OCS ENVIRONMENTAL ASSESSMENT

LEASE OCS-P 0301

SHELL CALIFORNIA PRODUCTION, INC.

JUNE 1, 1984

Beta Unit

June 1, 1984

Regional Supervisor, Office of Leasing and Environment

Finding of No Significant Impact (FONSI)

File: Lease OCS-P 0301

Operator: Shell California Production, Inc. Date Submitted: March 14, 1984

Lease: OCS-P 0301 Block: 33N, 36W

Plan Type: Development and Production

Documents included with the FONSI are as follows:

Environmental Assessment	see attached
Impact Summary	see attached
Related Environmental Documents	see EA
Correspondence	see EA
Cultural Resource Survey	on file
Biological Survey	not applicable
Geologic Hazard Survey	on file
Other	none

FONSI: Based on the Environmental Assessment, approval of Shell California Production, Inc.'s proposed action does not constitute a major Federal action significantly affecting the quality of the human environment in the sense of NEPA, Section 102(2)(C). In rendering this opinion, I have given special consideration to 30 CFR 250.34-4 (compliance with NEPA).

John F Fields 6/1/84

John F. Fields Date
Regional Supervisor
Office of Leasing and Environment
Pacific OCS Region

Based on the Environmental Assessment of the proposed action, I have determined that an Environmental Impact Statement is not required.

William E. Grant 6/1/84

William E. Grant Date
Regional Manager
Pacific OCS Region

cc: RM Chron
RS, OLE
Chief, EOS
MH
Chron

EOS: MHill/CMcGregor: mew

United States Department of the Interior
Minerals Management Service
1340 West Sixth Street
Los Angeles, California 90017

OCS ENVIRONMENTAL ASSESSMENT

June 1, 1984

Operator	Shell California Production, Inc.	Plan Type	Development/Production
Lease	OCS-P 0301	Block	33 N, 36 W
Platform	Eureka	Date Submitted	March 14, 1984
Unit	Beta		

Prepared by the Regional Supervisor
Office of Leasing and Environment, Pacific OCS Region

Related Environmental Documents:

Environmental Impact Report - Environmental Assessment, Shell OCS Beta Unit Development (prepared jointly with agencies of the State of California, 1978) 3 Volumes
Environmental Assessment, Development for Lease OCS-P 0296
Environmental Assessment, Exploration for Lease OCS-P 0301
Environmental Assessment, Exploration for Lease OCS-P 0488

U.S. DEPARTMENT OF THE INTERIOR

Proposed 1975 OCS Oil and Gas General Lease Sale Offshore Southern California (OCS Sale No. 35), 5 Volumes
Proposed 1979 OCS Oil and Gas General Lease Sale Offshore Southern California (OCS Sale No. 48), 5 Volumes
Proposed 1982 OCS Oil and Gas General Lease Sale Offshore Southern California (OCS Sale No. 68), 2 Volumes
Proposed Southern California Lease Offering, 1984 (OCS Sale No. 80), 2 Volumes
Also, see References Cited

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I. DESCRIPTION OF THE PROPOSED ACTION

A) Objectives of the Proposed Action

Federal policy encourages the development of oil and gas resources in offshore Federal waters referred to as the Outer Continental Shelf (OCS). It is the OCS Lands Act as amended in 1978 that presents this policy as defined by the United States Congress. The American public and commerce have the need for petroleum products that require development of these resources. It is necessary to emphasize national resources to reduce dependence on foreign sources of petroleum. This foreign dependence helps create an unfavorable balance of national payments and places the national economy in an insecure position. A secondary benefit is the collection of royalties which is a significant source of revenue for the federal government.

The OCS Lands Act requires resource development to not affect navigational and fishing rights and to be subject to environmental safeguards. It is the objective of this Environmental Assessment (EA) to determine the impacts, level of impacts and, if necessary, present methods of reducing impacts to these concerns.

As part of a larger program, the Department of the Interior has held a series of oil and gas lease sales of the OCS. On December 11, 1975, the Bureau of Land Management held Lease Sale No. 35 that resulted in leases for exploration and development in four general geographic areas, including the Gulf of Santa Catalina. A total of 57 leases were issued in that sale and only four are now active, also in the Gulf of Santa Catalina. There are two other active leases in this same area: one obtained in Lease Sale No. 48 and the other in Lease Sale No. 68. Shell California Production Inc. (SCPI) is proposing an oil and gas platform to be placed on lease OCS-P 0301 obtained from Sale No. 35. It is their belief that they are conforming to the national policy of resource development.

The specific lease of interest is OCS-P 0301. The current record of title interest is as follows:

Shell California Production, Inc.	50%
Petro-Lewis Beta Co. Joint Venture	17%
Aminoil, Inc.	16.5%
Santa Fe Energy Co.	12%
Hamilton Brothers Oil Co.	2.565%
Hamilton Brothers Exploration Co.	1.215%
Hamilton Brothers Corp.	0.72%

Shell California Production Inc. is designated as the lease operator for OCS-P 0301 as well as for the adjoining lease OCS-P 0300. To maximize resource development of a shared field, SCPI together with Chevron U.S.A., Inc., operator of adjoining leases OCS-P 0296 and OCS-P 0306, formed the Beta Unit on April 15, 1983.

Shell California Production Inc.'s objective is to derive economic benefit through the extraction, processing and selling of the hydrocarbons from leases OCS-P 0300, P 0301 and P 0306. This intent was originally discussed in the Environmental Impact Report/Environmental Assessment, a joint document between

the U.S. Geological Survey, State Lands Commission and the Port of Long Beach that assessed SCPI's proposed Beta Unit development (USDI, 1978b). This document, released on December 1, 1978 only foresaw Platforms Ellen, Elly, and Eureka as developing the Beta Field. After receiving approval from

the Minerals Management Service (MMS) SCPI installed Ellen on January 5, 1980 and Elly on March 12, 1980. It was SCPI's intent to install Eureka during the next five years. On April 15, 1981 Chevron officially submitted its Development and Production Plan (DPP) together with the Environmental Report (ER) that proposed development of the Beta Field that extended into OCS-P 0296 by Platform Edith. This plan was approved on July 12, 1982. Before Edith was installed, Chevron and SCPI unitized OCS-P 0296, P 0300, P 0301 and P 0306 to allow equitable and efficient development of the Beta Field. On January 12, 1983 Edith was installed with initial production on January 24, 1984.

Shell California Production Inc.'s first DPP on the Beta Field development submitted in November 1977 proposed Platforms Ellen and Elly and mentioned the possibility of a platform installation on OCS-P 0301 in the future. Before the EIR/EA was completed, SCPI was able to supply the name Eureka, approximate installation date, and approximate locations of the platform and connecting pipeline. The EIR/EA could not properly address resulting impacts, site specific and cumulative, for Eureka. Thus, the USGS only approved Ellen and Elly.

Shell California Production Inc. delivered to the USGS a supplemental Beta Field DPP covering Eureka in more detail and outlining SCPI's objectives. It was found to be incomplete. In a letter dated December 16, 1981 from the USGS, SCPI was required to submit a complete DPP and accompanying ER for Eureka. A satisfactory DPP with an acceptable ER was finally deemed submitted on March 14, 1984.

The specific objective of Eureka is to allow the most efficient extraction of hydrocarbons from the southern portion of the Beta Field. Initial production is to coincide with the production peak expected from the Ellen/Elly facility in mid 1985. The motivation for start of production in late 1984 or early 1985 is the prevention of an adverse pressure gradient between the central and southern portions of the Beta Field. If Ellen and Elly are allowed to continue at their current rates without Eureka, there will be a migration of hydrocarbons from the southern portion. This would result in a lower resource recovery in that part of the field.

Three alternatives to the proposed action have been developed for this EA and they are: A) no project; B) delayed project; and C) on land disposal of drilling muds and cuttings. These alternatives are described and evaluated in Section IV of this document.

Several other alternatives have been considered by MMS. These were subsequently eliminated for detailed analysis in the EA due to their infeasibility or lack of reduction of impact. One potential alternative, "Alternate Location", would have modified the proposed action by requiring an alternative site for platform installation. The siting of proposed Platform Eureka presently is based upon the location of favorable hydrocarbon bearing structures, as well as being restricted by the present location of the U.S. Coast Guard designated

Traffic Separation Scheme. Impacts associated with platform installation on other locations within the lease would remain the same with the exception of placement within the traffic lane which would require modification of the Traffic Separation Scheme by the Coast Guard. Current Coast Guard regulations prohibit placement of any structure within a traffic lane or within 500 m of a traffic lane.

A second potential alternative would have modified the proposed action by requiring the processing facilities for the crude oil to be placed on proposed Platform Eureka. This would require the design for the platform be modified by increasing its size and potentially increasing some impacts (see Section III). This alternative would not have required an oil pipeline to Platform Elly. However, there would not have been a reduction in impacts from pipeline installation since the gas and water pipelines to Elly would still need to be installed. Impacts to air quality from the operation of processing facilities on both Platform Eureka and Platform Elly would remain the same (see Section III).

A third alternative that MMS has considered would have modified the proposed action by requiring the power generation facilities to be installed on Platform Eureka. The design of the platform would have required modification to accommodate the power generation equipment. Impacts associated with the placement of the platform would be increased (see Section III).

The placement of power generation facilities on proposed Platform Eureka would have eliminated the two power cables from Eureka to the existing Platform Elly. This would eliminate any impacts associated with the cable laying operations. However, such impacts are not likely to be significant (see Section III). Air quality impacts from the separate power generation would be similar to the proposal.

MMS has also considered alternative drilling facilities to those proposed by SCPI. Alternative drilling facilities could include subsea drilling chambers and individual or clustered multi-well completions, or multiple smaller platforms. Impacts associated with the use of these alternative facilities are discussed in the original EIR/EA (USDI, 1978b).

Use of subsea completions would not avoid conflict with marine traffic in the Traffic Separation Scheme, due to continual vessel servicing activities, and the potential risk for oil spills would be increased. The economic costs of multiple platforms and increased risk of collisions and potential oil spills eliminates this as a viable alternative.

B) Platform Eureka

i) Description and Location

Platform Eureka is to be located on lease OCS-P 0301 adjacent to lease OCS-P 0300 which contains Platforms Ellen and Elly. Ellen has production wells and Elly has the processing equipment and power turbines. Three pipelines, handling gas, oil and returning water for injection will connect Elly to Eureka. Further discussions of these pipelines are contained in Section I.C. of this EA. Two electric cables will connect the power turbines on Elly to Eureka. This will supply power to electric equipment used in production and

ancillary activities. The all electric drilling rig to be used during development will be powered by self-contained diesel engines.

Eureka is to be placed at the following coordinates.

Lambert Zone VI

x = 1,431,380' Y = 513,460'

Latitude/Longitude

Lat.=33° 33' 49.99" Long. = 118° 6' 59.99"

Loran C

X = 28201.55 Y = 40943.45

This places Eureka approximately 14.5 km (8.9 miles) southwest of Huntington Beach, 24.0 km (14.9 miles) southeast of the Los Angeles and Long Beach Harbors, and 24.5 km (15.8 miles) northeast of Avalon, Catalina Island. It will be 2.3 km (1.4 miles) south-southeast of the Ellen/Elly complex.

ii) Approximate Time Frames

As of March 1 the jacket was basically complete and SCPI is proceeding with the fabrication of the buoyancy tanks, boat landings and barge fenders needed for transportation. As of that date, the jacket fabrication/transportation contract was 79% complete by a man-hour basis and on schedule for the July 1984 installation. Deck and facilities were respectively 93% and 61% complete and on schedule. Rig components were 80% complete. The generator building fabrication/transportation contract for new power facilities on Elly was 74% and is on schedule. Quarters for Eureka were 48% complete.

Table 1.B.ii-1 presents the revised schedule, updating the DPP and ER. Realization of various governmental approvals and reviews has caused SCPI to delay jacket installation by approximately 6 weeks until July 7, 1984. Start of developmental drilling could be delayed to April or June 1985.

Shell California Production Inc. expects to complete up to 60 wells in 7 years. This represents 1.4 months per well and matches 1.43 months per well per drilling rig experienced on Ellen during the past 3.5 years.

Peak production for oil will occur at the end of the developmental period in 1992 at 10.5×10^3 barrels per day. Production is expected to decline to 4.5×10^3 barrels per day by 2015. Gas wells are expected to be completed and on line by 1987 producing 3.0×10^6 cubic feet per day. A rapid decrease to 1.75×10^6 cubic feet per day is projected for 1991. After that, gas production rates gradually decrease to 0.75×10^6 cubic feet per day after 2015.

Shell California Production Inc. anticipates two trips per day for crew boats, one trip per day for supply boats and four trips per day for helicopters during the installation, construction and development phases of the platform. This is based on the observed averages of 19 crew/supply boat trips per week

Table I.B.ii-1

Shell California Production Inc.'s Current Time Schedule

for Construction on Installation Activities

Activities	Dates
Modifications of Elly	6/30 - 7/7/84
Installation of jacket, decks & rig	7/7/84 - 9/12/84
Install pipelines	10/1 - 11/2/84
Install power cables	11/17 - 12/16/84

and 28 helicopter trips per week for Ellen and Elly. These rates are expected to decline after 1991 when there are only production activities at the platform. Shell estimates that there will then be 7-10 crew/supply boat trips per week and 5-7 helicopter trips per week.

iii) Description of Travel Modes and Routes

Crew boats to be used for personnel transportation will be berthed at Pier G in the Long Beach Harbor. Supply boat facilities are to be at the Seventh Street terminal in the Long Beach Harbor. For rapid transport of personnel, helicopters originate at the Long Beach Airport. All these facilities are and have been used by SCPI to service Ellen and Elly. This indicates that no additional harbor or airport facilities will be needed for Eureka.

Crew and supply boats will use the established route between the Long Beach Harbor and Ellen/Elly. This is a straight line course between a breakwater entrance and Ellen/Elly. Once outside the Precautionary Area surrounding the Long Beach and Los Angeles Harbors, these boats will travel in the separation zone between the northbound traffic lane and southbound traffic lane. Helicopters will be flying over similar routes between 1,000 and 3,000 feet above sea level.

iv) Required Personnel

The ER states, based on information from SCPI, that approximately 150 construction workers will be used for platform installation. This will be for a short duration of 3 to 4 months. Sixty personnel will remain at the platform site at all times. The other 90 personnel will experience a 14-days-on and 7days off work schedule where groups of 30 will be rotated every 7 days.

SCPI expects to have 76 of its own personnel and 30 contractor employees associated with the platform once developmental drilling begins. Most of SCPI's drilling personnel will be transferred from Ellen. After development drilling stops in 1991 only 11 of SCPI's 76 personnel will remain on a permanent basis for production activities. There will be no change in the 11 onshore personnel SCPI currently employs.

v) Brief Systems Description

a) Equipment and General Layout

Eureka is proposed to be a 60-slot platform supported by an eight-legged jacket in 213 m (700 ft) of water. The platform will have two deck levels approximately 52 m by 61 m (170 ft by 200 ft). The bottom portion of the jacket measures 55 m by 86 m (179 ft by 282 ft). The drilling derrick will extend 44.8 m (147 ft) above the drilling floor on the second level. The top of the derrick will be approximately 77 m (252 ft) above mean sea level. Platform orientation is 46° from true north. There is a flare boom that extends 18.9 m (62 ft) from the southernmost platform corner and is aligned towards the southeast.

Eureka will be connected to Elly by two electric power cables, 10-inch water line, 12-inch oil line and a 6-inch gas line. Design characteristics of the three pipelines will be discussed in Section I.C. The cables are 3 conductor No. 1/0AWG and will operate at 35 kilovolts. Both cables should handle up to

20 megawatts. Either cable should be able to manage Eureka's power requirements of 3 to 5 megawatts. Only one drilling rig will be used during development. It will be one of the two rigs that had been on Ellen. Modifications are currently being made to it onshore. The main power consuming components are to be the drawworks (2000 hp), two mud pumps (1000 hp each), and the rotary table (1000 hp). All are powered by electrical motors which in turn are supported by a selfcontained engine package. This package is to be three 800 KW generators connected to three Caterpillar D-398 diesel engines. One will serve as a backup for drilling operations. The entire package will serve as a backup power source for essential platform services.

Other diesel powered equipment that are minor in terms of fuel consumption will be the three service cranes and the two cementing units. These cementing units will be used for gravel packing during the pile driving of the jacket and for well casing cement operations. At the end of developmental drilling in 1991, the cementing units, derrick structure, drawworks, rotary table and other associated equipment will be used less frequently for well servicing.

In the ER, SCPI has projected the usage of the D-398's during development and later well servicing during production. Based on past experience on Ellen, SCPI estimates that 461 horsepower averaged power is required per drilling rig per well. According to the most recent published data from Caterpillar (Radian 1982) this corresponds to approximately 218,000 gallons of fuel per year per rig. Our office records for 1982, a year that both drilling rigs were heavily used on Ellen, show a total of 432,329 gallons or an average of 216,164 gallons per rig. Since the wells originating from Eureka will be developing the same field as Ellen, similar well depths and procedures indicate this fuel usage is applicable to Eureka.

After 1991, well servicing is estimated to require about 300 hp during a 12hour period. This should be done on a noncontinuous basis. The 300 hp and 12-hour per day assumption will require approximately 200 gallons of fuel per day. Well servicing will be intermittent on a weekly basis throughout the year.

The DPP calls for the installation of two new Solar Mars turbine generators on Elly to service the electrical need of production and ancillary activities at Ellen, Elly and Eureka. Each turbine has the capability of producing about 7 megawatts for a total of 14 megawatts. The three existing Solar Centaur turbine generators on Elly will become a backup source. Each Centaur has the capability of about 2.5 megawatts for a total of 7.5 megawatts. The original DPP for the Beta Unit called for use of two Centaurs until 1986 when a third unit would be brought on line. A fourth was projected for 1999. Power demand has been higher than estimated requiring the third Centaur to be used for the past 3 years. Shell California Production Inc.'s original power estimates were 5.0 megawatts in 1985 and peaking at 7.7 megawatts by 2000. The new DPP for Eureka now projects 8.2 megawatts in 1985 and a peak of 10.0 megawatts in 1996.

Shell California Production Inc. expects natural gas fuel consumption to be $1,038.5 \times 10^6$ cubic feet per year in 1985 and increasing to $1,122.0 \times 10^6$ cubic feet per year in 1993 for both Solar Mars turbines. Starting in 1994 one turbine will be fueled by diesel because natural gas production from Eureka and Ellen will be too low. Demands on these turbines will be more or less constant, requiring 657×10^6 cubic feet per year of natural gas for one turbine and approximately $3,200 \times 10^3$ gallons per year of diesel fuel.

Power demand on the present Solar Centaur turbine generators during the last six months of 1983 required an average of 52.8×10^6 cubic feet per month of natural gas and 914 gallons per month of diesel fuel. This should be representative of only production activities on Ellen and Elly since development is complete. Assuming a thermal conversion of 900 BTU/ft^3 for this natural gas, approximately 4,700 kilowatts was generated. This is about half of the projected electrical power demand for 1985. The other half can be accounted for by Eureka.

To more efficiently recover oil at Ellen, source water is extracted from two wells at various depths and reinjected together with produced water through nine wells at other depths. This produced water comes from the oil separation processes. When production starts at Eureka, water for reinjection will come through the water pipeline connected to Elly. Shell California Production Inc. believes the three existing Solar Saturn turbine pumps will be able to handle both Ellen's and Eureka's reinjection needs. Projected natural gas consumption will begin with 98.6×10^6 cubic feet per year in 1985 and increase to 240.9×10^6 cubic feet per year in 1997. After that diesel fuel will be phased in gradually until 2004 where no natural gas is to be used.

The last six months of 1983 had three Saturn turbine compressors consuming an average of 14.3×10^6 cubic feet of gas per month and 10,600 gallons per month of diesel fuel. This, when extrapolated to annual values, yields 171×10^6 cubic feet of gas and 126,800 gallons of diesel fuel. Diesel fuel usage is temporary due to startup problems and total natural gas dependence is expected in 1984. This 126,800 gallon value is equivalent to 17.8×10^6 cubic feet of natural gas. When combined, this amounts to about 190×10^6 cubic feet of natural gas and is double the projection for 1985 in the ER. MMS has contacted SCPI and is working with them to resolve this discrepancy.

The only other major piece of equipment to be used during developmental drilling is the Blow Out Prevention (BOP) system. This is a device that controls formation pressures in a well by closing the space around the drill pipe or by closing the top of the casing. For additional details on equipment used during developmental drilling see Section 5 of the DPP and Section 2.4.2.2 of the ER.

As mentioned earlier there will be 60 well slots with a few to be set aside for water injection. Such water is delivered from Elly at 1000 psi through a connecting pipeline and injected directly. There are to be no gas injection wells on Eureka and surplus gas will only be reinjected at Ellen.

There are to be electrically powered submersible pumps that will provide artificial lift for oil in all wells due to the high density (12-20 API gravity). Each producing well will have a surface controlled subsurface safety valve that is hydraulically-activated.

The wellhead arrangement will allow two exit ports, one for oil and the other for casing gas. Both will have safety valves as well as adjustable chokes to control flow rates.

Gas/oil separation equipment will be the only treatment on Eureka. The oil will be sent to Elly for water removal via reliable screw type pumps for the high viscosity oil and the gas sent by a low pressure (350 psi) compressor.

The various pressure vessels are to be equipped with relief valves. Vapors released by these valves will be discharged into a common header and routed to the continuous pilot flare. Low pressure vapors from tanks and sumps are to be piped to a 16-foot atmospheric vent pole located at the eastern corner of the top platform level.

For further detailed information on equipment to be used during development and production, refer to Section 5 and 6 of the DPP.

b) Platform Construction and Installation Equipment

The vessels to be used for installation of the platform jacket, movement of the drilling rig from Ellen to Eureka, pile driving and deck installation are a crane ship, jacket launch barge, three tugboats, cargo barge and various crew and supply boats. The crane barge will be equipped with a 1600 short ton crane, with an anchoring system of eight 22,000-pound anchors and accommodations for about 200 construction personnel. This crane barge is self-propelled and does not need tugs for maneuvering. It will be positioned by its anchor system extending 5,000 feet outwards. The launch barge is a nonself-propelled vessel requiring three tugboats for propulsion and four tugboats for maneuvering.

The skirt piles that will anchor the platform jacket will be transported to the site on a cargo barge by an ocean-going tugboat from the fabrication site on the Gulf of Mexico Coast and installed by the crane barge. These skirt piles will be hammered into place 225-320 feet below the seafloor by steam hammers on the crane barge.

The crane barge will also install structural casing for each of the 60 well slots, the four deck sections, the drilling rig previously taken from Ellen, and several modules that contain drilling apparatus, flare boom and living quarters.

c) Safety Systems

Safety concerns during development and production can be divided into areas covering platform/vessel collisions, loss of control of well pressure, ignition of flammable material, and hazardous and suffocating gases. There are three levels that personnel safety can be maximized. The first is the monitoring of conditions that may lead to dangerous conditions and having the appropriate procedures for avoidance. The second level is to provide equipment that will correct dangerous conditions once they exist and to protect personnel while on the platform. The last level is provision of platform escape systems.

Two fog signals are on Ellen/Elly and two are to be on Eureka. They are to be synchronized at 2 seconds on and 18 seconds off with a 2-mile minimum range. Ellen/Elly have eight and Eureka will have four, 7,000 candela lamps on each of the platform corners with an approximate range of four miles. These lights will flash in unison every 0.6 seconds. Ellen will retain its 15,000 candela derrick light that has a 15-mile effective range. A similar light is planned for Eureka (pers. comm., John Hallet).

Drilling mud is used to control the formation pressure by maintaining a proper

hydrostatic pressure in the well during drilling activities. If abnormal mud levels are needed in the mud tank, then there are procedures that will be followed to change the mud characteristics. If these procedures cannot prevent the rapid buildup of well pressure, then the BOP will be activated to seal the well and procedures started to relieve pressure.

After being drilled, each well is to be equipped with surface and subsurface safety valves. These valves are fail-safe and are held open by pneumatic pressure. Any accident or equipment failure that would cause pressure droppage will cause these valves to close and shut-in the well.

SCPI has given a general description in the DPP and ER of fire suppression systems. There are to be water and halon fire suppression systems, chemical extinguishers and water fire hose stations at appropiate locations. Deluge systems are to be around the diesel storage tank, well cleanup tank, separators, treaters and pipeline pumps. The fire water system will have two independent and separated pumps for redundancy.

SCPI plans to have fire and smoke detectors similar to ones found on Ellen. Their placement will follow guidelines also used on Ellen. Gas and smoke masks will be identical to the ones used on Ellen (Pers. Comm., John Hallet).

There are to be three enclosed lifeboats each having a 38 man capacity. There will be approximately 180 life jackets to be located in appropriate locations. There will be a number of inflatable liferafts to accompany this equipment (Pers. Comm., John Hallet). At the most, there will be 80 personnel on Eureka. This equipment should provide adequate safety.

d) Monitoring Systems

Air emissions will be reported on a monthly basis and submitted to the MMS four times a year. These rates will be based on the fuel consumption and appropiate emission factors of the diesel and gas engines. Fugitive hydrocarbon emissions are not to be monitored and are expected to remain the same as projected in the ER.

The discharge of drilling muds and cuttings is to be monitored in accordance with the NPDES permit. SCPI will be filing reports with the Permits Division of EPA, Region 9 on a regular basis.

e) Onshore Facilities

SCPI has not proposed any new onshore facilities supporting development and production activities. All produced oil will be handled by existing facilities in the Port of Long Beach near Harbor Scenic Drive and Ocean Boulevard. This distribution facility which terminates the oil pipeline from Elly is a crude oil distribution manifold facility that is connected by other pipelines to a larger seven-company distribution system. No expansion of existing onshore facilities is expected.

vi) Discussion of Normal Waste Discharges

The solid and liquid wastes which will be generated as a result of proposed Platform Eureka are discussed in Sections 2.10.2 and 3 of SCPI's ER, and are

summarized below.

a) Solid Waste

Solid wastes are generated at all stages of operations. During construction solid wastes consist primarily of scrap construction material, common paper waste, and some garbage. These wastes will be segregated, containerized, and transported to appropriate disposal facilities onshore. Generation rates for these wastes are highly variable, and estimates of construction period solid wastes have not been made.

The operational phase of the project will generate solid wastes consisting of paper and galley waste, empty metal and fiber containers, scrap maintenance material and drill cuttings. The solid wastes excluding drill cuttings will amount to a total of 60 to 70 tons per month, and these wastes will be segregated, containerized, and transported to appropriate disposal facilities onshore.

Drill cuttings will be disposed of in one of two manners, depending upon their either being clean or oil contaminated. Clean cuttings will be discharged beneath the platform at a depth of 200 feet (61 m) below the surface. Discharge rates are estimated at about 300 to 400 cubic feet (8.5 to 11.3 cubic meters) per day during drilling operations. Cuttings which are oil contaminated are segregated and stored for transport onshore and ultimate disposal in a Class I or II-1 disposal site.

b) Liquid Waste

There are three principal categories of liquid discharge sources associated with the proposed project: platform discharges, marine (vessel) discharges, and onshore discharges. Any platform wastes that might be considered harmful to the environment will be disposed of in an acceptable manner. All liquid platform wastes will be covered in the SCPI NPDES permit issued by the EPA. SCPI's discharge practices will be consistent with the NPDES permit requirements and MMS OCS Order No. 7, Pacific OCS Region.

Platform liquid wastes consist of once-through noncontact cooling water, treated water drainage, oil free drainage, treated sanitary and domestic wastes, drilling muds, excess cement slurry, filter backwash water, treated produced water, fire system test water, and spent oils and solvents.

Once-Through Noncontact Cooling Water is drawn from a depth of 125 feet (38 m) beneath the platform and distributed to heat exchanging equipment for cooling. There is no process contact and the warmed seawater is returned to the ocean at a depth of 121 feet (37 m) without treatment. Discharge rates will average about 81,000 barrels per day. Discharged water is not expected to be more than 20°F above ambient levels.

Oil contaminated deck water will be routed to a collection and treatment system being discharged 195 feet (59 m) below the ocean surface. Discharge rates will be highly variable, but should range from 350 barrels/day when not drilling to a maximum of 7200 bbl/day when drilling. Oily residue separated from the wastewater will be retained in waste tanks for transport to shore

and disposed of at an approved Class II-1 onshore site or will be combined with crude for recovery. Uncontaminated rainwater from the heliport deck will be discharged untreated through a discharge pipe 15 feet (4.6 m) above the ocean surface.

Sanitary and domestic wastes will be treated in an approved package sewage treatment system, and discharged 40 feet (12.2 m) below the ocean surface, with an average discharge rate of 275 barrels per day. Galley wastes will pass through grease traps before entering the treatment systems. Grease thus collected will be taken ashore for disposal by a renderer or in an appropriate waste disposal facility.

Only oil-free drilling muds authorized by EPA for overboard discharge under either an individual or a General NPDES Discharge Permit covering Eureka will be released from the platform. Oil contaminated muds or other muds not authorized for overboard discharge will be collected in containers and properly disposed onshore. Drilling mud is discharged in several ways. Some naturally adheres to drill cuttings and is discharged with them. In addition, as drilling depth increases or down-hole conditions change, mud formulations must be adjusted to meet drilling requirements. On occasion, mud pit volumes are such that a bulk discharge must be made to accommodate the formulation change. Finally, upon completion of the well, the entire mud system must be reformulated. Although some mud may be reused, most if not all the previously-used mud must be disposed in a bulk discharge. These discharges will occur at a depth of 200 feet (61 m) below the surface, which is the same discharge used for drill cuttings. The estimated net volume of excess treated drilling mud to be discharged is 900 barrels per well.

Excess cement slurry is discharged up to three times for each well drilled, with volumes generally less than 21 m^3 (27.7 cubic yards) per well. Discharge takes less than one hour, and joins the once-through noncontact cooling water discharge flow.

Filter backwash water is discharged 110 feet (34 m) below the surface at existing Platform Elly. Discharge rate when backwashing is approximately 2 to 30 bbl/day, maximum. This operation occurs on Platform Elly; rates will be the same, but frequency will increase due to processing of produced water from Platform Eureka.

Treated produced water, on occasion, may be discharged due to operational problems or injection system overpressure. When this occurs, discharge rates will be approximately 4,000 barrels per day, and the discharge point will be 177 feet (54 m) below the sea surface at existing Platform Elly. Contaminants in the produced water include dissolved solids, suspended solids, and oil and grease. Suspended solids and oil and grease are removed in the treatment process to levels authorized by the NPDES discharge permit.

Fire system test water will be discharged as a result of MMS requirements which include weekly testing of the firewater system. Both pumps on proposed Platform Eureka will be tested. Since seawater is used in the firewater system, no contaminants will be introduced. Any test water falling on potentially contaminated deck areas will be handled as oil contaminated water and will be treated accordingly.

Spent oils, solvents, and other environmentally toxic liquids will be held on the platform in suitable containers for transfer to appropriate onshore disposal facilities.

Marine (vessel) discharges consist of once-through noncontact cooling water which is continually discharged while the vessel engines are running, and sanitary waste. The sanitary waste is disposed of in accordance with Coast Guard regulations. Vessel discharges of these sorts are universal and accepted.

Onshore discharges to a publicly-owned treatment system occur only at the existing onshore facilities - offices, crude oil metering and pumping station, crew and supply boat areas. No increase in discharge rate or composition is expected from these sources as a result of this project.

c) Gaseous Pollutants

Sources of gaseous emissions can be categorized into four groups based on pipelaying, platform construction, developmental drilling and petroleum production. The first two are short term lasting one to two months. The latter two will last seven to forty years with production beginning a few months after the first well has been completed.

SCPI plans the use of a lay barge and accompanying two tugboats for 30 days for pipeline installation. The lay barge will be on the average consuming 5,000 gallons of fuel per day. Attending two tugboats, and various work/supply boats will consume an average 9,0000 gallons of fuel per day. All activities will be continuous 24-hours a day (Pers. Comm., John Hallet). Emission factors for a lay barge, tug boats, and crew/supply boats are found in Table I.B.vi.c-1 and corresponding daily rates are in Table I.B.vi. c-2. The estimated daily rates for cable installation are also noted in Table I.B.vi. c-2. Table I.B.vi. c-3 represents an inclusive emission amount for both activities.

Seventy-nine days will be needed to install and construct the platform. The major site emission sources as reported in the ER are to be derrick crane barge and various associated tugboats and work boats. Table I.B.vii.c-4 depicts the average daily emissions rates and the total for 79 days. These activities are to be completed before the pipeline and electric cable installation.

Developmental drilling activities to be powered by Caterpillar D398 diesel engines were represented by emission factors that are too low when compared to more recent material (Radian 1982). Table I.B.vii.c-5 shows peak hourly rates as projected in the ER and from more recent data (Radian 1982) for jacket water exhaust aftercooling and separate water exhaust aftercooling.

It is believed that the former method will be employed. By using the most recent emission factors and the anticipated 461 average horsepower requirement during the seven years of developmental drilling much higher NO_x rates can be anticipated. See Table I.B.vi.c-5.

The emissions caused by production activities, especially NO_x are to be produced primarily by the electric and water injection turbines on Platform Elly. Because these turbines are responsible for activities on Ellen and

Table I.B.vi.c-1

Pipeline Installation Emission Factors

(lbs/10^3 gal.)

	NO_x	SO_2*	TSP	CO	VOC
Lay barge [1]	469	70.6	33.5	102	7.04
Tug boats [2]	572	70.6	25	86	12.4
Crew/Supply boats [3]	390	70.6	25	114	21.7
Tug/Crew/Supply boats [4]	535	70.6	25	92	14

* 0.5% sulfur in diesel fuel

[1] EPA AP-42 Table 3.3. 3-1

[2] Goodley 1976

[3] EPA AP-42 Table 3.2. 3-3 Average of 500-1500hp in cruise/full speed

[4] Average 80% tugboats and 20% crew/supply boats

Table I.B.vi.c-2

Pipeline Installation Emissions

(lbs/day)

	NO_x	SO_2	TSP	CO	VOC
Lay barge	2,345	353.0	167.5	510.0	35.2
Tug/crew/supply boats	4,815	635.4	225.0	828.0	126.0
Total	7,160	988.4	392.5	1,338	161.2

Subsea Cable Installation Emissions

(lbs/day)

	VOC	NO_x	SO_2	CO	TSP
Tugboats* (2)	90.5	3,981	198	599	174

* Exxon's Santa Ynez Unit, Environmental Report, 1983.

Table I.B.vi.c-3

Pipeline and Cable Installation

(tons)

	VOC	NO_x	SO_2	CO	TSP
Pipeline (30 days)					
Lay Barge	0.5	35	5.3	7.7	2.5
Tugboats (2)	1.9	72	9.5	12.4	3.4
Subsea Cable (30 days)					
Tugboat (1)	0.1	3.0	0.1	0.4	0.1
Total	2.5	108	14.9	20.5	6.0

Table I.B.vi.c-4

Platform Installation

(lbs/day)

	VOC	NO_x	SO_2	CO	TSP
Derrick Crane Barge	225	2,814	187	612	201
Tugboats	38	872	87	201	---
Workboats	82	445	45	181	58
Total	345	4,131	319	994	259
x 79 day					
Total (tons)	14	163	13	39	10

Table I.B.vi.c-5

Platform Drilling Rig Engines

Peak (lbs/hour)

	VOC	NO_x	SO_2	CO	TSP
Eureka EA	0.11	8.45	0.69	2.43	0.17

	NO_x	TSP
Radian Report		
Jack Water Aftercooling	15.0	0.3
Separate Water Aftercooling	11.4	0.1

Annual NO_x tons

	1985	1986	1987	1988	1989	1990	1991
Eureka ER	19.3	18.3	13.5	13.5	13.5	13.5	8.6
Radian Report	17	25	25	25	25	25	25

Table I.B.vi.c-6

Elly Turbine Emissions

	tons/yr (lbs/hour)				
	VOC	NO_x	SO_2	CO	TSP
1985	217.5(49.7)	4.8(1.1)	15.3(3.5)	8.0(1.8)	---
2002 (MAX NO_2)	360.3(82.3)	12.2(2.8)	19.0(4.3)	16.9(3.9)	35.7(8.2)

Eureka and emission cannot be reasonably divided between these two platforms, total emissions will only be considered. Table I.B.vi.c-6 shows annual emissions for the first full year 1985 and for the peak year of NO_X output, 2002. The values for 1985 through 1990 could be underestimated because no use of diesel fuel is assumed. Office records do show for the past two years diesel fuel being used. If this trend continues then the NO_X projections for 1985 through 1990 could be too low by 5 to 10 percent.

SCPI has provided in the ER a platform inventory of valves, flanges and various pump seals for a good estimation of future fugitive VOC emissions from Eureka. This is the first such listing submitted to the MMS for a future platform. At full production, 104 pounds per day is expected. This is a significant portion of the total platform VOC emissions. This value is typical of what has been calculated for other comparable offshore platforms (API 1980 and CARB 1983). It is interesting to note that three types of gas valves; gate, slug and needle, contribute about 70 percent of these emissions.

SCPI reports the largest annual facility emission rates will be after the year 2000 with NO_X exceeding 360 tons. However, the largest overall annual rate may occur during 1985 when the pipelines and electric cables are laid. There could be as much as 370 tons. Platform installation will also contribute a large amount of NO_X but it will occur in mid 1984. The period between June 1984 and May 1985 may have about 300 tons.

The largest short-term emission rates may occur during pipeline installation. NO_X rates could approach 4.5 tons per day with a peak of 570 pounds per hour. This will be during a 30-day period between October 1984 and March 1985. The second highest short-term rate may occur during subsea cable installation, 2.0 tons per day and peaks of 332 pounds per hour; or during platform installa tion, 2.1 tons per day and peaks of 345 pounds per hour. Cable installation will be for two or three days some time between November 1984 and April 1985. Platform installation may last up to 79 days from July 1984 through September 1984.

C) Subsea Pipelines and Electrical Power Cables from Platform Eureka to Platform Elly

i) Description and Location

Produced oil and gas will be transported from Platform Eureka to SCPI's production Platform Elly via subsea pipelines (see Figure 7-1 of the DPP). Pressurized, filtered source, sea, and/or produced water will be transported to Platform Eureka via subsea pipeline from Platform Elly. This water will either be discharged in injection wells or will be used for several utility functions on Platform Eureka. Electrical power for Platform Eureka will be supplied from Platform Elly via two subsea power cables. Details of the pipeline and power cable specifications are given in part (v) of this section.

The pipelines and cables will be installed in two separate procedures. The pipelines will be installed by the lay barge method after completion of the platform installation phase. The power cables will be installed with a cable laying barge after the pipeline work is completed. Details of the installation activities are discussed in part (v) of this section.

ii) Approximate Time Frames

Pipeline installation will follow installation of the platform. SCPI plans to install the pipelines in the period between September 1984 and March 1985. Electrical power cable installation will follow pipeline installation. These installation activities are anticipated to last about 30 days each.

iii) Description of Travel Modes and Routes

The pipelines and electrical cables will be installed after completion of the platform installation phase. Pipe segments, power cable spools and installation equipment will be loaded at SCPI's supply boat facilities at Seventh Street Terminal in Long Beach; the crew boat will work out of Pier G in Long Beach; and any necessary helicopter activity will originate at Long Beach Airport (Air Logistics). The pipe lay barge will come to the operation site from the Gulf of Mexico. The electrical power cables lay boat (actually a modified crew boat) will transit from Seattle, Washington to the operation site. Vessel traffic between Long Beach and the platform site will follow the most direct route.

iv) Required Personnel

Shell California Production Inc. plans to use 100 people, working two shifts, during the pipeline installation phase. These personnel are to be supplied from the Gulf of Mexico area. The electrical power cable installation will require 25 people. Since the cable installation will take place only in daylight hours, there will be only one work shift. It is anticipated that all personnel will stay on their work vessel throughout the installation phases, unless emergencies or sickness occur.

v) Brief Systems Description

a) Equipment and General Layout

The subsea pipelines are designed in compliance with MMS OCS Order No. 9; ANSI B31.4-1979 "Liquid Petroleum Transportation Piping Systems"; ANSI B31.8-1975, "Gas Transmission and Distribution Piping Systems"; DOT Regulations (49 FR192, 195), "Transportation of Liquids by Pipeline" and "Transportation of Natural and Other Gas by Pipeline," as applicable. Additionally, the design and operation procedures will follow API Recommended Practice RP 1111, "Design, Construction, Operation and Maintenance of Offshore Hydrocarbon Pipelines" and the DOI/DOT MOU of June 11, 1976.

All pipelines will be designed to resist movement under the action of onbottom currents predicted to occur during the design 100-year storm and seabed slopes. On-bottom stability will be achieved by proper design of submerged pipeline weight when the pipelines are placed on the ocean bottom. Shell California Production Inc. anticipates the pipelines to settle about halfway into the bottom sediments. No trenching or jetting is planned.

The subsea pipeline and electrical power cable specifications are given in Table I.C.v-1. Also refer to Section 7 of the DPP. The crude oil/produced water pipeline has an outside diameter (OD) of 12.75 inches and a length of

Table I.C.v-1. Subsea Pipeline and Electrical Power Cable Specifications.

Type of Service	Outside Diameter (Inches)	Thickness (Inches)	Total Length (Feet)	Protective Coating	External Corrosion Protection	Maximal Capacity	Expected Peak Throughout
1) Crude oil and Produced water	12.75	0.625	8,220	Thin film thermo-setting epoxy (14 mils)	150# alum. anodes; 550 ft spacing	24,500 bpd	11,400 bpd
2) Wet natural gas	6.63	0.375	8,439	Thin film thermo-setting epoxy (14 mils)	75# alum. anodes; 550 ft spacing	12.3 MMSCFD	3.0 MMSCFD
3) Injection water	10.75	0.594	8,156	Thin film thermo-setting epoxy (14 mils)	125# alum. anodes; 550 ft spacing	180,000 bpd	58,000 bpd
4) Power cable (easterly circuit)	4.0	--	8,515	Insulated and armored	--	35 kV	--
5) Power cable (westerly circuit)	4.0	--	8,485	Insulated and armored	--	35 kV	--

8,220 feet; the wet gas pipeline has an OD of 6.63 inches and a length of 8,439 feet; the injection water pipeline has an OD of 10.75 inches and a length of 8,156 feet. All pipelines will be protected with a coating of thin film thermo-setting epoxy. Cathodic protection will be achieved with sacrificial aluminum anodes. The two power cables have an OD of 4.0 inches, a length of about 8,500 feet, and are protected by insulation and steel armor.

The pipelines and power cables will be laid in two separate procedures (Figure 7-1, DPP). Pipelines will be installed by the lay barge method. A ten point mooring system consisting of 30,000 pound anchors, buoys and anchor cable will be used. Each of the three lines will be laid starting at Platform Eureka and proceeding towards Platform Elly. Individual pipe segments will be stored on a barge situated next to the lay barge then welded together on the lay barge and lowered to the ocean floor. Subsea connections will be made between riser sections and their respective pipelines near Platform Elly. These connections are within 100 meters of the platform and well within the 500 m safety zone of Platform Elly. In addition to the pipe barge and lay barge, four other vessels will be used for assistance in this phase. Two tugboats will be used for anchor setting and removal. A survey boat will also be present to deploy and retrieve a Remotely Controlled Vehicle (RCV). This RCV is used to inspect the pipelines via closed circuit television after the lines are laid. A crew boat will be used for transfer of personnel to shore if necessary.

The electrical power cables will be installed with a cable laying boat after the pipeline installation. The boat is a converted or modified crew boat. A four point mooring system consisting of 18,000 pound anchors, buoys and anchor cable will be positioned near each platform prior to cable loadout. Each cable will be laid separately.

b) Safety and Monitoring Systems

SCPI states in their DPP that all pipeline systems will conform to MMS OCS Order No. 9. Briefly, this order has the following requirements for pipelines: a) all hydrocarbon pipelines leaving a structure receiving production from the structure shall be equipped with a high-low pressure sensor to shut-in the wells on the structure; b) all hydrocarbon pipelines delivering production to either offshore or onshore production facilities, or both, shall be equipped with an automatic shut-in valve, at or near the receiving facility, connected to an automatic and a remote shut-in system; c) all hydrocarbon pipelines coming onto a structure or delivering production to an onshore facility shall be equipped with a check valve or a quick-operating manual valve, as approved by the District Supervisor, at or near the structure or facility to control backflow; d) all pipelines shall be equipped with an automatic shut-in valve to avoid uncontrolled flow; e) all oil pumps and gas compressors shall be equipped with high-low pressure shut-in devices; f) all oil pipelines shall have a metering system to provide a continuous volumetric comparison of input to the line at the structure, with delivery onshore. The system shall include an alarm system and shall be of adequate sensitivity to detect significant variations between input and discharge volumes; g) all pipelines shall be protected from corrosion; all pipelines shall be installed and maintained to be compatible with trawling and other uses; h) all pipelines shall be hydrostatically tested; i) all hydrocarbon pipelines shall be maintained in

good operating condition. The ocean surface above the pipeline shall be inspected a minimum of once each week for indication of leakage using aircraft or other means; j) all pipelines shall be designed and maintained for protection against water currents, storm scouring, soft bottoms, and other environmental factors; and k) an external inspection of all pipelines by side scan sonar or other means, shall be made at least once each year. Results of all testing and inspections shall be reported to MMS.

D) Discussion of Contingency Plans

To implement the Clean Water Act (1973), as amended, the President's Council on Environmental Quality (CEQ) developed the National Oil and Hazardous Substances Pollution Contingency Plan. It follows specific legislative directions to include: 1) the duties and responsibilities of each Federal agency in coordination with State and local agencies; 2) a strike force of trained personnel available to provide the earliest possible alert to a discharge; 3) a system of surveillance to provide the earliest possible notice of a discharge; 4) a national center to coordinate the plan; and 5) procedures and techniques for identifying, containing, and removing the discharge or dispersing it, if necessary.

In addition, the CEQ requires a detailed oil spill contingency plan for every exploration and development plan submitted. This plan shall include emergency procedures and contact personnel, documentation of environmentally sensitive areas to be protected, actual plans to follow in the event of a spill, containment and cleanup measures, and oil spill response training requirements.

The contingency plans submitted for the SCPI project also include the following appendices: 1) coastal beach and park facilities; 2) cleanup equipment inventories including oil spill chemicals; 3) available contractors, equipment, and facilities; 4) techniques for cleaning oiled birds; and 5) an oil spill risk analysis, including spill trajectory estimates of likely land-falls based on meteorological and oceanic conditions.

The U.S. Environmental Protection Agency and the U.S. Coast Guard are the enforcing agencies for the Clean Water Act. These agencies have the authority and the capacity to marshal the nation's capabilities to combat oil spills.

The oil spill contingency plans are approved by the U.S. Minerals Management Service (MMS) with review from the U.S. Coast Guard (CG). The oil company will update the plan at least annually. An agreement in effect between MMS and the CG serves as specific guidelines for contingency plans (Commandant Notice 5740). In addition, MMS Pacific OCS operating orders numbers 2, 5, and 7 address general requirements for well blow-out preventors, pollution prevention equipment, oil spill contingency planning, personnel training, and maintenance of on-site oil spill containment and recovery equipment.

i) Pollution Prevention Procedures

The Oil Spill Contingency Plan for the Beta Unit Complex has been approved by the Minerals Management Service and meets the requirements of the MMS and the U.S. Coast Guard. As required in OCS Order No. 7, the Oil Spill Contingency Plan (OSCP) will be reviewed annually and all modifications and results from the review will be submitted to MMS for approval.

The contingency plans outline cleanup procedures and strategies for several possible oil spill emergencies. Ideally the physical removal of the oil from the environment is the preferred action. In reality, a good deal of spilled oil will evaporate, disperse, sink, and spread, due to the nature of oil in the environment and the way spilled oil responds to the natural forces of wind and currents. If a spill of any size occurs, then cleanup measures will begin immediately with the equipment available on the platform or nearby platforms. After personnel safety is ensured and the pollutant flow is stopped or its source identified, containment and recovery procedures will begin.

Minerals Management Service has regulations which prohibit spillage of oil or other pollutants of any volume from reaching the ocean. In order to meet these regulations, SCPI has designed the Eureka project with pollution prevention features. For example, "drain pans" built into the structure will route all spilled material through a drain system to a water sump. Oil skimmed from the water sump overflows into an oil sump where it will be pumped back into the liquid handling system. Oil-free water will be discharged through an emergency sump to the ocean. Should oil migrate to the emergency sump as a result of sump system malfunction, a pump will be included to recover oil from the emergency sump. In the event that a pollutant reaches the ocean, immediate containment and clean-up response will be implemented as pre-planned and detailed in SCPI's Oil Spill Contingency Plan. All incidences resulting in oil or other pollutants of any volume reaching the ocean will be reported to and recorded by the Minerals Management Service. All disposal operations will be coordinated with the federal On-Scene Coordinator and, if appropriate, other federal, state and local officials.

To prevent re-spillage, recovered oil will be placed in containers that can be sealed. Oily debris, such as vegetation or sediments, will be placed in leak-proof containers to prevent leakage during handling and transport. Temporary storage may be necessary if larger quantities of oil or oily debris are recovered. If temporary storage in leak-proof tank trucks, bags or other containers is not adequate, a pit lined with plastic sheeting to prevent soil penetration of the oil can be used. Spilled oil which has been recovered will then be transported to a local refinery for reclamation.

The disposal method selected for contaminated debris depends on the nature of the oil-contaminated material, the location of the spill, and the prevailing weather conditions. Local requirements for disposal of these materials are established by the California Regional Water Quality Control Board.

For very small spills (1-2 bbls) sorbents and sorbent boom will be loaded on crew or supply boats. The boom will be deployed, containing as much of the slick as possible. Sorbent pads will be distributed on the slick within the boom as well as any oil escaping the boom. Oil cleanup will continue until no oil is visible and deployed equipment is recovered.

In the event of small spills (up to 10 bbls) the cleanup cooperative (Clean Coastal Waters) will be notified and called in for assistance if needed. The nearby Platform Elly containment boom will be brought on-site and lowered into the water and deployed with the aid of a crew or supply boat. A fast response boat or Clean Waters I with skimming/recovery capability will be brought to the spill site. Sorbents will be used to capture any oil escaping the boom. When the skimmer is no longer effective in oil recovery, it will

be removed from the water, and any oil remaining within the boom will be removed with solvents.

Spills greater than 100 bbls will require additional assistance from land-based personnel and equipment. Cleanup procedures will begin (as above) with equipment from nearby Platform Elly. The cleanup co-op will be mobilized. The notification procedures outlined in the contingency plans will be followed, including notifying the Coast Guard. An assessment of the local wind and current conditions, size, type, and movement of the spill will be made. If sensitive coastal areas (bays, harbors, estuaries) appear to be threatened, the co-op will dispatch cleanup/diversion equipment to those sites. Specific information needed for booming of sensitive areas is included in the oil spill contingency plan.

The use of chemical dispersants or surface collecting agents will be considered, and if deemed appropriate authorization for use will be requested. Dispersants would be most appropriate for use when uncontained oil is threatening a sensitive coastal area. The dispersants would be most effective and least potentially harmful when applied to the oil when the oil is still relatively fresh and still 3-5 miles from the sensitive area. This will allow the oil to disperse at sea before weathering and possible contact with the coast.

ii) Involved Personnel and Notification Procedure

It is the responsibility of all platform personnel to report any oil spills to their supervisors. The supervisor will in turn report this to the platform or drilling foreman. Reports of any spills will be logged along with any details of the spill. By law any oil spilled must be reported. The foreman will initiate spill control measures and notify the spill cleanup manager. The following agencies must be notified: 1) MMS District Supervisor (Ventura District Office); 2) CG Captain of the Port of L.A./L.B.; 3) National Response Center (D.C.); 4) CG Captain of the Port of San Diego (if threatened); 5) National Marine Fisheries (Terminal Island). Oral reports of spills will be made to the District Supervisor or several other key personnel in MMS (Regional Manager, Regional Supervisor for Field Operations, or the section supervisor for Environmental Operations). If the spill is threatening state waters the Governor's Office of Emergency Services will be notified.

As needed, the on-scene coordinator (either a SCPI representative, the cleanup cooperative manager, or the Coast Guard) may call upon the Regional Response Team and the Scientific Support Coordinator for additional resources. Full documentation and a monitoring effort of all measures undertaken, including any damage to environmental or coastal resources, will be made. As needed, additional personnel and equipment may be accessed from other west coast cleanup cooperatives or the Coast Guard (including the Pacific Strike Team).

iii) Description of Equipment, Response Time, Capacity, Location

a) Cleanup Capabilities

The issue of oil spill cleanup capabilities by conventional mechanical means (booms, skimmers) and chemical means (dispersants, surface collecting agents, sinking agents) remains very controversial. There is much disagreement on the ability of mechanical cleanup equipment to function under less than

ideal weather conditions (low wind velocities, flat seas). As the weather conditions worsen, oil begins to be entrained above and below containment booms, and skimming efficiency decreases (increasing amounts of water and decreasing amounts of oil are recovered). Harsh weather also poses a threat to human safety - the personnel involved in the cleanup operations. It is generally considered safe to deploy cleanup equipment in approximately 4-5 foot seas, 20 knot winds. Certain equipment and deployment boats are regularly deployed in rougher weather than this by the Coast Guard in Southern California. Under harsher weather conditions although mechanical containment equipment is less effective or not deployable, natural breakup and dispersion of oil slicks is enhanced due to greater wave action (increased surface energy).

When mechanical cleanup is not feasible due to weather conditions or other reasons, chemical dispersants may be applied with EPA approval either from the air or surface ships. Chemical dispersant technology has been advanced significantly in the last few years, reducing toxic chemical effects from the dispersants themselves while increasing dispersant efficiencies. A rigorous approval policy for dispersant use must be followed before application is allowed. A standardized chemical dispersant checklist for deciding appropriateness of usage from the Region IX Oil and Hazardous Substance Pollution Contingency Plans is used.

Although the use of chemical agents to facilitate oil spill cleanups is discouraged, they may be used at the descretion of the on-scene coordinator (OSC) (with EPA approval) to reduce an immediate threat to life or property. In other instances, a senior EPA official will decide whether it is appropriate to use dispersants after going through the checklist mentioned above and after consultation with the OSC and State and Federal representatives (members of the Regional Response Team - RRT). The RRT is made up of Federal (including MMS) and State Agencies responsible for responding to and planning courses of action in the event of environmental emergencies, such as oil spills. The EPA maintains a list of pre-approved chemical dispersants that may be considered for use.

It appears now that the "last-resort" attitude towards dispersants is beginning to change. The EPA is considering streamlining the approval process, and a new policy statement is expected within the year. A multidisciplinary task force (industry, government, academia) is currently developing ecologically based guidelines for dispersant use, with the intention of minimizing ecological damage from oil spills. Dispersants are being considered on an equal level with other cleanup alternatives, including the "no action" option. A final report is pending.

It appears, at present, that the oil spill cleanup cooperatives with the assistance of the Coast Guard and the on-site oil company equipment are capable of handling the cleanup of most oil spills (less than 1,000 bbls). The chief limiting factor would be weather conditions (rather than equipment) at the time of the spill. In the event of a large spill or a spill occurring during harsh weather, dispersants may be applied, as avoidance of oil contact with shoreline or island areas is the primary concern after personal safety, adding significantly to the arsenal of oil spill countermeasures.

b) Equipment/Location

The on-site containment equipment that will service Platform Eureka is located on nearby Platform Elly. This equipment represents the first line of defense in the event of an oil spill. The travel time from Elly to Eureka is approximately 30 minutes after deployment. This equipment includes 1600 feet of Kepner Supercompactible fast deloyment heavy-duty containment boom. This boom can be dispatched from Elly within 15 minutes of notification, and operational near Eureka within 45 minutes. A work boat capable of deployment will normally (90% of the time) be within 15 minutes of Eureka. A standby work boat will be at Platform Eureka at all times according to the Oil Spill Contingency Plan. Communications equipment and miscellaneous amounts of sorbent pads, booms, and dispersants will also be stored on a Beta platform (see the oil spill contingency plans for further details). The actual cleanup (after containment is accomplished) will take several hours longer.

In addition to the on-site equipment, the industry cleanup cooperative Clean Coastal Waters maintains a tremendous amount of dedicated cleanup equipment. The co-op is based in Long Beach, with equipment stored in Long Beach Harbor and on Catalina Island. Additional equipment is stored at various oil company and contractor yards in the area. The oil spill contingency plan include a full equipment inventory. Clean Coastal Waters arsenal includes Clean Waters I and II, major oil spill response vessels located at the Port of Long Beach, as well as several smaller, flat response vessels.

It has been estimated that the shortest period of time a spill originating from any Beta platform will contact the coast is 12 hours (Oil Spill Contingency Plan). The area of highest probability of shoreline contact is from Huntington Beach to Newport Beach, during March-April. Clean Coastal Waters (and its contractors) can mobilize personnel and be on location to Beta platforms in 4 hours. Aircraft can be mobilized (helicopters with dispersant capabilities) and be on-site within 2 hours. The major plan for dispersant use (Globe Air based in Mesa, Arizona) can be on-site within 4 hours.

Equipment and personnel from other west coast cooperatives (such as Clean Seas in Santa Barbara), the Coast Guard Pacific Strike Team (near San Francisco), and from centers around the country can be brought in if needed. This can be done within 24-48 hours of notification.

iv) Relation to Regional Contingency Plans

CCW has its own Oil Spill Contingency Plan for use in responding to calls from member companies. In addition, both the State of California and the federal government have established oil spill contingency plans in accordance with their respective governmental regulations.

a) State of California

State responses to pollution incidents is governed by the State of California Oil Spill Contingency Plan of March 1977, developed in accordance with California Government Code 8574.1. This Plan (1) provides for a coordinated response to oil spills by various state agencies, and (2) furnishes a procedure for keeping local governments and the public informed regarding a spill and

its probable effects. The state plan creates a State Agency Coordinator, with responsibility for directing on-scene operations of all state agencies engaged in combating a pollution incident. The state plan also establishes a support team to provide technical advisory and supervisory advice in response to an actual spill.

While the state plan provides direction in a spill situation, it does encourage local agencies to prepare plans to handle the specific needs of individual localities. However, based on discussions with local officials and with the possible exceptions of the Port of Los Angeles, cities of Laguna Beach and Huntington Beach, and Orange County, little effort has been expended by local governments in this region to establish local plans.

b) Federal

The national legal and administrative framework for oil spill response procedures is provided by the Federal Water Pollution Control Act of 1970 (PL 92-500), as amended. PL 92-500 established that the spiller would be liable for cleanup costs and all penalties, the only defenses being acts of God, acts of war, negligence on the part of the U.S. Government, or acts of omissions on the part of third parties. This act required the formation of a new contingency plan and delegated responsibility for its development to the Council on Environmental Quality. Pursuant to Section 311(c)(2) of the Act, a National Oil and Hazardous Substances Pollution Contingency Plan (NCP) was established in 1973, amended in 1975, and further amended in 1982 (47 CFR 31180 et seq.).

The NCP provides for: (1) assignment of cleanup responsibilities to various federal agencies in coordination with state and local entities; (2) establishment of a national center for coordination and direction of operations; and (3) establishment of strike and task forces to carry out the plan. The body with overall responsibility for implementation of the plan is the National Response Team (NRT), composed of representatives of several cognizant government agencies such as the Departments of Defense, Interior, Commerce and Transportation, and the Environmental Protection Agency; the U.S. Coast Guard is responsible for coastal waters and the Great Lakes and for ports and harbors. The Minerals Management Service is responsible for measures to abate the source of pollution from offshore wells.

The U.S. Coast Guard has established three national strike teams to provide this protection. The Southern California coastal area is the responsibility of the Pacific Strike Team, which is based in San Francisco. The strike team is staffed with trained personnel and supplied with sophisticated containment and removal equipment. They can provide direct assistance in major emergencies, as well as furnish consultation and equipment on request for less serious spills. However, basic implementation of the NCP rests on the regional concept: each of the Standard Federal Regions (EPA, HUD, and HEW regions) is directed by the NCP to develop a Regional Contingency Plan establishing a Regional Response Team (RRT) with overall responsibility for coordinating spill response within the region.

The governing plan for the Southern California coastal region is the Region IX Multi-Agency Oil and Hazardous Materials Pollution Contingency Plan, Subregional plan for Zone One, Southern California, dated December 1971.

Zone One is contained within the 11th Coast Guard District, whose coastal boundaries are the northern limit of Santa Barbara County and the Mexican border. The Commandant of the 11th Coast Guard District serves as the onscene coordinator (OSC) for all spills, and as such, is the key federal official on-site. It is the OSC, together with other federal, state, and local agency representatives, who coordinates cleanup efforts and, if necessary, actually directs those efforts when the spiller's response is judged inadequate. As such, the 11th Coast Guard District has a very detailed containment plan which provides policy and direction for spill containment within the SCPI Beta project area.

E) Coastal Zone Consistency

The Coastal Zone Management Act (CZMA) of 1972, as amended, requires offshore oil and gas development to be consistent with a state approved coastal zone management program (Section 307(c)(3)(B)). California's Coastal Zone Management Program was approved by NOAA in 1978. The California Coastal Commission is the authorized agency for implementing the provisions of the Management Program.

CZMA gives the authorized agency 3 months or 6 months in which to agree or disagree with an applicant's certification of consistency with the management program unless written notice is received (15 CFR 930.79). Concurrence is presumed if no objection is made within three months or six months. In a certification, the applicant must demonstrate that the proposed project can be accomplished in a manner consistent with the policies of the approved management program. SCPI has included, in the Environmental Report, an analysis of their project in terms of California'a Management Program, and SCPI has determined that their project is consistent with the policies of the program.

On May 9, 1984 the Commission voted 12 to zero in favor of SCPI's proposal.

F) Description of Measures Proposed to Comply with OCS Orders and Other Pertinent Regulations

Shell California Production Inc.'s proposed measures to comply with Pacific OCS operating orders and other pertinent regulations or management plans are addressed in their ER (Section II) and POD. In the case of violations, leases are subject to cancellation and lessees are subject to penalties as provided for in the OCS Lands Act.

On December 8, 1983 (48 FR 55031) the EPA issued a General NPDES permit for offshore oil and gas facilities off Southern California. The permit extends the General NPDES permit issued on February 18, 1982 (47 FR 7312) to June 1984. In the event the General permit is not extended beyond June 1984, SCPI must apply for an individual permit. If neither permit is obtainable, SCPI will not be able to commence their proposed discharges until alternative disposal methods are approved.

G) Nearby Pending Actions and Existing Platforms

i) Exploratory Actions

Gulf Oil Exploration and Production Company proposes to drill up to five exploratory wells on OCS-P 0488, immediately north of OCS-P 0301. The wells

will be drilled with a jack up rig, with drilling expected to be initiated before the end of 1984. The California Coastal Commission has agreed with Gulf's consistency certification. Chevron U.S.A. Inc. proposes to drill five wells on OCS-P 0366. A drill ship would be used, starting by the end of 1984. The California Coastal Commission has agreed with Chevron's certification of consistency. OCS-P 0366 is located approximately three miles to the south of OCS-P 0301. Chevron has already drilled and abondoned one well on OCS-P 0306 which is located adjacent and south of OCS-P 0301. Chevron has not been approved to drill more wells on OCS-P 0306.

ii) Existing Platforms

Eureka is the fourth of the four platform development for the Beta Field. Already installed are SCPI's Platforms Ellen and Elly and Chevron's Platform Edith, all to the north of the proposed site of Eureka.

Platform Edith, installed on OCS-P 0296, is a 12-legged, 70 slot drilling and production platform, located in 161 feet (49 m) of water. Edith is operated by Chevron USA for itself and partners Union Oil, Minoco et al., and Pacific Federal Ventures. Clean oil from Edith is shipped to Platform Elly where it is comingled with production from Ellen. The comingled oil is then transported to shore (Long Beach) via a 16-inch (41 cm) crude pipeline. Gas from Edith is piped to Union's Platform Eva in state waters. Power for Edith is provided via a 34.5 KV cable from Huntington Beach. Platforms Ellen and Elly are co-located on OCS-P 0300, Elly being a production platform only. Ellen and Elly are connected by a 200 feet walkway. Ellen is an 80-slot, 8-legged drilling platform in 265 feet (81 m) of water. Ellen currently has two drilling rigs, but one will be removed and modified for installation on Platform Eureka. Elly is a 12-legged production platform, installed to process oil from Ellen and eventually from Eureka. Natural gas produced from Ellen, and eventually from Eureka, is burned in generators to provide power to Ellen. A second generator will be added to power Eureka. Processed oil from Ellen, Edith, and eventually Eureka, is shipped to shore (Long Beach) via pipeline.

II. DESCRIPTION OF AFFECTED ENVIRONMENT

A) Geology

i) Geologic Setting

Detailed description and evaluation of the platform site and pipeline corridor can be found in several documents and published reports. Government documents include the EIR/EA for the Beta Unit (USDI, 1978), and EIS for Lease Sale No. 48 (USDI, 1979). Published literature sources detailing the geology at the platform site end of the San Pedro shelf include Nardin and Henyly (1978), Greene and others (1975), Junger and Wagner (1977), and Richmond et al. (1981). Recent seismic activity proximal to the proposed Platform Eureka site area is addressed in Henyey and Teng (1984), Riccio and Gills (1977), Woodring et al. (1948), Yeats (1973), and USC (1984).

Geologic evaluation of the platform site and Beta Unit has involved several subcontractors and government agencies and has taken place over a 12-year period. Evaluation has included a thorough suite of state-of-the-art techniques: several generations of detailed geophysical cruises, soil borings, detailed mapping of surficial sediment units, geochemical, paleontologic, and radiographic analyses of cores, and deeper-penetration seismic surveying of the site and shelf area.

The proposed Platform Eureka site area is in the southeast portion of the gently sloping San Pedro shelf, in 702 feet (214 m) of water. The now-inactive San Gabriel submarine canyon is located 1.6 km (1 mile) east of the platform site. Two north-trending gentle-relief gully systems exist 150 and 300 m to the east and northest of the platform area. Rare surficial gorges and anchor drag marks occur throughout the platform site area; these features are interpreted to be related to Beta Unit exploratory drilling operations. The slope at the proposed platform site is approximately 2 degrees.

Surficial sediments at the platform sites are composed of almost 90 m (300 feet) of Neogene through Quaternary-aged silty clays and clayey silts. The upper 6 m (20 feet) of the platform site soils are soft, uncompacted Holocene muds. The underlying clays and sites are more compacted and coherent. A regional parallel unconformity, delineates the Holocene/Pleistocene boundary.

Geologic structure at the site area involves regional fault systems controlling homoclinal flexures of the San Pedro shelf. The northwest-trending Palos Verdes fault zone runs beneath the platform site, having as near-surface extent expressed as a multi-splayed zone coalescing at depth into a single fault. Surface expression of the fault zone is a single splay, occurring 183 m (600 feet) to the northeast of the platform site. Fault movement in this region of the Palos Verdes fault zone appears to be high-angle reverse (east block down) and normal.

ii) Geologic History

The San Pedro shelf is an offshore extension of the western margin of Los Angeles basin west of the Newport-Inglewood fault zone, and has been a site of considerable tectonic deformation since Middle Miocene time. This deformed crustal block which includes the Palos Verdes Hills, San Pedro shelf, and Lasuin

Knoll was part of a tectonic submarine sill which separated the Los Angeles basin at the east from the San Pedro and Santa Monica basins to the west during late Pliocene time. During late Quaternary time where the surrounding area remained below sea level, the Palos Verdes Hills were uplifted 395 m (1,300 feet) above sea level along the Palos Verdes fault (Nardin and Henyey, 1978; Yeats, 1973). Subsidence occurred during the Pleistocene, with as much as 300 m of paralic sediments being deposited on the Palos Verdes Hills and San Pedro shelf during that time. During late Pleistocene time, the Palos Verdes Hills were again uplifted as a block along the differentially moving Palos Verdes fault system, creating the 13 marine terraces that are recognizeable today. This San Pedro basin was receiving additional sediments (Hardin and Henyey, 1978; Yeats, 1973; Junger and Wagner, 1978).

iii) Geohazards

Principal geohazard conditions which are thought to exist at the proposed Platform Eureka site include active faulting along the Palos Verdes fault zone, and a potential Richter magnitude of 6.75 earthquake along this fault zone.

A magnitude 3.9 earthquake occurred on February 27, 1984, located 20 km southeast of Newport Beach and 2 km of the proposed Platform Eureka site. The calculated hypocenter was at approximately 14 km depth. This well constrained event, involving right-lateral strike-slip motion, exhibited no discernable after shocks of greater than 1.5 magnitude (USC, 1984). This earthquake is the largest event to occur near the southeast trending offshore portion of the Palos Verdes fault since detailed seismic monitoring programs began in southern California in 1972 (USC, 1984).

In order to accurately determine whether or to what extent seismicity is triggered by oil field production operations, MMS has funded a 3-year project to continuously monitor newly developed hydrocarbon fields. This has been accomplished by installing ocean bottom seismographs in and around Dos Cuadras field (south of Santa Barbara) and the Beta field, of which Platform Eureka will be part. Results of this monitoring program are included in Appendix 6 of this EA.

iv) Other Minerals Resources

No other non-petroleum resources (sand and gravel, phosphorite) are known to occur in economic quantities at the proposed Platform Eureka site.

v) Nature of Known Oil and Gas Field

SCPI has covered this topic in their 1977 DPP for the Beta Unit and the submitted Eureka DPP. Both analyses are essentially the same. The Beta field extends from Chevron's Lease OCS-P 0296 and Shell's Leases OCS-P 0300 and P 0301. There is the possibility of extension farther south into Chevron's Lease OCS-P 0306.

The Beta Field consists of various formations of oil and gas Miocene Sands between 3,000 to 5,000 feet below the ocean floor. They parallel and are to

the east of the Palos Verdes Fault. This field extends 5 miles northwest and 1 mile wide.

SCPI estimates peak oil production in 1992 for Eureka at 10,500 barrels per day. The peaks for both Ellen and Eureka will be in 1991 at 17,200 barrels per day. Peak gas production for Eureka will be in 1988 at 3,000 MCF per day. Both Ellen and Eureka that same year will produce 5,000 MCF per day. All gas produced at Ellen and Eureka will be used as fuel for water injecture and electric power turbines on Elly.

The oil and gas is expected to be sweet. Oil API gravity is expected to range from 12° to 20°. Reservoir temperatures should range from 140°F to 160°F.

vi) Subsurface Water Aquifers

The information examined by the MMS indicates that no fresh water aquifers are underneath the project.

If water aquifers are encountered while drilling, SCPI will prevent possible contamination of the fresh water zone by proper isolation and cementing drilling methods to prevent communication between the fresh water and drilling muds or hydrocarbons.

B) Climate

i) Meteorology

A description of general weather patterns, typical temperatures, prevailing wind direction, visibility, storm occurrences, onshore precipitation, and air quality for the San Pedro Channel and nearby onshore regions can be found in the ER for Eureka, ER for Chevron's Platform Edith and the EIR/EA for SCPI's Beta Unit.

The San Pedro Channel and surrounding areas can be characterized as having a moderate Mediterranean subtropical climate. Nearby onshore average temperatures range from 59 to 77°F. Onshore winter temperatures have in rare instances gone below freezing and summer temperatures occasionally rise above 100°F. Because the project area is more than 10 miles offshore, temperatures are expected to be moderate.

On the average, winds in the project area are westerly. Surface wind observations from the South Coast Air Quality Management District (SCAQMD) monitoring station at Costa Mesa depicts the prevailing wind to be between the northwest and southwest directions approximately 45 percent of the time. Data from the Southern California Edison Huntington Beach Generating Station show the same prevailing wind directions (USDI, 1978b). Diurnal analysis for most of coastal Southern California shows that the period between early afternoon and late evening produces westerly winds. This is due to the land heating effect. However, the region between Palos Verdes, Laguna Beach, and Santa Catalina Island normally experiences light winds between late evening and morning hours. This is due to the counteracting effects of the local land breeze and the more regional northwest winds (DeMarrais, 1965).

The primary mechanisms that produce temperature inversions in the coastal areas of Southern California are the large scale subsidence of warmer air caused by the Pacific High, radiation cooling of the lower atmosphere during cloudless conditions and cooling of low-level air over cooler ocean surfaces. Temperature inversions tend to reduce the vertical turbulent mixing of lower-level air. This mixing is further limited by light winds or calm conditions. Pollutants emitted under these conditions will be trapped within a mixing height. Mixing heights offshore in the San Pedro Channel could range between 400 to over 1000 meters (1300 to 3200 feet) (USDI, 1978b). However, there have been no indirect or direct measurements of the mixing layer made in this area. Studies made offshore of Ventura and San Luis Obispo Counties show that marine mixing heights can be as low as 200 meters (650 feet) (Schacher et al., 1982).

During the afternoon and evening hours, pollutants emitted offshore will be trapped within this mixing layer and taken ashore to the east. During the morning period, due to calm conditions, pollutants will remain in the area until the westerly sea breeze later in the day.

ii) Air Quality

The air quality of onshore areas of Los Angeles and Orange Counties is classified as nonattainment for NO_2, O_3, TSP, and CO by the EPA. Only levels

of SO_2 have not exceeded the National Ambient Air Quality Standards (NAAQS). According to the Air Quality Management Plan published in 1983 by the Southern California Association of Governments (SCAG) and the South Coast Air Quality Management District (SCQAMD), the air quality is not expected to significantly improve before the year 2000.

The closest air quality monitoring stations maintained by the SCAQMD are in north Long Beach, Los Alamitos, and Costa Mesa. The Long Beach station has facilities that monitor O_3, CO, NO_2, SO_2, and TSP. The Costa Mesa station only records O_3, CO, NO_2, and SO_2. The Los Alamitos station is limited to O_3 and SO_2.

According to 1982 data (CARB, 1983), the maximum hourly values for O_3 were 0.22 ppm in Long Beach, 0.18 ppm in Costa Mesa, and 0.23 ppm in Los Alamitos. The Federal standard (0.12 ppm for one hour) was exceeded during 6 days in Long Beach, 6 days in Costa Mesa, and 10 days in Los Alamitos.

During 1982, the Federal hourly standard for CO (35.0 ppm) was not exceeded at Long Beach or Costa Mesa. However, the Federal 8 hour standard (9 ppm) was exceeded on 6 days at Long Beach and 5 days at Costa Mesa (CARB, 1983). CO is a local pollutant originating primarily from automotive exhaust. High concentrations are usually expected near very high density traffic during days having strong temperature inversions.

The annual 1982 average of NO_2 at Long Beach of 0.051 ppm just exceeded the Federal standard (0.05 ppm). Costa Mesa was lower at 0.031 ppm. The California hourly standard (0.25 ppm) was exceeded on four days at Long Beach and none at Costa Mesa (CARB, 1983).

Relatively low levels of SO_2 were measured at Long Beach, Costa Mesa, and Los Alamitos. No exceedances of any Federal SO_2 standards were recorded (Annual 0.03 pm, 24-hour - 0.14 ppm, and 3-hour - 0.5 ppm). The highest 24-hour average of the three stations was recorded at Long Beach 0.029 ppm (CARB, 1983). It may be the presence of petroleum refineries in that area that have caused SO_2 levels to be relatively higher.

Long Beach and Los Alamitos recorded 192 and 218 ug/m^3 for their 1982 maximum 24 hour TSP concentrations. These values only exceeded the Federal secondary standard (150 ug/m^3). Long Beach exceeded this standard only on 3 days and Los Alamitos on 5 days. Long Beach had an annual geometric mean of 76.3 ug/m^3 and Los Alamitos a mean of 84.2 ug/m^3. These values exceed the Federal primary standard (75 ug/m^3) (CARB, 1983).

The 1982 measurements typify the air quality for the Long Beach, Los Alamitos and Costa Mesa areas for the past 10 years. It is believed that these areas will continue to experience moderately high levels of O_3, TSP, CO, and NO_2 through the year 2000 (AQMP, 1983).

C) Oceanography

i) Physical Oceanography

Physical oceanography of the Southern California Bight has been discussed previously in detail in the Final Environmental Impact Statement for OCS Sale No. 48 (USDI, 1979) and in SCPI's ER. CalCOFI has continued research cruises in the area accumulating more data on physical and chemical parameters and a summary of existing oceanographic data is completed (NOAA/EDIS Climatology and Oceanographic Analysis of the California Pacific Outer Continental Shelf Region, 1980). There are some data available in the above summary which indicate surface transport onshore in several parts of Southern California for some seasons. Although indicative, these data are sparse and lack sufficient repetition to adequately assign probabilities to surface transport vectors. To increase the knowledge of physical oceanography, multi-year circulation studies are in progress by MMS in the Santa Barbara Channel and in Central California. In addition, a state-of-the-art circulation model for the entire California coast is being developed for MMS under contract using the best available oceanographic data. The Coastal Ocean Dynamics Experiment (CODE) in progress in Northern California involves current measurements which will add to the knowledge of nearshore processes.

Analyses of CalCOFI data on long-term Pacific temperature and salinity anomalies indicate that the forces driving and affecting the California currents are complex and that patterns which we see on short-term scales may not hold for longer scales. Meandering of the western edge of the California Current, incursion of warm high-salinity tropical waters into Southern California, and offshore upwelling events which are driven by distant meteorological patterns are only now being addressed. It remains to be seen whether an understanding of these large scale long-term processes will enable better nearshore short-term processes to be predicted.

Ocean conditions in the San Pedro Bay are generally calm. Protection offered by the offshore islands is quite complete, and waves over the shelf are mainly formed in the area.

Swells and locally generated waves are predominantly from the west, although swells may be from any direction. Significant sea height is less than 4 feet (1.2m) 89 percent of the time while swell observations indicate heights of less than 4 feet (1.2 m) with a frequency of 74 percent. Maximum wave heights during storm conditions have been known to reach 25 feet (7.6 m). Tidal ranges vary between less than one foot to slightly more than 6.5 feet (2 m). Storm tides, however, may further raise sea level.

Currents within the San Pedro Channel are complex due to the interaction between the coastline and local or oceanic currents. Measurements taken near Platform Edith exhibited strong tidal influence on surface currents. Current directions advanced progressively clockwise over the 24-hour recording period reflecting a progressive tidal wave with a 24-hour period. Current speed varied between 0.12 and 0.46 knots with an average of 0.51 knots (USDI, 1978b).

Currents at mid-depth (120 feet) alternated between northwest during flood tide and southwest during ebb tide. Current speeds varied between 0.12 and 0.46

knots and averaged 0.27 knots. Bottom currents were predominantly toward the west or southwest with current speeds between 0.15 and 0.49 knots (USDI, 1978b).

Existing water quality, temperature and visual transparency are discussed in secton 3.4.5 of the ER. The waters of the region are all within ranges considered normal for marine coastal waters.

Only a few tsunamis have been recorded along the coast south of the Santa Barbara Channel. Locally generated tsunamis occurred in 1879 at Santa Monica and in 1925 and 1933 at Long Beach; the 1933 tsunami resulted from the March 10, 1933 Long Beach earthquake.

All of Southern California was affected by the tsunami resulting from the May 1960 Valdavia, Chile earthquake (magnitude 8.5). Long Beach Harbor reported 1.5 m waves and surges in Cerritos Channel. Surges of 1.5 m or more were reported from Marina del Rey to Newport Harbor as a result of the March 1964 Prince William Sound earthquake. The tsunami generated by the 1964 Alaska earthquake apparently was not discernible in the area.

ii) Chemical Oceanography

Chemical oceanography (i.e., water quality) of the Southern California Bight has been described in the FEIS for Sale No. 48 (USDI, 1979), in Sale No. 48 Reference Paper No. II (USDI, 1978a), and in SCPI's ER. Heavy metals and hydrocarbon burdens in the water are discussed in the following section on water quality.

The major sources of marine pollution at present in the Southern California Bight are 28 municipal and industrial effluent discharges, surface runoff, and atmospheric deposition. The total volume of municipal wastewater discharged into the marine environment in the bight exceeds 1×10^9 gallons each day (USDI, 1983). The effluent receives a variety of treatments and five of the municipal dischargers account for over 90 percent of the total volume output.

Wastewater discharged from municipal outfalls contains a great diversity of potentially toxic or polluting chemicals. Surface runoff, the second source of pollutants into the ocean, is variable, depending primarily on the amount of precipitation, but averaged 66.9×10^9 gallons per year for the period 1971-1972. Aerial fallout is similarly difficult to quantify accurately, but rainfall washout may account for several thousand tons of pollutant input into the bight each year (SCCWRP, 1973).

The Southern California Coastal Water Research Project (SCCWRP) has been monitoring pollutants for the past several years and some trends in concentration levels have been noted. Compared with the mass emissions of 1977, the figures for 1979 for the five major dischargers (Table III.A.6-1) show a decrease in total amount discharged of 7 percent for cadmium, 35 percent for chromium, 12 percent for copper, 20 percent for nickel, 14 percent for zinc, and 40 percent for cyanides. Three trace metals showed increases in the mass emissions during that time between 1977 and 1979. Lead increased 10 percent, arsenic 10 percent, and silver 25 percent (SCCWRP, 1981).

The California Mussel Watch Program monitors water quality along the mainland coast and at stations on the offshore islands. Fourteen of the 32 stations

monitored by the program are in Southern California and the mussels, Mytilus californianus, collected from these stations reflected the general trend throughout the State with mussels located near major urban centers showing greater concentrations of trace metals in tissues than mussels collected away from the urban areas (California State Mussel Watch, 1979). Areas with significant accumulations of lead, silver, and zinc in mussels are San Diego-La Jolla Ecological Reserve, Area of Special Biological Significance (ASBS), Newport Beach Marine Life Refuge ASBS, Santa Catalina Island West ASBS, Royal Palms State Beach, Anacapa Island ASBS, and Mugu Lagoon to Latigo Point ASBS. Cadmium, lead and zinc levels in mussels exceeded the proposed Food and Drug Administration (FDA) interim alert level at: Santa Catalina Island ASBS, West Santa Barbara Island ASBS, San Miguel Island ASBS for cadmium; San Diego-La Jolla Ecological Reserve, Newport Beach Marine Life Refuge, Santa Catalina Island ASBS West, and Royal Palms State Beach for lead; San Diego-La Jolla Ecological Reserve ASBS, Newport Beach Marine Life Refuge ASBS, Santa Catalina Island ASBS West, and Royal Palms State Beach for zinc. Elevated levels of mercury were found in mussels at the west end of the San Miguel Island ASBS and Point Conception; however, the levels were below the proposed FDA limit of 1.0 mg/g wet weight of tissue.

The Bureau of Land Management funded baseline studies in the Southern California Bight (SAI, 1978) which measured trace metal levels in sediments and water column (as particulates primarily). These studies indicated several areas where trace metals were in rather high concentrations. The metals Copper (Cu), Chromium (Cr), Nickel (Ni), Zinc (Zn), Lead (Pb), Cadmium (Cd), Barium (Ba), and Vanadium (V) were measured.

The concentration of any metal in a sediment (especially a surface sediment) is the end result of the flux of that metal through the marine system. Starting with weathering (dissolving of rocks) on land, metals are washed into the oceans via runoff, entering in one of three phases: dissolved as ions in the runoff water, associated with river suspended particulates, and embodied in the matrix of certain resistate rock minerals. In some instances this transport of heavy metals is added to be anthropogenic injection (i.e., sewage outfalls, industrial discharge, etc.), increasing the amounts of certain metals but not necessarily altering their geochemical pathways.

Upon contact with seawater, most of the heavy metals are partitioned even more to the particulate phase as a result of pH and ionic strength changes (increases in both). This has little or no effect on the mineralogically bound metals. Once the metals have entered the marine water column, they then proceed to sink, if associated with particulates, at some rate proportional to particle size, or, if dissolved, they are eventually incorporated into sinking particulates by metabolic or adsorption phenomena after some finite time of water column residence. Since all these metals eventually come to reside in sediments, this last process is necessarily complete but sometimes relatively slow.

These are the processes going on to naturally distribute metals among the sediments in the Southern California OCS. To a first approximation, sediment from the shelf areas of both the mainland and the islands should have similar values for most metals. However, there are some obvious exceptions. Several areas along the mainland coast are affected by sewage and industrial outfalls;

this is particularly true in the Palos Verdes peninsula area. On the mainland and island shelves, the shallow depths and high lateral energy of the water column act to move fine grained material into deeper, calmer water while often leaving behind heavy mineral-rich coarse grained particulates. These materials can be highly variable in their internal metal contents, but are usually lower in concentration than are deeper sediments (except perhaps in the case of barium) due to their relatively small surface area/volume ratios. Although the Tanner-Cortes Banks area is essentially a shelf regime, somewhat different (usually higher) metal levels result from increased productivity due to upwelling and consequentially efficient incorporation of metals into organic debris.

The heavy metal concentration levels found in marine suspended particulates are dependent on several transport processes interacting with the geochemical characteristics of individual metals. Particulates themselves are basically of two sources: continental weathering and marine productivity. In addition to these two basic sources, it can be seen that sewage plays a significant role in contributing to trace metal suspended particulate loads for all metals, and Coal Oil Point seep areas contribute to barium and vanadium loads above other nearshore stations.

Finally, it should be noted that in most marine waters free metal ions would quickly bind to organic substances naturally present in the ocean. This binding process called chelation, effectively removes many metals from a true soluble state to the particulate state where they are subject to sedimentation. Chelation also reduces the toxicity of many trace metals to marine organisms.

The levels of various hydrocarbons in the waters of the Southern California Borderland remain a subject of concern and monitoring by local and State agencies. SCCWRP, in addition to the trace metals, monitors the mass emissions and concentrations of oil and grease and chlorinated hydrocarbons in local coastal waters. Oil and grease showed a 10 percent decrease in total amount discharged from 1977 to 1979 while the chlorinated hydrocarbons, DDT and PCB, continued a decline in mass emissions and sediments noted prior to 1977 with a decrease of 35 percent for DDT and 15 percent for PCB from 1977 to 1979 (SCCWRP, 1981).

In addition to trace metals, the California Mussel Watch Program measures the levels of selected hydrocarbons in mussel tissues. The program has shown that the level of oil pollution in California's bays and harbors is relatively high. Concentrations of petroleum accumulated by mussels in these areas are only slightly below those in mussels from the highly "polluted" area in the vicinity of a natural oil seep at Goleta Point near Santa Barbara. Along the shore of the Southern California Bight from Pt. Conception to La Jolla, levels of oil pollution in coastal waters, as indicated by their concentrations in mussels, are significantly elevated over those on the central coast and over those in the vicinity of the Southern California Islands. Almost all California Mussel Watch samples produced evidence that a low level of chronic oil pollution may exist along the entire coast.

Elevated levels of hydrocarbons in mussels are similar to the pattern found for the trace metals in which the highest concentrations are generally found in or near harbors and urban centers. The one exception in Southern California is the area around Coal Oil Point and several other sites near Santa Barbara

and Pt. Conception where naturally occurring oil seeps are found and where mussels show elevated hydrocarbon burdens. The polycyclic aromatic compounds are of particular concern in regards to water quality as reflected in mussel tissue burdens since many of the aromatics are known or potential carcinogens. Bays and estuaries appear to be the most important source of these compounds since mussels from open coastal waters did not show evidence of accumulation. Levels of benzo(a)pyrene (an unsubstituted pentacyclic aromatic hydrocarbon with carcinogenic properties derived from combustion processes) reported by Dunn and Young (1976), Baseline levels of Benzo(a)pyrene in Southern California mussels (Mar. Pollut. Bull. 7(12):231-234) were generally less than 0.1 ng/g wet weight of mussels from San Diego to La Jolla and from several Channel Islands. Higher values were found in animals collected from Royal Palms (0.5 ng/g), Seal Beach pilings (8.2 ng/g), Seal Beach rocks (2.3 ng/g), Newport Pier (0.4 ng/g), and Oceanside (2.3 ng/g).

The levels of hydrocarbons in Southern California Bight waters is discussed briefly in the FEIS for OCS Sale No. 48, Volume I, page 121 (USDI, 1979). Values of dissolved hydrocarbons ranged from 0.03 ppb to 20 ppb.

The hydrocarbon levels in benthic sediments in the Southern California Bight are discussed briefly in the FEIS for OCS Sale No. 48, Volume I, page 121 (USDI, 1979). Recent surveys by SCCWRP (Wood and Mearns, 1979) are in agreement with the range of figures found by the BLM surveys for hydrocarbon in sediments [FEIS Sale No. 48 (USDI, 1979)]. SCCWRP noted a mean of 243 $\pm$ 44 mg/kg of hexane extractable material in the top 2 cm of sediments at the 60 m depth contour. As in the BLM study, values ranged up to several thousand mg/kg.

Ocean water used to cool both conventional fossil fuel power plants and nuclear power plants is discharged into the marine environment in Southern California. The amount of cooling water varies with power requirements, some stations not operating unless demand exceeds a certain limit. Scheduled and unscheduled maintenance also cause variations in the amounts of thermal effluents discharged. Two new nuclear units at San Onofre are scheduled to go into operation in the near future. These two new units will add approximately 3.84×10^9 gallons of heated water to the ocean each day.

There are currently three platforms in the Beta Field which discharge heated seawater into the waters nearby. The volumes of these discharges were discussed in the EIR/EA for the Beta Field. Thermal effluents also originate from two platforms, Eva and Emmy, in state waters inshore of proposed Platform Eureka.

D. Flora and Fauna

i) Plankton and Fish

Descriptions of planktonic and fish communities are presented in Sections 3.6.4 and 5 of SCPI's ER and below. Phytoplankton are discussed in detail in the Sale No. 48 Final Environmental Impact Statement (USDI, 1979) and in the Pacific OCS Reference Paper No. II for Sale No.48 (USDI, 1978a). Approximately 280 species of phytoplankton are reported from California waters (Riznyk, 1977), their distribution and abundance being controlled by amount of light (related to water turbidity), levels of nutrients (nitrates), currents, intensity of zooplankton grazing, temperature, and upwelling events. There are both seasonal and long-term components to phytoplankton variability.

Zooplankton are discussed in detail in the Sale No. 48 Final Environmental Impact Statement and in the Pacific OCS Reference Paper No. II for Sale No. 48 (USDI, 1978a). Recent analyses of CalCOFI zooplankton data (Bernal and McGowan 1980) suggest that the classical view of population and production dynamics of epipelagic ecosystems being forced primarily by upwelling phenomena is not able to explain long-term changes in the systems. Advection of water masses correlates well with zooplankton biomass and large scale water mass anomalies are better predictors of zooplankton biomass than upwelling. Furthermore, the productive area off California is at least 500 km wide. Chelton (1980) also concludes the above based on an analysis of long-term meteorological and physical oceanographic data. He found tide level records a simple and convenient method of monitoring the interannual variability of the largescale changes in the California Current.

The marine environment off Southern California is rich in fish life. Of the 562 species of coastal marine fishes known to occur in California (Miller and Lea, 1972, 1976), 485 species (87 percent) are found in Southern California waters. These counts do not include all of the deep-sea fishes, so the total number of species in Southern California actually exceeds 485. One reason Southern California is rich in fish life is this region constitutes a transition zone between southern warm-temperate, sub-tropical waters and northern coldtemperate waters. Thus, both warm-water and cold-water fishes are found either seasonally or year-round off Southern California (Horn, 1974). Table II.D.i-1 presents the characteristic fish species in the Gulf of Santa Catalina. Lists of other frequently occurring fish are in SCPI's ER (Section 3.6.5).

ii) Benthos

The intertidal and subtidal benthic communities are discussed in the SCPI's ER on pages 3-69 to 3-82.

a) Rocky Intertidal Areas

Rocky intertidal surveys conducted within and outside the Long Beach Harbor and on four oil islands have shown that: a) the mean densities of intertidal organisms increase from Inner to Outer Harbor and a greater mean number of species are present on the outer breakwater than inside the harbor; b) the community and zonation was broadly similar to that of other rocky intertidal areas of Southern California. There was an upper barnacle zone with the corresponding increase in the number of species and individuals in the lower zones; c) the macrophyte species list indicates the areas sampled may be stressed. The most common algal species were greens (Ulva spp., Enteromorpha sp., Cladophora) and the red Gelidium pusillum which tend to be early colonizing

Table II.D.i-1. Characteristic Fish Species in the Gulf of Santa Catalina by Depth Ranges (adapted from SCPI's ER)

Shallow Water (10-30 m)	Mid-Depth (80-200 m)	Deep Water (200-400 m)
Genyonemus lineatus	Citharichtyhy sordidus	Glyptocephalus zachirus
Seriphus politus	Porichthys notatus	Lyopsetta exilis
Cymatogaster aggregata	Zalembus rosaceus	Sebastolobus alascanus
Phanerodon furcatus	Sebastes diploproa	
Icelinus quadriseriatus		Intermediate (100-200 m)
Zaniolepis latipinnis		
Symphurus atricauda		Sebastes saxicola
Parophrys verticalis		Zaniolepis frenata
Pleuronichthys verticalis		Microstomus pacificus
Citharichthys stigmaeus		

species and are indicative of an area where one or several conditions in the environment prevents the community from reaching a settled mature condition.

b) Sandy Intertidal Areas

Three sandy beach intertidal areas have been sampled. All had depauperate upper intertidal and supra-intertidal fauna, probably due to frequent beach maintenance activities. The Long Beach and Outer Cabrillo Beach sites had fewer individuals and species than the more protected Inner Cabrillo Beach. The population of sandy beach intertidal communities are primarily controlled by wave exposure and the slope and length of the beach. Protected beaches with long gently sloping beaches have greater populations both in abundance and number of species than short steep beaches exposed to large ocean waves.

c) Structure Biofouling

Two distinct biofouling communities are associated with offshore structures. One is a littoral community existing near and at the surface of the support structures; the other is a subtidal community that is associated with the foundations of the structure.

d) Subtidal Areas

Subtidal benthic surveys have indicated that the San Pedro Shelf is primarily unconsolidated sediment but is in an area of considerable sedimentary, hydrographic, and physiographic complexity. This physical heterogeneity has given rise to high faunal diversities, complex distributional patterns, and a variety of community assemblages. The San Pedro Shelf has a diversified and complex fauna, changing from one location to the next, based upon sediments, locations and other physical factors. Jones (1969) found the pattern of recurrent groups typical of the shelves of the Southern California coastline does not apply on the San Pedro Shelf except in the deeper areas. Hartman (1966), however, found that most species had distinct depth preferences and some species tended to aggregate in predictable community assemblages.

Based on subjective mapping, Jones (1969) reported four benthic macrofaunal assemblages on the San Pedro Shelf. The most prominent inshore association is the Nothria-Tellina association, made up of species in the polychaete genus, Nothria, and the pelecypod genus, Tellina. This association is present for approximately 16 miles (25.8 km) from the Long Beach Harbor breakwater to a point west of the Newport Beach Marine Canyon.

The Amphioplus (ophiuroid) association is the second most prominent association on the San Pedro Shelf. It is located seaward of the Nothria-Tellina association and concentrated in the area of the proposed pipeline. Approximately 7 miles (11.3 km) of seabed occupied by the Amphioplus association was crossed by the existing pipeline from Elly to shore.

e) Sandy Bottom Areas

A small patch of the amphiodia (ophiuroid) assemblage was reported to be the closest assemblage to proposed Platform Eureka. Samples taken during the Southern California Baseline Study (SAI, 1977) at shelf, slope and basin

stations show that density and species richness decrease from the shelf to the basin. Upper slope Station 825 (231 m) is near the proposed platform location and had a relatively high average density (756 specimens per m^2) and diversity (23 species per sample). Standing crop also decreased downslope with Station 825 having a relatively high mean value of 223 grams/m^2.

The dominant species at Station 825 was the polychaete Maldane sarsi (30 percent of total). Myriochele gracilis (5 percent), Pectinaria californieusis (4 percent) and Axinopsida serricata (4.5 percent) were the next group of dominant species. A total of 17 species made up 65 percent of the total 1pecies found at Station 825.

The project site has a relatively rich benthic invertebrate fauna (Fauchald and Jones, 1978). The species represent a community dependent upon a soft bottom sediment and an abundance of detrital material. The moderate density and richness measurements are intermediate between the shelf and basin levels. The high level of standing crop may be indicative of an abundance of larger species feeding in a rich detrital deposition area.

f) Rocky Outcrop

Geohazard data (Mesa[2], 1984) not discussed in SCPI's ER has shown a hard bottom to occur about 2,600 feet south of the project site. No hard bottom substrate is located along the pipeline corridor as discussed in Fish and Wildlife's comments. Hard bottoms have a different type of community than the soft bottom communities discussed above. The dominant members of the community are sessile and are filter feeders. Little has been reported about hard bottom assemblages in this area of the California Bight, and nothing has been reported from this depth. It seems logical to hypothesize that the biological assemblages of these areas would have similar species as the other hard bottom assemblages recently surveyed (Chambers, 1982, 1983; Dames and Moore, 1982, 1983; HMA, 1982; IEC, 1979; Nekton, 1981, 1982, 1984; Ecomar, 1984) in Southern California and the Santa Maria Basin, although the relative abundances of these species may be different.

iii) Breeding Habitats and Migration Routes

Certain seabirds are known to breed along the island and mainland coastal regions in the study area. According to Sowls et al. (1980), the following seabirds breed in the Gulf of Santa Catalina (Table II.D.iii-1): Least tern, western gull, Brandt's cormorant, and xanthus murrelet. Marine mammals are not known to breed in the project area.

Several species of marine mammals are known to migrate through the project area. The gray whale commonly passes through the Gulf of Santa Catalina during the months of December through March in its migration between Scammon's Lagoon, Baja California, Mexico and the Bering Sea. Other endangered whales and turtles are infrequent migrators through the area.

The great majority of seabirds are not resident and either visit or migrate through the area on a seasonal basis. Further information on seabird migration may be found in USDI (1978a), Norris et al. (1975), California Department of Fish and Game (1973) and Center for Coastal Marine Studies (1980).

Table II.D.iii-1. Numbers and Areas of Breeding Seabirds, Gulf of Santa Catalina (from Sowls, et al., 1980)

Species	No.	Area
Least Tern	80-96	Anaheim Bay, Surfside
Least Tern	40-52	Bolsa Chica State Beach
Western Gull	52	Bird Rock, Catalina Island
Brandt's Cormorant*	0	Bird Rock, Catalina Island
Xantus Murrelet*	0	Bird Rock, Catalina Island
Least Tern	140-180	Huntington Beach
Least Tern	4-10	Newport Bay
Least Tern	100	Aliso Creek

*Present in past years, however, the species was absent in most recent survey.

iv) Threatened and Endangered Species

A partial discussion of threatened and endangered species in the project area is presented in Sections 3.6.7 and 3.6.8 of SCPI's ER. Further detailed analyses of these biota are in USDI, 1983 and Center for Coastal Marine Studies (1980) and The Biological Opinions of the USFWS and NMFS for this development activity (Appendix 1). Threatened and endangered species currently listed or under review in the Southern California Bight by the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) are presented in Table II.D.iv-1. Additionally, the State of California lists Belding's savannah sparrow as endangered.

The large and complex marine mammal community of the Southern California Bight ranks as one of the most diverse faunas in north temperature waters. Not only does the Bight support resident populations, of which several have worldwide or regional significance, but it is also an area where many wideranging species overlap. The Bight lies along the migration routes of important species such as the California gray whale, the northern fur seal, and many birds that pass through the area every year. The species which forage or pass through the project area include the migratory whales, sea turtles and the California brown pelican. The lightfooted clapper rail, California least tern (April to September), the Palos Verdes blue butterfly, black flowered figwort, and salt marsh bird's beak are known to inhabit coastal areas from Palos Verdes to Newport Beach in the study area. In addition, the state listed endangered Belding's savannah sparrow occurs in the area.

v. Refuges, Preserves, Marine Sanctuaries, and Areas of Particular Concern

Environmentally sensitive areas are discussed in SCPI's ER (pages 3-90 through 3-96). In the general region of the Gulf of Santa Catalina, the following officially protected areas exist:

-State Oil and Gas Sanctuary. This three mile buffer zone was originally designated to preclude offshore drilling within close proximity to nearby mainland and island beaches. The proposed activities will occur about seven miles from the nearest mainland sanctuary and 15 miles from Santa Catalina Island Oil and Gas Sanctuary.

-Heisler Park Ecological Reserve, Newport Beach Marine Life Refuge, Irving Coast Marine Life Refuge, Santa Catalina Island and San Clemente Island. These areas are designated as Areas of Biological Significance (ASBS) by the State Water Resources Control Board because they contain biological communities of "extraordinary" value. These areas are discussed in more detail in SCPI's ER. SCPI's project is located from seven to 27 miles from these ASBSs.

There are several state-designated marine life refuges or ecological reserves in the area: Bolsa Chica Ecological Reserve, Upper Newport Bay Ecological Reserve, Abalone Cove Ecological Reserve, Pt. Fermin Marine Refuge, Laguna Beach Marine Life Refuge, South Laguna Beach Marine Life Refuge, Niguel Marine Life Refuge, Dana Point Marine Life Refuge, and Doheny Beach Marine Life

Table II.D.iv-1. Threatened and endangered species currently listed or under review in the southern California Bight by U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS).

Common Name	Scientific Name	Status
Gray Whale	(*Eschrichtius robustus*)	Endangered
Right Whale	(*Eubalaena glacialis*)	Endangered
Blue Whale	(*Balaenoptera muculus*)	Endangered
Fin Whale	(*B. physalus*)	Endangered
Sei Whale	(*B. borealis*)	Endangered
Humpback Whale	(*Megaptera novaeangliae*)	Endangered
Sperm Whale	(*Physeter catodon*)	Endangered
Green Sea Turtle	(*Chelonia mydas*)	Endangered
Leatherback Sea Turtle	(*Dermochelys coriacea*)	Endangered
Pacific Ridley Sea Turtle	(*Lepidochelys olivacea*)	Endangered
Loggerhead Sea Turtle	(*Caretta caretta*)	Threatened
Southern Sea Otter	(*Enhydra lutris nereis*)	Threatened
Guadalupe Fur Seal	(*Arctocephalus townsendi*)	Candidate
California Brown Pelican	(*Pelecanus occidentalis*)	Endangered
California Least Tern	(*Sterna antillarum browni*)	Endangered
American Peregrine Falcon	(*Falco peregrinus anatum*)	Endangered
Bald Eagle	(*Haliaeetus leucocephalus*)	Endangered
Light-footed Clapper Rail	(*Rallus longirostris levipes*)	Endangered
Santa Barbara Song Sparrow	(*Melospiza melodia graminea*)	Endangered
San Clemente Sage Sparrow	(*Amphispiza belli clementeae*)	Endangered
Palos Verdes Blue Butterfly	(*Glaucopsyche lygdamus palos verdesensis*)	Endangered

Table II.D.iv-1. Threatened and endangered species currently listed or under review in the southern California Bight by U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) (continued...)

Common Name	Scientific Name	Status
El Segundo Blue Butterfly	(*Euphilotes* [*Shijimiaeoides*] *battoides allyni*)	Endangered
Salt Marsh Bird's Beak	(*Cordylanthus maritimus* ssp. *maritimus*)	Endangered
Black Flowered Figwort	(*Scrophularia atrata*)	Candidate

Refuge. The areas are discussed in SCPI's ER, USDI 1983, and USDI 1975.

"Areas of Biological Concentrations" (USDI, 1983) of marine mammals and birds in the Gulf of Santa Catalina and surrounding areas are:

AREA	SIGNIFICANCE
Waters within a 10 km radius of Point Vicente.	Concentration of migrating gray whales (endangered) and seabirds. Extremely heavy use by wintering seabirds. Year-round residence of bottlenose dolphins and pilot whales.
Santa Catalina Island to 10 km seaward, especially to the north.	Major feeding grounds for cetaceans and area of maximum seasonal concentrations of pilot whales in the SCB. Migration pathway of gray whales (endangered). Pupping site for harbor seals. Major flyway for migrating loons and Brant.

10 km of mainland.	(endangered) and waterfowl.

AREA	SIGNIFICANCE
Waters within 10 km of mainland shoreline, especially between San Clemente and Dana Point.	Migration path of gray whales and waterfowl. Heavy seasonal concentration of common dolphins.
San Clemente Island to a radius of 10 km.	Sea lion breeding rookery on west side, major seabird (including the endangered Brown Pelican) roosts at north end.

These areas are located from 14 to 48 miles from the project area.

In addition, Anaheim Bay and the Seal Beach National Wildlife Refuge are located about ten miles north of the project area.

E) Maritime Human Activity

i) Commercial Fishing

California is an important center for commercial fishing interests. In 1982, over 315,000 metric tons (695 million pounds) of fish and shellfish worth $241 million to commercial fishermen were landed in California (U.S. Department of Commerce, 1983). This represents about 10 percent of all landings in the United States. When the contributions of the support, processing, transportation, and marketing industries are considered, with a multiplier of 3.1 (U.S. Water Resources Council, 1977), the total value of California's commercial fishing industry is nearly $750 million.

The total annual landings of fish and invertebrates varies considerably from year to year depending in part on fish availability, market demand, weather conditions, and harvest regulations. In 1981, the most recent year for which comprehensive landing data are available, $211 million worth of fish and shellfish were landed into Southern California (USDI, 1983). This represents about 75 percent of all landings into California. When the contributions of related jobs are considered, the total value of the Southern California commercial fishing industry is over $650 million. However, most of the fish landed into Southern California are not caught offshore California. For example, the tuna fishery is the result of a worldwide operation with most of the tuna being brought to Southern California from waters off Central America, South America and West Africa. Excluding fish not caught offshore California, the value of fish landings at Southern California ports was about $64 million in 1981. When the contributions of related jobs are considered, the total value of the Southern California commercial fishing industry for fish caught in local waters is about $198 million.

The annual landings of fish and invertebrates by port also varies considerably from year to year. In 1981, the most important ports in Southern California based on value of landings were Terminal Island, San Diego, San Pedro and Santa Barbara (USDI, 1983). However, a large part of the landings into Terminal Island and San Diego was tuna, most of which was not caught in local waters. Although landings into other Southern California ports are small compared to the total State landings, the commercial fishing industry is an important part of the local economies of most communities in this area.

Species composition of the catch also varies from year to year. In 1981, the most important species based on value that were landed into Southern California ports were yellowfin tuna, skipjack tuna, and mackerel (USDI, 1983). Many fishermen do not fish for just one species, but switch fisheries one or more times during the year depending on market demand, harvest regulations and fish availability.

A major impact to commercial fisheries has been the recent intrusion of El Nino conditions. El Nino weather conditions evident during 1983 have been identified as contributing to a statewide drop in commercial landings of over 25 percent. Preliminary 1983 figures from the CDFG (News Release 19 March

1984) show a total commercial catch of 513,242,858 pounds compared to 687,808,987 in 1982 (see Table 1). Landings of the leading 25 species taken dropped from 456,877,393 pounds in 1982 to 343,245,778 in 1983. This corresponds with only a 3 percent drop in statewide revenue to commercial fishermen from $105,468,897 to $102,238,455 for the same 25 species due to increased costs to consumers.

Proposed Platform Eureka lies within CDFG fish blocks 739 and 740. SCPI's Environmental Report (ER) summarizes data from CDFG fish blocks 739, 740, and adjacent fish blocks 759 and 760 through 1981. Based on the information presented in the ER, the primary commercial fishing activity in the vicinity of the proposed platform appears to be presently purse seine fishery for northern anchovy, Pacific mackerel, jack mackerel, and Pacific bonito. Purse seining for these species usually occurs in waters shallower and inshore of the proposed platform. The size of the purse seine area is controlled by the depth of purse seine net itself and CDFG regulations. The majority of the purse seine fleet is based in San Pedro and returns to deliver its catches to the market and canneries in the Los Angeles Harbor area.

Purse seine vessels vary in length from about 60 to 85 feet and carry crews of 8 to 12 people. To avoid tangling the net or snagging it on the bottom, most seiners will not operate in waters deeper than the depths of their nets (up to 240 feet). In shallow waters, however, the bottom of the net may be tied up. The purse seine itself generally ranges in size up to 2,500 feet long and 240 feet deep. To operate, one end of the net is attached to the vessel, the other end to a skiff or buoy. The entire purse seining operation may take 1.5 hours or longer. To locate schools of fish purse seiners usually work in groups moving along erratic or zig-zag courses. Seining activity usually occurs at night, during periods of a new moon or cloud cover.

To set the net, the vessel requires approximately 900 feet of maneuvering space. Once the net is set, the vessel is stopped in the water and may drift some distance. It is not possible for the vessel to maneuver again until the net is hauled in and the fish loaded onto the vessel.

As mentioned previously, catches are affected by a variety of environmental conditions. Fluctuating market conditions, for example, along with size limits recently imposed on Pacific bonito have reduced landings. Also, the recent resurgence of Pacific mackerel off our coast has dramatically increased landings of mackerel in the catches (this species has been at very low population levels since the 1960s). Restrictions also exist on landings of northern anchovy. Seiners are prohibited from fishing in State waters and no anchovy may be landed for reduction purposes during the summer months.

Shell California Production Inc.'s ER states that some seining does occur in the vicinity of proposed Platform Eureka during the spring, according to local seiners.

ii) Mariculture and Kelp Harvesting

Known mariculture activities in the Gulf of Santa Catalina include experimental culture of shrimp at Redondo Beach, experimental Gelidium cultivation on the westside of Catalina Island, Pacific oyster research at Catalina Island,

invertebrate (various) aquaculture at Los Angeles Harbor, Panneid shrimp and American lobster aquaculture at Carlsbad, and experimental abalone aquaculture at San Clemente Island.

Kelp (Macrocystis pyrifera) is harvested in shallow nearshore waters of the mainland and islands. All significant kelp beds in California are under the jurisdiction of the California Department of Fish and Game (CDFG). Each bed or area is numbered according to the "Official Kelp Bed Map" of CDFG. Since substrate type and light availability are the limiting factors for distribution of Macrocystis, no kelp occurs on or near the proposed platform site or pipeline/cable corridor. The nearest kelp beds are located in the nearshore waters offshore Orange County. These areas are depicted on CDFG's Map Nos. 9 10. Kelp also is found along the Palos Verdes Peninsula (Map No. 13), Santa Catalina Island (Map No. 75) and San Clemente Island (Map Nos. 71-74). At the present time, no significant kelp development occurs in these areas, due to the recent El Nino warm water intrusions (see Section III.C). Harvesting activities have not been carried out in these areas in recent years.

iii) Sportfishing

Sportfishing is a popular recreational activity throughout California, particularly in the southern portions of the State. Intensive fishing occurs on both private boats and commercial boats. Commercial passenger fishing vessels operate out of almost every harbor or bay in the Southern California area. There are four landings which operate sportboats within a reasonable distance to the proposed project area. These are located in Los Angeles Harbor (Ports O'Call, 22nd St. Landing), Long Beach Harbor (Queen's Wharf and Belmont Pier), Seal Beach (Seal Beach Pier), and Newport Beach (Davy's Locker and Art's Landing). Presently, none of the boats operating from these landings fish in the vicinity of the existing Beta field platforms or the proposed project area.

The most common practice for these sportboats is to occupy shallow waters near kelp beds for fishes such as kelp bass, sheephead, and sand bass. Deeper areas are fished for rockfish but generally the boats will target rock piles, seamounts and heads of submarine canyons for the best fishing. The exact location of these areas are confidential to the skipper of the vessel and hence, are not specifically reported to the CDFG. Conversations with staff at Queen's Wharf and 22nd St. Landing have indicated that there are no sportboats which presently fish the vicinity of the Beta Field. Personnel living on board the existing Beta platforms have not observed much sportfishing activity in the vicinity of the Beta Field.

iv) Shipping

Vessel Traffic Separation Schemes (VTSS) have been estabished on the approaches to Los Angeles and Long Beach Harbors as aids to shipping and for safety purposes. A VTSS is an internationally recognized vessel routing measure to provide a separation for opposing flows of traffic. The VTSS consists of a one nautical mile wide designated northbound lane and a one nautical mile southbound lane with a two nautical mile wide separation zone between the lanes. Buffer zones are established of 500 m on either side of the lanes for safety and cautionary purposes. The proposed location of Platform Eureka is between the northbound and southbound traffic lanes of the Gulf of Catalina

VTSS. Platforms Edith, Ellen and Elly are also located within the separation zone. U.S. Coast Guard regulations allow permanent, or semipermanent, structures within the separation zone, but not within the 500m buffer zones adjacent on either side of the traffic lanes or within the traffic lanes. The proposed location for Platform Eureka is over 1000 feet away from the edge of the buffer zone and more than 2500 feet from the northbound traffic lane (the closest lane).

The Ports of Los Angeles and Long Beach are the major shipping ports south of San Francisco Bay. A 1982 Port Access Study by the U.S. Coast Guard (47 FR 27430-27434, June 24) predicted vessel arrivals at the Ports at 7,500 in 1985 and 8,000 in 1990. The majority of this traffic utilizes one of the two VTSS approaching the Ports (Santa Barbara Channel VTSS or Gulf of Catalina VTSS). Currently there are 19 crew and/or supply boat trips per week for service to Ellen and Elly (SCPI 1984).

v) Military

Offshore Southern California is one of the most active areas for military operations in the U.S. The area off Los Angeles and Orange Counties is a designated joint use area. The Naval Shipyard Electronics System Evaluation Facility is located at Long Beach and numerous naval ships are based at the Port.

vi) Existing Pipelines and Cables

Pipelines and cables in the vicinity of the proposed project are part of the Beta Field development. There currently exists a 16" dry crude pipeline from Elly to shore, a 6" gas pipeline from Edith to Eva and a 34.5 KV submarine cable from Edith to shore. The 16" crude oil line follows the same route nearshore as the THUMS pipeline servicing the offshore islands. The proposal includes installation of pipelines from Elly to Eureka, but no new lines to shore are proposed.

vii) Ocean Dumping

Several ocean dumping sites exist or have existed in the vicinity of the proposed project. These dump sites are detailed in the Final EIS Proposed Oil and Gas Lease Offering Southern California, April 1984 (1983) and the accompanying Graphic No. 5. Currently, dumping is prohibited in the area approximating the Precautionary Zone at the entrance to the Ports. An Environmental Protection Agency and U.S. Corps of Engineers approved site, LA2, is located 11 nautical miles northwest of the proposed platform location. Additional sites or the use of old sites may be approved by EPA. In addition to ocean disposal sites some miles offshore, coastal counties and communities dispose of their treated sewage in the near shore areas. Ocean outfalls of the City of Los Angeles, Orange County, and Los Angeles County are in the nearshore areas from Point Fermin to Huntington Beach. These wastewater outfalls are the primary sources of contaminants to ocean water quality.

viii) Recreation and Tourism

Recreation and tourism provide an important source of revenues for local communities. The tourist expenditure exceeded 2 billion dollars in Los Angeles and Orange Counties in 1979 (MMS 1983). Onshore recreation centers are the

tourist attractions, the Queen Mary, Ports-of-Call, etc., and the recreational beaches and scenic areas. Recreational beach use exceeded 44 million visitors in 1981 (SCPI 1984). Offshore recreation includes pleasure boating, diving, and sportsfishing. Sportsfishing is discussed above under Commercial and Sportsfishing. Boat registration in Los Angeles and Orange Counties total over 150,000 for 1979 (MMS 1983). Numerous marinas exist in the Long Beach to Newport Bay area. Most are at capacity with waiting lists for berthing spaces. A popular boating destination is Santa Catalina Island. The Beta Field developments are not in the straight line path to Santa Catalina from the major marinas between Long Beach and Newport Bay. Many pleasure boaters are also diving enthusiasts. Diving occurs all along the coast where appropriate, and around most of the coastal islands. There are currently 5 underwater parks and 15 other subtidal areas under consideration for inclusion in the California State Park System (MMS 1983).

ix) Cultural Resources

The Beta Field is located in an area with high potential for prehistoric and historic sites. Many shipwrecks are reported as occurring in the Port area or near the Ports of Los Angeles and Long Beach. Additionally, the water depths in the area are 150 m (450 ft) or less, and thus the land surface was exposed in the recent geological past. In the specific area of proposed Platform Eureka the water depth is 213 m (700 ft). Recorded historic shipwreck data includes two wrecks in the Beta Field vicinity, a 1888 schooner, the Fox, and a 1944 oil screw, the Navajo. An aircraft is also reported lost in the area. The aircraft is reported lost on OCS-P300 with a locational accuracy of 10 nautical miles.

x) Aircraft

The San Pedro Channel experiences many commercial and private aircraft overflights originating from Los Angeles International Airport, Hughes Airport, Long Beach Municipal Airport, Fullerton Municipal Airport, John Wayne Airport, Meadowlark Airport and Catalina Airport. Many of these airports are within three miles of the coast and have landing approaches and takeoff patterns over the ocean at relatively low altitudes. Private aircraft, single engined planes and helicopters, are expected to fly over the project area during night and day hours.

F) Socioeconomic Resources

The socioeconomic environment is adequately presented in the Environmental Report (ER) submitted by Shell California Production, Inc. (SCPI) to MMS. Socioeconomic impacts from this proposal would occur in Los Angeles and Orange Counties and, thus, all of the following discussions are related to those counties.

i) Employment

Los Angeles County in November 1982 had a labor force of 3,716,000, of which 3,325,000 were employed. During the same period Orange County had a labor force of 1,228,900, of which 1,130,600 were employed. The unemployment rates were 10.5% and 8.0%, respectively (California Employment Development Department, 1982). The majority of the labor force employed in three employment sectors: manufacturing, retail-wholesale trade, and services. These three sectors employ 71.5% of the Los Angeles and 71.8% of Orange Counties labor force. Mining, which includes the oil and gas industry employs only 0.4% and 0.3%, respectively, of the labor force (California Employment Development Department, 1982).

ii) Population

The population of Los Angeles County was 7,477,657 in 1980 (USDOC, Bureau of Census). Minerals Management Service projections raises this figure to 8,657,514 by the year 2000 (Fernandez 1983). The population figure for Orange County is 1,931,570 in 1980 (USDOC, Bureau of the Census 1981) with an MMS projection of 2,841,443 by the year 2000 (Fernandez 1983). The oil and gas industry is spread throughout the two counties. Numerous oil companies maintain corporate or regional headquarter offices in the area. SCPI maintains onshore support facilities in the City of Long Beach. A supply boat base is located in the Long Beach Harbor.

iii) Community Services

Emergency services if required onshore, or offshore, would be provided by established agencies or services. Police protection at the onshore facilities are provided by SCPI security guards, with backup available from the Harbor Police, or the Long Beach Police Department. The Long Beach Fire Department provides onshore fire and paramedic services. Adequate medical treatment facilities are available in the City of Long Beach. Helicopter landing facilities are available at the hospital to receive evacuated injured personnel from the platform. Energy for onshore facilities is provided by Southern California Edison. Energy for Platform Eureka will be provided from generators located on Platform Elly. The onshore facility receives fresh water from the City of Long Beach. Water to Los Angeles County is provided by the Los Angeles Department of Water and Power and the Metropolitan Water District (MWD). MWD water sources are from the Colorado River and the State Water Project. Wastewater collection is provided by the City of Long Beach.

iv) Public Opinion

Public opinion regarding offshore oil and gas development varies greatly in the region. The City of Long Beach has long been associated with oil and gas development both onshore and offshore. The City of Huntington Beach in Orange

ounty also has a long history of exposure to oil and gas development. Opinion varies depending upon place of residence, the degree of knowledge regarding the offshore oil industry and its practices, and a host of other factors. SCPI references a Western Oil and Gas Association opinion poll in which 56% of a statewide sample "favored" or "strongly favored" continued offshore development.

v) Transportation Systems

The onshore facilities located in the Port of Long Beach are accessible via rail and road transportation systems. The Long Beach Freeway, Harbor Freeway, and Terminal Island Freeway provide access to the combined harbor area with secondary streets providing direct access to the Port and SCPI facilities. Air transport can be provided via Long Beach Airport, Los Angeles International Airport, and several smaller facilities.

vi) Coastal Resources

Coastal resources that might be impacted by the proposed project include the availability of water, adequacy of available dock space and visual resources.

As discussed above water is provided to SCPI onshore facility by the City of Long Beach. Potable water will be provided to Platform Eureka from shore via supply boats. Current water supplies to the Long Beach area are adequate to support current demand and expected future growth.

Supply and crew boat dock space is currently being provided at SCPI facilities in the Port of Long Beach. These facilities are currently serving Platforms Ellen and Elly.

Visual intrusion of oil and gas facilities is a major concern of much of the public and a cause of opposition to offshore development. There currently exist 3 platforms, Edith, Ellen and Elly shoreward of the proposed location for Platform Eureka. Also numerous artificial islands exist in state waters offshore Long Beach and Huntington Beach.

III. ENVIRONMENTAL CONSEQUENCES

A) Geologic Hazards

Proposed Platform Eureka site and pipeline corridor is in a seismically active region of California, and may experience strong ground motion during an earthquake.

Proposed production and injection wells contained on Platform Eureka will not cross the main splay of the Palos Verdes fault zone. Smaller minor branches of the fault zone will be penetrated within the Palos Verdes fault zone at depth.

Earthquakes may, in certain cases, be induced as a function of altering underground or subsea geopressures during hydrocarbon extraltion. By using flared injection techniques, reservoir pressures may be controlled or maintained, thereby preventing induced seismic activity (Wilkinson, personal comm., 1984).

Design of Platform Eureka followed industry guidelines and standards for earthquake ground motion (API, 1980). These industry guidelines and standards were adopted by the U.S. Geological Survey and Minerals Management Service (U.S.Geological Survey Conservation Division at that time) as being acceptable guidelines and standards for the design and fabrication of offshore facilities. The State of California also concurred with the adoption of these guidelines and standards.

A relict slide, which is located in the northeast corner of OCS-P 0300, is described by MESA^2, Inc. (1984). The relict slide is situated within a modern slope gully in 91 m of water. The proposed pipeline route crosses the slope gully that contains the relict slide 381 m below (down-slope) of the toe of the relict slide.

There is no evidence that the relict slide has moved significantly downslope. By unfolding the contorted beds or reflectors within the upper portion of the slide mass, the amount of downslope displacement can be estimated. This estimated displacement does not exceed 152 m between the headscarp area and the base of the topographic bulge or toe of the relict silde (plotted on maps at event marks 123 to 126 and at event mark 136, respectively). This portion of the relict slide is believed to be the latest slide block. It is the only area of anomalous topography along the relict slide as mapped (Plate IV of MESA^2, Inc., 1984).

The maximum sediment volume or mass of this latest silde-block is estimated to be 620,000 cubic yards or 474,000 cubic meters. The total volume of the relict slide as mapped is 1.6 million cubic yards or 1.2 million cubic meters. A minimum volume of relict slide mass can also be estimated. Assuming any rupture or reactivation of the relict slide would occur along bedding planes immediately below the surface of the topographic bulge, the mass of this block is approximately 200,000 cubic yards or 152,000 cubic meters.

Borings of this upper interval near the proposed Platform Eureka site penetrated 6 m of very soft, low shear-strength, dark gray clayey silt to silty clay, which overlies 6 m of medium stiff clay (Woodward Clyde Consultants, 1978, Boring 2622). Any failure of this upper interval would most probably produce a mud or debris flow. It should be emphazised, however, that no evidence of

significant flows has been found down slope of the relict slide mass. The volume of modern sediment Unit I, which lies in a triangular-shaped area within the slope gullies and on the slope above the Eureka site, is estimated to be 100 cubic yards or 74 cubic meters. Based on the distribution of modern sediment Unit I and the depression associated with the slope gullies, a sediment flow would be largely confined to the slope gully system. This gully system should direct the majority of the soil movement along an axis which falls east of the Platform Eureka Site.

The effects of a mass movement from this relict slide do not appear to be significant. If the slide did move, it would actually have to move approximately 250 m downslope before it encountered the crude oil pipeline. Shell Development Company has studied the effects of mass soil movements on the crude oil pipeline using an in-house computer program which solves equations for pipeline deflection. Assuming a 122-m wide soil movement, the maximum tensions developed in the pipeline were approximately 30 percent of allowable. The slide would have to move approximately 244 m past the point of initial contact before this tensile load would actually be encountered. The effective stresses on the crude oil pipeline due to a slide were increased approximately 20 percent over that of the normal operating condition. The stress level due to the slide were still only 60 percent of the minimum yield strength. It is estimated that the slide width would have to be approximately three to four times wider than that expected before significant pipeline deflections would cause tensile failures.

As stated earlier, the probability of the relict-slide impacting the Platform Eureaka site is very remote. The slide would have to move approximately 1,525 m before it would be in the Eureka site area. The small volumes of material actually reaching the platform site would have an insignificant effect on the platform.

The possibility of faulting within the site area was reviewed by MESA^2, Inc. (1984). As shown on the Geological Design Map (Plate IV and Figure 8) of that report, the proposed site is located within a block between the F-2 and F-3 faults. This block is defined by continuous, unfaulted reflectors at least to the "Blue" reflector, which is over 91 m below sea floor at the proposed site. Seismic reflection data can be used to document fault displacements of a meter or even 1/2 meter along the Palos Verdes fault zone (Darrow and Fischer, 1983). In addition, the extension of faults beyond the area in which offsets can be determined is frequently possible. This implies that fracturing of the bedding has occurred without measurable displacement. The resulting reflectivity changes along a fracture zone are evidence by diffraction and a lack of horizontal reflector continuity ("disrupted zones").

To the west, the minor F-5 fault zone shows just such changes of reflector characteristics along its mapped trace (Fischer and others, 1977). However, no such zones occur below the sea floor of the proposed site area. Beneath the site, excellent reflector continuity between the sea floor and the Blue horizon provides significant evidence of a lack of faulting or fracturing. Therefore, we believe that there is no fault or fracture zone within the site area between the seafloor and the "Blue" reflector (92 m).

B) Climate

i) Impact of Storms on the Proposal

Waves and high winds caused by storms will produce lateral forces on structures moored at the ocean's surface. The platform once properly installed will withstand any storm that has passed through the San Pedro Channel. However, these storms would limit access to Eureka by crew/supply boats, barges and helicopters. This would interfere with transport of necessary equipment, supplies and personnel needed during critical parts of development. SCPI has outlined what drilling operations would be affected and curtailed for safety in the Critical Operations and Curtailment Plan.

Pipeline and electric cable laying activities will be the most vulnerable activities because associated barges and tugs will be moored during the winter months at or near the platform site. There may be some small safety problems but the biggest concern would be delays on the order of days.

The MMS believes that typical storms that move through the San Pedro Channel will not significantly impact installation of Eureka and following development and production activities.

ii) Impact on Air Quality

The proposed location for Eureka is 8.4 miles from the nearest shoreline. This sets the exemption level at 280 tons per year for NO_x, SO_2, VOC and TSP and 14,060 tons per year for CO as calculated by DOI formula regulating (30 CFR 250.57-1). This exemption level is a screening method of determining when to apply a more sophisticated model to determine onshore impacts. Of all the pollutants, only NO_x required this.

A modified MTPER Guassian dispersion computer model as approved by the MMS was employed to calculate onshore concentrations. The MTPER program is part of a series of EPA computer dispersion models. Certain changes were made to adjust for different atmospheric characteristics over water. Details of the model modifications and input parameters can be found in Appendix B of the ER.

There are two minor inconsistencies of the emission rates. The model input for each of the Saturn turbines was 0.38 g/sec. This number conflicts with 0.62 g/sec as calculated from Table 4.3-9 in the ER. However, this difference will only result in the calculated concentrations being approximately 7% too low. There is a claim in Appendix B that crew/supply boat and helicopter emissions are contained in the Mars turbine values. The 4.25 g/sec rate does not reflect this and is only for the Mars turbines, this rate is appropiate because the modeling analysis is only for facility activities and not transportation.

Two scenarios were considered, addressing two different ways of handling the Mars turbine exhaust. The NO_x emission rates remained the same. Only the exhaust temperatures were different.

The maximum onshore annual average was the only required result. The DOI regulations (30 CFR 250.57-1) have a set of concentrations that are to be used to determine significance. In the case of NO_2, it is 1.0 ug/m^3 averaged

for a year. Eureka modeling yielded 0.34 and 0.29 ug/m^3 as the highest onshore annual averages for both exhaust scenarios. Since both values are below 1.0 ug/m^3, the MMS concludes the NO_x emissions from the Beta Unit (Ellen, Elly and Eureka) will not significantly impact onshore areas when compared to the National Ambient Air Quality Standard for NO_2.

At the present there is no easy method of determining the ozone generation from the facility's emitted hydrocarbons and NO_x. Photochemical generation of ozone is very complex and is dependent on the location and emission rates of other sources of hydrocarbons and NO_x. This analysis would require a very sophisticated computer model and careful simulation of the input parameters. The California Air Resources Board and the South Coast Air Quality Management District have expressed their concerns of possible significant amounts of ozone created. To address this, SCPI has proposed to these two agencies that SCPI reduce NO_x emissions at their Wilmington Manufacturing Complex in Los Angeles County. This will be a ratio of 1.5 pounds of NO_x at Wilmington reduced for each 1.0 pounds generated at the Beta Unit.

The use of water injection for the Solar Mars turbines was investigated by SCPI as a means of reducing NO_x emissions. It was found to be excessively expensive for this type of turbine and in fact there has been no recorded use of water injection on a Mars turbine. That latter point could easily cause power shutdown from component failure.

There is the possibility of NO_x emissions from pipeline and platform installation causing short-term impacts for the period of an hour at a time during a short period of a few months. However, these emission rates are below DOI exemption formulas. Short-term concentrations of NO_2 are not considered by the EPA as directly affecting the public health. It is only the long-term impact as measured by annual averages that can pose a health hazard.

C) Oceanography

i) Impact on Physical Oceanography

Other than some minor turbulence in the immediate vicinity of the proposed platform no impacts are expected to local physical oceanography. Physical oceanographic forces due to currents and waves are believed to pose no threat to the physical integrity of the proposed platform. Platform Eureka has been engineered to withstand the maximum expected currents, which are generally less than 50 cm/sec in the project area, and also 100-year expected storm waves, which are generally less than 12m in the area. Storms and the associated waves may cause cessation of some activities on rigs and platforms because of danger to personnel transfer from shore boats. Bottom currents are not expected to affect the transportation of oil and gas by pipeline.

Exceptions to the above are in the areas nearshore where wave energies may be magnified in the shallow water. A recent example of structure failure to withstand severe storms occurred in State of California waters when oil island Esther was destroyed by high waves occurring during high tide and large storm surge. The reason for the failure is being investigated. No damage was reported from any platforms in federal or deeper state waters.

Platform Eureka will be located in 700 feet of water and should not be as vulnerable to these wave events.

ii) Impact on Chemical Oceanography

Impacts to chemical oceanography (i.e. water quality) associated with the proposed platform include 1) resuspension of sediment through platform installation activities and pipeline construction, 2) daily sewage discharge, 3) formation water discharge, 4) drilling muds and cuttings discharge, and 5) hydrocarbon discharge through potential accidents. The impacts on water quality of each of these except the second, sewage discharges, will be discussed below. Although sewage discharges add pollutants to the ocean, the volumes expected from Platform Eureka are insignificant in relation to the volume of receiving water. Marine organisms or water quality would not experience any changes due to sewage unless immediately under the discharge pipe. Therefore, sewage is not considered to be a significant impact agent and poses no significant environmental issues as regards proposed Platform Eureka.

Bottom Sediments. Bottom sediments will be put in suspension during installation of the platform and pipeline placement. The impacts which could result from resuspension of bottom sediments are increased turbidity, and in areas of pollutant rich sediments (which occur throughout San Pedro Bay), the potential for pollutants to be mobilized into the water column.

The magnitude and extent to which sediment will be put into suspension will be dependent on the bottom material type and grain size, prevailing water current and the duration of the activity. For most of the activities involved in positioning, anchoring, and installing the platform and associated pipeline, the impact should be low and short term, involving tens of meters within the area of the activity. These turbidity increases would have a very low impact on photosynthesis and productivity of phytoplankton for most phytoplankton and would probably be confined to these depths by the thermal stratification which

exists generally above 50 m for the California OCS area. Upwelling might be expected to bring turbid water to the surface and affect photosynthesis rates but this phenomenon is confined to the upper 200 m generally.

The movement of pollutants back into the water column from sediment particles (either by dissolving from the particles in sediments or resuspension of sediments) is expected to have very low impacts (will not elevate ambient metal or hydrocarbon concentrations) on water quality. This is because the metals are not easily dissolved from the clays and sulphide minerals to which they are intimately bound.

Sediment resuspension would add little if any trace metals and these would be removed when sediment particles settled out again. Lower invertebrates such as benthic clams, mussels, and polychaetes have been shown to accumulate high levels of trace elements in polluted environments (Bryan and Hummerstone, 1971; Oshida, 1977).

Resuspension of sediments could release chlorinated hydrocarbons (pesticides) into the overlying water. The levels of DDT (and its relatives) and PCBs are known for several areas nearshore along Southern California (SCCWRP, 1980), but the levels of these materials are unknown for most of the proposed lease area.

Drilling Muds. The fate and effects of drilling muds have been discussed in detail in the FEIS for OCS Lease Sale No. 53 (BLM, 1980) and Sale 68 (BLM, 1981) and further references may be consulted in the Symposium on Research in Environmental Fate and Effects of Drilling Fluids and Cuttings, Petrazullo (1981), Dames and Moore (1980), and NRC, 1983.

Studies to date (ECOMAR, 1978; Ray and Meek, 1980) have shown that drilling mud discharged into the ocean separates into two or three plumes, the longest of which may be up to several kilometers long. Water quality impacts decrease with increasing distance from the origin of the discharge. The limit to measurable water quality parameter changes due to muds seems to be less than 1,000 m for all parameters except light transmittance (turbidity). Turbidity increases have been measured out to more than 1,500 m (Ayers et al., 1980) and the lightest fraction of mud (non-settleable particles) may form an upper plume visible for over 2,000 m. Water quality impacts are, therefore, considered moderate inside a radius of approximately 300 m, low from 300 m to about 1,000 m and very low outside 1,000 m radius around the discharge pipe prolonged drilling and mud discharge.

The long-term fate of discharged muds is unknown but probably is similar to the fates of other sediments in the Bight with some probability of ultimate transport into the basins or off the Borderland via submarine canyons.

The low (slight elevations in turbidity trace metal concentrations, hydrocarbon levels, COD, etc.) and moderate level (higher conc.) impacts to water quality are expected to disappear within a few hours after cessation of mud dumping.

Drill cuttings will be discharged along with muds. The fate and effects of cuttings on water quality were discussed in the FEIS for OCS Lease Sale Nos. 53 and 68. The impact level on water quality of cuttings will be minimal because cuttings drop to the bottom or settle out rapidly from the discharge plume remaining in the water column only a short time.

Drill cuttings should cause no degradation of water quality but could have a significant impact in smothering bottom organisms near the platform and in changing local sediment characteristics.

After being washed free from oil contamination, cuttings are discharged and fall to the bottom beneath the platform even more quickly than the lighter muds. Studies on the Tanner Banks (Ecomar, 1978) indicate that cuttings would settle predominantly within 150 m of the discharge point. Visual inspection around the Tanner Bank drilled area revealed no accumulation of cuttings but microscopic examination of sediments did show some cuttings present. These results are consistent with results reported from Galveston (Shinn, 1974), Georges Bank (Dames and Moore, 1981), but not with the results from Gulf of Mexico (Zingula, 1975) or the mid-Atlantic C.O.S.T. well (Menzie et al., 1980). Cuttings may be mixed vertically in the sediments beneath platforms (Houghton, 1980).

The more significant impacts from cuttings are on the benthic marine fauna and flora and are due to changes in sediment characteristics brought about by the accumulation of cuttings.

Pipe lubricants and pipe joining compounds (dope) may introduce small amounts of trace metal and hydrocarbons into the ocean during routine oil and gas operations. The amounts are considered to be insignificant and pose no significant environmental issue from the proposed action.

Produced water will be discharged into the ocean on occasion during the production life of the field. On occasion, it may be necessary to discharge injection water due to operational problems or injection system overpressure. When this occurs, rates will be about 4,000 bbl/day, and the discharge point will be 177 feet below sea level at existing Platform Elly.

Discharged injection water will be dispersed (diluted) as the water mass moves away from the point of discharge but will change ambient ocean water quality near the discharge point. The main formation water characteristics affecting ocean water quality are trace metals dissolved in produced water, and an absence of dissolved oxygen.

Formation water may have an impact on ocean water quality 1) when chemical constituents are raised above ocean ambient levels, and 2) when chemical concentrations of constituents are increased to a level that may have a deleterious effect on marine life. Ambient trace metal concentrations for ocean surface water in California and the changes in these trace metals were discussed in previous EISs for OCS Lease Sales 48, 53, 68, 73 and 80 (USDI, 1979, 1980, 1982). As indicated in those previous discussions, the increased levels of trace metals at a distance of 500 meters away from the discharge point (or greater) will be below EPA 24hour criteria levels. All metals except zinc would be below the maximum concentrations that present minimal risk of deleterious effects to marine life (= maximum safe levels).

Impacts from produced water are expected to be restricted to less than 500 meters from the platform; a radius inside of which impacts on water quality and possible impacts to biota are expected to be low (except for zinc) and outside of which impacts will be low to unmeasurable (except zinc). Impacts to

the entire area considered as a unit are expected to be very low from produced water. Long-term localized and area wide impacts from produced water have not been studied on this coast but information from the Gulf of Mexico (Middleditch, 1981) leads one to expect very low impacts to water quality.

The following summary of water column effects is quoted from a presentation by Ayers, R.C. Jr., 1981, "The Fate and Effect of Offshore Drilling Discharges," at the Second Meeting of the United Nations Environmental Consultative Committee of the Petroleum Industry, Paris, France, June 2-4, 1981.

> "Upon discharge, the bulk of material settles rapidly in the immediate vicinity of the well site. For this reason drilling discharges have a minimal effect on ocean water quality. For the material remaining in the water column, dispersion is rapid and temperature, salinity, pH and dissolved oxygen reach background levels within a few meters of the discharge point. Suspended solids concentrations are reduced to .01 percent or less of the original value within 100 meters of the discharge and normally reach background in less than 1,000 meters downcurrent. Transmittance values reach background a few hundred meters further downcurrent. Typical LC_{50}'s for drilling muds fall in the 1 to 10 percent concentration range. Concentrations approaching these LC_{50} values exist in the water column only in the immediate vicinity of the discharge pipe and only for a few minutes while the mud is being discharged. When the discharge stops the concentration immediately begins to fall off. Furthermore, the LC_{50}'s themselves are based on a 96-hour exposure time. Bioassay data based on 96hour exposure time is extremely conservative when applied to this type of discharge. It is clear that drilling discharges have a negligible effect on ocean water quality."

During pipeline placement impacts to water quality from temporary localized turbidity increases would be very low and impacts due to mobilization of trace metals or chlorinated hydrocarbons would also be very low (probably not measurable). Sediments in the basin are not suspected to be high in either trace metals or hydrocarbons.

Approximately 6,000 ft^3 of cuttings and 900 bbl of muds per well are expected to be discharged from Platform Eureka. The level of impact to water quality from this material is expected to be low (increases of 2-3 times ambient suspended particulates and trace metals lasting only a few hours) at distances greater than 1,000 meters from the discharge point. Impacts would be moderate (increases 2-3 orders of magnitude above ambient) within 300 meters of the discharge point. These impacts could be slightly greater than described above due to the proximity of other oil and gas platforms.

Approximately 4,000 barrels per day of produced waters (on occasion) and 600 barrels of completion fluid per well are expected to be discharged from Platform Eureka. The level of impact is expected to be low to very low outside a radius of 100 m from the discharge points. Produced water discharges could be additive from one platform to another leading to a zone of low to moderate impact on water quality over the Beta Field.

Thermal discharges from Platform Eureka are not expected to cause significant impacts to water quality.

Platform Eureka will draw cooling waters from a depth of 125 feet (38 m) beneath the platform and distribute it to heat exchanging equipment for cooling. Since there is no contact with any potential contaminating sources the heated seawater will be returned to the ocean at a depth of 121 feet (37m) without treatment. Temperature increases of the discharged water should not exceed 20°F. Discharge rates will range from 72,000 barrels/day to a maximum of 90,000 barrels/day.

Overall, impacts to water quality are not anticipated to be significant. Impacts to water quality would be most severe in the event of an accidental oil spill. Impacts from an oil spill are discussed in Section III. H.

D) Flora and Fauna

i) Impact on Plankton and Fish

Impacts on plankton and fish as a result of normal platform activities may occur as a result of platform discharges. These discharges include drill muds and cuttings, formation waters, cooling waters, and sewage (see Section I.B.vii). OCS Order No. 7 prohibits disposal of any waste materials into the ocean that will create conditions which will adversely affect aquatic life or commercial fishing. Disposal of waste materials is regulated by the General NPDES permit issued by EPA. Proposal-related discharges or intakes could cause lethal or sub-lethal impacts to a few individual plankton populations and to a few individual fish that are concentrated near the platform site. However, these impacts are likely to be short term and localized, due to rapid dilution of these substances by deeper water. Therefore, no significant decrease in plankton or fish populations as a result of normal activities are expected. Further analysis of impacts is presented in USDI 1983.

Shell California Production Inc.'s proposal also could have a beneficial impact on certain fish populations. Platforms and other offshore structures act as artificial reeks that attract fish. The population sizes of some species (especially rockfish) may actually be increased by the presence of these reefs.

ii) Impact on the Benthic Environment

a) Anchors and Anchor Chains

Infauna and epifauna biota immediately around the temporary anchors and any anchor chains which contact the bottom are expected to be dislocated or eliminated by scraping and burial during platform installation. This impact is expected to be short term and localized due to the small area of effect and short duration of operations. Evidence indicates that repopulation of the affected areas should occur from adjacent areas.

b) Platform Jacket

The placement of the platform would result in the elimination of organisms under the pilings and lead to community alteration under and around the platform. Although this is a long-term effect, this loss of habitat and organisms is insignificant since the benthic organisms found in the area of the platform are generally common in the project area and are not concentrated within the project area.

c) Muds and Cuttings Discharge

Benthic organisms in the immediate vicinity of the discharge point may be smothered and undergo burial. Impacts from drilling cuttings should be limited to within 200 m of the discharge outlet. Impacts from drill muds should be limited to within 1,000 m of the platform. Evidence suggests repopulation of the impacted area should occur from adjacent areas.

d) Biofouling

The addition of platform supports, wellcasings and exposed pipelines will serve

s an additional surface where a rich biofouling community will develop. The offshore area is a relatively low relief environment and wherever high relief occurs, increased levels of biological activity can be found.

The normal benthic community under and around the platform may be further altered, possibly for a radius of over 100 m, by the falloff from the biofouling community. Falloff is caused by natural mortality and from cleaning the biofouling organisms from the platform.

e) Pipelines and Cables

The installation of the pipelines and cables will result in the physical disturbance of benthic and epibenthic soft bottom organisms along the proposed routes. This disturbance will be limited to the construction phase of the project. The area should be rapidly recolonized and the lines themselves will serve as attachment surfaces increasing epibiotic growth.

A series of rocky outcrops lies to the west of the proposed platform site. MESA^2 has provided more detailed information on these features since SCPI submitted their ER. MESA^2 collected a series of bottom photographs on March 24, 1984 to verify the interpretations of the side scan sonar and 3.5 khz high resolution profiles. This information is summarized below.

The features located nearest to the platform site (2,800 feet (854 m) west) are smaller patchy exposures of weakly lithified bedrock (Repetto Formation) surrounded by "shallow-bedrock" that is thinly veneered with sediment. The sediment veneer thins from over a meter (3 feet) in thickness to zero-edges along the low bedrock ridges. These features lie in water depths of 475 to 625 feet (145 m to 190 m). The approximate areas of these outcrops are 4,186, 10,248, and greater than 186,000 square meters. (This last feature extends south, out of the study area for MMS geohazards surveys.) About one mile (1.6 km) to the west and northwest of the site is a highly irregular bedrock area, which has an approximate area of 50,000 square meters. Low faunt scarps, that are less than two meters in height, trend northerly along the outcrop. Water depths range from 260 to 350 feet (79 m to 107 m).

MESA^2 also calculated drift measurements based upon 1) Mini-Ranger plots made during the bottom photography survey and, 2) the offset of the side-scan fish during the geohazards survey of November, 1983. These measurements showed consistent northeast to east direction and a maximum velocity of 0.9 feet (45 m) per second.

Based on the general direction of currents away from the outcrops and the distance of the outcrops from the platform location, MMS does not believe significant impacts from muds and cuttings are likely to occur on the epibiotic communities that exist on the outcrops in the area as a whole. SCPI has proposed to discharge muds and cuttings at a depth of 200 feet which should also help reduce the horizontal distribution of the muds.

SCPI has proposed to avoid impacting the rocky outcrops during the anchoring activities of the derrick barge and lay barge. In the event that anchors or chains are dragged over an outcrop, epibiota would be eliminated in the area of dragging. Evidence indicates that the affected area would repopulate if suitable rocky substrate remains.

In their comments on SCPI's ER, Fish and Wildlife Service expressed concern about impacts on hard bottom communities from pipelines. Inspection of SCPI's geohazard data shows no rocky outcrops in the vicinity of the pipeline corridor. Therefore, no impacts to rocky features from pipelines are expected from SCPI's proposal.

iii) Impact on Breeding Habitats and Migration Routes

Impacts on breeding habitats as a result of normal operations are not expected to occur due to the distance of the habitats from the proposed activities. Platform Eureka is located about nine miles from the nearest breeding habitat. Impacts on seabird migration routes from normal operations are not likely to affect seabird migrations. Impacts on whale migration are discussed in Section III.D.iv.

iv) Impact on Threatened and Endangered Species

Potentially Significant Impact Producing Agents and Resultant Impacts. The primary impact-producing activities associated with SCPI's proposed project include facility installation, drilling and production operations, and facility abandonment. Since no new onshore development is planned, impacts to listed plants as a result of normal operations are not expected. In their review of SCPI's proposal, National Marine Fisheries did not foresee any significant impacts to marine mammals or endangered species for which they have a responsibility. Similarly, Fish and Wildlife Service did not foresee significant problems for listed species that they have a responsibility.

The major impact-producing agents expected from normal activities are noise and disturbance, platform discharges, and increased vessel traffic. The following paragraphs describe the sources of these impact-producing agents and potential types of impacts associated with them.

a) Noise and Disturbance

The Gulf of Santa Catalina is currently subjected to numerous noise producing activities such as the daily transit of an average of 18 large commercial ships, commercial fishing, recreational boating, military activities, and ongoing exploratory development and production oil and gas operations. Thus, animals utilizing the project area are exposed to a variety of noise producing agents; this project will add an incremental increase to that background. Offshore sources of noise or disturbance associated with the proposed project will include: temporary sources related to pipelaying, platform installation and abandonment; transitory sources from crewboats, supply boats and helicopters; and the more constant sources related to platform drilling and production.

1) Temporary Sources

Pipeline and Platform Installation. Shell California Production Inc. anticipates that about 30 days is required to install subsea platform connecting pipelines using the conventional pipelay barge/stinger method. Trending or jetty operations aren't proposed. Noise associated with this operation originates from the barge laying the pipeline and would be mimimal and temporary in duration.

Platform installation from initiation to completion is proposed to last four months. Installation activities which generate noise include initial jacket launching and upending (which requires a few hours), pile installation, and installation of the platform modules. Platform Eureka is proposed to be installed in July, 1984.

Platform Abandonment. Platform abandonment is examined in this section because of its similarity to installation in type of activity and duration. In accordance with MMS orders, when the reserves are depleted, platforms are abandoned and removed. This involves carefully cementing and capping each well, cutting each well below the mud line, removing the platform deck and jacket by crane and barge, and cutting the pilings below the mud line to eliminate bottom obstructions. To date, no platforms have been abandoned on the California OCS. Platform Eureka life is estimated at 32 years.

2) Transitory Sources

Service Vessels. Crewboats and supply boats would be used daily to transport personnel and supplies to the platforms. Helicopters are also used for transportation and are described below. These vessels presently service exploratory and development operations in the Gulf of Santa Catalina. Only a small incremental increase is expected to service this proposed development, since Shell plans to use the same vessels that are being used to service Ellen and Elly. Noises emanating from support vessels are well documented (Urick 1975; Ross 1976; Leggat 1981). The primary source of the noise is propellar cavitation, which occurs at normal and high running speeds, and during maneuvering operations (Gales, 1982).

Travel routes have been designated for the support vessels by SCPI. The route is the same as that used currently by vessels supporting operations on Ellen, Elly and Edith. From the Long Beach Harbor the vessels enter Long Beach Channel and proceed to the breakwater. Once outside the breakwater, vessels proceed directly towards Ellen and Elly and then to Eureka.

Helicopters. Helicopters are also currently being used to transport some crew to and from Ellen and Elly. Helicopter use for Eureka will result in a very small incremental increase in traffic. SCPI plans to use the same helicopters for Eureka as are being used for Ellen and Elly. Helicopters can be substantial sources of noise. Although an above-water source, and much of the sound energy impinging on the water is reflected, sound can penetrate into the water under the helicopter and be propagated as underwater noise. The characteristics of the noise depend on helicopter type, flight conditions, altitude, water surface roughness, sound-speed profiles, and absorption characteristics of the sea bottom (Gales, 1982). Information on underwater noises associated with helicopter hover and flyover are also available in the literature (Urich 1972; Young 1973).

3) Operational Sources

Drilling and Production Activities. Development drilling from the one proposed rig is anticipated to last seven years (60 wells, 1.4 wells per month). Production is expected to come on line in 1985 and continue for the life of the project. Machinery noise sources found on drilling and production platforms are, generally, similar to those used for shore-based operations.

Special noise attenuation devices are sometimes used offshore to protect workers in their living quarters located on the platforms. Compressors and diesel engines are usually the loudest equipment on the platform, emitting about 90 dBA at a distance of 15 m (50 ft). By comparison, a diesel truck under full load also emits about 90 dBA at 15 m.

A relatively limited body of information is available on the noises generated by offshore platforms. According to Gales (1981), in light airs, sub-sea surface noise propagated by a platform may be detected up to 100 miles away.

In a study performed for the BLM (Gales 1982), noises from eighteen platforms were measured. Of these, fourteen platforms were offshore Santa Barbara, California. Results from this study indicated that oil and gas platforms produce significant underwater noise covering a fairly wide range of frequencies. Moreover, underwater sounds from the platforms measured did not reveal markedly different characteristics whether they were engaged in drilling or production. The most important observations made were that platform noises were generally steady, and certain platforms may be designed and constructed for reduced sound emission.

Above water, in a quiet sea with light wind conditions, normal offshore platform operations would be inaudible beyond about two miles (assuming ambient background noise level of 40 dBA and attenuation due to sound wave spreading only). In rough seas and weather conditions, the offshore facility would be inaudible beyond about 1/8 of a mile (assuming 70 dBA background). Therefore, no onshore noise impacts are anticipated from the offshore platforms.

Pipeline Operation. No significant noise is predicted for pipelines during the operational phase.

b) Solid and Liquid Disposal

The discharges which are most likely to affect endangered or threatened species are those which are discharged into the marine environment. This would include platform discharges such as drilling muds, formation waters and sanitary effluents.

Drilling Mud. The types of drilling muds used must be approved by EPA Region IX. Quantities and constituents are discussed in Section I.B.vii. Shell California Production Inc. plans to discharge 900 bbl of excess treated mud per well. Drilling mud is essential to drilling and maintaining control of an oil and gas well. Numerous studies have been funded to examine potential impacts of drilling muds. Most recently, the National Academy of Sciences published a study funded by the MMS entitled "Drilling Discharges in the Marine Environment." This review of existing information on the fates and effects of drilling fluids and cuttings on the OCS showed that "...the effects of individual discharges are quite limited in extent and are confined mainly to the benthic environment."

Other studies conducted at OCS well sites (Ayers, et al., 1980a; 1980b; Ray and Shinn 1975; Ray and Meek 1980; Zingula 1975) indicate that drilling muds undergo rapid dilution within a relatively short distance of the discharge point, an important factor in assessing the significance of discharge impacts to endangered species. Also, acute lethal toxicities of drilling muds to

marine organisms are very low (Petrazzulo 1981). Laboratory bioassays conducted to determine acute toxicities indicate that in most cases LC_{50} values of used drilling muds were greater than 10,000 ppm (Petrazzulo 1981). This, rapid dilution and low acute toxicities of drilling muds, combined with the pelagic life style of the threatened and endangered aquatic species being considered in this environmental assessment, will in all likelihood minimize direct adverse impacts of platform discharges to those species.

Formation Water. Formation waters are recovered along with oil during petroleum production and reflect the environment of their deposition. Estimated quantities are described in Section I.B.vii. Formation waters contain numerous minerals (low levels), including iron, calcium, and magnesium, along with entrained oil, trace elements, and an absence of dissolved oxygen. The impacts of formation waters on the marine environment are expected to be restricted to less than 500 meters from the discharge point. Impacts to endangered organisms found within that radius are expected to be insignificant due to the dilution capacity of the water column and the limited exposure period likely to occur for individual endangered organisms.

Sanitary Wastes and Other. Sewage effluent, also discharged into the marine environment at the platform site, must contain 50 ppm or less of suspended solids and a minimum chlorine residual of 1.0 mg/liter in order to conform to EPA discharge requirements. Although sewage discharges add pollutants to the ocean, the volumes expected (about 3,600 gallons per day) are insignificant compared to the volume of receiving water. Endangered species are not expected to be significantly impacted, unless they locate immediately under the discharge pipe. Cooling water discharges (i.e., thermal) represent a considerable portion of total daily project effluents. Cooling water will be discharged at a depth of 121 feet below MLLW and may be up to 20°F warmer than receiving water. No significant impacts to threatened endangered species populations are anticipated due to the limited exposure period likely to occur to individual organisms, and the lack of impact to critical habitats.

c) Vessel Traffic

The proposed addition of Platform Eureka in the Gulf of Santa Catalina will result in an increase in marine vessel traffic. The increase associated with this proposal results from added crew boat and supply boat activities. This increase should last only during the construction and installation phase (see Section I.A). As discussed in an earlier section, animals in the project area are exposed to impacts from a variety of vessels: hydrocarbon support vessels, commercial fishing, recreational boating, shipping activities (averaging 18 large ships per day) and military/Coast Guard activities.

Direct impacts to marine organisms could occur if animals were accidentally struck by boats. Though the potential exists that some of the listed species may encounter harm through a boat accident, this occurrence is unlikely.

Conclusions. No significant impacts to applicable mammals are anticipated as a result of proposal-related platform discharges due to the limited exposure period likely to occur to individual animals and the lack of impact to critical habitats. It is unlikely the right, fin, sei, blue, humpback, and sperm whale populations will be unaffected by the proposed project, as large numbers

of individuals of these species do not occur in the project area. Sensitive calving or breeding grounds do not occur in or near the project area and are also not expected to be affected. Significant impacts to the Guadalupe Fur Seal are not likely to occur as a result of the proposed action, since individual seals are unlikely to be physically affected. Only occasional sightings of single individuals have been made in recent decades. At this time, the species breeds only on Isla de Guadalupe, Mexico.

There is a high potential for mammals that utilize the Gulf of Santa Catalina to be exposed to a variety of noice producing agents. Of the mammals under consideration, only gray whales are thought to be potentially affected by noise-related impacts. However, since gray whales are not known to feed in the area, it is unlikely that significant effects on the gray whale population will occur. Additional noise levels may cause increased stress to gray whales, much the same as industrial noise increases stress in humans. However, the amount of noise anticipated from the proposed action is not anticipated to significantly affect any listed marine mammals due to increased stress.

All floating or swimming animals are subject to be struck by boats and, while it is not possible to totally eliminate collisions between vessels and marine organisms, the accident probabilities are such that no significant impacts to listed mammals are anticipated.

A review of the potential impact producing agents associated with this project has indicated that none of the proposed activities are expected to significantly impact populations of the endangered birds or reptiles in consideration. Although it is possible that individual birds or reptiles may interact on occasion with the project activities, it is unlikely that there will be any significant adverse impacts to these animals.

Impacts to listed plants are not expected due to the great distance of the proposed action from the plants.

v) Impact on Refuges, Preserves, Marine Sanctuaries, and Areas of Particular Concern

Several refuges, preserves, and areas of particular concern exist along the mainland coast between Palos Verdes and Oceanside and on Santa Catalina Island (see Section III.D.v.). None of these entities occur on SCPI's lease or pipeline route. Therefore, no impacts to these resources are expected as a result of normal activities. However, certain of these resources could be impacted in the unlikely event that an oil spill occurs and contacts the resource. Such potential impacts are discussed in Section III.H.

E) Maritime Human Activity

i) Impact on Commercial Fishing

The ER has concluded that the primary impacts to commercial fishing activities from the proposed Platform will center on space/use conflicts: "Potential commercial fishing space will be lost at the platform for the duration of the project construction and the life of the platform. In addition, temporary exclusion zones would be required at the pipeline location during construction. The area with availability of similar habitats within the vicinity of the proposed project suggests that the impact of the project on commercial fisheries would be long term but of minor significance."

Shell California Production Inc. or their contractor Westec have contacted several individuals for information regarding potential conflicts with fishing operations. These contacts have included Mr. Richard Klingbill (CDFG) for information about the drift gillnet fishery; and Mr. Bozanich (Fisherman's Co-op) for information about local purse-seining activity. All of the above persons commented that although no significant conflicts were anticipated, there was a moderate level of purse seining in the general area. Based on information obtained from these contacts, it appears that the area of the proposed Platform Eureka presently does not support a significant level of commercial fishing activity. However, northern anchovy, Pacific bonito and mackerel are all pelagic schooling fishes and it is difficult to predict where the fish may occur. It follows, then, that it is also difficult to predict the level of impact that the loss of space from the platform to fishing activity would have. Mr. Bozanich (who is a purse seiner) commented that a safe distance (1-1 1/2 miles) must be maintained from the platform due to the lack of maneuverability of the vessels when the nets are deployed, and fast surface and bottom currents.

Presently there are three platforms in the Beta Unit. The area closed to fishing due to the presence of these structures is approximately 3 square miles (1 1/2 miles between the three platforms plus a 1 1/2 mile buffer for safety reasons). Fishermen must also be concerned with vessels transitting the north and southbound shipping lanes in this area.

Since it is improbable that any fishermen would attempt to fish between Platforms Elly and Eureka, the area which fishermen will be prevented from fishing will be increased 1 1/2 miles to the southeast. It is important to note that installation of Eureka will completely develop the Beta Field and no additional platforms are anticipated.

SCPI has also made efforts to provide an early identification of potential conflicts between the commercial fishing industry and proposed Platform Eureka. Since December of 1983, Shell has attempted to provide information to the commercial fishing community via the "Oil and Gas Project Newsletter for Fishermen and Offshore Operators" published by the UC Sea Grant Marine Advisory Program. The information provided has included a map of the location of the proposed platform, loran-C Coordinates, water depth and routes of associated pipelines (Figure III.E.i.). Also, the names and phone numbers of persons to contact if a potential conflict was identified have been published. The

contacts are John Hallett, SCPI and Eugenia Laychak, California Coastal Commission. No information identifying potential conflicts have been received by either party. Additionally, none of the MMS personnel identified as contacts for comments and/or information on development plans has been notified of any concerns.

Based on their review of SCPI's ER and their own expertise the National Marine Fisheries Service has determined that the "expected conflicts with commercial fishing from the placement of one additional platform in the Beta Unit do not appear to be significant." We assume that other than the potential impacts discussed above, no specific conflicts should arise.

Although the ER states that the platform structure will undoubtedly serve to attract fishes, these concentrations of fishes will be unavailable to commercial fishermen. In addition the platform lights will probably attract certain species (i.e., market squid), however, this resource will also be unavailable to fishermen.

Based on the above information it appears that although the current level of commercial fishing in the area of Platform Eureka is moderate, the probable level of impact to this fishery will be dependent upon environmental conditions, occurrence of target fish, and market demand. At the present time, it appears that impacts to purse seiners resulting from the installation of Platform Eureka will not be significant.

ii) Impact on Mariculture and Kelp Harvesting

Neither mariculture activities nor kelp harvesting takes place in the vicinity of the proposed pipeline, cables or platform. Therefore, no impacts to these resources are expected as a result of normal proposed activities.

iii) Impact on Sportfishing

Since no sportfishing activity is reported in the project area, it is unlikely that any significant impacts to sportfishermen will be experienced. Most of the sportfishing activity reported in SCPI's ER reflects significant activity on the Horseshoe Kelp, located in the same fish block as the proposed platform but well to the north and in much shallower waters.

iv) Impact on Shipping

Platform Eureka will be the fourth of a four platform development plan. All four platforms are, or will be, located within the separation zone of the VTSS for the Gulf of Catalina. As part of the EIR/EA prepared for the Shell portion of the Beta Field development (Platform Eureka included), a collision risk assessment was done. The risk assessment estimated that there was one chance in 654 years for a ramming incident between Platform Eureka and a vessel over 500 gross tons. The probability of a ramming incident with a smaller vessel is higher, one in 238 years, as vessels under 500 gross tons are not required to use the VTSS (State Lands Commission, 1978). Platform Eureka will conform to established U.S. Coast Guard regulations for lighting and navigation aids. The platform will be located within the Separation Zone more than 500 m from the northbound traffic lane as per Coast Guard regulations. The Coast Guard proposes to establish a 500 m safety zone around the platform,

similar to the zones already established around Edith, Ellen and Elly. The U.S.Coast Guard has sent out for review a preliminary environmental assessment on their proposal. Notice of the proposed rule establishing the safety zones will be published in the Federal Register. Because of the existence of other platforms within the Separation Zone, the conformance of Platform Eureka with established Coast Guard procedures and regulations, and the low probability of a ramming incident, the placement of Platform Eureka is not expected to impact shipping.

Current levels of vessel traffic between shore and Platforms Elly and Ellen average 19 crew/supply boat trips per week and 28 helicopter trips per week. During installation and construction, SCPI expects the vessel traffic to increase by 50%, with most of the traffic generated by the need to bring supplies to Eureka. After installation, trip frequency is expected to return to near current levels of activity. It is expected that the boats (and helicopter) will visit each platform during a given trip, or loop between platforms, before returning to shore.

The crew/supply boats will generally travel a straight path to the platforms once they are free of harbor navigation restrictions. As stated in the ER the crew/supply boats, and helicopter, frequently follow the same path as the oil pipeline to shore and provide a sea level inspection for possible leaks in the pipeline (SCPI, 1984).

The increased vessel traffic during the installation and construction phase may result in a temporary impact to navigation. The temporary increase in vessel traffic will cause all vessels to use greater caution when transitting the precautionary zone and the area near Eureka. After construction and installation are completed platform associated traffic would be reduced to near current levels. Therefore, a short-term minor impact to vessel traffic may result from this project.

v) Impact on Military

In 1976 the Shell group signed an agreement with Fleet Area Control and Surveillance Facility. This agreement covered aspects of potential conflicts between the placement and operation of the platforms and military activities in the vicinity of the Beta Field. Subjects covered in the operating agreement included: control of electromagnetic emissions, control of aircraft operations, control of acoustic emissions, control of vessel/surface and subsurface operations, and various indemnification clauses.

Shell has a long history of cooperating with the military. The addition of Platform Eureka to the existing platforms is not expected to impact military operations and is expected to be subject to the same operating agreement as the existing platforms. No impact to military operations is anticipated from this proposal.

vi) Impact on Existing Pipelines and Cables

No impact to existing pipelines is expected from the installation and operation of Platform Eureka. The existing oil pipeline to shore was originally designed to accommodate the eventual production from Platform Eureka. No new platform to shore cables or pipelines are proposed. A group of pipelines and cables

will be installed between Platform Eureka and Platform Elly in order to transport produced oil, gas, and injection water, and to power Eureka from generators located on Elly. No impact is expected to existing pipelines or cables.

vii) Impact on Ocean Dumping Activities

No ocean dumping sites exist in the immediate vicinity of the proposed Platform Eureka. The installation, therefore, would have no impact on ocean dumping. Disposal of drilling needs, formation water, treated wastes, etc. are addressed in Section I.B.vi. of this EA.

viii) Impact on Recreation and Tourism

Recreation and tourism are not expected to be significantly impacted by the proposed project. Onshore recreational opportunities will remain as currently available. Offshore recreational opportunities would be temporarily restricted in the vicinity of the platform during installation and construction. Increased crew and supply boat traffic during construction will increase the need for caution when boating in the area of the platform or near the routes used by the crew and supply boats. The addition of a fourth platform would not unduly restrict boating activities in the area during normal operations. Boaters are known to use platforms as navigational aids. The impact on recreation and tourism from the proposal would be minor during the installation and construction of the platform, and insignificant during normal operations. Potentially, impacts could occur in the unlikely event of an oil spill. These impacts are discussed in Section IV. H of this EA.

ix) Impact on Cultural Resources

To meet its responsibilities to the legislation passed to protect cultural resources, National Historic Preservation Act of 1966, as amended, Executive Order 11593, and National Environmental Policy Act of 1970, Minerals Management Service requires lessees, permittees and operators to investigate for the possible presence of cultural resources, if warranted, prior to initiating potentially disturbing activities.

Investigations for the presence of cultural resources have been conducted several times for earlier Beta Field development projects. An investigation of the lease (OCS-P0301) by MESA[2] (1984) was conducted for Platform Eureka and its associated pipelines. The following is a summary of the report submitted in compliance with NTL 77-3 Minimum Requirements for Cultural Resources Survey and 77-2 Minimum Requirements for Geohazard Survey. The data collected were adequate for interpretation for cultural resources purposes. From the data 279 side scan sonar reflections, 102 magnetic variations, and numerous drag scars were identified. Of these, 14 anomaly clusters were identified as potential cultural features. With one exception the anomalies were associated with oil and gas exploration, other scientific investigations of the area (bottom trawls), rocky outcrops, or unidentified single datum events.

The exception, Feature A, is located approximately one mile south of the proposed platform site and is principally a sidescan signature. The Feature consists of 5 linear elements and associated lesser reflections in 251 m (825

ft) of water. The objects are manmade, possibly cylindrical in shape, 114 to 131 feet (35 to 40 m) in length, and projecting 7 feet (2 m) into the water column off the sea floor (Mesa[2], 1984). The significance of this Feature cannot be determined from the information presented in the report, and until such time as significance can be determined a policy of avoiding the Feature with any potentially disturbing activities is the recommended procedure.

Bottom located cultural resources are subject to disturbance from pipelaying activities, anchor placement, and other bottom disturbing activities. No cultural resources of suspected or potential significance were located along the proposed pipeline routes between Elly and Eureka. Feature A, the only feature of undetermined but potential significance, is located over one mile to the south of the proposed platform site, away from most potential disturbing activities. The placement of anchors of the crane barge during placement of the rig jacket may have a potential for disturbing this Feature. The area potentially subject to disturbance from anchors can extend 5 or 7 times the water depth away from the barge or drilling rig. In 700 feet of water, the water depth at the proposed platform site, the area of potential disturbance would be equal to 3500 to 4900 feet. Depending upon where the crane barge is located in relation to the Eureka and Feature A, the anchors may impact the Feature. The launch barge for the platform jacket will be located approximately one mile south of the proposed platform location, near the location of Feature A. The launch barge will be held on position by tug boats. The jacket, when launched off the barge, will not touch bottom.

SCPI has committed to identifying the location of Feature A on charts prepared for the derrick/crane barge master and informing the master that anchors are not to be placed on or near the Feature. (John Hallett, SCPI, personal communication April 25, 1984.) With this commitment by SCPI, the potential for impact to cultural resources, from any expected activities associated with the proposal, is removed. No impact to cultural resources is anticipated.

x) Impact on Aircraft

The height of the drilling derrick is over 250 feet above the ocean surface and warrants an aircraft warning light because of the frequency of low flying aircraft. SCPI is planning such a warning light satisfying Federal Aviation Agency guidelines (Pers. Comm., John Hallet). This will mitigate concern of aircraft collisions.

F) Onshore Impacts

i) Impact on Socioeconomic Resources

SCPI estimates that a total of 11 new SCPI employees and 36 contractor employees will be hired as result of the installation of Platform Eureka. The majority of employees will be transferred from Platforms Ellen and Elly. Fabrication of the platform is taking place outside the area and thus the economic benefits from this activity are occurring elsewhere (Northern California and the Gulf of Mexico). The outside construction activities are generating approximately 630 direct employment opportunities and 2,268 secondary employment opportunities (Table 4.8-1, SCPI 1984). During offshore fabrication SCPI estimates 250 direct, and 900 indirect, employment opportunities. These will occur in the Los Angeles basin area and will draw from the existing labor force. Due to the large available labor force and the short-term nature of these jobs, no significant impact to the local employment situation is anticipated. Permanent employment opportunities are limited to 47. These new employees will be drawn from the local labor force and will have an insignificant impact on the local employment situation. Likewise there would be an insignificant impact on local housing from in migration of new employees.

A temporary, short-term increase in the demand for local community services (police, fire, water, wastewater treatment, etc.) may occur during the construction/installation phase of the project. This is a result of the relatively large numbers of temporary employees parking at the SCPI facilities and utilizing the local area, in comparison to the small number of new permanent employees that will be utilizing the facilities. The increased demand is not expected to exceed the capabilities or capacity of existing services due to its temporary, short-term nature, and relatively low numbers involved in relation to the entire local population. Police, fire, medical, energy, water, and wastewater services are not expected to be impacted from this proposal.

Public opinion regarding this project is expected to vary from those opposed to those in favor of the project. As this project will not cause an influx of new workers or residents, result in a significant number of new jobs, or impact existing levels of community services, and since it is a continuation of an existing activity, i.e., the fourth of four platforms in the Beta Field, public opinion regarding the proposal is expected to be neutral.

Transportation to and from Platform Eureka will be via crew or supply boat, or helicopter. While an increase in the number or frequency of trips is expected, the demand is expected to be within the capacity of existing facilities and services. The same contractors that currently provide transportation to Platforms Ellen and Elly are available for contracting to provide service to Platform Eureka.

Impacts to coastal resources, i.e., water, dock space, and visual resources, would be minor or insignificant. Potable water will be provided from the supply base and transported via the supply boats. A seawater based mud system will be used to drill the proposed wells. There is a possibility of up to three wells being drilled with fresh water, requiring 1 to 2,000 bbls of water per well. This water would be transported from the supply base. The supply base purchases its water from the City of Long Beach. Should the City decide that it can no longer provide that service, then SCPI will have to

acquire their water from some other source or use desalination units. There would be an insignificant impact on local water sources from this proposal. Crew boats and supply boats would use separate pier facilities in Long Beach Harbor. These facilities are currently being utilized for these purposes. This proposed project would result in an increase in the number of crew and supply boat trips. Supply boat traffic is expected to have a net increase of 50% over existing traffic during the construction/installation phase; traffic to Ellen and Elly would decrease but trips to Eureka would be added. The existing facilities are adequate to meet the needs of the increased traffic.

Visual intrusion from Platform Eureka would be minor. The Beta Field is located approximately 9 miles (14.4 km) offshore of Huntington Beach. Platform Eureka is the fourth of four platforms proposed for this unit and the furthest south of the four platforms. An evaluation of the aesthetic resources for this segment of the coastline does not change the ratings for the subsegments of the Huntington Beach to Newport Beach area for the presence of either one platform or four platforms offshore (Granville 1981). Generally offshore platforms would have a minimal impact on aesthetics because of their distance offshore. Additionally, the City of Huntington Beach pointed out in their comments on the proposed action that "on the average, the platforms of the Beta Complex are visible from the shore at least four days per week. Visibility is typically least restricted in the spring and most restricted in summer and early fall".

This does not hold true for the area south of Newport Bay where ocean views are part of the aesthetic experience of the area (Granville 1981). Overall Platform Eureka would have a minor impact on visual resources because of its distance from shore and the presence in the immediate vicinity of three other platforms.

ii) Demand for Goods and Services

Supplies and equipment will be purchased from local and regional suppliers. The demand would not result in any increase in the number of business or expansion of existing business. The decrease in the demand for drilling supplies for Platform Edith from the removal of one drilling rig would be offset to some degree by the demand for supplies for Platform Eureka. The need to provide food, laundry and other sundry services will provide new contract and local employment opportunities. The demand for supplies and equipment would be within the capacity of local or regional industry to provide and result in an insignificant economic benefit to the region. The demand for water for Platform Eureka is discussed above with other limited coastal resources. The demand is expected to be within the capability and capacity of local systems and would not cause an impact to those systems. The energy needed to power Platform Eureka will come from natural gas burned on Platform Elly. No increase in energy demand for onshore facilities is anticipated. There would be no impact on energy from this proposal. The installation of Platform Eureka would result in a minor demand for goods and services that would be within the capability and capacity of local and regional industry and result in a minor economic benefit to the region.

G) Cumulative Impacts

Without the approval of SCPI's proposal to install Platform Eureka, impacts are expected to occur on air quality, chemical oceanography, flora and fauna, maritime human activity, and other resources. These impacts are expected to occur as a result of future projects, or activities which would incrementally add to the existing background effects on these resources. Such proposals or activities in the general area of the Gulf of Santa Catalina include: Department of Interior OCS leasing, exploration, and development; State Tidelands activity; import oil tankering; human population expansion with concommitant effects; Ports of Los Angeles and Long Beach expansion; and increased military operations. Recent analyzes of cumulative impacts are discussed in USDI (1983) (Section IV. E). MMS has determined that the addition of one platform (Eureka) to the Gulf of Santa Catalina is not likely to significantly add to the cumulative impacts on these resources. MMS will continue to assess cumulative impacts in the Gulf of Santa Catalina as part of its ongoing responsibility of managing OCS leases.

H) Accidents

i) Oil Spills

A major environmental concern with offshore oil and gas activities is the potential for an oil spill and the resulting effects on sensitive marine habitats, threatened and endangered species, commercial and sportfishing, recreation and tourism, and other resources. In the course of normal, day-today platform operations, unplanned, occasional accidental discharges of hydrocarbons may occur. These individual accidents are typically limited to discharges of quantities less than one bbl of crude oil. In the period between 1975 and 1981, a total of only 24 of these accidents have taken place on the entire Pacific OCS area. These spills have resulted in less than 20 bbls of oil being discharged to the ocean. Due to the infrequency and low amounts of these accidental discharges, they are not considered to be a significant impact producing agent for the resources considered in this Environmental Assessment.

Oil spills may also be catastrophic events. Such spills may result from a well blowout, vessel-vessel collisions, vessel-platform collisions, pipeline breaks, or operational errors. See USDI, 1975, 1979, 1981 and 1983 for a discussion of impacts.

In general, the level of impacts of a major oil spill will depend on many factors. These factors would include: the relative abundance and sensitivity of marine organisms (varying temporarily); which phase of the reproductive cycle; the degree of oil weathering and evaporation; the nature of the spillinstantaneous or continuous; the type, rate and volume of oil spilled; and the weather and oceanographic conditions at the time of the spill. These parameters would determine the quantity of oil that is dispersed into the water column, the degree of weathering, evaporation, and dispersion of the oil before it contacts a shoreline, the actual amount, concentration, and composition of the oil at the time of shoreline or habitat contact, and a measure of the relative toxicity of the oil. These factors along with knowledge of the affected habitats, organisms, or beach areas will be critical in determining the best cleanup strategies.

The MMS feels the primary way to minimize impacts from major oil spills is to minimize the probability of a spill during drilling. The risk of a spill can be greatly reduced through the use of state-of-the-art engineering designing procedures and consistent personnel training, by employing maximum safety precautions, and by monitoring drilling activities regularly to reflect stateof-the-art technology. Blowout preventor equipment located on the platform will shut off the well should unusual pressure or conditions be encountered and well control be jeopardized. Additional test and safety precautions will be required as needed and the MMS will monitor SCPI's activities throughout the drilling operations.

For the purposes of impact analysis in the Environmental Assessment, MMS has estimated the number of oil spills that could occur as a result of the proposed action. The estimates are based on a production value of 65 million bbls of oil over the 30-year life of the project, with subsea pipeline transportation of hydrocarbons to Platform Elly. Based on the MMS Accident Spill Rates for platforms and pipelines (see USDI, 1983; Lanfear and Amstutz, 1983; and LaBelle, et al., 1983), we estimate a mean of less than one (0.169) large

spill (≥ 1,000 bbls) to occur as a result of the proposed action. The mean number of very large spills (≥ 10,000 bbls) estimated as a result of the proposal is also less than one (0.072). Thus, the number of estimated spills is very low. Note that these numbers represent oil spill occurrences and not oil spill probabilities, contacts, or impacts, and are based solely on the oil spill accident rates and the oil resource volume estimate.

Shell California Production Inc. has prepared an oil spill trajectory analysis for proposed Platform Eureka (SCPI, 1984b). This information is also discussed and analyzed in SCPI's Oil Spill Contingency Plan (also see Section I.D of this EA), along with the details of responding to an oil spill. In particular, the Plan discusses (Chapter VIII) booming efforts to protect Newport Harbor, Alamitos Bay (including San Gabriel River), and Santa Ana River estuary.

The oil spill trajectory analysis was designed to predict the likely fate of oil spilled from any of the proposed elements (platform, pipeline) on SCPI's Beta leases, by selecting a release site midpoint between Ellen/Elly and Eureka. Spills were simulated for all months of the year. This simulation resulted in 2,400 trajectories for a year to cover all seasonal wind and current situations that may occur.

In the summer months, the greatest percentage of shoreline contacts were in the region from Newport Beach to Huntington Beach. This is due to the dominance of southeastward winds during these months. In the winter months, when a greater percentage of northward wind and current regimes occur, the largest percentage of contacts were recorded in the Long Beach area.

Averaged annually, 63.5 percent of all trajectories contact land. The monthly percentage of contacts range from 100 percent in the summer months to a minimum of 10 percent in October. The time from oil spill occurrence to shore contact exceeded 12 hours in all runs.

The expected impacts to flora and fauna in the area are very low due to the very low number of estimated spills.

Potential oil spill impacts to resources of particular concern are discussed below.

Refuges, Preserves, Marine Sanctuaries, and Areas of Particular Concern

The communities that exist in these resources include the subtidal and intertidal benthic communities and wetland habitats.

a) Benthic Communities

Crude oil spilled from the production platform would represent a potential hazard to subtidal benthic communities (e.g., USDI, 1983). Oil that reaches the shallow water epibenthic communities would likely result in damage to organisms. The extent of this impact would be difficult to predict, but epilithic algae and invertebrates appear to have been subjected to considerable damage in certain of the previous oil spills though Strachan (1982) found most populations had recovered and were viable within two years after the Santa Barbara Spill of 1969. The impacts of oil deposition on deep water environments is currently being studied (Karinen, 1980). The Bureau of Land

Management (USDI, 1979) suggests that complete destruction would not be anticipated, but that certain populations of various sensitive species, particularly microcrustacean and shallow water endemics, may be eliminated or significantly reduced from the area impacted by oil.

1) Intertidal communities have been found to be most vulnerable to oil spills, particularly the upper shoreline forms, such as barnacles, limpets and long-lived habit forming seaweeds (Pelvetia, Hesperophycus).

2) Species found to be most affected include the intertidal barnacle Chthamalmus fissus, the marine sea grass Phyllospadix torreyi, the marine algae Hesperophycus harveyanus and Pelvetia fastigiata. Sublethal effects included a reduction in breeding in Pollicipes polymerus in localized areas.

3) Generally, deposited crude oil may physically coat organisms, thereby smothering them, or produce toxins causing mortality and physiological stress. In the event of a major spill from the platform and/or pipeline, much of the affected intertidal habitats would be damaged.

4) Repopulation of the impacted habitats will commence once oil is cleared from the substrata and sexually reproducing populations are available to provide new colonizers. The capacity of the intertidal macrobiota to recover to pre-spill conditions, or to conditions prevailing on nearby nonoiled shorelines, will generally not be diminished following a single crude oil spill, even though there were substantial mortalities of some species. Areas affected by an oil spill are expected to exhibit recolonization and recovery not unlike that which occurs continuously under natural conditions on the rocky intertidal. The time required for recovery may depend upon the size and location of the area affected and season in which impact occurs but the process would begin immediately, often before the last traces of oil are removed. Certain communities and population could require up to 10 years or more for recovery.

5) The oil spill trajectories for Platform Eureka (SCPI ER, Appendix I) indicate the most significant intertidal areas along the Gulf of Santa Catalina coast are the beach areas from Newport Beach to Anaheim Bay. Oil spills offshore would contact land in these areas at nearly 100 percent probability during the period of April to September, with a mean contact time of 46 hours. Onshore winds would drive an oil spill toward these beaches. From October to March a monthly trajectory is projected with the principal contact point being Long Beach/San Pedro Harbor. This area is dominated by rocky intertidal (natural and artificial). The probability of an oil spill contacting land in this zone as a yearly average is 63.6 percent with a mean contact time of 44 hours (assuming no intervention).

6) In summary, the intertidal communities near the project area could be impacted from an oil spill due to the construction and operational activities of Platform Eureka and the marine pipeline. The degree of this impact would vary with the magnitude of the spill and the ability to contain the oil. The impact on the intertidal habitat would generally be greatest to the highest intertidal habitats and should pose no long term degradation in the local populations.

b) Wetlands/Estuaries

In the unlikely event of a large spill which completely covered the surface and tidal flats of a wetland/estuary, and remained for several days, high impacts could be manifested for over 10 years. Some species within the area, if endemic, could be permanently eliminated. Artificial restocking of the habitat could be necessary to achieve recovery. A spill covering a smaller portion of the estuary or one covering a significant portion of the estuary, but remaining for only a couple of tidal cycles, would probably cause a moderate impact.

iii) Threatened and Endangered Species

a) Cetaceans

Whales occupy surface waters to breathe, and some to feed, potentially exposing them to spilled oil by contact, inhalation or ingestion (Geraci and St. Aubin, 1982). There is little evidence, however, that endangered cetaceans are able to detect hydrocarbon pollution. Accounts from past oil spills show that marine mammals such as seals and sea lions may not avoid oil; however, there has yet to be found a confirmed case of a whale, dolphin, or porpoise coated or fouled with oil (Geraci and St. Aubin, 1979) as a result of contact made while alive. Toothed whales may be more likely to detect oil due to certain sensory capabilities (Geraci and St. Aubin, 1980). In Alaskan waters, two killer whales, one sick and one dead, were observed in association with an oil spill (Anonymous, 1971), but a precise causal relationship was not established. Duguy (1978) reported the presence of petroleum hydrocarbons in the intestine of a stranded bottlenose dolphin, without evidence to suggest that oil ingestion had been responsible for the stranding and death of the animal. More recently, two accounts of whales and dolphins swimming and feeding in oil slicks (Goodale et al., 1981; Gruber, 1981) have been reported. In addition, Geraci and St. Aubin (1982) suggested that bottlenose dolphins, studied under optimum light and water clarity conditions, used echolocation alone to detect thick patches of heavy oil, particularly if the substance contained air bubbles as a result of churning by wind and wave action. It remains unknown whether dolphins can see these substances at night or in turbid water. Further laboratory studies by Geraci and St. Aubin with bottlenose dolphins suggested that avoidance behavior was clear and consistent--the species repeatedly avoided a controlled slick of non-toxic colored mineral oil that the authors knew they could detect. Each time a dolphin contacted oil, it responded by abruptly diving, and quickly returning to an oil-free area, even though the mineral oil was innocuous. At sea, this response might be modified by social interaction, feeding, agonistic behavior, migration, or human activity (Geraci and St. Aubin, 1982).

Direct response to oil spills by free-ranging cetaceans has only recently been observed (Geraci and St. Aubin, 1982). Swimming speeds, surfacing and diving times, and respiratory rates of small groups of gray whales migrating through an area containing naturally occurring oil seeps were compared in relation to the presence and extent of oil. Typically, the whales were observed swimming through the oil at a modified speed but without a consistent pattern. Geraci and St. Aubin (1982) noted some changes in the respiration behavior of whales when in oil-contaminated areas. In oiled waters, the whales seemed to spend less time at the surface, blowing less frequently but at a faster rate. If

this reaction is interpreted as an avoidance response, it suggests that gray whales can detect oil. Whales showing no response either could not detect the amount or type of oil present, or were indifferent to it (Geraci and St. Aubin, 1982). However, these comparisons are not firmly supported, as it was not possible for the authors to follow specific whales into and out of the oil areas.

The nature of cetacean skin suggests that whales may be vulnerable to effects of surface contact with hydrocarbons (Geraci and St. Aubin, 1979). The epidermis is not keratinized, but composed of live cells (Geraci and St. Aubin, 1979) surprisingly rich in enzymes and vitamin C (St. Aubin and Geraci, 1980). Geraci and St. Aubin (1979) reported that cetacean epidermis is virtually unshielded from the environment and may react to substances such as crude oil and gas condensates in a manner similar to sensitive mucous membranes. Any substance which affects the skin may have far-reaching consequences for these animals. However, field observation of at least one instance of possible contact of gray whales with spilled oil did not show evidence of extreme effects. In 1969, the entire northward migration of gray whales passed through or near the area contaminated by the Santa Barbara Channel spill, yet the number of gray whale strandings was not significantly different from previous years (Brownell, 1971). Gas chromatograph analysis of tissues of gray whales stranded in the vicinity of the spill did not indicate the presence of crude oil. Concern has been expressed by Albert (1981) that bowhead tissue analysis suggests that eroded areas on the skin and the animal's eyes may also be senitive to oil contact. However, such concerns remain untested hypotheses.

More recent laboratory studies by Geraci and St. Aubin (1982) using bottle nose dolphins as their principal subjects revealed that dolphin skin exposed to gasoline and crude oil showed no gross evidence of damage or loss of integrity. Although exposed skin turned a pale gray in color, it always returned to normal color within two hours. On the other hand, human skin similarly treated showed more extensive irritation. Other histological and ultrastructural studies by Geraci and St. Aubin (1982) on dolphins showed that petroleum hydrocarbons produced mild and transient damage to cells of the epidermis, although the cells showed signs of recovery within three to seven days. Other surface contact studies by the same authors include studies to determine the progress of healing of oil-contaminated versus uncontaminated cetacean wounds, and studies of biochemical processes of epidermal cells for evidence of functional damage due to oil. In all of these surface contact studies, the morphological changes were reversible even after prolonged exposure (75 min). However, the authors did not determine whether biochemical changes impair the functional integrity of the skin. These findings suggest that oil contact with the epidermis of other cetaceans would probably have similar sublethal effects.

In addition to potential cutaneous contact with oil (or gas), inhalation of toxic substances or plugging of blowholes by oil have been cited as possible threats to cetaceans. Certainly, the form is a possibility to the extent that whales may be in the vicinity of a spill prior to the evaporation of toxic compounds. The latter event would be very unlikely to occur. The typical breathing cycle of cetaceans involves an "explosive" exhalation followed by an immediate inspiration and an abrupt closure of the blowhole (Geraci and St. Aubin, 1979). This mechanism prevents inhalation of water

and should be discriminatory of gas condensates and oil; however, toxic hydrocarbon gas could be inhaled. The effects of gas condensate or gas vapor inhalation on cetaceans are unknown. In addition, it is unknown whether endangered whales would ever inhale sufficient vapor or oil in the open environment to create irritation to respiratory tissue. Cetaceans that are already stressed by lung and liver parasites and adrenal disorders might be particularly vulnerable to the effects of even low levels of hydrocarbon vapors (Geraci and St. Aubin, 1982).

Cetacean vulnerability to hydrocarbon ingestion would vary with species, type of hydrocarbon, and nature of the spill. Tomilin (1955) reported that cetaceans, especially benthic feeders, have a poorly developed sense of taste, and the presence of foreign bodies in cetacean stomachs attests to this. Thus, whales may not be able to differentiate between hydrocarbon contaminated and uncontaminated food.

Another potential direct effect of spilled oil on whales is fouling of baleen, with a subsequent decrease in feeding efficiency. The probability of such fouling and effects on feeding efficiency are directly linked to probabilities of spills and whale contact with such spills. Results of experimental research suggest that oil, under controlled conditions, may reduce the filtering efficiency of bowhead baleen (Braithwaite, 1980). More concise fouling studies by Geraci and St. Aubin (1982) conducted on fin and gray whale baleen plates showed conclusive evidence that although the filtering efficiency of baleen was temporarily reduced by crude oil for up to 15 minutes, normal flow patterns were always restored. These observations alleviate the concern that crude oil would irreversibly obstruct water flow through baleen. However, it is unknown whether the persistence of oil on the fibers would contaminate food sources or cause them to adhere. Prolonged impairment caused by repeated fouling might affect feeding activity and, therefore, diminish blubber stores which would be essential during migration and other periods of fasting. Predicting eventual population response on endangered whales as a result of baleen fouling would depend on the number of whales affected and the degree and frequency of contamination. The above data indicates that reduced filter feeding efficiency from oil contamination of baleen would be a short-term effect.

b) Birds

A number of factors influence the vulnerability of different species of birds who make contact with spilled oil. Factors increasing vulnerability include: 1) tendency to form large, dense flocks on the water; 2) existence of certain species only as small populations; 3) considerable time spent swimming on the water; 4) a feeding behavior which entails diving into the water; and 5) tendency to dive when alarmed. On the other hand, species which have the following characteristics are likely to be less vulnerable to spilled oil: 1) foraging done by widely dispersed individuals; 2) foraging onshore; and 3) a tendency to fly rather than dive when alarmed.

Most incidents involving ingestion of oil by birds apparently occur during preening (Nero and Associates, 1982). Acute toxicity may result. Recovered birds have shown wasting of fat and muscle tissue, abnormal conditions of major organs such as the liver, kidneys, and adrenals, and inhibition of pituitary function (Holmes and Cronshaw, 1977). Recovered birds also show symptoms of severe dehydration (Berkner, personal communication), apparently

caused by malfunction of the salt gland which regulates the water/salt balance. Several salt excretion studies indicate whether crude may be the most toxic form of oil in respect to maintenance of water/salt balance (Clark, in press).

Increased mortality may occur in bird eggs contaminated with fresh crude from the adults. This has been demonstrated for mallard ducks, Cassin's auklets and gulls (Clark, in press). Brown pelican eggs were found contaminated on the east coast, but no study was made of the mortality.

Longer term or sublethal effects of oil include delayed and depressed egg laying, reduced hatching, and reduced growth rate due to poor nutrient uptake. Experiments on sublethal effects have been limited. Some of the observed effects are undoubtedly due to laboratory conditions, and applicability of these experiments to the marine environment has yet to be determined (Clark, in press).

Birds that do not die from ingested oil would likely suffer reduced health, and generally animals in poor condition do not survive very long in the natural environment. The level of mortality due to the toxicity of oil cleaned from feathers or ingested with food is uncertain. However, these impacts could add to the direct contact effects and delay recovery time.

Estuarine habitats such as used by least terns and clapper rails are potentially the most severely impacted. These species use estuaries for both feeding and breeding. A large oil spill that entered an estuary might destroy nesting sites and feeding areas for two to ten years (Woodward-Clyde, 1982). The other endangered bird species which are less dependent on estuarine habitat would not be severely affected.

An oil spill can also impact endangered bird species affecting their food source. For example, brown pelicans are almost entirely dependent on anchovies as a food source, and a significant correlation has been noted between anchovy populations and pelican breeding success (Southwest Fisheries Center, 1983; Gress and Anderson, 1982). Therefore, an oil spill which significantly affects the anchovy population would probably affect pelican reproductive success, potentially resulting in a significant impact to the regional brown pelican population. The nearest nesting of brown pelicans occurs on Anacapa Island. No oil spill impacts are expected for this island.

Use of disperants following an oil spill may present a hazard to endangered bird species which come in contact with the ocean surface, primarily the brown pelican. Testing on birds has been limited, but results show that dispersants capable of breaking up petroleum will also break up the protective oils coating bird feathers, ultimately resulting in death of some exposed birds. Overall impacts to bird populations, while comparable to those of an oil spill, are expected to be less severe due to the fact that the ocean area sprayed with dispersant will usually be much less than the area covered by a spill and because dispersants can be used to control the quantity of oil impacting sensitive habitats.

iii) Recreation and Tourism

The potential impacts to recreation and tourism should an oil spill occur and contact the beach are very severe. As discussed in the Final Environmental Impact Statement Proposed Lease Offering Southern California, April 1984 (USDI, 1983), the potential economic loss to Los Angeles or Orange Counties are in the millions of dollars. The oil spill trajectory analysis prepared for SCPI in the Environmental Report (SCPI, 1984b) shows the most trajectory hits to the coast for Long Beach in the winter months, and Huntington Beach and Newport Beach in the spring and summer months. Time from occurrence of spill to shore contact exceed 12 hours in all runs. For additional information refer to Section III.H. Referring to the 1983 FEIS, the potential economic loss to Los Angeles County if the beaches are closed for 14 days for cleanup during high use summer period could range as high as $179.3 million in tourist expenditures. Related losses would occur in human welfare, boating and sportfishing. The loss to Orange County under the same scenario could be as much as $96.6 million in tourist expenditures. Regional economic loss could be as high as three times as much. Longer beach closure would result in greater losses; shorter closer periods would result in shorter losses. SCPI has detailed in their Oil Spill Contingency Plan how they propose to respond should an oil spill occur, an unlikely occurrence. The plan stresses protection of the beaches and sensitive coastline areas. The plan contains other information regarding oil spill cleanup and is available for review at the MMS Pacific OCS office. In the unlikely event that an oil spill occurs and contacts the coast, the loss to recreation and tourism in terms of economic loss could be significant to the local and regional economy.

iv) Commercial and Sportfishing

Offshore oil and gas activities sometimes result in an accidental release of oil. These oil spills potentially can cause economic losses to commercial fishermen (including kelp harvesters) by: 1) reducing the total available catch; 2) tainting marine organisms; 3) contaminating fishing and harvesting gear and vessels; and 4) preventing fishermen (or harvesters) from leaving port. Similar losses would be incurred on sportfishing activities.

Reducing the Total Available Catch. Oil spills potentially can reduce the total available catch by reducing fish, invertebrate or kelp populations. The greater the reduction in available catch, the more likely it is that fishermen will sustain economic losses.

Tainting Marine Organisms. Direct coating or incorporation of hydrocarbons potentially can cause tainting of marine organisms (particularly shellfish), rendering them undesirable or unmarketable. Since fishermen (including mariculturists) may need to move the shellfish to clean water before marketing them so that the shellfish can cleanse themselves, moderate (10-20 percent) economic losses to commercial fishermen for about one month could occur if a larger oil spill occurs and contacts important shellfish areas. Fishermen (other than mariculturists) could also sustain moderate economic losses for about one month if they choose to fish another area temporarily due to concern that their gear and vessels will be contaminated.

Preventing Fishermen from Leaving Port. In the unlikely event that a large oil spill contacts a fishing port, oil containment booms could be placed across the mouth of the port. Although usually ways can be found to allow fishing vessels to enter and exit the port around these booms, if this is not possible then fishermen could be prevented from leaving port as occurred during the 1969 Santa Barbara oil spill (see Mead and Sorenson, 1970). This could result in very high economic losses to fishermen during the period the oil spill hits shore if it happens during a peak fishing season. The probability of this occurrence is low.

v) Chemical Oceanography

The fate and effects of a spill, should it occur, are subject to a variety of factors influencing the rate at which oil disappears from the environment, the populations of organisms affected, and extent of the impact on these populations. The type and quantity of spilled oil will influence the toxicity of the released hydrocarbons, crude oils being less toxic than refined petroleum products. The season during which a spill occurs will determine the degree to which water quality is degraded and the degree to which marine organisms are impacted. Winter oceanographic regimes in the study area are characterized by large wind and wave energies which result in greater mixing of the surface water than occurs at other times during the year. A spill occurring during winter would, therefore, be expected to disperse more quickly and have less impact on water quality than a spill during other seasons.

The most severe water quality degradation would occur during incoming tides in relatively calm waters of enclosed bays and estuaries. Severe impacts would be felt in these areas since surface slicks of oil in shallow areas would create high chemical oxygen demands relative to the volume of water underneath the slick, and organisms in these habitats would be much closer physically to the oil compared to open ocean slicks. In addition, physical processes, which would break up slicks and aid in weathering the oil, are usually reduced in estuaries, and enclosed bays.

An excellent review, "Fate and Weathering of Petroleum Spills in the Marine Environment" by Jordan and Payne (1980) discusses in detail recent research into the factors affecting spiled crude oil.

The hydrocarbons in crude oil are a complex mixture of thousands of types of simple carbon chains and complex branched and ring carbon structures. The persistence of various classes of compounds in the marine environment differs as discussed by Jordan and Payne (1980) and, therefore, water quality will experience impacts from varying groupings of hydrocarbons with the increasing age of a spill or distance from a spill location. The level of impact to water quality from spills is based on the amount of oil produced at Platform Eureka and projections from historical spill data trend analysis.

The possible impact on water quality from oil spills is difficult to predict with accuracy but data from the 1969 Santa Barbara Channel oil spill suggest that the effects should be short lived in open ocean or open coastal environments (Straughan, 1971). The areal extent of impact will be related to the volume of oil spilled but would not be significant if the entire Gulf of Santa Catalina is considered as a unit and only 1,000 barrels is spilled. Degradation of water quality would be severe on a localized (along several kilometers of

beach) basis with a spill of this magnitude reaching shore (based on Texas Coast studies of Ixtoc I well blowout effects; API, 1981 Oil Spill Conference). The exception to localized short-term impacts could occur from oil becoming trapped in sediments, being covered by summer sandy beach accretion, and subsequently uncovered the following winter season. The effects in this case would still be local but of longer duration (perhaps several seasonal cycles before complete disappearance of oil in sediments). The important exceptions to the generally short-lived impacts would occur in wetlands or estuaries (such as Anaheim Bay, Upper Newport Bay, Balsa China Wetlans). Oil migrating into these sensitive shallow water habitats would produce severe impacts by reducing oxygen content of the water, increasing chemical oxygen demand, decreasing light transmittance, and significantly elevating toxic compound levels in the water column.

An H_2S Contingency Plan is on file in the Public Information Room at the MMS office in Los Angeles. Regulations governing H_2S operations are found in Pacific OCS Order No. 2 and the USGS Standard No. 1 (GSS-OCS-1), February 1976.

The use of only one gas compressor on Eureka may subject the electric power and water injection turbines on Elly to gas shortages if there is a compressor shut down. SCPI is aware of this and plans to have a by-pass system to allow gas from high pressure wells to continue the supply. There still may be a reduction of available fuel gas that would present a choice of using diesel fuel or curtailing production activities. However, these possible shutdowns should be short-term on the order of hours or days and infrequent.

The only perceivable environmental concern could be from resulting upset flaring, however, the produced air emissions would be very small compared to other air emissions from other normal activities.

IV. Alternatives to the Proposed Action

a) No Project

The No Project Alternative would result in the prevention of the impacts associated with the proposed action (See Section III). Impacts associated with the Country's increased dependence on foreign sources (i.e., coal, nuclear, etc.) (USDI, 1975) could occur due to the replacement of the energy which would have been produced from the hydrocarbon resources on the lease. It would also have a negative effect on the U.S. balance of payments and would cause a monetary loss to the U.S. Government, State of California and the lessee.

b) Delayed Project

Project postponement impacts may not change any of the impacts assumed to occur as a result of the Platform Eureka Project. It would most likely delay their occurrence. However, improvements may occur in technologies which could reduce the risks of potential adverse impacts. The Delayed Project Alternative would have an economic impact on the lessee by increasing the cost of the platform installation and delaying any economic benefit based upon its construction, installation and operation.

c) Land Disposal of Drilling Muds and Cuttings

Onshore disposal of drilling muds and cuttings is regulated under California law and requires the use of appropriate Class I and Class II-1 disposal sites. Use of such sites would result in consumption of valuable and limited space which, in the case of nonhazardous muds and cuttings, is contrary to the State's active program to minimize the number and size of these facilities.

Beyond this consideration, a heavy air pollution burden would be created by the large number of trucks which would be required to transport these materials to the disposal location, with concomitant increases in heavy truck traffic, noise, road and highway congestion. An estimated 5 to 10 thousand barrels of drilling muds and/or 1500 barrels of cuttings per well would require transport. Using trucks with an average of 100 barrels, some 65 to over 100 trips would be required for each of the 60 wells scheduled for Platform Eureka. Between 1400 and 2400 cubic yards of disposal site space would be occupied for each well drilled. Assuming disposal would occur at the BKK site in West Covina (80 miles round trip), 5200 to 8000 miles would be traveled, again for each well. However, the BKK site will not be permitted to accept liquid wastes after May of 1984. Therefore, the Casmalia or Kettleman Hills disposal facilities would have to be used. The travel distances to these disposal sites will be far greater.

The use of vessels to transport mud and cuttings ashore will increase marine traffic in the project area and will require the availability of dock space with dockside truck access. Additional air pollutant emissions will result from the use of platform cranes, transport vessels, and unloading equipment at the pier.

Space, equipment and manpower considerations must also be evaluated for this alternative. For economic reasons platforms are designed with little free space. Thus, the storage facilities for muds and cuttings is at a premium and

would at a minimum result in overcrowding an already crowded area. The manpower required to handle the loading of storage bins, transferring them to vessels and transport to shore is costly and the operation can increase the opportunity for accidents. Costs associated with land based disposal are large and are comprised of not only those included in the handling and transport of these wastes, but also fees charged by the disposal facility and by the State of California.

The alternative of onshore disposal of oil-free mud and cuttings is not considered viable. Despite the elimination of the environmental impacts of onsite marine disposal, the added economic and environmental effects of onshore disposal are considered excessive.

V. Unavoidable Adverse Environmental Effects

There are certain unavoidable adverse environmental effects which will occur as a result of normal, project-related activities. These are:

1) A small degradation in water quality due to:

   a) an increase in turbidity near drilling, construction, and pipelaying;

   b) an increase in suspended solids, nutrients, chlorine, and BOD near Platform Eureka from the discharge of treated sewage; and

   c) an increase in hydrocarbons and possible trace metals near the platform from formation water discharge;

2) A small, localized decrease in phytoplankton and zooplankton populations due to thermal discharge and from entrainment;

3) Minor alterations in benthic communities within 1000 m of Platform Eureka due to discharges of drill muds and cuttings and construction activities; further alterations to communities within a 100 m radius of the platform would result due to a falloff of organisms from the platform; minor alterations to benthic communities in the platform/pipeline area from anchoring activities.

4) Possible temporary disruption of normal activities of marine mammals; possible loss or injury of individual marine mammals as a result of being rammed by support vessels: Due to the low likelihood of such an occurrence, significant impacts are not anticipated;

5) At the present time, no adverse impacts on commercial or sport fishing are anticipated. However, the principal catch in the area is pelagic schooling fishes. In the unlikely event that these fishes move into deeper waters significant space-use conflicts could result;

6) Minor, short-term impact from project during installation activities; This would result from increased support vessel activity which, in turn, would require an increase in cautionary action by vessels that transit the area;

7) Minor impacts on cultural resources. The installation of Platform Eureka would enlarge the area wherein magnetometer data is unreliable due to the overpowering presence of metal platforms, pipelines, and cables. Limits to the detection of cultural resources would occur for the lifetime of the project;

8) Minor, short-term reduction in boating area and minor short-term increase in support vessel traffic which would require increased caution from all boaters;

9) A minor visual intrusion impact with the addition of a fourth platform to the Beta Field.

VI. CONTROVERSIAL ISSUES

Review of SCPI's DPP and ER by outside agencies has identified certain controversial issues. The agencies' specific comments are in Appendix 7. The controversial issues are the concern for geologic hazards, oil spill impacts, and drill muds and cuttings impacts. The MMS has considered these issues in the development of this ER and has determined that significant impacts are not likely to result. Refer to Sections II. and III. for analysis of these issues.

VII. FINDING OF NO SIGNIFICANT IMPACT

MMS has assessed the impacts of SCPI's Development and Production Plan (proposed Platform Eureka), Lease OCS-P 0301, Beta Unit, Gulf of Santa Catalina, offshore Southern California, in the preceeding pages of this EA. Based on this assessment, we have determined the action to have no significant impacts. Refer to the impact summary on the following page.

IMPACT SUMMARY

Key
NI - No impact
NS - No significant impact

CEQ Parameter 40 CFR 1508.27(b)	Severity of Impact Level/Degree of Significance	EA Section Reference
1. Beneficial and/or adverse effects.	NS	Section V
2. Public health & safety.	NS	Section II, III
3. Unique characteristics of the geographical area.	NS	Section II, III
4. Effects highly controversial.	NS	Section VI
5. Highly uncertain effects or unique or unknown risks.	NS	Section III
6. Establishes precedent for future actions or is a decision in principle about future action.	NI	Not Significant
7. Assessment of cumulative actions and impacts thereof. Note 400 CFR 17.	NS	Section III, V
8. Effect on districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural historical resources.	NI	Section II, III
9. Effects on endangered or threatened species or their habitat that have been determined to be critical under the Endangered Species Act of 1973.	NS	Section III
10. Threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.	NS	Section IV
11. Other related NEPA and environmental documents.		See Title page

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IX. APPENDICES:

Appendix 1 - Biological Opinion from U.S. Fish and Wildlife Service and National Marine Fisheries Service for the OCS Lease Sale No. 35 Area.

Appendix 2 - Cultural Resource Survey and Biological Surveys.

Appendix 3 - Contingency Plans.

Appendix 4 - Maps and Diagrams.

Appendix 5 - Nonproprietary Copy of the Development and Production Plan (DPP) and Environmental Report (ER).

Appendix 6 - Correspondence from MMS District Supervisor, Ventura District

Appendix 7 - Review Comments and Related Correspondence from Other Agencies

Appendix 1

FWS Biological Opinions for Oil and Gas Activities
in the Sale No. 35 Area

NFWS Biological Opinion for Oil and Gas Activities
in the Sale No. 35 Area

United States Department of the Interior

FISH AND WILDLIFE SERVICE
WASHINGTON, D.C. 20240

In Reply Refer To:
FWS/OBS 375.419
USGS 79-2

NOV 1 1979

Memorandum

To: Director, U.S. Geological Survey

From: Acting Director

Subject: Biological Opinion Regarding Oil and Gas Exploration and Certain Development Activities in Southern California

On April 24, 1979, the Fish and Wildlife Service (FWS) sent a memorandum to the U.S. Geological Survey (GS) requesting initiation of consultation under Section 7 of the Endangered Species Act of 1973, as amended, for Outer Continental Shelf (OCS) oil and gas exploration, development, and production activities on tracts in the OCS Sale No. 35 area (Southern California). By memorandum dated May 18, 1979, (Attachment 1) GS requested consultation with the FWS and expanded the scope of the request to include all lease sale activities off Southern California not previously subject to Section 7 consultation.

In response to this request, I appointed a consultation team by memorandum dated May 30, 1979, (Attachment 2) to assist me in determining whether the subject exploration, development, and production activities off Southern California are likely to jeopardize the continued existence of Endangered or Threatened species or result in the destruction or adverse modification of Critical Habitat of such species.

The team was comprised of Nancy Sweeney, Brian Kinnear, Steve Tonjes, and David Watts, Office of Endangered Species, Washington, D.C.; and Ralph Swanson, Sacramento Area Office, FWS.

On June 5 and 6, 1979, the FWS consultation team and National Marine Fisheries Service (NMFS) representatives met with GS representatives in Los Angeles, California, to discuss the exploration, development, and production activities in Southern California and their impact on Threatened and Endangered species within the area. A list of the participants is attached (Attachment 3).

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The consultation team reviewed reports, publications, and correspondence from knowledgeable sources on the species considered in this consultation identified below, and numerous telephone contacts were made with other experts. Information contained in the Final Environmental Impact Statements (FEIS) for OCS Sales 35 and 48, Southern California, was carefully evaluated to ascertain the effects of the exploration activities on listed species and their habitats. In addition, development plans were reviewed for seven development tracts. Copies of pertinent records and documents are included in an administrative record maintained at the Office of Endangered Species and are incorporated herein by reference.

Project Description

GS has primary regulatory authority for exploration, development, and production activities in the OCS after the issuance of the leases by the Bureau of Land Management (BLM).

Exploration of the OCS requires certain onshore support facilities including office space, helicopter and/or fixed-wing aircraft facilities, docks for boating activities, and supply bases. Due to the uncertain nature of oil exploration, companies are generally unwilling to construct new facilities to support exploration activities and usually prefer to utilize existing areas and facilities. At present, the numerous onshore facilities in Southern California being used for exploration activities will support any proposed new exploration.

Therefore, the biological opinion is based on the assumption that existing onshore facilities will continue to be utilized for exploration activities. Should the use pattern of these facilities be changed or additional onshore facilities be required which may affect listed species or their habitats, GS must reinitiate consultation.

Development and production (development/production) activities planned for seven specific tracts are included in this consultation. In the future, GS will review each development/production plan to insure compliance with Section 7.

Development/production plans include the location for the platform placement, possible transportation routes (pipelines and/or barges, tankers), and identification of specific onshore facilities and their intended use, i.e. storage, refinement, etc. These plans have more specific information than do the exploration plans.

Your request for consultation included the following species: bald eagle (Haliaeetus leucocephalus), American peregrine falcon (Falco peregrinus anatum), southern sea otter (Enhydra lutris nereis), brown pelican (Pelecanus occidentalis), California least tern (Sterna albifrons browni), light-footed clapper rail (Rallus longirostris levipes), Aleutian Canada goose (Branta canadensis leucopareia), San Clemente loggerhead shrike

(Lanius ludovicianus mearnsi), San Clemente sage sparrow (Amphispiza belli clementeae), Smith's blue butterfly (Shijimiaeoides enoptes smithi), San Clemente broom (Lotus scoparius ssp. traskiae), San Clemente Island bush-mallow (Malacothamnus clementinus), San Clemente Island larkspur (Delphinium kinkiense), San Clemente Island Indian paintbrush (Castilleja grisea), olive Ridley sea turtle (Lepidochelys olivacea), green sea turtle (Chelonia mydas), loggerhead sea turtle (Caretta caretta), and leatherback sea turtle (Dermochelys coriacea).

After reviewing the proposed activities and biological data on the above species, we have determined that the following species will not be affected because they are not known to occur in the impact area from the proposed exploration and the specific development/production activities. They are the Aleutian Canada goose, San Clemente loggerhead shrike, San Clemente sage sparrow, Smith's blue butterfly, San Clemente broom, San Clemente Island bushmallow, San Clemente Island larkspur, and San Clemente Island Indian paintbrush. Therefore, they are not considered in this consultation.

The sea turtles listed above were also included in your consultation request. The NMFS has jurisdiction over Endangered and Threatened sea turtles while they are in the aquatic environment; they are under the jurisdiction of the FWS onshore. Since these four sea turtles have no known nesting sites within the proposed project area, we defer consultation to NMFS.

We feel that two additional species should be included in this consultation: El Segundo blue butterfly (Shijimiaeoides battoides allyni) and salt marsh bird's beak (Cordylanthus maritimus ssp. maritimus).

The following species are included in this biological opinion: El Segundo blue butterfly, bald eagle, American peregrine falcon, southern sea otter, California brown pelican, California least tern, light-footed clapper rail, and salt marsh bird's beak.

After evaluating the proposed activities and their effects on the following eight species, it is my biological opinion that these activities, as proposed, are not likely to jeopardize the continued existence of the species.

A summary of the biological data and considerations of the consultation tear are provided for each of the eight species.

El Segundo Blue Butterfly (Shijimiaeoides battoides allyni)

The El Segundo blue butterfly is an insect endemic to the Southern California coastal strand. This species was listed as Endangered on June 1, 1976. Critical Habitat has not yet been designated for this species.

This butterfly is limited to two small remnants of the once extensive El Segundo Dunes system (36 square miles) extending from the Los Angeles Airport to San Pedro, in Los Angeles County. Its current distribution is limited to dunes adjacent to the Los Angeles Airport and a small parcel of commercially owned land on the Chevron oil refinery in El Segundo.

The El Segundo blue is dependent upon coastal dune habitat which contains two species of buckwheat (Eriogonum) that provide the butterfly with nesting, feeding, and resting habitat. The conversion of this essential dune habitat to urban developments threatens the continued survival of this species.

Onshore activities such as the placement of pipelines and the location of refineries, present the greatest threat to the destruction of this species' habitat. However, since existing onshore facilities are to be used, proposed oil and gas exploration or development/production activities are not expected to jeopardize the continued existence of this species.

Bald Eagle (Haliaeetus leucocephalus)

The bald eagle was listed as Endangered in 43 of the contiguous 48 States including California, and Threatened in the remaining five States on February 14, 1978. Critical Habitat has not yet been determined for this species. This large bird occurs from Alaska to northern Mexico and lives in association with aquatic habitats such as lakes, large rivers, and estuaries.

Bald eagles nested on the Channel Islands until the mid 1950's. Reproductive failure, probably due to pesticide contamination of its food sources, and habitat losses have been the chief causes for the eagle's decline and present status. The reintroduction of the bald eagle to the northern Channel Islands is planned for the future. In addition, Santa Catalina is also being considered for eagle hacking within the near future.

Successful reintroduction of bald eagles to their former nesting range in California will result in the increased numbers utilizing coastal areas.

The potential impacts to the eagle from proposed oil and gas exploration and development/production activities are disturbance to its nesting areas resulting from onshore activities and the possibility of an oil spill reaching the coast and subsequently oiling the eagles and/or contaminating the food source. Oiled eagles returning to the nest to incubate could contaminate the eggs or nestlings. Toxicological studies have indicated that even small amounts of oil applied to an egg are toxic to the embryo.

Recent information indicates that bald eagles may be wintering on the Channel Islands. Since no onshore development is proposed for the Islands, the impacts from an oil spill to wintering eagles would be limited to the contamination of the eagle's food source or feather contamination of individual eagles.

However, the present concentrations of California's eagle population are located along inland lakes and rivers, and are removed from the impacts of coastal oil and gas development activities.

American Peregrine Falcon (Falco peregrinus anatum)

The American peregrine was listed as Endangered on June 2 and October 13, 1970, and a portion of the peregrine's Critical Habitat was designated in the August 11, 1977, Federal Register. This subspecies once occurred widely through much of North America from southern Alaska and Canada, to northern Mexico. This peregrine is migratory in the northern portion of its breeding range, but exhibits less migratory behavior toward the southern portion of its range. In California, the species once occurred throughout the State where cliff faces and steep rocky slopes provided suitable nesting locations. The mountains, sea coast, and Channel Islands historically harbored significant populations.

The species has suffered a drastic decline throughout its range primarily due to reproductive failure resulting from pesticide contamination of its avian prey. Currently, less than fifty known pairs remain in California and the species has been extirpated from the Channel Islands.

Several historic eyries are located along the coast from Point Conception south to the Mexican border. At present, however, only one active nest site, located west of Santa Barbara, exists along this reach of the coast. Considerable effort is currently being expended toward recovery of this species, chiefly through captive propagation and reintroduction. The Channel Islands include several sites where reintroduction efforts may eventually be made. Natural expansion of American peregrines is anticipated with the decreased usage of residual pesticides.

The falcons prey heavily upon coastal birds. The potential impacts on the American peregrine falcon from oil and gas exploration and development/production activities are identical to those on the bald eagle.

At this time, there are no proposals for new onshore facilities along the Southern California coast, particularly in the vicinity of Point Conception. Should additional facilities be proposed, GS must reinitiate Section 7 consultation. The Oilspill Risk Analysis, prepared by GS for the Southern California (Proposed Sale 48) Outer Continental Shelf Lease Area, arbitrarily divides the California coast into segments and projects the probability of oil impacting these segments from various offshore lease locations. According to this analysis, the probability of an OCS related oil spill reaching the vicinity of the one active peregrine nest is less than ten percent. Since the Critical Habitat is outside of the area considered in this consultation, that habitat will not be destroyed or adversely modified by the proposal.

Transient American peregrines may be found in small numbers along the coast, especially during migration and winter periods. We recommend that the majority of the estuaries, bays, lagoons, and rivers have available cleanup equipment to close off these areas within two hours of a spill occurrence. This action would minimize the impact of the oil, should it reach the shore.

Southern Sea Otter (Enhydra lutris nereis)

The southern sea otter was listed in the Federal Register as Threatened on January 14, 1977. Critical Habitat has not yet been determined for this species.

Historically, the southern sea otter was found in relative abundance along the California coast. The principal population decreases resulted from commercial harvest by fur traders during the 1800's, and the population was brought to near extinction at the turn of the century.

In 1938, the southern sea otter was identified off Point Sur, California and that population has expanded to an estimated high of 1,856 individuals (1976 census) with a range between Point San Luis (San Luis Obispo County) to Ano Nuevo Point (Santa Cruz County). A few wandering individuals have been sighted to the north and south of these range limits. Provided the population continues to increase at the current census rate, it is presumed that the population will extend its range to the Channel Islands and mainland south of Point Conception. Because the area considered in this consultation is part of the southern sea otter's historical range, it will be considered in this consultation.

The southern sea otter is an opportunistic predator which forages in both the rocky and soft sediment communities, seldom ranging beyond the 20-30 fathom depth curve.

An oil spill could affect sea otters in several ways. When trying to determine these effects, the physical configuration and the amount of oil on the surface of the water must be considered. The oil is influenced by environmental factors including wind, waves, temperature, suspended sediments, and time. Direct contact with oil would mat the coat and decrease the otter's natural insulation against temperature loss. Constant preening to maintain the insulating quality of the coat would result in the direct injestion of some petroleum products. As stated in the DES for Sale No. 48, "Accidental exposure of two sea otters to a small but unknown amount of oil (probably diesel) in an experimental holding pool on Amchitka Island resulted in fur matting, progressively severe distress, emergence from the water, and death by exposure within several hours" (K.W. Kenyon, unpublished data). "The oil in this case formed a visible sheen comparable to that sometimes present in harbor areas where gulls appear unaffected by it."

The sea otter feeds on benthic organisms such as abalone, pismo clams, and urchins.

There are natural factors which affect the persistence of oil such as dilution, evaporation, photo-oxidation, sedimentation by adsorption on suspended particles and microbial degradation. Because of these factors, it makes it difficult to determine the effects of oil on benthic communities. Oil which settles to the bottom, depending upon the factors identified above, could kill benthic organisms by smothering the organisms or from its toxic effects.

In the event of an oil spill, another major effect on otters would be the local loss of food sources. The secondary effect would be the long term contamination of shellfish populations which may also result in the ingestion of petroleum products by the sea otters.

The southern sea otter does not presently inhabit the area considered in this consultation. Should the otter move into this area during the life of these activities, GS must reinitiate Section 7 consultation to determine whether the ongoing activities are likely to jeopardize the continued existence of the sea otter.

California Brown Pelican (Pelicanus occidentalis californicus)

The California brown pelican was originally listed as Endangered on October 13, 1970. Critical Habitat has not yet been determined for this species. All subspecies of brown pelicans were listed on December 2, 1970.

The only regular breeding colonies of this subspecies in the United States are located on Anacapa Island and nearby Scorpion Rock. This nesting population is augmented from late July through early November by large numbers of pelicans which regularly disperse north from Mexican waters. These migrants are generally gone again by early December; however, it has been recently determined that some may be recruited into the Anacapa breeding population.

Pelicans rarely are found far from salt water, or farther than 20-30 miles offshore. They forage intensively in the Santa Barbara Channel. Their major food is small fishes (primarily anchovy), which they capture near the surface by plunge-diving from the air.

During the late 1960's and early 1970's, the Anacapa colony suffered catastrophic nesting failure induced by DDT and its derivatives accumulating in the reproducing adults. Following the ban on this pesticide, the fledging rate has continued to fluctuate widely but has not dropped to the low numbers experienced earlier.

Pelicans may be affected by oil spills through contamination of their plumage as they dive for food or drift on the surface. This may contribute to direct mortality or result in reduced hatchability of eggs oiled from the fouled plumage of an adult bird. Individual pelicans that have been found oiled have responded well to treatment.

In accordance with the Oilspill Risk Analysis, we have identified ten segments which contain habitats important to the listed species and are susceptible to damage from oil (Attachment 4). Of these ten, Anacapa, Segment 50, has the greatest projected likelihood of being hit by oil from the greatest number of sources (Attachment 5).

It is difficult to predict from oil spill probabilities what the effects of oil activities might be on Anacapa. The only known incident of significant numbers of pelicans being oiled was after a spill from the Navy vessel Manatee in August 1973. Concentrations of light tar washed up on beaches from San Clemente south into Mexico. Twenty to 25 juvenile pelicans were found oiled. In contrast, no pelicans were reported oiled as a result of the January 1969, Santa Barbara blowout. Judging only from location of the spills, the results should have been reversed, but timing was the determinant in these cases. The San Clemente spill occurred in the late summer, when large numbers of pelicans were dispersed throughout the area; the Santa Barbara spill occurred in the winter, just following a severe storm, when relatively few pelicans were in the area and fewer still would have been far from shelter. While the breeding grounds and feeding areas surrounding Anacapa Island are extremely vulnerable locations, the San Clemente spill indicates that large amounts of oil anywhere within the pelicans' range could cause significant damage at the wrong time of year.

No pelican losses from OCS activities off Southern California have been reported to date, nor from nearby activities in the State tidelands. Additional threat from OCS Sale 48 has been considerably reduced by the withdrawal of tracts that were close to Anacapa.

To assist GS in carrying out their responsibility for the conservation of the listed species, the following recommendations are given.

From Attachment 5, the following tracts, transportation routes, and pipeline routes indicate a high probability of an oil spill contacting Anacapa Island. Tracts leased before Sale No. 48: 166, 202, 203, 204, 205, 208, 210, 215, 216, 217, 233, 234, 240, and 241. Tracts leased in Sale No. 48: 337, 346, 347, and 361. Transportation Route: T6 and T7. Pipleline Route: L4 and L6.

We recommend that GS require the lessee to assign a high priority and prescribe specific measures for the protection of Anacapa Island in all Oil Spill Contingency Plans submitted to GS for exploration or development/production within the above listed tracts, and for activities that might result in substantially increased tanker traffic over the identified transportation routes.

In accordance with OCS Operating Order No. 7, the proper authorities must be notified in the event of an oil spill occurrence. We would like to insure maximum protection to Anacapa Island by further recommending that GS require the oil spill containment equipment, which is maintained on the invididual platforms, also be required to respond to a spill from another platform in the area.

California Least Tern (Sterna albifrons browni)

The California least tern was listed as Endangered in the Federal Register on October 13, 1970. Critical Habitat has not yet been designated for this subspecies.

The least tern migrates from Mexico each spring to establish breeding colonies on the California coast. It occupies coastal habitats from the Pacific coast of Baja California to the San Francisco Bay from April to September.

The least tern usually chooses a nesting location in an open expanse of sand, dirt, or dried mud close to a lagoon or estuary where food can be obtained. Prey consists of small fish such as the northern anchovy (Engraulis mordax), deepbody anchovy (Anchoa compressa), jacksmelt (Atherinopsis californiensis), topsmelt (Atherinops affinis), California grunion (Leuresthes tenuis), shiner surfperch (Cymatogaster aggregata), California killifish (Fundulus parvipinnis), and mosquitofish (Gambusia affinis). The reduction in numbers of least terns has resulted from the loss of feeding and nesting habitats and disruption of nest sites by human-associated activities.

Potential threats to the California least tern from oil and gas activities are related to oil spills and increased human activities in coastal areas where nesting colonies occur. The birds could be contaminated by a spill as they dive for food. This may contribute to direct mortaility or result in reduced hatchability of eggs oiled from the fouled plumage of an adult bird. Oil spills cause severe damage when they enter coastal wetlands, and could destroy essential feeding areas for the terns.

To assist GS in implementing its responsibility for the conservation of the species, the following recommendation is given. GS should require that the Oil Spill Contingency Plans include provisions for the deployment of adequate containment equipment into the areas listed below to prevent the entry of an advancing oil spill. The necessary equipment must be onsite, within two hours, on any of these areas that are threatened by a spill.

The areas identified in the Recovery Plan as essential habitat for least terns are: Mission Bay; Sweetwater Marsh Complex; Tijuana River Estuary; South San Diego Bay; North San Diego Bay; Los Penasquitos Lagoon; San Dieguito Lagoon; San Elijo Lagoon; Batiquitos Lagoon; Aqua Hedionda Lagoon; Buena Vista Lagoon; Santa Margarita River; Santa Ana River; Anahiem Bay/ Huntington Harbor; San Gabriel River/Alamitos Bay; Harbor Lake; Terminal Island; Playa del Rey; Mugu Lagoon; and Ormond Beach (Attachment 4).

Light-footed Clapper Rail (Rallus longirostris levipes)

The light-footed clapper rail was listed as Endangered on October 13, 1970. Critical Habitat has not yet been designated for this subspecies. Histori-

cally, the clapper rail's range extended from Santa Barbara County, California, to San Quintin Bay, Baja California, Mexico. Currently, this subspecies probably occurs in 16 California marshes and at least two marshes in Baja California. Distribution is along approximately 200 miles of United States coastline from Goleta Slough in Santa Barbara County south to the Tijuana Estuary in San Diego County.

Food consists of various invertebrates (crustaceans, mollusks and annelids) found in tidal coastal marshes. Past decline of the species has been attributed to the loss of over 65 percent of its former habitat as well as overhunting prior to 1939.

Potential threats from oil and gas activities could be from oil spills and increased human activities in the estuaries where existing populations live. The population estimate of 1976 suggested a total population of 250 birds distributed throughout 16 locations in California. Of these, five are in public ownership and may contain over 40 percent of the estimated population in California. Through the efforts of the Light-Footed Clapper Rail Recovery Team, a plan to stabilize this species through land acquisition and marsh management has been approved.

According to the Oilspill Risk Analysis, the possibility of an oil spill hitting clapper rail habitat is low. In addition, with the use of existing onshore facilities, no increased human disturbance from these activities is likely.

In order to assist GS in carrying out its responsibility to conserve the species, it is recommended that GS require the lessee to deploy the required containment equipment onto those areas identified in the Draft Recovery Plan as essential clapper rail habitat (Attachment 4). The necessary equipment should be onsite within two hours of an oil spill to prevent the entry of any advancing spill. Those areas to be included in the Oil Spill Contingency Plans for exploration and development/production are: Mission Bay; Sweetwater River complex; Tijuana River Estuary; South San Diego Bay; San Diego River mouth; Los Penasquitos Lagoon; upper Newport Bay; Anaheim Bay; Mugu Lagoon area; Carpinteria Marsh; and Goleta Slough.

Salt Marsh Bird's Beak (Cordylanthus maritimus ssp. maritimus)

Salt marsh bird's beak is an annual herb (15-30 cm high) with purple flowers, that inhabits the upper elevations of tidal salt marshes. Populations of bird's beak are associated with pickleweed (Salicornia) and salt grass (Distichlis) near elevations at and above high tide. The bird's beak was listed as Endangered in the Federal Register on September 28, 1978. Critical Habitat has not yet been determined for C. m. maritimus.

Historically, this subspecies occurred from Carpinteria in Santa Barbara County south to San Diego County and northern Baja California, Mexico.

Today, distribution is restricted to the Sandyland Marsh (Carpinteria) in Santa Barbara County, Point Mugu in Ventura County, and the Tijuana River Estuary in San Diego County.

Destruction of coastal salt marshes is the major factor responsible for the elimination of this wetland species.

The Carpinteria Marsh area and the Tijuana River Estuary are in public ownership; and since existing onshore facilities will be utilized, the potential for further destruction of the bird's beaks' existing habitat from OCS activities has been reduced. The probability of an oil spill reaching this species' habitat is minimal.

Although the remaining populations of the salt marsh bird's beak are located inside protected estuaries and along the upper elevations of tidal salt marshes, the potential for inundation by an OCS related oil spill still exists.

In order to assist GS in carrying out their responsibility to conserve the listed species, it is recommended that GS require the necessary containment equipment be deployed to those three areas identified above within two hours of an oil spill. This requirement should be a part of the Oil Spill Contingency Plan for each exploration and development/production plan.

Development Plans

This consultation includes three existing development activities and four proposed development plans. A discussion of these development tracts follows:

The three existing development tracts are located in the Santa Barbara Channel (tracts 166, 240, and 241). The proposed development plans for tracts 188, 202, and 217 are also located in the Santa Barbara Channel. The remaining development plan (tract 300) is located south of Long Beach.

There are two platforms on tract 166—Hogan and Houchin--located five miles south of Carpinteria. These platforms are sending 4,600 barrels of oil per day via pipeline to existing facilities at La Conchita. Crew boats make two or three round trips a day from existing facilities at Carpinteria.

Another tract under development, tract 241, has three platforms sending 20,024 barrels of oil per day via existing pipeline to the Rincon facilities. These platforms require two to three crew boat trips a day from Carpinteria.

The third producing tract is tract 240, containing platform Hillhouse. This tract is located ten miles south of Summerland. The platform is serviced by two or three crew boats a day from Carpinteria. The 7,752 barrels of oil per day is transported by connecting pipeline to the tract 241 pipeline which goes to the Rincon facilities.

There are four proposed development plans being considered in this consultation. The first is a proposal for tract 217 for platform Grace. The estimated production is 16,000 barrels of oil per day by 1982. The tract is located 12 miles south-southwest of Rincon. It is proposed to connect this platform to the State platform Hope via pipeline, then to Carpinteria via existing pipeline. An additional pipeline proposal associated with this platform, is a 5.8 mile overland pipeline from Carpinteria south to Ventura. This pipeline is south of Carpinteria Marsh.

Tract 188 is located five miles south of Refugio Cove and platform Hondo will be placed on the tract. It is estimated that a production rate of 60,000 barrels of oil per day will be produced by 1982. The oil will be transported by pipeline to an offshore storage and transport (OS&T) vessel. This OS&T vessel will be located within the same tract. It is anticipated that two to three crew boat trips per day will originate from Carpinteria and two helicopter trips per week out of Ventura or Santa Barbara will be servicing this platform. From the OS&T vessel the oil will be tankered to an existing onshore facility.

Platform Girty is proposed for tract 202, located four miles southwest of Oxnard. Oil production is estimated to be 6,000 barrels per day and will travel via pipeline to a proposed onshore facility south of McGrath Lake at Ventura. It is estimated that three boat trips a day and three to four helicopter trips a month from Ventura will be needed to service this platform. From the proposed facility in Ventura, the oil will go to the Carpinteria facilities and then to Rincon facilities. There are two proposed onshore pipeline routes from Carpinteria to Rincon—one directly to Rincon, the other from Carpinteria to Rincon via La Conchita.

The fourth proposed development plan is located on tract 300, seven miles south of Long Beach. There will be two platforms on this tract, Ellen and Elly, with an estimated production rate of 16,000 barrels of oil per day by 1982. A proposed pipeline will connect these platforms to Long Beach refinery facilities. Three to four crew boats a day and two helicopter trips per week from Huntington Beach are anticipated to serve this tract. There is a proposal to place a platform, Eureka, on the adjacent tract, number 301. This platform will be joined to those on 300 by pipeline.

The four proposed development plans (tracts 188, 202, 217, and 300) specifically address the proposed pipeline routes and the onshore facilities to be used. We have reviewed the proposals and believe that the proposed pipeline routes and the construction of the onshore facility are not likely to jeopardize the continued existence of the listed species or destroy or adversely modify the Critical Habitat of the American peregrine falcon. However, Section 7 consultation must be reinitiated should any of the following occur which may affect listed species or their Critical Habitats: (1) alternative pipeline route be planned; (2) the construction of additional onshore facilities; (3) a change in the use pattern be conducted at the onshore facilities mentioned above; or (4) a new species be listed.

Cumulative Effects

There are numerous offshore and coastal projects and activities in Southern California. Those known to the Office of Endangered Species which could have an impact on the Endangered and Threatened species are considered in this consultation.

The Standard Oil Company of Ohio (SOHIO) pipeline project proposes to transport Alaskan crude oil from Valdez, Alaska to a new (unconstructed) unloading facility at Long Beach, California by tanker. Fourteen tankers will be required, each making 23 round trips per year, to transport the oil. From Long Beach, 500,000 barrels of oil per day will be transported by pipeline to Midland, Texas.

Additional increases in tankers carrying oil out of California can be attributed to the Naval Petroleum Production Act transporting oil from Elk Hills in the San Joaquin Valley to Port Hueneme via pipeline. It is proposed that 350,000 barrels of crude oil a day be sold to any interested party, which makes it difficult to predict the transport routes. However, it could possibly go to the Los Angeles/Long Beach area or even to the east coast traveling through the Panama Canal.

The Chanslor-Western Oil and Development Company has proposed to explore the Vaca Tar Sands. Because the oil would be extremely viscous, an oil processing plant or coking facility would probably be needed at the project site before being shipped by pipeline.

Additional vessel traffic can be expected in the San Pedro and Santa Barbara Channels from the Space Shuttle program.

There are two nuclear power plant proposals. The first, at Diablo Canyon in San Luis Obispo County, has been constructed, but start-up has not been granted. The second plant is in operation but has proposed to expand the facilities. This one is located at San Onofre, Orange County.

There are several Liquified Natural Gas (LNG) facilities proposed for Southern California. None have received approval yet. The onshore LNG plant would be at Point Conception and the offshore sites being considered are: Beachers Bay; Chinese Harbor; San Pedro Point; Smugglers Cove; East Channel Shelf; and Camp Pendleton. If the onshore LNG facility at Point Conception is approved, it will be processing gas from Alaska (400 million cubic feet a day) and from Indonesia (500 million cubic feet a day). This would increase tanker traffic (190 trips a year) into Point Conception.

The Office of Coastal Zone Management (OCZM) has proposed a marine sanctuary be designated around the northern Channel Islands and Santa Barbara Island which would exclude oil and gas activities within six nautical miles of the islands. Concurrently, the OCS Sale No. 48 excluded those tracts within six nautical miles of the Channel Islands and Santa Barbara Island.

The State of California leases tracts within three nautical miles of the coast. These activities generate the placement of pipelines, increased crew boats/supply boats and helicopters servicing the rigs, possible construction of additional processing facilities, and increased tankering.

There are several U.S. Army Corps of Engineers projects in the area including maintenance dredging, beach erosion, and harbor deepening projects.

All of the above projects potentially increase the disturbance to Endangered and Threatened species' habitat and/or increase the possibility of an oil spill occurring within the Southern California area considered in this consultation.

An individual project or activity may have no significant impact upon the listed species, but when considered in light of the numerous projects within the same area, significant impacts could occur.

With accelerated offshore oil and gas activities, the probable risk of oil spills also increases. Additional oil spillage could increase the impacts to Endangered and Threatened species. Due to this, immediate oil spill containment response is extremely necessary.

An increase in onshore activities presents another possible impact to the listed species. There are numerous coastal activities in this area. Due to the stress on the coastal area, changes in OCS related onshore activities must be evaluated carefully.

Conclusion

This biological opinion covers the oil and gas exploration activities for those tracts leased prior to OCS Sale 35, and those leased in OCS Sale 35 and 48. It also covers the seven development tracts identified above.

We have rendered our conservation recommendations for the protection of the El Segundo blue butterfly, the California brown pelican, the California least tern, the light-footed clapper rail, and the salt marsh bird's beak. Any activity or program authorized, funded, or carried out by a Federal agency which may affect any listed species or its Critical Habitat, will require Section 7 consultation.

The GS is reminded of their continuing responsibility to review their activities in light of their Section 7 obligations. Should additional onshore facilities be proposed, or the use pattern of existing facilities be changed, or a new species be listed that may be affect by exploration activities, Section 7 consultation must be initiated if a "may affect" determination is made. Also, should the construction of additional onshore facilities be proposed, different pipeline routes be proposed, a change in

the use pattern of the existing onshore facilities be proposed, or a new species be listed which may be affected by the development plans contained in this consultation, Section 7 consultation must be reinitiated.

GS must review all development/production plans not covered by this consultation in light of Section 7(c) of the Endangered Species Act of 1973, as amended.

We would like to thank GS for their consideration in providing the necessary information needed to conduct this consultation.

Robert S. Cook

Attachments (5)

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Washington, D.C. 20235

F6:TRL

SEP 25 1979

Mr. J. S. Cragwall, Jr.
Acting Director
Geological Survey
U.S. Department of the Interior
Reston, Virginia 22092

Dear Mr. Cragwall:

This letter responds to your May 18, 1979, request for formal consultation pursuant to Section 7 of the Endangered Species Act, as amended, regarding the possible impact to listed species from Outer Continental Shelf (OCS) oil and gas exploration activities in southern California. The enclosed biological opinion concludes that the identified activities are not likely to jeopardize the continued existence of listed species.

The opinion recommends that the Geological Survey allow the utilization of offshore storage and treatment facilities only under the most stringent safety guidelines possible and only when no other alternatives are available.

I look forward to continued cooperation in future consultations.

Sincerely yours,

for Jerry D. Leitzell
Assistant Administrator
for Fisheries

Enclosure

Endangered Species Act

Section 7 Consultation

Agency: United States Geological Survey

Activity or Program: Development of Outer Continental Shelf Oil and Gas Reserves in the Southern California Bight

Consultation Conducted by: National Marine Fisheries Service, Regional Director, Southwest Region

Summary:

By memorandum of May 18, 1979, the Director of the Geological Survey (GS) requested formal consultation on all Outer Continental Shelf (OCS) oil and gas exploration, development, and production activities in the Southern California Bight according to regulations promulgated under Section 7 of the Endangered Species Act of 1973, as amended. To assist me in responding to the request, a team was appointed consisting of representatives from National Marine Fisheries Service (NMFS) Southwest Region and Central Office. Although not participating as team members, the Southwest Fisheries Center and the Northwest and Alaska Fisheries Center were helpful in providing information used in the formulation of our biological opinion.

The team met June 5-7, 1979, with representatives of GS and the Fish and Wildlife Service consultation team to discuss ongoing and proposed GS activities in the Southern California Bight. These activities are the result of development of tracts leased in pre-lease sale 35 offerings, lease sale 35, and lease sale 48.

After reviewing available information and discussing effects of ongoing and proposed activities with GS, the consultation team recommended that GS allow the utilization of offshore storage and treatment (OS&T) facilities only under the most stringent safety guidelines possible and only when no other alternatives are available. The team also recommended that GS work with NMFS, Fish and Wildlife Service and any other concerned agencies to establish a program to monitor cumulative impacts of OCS oil and gas development on the threatened and endangered species in the area. The team concluded that the identified activities are not likely to jeopardize the continued existence of any of the endangered or threatened species in question.

Proposed Action

The project area includes the U.S. contiguous zone from Point Conception to the California-Mexico border. Five groups of tracts within the project area have been identified as potential oil and gas producing areas. These areas are the Santa Barbara Channel, the Santa Rosa Ridge, Santa Barbara Island, San Pedro Bay, and Tanner-Cortes Bank.

There are currently 15 platforms located in the Santa Barbara Channel, eight in State waters and seven in Federal waters. The majority (10) are located southwest of Carpenteria. The other five are located in the west end of the Channel; four are in State waters between Coal Oil Point and Point Conception, and one, the Hondo platform, is in Federal waters approximately five miles south of Refugio Cove. Forty subsea completions have been installed in the Santa Barbara Channel, all in State waters. An OS&T is planned for installation near Hondo platform as soon as it receives Environmental Protection Agency approval. The OS&T will separate the crude oil from the oil-water emulsion that comes from the wells. The crude oil will be stored and water will be piped back to the platform for injection into the formation. At regular intervals, depending on the rate of production, the OS&T will transfer the crude oil to shuttle tankers for transport to onshore refineries.

The only other existing platforms in the Southern California Bight are two in State waters south of Huntington Beach. There are, however, four platforms planned for installation in late 1979. Two of these will be placed in the east end of the Santa Barbara Channel and two will be placed in San Pedro Bay. There are no platforms or subsea completions in any of the other groups of tracts.

GS has estimated that approximately 371 wells will have to be drilled to adequately explore leased tracts for oil deposits. Exploration of leased tracts is currently being conducted by four drilling ships. Since there are no plans to bring in additional exploration vessels, the necessary exploratory wells will be drilled without an increase in the current overall level of activities related to exploration during the course of the project. If more drilling ships are required in order to speed up the exploration process, the cumulative environmental impacts would probably remain the same, but the increased level of activity in the short term would be more likely to have an immediate adverse impact on the species involved. An additional 87 platforms, 86 subsea completions, and over 1,000 miles of pipelines have been estimated to be required to fully develop these offshore fields. The length of time necessary for this development is 25 years and the total life of the project is estimated to be 40 years.

The distribution of the oil fields in the OCS appears to be patchy. The subsea completions are expected to be concentrated around the deep water (300m.) oil fields at the west end of the Santa Barbara Channel, in the southern half of the San Pedro Bay group of tracts, and around the Tanner-Cortes Bank. Where ecologically and economically feasible, pipelines will be used to bring crude products to existing refineries on shore. When pipelines prove infeasible, OS&T's coupled with tanker and barge transportation will be utilized. GS estimates that four OS&T systems may be required during the development of the Southern California Bight oil and gas reserves.

Endangered Species Present in the Project Area

The species of concern in the consultation were as follows:

blue whale (Balaenoptera musculus)
fin whale (B. physalus)
sei whale (B. borealis)
humpback whale (Megaptera novaeangliae)
sperm whale (Physeter catadon)

gray whale (Eschrictius robustus)
right whale (Eubalaena glacialis)
Pacific ridley turtle (Lepidochelys olivacea)
green sea turtle (Chelonia mydas)
loggerhead turtle (Caretta caretta)
leatherback turtle (Dermochelys coreacea)

All of these are either casual visitors or migrants through the Southern California Bight.

The North Pacific population of blue whales is approximately 1,700 individuals. A significant portion migrates through the project area from May through July on their way to their summer feeding grounds and again from September to February during their return migration to their wintering grounds in the warm waters off southern Baja California. The probable migratory pathway and distribution of the blue whale in the Southern California Bight has been described as generally offshore, very near or outside of the Channel Islands, and along the Santa Rosa Ridge to Tanner-Cortes Banks. While they are frequently observed around the Channel Islands, they are seldom seen from shore.

The North Pacific population of the fin whale numbers approximately 17,000 individuals. Fin whales may be found west of the Channel Islands year round. They are, however, most abundant in late spring or early summer.

Sei whales in the North Pacific number about 9,000 whales. Little is known about their migratory habits. Sei whales may be found off Southern California, west of the Channel Islands during the late summer or early fall. There is also a possibility that these whales may be feeding in the southern California Bight.

Sperm whales are the most abundant of the large whales in the North Pacific, numbering about 300,000 individuals. They are common in the project area from April until the middle of June and again from late August to mid-November, indicating a northward migration in the spring and return migration in the fall. The boundaries of the migratory path are not well known but probably are quite broad.

The humpback whale is one of the most severely depleted of the whale stocks. The North Pacific population is estimated at approximately 850 individuals. A portion of this population migrates from Alaska south to its calving and breeding grounds off the western coast of Baja California, where it spends the winter months. During the summer these whales may be found in any portion of their range.

The most prominent whale occurring in the Southern California Bight is the gray whale. The current population is estimated at about 15,000 whales. Its rather narrow migratory path along the California coastline makes it the most frequently observed endangered whale as well as the species most likely to be adversely impacted as a result of OCS development. Essentially, the entire population of gray whales migrates through the project area from late September through December on its southern migration to the calving and breeding grounds in Baja California, and again on its northward migration between February and June. Juvenile gray whales have been known to take up residence for extended periods in the kelp beds along the coast and around the Channel Islands, in order to feed on the crustaceans living in the kelp canopy.

The most depleted species stock is the North Pacific population of Pacific right whales which numbers only about 220 individuals.

Individuals of all four species of listed sea turtles may be found in the project area. They are probably transient portions of their respective populations feeding at the northern limits of their ranges. They are not known to nest here. There is no historical evidence of any nesting beaches north of Guerro Negro Lagoon, Baja California Sur, Mexico, and there are no known nesting beaches remaining on the Baja Peninsula.

Probable Impacts

The most probable source of adverse impacts on endangered species in the project area are oil spills from various sources; increased vessel traffic due to the greater number of platform support vessels as well as increased tanker and barge traffic; and increased levels of noise resulting from exploration, construction, and production activities.

The severest impacts are likely to result from a catastrophic event resulting in a large oil spill. Such events include blowouts, the sinking of or breaking up of tankers, and accidents involving OS&T's. The probability of an oil spill occurring during the life of this project has been estimated by GS to be 100%. In the light of this high probability we recognize that the availability of oil spill containment and clean-up equipment reduces the likelihood of severe impacts resulting from a spill when it does occur.

There are few data available pertaining to the effects of oil on endangered species. Some anecdotal information indicates that gray whales swim through naturally occurring oil slicks in the Santa Barbara Channel. There is no way to access the long term or chronic effects of contacting oil. Some of the adverse effects which could result from contact with an oil spill include eye damage, inhalation of toxic fumes or aerosols, ingestion of oil, and the fouling of baleen plates.

The species most likely to be impacted by an oil spill is the gray whale. If a large spill occurred during the whales migration, a significant portion of the population could encounter the spill, and possibly suffer one or more of the adverse effects listed above.

A catastrophic spill would have the most severe impact on the North Pacific population of right whales. The probability of right whales encountering such a spill is small, because their population is so depleted. Although there has not been a documented sighting of a right whale in the project area since 1956, the elimination of just a few individuals could result in the loss of the recruitment of an entire season.

We are not aware of any information on the effects of oil on sea turtles. Presumably they would be susceptable to the same sorts of ill effects as the cetaceans. Since the few sea turtles occurring in the project area are feeding at the northern extent of their range and since there are no nesting beaches in or near the project area, the impacts of a spill on the sea turtle populations is expected to be slight.

OS&T's appear to represent a threat to the environment because they require unnecessary handling of oil at sea. The OS&T planned for installation near the Hondo platform in the Santa Barbara Channel will be located outside of the three-mile territorial sea where it will encounter the full force of the severe winter storms that occur in the Channel. Although the mooring system is designed to withstand a hundred year storm, should the the OS&t break loose it would probably ground and break up, resulting in a spill of up to 200,000 barrels of oil. There is also the threat of a collision between the OS&T and the shuttle tankers that it would load. Even though the possibility of such accidents is remote, the threat of such accidents could be eliminated by utilizing onshore storage and and treatment facilities coupled with nearshore marine terminals for shuttle tankers.

Increased vessel traffic increases the probability of the occurrance of whale-vessel collisions. Every year a few whales wash ashore with definite signs of injury resulting from confrontations with large vessels. We do not know how many whales are killed or seriously injured in this manner each year nor do we know the impact of this mortality on endangered species populations.

The gray whale is most likely to be impacted by increased vessel traffic because it is most abundant endangered species in the project area and its migratory route coincides with traffic lanes in the Southern California Bight. Vessel traffic could be one of the stimuli pushing the gray whale migration offshore.

Noise in the Southern California Bight issues from several sources, including commercial vessel traffic, pleasure craft traffic, fishing operations, military operations and OCS mineral development. There are no data available that indicate the relative amounts of noise contributed by each of these sources. Therefore, we are not able to predict what the impacts of noise from OCS oil and gas development on endangered species will be.

However, increased activities will increase noise levels by some degree. Our concern is that noise levels in the Southern California Bight may reach a threshold resulting in the abandonment of migratory routes and feeding grounds by endangered whales.

Estimates prior to the mid-1960's indicated only 5-10% of the gray whale population migrated along offshore routes. Recent observations indicate a higher percentage of the population is utilizing offshore routes around the Channel Islands. The reasons for this apparent offshore shift are not clear. The increasing population, currently 15,000 whales, up from 3,000 in 1952, may be expanding the migratory path seaward as a result of population pressures, or the gray whales may be migrating further offshore in an effort to avoid noise from human activities, which have increased substantially in the last 20 years.

In October, 1978, humpback whales were observed feeding on Northern anchovies over the Santa Rosa Ridge. Additional feeding areas may be found around the Tanner-Cortes Bank. If noise levels reach a threshold the whales may abandon these areas, thus diminishing available feeding areas and increasing competition on remaining feeding grounds.

Conclusions:

Based on current population estimates and data on distribution of species, NMFS concludes that development of OCS oil and gas reserves in the Southern California Bight is not likely to jeopardize the continued existence of any of the endangered species under consideration.

With the exception of the gray whale, endangered cetaceans are widely distributed in the North Pacific. Their distributions serve to protect ther from being inundated by activities in a relatively small portion of their ranges.

The gray whale is the species most likely to be impacted by this project because of its biannual migration through the project area. This population is recovering from heavy exploitation by commercial whalers and is approaching pre-exploitation levels. Based on this resiliency and the fact that it is a migrant through the area and not a resident, NMFS has determined that the continued existence of this species is not likely to be jeopardized.

The right whale population, if impacted by the project, is likely to suffer severely. However, the small population is widely distributed and no individuals have been reported in the project area in over 20 years. Therefore, the probability of this project jeopardizing this species is small.

The distribution and migration of Pacific ridley, green, loggerhead, and leatherback sea turtles in the eastern North Pacific is poorly known. There are no nesting beaches in the project area nor are there any nesting beaches outside the project area that would be impacted by oil from a catastrophic spill in the project area. The sea turtles found in the project area are apparently feeding near the northern limits of their ranges and, although a few individuals of each species may suffer impacts from the project, the project is not likely to jeopardize the continued existence of any of the endangered sea turtle populations.

Recommendations:

We recommend that GS establish a program to monitor the impacts of OCS oil and gas development in the Southern California Bight. The purpose of this program would be to centralize information already available to various offices within GS, so that other agencies could have access to that information. The type of information we are interested in includes, among other things, location and cause of chronic pollution, results of exploratory activities so that we may anticipate the development of areas which may be important to endangered species, and any reports on behavior of animals around drill-ships and platforms.

We recommend that GS cooperate with NMFS in the placement of observers aboard exploratory vessels and platforms when in the opinion of the Regional Director, Southwest Region, NMFS the placement of an observer may yield data useful in the determination of impacts of oil and gas development on endangered species. The Southwest Region currently reviews Environmental Reports for plans of exploration and development and could as part of the review consider the benefit of placing an observer on board a particular vessel or platform without consuming much additional time. Should the Regional Director decide to place an observer aboard a vessel or platform we would expect GS assistance in providing support.

We recommend OS&T's be utilized only when onshore storage and treatment facilities and near shore marine terminals are not feasible. NMFS is concerned with the use of OS&T's. OS&T's require extra handling of oil while at sea thus increasing the chance of a spill that could impact endangered species. We further recommend that any OS&T's that are installed be closely monitored by GS and that GS in consultation with Coast Guard — and NMFS develop and implement strict procedural guidelines, for the safe transfer of oil from the OS&T to shuttle tankers, prior to the initiation of the proposed operations. These guidelines should include, among other things, criteria for the cessation of transfer of oil during high seas or inclement weather.

We recommend that GS contact the Regional Director, Southwest Region, NMFS to initiate development of a monitoring program and OS&T operational guidelines.

Finally, we recommend that consultation be reinitiated in the event that studies, being funded by the Bureau of Land Management, on the effects of noise and oil pollution on marine mammals produce information relevant to this opinion, or data indicating potential adverse impacts on listed species of whales and sea turtles become available, or should another species in the project area be listed as threatened or endangered.

Appendix 2

Cultural Resource Surveys

(On File in the Public Information Office,
MMS, Los Angeles, California)

Biological Surveys

(Not Applicable for this Development and Production Plan)

Appendix 3

Contingency Plans

(The H_2S and Oil Spill Contingency Plans are on file in the Public Information Room, MMS, Los Angeles.)

Appendix 4

Maps and Diagrams

(See ER and DPP in Appendix 5 of this EA)

Appendix 5

Nonproprietary Copy of the Development and Production Plan (DPP)
and Environmental Report (ER)

(Copies available for review in Public Information Room, MMS, Los Angeles)

Appendix 6

Correspondence from MMS District Supervisor,

Ventura District Office

United States Department of the Interior

MINERALS MANAGEMENT SERVICE
PACIFIC OCS REGION, VENTURA DISTRICT
145 NORTH BRENT STREET SUITE 202
VENTURA, CALIFORNIA 93003

NOTED - DUNAWAY

In Reply Refer To:
MMS-Mail Stop

April 27, 1984

Medmorandum

To: Regional Supervisor, Field Operations, Pacific OCS Region

From: District Supervisor, Ventura District

Subject: Transmittal of Special Report, San Pedro Earthquake of February 27, 1984, Prepared by U.S.C. Under Minerals Management Contract No. 14-12-0002-40030

Enclosed is a copy of a short report on the subject earthquake that was prepared by the University of Southern California as part of their induced seismicity monitoring studies in the Beta Field. It is assumed that this event is associated with movements on Palos Verdes fault zone.

We will take this opportunity to note that a swarm of small seismic events (M less than or equal to 4) commenced on April 20, 1984 south of the Dos Cuadras on April 21, 1984 (1430-1500hrs). Earlier USC reports predict the occurence and character if not the timing of this swarm. The hypocenters appear to line up with the Pitas Point fault trend in the immediate vicinity of Platform Habitat.

Calculated hypocenters for both the Beta and Dos Cuadras events are below 10km (Ca. 14km) and therefore appear to be unrelated to production and development activities.

James W. Wright

recd Pearma 7/2/07 attn: Julia Van Aukel

The San Pedro Earthquake (M_L = 3.9) of February 27, 1984

A magnitude 3.9 earthquake occurred 20 km southwest of Newport Beach on February 27, 1984. The calculated hypocenter is: 33°N28.28' and 118°W 4.62' with a depth of 14 km, (see Figure 1). The arrival times that were recorded by the U.S.C. L.A. Basin seismic network and used to calculate the hypocenter are given in Table 1 along with the hypocentral parameters. Both the epicenter and depth of this event are well constrained because of its closeness to the seismic stations SPB and SPC located off the Platform Ellen in the San Pedro Channel. No locatable aftershocks of magnitude greater than ~1.5 were observed following this earthquake.

The focal mechanism determined from first motions of P-wave arrivals recorded by the U.S.C. L.A. Basin seismic network indicates right-lateral strike-slip motion, (see Figure 2). The north-south striking nodal plane is well constrained (azimuth: 180°±10° and dip: 80°±5°) but the east-west striking nodal plane is poorly constrained caused by the lack of data. It is worth noting that the seismic stations SPB and SPC located off the Platform Ellen provided the only available constraints on the second nodal plane. Since there were no locatable aftershocks it is not possible to determine which of the two nodal planes was the actual fault plane. The local tectonics and geologically mapped faults, however suggest that the north-south striking nodal plane is probably the fault plane.

This earthquake is the largest one to occur near the south-east trending offshore extension of the Palos Verdes fault since detailed seismic monitoring began in southern California in 1972. The C.I.T./U.S.G.S. earthquake catalogue contains at least four earthquakes in the magnitude range 4-5 that

occurred from 1932-1983 within a distance of 20 km. Hence, the available data suggest that the south-east extension of the Palos Verdes fault has some seismic activity associated with it, although further analysis are needed to assess the detailed seismological character of this activity.

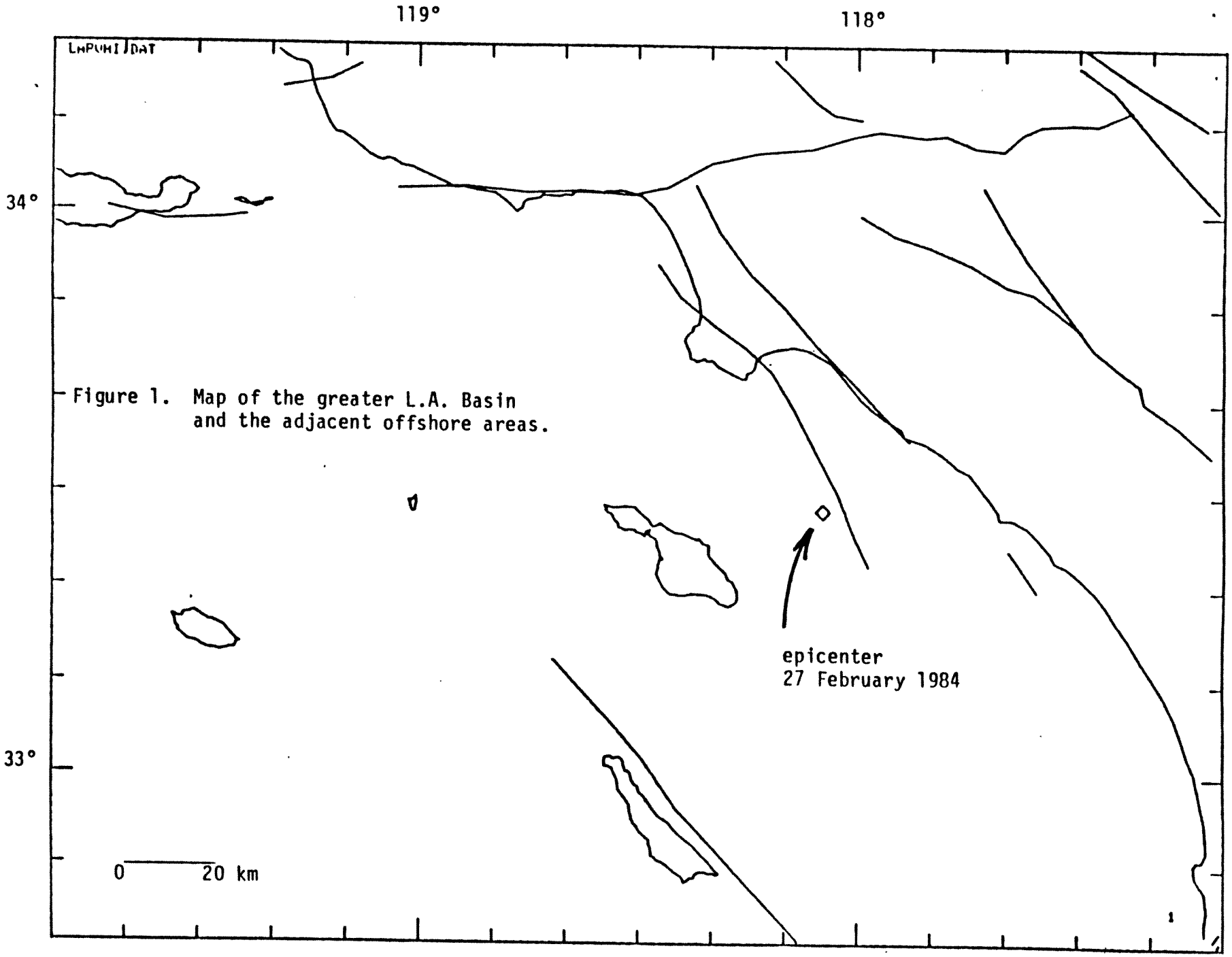


Figure 1. Map of the greater L.A. Basin and the adjacent offshore areas.

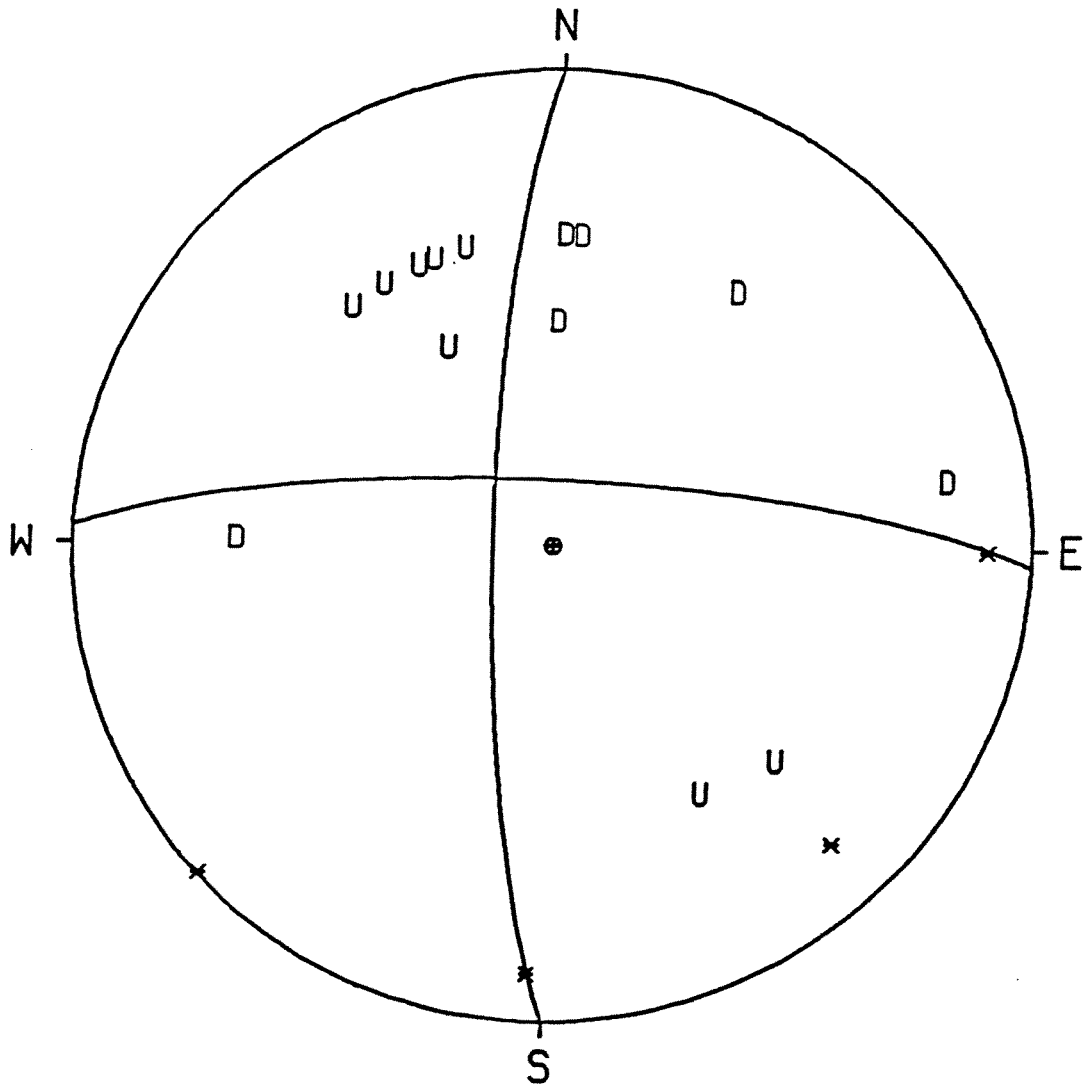


Figure 2. Focal mechanism of the San Pedro Earthquake of February 27, 1984. This is a lower hemisphere projection where U indicates compression and D indicates dilatation. Below the azimuths and dips of the two nodal planes are shown.

AZ1=180.0 DIP1= 80.0 AZ2=272.0 DIP2= 78.8

Table 1: Hypocentral parameters of the San Pedro Earthquake of February 27, 1984.

27 FEB 84, 10:18 EVENT NO. 1

YR	MO	DA	ORIGIN	LAT N	LON W	DEPTH	RMS	ERH	ERZ	GAP	XMAG	FMAG
84-	2-	27	1018 13.50	33 28.28	118 4.62	13.80	0.40	1.36	0.65	161		3.9

RMSWT	DMIN	ITR	NFM	NWR	NWS	REMK	Q	SQD
0.40	11.8	5	16	20	1		C	C C

STA	DIST	AZM	AN	P/S	W	SEC+CCOR	(TOBS	-TCAL	-DLY	=RES)	WT	XMG	FMG	R	INFO
SPC	11.8	331	135	IPU		17.86	0.00	4.36	4.09	0.00	0.27	1.43			0.471
SPB	13.7	312	130	IPU		17.70	0.00	4.20	4.36	0.00	-0.16	1.43		3.7	0.386
CIS	31.1	257	109	IPD		20.79	0.00	7.29	7.32	0.00	-0.03	1.43			0.505
LNA	35.4	3	55	IPD		21.80	0.00	8.30	8.07	0.00	0.23	1.43			0.208
LCL	42.0	344	55	IPD		23.00	0.00	9.50	9.12	0.00	0.38	1.43			0.155
CIW	44.0	270	55	IPD		22.78	0.00	9.26	9.44	0.00	-0.16	1.43			0.385
PVP	46.2	320	55	EPU		22.89	0.00	9.39	9.79	0.00	-0.40	1.43			0.160
VPD	48.1	37	55	IPD	2	23.15	0.00	9.65	10.10	0.00	-0.45	0.71			0.122
SNS	49.4	96	55	IPD	1	23.74	0.00	10.24	10.31	0.00	-0.07	1.07			0.825
TCC	58.3	5	55	IPD	3	25.40	0.00	11.90	11.73	0.00	0.17	0.36			0.013
ESG	58.8	328	55	EPU	1	25.52	0.00	12.02	11.80	0.00	0.22	1.07			0.085
IPC	60.4	337	55	EPU	2	25.84	0.00	12.34	12.05	0.00	0.29	0.71			0.037
HCM	64.6	335	55	IPU	2	26.90	0.00	13.40	12.73	0.00	0.67	0.71			0.037
GFP	76.3	344	55	EP		27.33	0.00	13.83	14.59	0.00	-0.76	1.43		3.9	0.155
SCY	78.7	334	55	EPU		28.29	0.00	14.79	14.99	0.00	-0.20	1.43			0.149
MWC	83.6	1	39	IPD	3	28.77	0.00	15.27	15.67	0.00	-0.40	0.36		4.0	0.012
SBI	88.3	271	39	EP	1	30.18	0.00	16.68	16.24	0.00	0.44	1.07			0.221
TWL	101.6	332	39	EPU	3	32.70	0.00	19.20	17.87	0.00	1.33	0.36			0.010
				ES	3	46.10	0.00	32.60	30.92	0.00	1.69	0.36			0.041
SYP	210.9	304	39	EP	3	46.10	0.00	32.60	31.19	0.00	1.41	0.36			0.013

FINAL TECHNICAL REPORT SUBMITTED TO THE

DEPARTMENT OF THE INTERIOR
MINERALS MANAGEMENT SERVICE

by the

CENTER FOR EARTH SCIENCES
UNIVERSITY OF SOUTHERN CALIFORNIA

CONTRACT NO.:	#14-08-0001-21195
PRINCIPAL INVESTIGATORS:	THOMAS L. HENYEY PROFESSOR OF GEOPHYSICS
	TA-LIANG TENG PROFESSOR OF GEOPHYSICS
GOVERNMENT TECHNICAL OFFICER:	JACK MC CARTHY
TITLE OF WORK:	SEISMIC STUDIES OF THE DOS CUADRAS AND BETA OFFSHORE OIL FIELDS, SOUTHERN CALIFORNIA OCS
EFFECTIVE DATE OF CONTRACT:	SEPTEMBER 30, 1982
CONTRACTION EXPIRATION DATE:	SEPTEMBER 30, 1983
AMOUNT OF CONTRACT:	$99,231

THIS WORK IS SPONSORED BY THE MINERALS MANAGEMENT SERVICE OF THE DEPARTMENT OF INTERIOR UNDER CONTRACT #14-08-0001-21195.

JANUARY, 1984

UNIVERSITY OF SOUTHERN CALIFORNIA GEOPHYSICS LABORATORY
TECHNICAL REPORT 84-1

I. ABSTRACT

The University of Southern California is monitoring seismicity in the areas of the Cos Cuadras and Beta Offshore Oil Fields, Southern California OCS. This report summarizes network operation and data analysis during the period from October 1, 1982 to September 30, 2983. Twenty-four (24) earthquakes were located in the vicinity of the Dos Cuadras field during the period, the largest being an M=2.7 event on December 2, 1982, ~ 5 km north of the field area. One hundred twenty-eight (128) earthquakes were located in the vicinity of the Los Angeles basin during this period. Only twelve (12) events were located within 15 km of the Beta Oil Field, the largest being an M=3.9 event on February 22, 1983. A magnitude 2.2 earthquake occurred on the Palos Verdes fault ~ 5 km south-southeast of the Beta Field on June 13, 1983. This earthquake was located at a depth of 14 km and appears to be a natural event.

In summary, all earthquakes in the vicinity of both oil fields appear to be natural events with no relation to oil field activities.

II. INTRODUCTION

The University of Southern California is monitoring seismicity in the areas of the Dos Cuadras Offshore Oil Field, Santa Barbara OCS, and the Beta Offshore Oil Field, San Pedro OCS. Performance under a contract (#14-08-0001-21195) from the Minerals Management Service of the Department of the Interior included: the maintenance of all field seismic stations and recording instruments in the laboratory; the daily continuous monitoring of seismic activities; the computer processing and interpretation of recorded seismic events; and the systematic archiving of all seismic records for future reference.

The major objectives in the continuing studies are:

1) To determine microearthquake activity and to study whether any fault movement might be caused by repressuring operations in the oil field areas, and
2) to serve as a precise epicenter location apparatus for all seismic events, and prevent those naturally occurring earthquakes on the Santa Barbara and San Pedro OCS from being directly attributed to the oil field injection operations.

III. BACKGROUND

A. Beta Offshore Oilfield, San Pedro OCS

The recent discoveries of petroleum below the shelf of San Pedro Bay, southern California, are entering into the production phases with the installation of drilling and production platforms. In particular, portions of OCS tracts 035-261 and 262 are under development. This area is adjacent to the active Palos Verdes fault and only about 15 km west of the important Newport-Inglewood fault zone and probable epicenter of the 1933 (M = 6.3) Long Beach earthquake. It is desirable that a program of seismic monitoring continue during the various phases of exploratory drilling and production. Of principal concern will be any causal relationships between oilfield activities and seismicity, particularly related to the Palos Verdes fault. Furthermore, better delineation of natural epicentral patterns will be useful in guiding further development in the region. U.S.C. has upgraded the existing coastal zone seismic network operated by the University of Southern California (USC) and installed three ocean bottom seismometers to improve detection in the offshore area. The locations of the three new OBS sites are shown in Figure 1; the locations of the Beta network and regional stations are listed in Table I.

The Beta field is located on the southeastern corner of the San Pedro Shelf (Figure 1) and straddles the Palos Verdes fault. The central San Pedro Shelf is a down-dropped block between the Palos Verdes fault and an unnamed series of faults to the northeast parallel to the coast (Junger and Wagner, 1977). Within this graben (Wilmington Graben) is a gently southeast dipping, thick upper Pliocene-Quaternary section. To the southwest, seaward of the Palos Verdes fault, late Neogene rocks of the Monterey (Modelo) and Repetto (?) are highly folded, and overlain unconformably by only a thin layer of flat

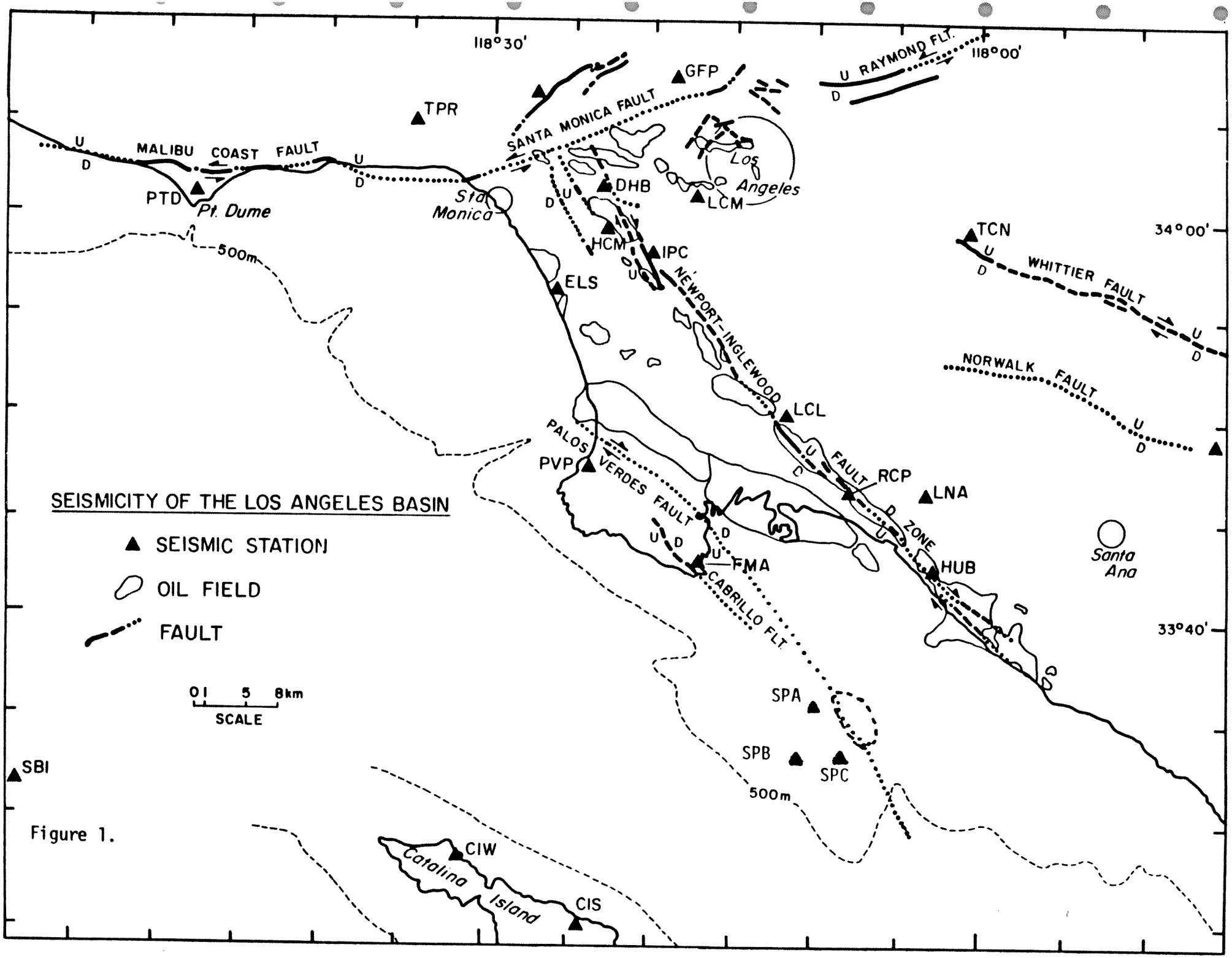

118°30'
118°00'
34°00'
33°40'
SANTA MONICA FAULT
MALIBU COAST FAULT
U RAYMOND FLT.
WHITTIER FAULT
NORWALK FAULT
NEWPORT-INGLEWOOD
PALOS VERDES FAULT
CABRILLO FLT
ZONE
FAULT
TPR
GFP
PTD
Pt. Dume
Sta Monica
DHB
LCM
Los Angeles
HCM
IPC
ELS
TCN
LCL
RCP
LNA
PVP
FMA
HUB
Santa Ana
SPA
SPB
SPC
SBI
CIW
CIS
Catalina Island
500m
SEISMICITY OF THE LOS ANGELES BASIN
SEISMIC STATION
OIL FIELD
FAULT
0 1 5 8km
SCALE

Figure 1.

TABLE I. Station Coordinates of the USC/MMS Beta Network.

Station Code	Latitude (N)	Longitude (W)
SPA	33°36.17'	118°10.49'
SPB	33°33.19'	118°11.19'
SPC	33°33.78'	118°08.37'
HUB	33°43.10'	118°02.01'
2 additional coastal sites to be added.		
Peripheral Stations of the Los Angeles Basin Network		
FMA	33°42.75'	118°17.47'
LCL	33°50.00'	118°12.41'
LNA	33°47.35'	118°03.27'
DTI	33°45.06'	118°13.25'
RCP	33°46.66'	118°08.00'
BHR	34°00.51'	118°21.71'
HCM	33°59.64'	118°22.98'
IPC	33°58.24'	118°20.07'
TPR	34°05.33'	118°35.20'
GFP	33°01.07'	118°18.59'
LCM	34°01.07'	118°17.22'
DHB	34°01.05'	118°23.13'
PVE	33°47.20'	118°24.15'
SBI	33°28.84'	119°01.72'
CIW	33°27.92'	118°33.10'
SCR	34°06.37'	118°27.25'
VPD	33°48.90'	117°45.70'
TCN	33°59.67'	118°00.77'
CIS	33°24.40'	118°24.40'

lying Holocene sediments (Greene et al., 1975). This relationship southwest of the fault is suggestive of an elevated basement contiguous with the Palos Verdes Hills uplift to the north. Oil accumulation is presumably related to structural and stratigraphic traps terminated along the Palos Verdes fault. The Palos Verdes fault in this region is a complex zone of en echelon to braided faults (Fischer et al., 1977). Apparent displacement along the zone is high angle reverse (southwest block up) with a component of wrenching or right-lateral slip. Although western faults within the zone are entirely within the Neogene bedrock units, progressively younger Quaternary units are involved to the east. Fischer et al. (1977) suggest that consistent westerly thinnning of Holocene units indicates continuous uplift along the zone during at least the past 150,000 years. In many places the fault strands break Holocene deposits as well as the sea floor. In addition to the active Palos Verdes fault, it is likely that an active fault conincides with the San Gabriel submarine canyon to the east of the tract areas (Fischer et al., 1977).

Evidence for epicenters directly attributable to the Palos Verdes fault zone is scant. In large part this is a result of poor seismic station control in the past. Several events (largest M = 3.8), possibly associated with the Palos Verdes fault near Redondo Beach have been reported in recent years (Teng et al., 1983). The M = 5.4 1941 Torrance-Gardena earthquake may also have occurred on this fault. However, experience suggests that a lack of epicenters along a fault does not establish inactivity, but rather may represent a seismic gap (location for future earthquakes), particularly where geomorphic evidence for Holocene movement is abundant.

The largest earthquake of consequence to the offshore tracts was the 1933 (M = 6.3) Long Beach earthquake with an epicenter 15 km to the east (Figure 2). Also shown in Figure 2 are the on-land and minimum probable offshore isoseismals for this event. Peak accelerations in the tract areas probably were $\geq$ 0.3 g. This event was apparently located along the Newport-Inglewood uplift, now recognized as the major strike-slip fault in southern California's coastal zone. Other notable nearby earthquakes along this zone include the M = 5.4 1933 Signal Hill and the M = 5.0 1941 Compton events.

B. Dos Cuadras Offshore Oilfield, Santa Barbara OCS

The Dos Cuadras offshore oilfield is a large, multi-zone anticlinal accumulation of oil in a sequence of early Pliocene sandstones and siltstones (McCulloch, 1969). The accumulation occurs in an elongate doubly-plunging, faulted culmination of the Rincon anticlinal trend. An area of roughly 1000 acres is producing from multiple sandstone reservoirs at subsea depths of 4000 feet and less. Development of the Dos Cuadras field began in 1968. Blowout of a well on platform A occurred on January 28, 1969 shutting down operations in the field.

The Dos Cuadras field is located in the eastern Santa Barbara Channel, a region characterized by numerous east-west trending faults (Jennings, 1975) and significant offshore seismicity (Hamilton, et al. 1969; Lee and Vedder, 1973; Lee, 1977; Henyey and Teng, 1975). Earthquake recurrence statistics (Henyey and Teng, 1975) suggest that the eastern Santa Barbara Channel is at least as seismically active as greater southern California. The largest earthquake during the period of ample statistical records (1932 to the present) occurred in 1941 (M = 5.9), less than 10 km south of the Dos Cuadras field. The 1925 Santa Barbara earthquake (M = 6.3) occurred some 25 km to the NW of the field. From June to August, 1968, an earthquake swarm was also

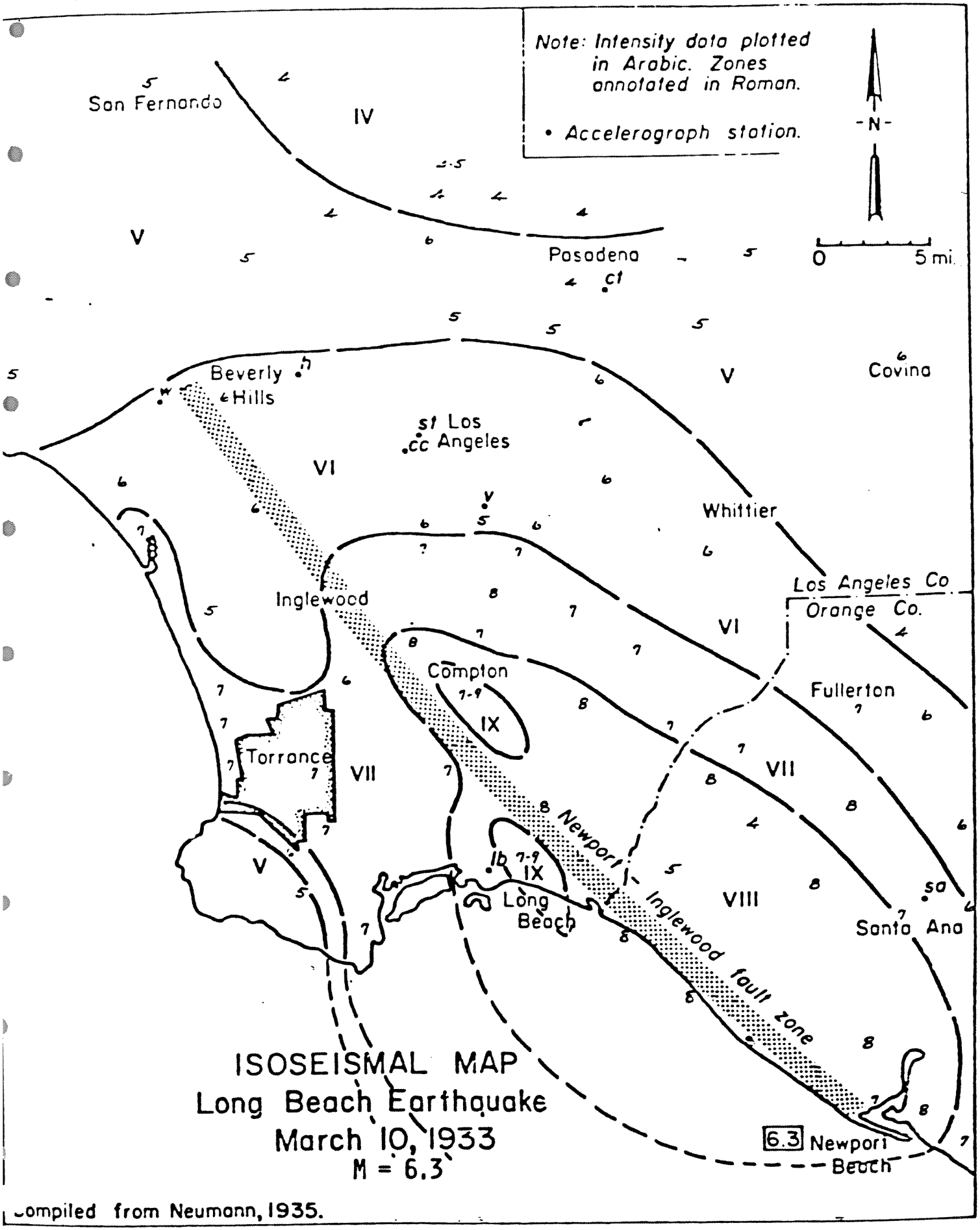


Figure 2. Isoseismals of Long Beach earthquake of March 10, 1933.

recorded several km southwest of the field in the center of the channel. On August 13, 1978, an M = 5.1 event occurred only 8 km to the northwest of the Dos Cuadras field. Subsequent lesser seismicity has occurred around the periphery of the field.

In order to address the seismic hazard of the Dos Cuadras field, the University of Southern California (U.S.C.) installed an eight element network, consisting of 5 ocean bottom seismometers and 3 land-based detectors in 1978 (Figure 3, see Table II). Two new OBS sites were installed in June, 1982. Data from these instruments, together with stations operated in the greater Santa Barbara area by USGS/Caltech (see Table II), are telemetered to a central recording facility at U.S.C.

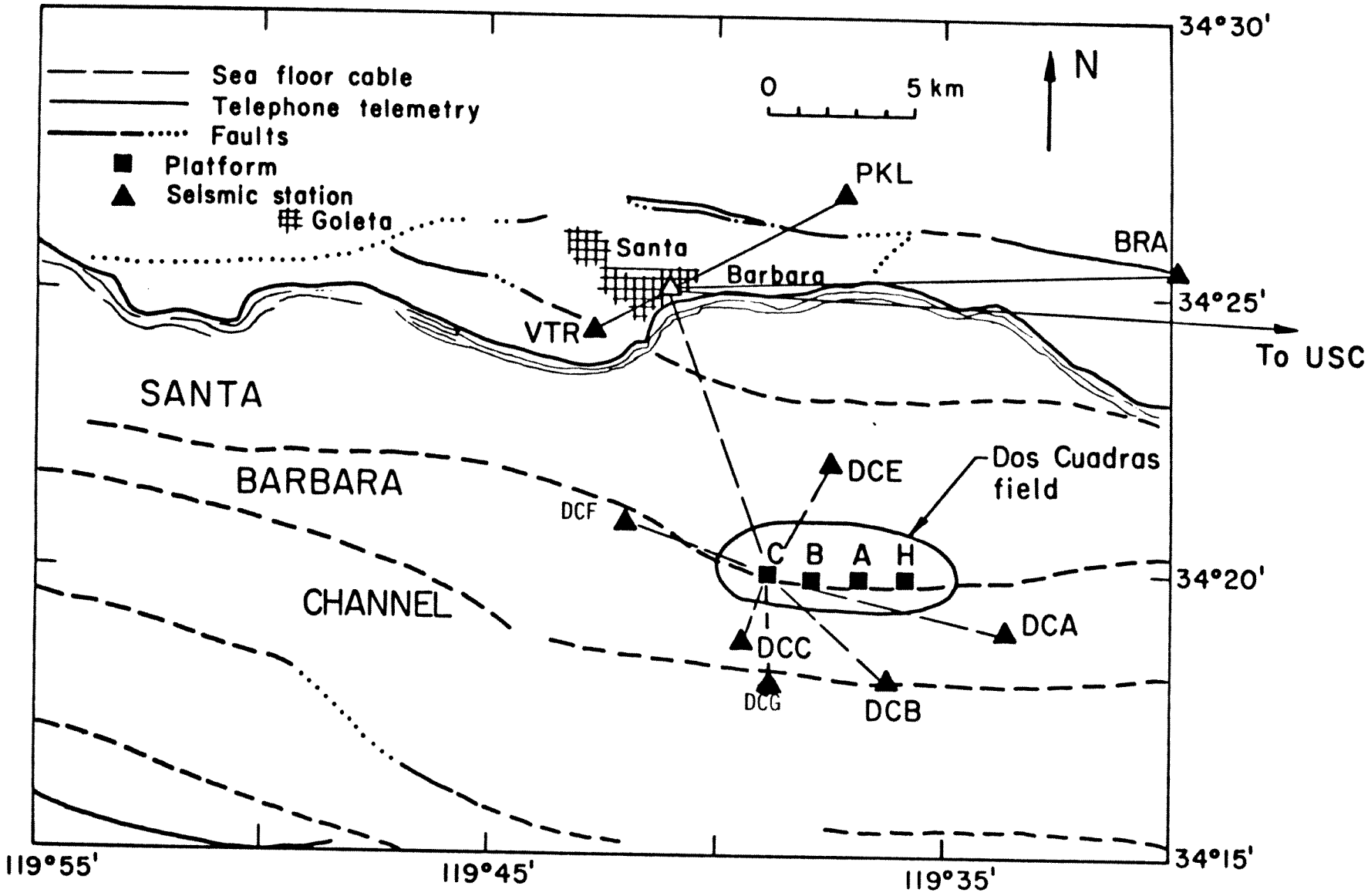
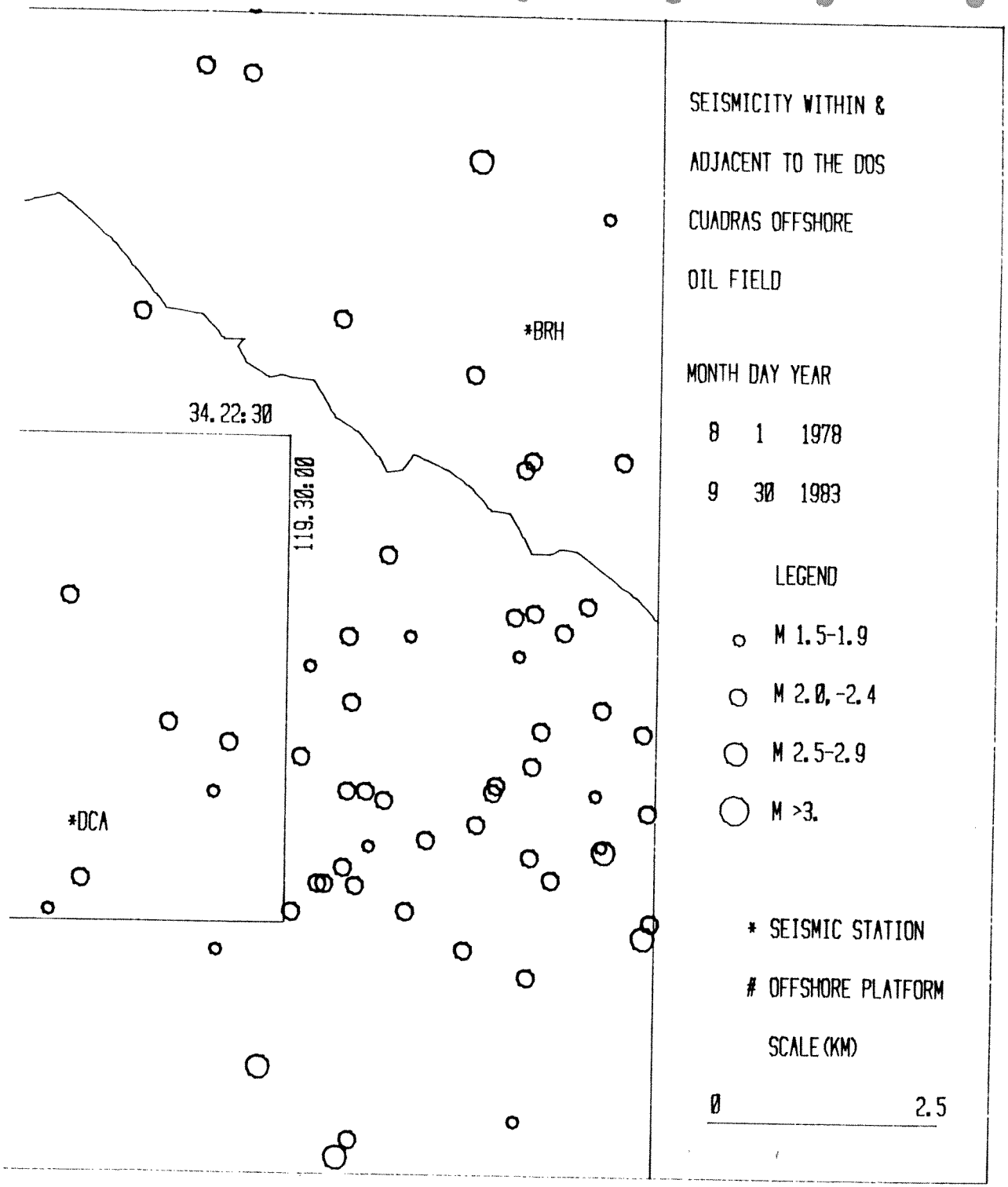


Figure 3. Location map of Dos Cuadras Field area showing location of seismic stations.

TABLE II. Station Coordinates of the USC/MMS Dos Cuadras Network.

Station Code	Latitude (N)	Longitude (W)	Elevation (m)
DCA	34°18.72'	119°33.68'	-76
DCB	34°17.26'	118°36.26'	-91
DCC	34°18.57'	119°39.35'	-82
DCE	34°22.00'	119°37.35'	-46
DCF	34°20.80'	119°39.97'	-51
DCG	34°17.19'	119°37.76'	-96
PKL	34°26.84'	119°36.98'	164
VTR	34°24.32'	119°42.85'	137
BHR	34°23.53'	119°26.97'	85
SBCC*	34°56.48'	120°10.32'	610
SBCD*	34°22.12'	119°20.63'	213
SBLC*	34°29.79'	119°42.81'	1190
SBLG*	34° 6.57'	119° 3.85'	415
SBLP*	34°33.62'	120°24.03'	134
SBSC*	33°59.68'	119°37.99'	457
SBSM*	34° 2.25'	120°20.99'	172
SBSN*	33°14.70'	119°30.40'	259

*Monitored from Caltech.


SEISMICITY WITHIN &
ADJACENT TO THE DOS
CUADRAS OFFSHORE
OIL FIELD
MONTH DAY YEAR
8 1 1978
9 30 1983
LEGEND
M 1.5-1.9
M 2.0,-2.4
M 2.5-2.9
M >3.
* SEISMIC STATION
# OFFSHORE PLATFORM
SCALE(KM)
0
2.5
*BRH
*DCA
34.22:30
119.30:00

4. Activity which began July 23, 1980 with a M=3.7 event just southwest of the field area.

San Pedro Shelf Area:

There were 120 events large enough to be located and catalogued during this time period in the Los Angeles Basin area. 12 events in the San Pedro OCS were located within 15 km of the Beta Oil Field. As this is the first year of seismic monitoring with greatly improved epicentral locations in the shelf area, it is too early to draw conclusions on the seismicity of the field area.

In the greater L.A. Basin area, aftershocks from the September 4, 1981 M=5 Santa Barbara Island earthquake continue, although decreasing in number. To the south of the island, a related sequence of earthquakes which occurred early in 1982, has apparently died out completely.

In the Los Angeles basin proper, most of the seismicity appears to be associated with the Newport-Inglewood fault zone, although the pattern is diffuse and we are unable to assign causal faults. The pattern is similar to previous years, with more northerly earthquakes showing locations east of the fault zone and more southerly earthquakes showing locations to the west.

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Appendix 7

Review Comments and Related Correspondence from
Other Agencies

National Marine Fisheries Service
U.S. Coast Guard
U.S. Fish and Wildlife Service

United States Department of the Interior

FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
24000 Avila Road
Laguna Niguel, California 92677

April 23, 1984

NOTED-DUNAWAY

Memorandum

To: Regional Supervisor, Field Operations Office
Minerals Management Service, Los Angeles, CA

From: Field Supervisor (ES), Laguna Niguel, CA

Subject: OCS P-0301, Development Production Plan for Platform Eureka, Beta Unit - Shell California Production Incorporated

This memo is in response to your memorandum of March 16, 1984. Under policy described in 655 DM 1, the Fish and Wildlife Service (FWS) is providing the following review comments on the Environmental Report (ER) for Platform Eureka--Beta Unit. We understand that Platform Eureka will be tied into oil and gas pipelines and power generation and crude treatment facilities on existing Platforms Elly and Edith in the Beta Unit, approximately 14.5 kilometers west southwest of Huntington Beach in a water depth of 213 meters.

General Comments

We found the environmental content of the Production Plan and ER to be current and generally complete. Specific comments relate primarily to issues involving endangered species. As Platform Eureka is the last platform planned for the Beta Unit and will be utilizing some existing facilities on other platforms, the FWS foresees no significant problems with proceeding with the production plans proposed by Shell California Production Incorporated.

Specific Comments

Pages 3-74 to 3-82. The text is a good description of soft bottom communities of the Southern California Bight. However, Figure 3.1-6 on page 3-15 depicts oil and gas pipelines crossing bedrock outcropping areas. Benthic communities associated with hard bottom substrate need to be described and assessed for potential impacts.

Page 3-92. Additions to the list of endangered species include the State listed bird, Belding's savannah sparrow, and the Federal and State listed endangered plant, saltmarsh bird's beak. The California least tern is found along the coast from April to September, not the dates of September to mid-March as stated in the text, and the tern nests at the mouth of the Santa Ana River. The light-footed clapper rail is a year-round resident of Upper Newport Bay.

Page 4-35. In describing the effects of oils trapped in the sediments, the text attributes the source of the oils to natural oil seeps. The Geology Section of the ER does not describe any oil seeps in the project area. Therefore, either the Geology Section needs to describe any oil seeps in the project area or any reference to the accumulation of oils into soft sediments from natural seeps needs to be deleted.

Page 4-45. The potential loss of epifaunal resources due to anchors and anchor chains on bedrock outcroppings needs to be described. Since recolonization rates on offshore, hard bottom substrates can be prolonged, the recovery of these habitats could result in localized, long-term impacts. Changes in the benthic communities on the rocky outcroppings could affect the distribution of some fish species, especially rockfish (Sebastes sp.) which utilize the epifauna as a food resource.

Page 4-62. The list of Federal and/or State endangered species for Upper Newport Bay is applicable to Bolsa Chica and Anaheim Bay and should also contain the endangered plant, saltmarsh bird's beak.

Page 4-64. The vulnerability of the endangered California brown pelican to oil spills needs to be described, especially since it is a diving seabird, relies on Pacific anchovy as a food source, and is found in the project area throughout the year.

If you should have any questions on the above, please contact John Wolfe at FTS 796-4270.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southwest Region
300 South Ferry Street
Terminal Island, California 90731

April 26, 1983

F/SWR33:JJS
1503-06

Mr. Thomas W. Dunaway
Regional Supervisor
Offshore Field Operations
Minerals Management Service
Pacific OCS Region
1340 West Sixth Street - Mail Stop 150
Los Angeles, CA 90017

NOTED-DUNAWAY

Dear Mr. Dunaway:

We have reviewed the Environmental Report for "Development and Production Plan - Beta Unit, OCS-P-0301" (Shell California Production, Inc.) offshore California.

The information presented in the document on commercial fishing is thorough and up-to-date. The expected conflicts with commercial fishing from the placement and operation of one additional platform in the Beta Unit do not appear to be significant. We also foresee no significant impacts to the marine mammals or endangered species for which the National Marine Fisheries Service has a responsibility.

Sincerely yours,

Rodney R. McInnis

for E.C. Fullerton
Regional Director

cc:
FWS, Wolfe
CDFG, Nitsos

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

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16475/SHELL
22 March 1984

NOTED-DUNAWAY

Mr. T. W. Dunaway
Minerals Management Service
1340 W. Sixth St.
Los Angeles, CA 90017

Re: ER/DPP for OCS P-0301 and
Platform EUREKA

Dear Mr. Dunaway:

The Development and Production Plan (DPP) and accompanying Environmental Report (ER) for the above referenced tract have been reviewed. Subject to the following comments, the Coast Guard has no objections to construction of the proposed platform by Shell California Production, Inc.

The Oil Spill Contingency Plan has been reviewed and recommended for approval. Shell's spill plan for the Beta Unit, which includes Platform EUREKA, contained the potential use of dispersants (COREXIT 9527) in case of a spill. Based on recent discussions with persons experienced in the use of dispersants and Beta oil characteristics, it is questionable if Shell will have any success with COREXIT 9527 on a spill. Before spudding of its first well, Shell should evaluate the performance of dispersants on the Beta oil and determine which, if any, may be effective and under what conditions in controlling spilled Beta crude.

Shell must contact the Eleventh Coast Guard District Aids to Navigation Branch at least two weeks prior to any construction to inform them of the type of equipment performing the work, inclusive dates necessary to complete their project and any other possible hazard to navigation so that pertinent Notice to Mariners can be issued. Also, they can be consulted concerning the requirements for the lighting and marking of hazards to navigation. A telephone update on the project is required every Monday morning to insure the current Notice to Mariners is correct. The Application for Private Aids to Navigation and further details can be obtained from the Eleventh Coast Guard District Aids to Navigation Branch (213) 590-2222.

The Commander, Eleventh Coast Guard District will establish a safety zone of 500 meters around the platform during and after construction. All support vessels for the project are to obey Rule 10 of the International Navigational Rules when commuting to

and from or at the construction site. Thank you for the opportunity to comment on these documents and, if you have any questions, feel free to contact me at the above address or telephone number.

Sincerely,

R. S. VARANKO
Lieutenant Commander, U.S. Coast Guard
Chief, Outer Continental Shelf Branch
By direction of the District Commander