

4.1.14 Iron Roughneck - Varco. Floor mounted modular unit incorporating torque wrench for 4" O.D. to 8" O.D. tool joints and drill collars; hydraulic spinning wrench for 2-7/8" to 8" O.D. drill pipe and drill collars. Power slip assembly for 3-1/2" to 5" O.D. drill pipe for above.

4.2 Drill String

4.2.1 Drill Pipe:

a. 10,000' - 5" O.D., Grade E 19.5 lb./ft. range 2 drill pipe, with 5" NC-50 x 6-1/2" O.D., 18 degree taper, non-hard banded tool joints, plastic coated internally.
b. 15,000' - 5" O.D., Grade G 19.5 lb./ft. range 2 drill pipe, with 5" NC-50 x 6-1/2" O.D., 18 degree taper, non-hard banded tool joints with single grooves, plastic coated internally, and quenched and tempered.

4.2.2 Drill Pipe Pup Joints:

a. One each 5" drill pipe pup joint, 5', 10', and 15' long as specified in Item 1(b).
b. One each 5" blank pup joint with 5" NC-50 pin by slick end for testing BOP stack.

4.2 Drill String, (continued)

4.2.3 Drill Collars:

a. 6 - 9" O.D. x 3" I.D. x 30' long collars with 7-5/8" API Regular box and pin connections. AISI 4145H fully heat treated alloy steel, hob cut connections, API stress relief at box and pins, cold roll thread roots and phos coated. Grooved for ziplift slips and elevators.

b. 30 - 8" O.D. nominal 3" I.D. x 30'0" long with 6-5/8" API REG connections. AISI 4145H fully heat treated alloy steel, hob cut connections, API stress relief at box and pins, cold roll thread roots and phos coated. Grooved for ziplift slips and elevators.

c. 40 - 6-1/2" O.D. x 2-13/16" I.D. x 30'0" long with 4" I.F. connections. AISI 4145H fully heat treated alloy steel, hob cut connections, API stress relief at box and pins, cold roll thread roots and phos coated. Grooved for ziplift slips and elevators.

4.2.4 Stub drill collars 2 each (9", 8" and 6-1/2") 15-foot lengths, as described in Item 3, above.

4.2.5 Subs: Sufficient for Contractor furnished drill pipe, drill collars and drill tools, including kellys.

4.2.6 Eight stabilizer bodies for 8-1/2" hole, and six stabilizer bodies for 12-1/4" hole (drillable wing or rubber sleeve type).

4.2.7 Necessary stabilizer wings or sleeves and spare parts for stabilizer bodies.

4.2.8 Sufficient box and pin thread protectors for all Contractor equipment.

4.3 Blowout Preventers, Subsea Equipment and Control Equipment

4.3.1 Diverter System: Regan type diverter system capable of containing 100 PSI pressure and equipped with hydraulically operated seals.

4.3. Blowout Preventers, Subsea Equipment and Control Equipment, (continued)

Diverter lines will be 8" - 12" with sliding gate valves. The diverter lines are designed for 100 MMSCFPD at 100 PSI pressure drop. Diverter equipment to be trimmed for H_2S service, as appropriate. The diverter is controlled by a hydraulic diverter control manifold to supply hydraulic pressure to KFD bag, insert latch and riser support latch, all being controlled from the master or remote control panels.

National 30-inch wellhead latch connector for diverter.

4.3.2 16-3/4", 10,000 PSI W.P. blowout preventer system consisting of the following (trimmed for H_2S service as appropriate).

a. Regan riser adaptor - FC 8

b. CIW 19 clamp

c. Regan CR-1 pressure balanced ball joint with 16-3/4" 5,000 PSI CIW 19 clamp hub up (BX 163 seal ring) 16-3/4" 10,000 PSI flange down with 162 ring groove.

d. Two blowout preventers - Rucker Shaffer spherical 18-3/4" - 5,000 PSI with 18-3/4" bore. 16-3/4" - 10,000 PSI BX 162 studded top. 16-3/4" - 10,000 PSI BX 162 hub bottom. S.S. lined ring grooves and H_2S service. Neoprene packing element. 1 each 10 gallon surge bottle on closed side and open side and all standard accessories.

e. CIW clamp 28 special type "B".

f. National Taper Connector 16-3/4" 10,000 W.P. top with #28 clamp hub.

g. National Taper Mandrel, 16-3/4" 10,000 flange down with BX-162 ring groove.

h. CIW 28 clamp special type "B".

i. One Blowout preventer. Cameron type U 16-3/4" 10,000 PSI W.P., single 16-3/4" 10,000 PSI W.P. BX-162 clamp hub top and bottom, two 3-1/8" 10,000 PSI W.P. BX-154 clamp hub outlets, assembled with one set of new style shear rams and wedge locks and balance chambers, S.S. lined ring grooves, prepped internally for H_2S service but with standard bonnet bolts.

4.3 Blowout Preventers, Subsea Equipment and Control Equipment, (continued)

j. CIW 28 clamp special type "B".

k. One Blowout preventer, Cameron type U 16-3/4" 10,000 PSI W.P. double, 16-3/4" 10,000 PSI W.P. B-162 clamp hub top and bottom, four 3-1/8" 10,000 PSI W.P. BX-154 clamp hub outlets, assembled with one set of 5" pipe rams in the upper ram cavity and one set of 3-1/2" pipe rams in the lower cavity of the blowout preventer.

l. CIW 28 clamp special type "B".

m. One marine system equipment blowout preventer, Cameron type U 16-3/4", 10,000 PSI W.P. double. 16-3/4" 10,000 PSI W.P., BX-162 clamp hub top and bottom, four 3-1/8" 10,000 PSI W.P. BX-154 clamp hub outlets, assembled with two sets of 5" pipe rams and wedge locks and balance chambers, S.S. lined ring grooves prepped internally for H_2S service but with standard bonnet bolts.

n. National 16-3/4" well head connector 10,000 PSI W.P. top #28 clamp hub.

4.3.3 BOP Kill and Choke Line System:

a. Master Valves: Two each McEvoy 10,000 PSI W.P. 3-1/8" right angle failsafe valves, hydraulic open, hydraulic assist close, with CIW 5 clamp hubs (BX-154 seal rings).

b. Operating Valves: Two (2) each McEvoy 10,000 PSI W.P. 3-1/8" straight through failsafe valves, hydraulic open, hydraulic assist close, with CIW 5 clamp hubs (BX-154 seal rings).

c. Location of Outlets: to be agreed between Company and Contractor.
All other outlets to be non-machine bored and capped with blind flanges with CIW 5 clamp hubs (BX-154 seal rings).

d. BOP choke and kill lines: 10,000 PSI W.P. 3-1/8" spools.

e. Ball Joint Jumper Connection: Regan 10,000 PSI W.P. steel choke and kill helicoils.

4.3 Blowout Preventers, Subsea Equipment and Control Equipment, (continued)

4.3.4 BOP Guidance System:

a. Four-post BOP frame on six foot radius centers complete with reinforcement and guide funnels as required. Funnels and posts slotted for guide wire installation, internally ground and complete with retaining doors. Frame attaches at lower annular preventer and at wellhead connector.

National Guideline Re-establishment System:

b. Lower marine riser guide frame with guide funnels on six foot radius centers complete, with reinforcement as required. Funnels slotted for guide wire installation, internally ground and complete with retaining doors. Frame attaches at marine riser connector.

4.3.5 Miscellaneous Equipment Items:

a. Spare ram rubbers.
b. Five sets 5" rams complete (includes three installed in BOP).
c. Three sets 3-1/2" rams complete.
d. Two sets shear rams complete (includes one set installed in BOP).
e. Six each spherical bag elements (includes two each installed in BOP).

4.3.6 H_2S Service Requirements:

a. All components exposed to well bore fluids to be trimmed for H_2S service - (includes BOP, valves, and choke and kill lines on BOP, choke manifold and diverter system).

4.3.7 BOP Moonpool guidance system.

4.3.8 BOP Cart System:

Two-cart hydraulic skidding system to allow stowage of BOP in either one or two sections.

4.3.9 Marine Conductor Regan Buoyant type FCF-8 - 18-3/4" x 40" O.D. x 50' each with two 4" O.D. 10,000 lb. PSI choke and kill lines, 4130 mechanical tubing, one 2-7/8" O.D. air injection line and one 2-7/8" O.D. hydraulic supply line. Sufficient joints to drill in 2,000 ft. W.D., with following pup joints one 18-3/4" x 25', one 18-3/4" x 15', one 18-3/4" x 10', one 18-3/4" x 5'.

4.3 Blowout Preventers, Subsea Equipment and Control Equipment, (continued)

Note: Drilling unit to be equipped with air compressor capacity for evacuation of buoyant riser cans for operation in 2000 foot water depth. Space has been provided for installation of additional air compressor capacity to accommodate water depths greater than 2000 feet.

4.3.10 Slip joint two each: Regan type FC-8 38 foot stroke, inner barrel 18-3/4" O.D. x 5/8" wall pipe and terminates with a FC-8 riser boxup. Outer barrel 24" O.D. x 5/8" wall, end terminates with FC-8 pin down. Two 4" O.D. 10,000 PSI choke and kill lines, two 2-7/8" O.D. lines, for hydraulic supply and air injection.

4.3.11 One Regan ball joint, pressure balanced type CR-1 (spare).

4.3.12 Handling tools for riser, slip joints and associated equipment.

4.3.13 Surface Choke and Kill Transition Hoses: 15,000 PSI test pressure. 3" I.D. x 65' length.

4.3.14 Marine Conductor Tensioning System:

a. Four dual each 14" diameter VETCO tensioning rams designed for continuous 75,000 pound line tension based on 3500 PSI system with 50 foot line travel. Units are complete with hydraulic system, air system, compressor units, sheaves, wire line, manifolding and control panel. Air reservoirs for tensioners will be manifolded separately to allow taking one tensioner out of service without affecting operation of other three. Sheave diameters will be 52" for use with 1-3/4" diameter wire.

4.3.15 Guidance System: 4-post system, 6 feet radius, with 3/4" guide lines.

4.3.16 Guideline Tensioning System:

a. Four each 6-1/2" diameter VETCO tensioning rams designed for 16,000 pound line tension based on 3500 PSI system with 40 foot line

4.3 Blowout Preventers, Subsea Equipment and Control Equipment, (continued)

travel. Units are complete with hydraulic system, compressor units, sheaves, wireline, manifolding and control panels. Air reservoirs for tensioners will be manifolded separately to allow taking one tensioner out of service without affecting operation of the other three.

4.3.17 Vetco Pod Line Tensioning System:

a. Two each, as in Item D.16 above with deadman Ingersoll-Rand 35 UWD 962 air tuggers.

4.3.18 Power, Accumulators, Manifold System

a. Koomey model air-electric powered accumulator unit located in Halliburton room including three high-pressure air-operated pumps (10 gpm at 3000 PSI with 120 PSI air pressure) and two (each) electric driven triplex pumps with minimum 28.8 gpm output at 3000 PSI.
b. Fluid reservoir capacity equals 600 gallons and is equipped with sight glass. This is sufficient volume to charge accumulator bottles to 3000 PSI.
c. Hydraulic fluid mixing system capable of mixing fluid at rate equivalent to combined output of all pumps.
d. Hydraulic fluid concentrate reservoir capacity equals 200 gallons and is equipped with sight glass.
e. Low level alarm for each fluid reservoir.
f. Total accumulator bottle capacity to open and close all functions one time with 50% reserve remaining. Accumulator bottles will be manifolded suitably for maintenance isolation.
g. Minimum nominal 10-gallon accumulator bottle for surge dampening will be installed on open and close line of upper and lower annular preventer.
h. Hydraulic power will be supplied to diverter control system.

4.3.19 Blowout Preventer Control Panels:

a. Master control (explosion proof) panel located on rig floor adjacent to driller's console.
b. Remote control panel located in tool pushers office and completely redundant.
c. Complete manual control at accumulator unit.

4.3 Blowout Preventers, Subsea Equipment and Control Equipment, (continued)

d. Master control and remote control panel to include memory of function position system.
e. All control panels to be graphically illustrated.

4.3.20 Hydraulic Control Hose:

a. Two each Synflex hose series 3300, 2200 feet long, containing one each 1" power lines, 60-3/16' pilot lines.
b. Two each self-powered live hose reels (or equivalent capacity) of sufficient capacity to store 2,500' hose bundle selected live functions for running BOP stack.
c. System to contain quick connect hose bundle junction boxes at hose reels.
d. Hose sheathing to be polyurethane.

4.3.21 Hydraulic Control Pods:

a. Two each Koomey double female design pod complete with 60 1" SPM pockets, and seven straight-through functions, and all associated equipment.
b. Double female section for surface testing of male pod.
c. Surface BOP test manifold and chart recording pressure gauge.
d. Shuttle valves, associated equipment and piping.

4.3.22 Typical reaction times including pilot valve actuation time of following functions (times to close and open with 2200 ft. hose bundle):

a. Annular bag type at 1500 PSIG regulator pressure - close: 32 seconds, open: 32 seconds (4 second pilot time).
b. Shear ram/blind ram at 1500 PSIG regulator pressure - close: 17 seconds, open: 17 seconds (4 second pilot time).
c. Pipe ram No. 1 at 1500 PSIG regulator pressure - close: 17 seconds, open: 17 seconds (4 second pilot time).
d. Pipe ram No. 2 at 1500 PSIG regulator pressure - close: 17 seconds, open: 17 seconds (4 second pilot time).
e. Pipe ram No. 3 at 1500 PSIG regulator pressure - close: 17 seconds, open: 17 seconds (4 second pilot time).

4.3 Blowout Preventers, Subsea Equipment and Control Equipment, (continued)

f. Pipe ram No. 4 at 1500 PSIG regulator pressure - close: 17 seconds, open: 17 seconds (4 seconds pilot time).
g. Hydraulic connectors at 1500 PSIG regulator pressure - close: 22 seconds, open: 22 seconds (20 second pilot time).
h. Choke and kill line valves at 1500 PSIG regulator pressure - close: 6 seconds, open: 6 seconds (4 seconds pilot time).

4.3.23 Choke Manifold:

a. 4 station, 10,000 PSI W.P. choke manifold, with full opening by-pass line, Global Marine design - includes two Swaco chokes with remote control panel and two adjustable chokes. Choke manifold and all downstream manifolding to be fitted for H_2S service.

4.3.24 Tools and equipment as required for Company's well control procedure above Global Marine's obligation.

4.4 Downhole Tools and Equipment

4.4.1 Casing Protectors: Drill pipe rubbers for 5" O.D. and 3-1/2" drill pipe for each joint inside casing.

4.4.2 Sand reel and sandline to 20,000'.

4.4.3 Halliburton type extra heavy duty hydraulically driven wire line measuring assembly with 20,000' of 0.092" stainless steel line with SR-2 Lister, 15.5 HP motor.

4.4.4 Drilling bits, under-reamers, hole openers, wall scrapers, etc.

4.4.5 Bumper Subs:

a. 2 - Baash Ross, 8" O.D. type 6 SI-1PM long stroke splined bumper sub, with 6-5/8" API reg. connections.
b. 2 - Baash Ross, 6-1/2" O.D. type 6 SI-1PM long stroke splined bumper sub, with 4" I.F. connections.

4.4.6 Inside BOP: Gray, with 6-1/2" O.D. and 5" NC-50 connections.

4.4.7 Bit subs bored for float.

4.4.8 Drill Stem Testing Tools and Equipment.

4.5 Fishing Tools

4.5.1 Overshots:

a. 1 - 11-1/4" O.D., full strength series "150" Bowen releasing and circulating overshot, complete with spiral grapple and type "A" packer to catch and packoff 9" O.D. drill collars and furnished with 11-1/4" O.D. standard lipped guide for operation in 12-1/4" hole and short top sub, type "SS", with 6-5/8" API regular tool joint box top connection.

b. 1 - 7-7/8" O.D. slim hole series "150" Bowen releasing and circulating overshot, complete with spiral grapple and type "A" packer to catch and packoff 6-3/4" O.D. core barrel and furnished with 7-7/8" O.D. standard lipped guide and short top sub, type "SS" with 4" API I.F. (6-1/2" O.D.) tool joint box top connection.

c. 1 - 8-1/8" O.D. full strength series "150" Bowen releasing and circulating overshot, complete with spiral grapple and type "A" packer to catch and packoff 6-1/2" O.D. and furnished with 8-1/8" O.D. standard lipped guide for operation in 8-1/2" hole and short top sub, type "SS" with 4" API I.F. (6-1/2" O.D.) tool joint box top connection.

d. Additional overshots etc., as required to catch Contractor's equipment.

e. One additional standard and oversize guide per overshot.

4.5.2 Junk Catchers:

a. Junk basket, Bowen, reverse circulating type, 11" O.D. with magnet insert assembly No. 2960 for 12-1/4" hole.

b. Junk basket, Bowen, reverse circulating type, 7-7/8" O.D. with magnet insert assembly No. 2567 for 8-1/2" hole.

4.5.3

Two - Taper taps with fluted wickers, for catching 9" O.D., 8" O.D., 6-1/2" O.D. and 4-1/8" O.D. drill collars - one being skirt type, with skirts for 17-1/2", 12-1/4" - 8-1/2"hole.

4.5.4

Fishing tools for retrieving special tools and equipment.

4.5 Fishing Tools, (continued)

4.5.5
a. Jars, Bowen, 8" O.D. hydraulic rotary jar, with 6-5/8" reg. connection.
b. Jars, Bowen, 6-1/2" O.D. hydraulic with 4" I.F. connections.
c. Jars, Bowen, 6-1/2" O.D. mechanical with 4" I.F. connections.

4.5.6 Junk Subs:

a. One - Bowen basket sub, with 6-5/8" API reg. pin up connections for 12-1/4" hole, 9-5/8" O.D.
b. One - Bowen basket sub, with 4-1/2" API reg. pin up connections for 8-1/2" hole, 6-5/8" O.D.

4.5.7 Safety Joints:

a. Safety Joint: One - TIW - HRLO for 5" O.D. drill pipe, with 5" NC-50 connections, 6-1/2" O.D.
b. One bumper safety joint, Bowen Shaffer Waggener No. SJ428 6-1/2" O.D. x 2-13/16" I.D. - 5" NC-50 connections.

4.5.8 Junk Mills:

a. Two each - 12" O.D. Bowen w/6-5/8" API reg. pin connections.
b. Two each - 8-1/4" O.D. Bowen w/4-1/2" API reg. pin connections.

4.5.9 Magnets:

a. 11-1/2" O.D. Bowen K and G 6-5/8" API reg. pin No. 32370 with flush and mill guide.
b. 7" O.D. Bowen K and G 4-1/2" API reg. pin No. 32300 with flush and mill guide.

4.5.10 Special subs for matching core barrels and fishing tools with Contractor's drill string Connections.

4.6 Drill String Handling Tools

4.6.1
a. Tongs BJ type SDD and Web Wilson type AAX w/lug jaws to fit Contractor's drill pipe and drill collars.
b. Slips:
1) Varco type SDXL extra long rotary
2) Varco type DCS drill collar slips, and type "MP" safety clamp

4.6 Drill String Handling Tools (continued)

c. Elevators: BJ type SLBB elevators.
d. Links: One set each 350 ton and 500 ton.

4.6.2 Pipe Racker: Automatic drill pipe racker, capacity for 262 (Range 2 triple) stands, Global Marine design.

4.6.3 Pipe Stabber: Hydraulic, Global Marine design.

4.6.4 Kelly Spinner: Varco, type 6500 - pneumatic operated.

4.6.5 Bit Breaker: 17-1/2" and smaller.

4.6.6 Air Tuggers: 3 on rig floor, 4 on main deck around moon pool.

4.6.7 Varco drill pipe spinning wrench.

4.7 Mud Facilities and Equipment

4.7.1 Shale Shakers: Brandt tandem dual unit, or equivalent, mounted on active tank with two 3 HP explosion proof motors.

4.7.2 Desander: Pioneer T-10-6 Sandmaster, 1000 GPM capacity mounted on active tank - charged by Ingersoll Rand MIR 150 Ni-Hard Slurry pump.

4.7. Mud Facilities and Equipment, (continued)

4.7.3 Desilter: One Brandt desilter assembly consisting of two identical units mounted on a common base plate with discharge from both units combined, charged by Ingersoll Rand MIR 150 Ni-Hard Slurry Pump.

4.7.4 Mud Agitators:

a. Two - "Lightnin" mud mixers, model 84-Q-5, driven by 5HP explosion proof electric motor - mounted on active tank.
b. Four - "Lightnin" mud mixers, model 85-Q-25, driven by 25HP, explosion proof electric motors - mounted on reserve tanks.
c. One - "Lightnin" mud mixer, model 81-Q-3, driven by 3HP explosion proof electric motor, mounted on desilter tank.
d. One "Lightnin" mud mixer, model 81-Q-1.5, driven by 1.5HP explosion proof electric motor, mounted on pill tank.

4.7.5 Pit Level Indicator: Guide rail float type mounted on active tank. Two pit system, complete with automatic recorder indicator gauge, weighing mud unit.

4.7.6 Mud-Gas Separator.

4.7.7 Degasser: Wellco Series 5200, mounted on active tank.

4.7.8 Mud Testing Facilities: Basic Kit for viscosity, filtration, weight and titration.

4.7.9 Mud Mixing Pumps: Two - Ingersoll Rand MIR 150 centrifugal pumps, driven by 75 HP explosion proof electric motors.

4.7.10 Automatic mud system, for maintaining desired mud weight.

4.8 Casing and Related Tools

4.8.1 Casing tools for 30", 20", 16", 13-3/8", 9-5/8", 7-5/8", 7", and 5" casing.

4.8.2 Tubing tools for 2-7/8" and 2-3/8" O.D. sizes.

4.8 Casing and Related Tools, (continued)

4.8.3 Casing Tongs: Eckel hydraulic casing tongs, with jaws for 13-3/8", 9-5/8" and 7" casing.

4.8.4 Casing, tubular goods, casing and tubing hangers, packers and bridge plugs.

4.8.5 Casing shoes, flanges, baskets, centralizer, float collars, scratchers.

4.8.6 Wellheads, including casing and tubing heads, spacer spools, wear bushings, including ring gaskets.

4.8.7 National wellhead running and testing tools (one set).

4.8.8 Subsea wellhead landing bases.

4.8.9 Valves, christmas trees, and all materials and services required for permanent installation that will remain as part of a well.

4.8.10 Casing hold overhead crane (10 tons).

4.8.11 Wellhead running and testing tools.

4.9 Special Services and Equipment

4.9.1 Cementing Unit:

a. Twin Halliburton HT 400 skid mounted cementing units.
b. Two GE-752 RI electric motors to power above units.
c. Halliburton recirculating cement mixing unit.

4.9.2 Cement Mixing Pumps: One - Skid mounted low energy cement mixing equipment, including a 44L Deming 165 PSI pump driven by a 60 HP, explosion proof, 460 volt electric motor.

4.9.3 Cement and cementing services.

4.9.4 Schlumberger wireline electric logging unit, model OSU.

4.9.5 Electric logs, dipmeter and related tools and services.

4.9.6 Gun perforating and related services.

4.9 Special Services and Equipment, (continued)

4.9.7 Mud logging unit and related services.

4.9.8 Whipstocks and all other deflection tools, equipment and services.

4.9.9 All surface and down-hole survey equipment and services, except drift indicator.

4.9.10 Totco drift indicator, 0-8 degrees and 0-16 degrees.

4.9.11 Test tanks and accessories for production testing.

4.9.12 Formation testing tools and services.

4.9.13 Core barrels and core heads.

4.9.14 Well testing burner equipment:

a. Port and starboard burner booms for well testing.
b. Manifolding and piping as required to end of boom for oil, gas, water and air.
c. Two each production test burners.

APPENDIX B

ANALYSIS OF IMPACT OF AIR EMISSIONS FROM PROPOSED EXPLORATION ACTIVITIES ON ONSHORE AIR QUALITY

APPENDIX B

ANALYSIS OF IMPACT OF AIR EMISSIONS FROM PROPOSED EXPLORATION ACTIVITIES ON ONSHORE AIR QUALITY

(1) INTRODUCTION

Section 5(a)(8) of the Outer Continental Shelf Lands Act Amendments of 1978 requires the Secretary of the Department of the Interior to prescribe regulations with provisions "for compliance with the national ambient air quality standards pursuant to the Clean Air Act (42 U.S.C. 7401 et. seq.) to the extent that activities authorized under the Act significantly affect the air quality of any State." The Department of the Interior published final air quality regulations on March 7, 1980, which are applicable to all facilities proposed or operating on the OCS (see 45 F.R. 15142).

Under the MMS regulations, a three step process is created to determine whether emissions from OCS facilities have the potential to have or are having a significant effect on the ambient air quality of any onshore area. In step 1 (see 30 CFR 250.57-1(d) and 250.57-2(b)), an exemption formula is used to "screen out" those facilities which, because of their low emissions levels and distance from shore, are unlikely to significantly affect an onshore area. Under step 2 (see 30 CFR 250.57-1(e) and 250.57-2(c)), significance levels are established to determine whether emissions not exempted under step 1 significantly affect an onshore area. Finally, under step 3, controls are specified for those facilities that have the potential to affect or are significantly affecting an onshore area.

Exploration activities of the type described in this Environmental Report (Exploration) fall within the definition of "temporary facilities" in Section 250.2(fff). Therefore an identi-

fication of the air emissions from the proposed exploration activities and an analysis of the impacts of these emissions on onshore air quality is necessary as part of this submission.

(2) DESCRIPTION OF GASEOUS EMISSIONS

Gaseous emissions will be generated as a result of the following activities:

- generators and associated equipment used to provide power for drilling operations;
- fuel vapor loss
- operations of support vessels and aircraft; and
- flared natural gas.

Information about the nature and quantity of emissions from each of these activities is presented in this analysis. However, in calculating the onshore impacts of air emissions under the MMS's air quality regulations, only the emissions generated from the equipment on the facility are to be considered. Therefore, the following discussion is divided into two sections:

- To fulfill the requirements of the MMS regulations, a description of the nature and quantity of emissions produced as a direct result of drilling operations and the onshore impacts of these emissions; and

- To provide additional baseline data on projected emissions, a description of the nature and quantity of other emissions generated by support operations.

(A) Emissions produced as a direct result of actual drilling operations: The MMS's air quality regulations require that the lessee describe each source of emissions from a facility,

the amount of the emissions by air pollutant expressed in tons per year, and the frequency and duration of emissions. An explanation of the basis for all calculations is also required.

The air emission calculations provided in this analysis are based on use of the GLOMAR PACIFIC drilling vessel. Air emissions from any other drilling vessel that may be used in lieu of or in addition to the GLOMAR PACIFIC probably would be comparable in nature and quantity.

The projected emissions have been calculated on the basis of actual fuel usage data from the equipment on the GLOMAR PACIFIC. From February 10 to June 3, 1980 the GLOMAR PACIFIC was used by Exxon to drill well OCS-P 0182-2 in the Santa Ynez Unit. During an 82-day drilling period for that well, actual fuel consumption by the primary engines (four diesel engines driving three 2750 KW generator sets) was 3,250 gallons per day. The discrete activities undertaken during this drilling phase included the drilling and tripping cycles, setting/cementing casing, repair, and logging and equipment testing.

During a 34-day testing period for well OCS-P 0182-2, the engines consumed an average of 2,250 gallons of fuel per day. Testing activities conducted during this period included drillstem testing, running and setting tubing, and plugback operations.

For all other equipment on the vessel (emergency power generator, steamboilers, crane operations, and minor miscellaneous uses), fuel usage is the same during drilling and testing.

The projected emissions have been calculated on the basis of planned 8,000-foot wells requiring about 40 days to drill and 20 days to test. The actual length of time needed to test a well cannot be predicted. However, based on past drilling experience on the

Pacific OCS, a 20-day testing period has been estimated. Depending on the drilling results, the actual testing period could vary from 0 to as much as 40 days.

The air quality impact analysis was done in the following manner:

1. Average fuel consumption for each piece of equipment on the GLOMAR PACIFIC was obtained from actual fuel usage data from past drilling and testing activities in the Santa Ynez Unit. Emission factors were obtained from the U.S. Environmental Protection Agency's technical document "AP-42" or were provided by the equipment manufacturer. Table B-1 identifies the fuel consumption rate, operating frequency, and emission factors for each piece of equipment on the drilling vessel.

2. The emission factors and fuel consumption data were used to calculate the projected emissions in tons per well for each of five pollutants. Table B-2 shows how these calculations were performed. The results of these calculations are presented in Tables B-3.

3. The projected emissions (tons/well) of each pollutant that will be generated during the drilling and testing period for each well were compared to the emission exemption amount "E" ["E" = 33.3D for TSP, SO_x, NO_x, and VOC and 3400 ($D^{2/3}$) for CO, where D = distance of well from nearest onshore area and E is expressed in tons per well]. In Table B-4 the projected emissions in tons per well and the emission exemption amounts (which vary with the distance of the well from shore) are presented.

The calculations presented in Table B-4 demonstrate that the air pollutants generated during the proposed drilling and testing periods at each of the well sites will not exceed the exemption amounts and thus no further analysis of the impacts of these emissions is required.

Very insignificant amounts of SO_x, NO_x, TSP, CO and THC may be produced if natural gas is flared during the testing phase. The emissions associated with such flaring or whether any flaring will be necessary at all is dependent upon identification and testing of hydrocarbon zones as they might occur in each well. An estimate of air emissions which may result from flaring is presented in Table B-5.

Beginning January 1, 1983, actual fuel consumption will be measured on a daily basis for the GLOMAR PACIFIC and air emissions of NO_x, SO_x, TSP, CO, and VOC will be calculated for each well at the completion of drilling. This information is required pursuant to MMS letter of November 24, 1982.

The injection-retard program to reduce NO_x emissions for the General Electric engines has been approved by the American Bureau of Shipping and will be implemented on the GLOMAR PACIFIC beginning about January 20, 1983.

(B) Emissions Generated by Support Operations

The MMS's regulations require that the Environmental Report (Exploration) include a description of the nature and quantity of emissions from onshore activities directly associated with the proposed OCS facility (see § 250.34-3 (a)(4)(i)). Emissions in this category include those generated by service boats and helicopters moving between the drilling site and the shore.

Crewboat Emissions: Projected emissions for the crewboat were calculated using emission factors from AP-42, Part A, Table 3.2.3-1 (for SO_x) and Table 3.2.3-3 (for CO, VOC(HC) and NO_x). The emission factor for TSP (25 lb/10^3 gal) was suggested by CARB. The total projected emissions of each pollutant generated by the crewboat during the drilling and testing period, expressed in tons per

well, are presented in Table B-6. Crewboats operating under inclement weather conditions out of Ellwood or Port San Luis will have, respectively, 58 and 69% less emissions per trip made.

Workboat Emissions: Projected emissions for the workboat were calculated using emission factors from AP-42, Part A, Table 3.2.3-1. The total projected emissions of the workboat during the drilling and testing program, expressed in tons per well, are presented in Table B-6.

Helicopter Emissions: Projected emissions for the helicopter were calculated using emission factors from AP-42, Table 3.2.1-3 (4/73). The projected emissions are presented in Table B-7. Operations out of Oceano will be 42% less than those from Gaviota.

(3) CONCLUSION

The air pollutants generated as a result of the proposed exploration activities are minor and of short duration. Because the emissions produced by the drilling and testing of the exploratory wells described in this Environmental Report (Exploration) are much less than the exemption amounts "E" established by the MMS, no further analysis of their impact on onshore areas is required. The emissions generated by support vessels and helicopters are also very low and should have no adverse onshore impacts.

TABLE B-1

FUEL CONSUMPTION, OPERATING FREQUENCY, AND EMISSION FACTORS FPR EACH SOURCE OF AIR EMISSIONS ON THE GLOMAR PACIFIC

Source	Fuel Consumption	Operating Frequency	Emission Factors (lb/10³ gal)		Source of Emission Factor
Four diesel engines, rated capacity 3900 HP, driving three 2750 KW generator sets.	Drilling: 3250 gal/day Testing: 2250 gal/day	60 days	TSP NO_x CO VOC(HC) SO_2	25.0 551.5 76.4 72.1 28.5	NO_x, CO, VOC from Source Publication 75-DGP-10 (provided by Diesel Power Division of General Electric Corp.); TSP based on EPA AP-42, Table 3.2.2-1; SO_2 based on EPA AP-42, Table 1.3-1
GM 12V Model 149 diesel engine rated at 1135 HP, driving a 600 KW Emergency Power Generator	60 gal/hr	1 hr/week during drilling and testing period	TSP NO_x CO VOC(HC) SO_2	33.5 408.9 387.6 64.0 28.5	NO_x, CO, VOC and SO_2 from Detroit Diesel Engine Division of General Motors Company. TSP from EPA AP-42, Supp No. 9, Appendix C, page 9.
Steam boilers, Vapor Corp. Model 4611, 40 HP, 1,240,000 BTU/hr	12 gal/hr 288 gal/day	7 months of year for heating; for purposes of these calculations, assume year-round operations	TSP NO_x CO VOC(HC) SO_2	2.0 22.0 5.0 1.0 28.4	From AP-42, Part A (4/77), Table 1.3-1. (Fuel Oil Combustion)
Diesel Engines for crane operation GM 8V-71, rated capacity 63 tons	18 gal/hr	8 hr/day for 60 days	TSP NO_x CO VOC(HC) SO_2	47.9 688.7 434.6 29.5 28.5	From Detroit Diesel Division of GM Corp., for GM 8V-71 engine
Miscellaneous uses (fork lift, urgency starting air, welding machines, etc.)	10 gal/day	60 days	TSP NO_x CO VOC(HC) SO_2	33.5 469.0 102.0 37.5 28.4	From EPA AP-42, Part A, Table 3.3.3-1; SO_2 calculated on basis of 0.2 percent by weight sulfur content
Fuel Tank Vapors, "working" and "breathing" loss	Stored Volume = 4000 bbl. (168,000 gal) Consumption per day = 3,900 gal	60 days	Breathing loss = 0.0039 lb/10³ gal/day Working loss = 0.023 lb/10³ gal/throughout		EPA AP-42, § 4.3 (Storage of Petroleum Liquids) Table 4.3-4

TABLE B-2

EXAMPLE OF CALCULATIONS

1. Calculation:
   NO_x Emission Rate for Diesel Engines (Prime Movers) for Well Requiring 40 days to Drill and 60 days to Test

Fuel Consumed (10^3 gal/day) x Emission Factor ($lb/10^3 gal$) x $\frac{\text{\# of days}}{\text{well}}$ x $\frac{1 \text{ ton}}{2000 \text{ lb}}$ = Emission Rate

Drilling:

$$\frac{3.25 \times 10^3 \text{ gal}}{\text{day}} \times \frac{551.5 \text{ lb } NO_x}{10^3 \text{ gal}} \times \frac{40 \text{ days}}{\text{well}} \times \frac{1 \text{ ton}}{2000 \text{ lb}} = \frac{35.85 \text{ tons}}{\text{well}}$$

Testing:

$$\frac{2.25 \times 10^3}{\text{day}} \times \frac{551.5 \text{ lb } NO_x}{10^3 \text{ gal}} \times \frac{20 \text{ days}}{\text{well}} \times \frac{1 \text{ ton}}{2000 \text{ lb}} = \frac{12.41 \text{ tons/}}{\text{well}}$$

35.85 ton/well (Drilling)
\+ 12.41 ton/well (Testing)
48.26 ton/well (Total NO_x Emission Resulting from Prime Movers)

2. Calculation:
   NO_x Emission Rate for Crane Operations for Well Requiring 40 days to Drill and 20 days to Test

Fuel Usage: 144 gal/day = $.144 \times 10^3$ gal/day

$$\frac{.144 \times 10^3 \text{ gal}}{\text{day}} \times \frac{688.7 \text{ lb } NO_x}{10^3 \text{ gal}} \times \frac{60 \text{ days}}{\text{well}} \times \frac{1 \text{ ton}}{2000 \text{ lb}} = \frac{2.98 \text{ tons}}{\text{well}}$$

3. Calculation:
   VOC Fuel Tank Vapors

Daily Breathing Loss: Maximum Storage Capacity (10^3 gal) x Emission Factor ($lb/day/10^3$ gal) = Emission (lb/day)

Daily Working Loss: Daily Consumption (10^3 gal/day) x Emission Factor ($lb/10^3$ throughout) = Emissions (lb/day throughout)

Total VOC (vapor loss) per day = Daily Breathing Loss + Daily Working Loss.

TABLE B-2 (cont.)

Breathing Loss/day: $\frac{168 \times 10^3 \text{ gal}}{\text{day}} \times \frac{.0039 \text{ lb}}{10^3 \text{ gal}} = 0.655 \text{ lb/day}$

Working Loss/day: $\frac{3.7 \times 10^3 \text{ gal}}{\text{day}} \times \frac{.023 \text{ lb}}{10^3 \text{ gal}} = 0.085 \text{ lb/day}$

.655 lb (Breathing loss/day
+ .085 lb (Working loss/day
.740 lb/day

$$.74 \text{ lb/day} \times \frac{60 \text{ days}}{\text{well}} \times \frac{1 \text{ ton}}{2000 \text{ lb}} = 0.02 \text{ ton/well}$$

TABLE B-3

PROJECTED EMISSIONS BY POLLUTANT FOR EACH SOURCE FOR 8,000 FOOT WELLS REQUIRING 40 DAYS TO DRILL AND 20 DAYS TO TEST

Source	TSP lb/day	TSP T/well[1]	NO_x lb/day	NO_x T/well	THC lb/day	THC T/well	SO_x lb/day	SO_x T/well	CO lb/day	CO T/well
Four diesel engines,[2] driving three 2750 KW Generator Sets	D[3] 81.25 T[4] 56.25	2.19	D 1792.40 T 1240.90	48.26	D 234.30 T 162.20	6.31	D 92.60 T 64.10	2.49	D 248.30 T 171.90	6.69
GM 12V Model 149 Diesel Engine, driving 600 KW Emergency power generator		0.01		0.11		0.02		0.01		0.10
Steamboilers	0.58	0.02	6.34	0.19	0.29	0.01	8.17	0.25	1.44	0.04
Crane Operations	6.90	0.21	99.17	2.98	4.25	0.13	4.10	0.12	62.58	1.88
Miscellaneous Uses	0.34	0.01	4.69	0.14	0.37	0.01	0.28	0.01	1.02	0.03
Fuel Tank Vapors	-	-	-	-	0.74	0.02	-	-	-	-
Total		2.40		51.70		6.50		2.90		8.70

1. Total emissions for drilling and testing period
2. Fuel usage consumption for the four diesel engines is 3,250 gal/day for drilling and 2,250 gal/day for testing
3. D = Drilling
4. T = Testing

TABLE B-4

COMPARISON OF PROJECTED EMISSIONS TO EXEMPTION AMOUNTS "E" FOR EACH PROPOSED WELL

Well #			Emission Levels For Each Proposed Well						Exemption Levels	
OCS-P	Well Depth (feet)	Total Number Days To Drill and Test Wells	Projected Emissions (T/well) TSP (1)	NO_x (2)	THC (3)	SO_x (4)	CO (5)	Distance from Shore (miles)	Exemption Amount "E" (tons/yr) NO_x, SO_x, TSP, THC (6)	CO (7)
0438(A)	8,000	60	2.4	51.7	6.5	2.9	8.7	6.1	203	11,350
0438(B)	8,000	60	2.4	51.7	6.5	2.9	8.7	6.2	207	11,474
0440(A)	8,000	60	2.4	51.7	6.5	2.9	8.7	6.2	207	11,474
0440(B)	8,000	60	2.4	51.7	6.5	2.9	8.7	6.0	200	12,226
0440(C)	8,000	60	2.4	51.7	6.5	2.9	8.7	6.1	203	12,350
0440(D)	8,000	60	2.4	51.7	6.5	2.9	8.7	6.3	210	11,598

Compare projected emissions in columns (1), (2), (3) and (4) to exemption amount in column (6); compare projected emissions in column (5) to column (7).

TABLE B-5

Estimated Emissions Associated
With Flaring of Natural Gas

Based on three tests per well,
generating an estimated
2000 MCF per well

Pollutant	Estimated gas Flared		Emission Factor ($lb/10^6$ cubic feet)[a]		lb/well/ (1 test)	lb/well/ (3 tests)	Tons/ well
NO_x:	2.0×10^6	x	100	=	200	600	0.30
CO:	2.0×10^6	x	20	=	40	120	0.06
TSP:	2.0×10^6	x	10	=	20	60	0.03
HC:	2.0×10^6	x	8	=	16	48	0.02
SO_x[b]:	2.0×10^6	x	40	=	80	240	0.12

a. Emission factors derived from AP-42, Table 1.4-1, (5/74)
b. Based on 15 grains sulfur per 100 cubic feet

TABLE B-6

Projected Emissions from Crewboat and Workboat[1]

Lease # OCS-P	Pollutant	Crewboat (T/well)	Workboat (T/well)
0438	NO_x	1.9	8.1
	CO	0.4	3.3
	HC	0.1	1.5
	SO_x	0.1	0.8
	TSP	0.1	0.7
0440	NO_x	1.9	7.8
	CO	0.4	3.2
	HC	0.1	1.5
	SO_x	0.1	0.8
	TSP	0.1	0.7

1 Calculated on basis of fuel usage data provided in Table II-5 and assumptions discussed in Sections II(F)(1) and (2) of this document.

TABLE B-7

Projected Emissions from Use of Helicopter

Pollutant	Emission Factor (lb/LTO/engine)[1]	Projected Emissions[2,3] tons/well
TSP	0.25	0.04
NO_x	0.57	0.09
CO	5.7	0.90
HC	0.52	0.08
SO_x	0.18	0.03

1 From AP-42, Table 3.2.1-3 (4/73).
2 Based on 160 LTO's per well.
3 For LTO cycle only; no flying mode emission factors are available.

APPENDIX C

INVENTORY OF CLEAN SEAS EQUIPMENT AND MATERIALS

(list provided by Clean Seas status as of March 1982)

CLEAN SEAS INVENTORY OF EQUIPMENT AND MATERIALS

1. CONTAINMENT

- 2,000' Bottom Tension Boom

This is a heavy duty, open ocean containment boom with 4' x 13' floats and 8' curtains extending 3½' above the water line and 4½' below the water line. It is usually stored on land and deployed from the beach, requiring 24-36 hours for assembly.

Capability: Will contain oil in 6'-8' significant waves and winds to 25 knots at currents up to 1½ knots.

- Vikoma Seapack with 1,600' boom

2 Units.

For very fast response to an oil spill. The Vikoma Seapack is based on a 23' hull and contains 1,600' of seaboom connected at one end to a diesel driven fan and ducted propeller water pump. The Vikoma Seapack unit can be transported by road trailer, towed by a small vessel, or carried on a workboat or tanker. It could also be transported by an aircraft.

Capability: Experience over the past several years indicates this boom can be on the scene and deployed in less than one hour. It is effective in preventing the spread of oil in significant waves up to six feet and winds of 20 to 25 knots. In the mode in which this boom is used,

there is little or no current across the boom which could cause loss of oil due to underflow. Deployment is instantaneously accomplished on arrival at the site.

Oil Containment Booms

- 2,000 feet of medium duty boom (16" x 12" skirt Kepner Sea Curtain) for harbor protection.
- 2,000 feet light duty boom (8" x 12" skirt Kepner Sea Curtain) for secondary harbor protection.
- 2,695 feet (12" x 24" Goodyear Sea Sentry) for harbor protection and offshore containment boom.
- 5,527 feet (Model 3,000 Expandi light duty oil boom). This boom may be used for offshore rapid deployment for containment as well as harbor protection.
- 9,100 feet (Model 4,300 Expandi medium duty oil boom). This boom would primarily be used for offshore rapid deployment and containment.
- 2,500 feet (36" Supermax) 50 sections of 28oz. fabric with 3/4" cable.
- 5,500 feet (Minimax boom) 55 sections of 22oz. fabric with 5/8" chain.
- 2,035 feet (14" x 24" Goodyear Sea Sentry) offshore containment boom.

Tide-Mar VII Barge:

One 641 ton tank barge, Tide-Mar VII, for collecting oil picked up by skimmers as they work in an oil spill. This is a 160' x 39' ocean going barge with 10 tanks, capacity of 7,840 barrels and six (6) diesel engine driven pumps. Presently moored in Santa Barbara Harbor.

Floating Storage Bags:

- Six (6) 5,000 gallon Kepner Floating Storage Bags
- Six (6) 1,200 gallon Kepner Floating Storage Bags
- One (1) 6,000 gallon Dracone Floating Barge

These bags are used for interim storage purposes while awaiting the arrival of the Tide-Mar VII or similar tank barge/vessels.

2. RECOVERY

. Cyclonet-100

One (1) Cyclonet-100 skimmer. This skimmer is an open ocean skimmer and is fitted to MR. CLEAN I (OSRV). This skimmer contains a diesel engine, hydraulic unit, and pumping system.

. Cyclonet-050

One (1) Cyclonet-050 skimmer fitted to a Zodiac Mark-V inflatable dinghy. This skimmer is primarily for use in protected and semi-protected waters, but may be used in the open ocean in light sea conditions. This skimmer is self-propelled, contains a pump system, and a small oil storage capacity.

. Acme 39T Weir Skimmer

One (1) Acme 39T weir skimmer, gasoline driven pump. This pump is designed to collect oil in somewhat heavy concentration. Ideal for harbor areas. Will recover oil in the open ocean in light seas. Fluid recovery rates up to 340 GPM. Light in weight and can be handled by two men.

. Acme 51T Weir Skimmers

Five (5) Acme 51T weir skimmers, gasoline driven pumps. These pumps are designed to collect oil in somewhat heavy concentrations. Ideal for harbor areas. Will recover oil in the open ocean in light seas. Fluid recovery rates up to 340 GPM. Light weight and can be handled by two men.

Oil Mop-MK-II-9

Two (2) Oil Mop MK-II-9 systems each consisting of a two-wheel trailer, oil mop machine, tail pulleys, and 400' of 9" mop. This system is primarily used in protected waters and will recover all grades of oil. Maximum capacity of 100 bbls/hr.

Komara Miniskimmer

One (1) floating disc skimmer hydraulically driven disc and pump. This pump is designed to collect oil in concentrated areas and is ideal for containment booms. Will recover oil in light sea conditions. Fluid rate 15 to 76 bbl/hr. Light weight, can be handled by manpower.

CS Skimmer System

One (1) CS skimmer system consisting of 45' x 17' x 6' catamaran-type adjustable weir skimmer barge; two (2) 240' lengths of 30" Kepner Sea Curtain boom; a 2,000 GPM pumping system; and two (2) 100 barrel oil-water separation tanks or a 5,000 gallon floating storage bag. The CS Skimmer is currently in dry storage at the Clean Seas yard in Carpinteria.

Capability: This system is capable of recovering all grades of oil from light to bunker C at rates up to 2,000 GPM plus some debris and sorbent material in moderate sea states. Modification to this skimmer eliminates the necessity of the tanks by installing a pump onboard and a 5,000 gallon floating storage bag. Also, may be pumped directly into the Tide-Mar VII barge.

- Mark-II Skimmer

Two (2) Mark-II skimmers, 14' x 30' weir type, are available in the Carpineria Yard. These may be used one on each side of a vessel, singularly with a vessel, or may be used independently with O/B motors in a harbor situation. Recovery system can be either an 80 barrel, skid-mounted vacuum tank or compressed air-driven Wilden pumps and 100 bbl. oil-water separation tanks, or a self-contained pump and floating 1,200 gallon storage bag, all of which are available.

Capability: These are very simple skimmers and may be used in a number of ways to solve the particular problem at hand. All grades of oil from light to bunker C can be recovered plus small amounts of debris. Fluid recovery rates from 50 GPM to 200 GPM are available. These skimmers are limited to light winds and light sea states. Trailers capable of carrying these skimmers on the highway have been constructed.

- Floating Weir Skimmers

Three (3) floating weir skimmers, compressed air-driven Acme type pump. These were designed to collect oil concentrated in the B-T boom area and work in harbor areas and quiet waters.

Capability: These skimmers will handle light to fairly heavy oil, no debris, in 2-3 foot waves. Fluid recovery rates are up to 300 GPM for each skimmer.

. Offshore Device Skimming Barrier

Two ODI offshore containment barriers and high seas skimming and pumping systems are located on MR. CLEAN II berthed at Port San Luis. The systems are comprised of two (2) offshore device skimming barriers with 3 pumps each, with a total capability of 750 gallons per minute. The 48" barrier is fitted to a 130' OSRV (MR. CLEAN II).

Capability: The ODI open water barrier and skimming system has been successfully tested in open water with high seas. It is capable of operating in winds up to 20 knots and wave highs of five feet. However, performance at much higher wave heights has been good.

. Walosep Skimmer

One (1) Walosep skimmer (W3) stationary skimmer with all accessory equipment, including pumps, power pack, hoses, etc. is stored on MR. CLEAN II at Port San Luis.

The Walosep W3 is a low weight, high capacity oil recovery system which can recover up to 100 m^3/hr (629 bph) of oil.

Capability: Official tests have shown that the Walosep W3 can operate in waves up to 10 feet and wind speeds of around 20 mph.

3. VEHICLES/TRAILERS

. Truck

One (1) 2½ ton. Used to tow Vikoma Seapack, boats, haul boom, absorbents, etc.

- 40' Enclosed Trailer Vans

  Eight (8) trailers stocked with booms, absorbents, small skimmers, miscellaneous cleanup equipment. Stored in strategic locations in CS area of interest.

- 25' Mobile Communications Center

  Has mobile base station, portable radios, auxiliary electrical power and all other equipment for self containment.

- 36' Flatbed Trailer

  One (1) 36' flatbed trailer for use with the 100 bbl. vacuum tank.

- Harbor Trailer

  Fast Response Harbor Trailer (FRHT) equipped with pollution control equipment.

- Tank Wagon Trailers

  Two (2) 100 bbl. tank wagon trailers loaded with dispersant (Corexit 9527).

- Truck

  One (1) 2½ ton Rapid Response Truck (RRT). Enclosed bed. Equipped with pollution control equipment.

4. BOATS/VESSELS

- Oil Spill Response Vessel (OSRV) "MR. CLEAN I"

136' x 36'. Powered by two (2) V-12 diesel engines providing 1,600 HP, capable of a speed of 12 knots. Fuel capacity of 99,500 gals. Two (2) 60 kw generators for electrical power.

Major items onboard include: Cyclonet-100 Acme skimmer, 2,000' of 43" Expandi boom on a 10' power reel, 2,500' of heavy duty Goodyear boom, Vikoma Seapack, with 1,600' of inflatable boom, 12 ton crane, oil/water separation tank (100 bbl). In addition, a 16' skiff, a 32' boom boat, and storage of absorbents and dispersants with necessary applicators. 6,000 gal. Dracone storage bags.

- Oil Spill Response Vessel (OSRV) "MR. CLEAN II"

130' x 36'. Powered by two (2) 16-V-92 diesel engines. Fuel capacility of 25,000 gals. Two (2) 75 kw generators for electrical power. SOA 13 knots.

Major items onboard include: Two (2) Offshore Devices' Advancing Skimmers 750 gpm each and all accessory equipment, Walosep Skimmer, Vikoma Seapack, 2,000' of 14' x 24' Goodyear boom, 2,000' of 4,300 Expandi boom, 100 bbl. oil/water separation system, 32' aluminum boom boat with 175 HP/OB, 14 ton pedestal crane, surface dispersant spray system, four (4) Kepner storage bags, 14' Skiff with outboard. In addition, storage of absorbents and dispersants.

- Fast Response Boom Boats (FRBB)

  Two (2) high speed response vessels, one for each Oil Spill Response Vessel (OSRV) "MR. CLEAN I" and "MR. CLEAN II". 32' x 8' aluminum boom boats.

- One (1) 19' Larson skiff with 75 HP Johnson motor, kept in Santa Barbara Harbor or Clean Seas' yard, for use as work boat around skimmers and barge.

  Five (5) 14' aluminum skiffs with OB-one on MR. CLEAN II, two on MR. CLEAN I, one in the van at Avila Beach, and one on the FRHT.

  One (1) 21' Monark utility boat with O/B for use as a workboat. Stored in Clean Seas' yard in Carpinteria.

  One (1) 10' Avon rubber raft with O/B-stored in Clean Seas' yard in Carpinteria.

5. ABSORBENTS/CHEMICALS/DISPERSANTS

- A large inventory of absorbents including Conwed: sweeps, blankets, booms and rugs; 3M Company: sweeps, sheets, booms, and Dow Imbiber bags and blankets.

  Stored in the Carpinteria warehouse are smaller quantities of Oil Herder, 101 boxes of booms (3,376'), 138 boxes of sweeps (100 per box), 9 rolls of blankets (300' each), 7 rolls of rugs (300' each), 18 boxes of sweeps (100' each). The above are from Conwed and 3M Company.

  199 Dow Imbiber Blankets

  11 boxes of Oil Snare

Additional quantities are available as "back-up" from warehouses in the Los Angeles area.

. Corexit #9527

225 Drums (200 drums stored in tank wagons)

. Helicopter Chemical Dispersant Spray Units

Two (2) Simplex Model 2000, with 150 gallon buckets and 32' boom.

. Surface Chemical Dispersant Spray Units

Two (2) Surface Chemical Dispersant Spray Units with pump, booms and mountings for different types of vessels.

. DC-4 Aircraft

With crew, dispersant spraying equipment, radio, portable dispersant loading equipment, 3,000 gal. per/load.

. Model 10 Fluorometer, Turner Designs

For use during dispersant applications.

6. RADIO COMMUNICATIONS SYSTEM

. A complete radio system consisting of UHF on 454.459.00 MHz and VHF on 158.445/159.480 MHz. This provides solid communication throughout the Clean Seas Area of Interest. This system consists of:

- 1 each VHF/UHF base station in Santa Barbara office
- 1 each VHF/UHF base station in Carpinteria warehouse
- 1 repeater on Santa Ynez Peak (158.445 MHz)

- 1 each VHF/UHF mobile unit in car and mobile van
- 20 portable Handie-Talkie units (UHF)
- 12 portable Handi-Talker units (VHF)
- 1 transportable repeater 454.00 MHZ

7. MISCELLANEOUS

. Air Driven Pumps:

Two (2) M15 Wilden double diaphram pumps used with MK-11 Skimmers and miscellaneous equipment.

. Six (6) Scare-Away Exploders:

Bird frightening devices. Operates automatically on LP gas.

. One (1) Wiggins Model WD-44 Forklift

4000#

. One (1) Vikoma Seaboom Vulcanizer Machine

For repair of boom

. One (1) Power Block

For Vikoma Boom recovery

. 100 bbl. Skid-Mounted Vacuum Tank with Trailer

One (1) 100 bbl. vacuum tank used with MK-II Skimmers or may be used independently.

- 100 bbl. Oil/Water Recovery Tanks

Two (2) oil/water recovery tanks, U.S. Coast Guard approved. Used with the CS Skimmer or other skimmer systems.

- 100 bbl. Flat Storage Tanks

Four (4) 100 bbl. flat storage tanks. Used with all skimmer systems.

- Bridger Shoulder Line Gun

One (1) line gun with rewinding machine, Model N, with accessories. For use with Vans in boom launching operations.

- Compressor

One (1) Gardner-Denver 600 CFM rotary, diesel engine driven, wheel mounted compressor stored in the Carpinteria yard. Usually used with air tools and to drive the Exxon Floating Weir Skimmers, Acme Skimmers or the Wilden pumps.

- Lines, Hoses, Tools

Complete set of all necessary sizes of nylon and poly lines for deploying and towing booms and skimmers. All hoses are fitted with Camlock fittings. Air hoses for compressors and complete sets of tools for all equipment.

- Skim-Pak Head and Control System

4,200 SH Double Port 4,000 gpm CS Control Wand, 4,000 E Extender.

. 2-43" 900# Magnets-adaptors for the Expandi Boom

8. VANS

- Van #1 (Green)

Carpinteria Yard

800' 16" Kepner boom
600' 8" Kepner boom

Sorbents

Conwed	
Booms	5 bales/24' per
Sweeps	5 boxes/100'per
Rugs	2 rolls/300' per
3M Company	
Booms	15 bales/40' per
Sheets	10 bales/100' per
Sweeps	2 bales/100'per
Dow Imbibers	
Bags	1 box/100 per
Blankets	20 boxes/1 per
Oil Snare	1 box/30 per

51T Acme Skimmer w/1,200 gal. bag
25':3" hose w/2"-3" valves
25':3" skimmer discharge hose
130' bouy line w/bouy
½" nylon, 3/4" nylon, ¼" manila
5 - Floats/Skimmer
1 - Rake
2 - Pitchforks
Miscellaneous Tools
2 - 55 gallon Drums
4 - Anchors 3/40#, 1/22#
4 - Anchor Line 200':½" nylon
4 - Crown Line w/bouy 200'
1 - Towing Bridle-5/8" wire
15 - Chemical Lights
4 - Life Preservers
5 - Mops

- VAN #2 (Blue)

Getty Oil Terminal-Gaviota

800' 16" Kepner Boom

Sorbents

Conwed	
Booms	10 bales/24' per
Sweeps	5 boxes/100' per
3M Company	
Sheets	10 bales/100' per
Sweeps	2 bales/100' per
Dow Imbibers	
Bags	1 box/100 per
Blankets	20 boxes/1 per
Oil Snare	1 box/30 per

51T Acme Skimmer with 5,000 gal. bag
1 - 25':3" hose with 30':½" bouy line and with bouy
2 - Skimmer hoses 75':3" blue (51T)
1 each - 100':½" nylon, 100':3/4" tow line
1 box - 1,000':¼" manila line
5 - Hose floats
4 - Life Preservers
2 - Pitchforks
1 - Rake
Miscellaneous Tools
2 - 55 gallon drums
4 - Anchors, 3/40#, 1/22#
4 - Anchor Line 200':½" nylon
4 - Crown Line 200':½" poly with bouy
2 - 3" Valves
5 - Chemical Lights

- VAN #3 (Red)

Avila

1,300':43" Expandi boom
990':30" Expandi boom (12 sections)

Sorbents

Conwed	
Booms	5 bales/24' per
Sweeps	3 boxes/100' per
3M Company	
Boom	5 bale/40' per
Sheets	5 bales/100 per
Sweeps	2 bales/100' per
Dow Imbibers	
Bags	1 box/100 per
Blankets	20 boxes/1 per

Oil Snare	1 box/100 per

51T Acme Skimmer with 1,200 gal. bag
2 - Skimmer hoses
1 - 25':3" Discharge hose
2 - 3" Valve
1 - 30':¼" poly bouy line with bouy
1 each - 100':½" nylon, 100':3/4" tow line
1 - 1,000':¼" manila line
1 box - 1,000':¼" manila line
5 - Hose Floats
5 - Life Preservers
2 - Pitchforks
1 - Rake
Miscellaneous Tools
2 - 55 Gallon Drums
4 - Anchors, 22#
4 - Anchor Line 200':½" nylon
4 - Crown Line 200':½" poly with bouy
5 - Chemical Lights
1 - 14' Skiff with OB

- Van #4 (Yellow)

Port Hueneme (1,200')	Ventura (1,500')	Channel Islands (1,500')

4,200':43" Expandi boom
743':30" Expandi boom (9 sections)

Sorbents

3M Company	
Boom	20 bales/40' per
Sheets	12 bales/100 per
Sweeps	5 bales/100' per
Type 100 Roll	1 roll/150' per

Dow Imbibers	
Bags	1 box/100 per
Blankets	20 boxes/1 per

Oil Snare	1 box/30 per

51T Acme Skimmer with 1,200 gal. bag
2 - Skimmer hoses
1 - 25':3" hose
2 - 3" Valve
1 - 30':½" poly line with bouy
1 each - 100':½" nylon, 100':3/4" tow line
1 - 1,000':¼" manila line
1 - 1,000':¼" manila line
5 - Hose Floats
4 - Life Preservers

2 - Pitchforks
1 - Rake
Miscellaneous Tools
2 - 55 Gallon Drums
3 - Anchors, 22#
4 - Anchor Line 200':½" nylon
4 - Crown Line 200':½" poly with bouy
10 - Chemical Lights
1 - 14' Skiff with OB

- Van #5 (Black)

Santa Barbara

1,500':43" Expandi boom
1,400':8" Kepner boom

Sorbents

Conwed	
Sweeps	1 box/100' per
Blankets	1 roll/200' per
3M Company	
Booms	10 bale/40' per
Sheets	5 bale/100 per
Sweeps	4 bale/100' per
Dow Imbibers	
Bags	1 box/100 per
Blankets	20 boxes/1 per
Oil Snare	1 box/30 per

39T Acme Skimmer with 1,200 gal. bag
2 - Skimmer hoses
1 - 25':3" Discharge hose
2 - 3" Valve
1 - 30':½" poly line
1 each - 100':½" nylon, 100':3/4" tow line
1 - 1,000':¼" manila line
5 - Hose Floats
4 - Life Preservers
2 - Pitchforks
1 - Rake
Miscellaneous Tools
2 - 55 Gallon Drums
2 - Anchors, 22#
4 - Anchor Line 200':½" nylon
4 - Crown Line 200':½" poly with bouy
5 - Mops
10 - Chemical Lights

- Van #6 (White)

Point Dume

2,475':30" Expandi boom (30 sections)

Sorbents

Conwed	
Sweeps	6 boxes/100' per
3M Company	
Booms	11 bale/40' per
Sheets	10 bale/100 per
Sweeps	2 bale/100' per
Dow Imbibers	
Bags	1 box/100 per
Blankets	20 boxes/1 per
Oil Snare	1 box/30 per

51T Acme Skimmer with 1,200 gal. bag
2 - Skimmer hoses
1 - 25':3" Discharge hose
2 - 3" Valves
1 - 30':½" poly line with bouy
1 each - 100':½", 100':3/4" tow line
1 - 1,000':¼" manila line
5 - Hose Floats
4 - Life Preservers
2 - Pitchforks
1 - Rake
Miscellaneous Tools
2 - 55 Gallon Drums
2 - Anchors, 22#
4 - Anchor Line 200':½" poly with bouy
4 - Crown Line 200':½" poly with bouy
5 - Chemical Lights

- Van #7 (Brown)

Morro Bay

495':30" Expandi boom - 6 sections
1,050':43" Expandi Boom - 21 sections

Sorbents

3M Company	
Booms	5 bale/40' per
Sheets	15 bale/100 per
Sweeps	5 bale/100' per

Dow Imbibers

Bags	1 box/100 per
Blankets	20 boxes/1 per

Oil Snare — 1 box/30 per

4 - Life Preservers
Miscellaneous Tools
2 - Pitchforks
2 - Rakes
2 - 55 Gallon Drums
4 - Anchors, 22#
4 - Anchor Line 200':½" nylon
4 - Crown Line 200':½" poly with bouy
1 - 100':3/4" Tow Line
1 - 1,000':¼" manila line

- Van #8 (Orange)

Port Mugu

825':30" Expandi boom - 10 sections
1,050':43" Expandi Boom - 21 sections

Sorbents

3M Company

Booms	5 bale/40' per
Sheets	15 bale/100 per
Sweeps	5 bale/100' per

Dow Imbibers

Bags	1 box/100 per
Blankets	20 boxes/1 per

Oil Snare — 1 box/30 per

4 - Life Preservers
Miscellaneous Tools
2 - Pitchforks
2 - Rakes
2 - 55 Gallon Drums
4 - Anchors, 22#
4 - Anchor Line 200':½" nylon
4 - Crown Line 200':½" poly with bouy
1 - 100':3/4" Tow Line
1 - 1,000':¼" manila line

APPENDIX D

NPDES PERMIT

[Permit No. CA0110516]

General Permit—Authorization To Discharge Under the National Pollutant Discharge Elimination System

In compliance with the provisions of the Federal Water Pollution Control Act, as amended (33 USC 1251 et seq.; the "Act"), the following discharges are authorized:

Drill Cuttings and Drilling Muds—(discharge 001)
Produced Water—(discharge 002)
Produced Sand—(discharge 003)
Well Completion and Treatment Fluids—(discharge 004)
Deck Drainage—(discharge 005)
Sanitary Wastes—(discharge 006)
Domestic Wastes—(discharge 007)
Desalinization Unit Discharge—(discharge 008)
Cooling Water—(discharge 009)
Bilge Water—(discharge 010)
Ballast Water—(discharge 011)
Excess Cement Slurry—(discharge 012)
BOP Control Fluid—(discharge 013)
Fire Control System Test Water—(discharge 014)

from offshore oil and gas facilities (defined in 40 CFR Part 435, Subpart A) to receiving waters named the Pacific Ocean, in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II and III thereof.

Offshore permittees who fail to notify the Regional Administrator of their intent to be covered by this general permit are not authorized to discharge to the specified receiving waters unless an individual permit has been issued to the facility by EPA, Region 9.

The authorized discharge sites are (by OCS lease parcel number):

In waters west and northwest of Point Arguello, P-0393, P-0394, P-0395, P-0396, P-0397, P-0400, P-0401, P-0402, P-0403, P-0404, P-0405, P-0406, P-0407, P-0408, P-0409, P-0410, P-0411, P-0412, P-0413, P-0414, P-0415, P-0416, P-0418, P-0419, P-0420, P-0421, P-0422, P-0424, P-0425, P-0426, P-0427, P-0429, P-0430, P-0431, P-0432, P-0433, P-0434, P-0435, P-0436, P-0437, P-0438, P-0439, P-0440, P-0441, P-0443, P-0444, P-0445, P-0446, P-0447, P-0448, P-0449, P-0450, P-0451, P-0452, P-0453;

In waters south and west of Pt. Conception, P-0315, P-0316, P-0317, P-0318, P-0319, P-0320, P-0321, P-0322, P-0323, P-0324, P-0325, P-0327, P-0328, P-0330, P-0331, P-0332, P-0333, P-0338;

In the Santa Barbara Channel from Pt. Conception to Goleta Point, P-0180, P-0181, P-0182, P-0183, P-0184, P-0185, P-0186, P-0187, P-0188, P-0189, P-0190, P-0191, P-0192, P-0193, P-0194, P-0195, P-0196, P-0197, P-0328, P-0329, P-0334, P-0335, P-0336, P-0339, P-0340, P-0341, P-0342, P-0343, P-0344, P-0345, P-0348, P-0349, P-0350, P-0351, P-0352, P-0353, P-0354, P-0355, P-0356, P-0357, P-0358, P-0359, P-0360;

In the Santa Barbara Channel from Santa Barbara to Ventura, P-0166, P-0202, P-0203, P-0204, P-0205, P-0206, P-0209, P-0210, P-0215, P-0216, P-0217, P-0231, P-0232, P-0233, P-0234, P-0238, P-0240, P-0241, P-0337, P-0346, P-0347, P-0361;

In waters south of Santa Rosa and Santa Cruz Islands, P-0248, P-0251, P-0382, P-0383, P-0384;

In the San Pedro Channel between San Pedro and Laguna, P-0295, P-0296, P-0300, P-0301, P-0306, P-0386;

In waters west of San Clemente Island in the Tanner Bank Area, P-0387, P-0389.

This permit does not authorize discharges from "new sources" as defined in 40 CFR 122.3.

The permit shall become effective on

This permit and the authorization to discharge shall expire at midnight, December 31, 1983.

Signed this 22nd day of January, 1982.

Sonia F. Crow,

Regional Administrator, Region 9.

Part I—Permit No. CA0110516

A. Effluent Limitations and Monitoring Requirements

1. During the period beginning the date notification of commencement of operations is received by the Regional Administrator and lasting through December 31, 1983, the permittee is authorized to discharge from outfall(s) serial number 001 (drill cuttings and drilling muds).

a. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent characteristic	Discharge limitations				Monitoring requirements	
	Kilograms per day (pounds per day)		Other units (specify)		Measurement frequency	Sample type
	Daily average	Daily maximum	Daily average	Daily maximum		
Total volume (cubic meters) [1]					Once/month	Estimate

[1] The total volume of drill cuttings and drilling muds discharged for the prior month at each site shall each be monitored by an estimate sample type.

b. There shall be no discharge of free oil as a result of the discharge of drill cuttings and/or drilling muds. The permittee shall make visual observations for the presence of free oil on the surface of the receiving water in the vicinity of the discharge on each day of the discharge.

c. There shall be no visible floating solids in the receiving waters as a result of these discharges.

d. The discharge of oil-base drilling muds is prohibited.

e. There shall be no discharge of toxic materials in a concentration and/or volume which after allowance for initial mixing, exceeds the limiting permissible concentration defined in Condition III.C.17. The discharge of generic drilling muds, as defined in Part III.C.18 of this permit, shall constitute compliance with this provision.

f. Drilling Muds Inventory. The permittee shall maintain a precise chemical inventory of all constituents and their volume added downhole for each well. This inventory shall include diesel fuel and any drilling mud additives used to meet specific drilling requirements.

g. Additional Monitoring Requirements: Bioassay of Spent Drilling Muds.

Within six (6) months of the initiation of drilling mud discharges, the permittee shall demonstrate compliance with condition I.A.1.e. by conducting and reporting the results of a drilling mud bioassay performed for each type of drilling mud discharged. A sample of spent drilling mud, immediately prior to its intended discharge, shall be collected for analysis. The bioassay shall be conducted in accordance with the procedures developed by the Mid-Atlantic Joint Industry Bioassay Program, or other methods approved by the Regional Administrator, Region 9. The following shall be submitted to the Regional Administrator:

(a) The date the sample was collected;

(b) The average rate of discharge and total volume of spent drilling mud discharged on the date of the sample;

(c) The water depth into which the drilling muds were discharged;

(d) The results of bioassays, including the survival percentages of all dilutions tested;

(e) A list of all components, including the weights, in pounds per barrel, used to compose the drilling muds which are discharged. If commercial names are listed, their chemical constituents shall also be provided.

The bioassay requirements shall be deemed satisfied where the permittee discharges a drilling mud for which bioassay test data, obtained through procedures defined above, has previously been submitted to the Regional Administrator without regard to whether the permittee was originally responsible for obtaining the test data.

2. During the period beginning the date notification of commencement of operations is received by the Regional Administrator and lasting through December 31, 1983, the permittee is authorized to discharge from outfall(s) serial number(s) 002 (produced water).

a. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent characteristic	Discharge limitations				Monitoring requirements	
	Kilograms per day (pounds per day)		Other units (specify)		Measurement frequency	Sample type
	Daily average	Daily maximum	Daily average	Daily maximum		
Flow—in Mday (MGD)					Once/month	Composite.
Oil and grease				[illegible]2.0	do	Do.
Arsenic (milligrams per liter)				[illegible]0032	Once/year	Do.
Cadmium				[illegible]0012	do	Do.
Total chromium				[illegible]008	do	Do.
Copper				[illegible]020	do	Do.
Cyanides				[illegible]020	do	Do.
Lead				[illegible]032	do	Do.
Mercury				[illegible]00056	do	Do.
Nickel				[illegible]080	do	Do.
Silver				[illegible]0018	do	Do.
Zinc				[illegible]080	do	Do.
Phenols				[illegible]150	do	Do.

[illegible] This limit is applicable after initial dilution within a mixing zone defined in Condition III.C.16. Compliance with these limits, shall be determined through the use of the following equation:
Ce = Co + Dm (Co − Cs)
where:
Ce = the maximum allowable concentration,
Co = the concentration in Part I.A.2.a. which is to be met at the completion of initial dilution,
Cs = background seawater concentration (See Part III.C.19),
Dm = minimum probable initial dilution expressed as parts seawater per part wastewater.

b. Samples taken in compliance with the monitoring requirements specified in Condition A.2.a., above, shall be taken at the following location: at a point in discharge 002 prior to entry into the waters of the Pacific Ocean.

3. During the period beginning the date notification of commencement of operations is received by the Regional Administrator and lasting through December 31, 1983, the permittee is authorized to discharge from outfall serial numbers 003–007.

a. Such discharges shall be limited and monitored by the permittee as specified below:

Serial Nos./outfalls	Effluent characteristic	Discharge limitations	Monitoring requirements	
			Measurement frequency	Sample type
003—Produced Sand [1]	Quantity (bbl)		Once/month	Estimate.
004—Well Completion and Treatment Fluids [1]	Volume (bbl/mo)		do	Do.
005—Deck Drainage [1]	Volume (bbl/mo)		do	Do.
006—Sanitary Waste	Flow Rate (MGD)		do	Do.
007—Domestic Waste	Residual Chlorine (milligrams per liter)	[illegible] 1.0	do	Grab.

[illegible] There shall be no discharge of free oil as a result of the discharge. The permittee shall make visual observations for the presence of free oil on the surface of the receiving water in the vicinity of the discharge on each day of discharge.
[illegible] Minimum of 1 mg/l and maintained as close to this concentration as possible. This requirement is not applicable to facilities intermittently manned or to facilities permanently manned by nine (9) or fewer persons.

b. Samples taken in compliance with monitoring requirements specified above shall be taken at a sampling point prior to commingling with any other waste stream or entering Pacific waters. In cases where sanitary and domestic wastes are mixed prior to discharge, and sampling of the sanitary waste component stream is infeasible, the discharge may be sampled after mixing. In such cases, the discharge limitation shown above for sanitary waste shall apply to the mixed waste stream.

4. a. During the period beginning the date notification of commencement of operations is received by the Regional Administrator and lasting through the permittee is authorized to discharge from outfall(s) serial number(s) 008–014 (miscellaneous discharges).

Discharge:

008—Desalinization Unit Discharge
009—Cooling water
010—Bilge Water
011—Ballast Water
012—Excess Cement Slurry
013—Control Fluid From Blow-Out Preventer
014—Fire Control System Test Water

b. There shall be no free oil in the receiving waters as a result of these discharges.

5. *Reopener Clause.* In addition to any other grounds specified herein, this permit shall be modified or revoked at any time if, on the basis of any new data, the Regional Administrator determines that continued discharges may cause unreasonable degradation of the marine environment.

6. *Commencement and Termination of Operations—Notification Requirements.* Written notification of commencement of operations including name and address of permittee, description and location of operation and of accompanying discharges shall be provided to the Regional Administrator at least fourteen (14) days prior to initiation of discharges. Permittees shall also notify the Regional Administrator upon permanent termination of discharge from these facilities. The permittee shall be the owner of the exploratory drillship or offshore platform or the leaseholder upon certification, in writing, to the Regional Administrator, prior to commencement of operation, that he shall assume full responsibility for compliance with this general permit.

7. *Effective Date for Monitoring Requirement.* The monitoring requirements shall take effect upon commencement of discharge.

8. *Notification of Relocation by Exploratory Drilling Vessel.* No less than fourteen (14) days prior to any relocation and initiation of discharge activities at an authorized discharge site the permittee shall provide to the Regional Administrator written notification of such actions. The notification shall include the parcel number and exact coordinates of the new site and the initial date and expected duration of drilling activities at the site.

B. Other Discharge Limitation

1. Floating Solids or Visible Foam. There shall be no discharge of floating solids or visible foam in other than trace amounts.

2. Halogenated Phenol Compounds. There shall be no discharge of halogenated phenol compounds.

3. Surfactants, Dispersants, and Detergents. The discharge of surfactants, dispersants, and detergents shall be minimized except as necessary to comply with the safety requirements of the Occupational Health and Safety Administration and the U.S. Geological Survey.

4. Sanitary Wastes. Any facility using a marine sanitation device that complies with pollution control standards and regulations under Section 312 of the Act shall be deemed to be in compliance with permit limitations for sanitary waste discharges until such time as the device is replaced or is found not to comply with such standards and regulations.

C. Monitoring and Records

1. Representative Sampling. Samples and measurements taken for the purpose of monitoring shall be representative of the volume and nature of the monitored activity.

2. Reporting Procedures. Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

3. Penalties for Tampering. The Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

4. Reporting of Monitoring Results. Monitoring results obtained during the previous 12 months shall be summarized and reported on a Discharge Monitoring Report Form, EPA No. 3320–1 (DMR). In addition, the annual average shall be reported and shall be the arithmetic average of all samples taken during the year. The highest daily maximum sample taken during the reporting period shall be reported as the daily maximum concentration.

If any category of waste (outfall) is not applicable due to the type of operation (e.g., drilling, production) no reporting is required for that particular outfall. Only DMR's representative of the activities occurring need to be submitted. A notification indicating the type of operation should be provided with the DMR's.

The first report is due on the 28th day of the 13th month from the day this permit first becomes applicable to a permittee. Signed and certified copies of these and other reports required herein, shall be submitted to the Regional Administrator at the following address: Director, Enforcement Division, Region 9, U.S. Environmental Protection Agency, 215 Fremont Street, San Francisco, CA 94105.

5. Additional Monitoring by the Permittee. If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR Part 136 or as specified in the permit, the results of such monitoring shall be included in the calculation and reporting of the data submitted in the DMR.

6. Averaging of Measurements. Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Regional Administrator in the permit.

7. Retention of Records. The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, and copies of all reports required by this permit for a period of at least three (3) years from the date of the sample, measurement, or report. This period may be extended by request of the Regional Administrator an any time.

8. Record Contents. Records of monitoring information shall include:

a. The date, place, and time of sampling or measurements;

b. The individual(s) who performed the sampling or measurements;

c. The date(s) analyses were performed;

d. The individual(s) who performed the analyses;

e. The analytical techniques or methods used; and

f. The results of such analyses.

9. Inspection and Entry. The permittee shall allow the Regional Administrator, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Act, any substances or parameters at any location.

D. Reporting Requirements

1. Anticipated Noncompliance. The permittee shall give advance notice to the Regional Administrator of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

2. Monitoring Reports. Monitoring results shall be reported at the intervals specified in Part I.C. of this permit.

3. Twenty-Four Hour Reporting of Noncompliance. The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including dates and times, and, if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

The following shall be included as information which must be reported within 24 hours:

a. Any unanticipated bypass which exceeds any effluent limitation in the permit;

b. Any upset which exceeds any effluent limitations in the permit; and

c. Violation of a maximum daily discharge limitation for any toxic pollutant or hazardous substance, or any pollutant specifically identified as the method to control a toxic pollutant or hazardous substance, listed as such by the Regional Administrator in the permit to be reported within 24 hours.

Reports should be made to telephone #415-974-8050. The Regional Administrator may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

4. Other Noncompliance. The permittee shall report all instances of noncompliance not reported under Part I.D.3. at the time monitoring reports are submitted. The reports shall contain the information listed in Part I.D.3.

5. Signatory Requirements. All reports or information submitted to the Regional Administrator shall be signed and certified in accordance with 40 CFR § 122.6.

6. Availability of Reports. Except for data determined to be confidential under 40 CFR Part 2, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Regional Administrator. As required by the Act, permit applications, permits, and effluent data shall not be considered confidential.

7. Penalties for Falsification of Reports. The Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

Part II—Permit No. CA0110516

A. Operation and Maintenance of Pollution Controls

1. Proper Operation and Maintenance. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes, but is not limited to, effective performance, adequate funding, adequate permittee staffing and training, adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

2. Duty to Halt or Reduce Activity. Upon reduction, loss, or failure of the treatment facility, the permittee shall, to the extent necessary to maintain compliance with its permit, control production or all discharges or both until the facility is restored or an alternative method of treatment is provided. This requirement applies, for example, when the primary source of power of the treatment facility fails or is reduced or lost.

3. Bypass of Treatment Facilities.

a. Definitions.

(1) "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

(2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which are reasonably expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. Bypass not exceeding limitations. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs c. and d. of this section.

c. Notice.

(1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, he shall submit prior notice, if possible, at least 10 days before the date of the bypass.

(2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in Part I.D.3. (24-hour notice).

d. Prohibition of bypass.

(1) Bypass is prohibited, and the Regional Administrator may take enforcement action against the permittee for bypass, unless:

(A) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(B) There was no feasible alternatives to the bypass, such as the use of auxilliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if the permittee could have installed adequate backup equipment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(C) The permittee submitted notices as required under paragraph c. of this section.

(2) The Regional Administrator may approve an anticipated bypass, after considering its adverse effects, if he determines that it will meet the three conditions listed above in paragraph d.(1) of this section.

(6). Upset Conditions. a. Definition. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of paragraph (c) of this section are met. No determination, made during administrative review of claims that noncompliance was caused by an upset, and before and action for noncompliance, is final administrative action subject to judicial review.

c. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the permittee can identify the specific cause(s) of the upset;

(2) The permitted facility was at the time being properly operated;

(3) The permittee submitted notice of the upset as required in Part I.D.3. (24-hour notice); and

(4) The permittee complied with any remedial measures required under Part II.B.4 (duty to mitigate).

d. Burden of proof. In any enforcement proceeding the permittee seeking to estalish the occurrence of an upset has the burden of proof.

5. Removed Substances. Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering navigable waters.

B. General Conditions

1. Duty to Comply. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action or for requiring a permittee to apply for and obtain an individual NPDES permit.

2. Duty to Comply with Toxic Effluent Standards. The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

3. Penalties for Violation of Permit Conditions. The Act provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to a civil penalty not to exceed $10,000 per day of such violation. Any person who willfully or negligently violates permit conditions implementing Sections 301, 302, 306, 308, 307, or 308 of the Act is subject to a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than 1 year, or both.

4. Duty to Mitigate. The Permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit.

5. Permit Actions. This permit may be modified, revoked and reissued, or terminated for cause, as provided in 40 CFR 122.7(f) and in 122.15, 122.16, and 122.17 (1980). The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or notification of planned changes or anticipated noncompliance, does not stay any permit condition.

6. Civil and Criminal Liability. Except as provided in permit conditions on "Bypasses" (Part II.A.3.) and "Upsets" (part II.A.4.), nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance.

7. Oil and Hazardous Substance Liability. Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalities to which the permittee is or may be subject under Section 311 of the Act.

8. State Coastal Zone Management Plan Consistency. Discharge from drilling vessels, production platforms or other facilities engaged in exploratory drilling or production of oil and gas within 1000 meters seaward of the territorial seas of California is prohibited until the plan of exploration or development, for each affected parcel, is determined to be consistent with the Coastal Zone Management Plan by the Coastal Commission of the State of California.

9. State Laws. Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Act.

10. Property Rights. The issuance of this permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State, or local laws or regulations.

11. Severability. The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

Part III—Permit No. CA0110516

Part III Other Requirements

A. When the Regional Administrator May Require Application for an Individual NPDES Permit

The Regional Administrator may require any person authorized by this permit to apply for and obtain an individual NPDES permit when:

a. The discharge(s) is a significant contributor of pollution;

b. The discharger is not in compliance with the conditions of this permit;

c. A change has occurred in the availability of the demonstrated technology or practices for the control or abatement of pollutants applicable to the point source;

d. Effuent limitation guidelines are promulgated for point sources covered by this permit;

e. A Water Quality Management Plan containing requirements applicable to such point source is approved; or

f. The point source(s) covered by this permit no longer:

(1) Involve the same or substantially similar types of operations;

(2) Discharge the same types of wastes;

(3) Require the same effluent limitations or operating conditions;

(4) Require the same or similar monitoring; and

(5) In the opinion of the Regional Administrator are more appropriately controlled under a general permit than under individual NPDES permits.

The Regional Administrator may require any permittee authorized by this permit to apply for an individual NPDES permit only if the permittee has been notified in writing that a permit application is required.

B. When an Individual NPDES Permit May Be Requested

a. Any permittee authorized by this permit may request to be excluded from the coverage of this general permit by applying for an individual permit. The permittee shall submit an application together with the reasons supporting the request to the Regional Administrator.

b. When an individual NPDES permit is issued to a permittee otherwise subject to this general permit, the applicability of this permit to that owner or permittee is automatically terminated on the effective date of the individual permit.

c. A source excluded from coverage under this general permit solely because it already has an individual permit may request that its individual permit be revoked, and that it be covered by this general permit. Upon revocation of the individual permit, this general permit shall apply to the source.

C. Definitions

1. "Cooling water" means once through non-contact cooling water.

2. "Daily maximum" means the average concentration of the parameter specified during any 24-hour period that reasonably represents the 24-hour period for the purposes of sampling.

3. "Deck Drainage" means all waste resulting from platform washing, deck washings, and run-off from curbs, gutters, and drains including drip pans and wash areas.

4. "Desalinization unit discharge" means wastewater associated with the process of creating fresh water from seawater.

5. "Domestic waste" includes discharges from galleys, sinks, showers, and laundries.

6. "No discharge of free oil" means a discharge that does not cause a film or sheen upon or a discoloration on the surface of the water or adjoining shorelines, or cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines.

7. "Drill cuttings" means particles generated by drilling into subsurface geological formations.

8. "Drilling muds" means any fluid sent down the well hole, including any specialty products, from the time a well is begun until final cessation of drilling in that hole.

9. "Produced waters" means waters and particulate matter associated with oil and gas producing formations. Sometimes the terms "formation water" or "brine water" are used to describe produced water.

10. "Produced sands" means sands and other solids removed from the produced waters.

11. "Sanitary waste" means human body waste discharged from toilets and urinals.

12. The term "territorial seas" means the belt of the seas measured from the line of ordinary low water along that portion of the coast which is in direct contact with the open sea and the line marking the seaward limit of inland waters, and extending seaward a distance of three miles.

13. "Well completion and treatment fluids" means any fluids sent down the drill hole to improve the flow of hydrocarbons into or out of geological formations which have been drilled.

14. A "discrete sample" means any individual sample collected in less than fifteen minutes.

15. For flow rate measurements, a "composite sample" means the arithmetic mean of no fewer than eight individual measurements taken at equal intervals for twenty-four hours or for the duration of the discharge, whichever is shorter.

For oil and grease measurements, a "composite sample" means four samples taken over a twenty-four hour period analyzed separately and the four samples averaged. The daily maximum limitation for oil and grease is based on this definition of a composite sample.

For measurements other than flow rate or oil and grease, a composite sample means a combination of no fewer than eight individual samples obtained at equal time intervals for twenty-four hours or for the duration of the discharge, whichever is shorter.

16. Mixing Zone—the zone extending from the sea's surface to seabed and extending laterally to a distance of 100 meters in all directions from the discharge point or to the boundary of the zone of initial dilution as calculated by a plume model or other method approved by the Regional Administrator.

17. Limiting Permissible Concentration—that concentration which, outside the boundaries of a mixing zone as defined in Part III.C.16 above, will not exceed 0.01 of a concentration shown to be acutely toxic (96 hr. LC 50) to appropriate sensitive marine organisms in a bioassay carried out in accordance with Condition I.A.1.h. When there is reasonable scientific evidence on a specific waste material to justify the use of an application factor other than 0.01, the Regional Administrator may approve the use of such alternative factor in calculating the LPC.

18. Generic Drilling Mud. a. A drilling mud where the components and the heavy metal concentrations in the whole mud do not exceed the below maximum values:

Drilling mud components		Maximum heavy metal concentration	
Component	Number per barrel	Species	Concentration, parts per million
Barite	176.0	Arsenic	3.0
Bentonite	22.1	Barium	141,000
Chrome lignosulfonate	6.0	Cadmium	1.0
Lignite	6.0	Chromium (total)	285.0
Polyonionic cellulose	1.0	Copper	26.0
Salt	10.0	Lead	24.0
Caustic	1.5	Mercury	1.0
Cellar	0.1	Nickel	8.0
Extractable organics	(1)	Vanadium	35.0
Drill solids	52.0	Zinc	181.0
Lime	1.5		

[1] 0.5 mg/g.

b. Alternatively, a drilling mud for which the 96 hour LC 50 concentrations, obtained via bioassay procedures defined in Part I.A.1.h of this permit, are equal to or greater than 53,000 ppm for the suspended particulate phase and 283,000 ppm for the liquid phase, or;

c. A drilling mud which, on the basis of information provided by the permittee, including the concentrations of components of the drilling muds, any bioassay data for similar drilling muds, and the rate and quantities of drilling muds discharged, as determined by the Regional Administrator, would not constitute, when discharged, a significant threat to the marine environment.

19. Background Seawater Concentration.

Waste constituent	Cs (milligrams per liter)
Arsenic	0.003
Cadmium	0.000
Total Chromium	0.000
Copper	0.002
Lead	0.000
Mercury	0.00006
Nickel	0.00
Silver	0.00016
Zinc	0.008
Cyanide	0.000
Phenolic Compounds	0.0

[FR. Doc. 82-4309 Filed 2-17-82; 8:45 am]

BILLING CODE 6560-38-M

FEDERAL MARITIME COMMISSION

[Independent Ocean Freight Forwarder License No. 2175]

Cougar International Corp.; Order of Revocation

Section 44(c), Shipping Act, 1916, provides that no independent ocean

APPENDIX E

COASTAL ZONE MANAGEMENT CONSISTENCY CERTIFICATION

APPENDIX E

COASTAL ZONE MANAGEMENT CONSISTENCY CERTIFICATION

The proposed activities described in detail in Exxon's Exploration Plan and Environmental Report (Exploration) for proposed exploratory drilling operations on leases OCS-P 0438 and 0440 comply with and will be conducted in a manner consistent with the California Coastal Management Program (CCMP). The policies of the CCMP which may relate to the proposed exploration activities are contained in Sections 30220-30223 (Recreation); 30230 (Marine Resources); 30231 (Biological Productivity and Water Quality); 30232 (Oil and Hazardous Substance Spills); 30234 (Commercial Fishing and Recreational Boating Facilities); 30240 (Environmentally Sensitive Habitat Areas); 30241 (Prime Agricultural Land); 30244 (Archaeological or Paleontological Resources); 30250 (Location of Development); 30251 (Scenic and Visual Qualities); 30253 (New Development); 30255 (Priority of Coastal Dependent Developments); 30260 (Location and Expansion of Industrial Facilities); 30261 (Use of Tanker Facilities); and 30262 (Oil and Gas Development).

RECREATION POLICIES

30220. Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.

30221. Oceanfront land suitable for recreational use shall be protected for recreational use and development unless present and foreseeable future demand for public or commercial recreational activities that could be accommodated on the property is already adequately provided for in the area.

30222. The use of private land suitable for visitor-serving commercial recreational facilities designed to enhance public opportunities for coastal recreation shall have priority over private residential, general industrial, or general commercial development, but not over agriculture or coastal-dependent industry.

30223. Upland areas necessary to support coastal recreational uses shall be reserved for such uses, where feasible.

ASSESSMENT: Existing onshore support facilities at Port Hueneme will be used by the workboats and crewboat servicing the proposed drilling activities. On an emergency, inclement weather basis crewboats may, for short hourly periods, intermittantly use (under an appropriate use permit) the Port San Luis dock. Helicopter support services will originate from either Santa Barbara or Oceano Airports. No new support bases will be constructed to accommodate the proposed exploration program. Clean Seas (CS) has moored the oil spill response vessel MR. CLEAN II at Port San Luis, an existing facility. The only modification needed to accommodate MR. CLEAN II was the installation of a mooring device. Because Exxon and CS plan to use existing facilities, construction in or use of potential coastal recreational areas to support the proposed offshore exploration activities will be unnecessary.

FINDING: The proposed exploration activities will have no effect on the enumerated policies.

MARINE RESOURCE POLICY:

30230. Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.

ASSESSMENT:

A very slight, temporary, and localized impact may occur on some phytoplankton, zooplankton, and benthic species within a small geographic area at the site of the proposed activities. How-

ever, because these species will recolonize the area soon after the completion of the drilling activities, no permanent, long-term adverse effect on these populations is anticipated.

The impacts of day-to-day exploration activities on marine mammals in the project area will be minimal. Concentrations of California sea lions and harbor seals occur at Point Sal [24 km (15 miles) from lease OCS-P 0438], while concentrations of harbor seals occur at Point Arguello [8 km (5 miles) from the lease OCS-P 0438]. Further to the north, harbor seal concentrations and breeding take place at or in the vicinity of Mallagh Landing [about 53 km (33 miles) north of lease OCS-P 0438]. These areas are remote from the proposed well locations. The closest sea lion rookery is Point Piedras Blancas, located in San Luis Obispo County 124 km (77 miles) north-northwest of the two leases covered by this report. The nearest breeding colony of northern fur seals is on San Miguel Island, which is over 69 km (31.5 miles) southeast of lease OCS-P 0440. In 1982, the southernmost boundary of the sea otter range was the Santa Maria River Mouth, which is approximately 32 km (20 miles) from Exxon's proposed drilling sites; however, wandering sea otters have been observed south of Point Conception. While the crewboat and workboats generally will avoid the established range of the sea otter, they may pass through areas where individual sea otters have been observed.

All proposed well locations are beyond 1,000 m (3,280 feet) of state waters. Discharges into the marine environment at the proposed locations are either inert, low to non-toxic, or biodegradable. They are strictly regulated by the U.S. Environmental Protection Agency and the MMS. Cleansed well cuttings will be dispersed by currents or may form a very localized deposit which will be rapidly colonized by resident benthic species.

Historical data on exploratory drilling in the United States indicates that the probability of an adverse impact on living marine resources from even a major (1,000 bbl) oil spill is very

low. No oil spill, much less one of any significance, is anticipated. To further minimize this risk, the protective measures discussed in the following section will be taken by Exxon and the drilling vessel operator.

FINDING: The proposed activities are consistent with the enumerated policy because:

1) The discharge of drilling muds and cuttings from offshore exploration activities will have no effect on marine organisms in, or within 1,000 meters (3,280 feet) of, state waters. Only a very slight, temporary, and localized affect on flora and fauna in the immediate area of the discharge pipes or over a small area of the bottom under the discharge pipe is expected from the drilling muds and cuttings. There will be no effect on land and water uses in the coastal zone from these discharges.

2) The marine mammals and sea birds of the area will not be affected by the activities which will occur miles away from breeding and nesting areas.

BIOLOGICAL PRODUCTIVITY AND QUALITY OF COASTAL WATERS POLICY

> 30231. The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.

ASSESSMENT: Overall, the oceanic water quality along the central California coast is considered to be very good even though there are several existing sources of water pollution in the area, including industrial, agricultural, and municipal sources; commer-

cial, recreational, and military vessels; and urban runoff. Maintenance of biological productivity and water quality in the area is especially important because the commercial fishing industry is a mainstay of the local economies of most central California coastal communities.

One activity associated with the proposed exploration which could affect biological productivity or water quality is the discharge of the various wastes generated as a result of the drilling program. Section III of this report (Environmental Consequences) explains in detail why the impacts of the waste discharges will be minor, localized, and short-term and will be mitigated to the maximum extent feasible. The liquid and solid wastes generated from drilling will be discharged in accordance with the effluent limitations and monitoring requirements set forth in the General NPDES permit issued by EPA on February 18, 1982. Discharges of visible oil and floating solids are prohibited. Oil-contaminated substances will be transported to shore for disposal at an EPA-approved Class I disposal site (currently in Casmalia). The water column in the vicinity of the proposed drilling operations will experience short-term degradation as a result of the dumping of excess mud and drill cuttings, but extensive research has demonstrated that drilling fluids could have lethal and sub-lethal impacts on marine organisms only at much higher concentrations than will be encountered as a result of the proposed activities. Thus commercial fish species will not be adversely affected by the proposed activities.

Water quality and biological productivity could also be affected by oil spills. Commercial organisms could be tainted and, if sexually mature commercial animals are killed as a result of a spill, the size and reproductive potential of the population could be reduced. These impacts are mitigated by various MMS regulations, orders, and NTLs designed to minimize oil spills, by the Offshore

Oil Spill Pollution Compensation Fund, and by the fisheries' training program for all personnel involved in vessel operations and for platform and shore-based supervisors.

Other potential conflicts offshore and onshore between commercial fishing operations and structures necessary to offshore exploration activities include interference with flatfish trawling activities (particularly if the drilling vessel is temporarily situated along a productive tow), the temporary displacement of fishing space, competition for onshore berthing and marine services, and damage to fishing gear by unrecoverable equipment left on the bottom or debris accidentally dropped overboard. These possible impacts are mitigated to the maximum extent feasible by: the temporary nature of the activities; Exxon's willingness to supply commercial fishermen with Loran C Coordinates and other information describing exploration operations (including the exact location of the lease and the wells to be drilled); Exxon's coordination of its proposed activities with commercial fishermen operating in the area; various OCS orders; the Fisheries Contingency Fund; and the industry's abandonment procedures, which leave no obstructions to fishing devices.

FINDING: The proposed activities are consistent with the enumerated policy because:

1) the offshore exploration activities will have only a very slight, temporary and localized effect on the water quality and biological productivity of the area; and

2) the possible adverse impacts associated with the proposed activities will be mitigated to the maximum extent feasible.

OIL SPILL POLICY:

> 30232. Protection against the spillage of crude oil, gas petroleum products, or hazardous substances shall be provided in relation to any development or transportation of

such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur.

ASSESSMENT: A major oil spill could have a significant impact on marine organisms (but only those in the path of the spill) and could result in short-term, localized adverse impacts on air and water quality. However, the chance of a major oil spill occurring as a result of the proposed activities is remote; Exxon has taken the steps necessary to insure that the drilling vessel carries "state-of-the-art" oil spill containment and cleanup equipment onboard, and that the vessel's crew and Exxon's personnel are trained in the deployment and use of this equipment. Additionally, the impacts of any such spill would be mitigated by the requirements described below.

FINDING: The proposed activities are consistent with the enumerated policy because adverse impacts of any oil spill will be mitigated to the maximum extent feasible.

The best available oil spill containment and cleanup equipment will be onboard the GLOMAR PACIFIC as the first line of defense against a major spill or to contain and clean up small spills that might occur. The onboard equipment will comply with all requirements of the MMS and the requirements of the California Coastal Commission applicable to previous projects, including:

- 1500 feet of open ocean oil spill containment boom
- one spill skimming device capable of open ocean use
- bales of oil sorbent material capable of containing 15 barrels of oil
- a boat capable of deploying the oil spill boom on the drill site
- storage capacity for at least 29 barrels of recovered oil.

The second line of defense, which would be employed if a major spill occurs, is mobilization of the oil spill cooperatives. The cooperative used in the Santa Maria Basin offshore area is Clean Seas. This cooperative, the MMS, and other appropriate agencies will be notified immediately in the event of a spill. Clean Seas will be called to the site if the spill is beyond the capability of the onsite equipment.

The logistics and response times for the deployment of oil spill containment and cleanup equipment are discussed in detail in Exxon's Oil Spill Contingency Plan. Response times will vary considerably depending on storage location, staging area, and location of the spill. The relevant equipment storage locations are primarily those of Clean Seas, (see Appendix D of this report for a complete discussion of the oil spill equipment available from Clean Seas), but also include those of Clean Coastal Waters, Clean Bay and the U.S. Navy. Response times from the primary staging areas at Port San Luis and Santa Barbara to the leases vary from 22 to 45 minutes for helicopters, and 2 to 4.2 hours for vessels.

Clean Seas will maintain the oil spill cleanup vessel, Mr. Clean II, at Port San Luis. The vessel can be underway within one to two hours after notification. Proceeding from Port San Luis in average seas, MR. CLEAN II should be at the most distant well site proposed by Exxon in approximately 3 hours. Once it arrives on site, containment boom can be deployed in approximately ten minutes and recovery initiated within one hour. Thus the total response time for the most distant well site, from notification to initiation of recovery, would be approximately 6 hours in average seas.

Adverse sea conditions would necessarily affect response time, since it is difficult either to launch or operate a workboat onsite during such periods (waves exceeding 6 to 8 feet and high winds). The operation of vessels in heavy seas also raises concerns

about the safety of personnel aboard. On the average, wave heights greater than 6 feet occur only 20% of the time in the Santa Maria Basin offshore. During such times, dispersant application as approved and as appropriate may be used.

The procedures for preventing and reacting to oil spills are described in detail in Exxon's Oil Spill Contingency Plan. The oil spill containment and cleanup equipment mitigates oil spill risks to the maximum feasible extent.

COMMERCIAL FISHING AND RECREATIONAL BOATING FACILITY POLICY:

> 30234. Facilities serving the commercial fishing and recreational boating industries shall be protected and, where feasible, upgraded. Existing commercial fishing and recreational boating harbor space shall not be reduced unless the demand for those facilities no longer exists or adequate substitute space has been provided. Proposed recreational boating space shall, where feasible, be designed and located in such a fashion as not to interfere with the needs of the commercial fishing industry.

ASSESSMENT: Existing harbor facilities at Port Hueneme, which have been used for many years by vessels supporting oil and gas operations, will be used by the workboats and crewboat servicing the drilling vessel carrying out the proposed exploration activities. Additional berthing spaces will not be necessary; accordingly, there will be no interference with commercial fishing and recreational fishing vessels.

FINDING: The enumerated policy will be unaffected by the proposed activities.

ENVIRONMENTALLY SENSITIVE HABITAT POLICIES:

> 30240. (a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on such resources shall be allowed within such areas.
>
> (b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall

be sited and designed to prevent impacts which would significantly degrade such areas, and shall be compatible with the continuance of such habitat areas.

ASSESSMENT: No known environmentally sensitive areas are located on or near leases OCS-P 0438 and 0440. The southernmost portion of the sea otter range in 1982, which is at the mouth of the Santa Maria River, is 32 km (20 miles) from lease OCS-P 0438. Even though individual sea otters have been sighted occasionally as far south as Point Conception, the proposed activities will take place outside the areas of greatest population concentration. Point Conception, which has been identified by the BLM as a biologically sensitive area because of its rich intertidal communities and its importance as a major marine biogeographic boundary between cold and warm temperature biotic provinces, is located 29 km (18 miles) southeast of lease OCS-P 0438. No other refuges, preserves, or marine sanctuaries exist in the coastal area between Point Conception and Point Buchon. The closest marine sanctuary is the Channel Islands Marine Sanctuary, located over 53 km (33 miles) away.

FINDING: No environmentally sensitive habitat will be affected by the proposed activity, therefore, the enumerated policy will be unaffected.

PRIME AGRICULTURAL LAND POLICY:

30241. The maximum amount of prime agricultural land shall be maintained in agricultural production to assure the protection of the areas' agricultural economy, and conflicts shall be minimized between agricultural and urban land uses through all of the following:

(a) By establishing stable boundaries separating urban and rural areas, including, where necessary, clearly defined buffer areas to minimize conflicts between agricultural and urban land uses.

(b) By limiting conversions of agricultural lands around the periphery of urban areas to the lands where the viability of existing agricultural use is already severely limited by conflicts with urban uses and where the conver-

sion of the lands would complete a logical and viable neighborhood and contribute to the establishment of a stable limit to urban development.

(c) By developing available lands not suited for agriculture prior to the conversion of agricultural lands.

(d) By assuring that public service and facility expansions and nonagricultural development do not impair agricultural viability, either through increased assessment costs or degraded air and water quality.

(e) By assuring that all divisions of prime agricultural lands, except those conversions approved pursuant to subdivision (b) of this section, and all development adjacent to prime agricultural lands shall not diminish the productivity of such prime agricultural lands.

ASSESSMENT: No onshore facilities will be constructed to support the proposed offshore exploration activities.

FINDING: The proposed activities will have no effect on the enumerated policy.

ARCHAEOLOGICAL AND PALEONTOLOGICAL RESOURCES POLICY:

30244. Where development would adversely impact archaeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be required.

ASSESSMENT: No known cultural resource areas exist on or near leases OCS-P 0438 and 0440 or are indicated by the shallow hazards seismic work recently completed. If a cultural resource is discovered during the drilling program, Exxon will notify the MMS and take appropriate actions to protect the resource.

FINDING: The proposed activities are consistent with the enumerated policy because mitigation measures required by lease stipulations and OCS Orders will be taken to protect any cultural resource which may be discovered on the lease during exploration operations.

LOCATION OF DEVELOPMENT POLICY:

30250. (a) New residential, commercial, or industrial development, except as otherwise provided in this division, shall be located within, contiguous with, or in close proximity to, existing developed areas able to accommodate it or, where such areas are not able to accommodate it, in other areas with adequate public services and where it will not have significant adverse effects, either individually or cumulatively, on coastal resources. In addition, land divisions, other than leases for agricultural uses, outside existing developed areas shall be permitted only where 50 percent of the usable parcels in the area have been developed and the created parcels would no smaller than the average size of surrounding parcels.

ASSESSMENTS: No new onshore development is necessary as a result of the proposed activities.

FINDING: The enumerated policy will not be affected by the proposed activities.

SCENIC AND VISUAL QUALITIES POLICY:

30251. The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas. New development in highly scenic areas such as those designated in the California Coastline Preservation and Recreation Plan prepared by the Department of Parks and Recreation and by local government shall be subordinate to the character of its setting.

ASSESSMENT: Leases OCS-P 0438 and 0440 are located over 6 km (4 miles) from the nearest onshore area (Point Perdenales). It is unlikely that drilling vessels on location this far from shore will be discernable by the public from any onshore coastal area.

FINDING: The enumerated policy will be unaffected by the proposed activities.

NEW DEVELOPMENT POLICY:

30253. New development shall:

(1) Minimize risks to life and property in areas of high geologic, flood, and fire hazard.

(2) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs.

(3) Be consistent with requirements imposed by air pollution control district or the State Air Resources Control Board as to each particular development.

(4) Minimize energy consumption and vehicle miles traveled.

(5) Where appropriate, protect special communities and neighborhoods which, because of their unique characteristics, are popular visitor destination points for recreational uses.

ASSESSMENT: No new onshore development will occur as a result of the proposed activities.

The California Air Resouces Board has taken the position that nitrogen oxide emissions from exploratory drilling operations may have a significant adverse impact on onshore air quality. To respond to this concern, the California Coastal Commission established an interim policy in January, 1982, under which it would review for consistency only one Exploration Plan per company per month. Furthermore, the Commission would review only projects for which the drilling vessels have already been contracted for as of the date of passage of the resolution. This policy was to be in effect until the completion of a six-month, industry-financed task force study designed to identify control technologies for reducing NO_x emissions from offshore exploratory drilling vessels. The

study, which identified two "interim" methods of reducing NO_x, was completed on August 31, 1982, and, on that date, the Commission passed a resolution ending the one well per company per month limitation.

Exxon was an active participant in the above study and did, in January 1983, implement the injection-retard program to reduce NO_x emissions. This action followed approval by the American Bureau of Shipping of the program. Such implementation was made to give the California Coastal Commission and CARB time to evaluate recent modeling study results that indicate insignificant onshore concentration of NO_x from exploratory operations. One such study was performed by Exxon Company, U.S.A. in 1982. ("Results of Analyses Conducted to Determine the Nature, Quantity and Onshore Concentration Levels of Air Emissions Associated with Exxon's Proposed Exploration Activities on the OCS Off Southern California." Prepared by Hooks, McCloskey & Associates, 1982).

The exploration activities proposed in this environmental report and by other lessees that obtained the right to explore for oil and gas in the Santa Maria Basin offshore OCS area as a result of Lease Sale No. 53 will result in a new type of use of this offshore area which it has not previously experienced. The possible impacts of these "new" activities have been extensively described in this report and are summarized below.

1. The short-term disturbance of the seafloor (bottom sediments) from anchors, drilling apparatus, and settled mud and drill cuttings.

2. The burial and smothering of non-mobile benthic organisms over the small area where the excess mud and drill cuttings might settle. In conditions of nondepositional or erosional bottoms

such as those which exist on leases OCS-P 0438 and 0440, burial and smothering is unlikely. Any settled cuttings will provide a habitat for recolonization by epifaunal organisms.

3. The permanent removal of minute amounts of the bedrock structure and an insignificant withdrawal of hydrocarbon resources if such resources are encountered and production tested.

4. An adverse impact on plankton and other filter feeders due to the increased turbidity associated with the discharge of mud, cuttings, and cement.

5. A localized and short-term impact on water quality due to discharge of drilling mud.

6. A minor, localized short-term impact on offshore and onshore air quality.

7. The temporary preclusion of commercial and sport fishing activities from the immediate area around the drilling vessel and possibly along a "tow" in the flatfish, rockfish, or inshore trawl fisheries.

8. The possible temporary disruptions of uses, activities, and resources in the unlikely event of an accidental spill.

9. A temporary, minor impact on air traffic, shipping and navigation due to the fixed location of the drilling vessel, and increased helicopter, crew, and service boat traffic.

If oil or gas in commercially producible quantities are discovered, the impacts on the OCS area from development and production activities may be more intense. Prior to the initiation of such activities, a separate environmental document which analyzes those impacts in detail will be presented.

FINDING: The proposed activities will not affect the enumerated policy.

PRIORITY OF COASTAL-DEPENDENT DEVELOPMENT POLICY:

> 30255. Coastal-dependent developments shall have priority over other developments on or near the shoreline. Except as provided elsewhere in this division, coastal-dependent developments shall not be sited in a wetland. When appropriate, coastal-related developments should be accommodated within reasonable proximity to the coastal-dependent uses they support.

ASSESSMENT: No new onshore development will be associated with the proposed exploration activities.

FINDING: The proposed activities will not affect this enumerated policy.

INDUSTRIAL DEVELOPMENT LOCATION OR EXPANSION POLICY:

> 30260. Coastal-dependent industrial facilities shall be encouraged to locate or expand within existing sites and shall be permitted reasonable long-term growth where consistent with this division. However, where new or expanded coastal-dependent industrial facilities cannot feasibly be accommodated consistent with other policies of this division, they may nonetheless be permitted in accordance with this section and Sections 30261 and 30262 if (1) alternative locations are infeasible or more environmentally damaging; (2) to do otherwise would adversely affect the public welfare; and (3) adverse environmental effects are mitigated to the maximum extent feasible.

ASSESSMENT: No onshore industrial development will be associated with the proposed exploration activities. Offshore exploration activities are classified by the Coastal Commission as "coastal dependent industrial development" and the three standards established by Policy 30260 are applied by the Commission in evaluating the consistency of a proposed offshore exploration activity. Exxon believes that the activities described in the Exploration Plan which accompanies this Environmental Report (Exploration) are consistent

with all the above enumerated coastal policies of the state. However, even if the Commission does not agree, it has the authority to approve the proposed activities because:

(1) Alternative locations for the offshore exploration activities are infeasible;

(2) It is in the public welfare to search for domestic sources of oil and gas; and

(3) The adverse impacts are mitigated to the maximum extent feasible.

FINDING: The proposed activities are consistent with the coastal program.

USE OF TANKER FACILITIES POLICY:

30261. (a) Multicompany use of existing and new tanker facilities shall be encouraged to the maximum extent feasible and legally permissible, except where to do so would result in increased tanker operations and associated onshore development incompatible with the land use and environmental goals for the area. New tanker terminals outside of existing terminal areas shall be situated as to avoid risk to environmentally sensitive areas and shall use a monobuoy system, unless an alternative type of system can be shown to be environmentally preferable for a specific site. Tanker facilities shall be designed to (1) minimize the total volume of oil spilled, (2) minimize the risk of collision from movement of other vessels, (3) have ready access to the most effective feasible containment and recovery equipment for oilspills, and (4) have onshore deballasting facilities to receive any fouled ballast water from tankers where operationally or legally required.

ASSESSMENT: No tanker facilities will be associated with the proposed exploration activities.

FINDINGS: The proposed activities will not affect the enumerated policy.

OIL AND GAS DEVELOPMENT POLICY:

30262. Oil and gas development shall be permitted in accordance with Section 30260, if the following conditions are met:

(a) The development is performed safely and consistent with the geologic conditions of the well site.

(b) New or expanded facilities related to such development are consolidated, to the maximum extent feasible and legally permissible, unless consolidation will have adverse environmental consequences and will not significantly reduce the number of producing wells, support facilities, or sites required to produce the reservoir economically and with minimal environmental impacts.

(c) Environmentally safe and feasible subsea completions are used when drilling platforms or islands would substantially degrade coastal visual qualities unless use of such structures will result in substantially less [sic] environmental risks.

(d) Platforms or islands will not be sited where a substantial hazard to vessel traffic might result from the facility or related operations, determined in consultation with the United States Coast Guard and the Army Corps of Engineers.

(e) Such development will not cause or contribute to subsidence hazards unless it is determined that adequate measures will be undertaken to prevent damage from such subsidence.

ASSESSMENT: The proposed exploration activities will be conducted professionally and with great attention to safety. The entire drilling operation will be conducted in compliance with MMS, OCS Orders, and with the Aids to Navigation requirements for Mobile Drilling Units operating within the jurisdiction of the 11th Coast Guard District. The Coast Guard will distribute the appropriate Notice To Mariners listing project sites as Precautionary Zones.

By carefully complying with all MMS and Coast Guard requirements, and the company's comprehensive safety policy, Exxon will minimize the potential for collisions between other vessels and the drilling vessel or support vessels.

FINDING: The proposed activities are consistent with the enumerated policy and will not affect land or water uses in the coastal zone.