ENVIRONMENTAL REPORT

DEVELOPMENT • PRODUCTION

HUENEME OFFSHORE PLATFORM AND ONSHORE FACILITY FOR UNION OIL COMPANY OF CALIFORNIA

BLOCK 350 – 351
LEASES OCS P – 0202 AND OCS P – 0203

DECEMBER 1978

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HUENEME OFFSHORE PLATFORM
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1.0 Introduction

1.1 General

The first offshore development of oil and gas resources in the United States began in the tidelands of the Santa Barbara Channel in 1896. The first state leases were sold in the 1950's. Today there are approximately 33 state oil and gas leases in the Channel and approximately an additional 65 active leases on the Outer Continental Shelf (OCS) under federal territorial control through the U.S. Geological Survey (USGS) Office of The Department of the Interior. Production from these leases is declining, most of which will be exhausted by the year 2000. Nevertheless, continuing demands by industry and a consumptive public produce demands upon these resources which have become an integral part of the national economy.

The coastal and offshore areas of Southern California are richly endowed with irreplaceable natural resources. California's warm ocean waters, temperate climate, islands, and coastal habitats support a diversity of marine mammals, fish, shellfish and other marine organisms, as well as terrestrial plants, animals, and birds. Some of the species are either rare or endangered. All are considered to form a part of the ecosystem which, in part, reflects upon man's dependency of the marine food chain and its supportive industries.

California industries which are dependent upon these resources include commercial and sportfishing, agriculture, pharmaceutical and tourism, to name a few. Also, by virtue of its underlying geological structure this area is one of the more attractive regions in the United States for oil and gas development.

1.2 Purpose

It is the purpose of the Environmental Report to delineate all activities proposed by Union Oil Company of California, in the development and production of OCS oil and gas reservoirs contained in leases P-0202 and P-0203 of the Hueneme offshore fields. This report seeks to identify all environmental and safety features required by law together with such additional measures Union proposes for safeguarding the environment. All information in this report is that which is currently available.

1.3 Proposed Project

As the sole lessee and operator for the Hueneme offshore field, Union Oil Company of California, proposes the following project for development and production of oil and natural gas reserves.

1) A fifteen-slot, bottom supported platform with sustaining equipment,
2) An oil, gas and produced water transporting pipeline to,
3) An onshore facility for separation of, oil and gas for delivery to existing onshore transport pipelines.

The Hueneme field is located on the Outer Continental Shelf (OCS) in the southwest corner of the Santa Barbara Channel, approximately four miles southwest from the city of Port Hueneme, California, blocks 350 & 351, lease designation OCS-P0202 and OCS-P0203. Discoveries were made in lease OCS-P0202 in June, 1969 and in lease OCS-P0203 in August 1969 (Ref. 1, P. 1 - 12). Mobil and Union were equal partners in these leases, formerly tracts 350 and 351, which were acquired in a Federal lease sale in April, 1968. On October 19, 1978 Mobil assigned their interest to Union.

Information pertaining to lease resevoir evaluations, production rates and other related information is to be found in the "Plan of Development" under the subject of "Resevoir Evaluation".

An orientation plot is shown in Exhibit A

2.0 Offshore Platform and Onshore Facility Descriptions

The location and general description of the proposed offshore platform and onshore facility and, their size are included in this section.

2.1 Offshore Platform

The offshore platform is situated in approximately 95 feet of water MLLW (mean lower low water) on the OCS approximately 4 1/2 miles westerly from Port Hueneme, California and approximately 8 miles easterly from the Anacapa Island outcropping. The Lambert Projection Grid Coordinates of the site are: x = 1,084,062 and y = 723,005. The platform will be located on lease OCS-P0202. A plot plan of the Santa Barbara Channel which is oriented to related OCS facilities is shown in Exhibit B.

The platform will be a six pile, steel structure supported on the seafloor by pilings driven or drilled in the seafloor substratum. Pilings will penetrate the substratum to a depth to satisfy all safety requirements as set forth in API RP-2A (latest addition) and in conformance with other applicable standards of USGS. Design parameters for the pilings will be based upon recommendations provided in a report by Geotechnical Consultants Inc. of the geological conditions at the specific site (Ref. 11). This report is incorporated herein by reference.

When operational, the platform will contain drilling and production equipment for development of the oil field, storage facilities for water, diesel fuel, lubricants, and solid and liquid wastes; space to support such equipment as compressors, pumps, electrical generators, pumps, fire and spill prevention equipment.

2.2 Onshore Facility

Oil, produced water and gas will come onshore through a pig receiver, at a temperature of 50F. Using waste cooling water from the adjacent Southern California Edison Co., Mandalay Steam Station, the oil will be heated to a temperature of +80F and passed into a Free Water Knock-Out Unit (FWKO) (1000 BBL capacity) where the natural gases and water are extracted from the oil. The oil, then, passes through a gas-fired heater treater for processing to pipeline specifications. Leaving the heater treater, the processed oil enters a shipping surge tank and an LACT unit before delivery to the existing transport pipeline. All produced water will be accumulated in a wash tank for further treatment in an induced flotation cell. From the cell, the clarified produced water will be pumped back to the platform for reinjection into the reservoir. Oil and water from the flotation cell and wash tank, passes to a small, high-temperature gas-fired heater treater for further treatment. Accumulated sand, sludge, and untreatable oil will be discharged to a vacuum sealed sump. Periodically the sump is evacuated into a sealed tank transport vehicle for final disposal in a Class I disposal site. Oil, and sales gas will be shipped in lines which presently exist in proximity to the onshore facility. Exhibit F depicts the schematic arrangement of the proposed onshore site.

The proposed onshore facility will be located immediately southward and adjacent to the property line of the Mandalay Steam Station of Southern California Edison Co.. The site contains approximately 1.5 acres with approximately 250 ft of ocean beach frontage. The block in which the site parcel is located is recorded in the Ventura County Assessors Map Bk. 183-P.01, as part of block 146. Exhibit E, is a plot of the proposed site which

contains the parcel dimensions and Lambert Projection Coordinates.

The property will be enclosed with a 10 ft high concrete block wall and will be lanscaped to the general specifications of the City of Oxnard Public Works Department. The property adjacent to the southern perimeter of the site consists of approximately 80 acres which, at the present time, is undeveloped. Future plans for this tract are development into a County of Ventura park, to be called, Mandalay Beach Park. Access to the site is by easement (applied for) from either Harbor Blvd. on the east or, West 5th Street on the south. The facility will be located approximately 300 feet inland from the beach. Public access to the beach will be provided where none now exists.

3.0 Staging and Fabricating Area Requirements

3.1 Offshore Componants

The amount of acreage required within a state for fabricating handling and pretreating--(painting, special coatings, etc.)--is difficult to access since, major equipment items are purchased by contract. Also, the possibility exists that some major equipment componants would be manufactured (by specification) outside of the United States. In a broad sense, however, it is possible to make order-of-magnitude estimates of the space required for assembly by others of major equipment componants, if, they were to be obtained from domestic sources. It is assumed, of course, that the platform would be fabricated at either a west coast or gulf coast seaport and that its obvious mode of transportation would be by barge to the Hueneme offshore site. Further, decks for the platform, for example, would be fabricated as subassemblies for final assembly and attachment at the platform site. Again, the mode of transport by virtue of the subassembly size and the ultimate destination would compel fabricating these subassemblies at the seaport location.

In determining space requirements for fabricating the offshore equipment the following tabulation is made:

EQUIP. COMPONENT	ESTM. FABRICATING AREA REQUIREMENT
platform rig	7 acres
pilings	2 acres
deck subassemblies	3 acres
crane and pedestal	2 acres
pipeline subassemblies and coating	15 acres
miscl. equipment	2 acres
TOTAL	31 acres

It is reasonable to assume that contractors would utilize existing facilities. Therefore no new facilities would be required in manufacturing these componants.

3.2 Onshore Facility

Space required for at site storage and staging of equipment for the onshore facility is estimated to be five acres. In addition to the staging area, an easement for use of the existing roadway at the site location will be required. Use of the staging area is estimated to be for a period of six months. Easement for use of the roadway would be permenant.

4.0 Transportation of Oil and Gas to Shore

4.1 Routing

Pipeline routing decisions provide the best combination of lease distance, shallowest water depth, and avoidance of geological hazards. In the Santa Barbara Channel, the shortest routes from oil and gas fields to shore are also the shallowest. (Ref. 5, P. 75) Emulsified oil, natural gas and produced water are transported from the well site in a 10.75" O.D. x .500 wall steel gathering pipeline for process separation at the onshore facility. Exhibit G, is a sketch showing the routing of the pipeline from the platform to the onshore facility.

The pipeline is approximately 6-1/2 miles at length and orginates in OCS waters at the platform site. Moving in a northerly direction along the Channel floor, it passes through State waters to a location approximately 5,000 feet offshore, where it curves to move onshore perpendicular to the shoreline, at the location of the onshore processing facility.

4.2 Estimated oil and Gas Flows

Estimated average flow of oil is: 6,000 barrels per day. Estimated average flow of natural gas is: 1,200,000 cubic feet per day.

4.3 Other Transport Facilities

4.3.1 Steel Injection Water Pipeline

A 6-5/8" O.D. x .250 wall steel injection water pipeline will be used to return produced water to the offshore platform for injection into the producing formation to maintaining the formation pressure. It is estimated that 7,000 barrels of water per day will be used.

4.3.2 Power Cable

A power cable of sufficient size to accommodate all power requirements at the platform will be provided.

4.3.3 Telephone Cable

A telephone cable which is an intergal part of the power cable, between the onshore facility and the platform will allow telemetery of commands and retrieval of data by the base control module at a major equipment componant at either the platform, or, at the onshore facility will automatically initiate a fail-safe condition of all systems.

4.4 Instatllation - Pipelines and Cables

Offshore pipelines may be buried for various reasons, but most important is the safety of the line against damage. Such damage can be caused by anchors, fishing operations, currents, etc.. (Ref. 1, P. I - 117)

Pipelines and cables connecting the platform and onshore facility will be installed in accordance with the applicable procedures of the USGS and other agencies having jurisdiction. Burial is usually affected by jetting sediment away from underneath the pipeline and allowing it to sink into the resulting trench.

4.5 Pipeline Coating and Corrosion Protection

To prevent corrosion, offshore pipelines are carefully coated with such

materials as epoxy compounds or thick asphaltic mastic. Lines are protected from electrolysis by both impressed current systems and by sacrificial anodes (zinc is commonly used).

5.0 Frequency of Boat and Aircraft Travel

5.1 Boat Departures and Arrivals

Crew boat departures from Port Hueneme to the offshore platform will comprise 3 round trips daily during the period March, 1979, to February, 1980. For the most part, crew boats will go directly to the platform, although, during the period of pipeline laying, November, 1979 through December, 1979, trips to the platform location may require travel to the pipelaying barges at their progress location along the route of the proposed oil and gas transport line. After February, 1980 the number of daily trips will be reduced to approximately one trip per day until full-production is attained afterwhich, trips to the platform area will be on an as-needed-basis.

Supply boat trips from Port Hueneme will average once-daily during the 11 month construction phase from March, 1979, to February, 1980, and reduced, thereafter, to an as-needed-basis.

5.2 Aircraft Departures and Arrivals

Aircraft departures from the Oxnard airport to the platform site will average approximately 3 to 4 trips per month during the construction phase. After February, 1980, aircraft departures and arrivals at the platform will be on an as-needed-basis.

Aircraft departures and arrivals at the Oxnard airport will be monitored by the FAA in accordance with the flight plans so that no conflict will occur with other aircraft operating within the area.

6.0 Disposal of Solid, Liquid and Gaseous Wastes

The disposal of solid, liquid and gaseous wastes is far-reaching, in that, it virtually effects all areas of activity during the development and operational phases of the program. Inadvertant spillage of minor amounts of debris, drilling muds, liquids, etc. and, release of gaseous pollutants are difficult to assess and quantify, therefore, the subject of these wastes and their control is directed toward a conscientious program of preventative measures to control accidental releases to the environment. Each of three classes of wastes can be characterized as those which are degradable and those which are nondegradable.

6.1 Solid Waste

Solid wastes include but are not limited to: trash & garbage, drilled cuttings, metals, wood, plastics, etc.. Drilled cuttings are frequently washed and deposited on the ocean floor where they could result in adverse impacts on sedentary bottom-dwelling organisms in the covered area. Otherwise, the cuttings should have no adverse impact on aquatic resources. Other solid wastes will require collection and containment for suitable disposal at appropriate onshore facilities. At the platform site solid wastes would be transfered to the supply vessel in their appropriate containers to prevent accidental spillage. At the onshore facility, disposal of solid wastes would be under state and local control.

6.2 Liquid Wastes

Liquid wastes are: sewage, spent lubricating oil, drilling muds, toxic chemicals, wash water, solvents, produced waste water, etc. each classification of liquid wastes will require separate containment vessels

consistant with EPA and county regulations for their ultimate disposal.

Produced waste water is treated at the onshore facility as previously discussed and disposed of by injection at the well site. The quantity of produced waste water injection is in the neighborhood of 7,500 barrels per day.

6.3 Gaseous Wastes

Gaseous wastes in the proposed operation primarily relate to emissions from internal combustion engines; a subject which is fully covered in the Air Pollution section of this report. Since drilling muds are used to seal the well bore hole the only other probable source for hydrocarbons entering the atmosphere is during the screening operation to remove cuttings from the circulated drill muds. In this operation a small amount of emulsified gas in the mud is released. The amount of gas released, however, is such a small amount that it will not adversely effect National Ambient Air Quality Standards.

7.0 RESOURCE REQUIREMENTS

The requirement for land, labor, energy and materials for the previously identified items are included herein.

7.1 LAND RESOURCE REQUIREMENT

Land area requirement for the proposed onshore facility is 1.5 acres. In addition, approximately 5 acres in proximity to the construction site will be required for staging (shake-out) of the equipment to be installed within the compound of the onshore facility, including area required for roadway easement.

Materials and supplies received at the harbor of Port Hueneme will be loaded directly onboard the supply boat or barges.

7.2 PROJECT WORKFORCE

The schedules shown in figures 1 , 2 , 3 , 4 , 5 , delineate the specific task: month and year the task is to be performed: number of persons required and duration of employment by craft or skill for onshore development and production activities. It is anticipated that all personnel will be recruited from the local labor markets and from present area-based Union Oil Company personnel. Land transportation of supplies or equipment will be furnished by Union Oil Company or by common carriers regularly serving the general locale.

7.2.1 TYPES OF CONTRACTORS TO BE USED:

general

electrical

engineering

mechanical

earth moving

transportation & heavy equipment

7.2.2 TYPES OF VENDORS

general oilfield suppliers

suppliers of oil field processing equipment

7.3 DEMOGRAPHIC INFLUENCES RELATING TO THE PROJECT

The labor force required to operate (or, monitor the operation of) the proposed offshore platform and onshore facility can be met from within Union's present local labor force. Therefore, there should be no impacts on population, housing and public services.

7.3 ENERGY, RESOURCES AND SUPPLIES

7.3.1 ELECTRICAL ENERGY to be consumed during the construction and development of the proposed project is approximately 3,000 kilovolt-amperes until February, 1980, and 750 kilovolt-amperes thereafter.

7.3.2 DIESEL FUEL consumption during the erection and development period for the project will be approximately 50,000 gallons. (until February 1980). Thereafter, diesel fuel usage will be in the neighborhood of 10,000 gallons annually.

7.3.3 NATURAL GAS will be consumed at the onshore facility only and will be restricted to use in the heater treaters. Under "worst condition" fuel usage will total 7 mm BTU/HR, or, 10 therms of natural gas per hr.. The source will be gas produced from the Hueneme field.

7.3.4 GASOLINE usage will be restricted to personal transportation of company employees, employees of contractors and vendors, and delivery of small items to the onshore site and embarkation point of the crew and supply vessels. Since the amount of gasoline used is not beyond "normal usage" it is not considered as project impact related.

7.3.5 OIL used (for lubrication) during the construction and development phases of the project is estimated to be 30 bbls.

7.4 POTABLE WATER

Water consumption expected during the construction and development phases of the project will average the equivalent amount used by a single family dwelling, after which, during the production phase, water required will substantially diminish.

7.5 SUPPLIES AND EQUIPMENT

7.5.1 STEEL PIPE

Approximately 34,000 feet of 10" O.D. (NOM) X .500 wall steel pipe will be purchased for the gathering transport line from the well site to the onshore facility and 34,000 feet of 6" O.D. (NOM.) X .250 wall steel pipe for the produced water return line to the well site for injection. In addition there will be other related pipe componants such as fittings and valves to be used at both the platform and onshore locations.

7.5.2 TOWER AND PLATFORM DECKS

The tower and platforms are sizeable steel structures which are fabricated at locations remote to the site. Usually they are prefabricated in sections that can readily be handled at the erecting site and delivered by barge(s). At the site, the tower is floated and then submerged in an upright position. Piling is then driven thru the tower legs. After erection of the tower, the decks are attached.

7.5.3 EQUIPMENT

Equipment for installation on the platform and equipment to be installed at the onshore site are obtained from a variety of sources from within the United States and from foreign suppliers. For the most part, the equipment is shipped by rail or truck, if of domestic origin, and by ship if it is arriving from foreign sources.

7.6 Project Duration

The time frame for the proposed project schedule setting forth major tasks and milestones (approvals or completion) are shown in figure 6 . Each of these tasks are shown in their sequence and are projected on a month to month basis. For further definitive task information, refer to figures 1, 2, 3, 4, 5, under the heading, "Task Schedule".

Total time required to construct and develop this project is approximately 14 months.

PROPOSED PROJECT WORKFORCE

OFFSHORE CONSTRUCTION SCHEDULE

TASK	TASK SCHEDULE	CRAFT OR SKILL	NO. OF PERSONS	EMPLOYMENT DURATION
Platform Rig-up	Jan. 1979	Drilling Crews(3)	18	30 DAYS
	Feb. 1979	Crane Operators	2	30 DAYS
		Supervisors	3	30 DAYS
		Welders	10	30 DAYS
		Electricians	10	30 DAYS
Production Deck & Support Systems	Jan. 1979	Welder Fitters	16	30 DAYS
		Laborers	8	30 DAYS
		Electricians	12	30 DAYS

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figure 1

PROPOSED WORK FORCE

OFFSHORE DRILLING & PRODUCTION SCHEDULE

TASK	TASK SCHEDULE	CRAFT OR SKILL	NO. OF PERSONS	EMPLOYMENT DURATION
Drilling & Production	Mar. 1979 to Feb. 1980	Drilling Crews (3)	18	11 MOS.
		Crane Operators	2	11 MOS.
		Welders	1	11 MOS.
Start-up Production	April 1979 to Feb. 1980	Operating Crew(1)	8*	10 MOS.
In Production	April 1979 to Feb. 1980	Production Pers.	1**	10 MOS.
In Production	after Feb. 1980	Production Pers.	8	------
Well Work-over	after Feb. 1980	Miscl.	15	1 MO/YR.

* Time Divided for 24 hr. coverage

** On duty 50% of time

figure 2

PROPOSED PROJECT WORKFORCE

ONSHORE CONSTRUCTION SCHEDULE

TASK	TASK SCHEDULE	CRAFT OR SKILL	NO. OF PERSONS	EMPLOYMENT DURATION
Site Preparation	July 1979	laborers	10	10 WKS.
Construct Fence		carp. & helpers	10	10 WKS
Foundations		oper. engrs.	6	3 WKS
		road repair gang	10	2 WKS
Install Equipment	Oct. 1979 thru Dec. 1979	welders & fitters	12	12 WKS.
		electricians	6	10 WKS.
		oper. engrs.	2	4 WKS.
		laborers	5	12 WKS.
		painters	6	4 WKS.

Not included: Supervision, Professional Engineers & Draftsmen

figure 3

PROPOSED PROJECT WORKFORCE

ONSHORE/NEAR SHORE
PIPELINE CONSTRUCTION SCHEDULE

TASK	TASK SCHEDULE	CRAFT OR SKILL	NO. OF PERSONS	EMPLOYMENT DURATION
Pipeline Construction	Nov. 1979 thru Dec. 1979	welders	20	8 WKS.
		x-ray tech.	2	8 WKS.
		laborers	10	8 WKS.
		divers	4	1 WK.

Not Included: Supervision, Professional Engineers & Cartographers

figure 4

PROPOSED PROJECT WORKFORCE

OFFSHORE CONSTRUCTION SCHEDULE

TASK	TASK SCHEDULE	CRAFT OR SKILL	NO. OF PERSONS	EMPLOYMENT DURATION
Pipeline	Dec. 1979	(Superintendents	2	15 DAYS
		(Engineers	2	15 Days
		(Timekeepers	2	15 DAYS
		(Mechcanics	6	15 DAYS
		(Electricians	4	15 DAYS
		(Cooks & Stewards	13	15 DAYS
Pipeline	Dec. 1979	(Oper. Engineers	8	15 DAYS
		(Riggers	8	15 DAYS
		(Welders	12	15 Days
		(Gen'l Foremen	2	15 DAYS
Lay Power Cable	Dec. 1979	(Barge Crew	10	2 DAYS
		(Diver	1	1 DAY

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figure 5

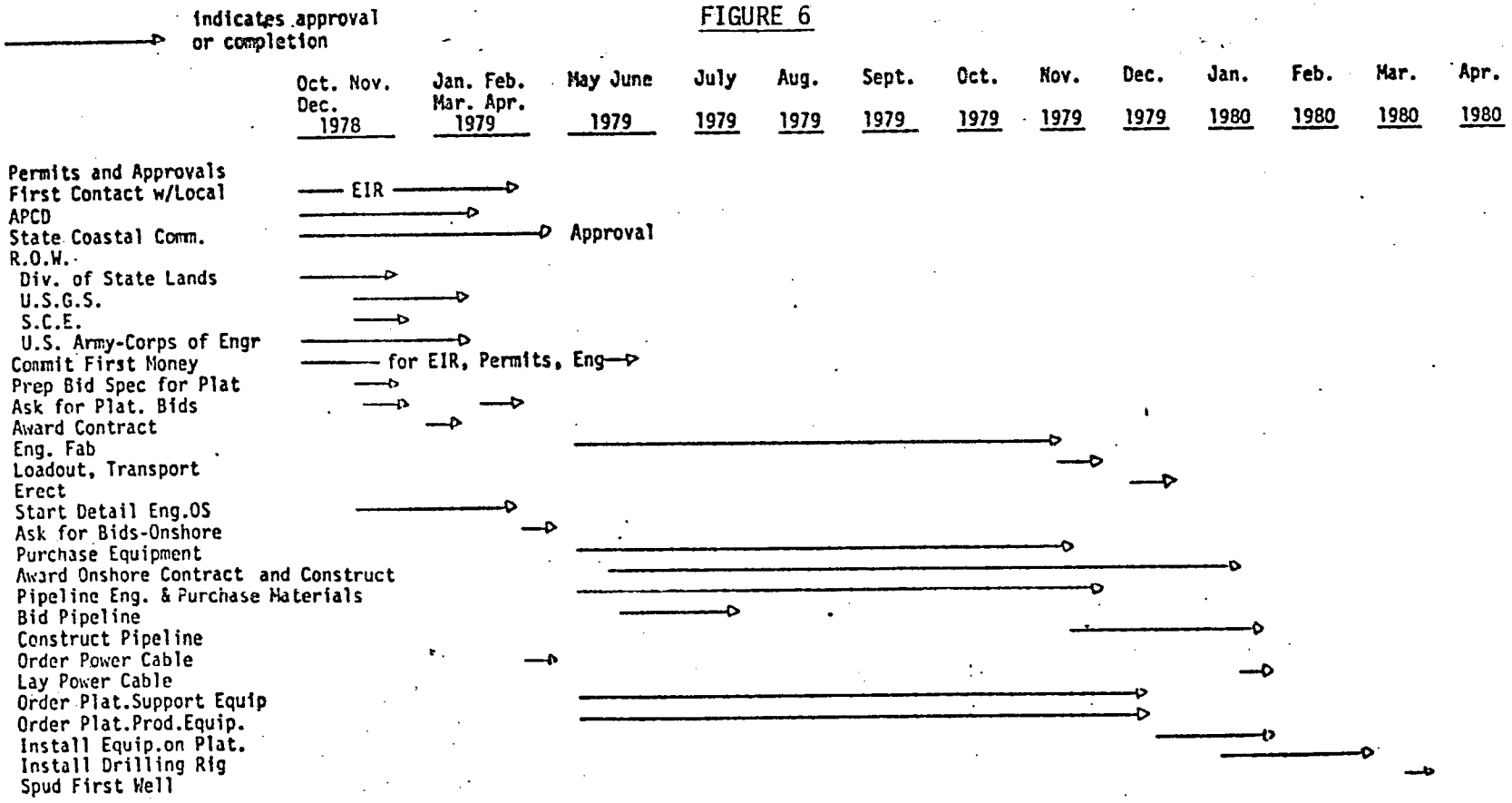

FIGURE 6

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8.0 Effect Upon Environmentally Sensitive or Potentially Hazardous Areas and Alternative Considerations

Those areas considered environmentally sensitive or potentially hazardous and which might be affected by the proposed development and production activities in the Santa Barbara Channel include, but are not necessarily limited to: cultural, biological (e.g. fisheries), archeological or geological (e.g. seismic) significance and areas of particular concern designated by affected states pursuant to the Coastal Zone Management Act. In this part of the report, alternative considerations and the actions to be taken to preserve and protect such areas are described and discussed.

8.1 Environmentally Sensitive Areas

Those areas which are state and federally designated environmentally sensitive are:

Marine Sanctuaries

Estuarine Sanctuaries

National Monuments

State Oil and Gas Sanctuaries

Areas of Special Biological Significance (ASBS)

Ecological Reserves and Marine Life Refuges

Consideration has been given to possible designation by the Secretary of Commerce of the waters within twelve miles of the Channel Islands as a marine sanctuary in order to preserve and protect the habitat for endemic species and as foraging grounds for sea birds and pinnipeds. However, at this time no such designation has been made. (Ref. 5, P. 336)

No estuarine sancturaies or marine life refuges presently exist in proximity to the proposed OCS platform site. The only candidate area in southern California for designation as an estuarine sanctuary is upper Newport Bay, which is not threatened by OCS development. (Ref. 5,P. 336)

The one existing national monument in the Santa Barbara Channel area is Santa Barbara and Anacapa Islands, which was established by presidential proclamation on April 26, 1938. Subsequent proposals have been made to expand the designation of the national monument to include Santa Barbara, Santa Rosa, San Miguel, Santa Cruz, and Anacapa Islands because of their unique historical, biological, archeological, paleontoligical and ecological values. (Ref. 5,P. 336)

The single State of California oil and gas sanctuary in the area extends from Goleta Point southward to just below Fernald Point and extends seaward from the shoreline 3 miles to the OCS, beyond which federal jurisdiction takes precedence. No federal leasing may occur within the state controlled sanctuary.

The State Lands Commission has and continues to recommend that buffer zones, similar to that near Santa Barbara, should be designated and maintained adjacent to sanctuaries. As of this time no such additional designations have been made. (Ref.5, P. 338)

One ecological preserve exists within the Santa Barbara Channel in OCS waters. This designated preserve lies 3 miles outward from the greater area of the City of Santa Barbara and is under federal jurisdiction. This preserve lies approximately 27 miles from the proposed area of development.

In 1974 the State of California Water Resources Control Board designated 3 Areas of Special Bioligical Significance (ASBS) within the confines of

the Santa Barbara Basin. These areas are: (1) San Miguel, Santa Rosa and Santa Cruz Islands, located within Santa Barbara County; (2) Anacapa Island, Ventura County; and (3) Mugu Lagoon to Latigo Point, Ventura County, (Ref. 1, pp. II-600 to II-602; ref.5, pp. 335-382; ref. 6).

The Santa Barbara Channel area also contains sites of historic, prehistoric and cultural significance, which have involved some archeological finds, and, "Early-California" historical artifacts.

No such specific sites have been identified by the USGS supervisor in the proposed area of the platform pursuant to NTL 77-3, effective March 1, 1977 (USGS requirements)

In the exhibit section of this report are inventories of the sensitive resources area for California Coastal Tidelands depicting:

Exhibit H

Popular skin and scuba diving sites

Exhibit I

Commercial and recreational shellfishing sites

Exhibit J

Popular sportfishing sites

8.2 Hazardous Areas

The Santa Barbara Channel area is part of a large geomorphic and structural province of Southern California. This province has east-west trending topographic features that transect the dominant northwest structural grain characteristic of southern California. The geological structure of the off-shore area in the vicinity of the proposed site consists of strata that has

been gently folded and considerably faulted. Two major structural features dominate the region: 1) the Oakridge thrust fault north of the site, and 2) the Transverse Ranges frontal fault zone to the south. (Ref 11, pp. 7 & 16) These faults are offset by several east-west trending faults.

In additional to local seismicity conditions in the Santa Barbara Basin, the drilling of a well offers a potential channel of communication between high pore-fluid pressures in deep reservoirs of petroleum and shallower strata under lower pressure. In some circumstances exposure to the higher pressures may cause fracture (or rupture) of the shallower strata in turn leading to release of oil and gas at the surface (cap rock rupture and blow out) (ref 1, pp. III, 90-91)

8.3 Alternatives

There appear to be no logical alternatives to the proposed development and production activities for the following reasons:

a) Drilling is the only presently known technique available to determine the presence of a hydrocarbon reservoir and to delineate its boundries and characteristics.

b) Because the petroleum deposits of the Santa Barbara Channel are within the United States and are close to refineries and markets, their continuing development would alleviate to a marked degree the need for imports of foreign oil. (ref 1 , p. III-1)

Characteristic of all exploritory operations, certain elements of risk are involved because of unknown quotients. Minimization of the risk element, then, becomes paramount in the preservation of; "life and limb", the environment,

valuable resources and equipment. Through thoughtful planning and the utilization of "Best Technology" the risk potential can be substantially reduced.

Based on the known submarine geology and earthquake recurrence intervals, it is feasible to erect a fixed-leg platform (ref 11,p. 24) at the designated site providing constraints for large magnitude shocks are incorporated into the design of the platform.

From the search of current literature and reports of the Santa Barbara Channel Basin it appears that adverse impact resulting from development and production activities at the wellsite will be minimal.

c) Alternatives to use of a pipeline to transport the crude oil from the production platform to the onshore facilities would be limited to the loading of the oil into tankers or barges which would inturn transport the oil to onshore facilities. Such tanker or barge loading operations could significantly increase the adverse impact on air quality and would increase the potential for spills. Additionally, the use of tankers would significantly increase the marine traffic in the area, resulting in air pollutant emissions from the tanker's propulsion system and increasing the potential for oil spills.

d) Use of the proposed primary treatment facilities would have as alternatives:

1) Primary treatment of the oil on the offshore production platform, and

2) Transportation of the crude oil in its natural state to an existing primary treatment facility.

Alternative 1 would require a considerably larger platform in order to accomodate treatment and storage equipment. This would not only add to negative aesthetic impact, but would seriously complicate containment of the production oil in the event of a spill.

Alternative 2 would require the trucking of the oil in it's natural state to existing primary treatment facilities since this oil could not be transported through existing onshore pipelines because of the natural gas and water content. Since existing facilities capacity would have to be expanded or utilized to a greater extent, the emissions of air contaminants would not be reduced. Additionally, air contaminants and increased use of the highway system would create greater negative impacts than the proposed project.

e) Alternatives to the use of the existing onshore pipelines to transport the treated oil to it's ultimate destination would require either the use of marine tankers or trucks. Selection of these alternatives would create greater negative environmental impacts.

f) The last alternative involves no project: this alternative is not acceptable in light of the analysis, which does not indicate that the proposed project would create a significant environmental threat.

It is therefore concluded that the proposed action is an environmentally acceptable project.

9.0 Physical Environment

The southern California OCS is unique among the OCS areas of the United States. Extensive and continuing tectonic activity during the last 20 million years has created a complex pattern of ridges and basins interlaced by a series of active and inactive fault systems. The southern California offshore can be divided, for discussion purposes, into the Borderland and the Santa Barbara Channel, with the Santa Barbara Channel Islands separating these two distinct regions. (ref. 5,p. 169) The Borderland has many ridges and basins which generally lie parallel to the mountain ranges on the mainland. Topographic relief is as much as 7,500 feet, with elevations ranging from 1,500 feet above sea level to more than 6,000 feet below sea level.

9.1 Archeological/Cultural Resources Surveys

Early exploration of the shores of southern California has been summarized by Emery (1960, pp1-4). Summaries more specifically related to the Santa Barbara mainland and Channel Islands include Dibble (1950, pp 9-14) and Weaver (1969, pp1-8).

There is some evidence of Indian cultures in the Santa Barbara Channel Islands dating back 37,000 years. Fossil remains of fire pits, dwarf mastodon bones and other evidence of human activity have been observed and documented. Although controversies exist as to the exact date of human habitation, human skeletal remains have been reliably dated at 10,000 years B.P. (before present).

Peoples of the Highland Culture, dating approximately 5,000 B.P., lived in the oak and Catalina Cherry forests existing at that time. Approximately 3,000 B.P. the Canolina culture, predominatly a marine culture occupied the area and were present at the time of the Portugese and Spanish explorers.

The Santa Barbara Channel area, as with many other parts of California, is rich in the lexicon of early Spanish culture. Numerous area landmarks attesting historical origins are located in Santa Barbara and Ventura Counties. A profussion of literature, found in the libraries of Ventura and Santa Barbara, is available for cultural surveys.

The only instances of underwater archeological finds recorded in southern California come from the San Diego area-------. The probability of such a site along the route of the proposed pipeline in the Santa Barbara Channel is highly remote. Site remains, if any, would be limited to scattered artifacts and no artifacts were observed during underwater biological transects observed by divers------(Ref. 2 , P. II-518).

A summary of literature sources including extensive side-scan sonar surveys conducted by Exxon during 1971, found no evidence of sunken vessels or any other objects of possible archeological significance in the Channel area. One object was referenced on the sea floor during this survey which was recognized as a 64-foot vessel resting on its port side (ref, summary, (2) PP.II- 518-520

It can be concluded that no known archeological/cultural sites exist in the area of the proposed platform (leases; P-0202 & P-0203) along the proposed pipeline route (Exhibit G) nor, at the site of the on-shore facility (adjacent to So. Calif. Ed. Co., Mandalay Steam Station).

9.2 Sea Floor Configuration

The proposed platform site is located along the southern extremity of a broad marine terrace referred to as the Oxnard shelf. Topography within the site is very uniform. Measurements taken during exploritory operations indicate that the elevation difference within 100 x 175 rectangular site is not more than one foot. The site appears to be barren of vegetation and rock outcroppings. The only improvement within the site are Well Heads placed during exploritory operations of the Hueneme-Offshore oilfield in 1975.

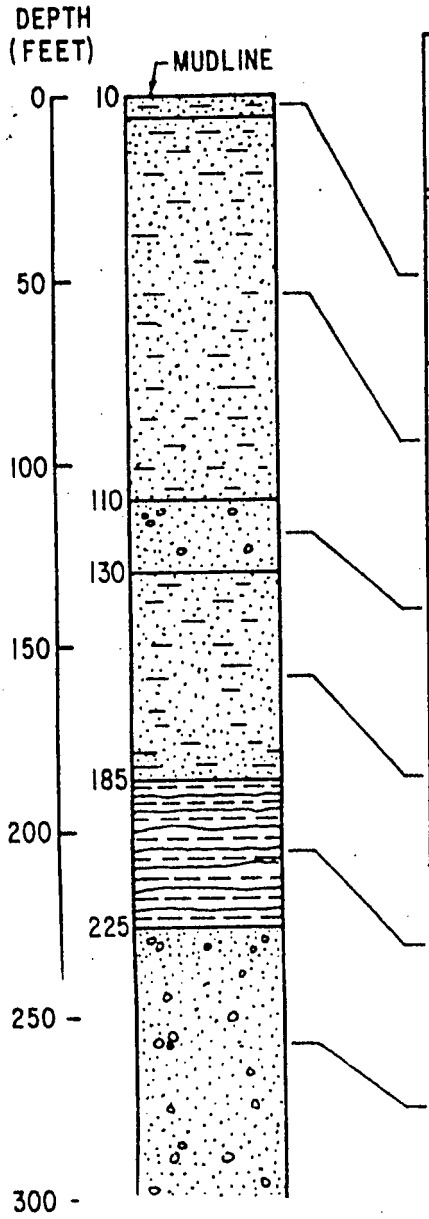
Data regarding the geological conditions at the wellsite are available from a variety of sources both local and regional. Geological conditions have been interpreted from seismic profiles, existing wells and from geological logging of boring samples. These data, together with geological investigations of the adjacent Oxnard Coastal Plain Ground Water Basin (State of California), 1950, 1958, and 1965; Thomas, et.a., 1954; Mann, 1959; Gorseline, 1970) provide correlation between onshore and offshore geological features.

Other generalized sources of the geological configurations of the Santa Barbara Channel are presented by Moore (1960) Vedder et.al., (1969) and, with updatings by Green, et.al. (USGS).

Alluvial deposits encountered in each of the exploritory borings at the platform site, by Geotechnical Consultants, show that alluvial deposits extend from the mudline to an approximate depth of 110 feet (see fig. 7). These deposits consist of intercalated layers of gray silty sand with various concentrations of clay. At the 110 foot layer firm gravelly sand is encountered with sufficient boring quality to support pilings of the proposed platform without potential for errosion. (report summary ref 11)

FIGURE 7

TYPICAL SHALLOW SOIL PROFILE



SOIL TYPE	TOTAL UNIT WEIGHT ($lb./ft.^3$)	BOUYANT UNIT WEIGHT ($lb./ft.^3$)	FRICTION ANGLE, OR (UNDRAINED SHEAR STRENGTH S_u in $lb./ft.^2$)
SILTY SAND TO SANDY SILT	115	53	35°
SILTY SAND TO SANDY SILT	122	60	40°
GRAVELLY SAND	130	68	42°
SILTY SAND TO SANDY SILT	122	60	40°
CLAYEY SILT TO SILTY CLAY	118	56	(3200)
GRAVELLY SAND TO SANDY GRAVEL	135	73	44°

FIGURE 7

9.3 Marine and Littoral Communities

The marine and littoral communities of the Santa Barbara Island, the Channel and the Santa Barbara Channel Coastlands are rather extensive.

9.3.1 Marine Mammals

Of the 32 species of marine mammals recorded in California waters, 29 (including 6 pinnipeds and 23 whales and porpoise) could be expected to occur in the Santa Barbara Channel or around the Channel islands. (Abbot 1974, Daugherty, 1966, National Marine Fisheries 1973).

9.3.2 Kelp Beds

In addition to being a commercial resource in its own right, kelp beds are an important marine habitat of southern California. Fish and invertebrates use kelp and other marine algae for shelter, food and a place to lay their eggs. (Ref. 5, Summary P. 312 & 313).

9.3.3 Regional Marine Fishes

The Santa Barbara Channel supports a sizeable commercial fishing industry. The total number of fish species found in the Santa Barbara Channel varies considerably from one report to another. One report states there are 590 species. Another report more consistant with other estimates states that 350 species are present, of which 249 species are considered to be epipelagic (free-swimming) in the upper 50 meters of the water. (Emery 1960)

9.3.4 Sport and Commercial Fish Catches

Areas most consistantly fished by sportsman and commercial fisherman are shown in exhibits H, I & J. The south coastal region supports a considerable fishing industry, with an estimated sixty-five to eighty commercial vessels based in Santa Barbara alone. It is probable that an additional 60 commercial fishing vessels are located at other ports in the Santa Barbara Channel area.

9.3.5 Coastal Wetlands

Many studies have underscored the need to protect and maintain the waters, tideflats and marshes of California estuarine areas. (Bauer and Speth, 1974) Wetlands and eustuaries provide a number of services as functioning ecosystems. (Ref 5, P. 318) The importance of estuarine areas cannot be over-emphasized. Estuaries are the spawning grounds for both sport and commercial fish and the feeding grounds for many species of waterfowl, shore, and marsh birds.

There are many scientists who look upon estuarine areas as the cradle of all sea life. Tidal movements constantly purge the wetlands of minute organisms which multiply very rapidly. These plankton are "washed out to sea" to be consumed by still larger plankton who in turn are consumed, etc.

9.3.6 Sea Bird Rookeries

The Channel Islands and surrounding waters provide essential feeding, nesting and breeding areas for resident and migrant seabirds. These palagic birds are the most conspicuous avian group found in OCS lease areas. (Ref 5, P. 320)

9.3.7 Intertidal Zone

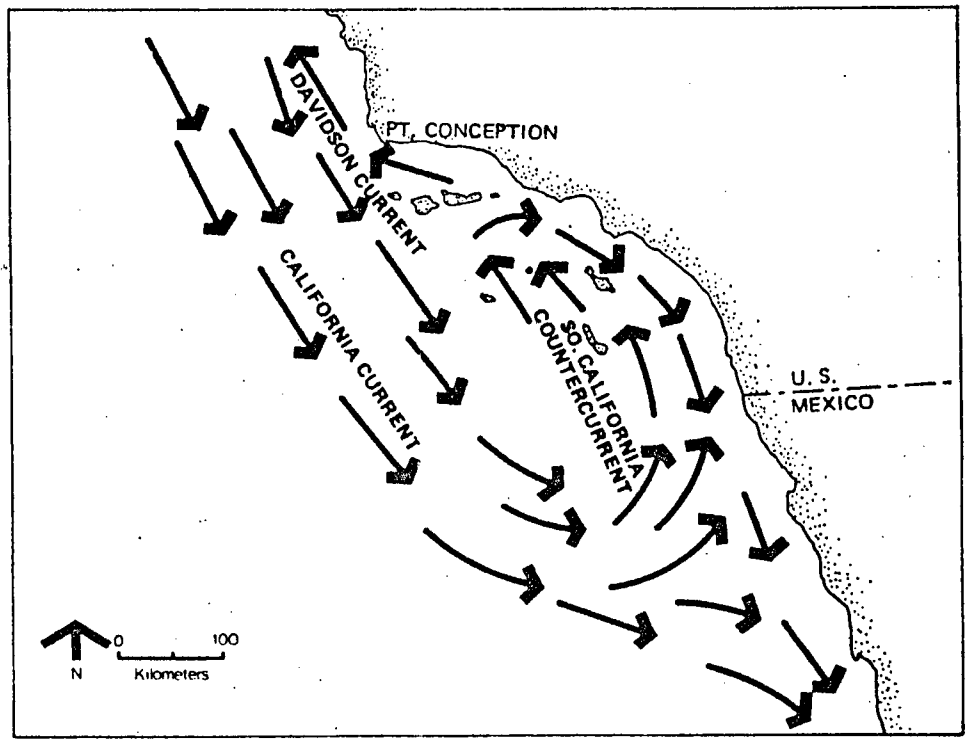
In general, most of the mainland coastline consists of sandy beaches with many rocks, rarely interrupted by rocky headlands and usually backed up by steep bluffs. The northern shores of the Channel Islands contain many seacliffs, rocky headlands and pebble beaches. (Ref. 3, P. II 279)

9.4 Ocean Currents

Some references (Jones, 1971; Kopack 1971) describe a predominately downcoast current in the Santa Barbara Channel. However, Reid (1965) describes the regional circulation of the Santa Barbara Channel as predominately upcoast from June to March and most strongly developed in December and January and downcoast in April and May. (See Figure 8)

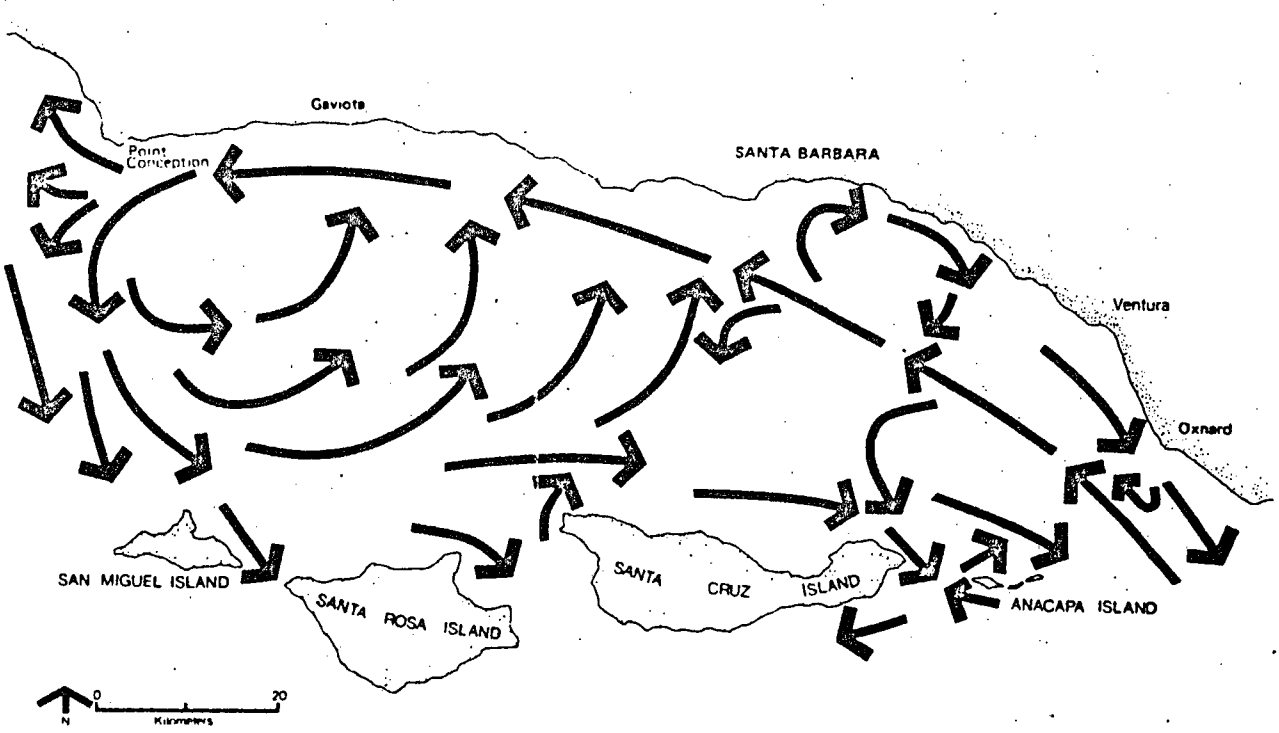
Intersea Research Corporation (1976) has performed studies and extrapolated empirical data from related nearby sources. IRC estimates that currents reaching 0.4 to 1.0 knot will occur for one to a few hours daily at the surface with mid-depth and near bottom currents 50 to 80% as strong. Based on a sustained (one or more hours) wind velocity of 50 knots, the relation of a wind-induced current will be 1.5 knots at the surface; probably decreasing to 0.5 knot at the bottom. Combining the two major components of tide and wind it is estimated that a maximum current of about 2.5 knots could occur at the surface and about 1 knot near the bottom.

Figure 5: GENERALIZED PATTERN OF SURFACE CURRENTS OFF SOUTHERN CALIFORNIA.



Source: United States Department of the Interior, Geological Survey, Final Environmental Statement – Oil and Gas Development in the Santa Barbara Channel Outer Continental Shelf of California, Figure II - 19, 1976.

Figure 6: GENERALIZED PATTERN OF SURFACE CURRENTS, SANTA BARBARA CHANNEL.



Source: Ronald L. Kolpack, "Relationship of Migration of Natural Seep Material to Oceanography of Santa Barbara Channel," unpublished report, August 1976.

9.5 Meteorology

General Weather Summary

The southern California coastal climate is classified as a Mediterranean type and is characterized by warm, dry summers and mild, wet winters. Semipermanent high pressure area covers the eastern Pacific Ocean resulting in the deflection of storms to the north and mostly dry summers. This Pacific high migrates southward and weakens during the winter months allowing periodic frontal systems to move across southern California. As the north Pacific high moves northward and strengthens, the winter rains cease. The coastal areas and deserts begin to warm up at the onset of spring. By late spring the desert areas are considerably warmer than the coastal areas, resulting in a thermal low over the deserts and causing strong onshore flow of marine air. These phenomenon result in the low coastal clouds and fog typical of late spring and early summer. By the onset of fall, the deserts have cooled resulting in a weakening of the thermal low, which in turn minimizes the low clouds and fog. Occasional "Santa Ana" conditions occur during the fall, characterized by warm, dry winds blowing across the coastal areas toward the west. By late fall, the Pacific high has migrated southward, and the winter rains begin. Detailed description of extratropical storms, tropical storms, thunder storms, funnel clouds, snow and freezing precipitation, temperatures, rainfall, humidity, wind, inversions, fog, and visibility for the subject area are referenced in Final Environmental Statement for the Proposed Plan of Development, Santa Ynez Unit, Santa Barbara Channel, off California, prepared by USGS, dated May 3, 1974. The following information is a brief summary of the above referenced material.

9.5.1 Storms

1. Extratropical Storms

With the exception of intense extratropical storms which develop between Hawaii and the California coast, most winter storms that affect the Ventura area move south-eastward from the northeast Pacific.

2. Tropical Storms

Tropical storms, during the summer and early fall, frequently move northwestward off the west coast of Mexico. Few of these storms reach southern California, although, they do occasionally cause swells that affect the southern California coast.

3. Thunderstorms

The coastal areas of the Pacific states normally have the smallest number of thunderstorms per year in the entire United States.

4. Funnel Clouds

Very few tornadoes (funnel clouds reaching the ground) occur in California and are smaller and weaker than those which occur in the midwest, and consequently do very limited damage.

5. Snow and Freezing Precipitation

Although snowfall above 4,000 ft occurs during the winter period in southern California, very rarely does snowfall occur at sea level.

9.5.2 Temperatures

Mean daily temperatures over the Channel Islands range from the low 50's in the winter to the mid 60's in late summer. In Oxnard, the winter low temperature is 42.1^{o} and the summer high is of 73.8^{o}.

9.5.3 Rainfall

Rainfall occurs mainly in the winter, with nearly 90 percent of the mean annual total falling from November through April inclusively. Point Mugu's mean annual rainfall from 1946 to 1971 was 10.56 inches, with a January mean of 2.57 inches.

9.5.4 Humidity

Moderate to high relative humidities occur throughout the entire year along the coast of southern California except for brief periods of dry northerly winds. The mean maximum relative humidity for July and August at Point Mugu for the period 1952 through 1964 was 96 percent. Humidities below 10 percent have occurred along the coast during "Santa Ana" wind conditions.

9.5.5 Wind

With the exception of the islands, the average wind conditions for the general area for the months of December through July are: winds from the northwest 48 percent of the time, speeds greater than 20 knots 39 percent of the time, from 10 to 20 knots 27 percent of the time, and from 5 to 10 knots 34 percent of the time. In the area of the outer channel islands northwest winds are generally stronger, with occasional gusts of 20 to 35 knots funneling through the outer islands.

Two different circumstances cause the strongest winds in the subject area: 1) strong frontal passages can cause strong general winds of 25 to 35 knots with locally higher gusts, and 2) high pressure system over the great basin of the western United States cause strong, localized Santa Ana winds.

Figure 9

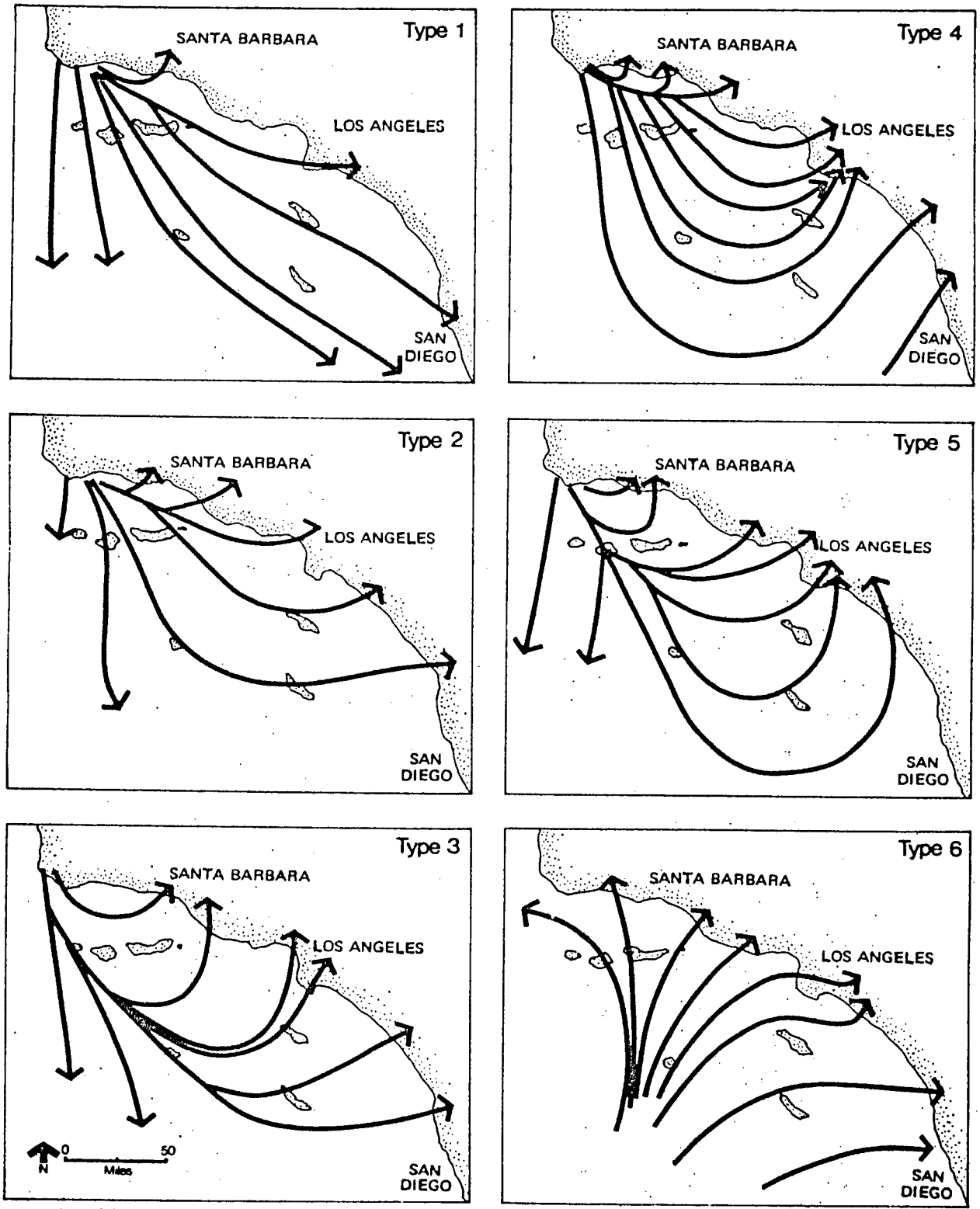


Figure 3: SIX COMMON WIND PATTERNS IN THE SOUTHERN CALIFORNIA BIGHT.

Source: State Water Pollution Control Board. Oceanographic Survey of the Continental Shelf of Southern California, Publication No. 20, 1959, pp. 24-26.

The typical wind pattern in the area is an onshore wind in the afternoon and early evening, followed by nighttime and early morning land drainage winds.

9.5.6 Inversions

The Pacific high prevails most of the late spring, summer and early fall months. Subsiding air from this high causes the air aloft to be warm and dry, while trapped below is cool marine air. The mean summer height of the base of the inversion is 800 feet along the coastal areas and approximately 1000 feet at the Channel Islands. The inversion is weaker, if not occasionally absent during the winter months. The particular significance of this inversion layer is the trapping of air pollutants below the layer which will significantly reduce vertical mixing.

9.5.7 Fog

Summertime fogs are common during the mornings and early afternoons and are often caused by nighttime radiation cooling of the air with subsequent condensation. The fog is usually dissipated by heating of the air and sea breezes.

9.5.8 Visibility

Low visibility in the area occurs during the summer as a result of haze and coastal fog. The area's visibility is 2 miles or less from January thru December the following percentage of the time: 2.4, 8.5, 7.4, 17.2, 13.3, 11.5, 20.4, 24.3, 20.8, 27.1, 9.9, and 3.7.

Detailed data and analysis of the subject area are contained in the report entitled "Design and Seasonal Waves and Weather Conditions of Port Hueneme, California", prepared by Intersea Research Corporation; dated January 5, 1976.

9.6 Oceanography

The Channel Islands are in the "Southern California Bight", an open embayment of the Pacific extending from Point Conception, California, to Cape Colnett, Baja, California. The Bight extends offshore to the California current, a broad, southerly flowing current along the California coast. Four separate factors are thought to cause the current patterns in the Southern California Bight:

9.6.1 Geostrophic Currents

The internal forces related to the distribution of mass and momentum of the water. These forces are called geostrophic currents and are due to mass distribution variations within the water. These variations in the mass distributions are related to water temperature and salinity.

9.6.2 Wind Action

The external forces caused by the wind acting directly on the water surface. These wind driven currents are caused by rapid fluctuations of the wind speed and direction.

9.6.3 Tidal Forces

The external forces produced by the tides. These tidal forces are produced by a balance of the gravitational attractions of earth, moon, and sun and the various centrifugal forces produced by their motions.

9.6.4 Ocean Waves

The forces caused by surface and internal waves. Water transport due to surface waves cause rip currents and longshore currents. They are generated

by surface waves breaking at an angle to the shoreline.

Detailed discussion of design waves, design storm water level, wave force profiles, normal waves, currents, water temperature mid salinity is contained in the report entitled, "Design and Seasonal Waves and Weather Conditions off Port Hueneme, California", prepared by Intersea Research Corporation, dated January 5, 1976. The following discussion is a brief summary of the data contained in the above referenced report.

9.6.5 Design Wave

The analysis of severe storm waves concluded that, due to the sheltering characteristics of the Channel Islands, the platform should be built at least 37 feet above mean lower low water (MLLW) to properly design for the 1-in-100 year wave.

9.6.6 Design Storm Water Level

The mean tide level is 2.8 feet above MLLW, and it has a probability of 50 percent occurrence simultaneously with the design wave. For the wave force profile calculations concludes a still-water depth of 97 feet at the site. The report recommends that the highest tide recorded (by USC & GS) of 7.5 feet in conjunction with a 1 foot wind set-up be considered in determining the platform elevation.

9.6.7 Wave Force Profiles

The analysis of: 1) the drag force related to fluid velocity, and 2) the inertial force related to fluid acceleration, concluded the method of

selection for cylindrical pile diameters. Allowances for biological fouling are also provided.

9.6.8 Normal Waves

Most usually the significant height of normal waves is less than 2 feet at the site, but about 3 percent of the time they range up to 3-4 feet.

Currents

9.6.9 Normal Currents

At the platform site it is estimated that currents reaching 0.4 to 1.0 knot will occur for one to a few hours daily at the surface with the mid-depth and near-bottom currents 50 to 80 percent as strong.

9.6.10 Design Current

Combining the two major components, that due to tide and that due to wind, gives an estimated maximum current of about 2.5 knots at the surface and about 1 knot near the bottom. The most probable direction will be toward either east-southeast or toward west-northwest.

10.0 Accessment of Impacts

In this section of the Environmental Report, those conditions seen as impacting the environment from implementation of the plan are accessed and discussed. Those impacts occuring both onshore and offshore during the development and production phases are addressed.

10.1 Air Pollution Generated During Operation

10.1.1 Onshore Facility

Combustion equipment consists of one 6×10^6 BTU/hr input and one 1×10^6 BTU/hr input gas-fired heater treaters. Use of waste cooling water from adjacent Southern California Edison Co., Mandaly Steam Station, will supply approximately 2.5×10^6 BTU/hr of the 6×10^6 BTU/hr energy requirements of the larger heater treater. However, if there were an unscheduled shut down of the Steam Station, the larger heater treater could be fired at it's full capacity. For the purposes of determining "worst case" air pollutant emissions, both heater treaters will be assumed to be fired at 100% capacity on a continuous basis. Emissions are calculated using emission factors from E.P.A. AP-42, appendix C, 12/75 and the gas sample analysis contained in Exhibit K.

10.1.2 Heater Treaters

1 - 6×10^6 BTU/hr input gas-fired heater treater

1 - 1×10^6 BTU/hr input gas-fired heater treater

Assumptions:

1. Both heaters are fired at 100% capacity on a continuous basis.
2. Combustion efficiency of 82%.
3. Calculated gross heating value = 1021 BTU/cu ft at S.T.P.
4. Factors for industrial boilers (less than 10 mm BTU/hr) AP-42.

TOTAL AIR POLLUTANT EMISSIONS

	P.M.	SO_x	NO_x	HC**	CO
Emission Factors (lb/10^6 cu ft)	10.0	0.60*	120	3.0	17.0
lbs/hr	0.069	0.004	0.823	0.021	0.117
lbs/day	1.645	0.099	19.745	0.494	2.797
tons/year	0.300	0.018	3.604	0.090	0.510

10.1.3 Storage and Process Equipment

1 - 1000 BBL. FWKO - Closed System

1 - 3000 BBL. Fixed-Roof Shipping Tank

1 - 3000 BBL. Fixed-Roof Bad Oil Tank

1 - 500 BBL. Fixed-Roof Slop Tank

1 - 500 BBL. Fixed-Roof Water Surge Tank

1 - 500 BBL. Fixed-Roof Wash Tank

10.1.4 Production Conditions:

1) All production oil and water vessels are enclosed to the atmosphere through a vapor collection system, which vapors are compressed on-site and transmitted to the sale gas outlet.

2) Vapor collection and processing equipment reflects "Best Available Control Technology" (BACT).

3) All sampling and gauging ports are sealed except during actual sampling and gauging.

* Gas sample in Exhibit K, indicates no H_2S content.

** HC reactivity per ARB "Emissions and Air Quality Assessment," April 1976. (ARB Class 1, 11, and 111 are 2.6%, 53.1%, and 44.3% of total HC, respectively

10.1.5 Miscellaneous Equipment

All other equipment will be electrically operated and maintained as required by VCAPCD, Rule 71. Fugitive emissions will therefore be negligible.

10.1.6 Mitigating Measures

Air pollutant emissions are negligible due to the enclosed nature of the storage and processing equipment. Fugitive emissions will also be negligible as a result of maintenance practices representing "Good Industrial Maintenance Practices" as required by the Ventura County Air Pollution Control District (VCAPCD), Rule 71 (adopted 6/20/78). Other mitigating measures will include a study to determine least aesthetic impact of the enclosure upon future use of the adjoining property as a municipal park.

10.2 Offshore Facility

The offshore production platform consists of production equipment only, no storage or processing equipment will exist on the platform with the exception of diesel fuel storage. Platform equipment which will emit air contaminants are:

1) 1-500 HP cementing unit - (Diesel Powered) operating 24 to 36 hours/month for approximately the first year, after which time it will be removed.

2) 1-120 HP fire pump engine - (Diesel Powered) operated for testing purposes 1 hour/month.

3) 1-140 HP crane engine - (Diesel Powered) operated 50 to 80 hours/month, which will drop to 5 to 10 hours/month after the first year.

4) 1-15 HP emergency generator engine - (Diesel Powered) operated for testing purposes 1 hour/month.

Figure 12, quantifies the expected air pollution emissions of this equipment.

Figure 12
OFFSHORE

AIR POLLUTANT EMISSIONS

Equipment/Emissions		P.M.	SO_x	NO_x	HC	CO	
Cementing Unit	(LB/HR)	1.102	1.026	15.432	1.235	3.340	3.380
	(TONS/YEAR)	0.238	0.222	3.333	0.267	0.721	.721
Fire Pump Engine	(LB/HR)	0.265	0.246	3.704	0.296	0.802	
	(TONS/YEAR)	0.002	0.001	0.022	0.002	0.005	
Crane Engine	(LB/HR)	0.309	0.287	4.321	0.346	0.935	
	(TONS/YEAR)	0.148	0.138	2.074	0.166	0.449	
Emergency Gen. Engine	(TONS/HR)	0.033	0.031	0.463	0.037	0.100	
	(TONS/YEAR)	0.000	0.000	0.003	0.000	0.001	
TOTAL	(LB/HR)	1.709	1.590	23.920	1.914	5.177	
	(TONS/YEAR)	0.388	0.361	5.432	0.435	1.176	

AIR POLLUTANT EMISSIONS AFTER THE 1ST YEAR

		P.M.	SO_x	NO_x	HC	CO
TOTAL	(LB/HR)	0.646	0.564	8.488	0.679	1.837
	(TONS/YEAR)	0.021	0.018	0.544	0.023	0.062

Assumptions:

1) Equipment will be assumed to be operated at 100% load for the period of time specified above.

2) Emission factor - EPA AP 42 - section 3.3.3, 1/75

3) Emissions calculated based on maximum usage (1st year)

Total air pollutant emissions generated following the first year of production will be substantially reduced due to elimination of the cementing unit and lower number of operating hours of the crane.

The above analysis reflects "worst case" scenarios for both the first year and subsequent period, in that, all equipment is assumed to be operated simultaneously. In reality, since none of the equipment is operated in excess of 80 hours/month, the "worst case" emissions have a very low probability of occurring. Exhibits C and D are schematic drawings of the proposed offshore platform.

12.2.1 Mitigating Measures

As discussed above, very limited operation of platform equipment will occur, even during the first year of operation, consequently, the bulk of air contaminant emissions could be mitigated during adverse ambient air quality by avoiding operating both the cementing unit and the crane.

Emissions could be further mitigated during operation by use of lowest emitting diesel engines available at the time of construction.

10.3 Transportation Related Emissions

Emissions associated with transportation of supplies, personnel and equipment result from the operation of the following equipment:

1) 1 - 600 HP crew boat (diesel powered) operated 100 to 120 hours/month.

2) 1 - 1000 HP supply boat (diesel powered) operated 100 to 150 hour/month during the first year, dropping to 5 to 10 hours/month after the first year.

3) 1 - Helicopter operated 10 hours/month during the first year, following which time it will no longer be used.

Assumptions:

1) diesel boat emission factor EPA, AP-42 table 3.2.3-3, 1/75

2) 600 HP crew boat consumes 20 GAL/HR at cruise

3) 1000 HP supply boat consumes 25 GAL/HR at cruise

4) diesel engines consume 20% of cruise fuel consumption at idle

5) 75% of operating hours are at idle mode

6) helicopter emission factors EPA: AP-42 tables 3.2.1-2 and 3.2.1-3, 4/73

Total air pollutant emissions generated following the first year of production will be substantially reduced due to the elimination of helicopter use and reduced use of the 1000 HP supply boat.

As discussed earlier, the above analysis reflects the "worst case" scenarios for both the first year and subsequent period. See Figure 13.

10.4 Air Pollution Generated During Construction

10.4.1 Onshore Facility

Generation of dust and exhaust fumes by construction equipment would occur over the six month construction phase of the project, and would be confined to the 1.5 acre site. Watering of the construction site and access roads

OFFSHORE

AIR POLLUTION EMISSIONS

EQUIPMENT/EMISSIONS		P.M.	SO_x	NO_x	HC	CO
600 HP	(LB/HR) max.	N/A*	N/A	6.984	0.482	1.552
	(TONS/YEAR)	N/A	N/A	1.920	0.234	0.650
1000 HP	(LB/HR) max.	N/A	N/A	9.000	0.428	2.023
	(TONS/YEAR)	N/A	N/A	2.386	0.937	1.210
HELICOPTER	(LB/HR) max.	0.750	0.540	1.710	1.560	17.100
	(TONS/YEAR)	0.004	0.003	0.009	0.008	0.086
TOTAL	(LB/HR)	0.750	0.540	17.694	2.470	20.675
	(TONS/YEAR)	0.004	0.003	4.315	1.179	1.946

*factors not available

AIR POLLUTANT EMISSIONS AFTER 1ST YEAR

		P.M.	SO_x	NO_x	HC	CO
TOTAL	(LB/HR)	N/A	N/A	15.984	0.910	3.575
	(TONS/YEAR)	N/A	N/A	2.079	0.296	0.731

Figure 13

would mitigate the impact of dust. Wind patterns through the site would aid in the dispersal of fumes and exhaust vapors.

10.4.2 Offshore Facility

Generation of exhaust fumes by a derrick barge, diesel tugs and crane equipment would occur over a 45 to 60 day construction phase of the project. These emissions would be generated at the platform site approximately 4.5 miles off of Port Hueneme. The prevailing sea breeze would carry these emissions onshore. However, due to the limited period of construction these emissions would not significantly impact ambient air quality.

10.4.3 Gathering Pipeline

Construction of the 6.5 mile pipeline would take approximately 2 months and would result in exhaust fumes from diesel tugs towing pipe barges. As in the case of the platform construction, these emissions would not significantly impact ambient air quality.

10.5 Air Pollution Associated with Spills

Because the lighter fractions evaporate to the atmosphere, oil spills have an adverse impact on air quality. Roughly one third of the volume of spilled oil may evaporate or sublime to the atmosphere and therefore contribute to air pollution. An oil well blowout or oil spill which resulted in fire would normally contribute less to water pollution but would contribute considerably to air pollution. An OCS platform blowout or spill would result in significant adverse impact on air quality since the prevailing sea breeze would eventually carry the hydrocarbon emissions onshore.

Ref. 5, P.52

10.6 Air Quality Impacts Summary

As discussed in the section on Air Pollutant Emmissions, the three activities following construction which result in the emissions of air contaminants are: 1) Onshore Facility (i.e., combustion of fuel in heater treaters), 2) Offshore Platform (i.e., combustion of fuel for operation of cementing unit, cranes etc.), and 3) Emissions related to Transportation (i.e., supply and crew boats, and Helicopter). Other sources of air pollutions which could occur from this type of project are mitigated to a maximum degree as a result of air pollution controls and methods of transporting the production and processed oil. All production and processed oil is stored and handled onshore, thus eliminating emissions of hydrocarbons on the platform. All storage and process equipment handling the production and processed oil and natural gas are closed systems where normal working and breathing losses are collected and compress for input into the sale gas line.

Following approximately the first year of production, emissions associated with the platform (i.e., operating and transportation equipment) are significantly reduced by either the elimination or reduction in the equipment needed. The cementing unit and helicopter are no longer needed, the use of supply and crew boats are reduced. Figure 14, depicts the emissions air contaminants for the first year and for period thereafter for the platform, onshore facility and transportation.

EMISSIONS (Tons per Year)

	P.M.	SO_X	NO_X	HC	CO
Total 1st Year	0.692	0.382	13.351	1.704	3.632
Total after 1st Year	0.321	0.036	6.227	0.409	1.303

Figure 14

Emissions associated with the transportation of both the production and processed oil are mitigated through the use of pipelines. The alternatives to the pipeline, from the platform to the onshore primary treatment facility, would involve loading the production oil into oil tankers which would, in turn, transport the oil to a primary treatment facility. The loading of oil tankers would result in significant emissions of hydrocarbons to the atmosphere as a result of vapors displaced from the cargo holds in the tanker. Additionally, the tanker operation (i.e. tanker engines) would result in emissions of NO_x, CO and SO_x. The alternative to the pipeline, from the onshore primary treatment facility to it's ultimate desitination (i.e. refinery), would involve transporting the processed oil by truck or rail which would result in similar emissions to the tanker loading and operation discussed above.

Emissions associated with the construction phase will only occur over a 1 year period and will be mitigated to the maximum extent possible by use of well maintained construction equipment and fugitive dust controls (i.e. watering and paving).

Figure 15,depicts the significance of the emissions generated by the subject project as compared to the total emissions generated in Ventura County and in the subject Regional Statistical Area (RSA).

The increase over existing emissions represents less than 1/10th of one percent as compared to 1977 emissions for RSA 3. It should, however, be noted that both the county wide and RSA 3 emissions will be reduced as a result of implementation of control strategies. For example, projected RHC emissions in 1982 with implementation of all Reasonable Available Control Strategies (RACM's) are 40% of the 1977 emissions, a 50% reduction in NO_x

Figure 15

1977 EMISSIONS FOR VENTURA COUNTY AND RSA 3 AND % INCREASE*

	P.M.	SO_x	NO_x	H.C.**	CO
COUNTY TOTAL	15,261	19,979	29,957	29,045	155,623
% Increase 1st Year	.005	.002	.047	.006	.002
% Increase after 1st Year	.003	.0002	.020	.001	.0008
RSA 3			15,809	11,560	
% Increase 1st year			.089	.015	
% Increase after 1st Year			.038	.004	

Table shows the 1977 Emission Inventory for Ventura County by Source Category

* Reference Draft AQMD prepared by Ventura Co. APCD, Dated Sept. 1978

** Inventory Addresses only, Reactive Hydrocarbon Emissions only

10.6.1 Photochemical Oxidant

Photochemical oxidant (smog) is the air contaminant which is of greatest concern in Ventura County. Smog consists primarily of ozone, and ambient smog levels are measured at the Ventura County air monitoring stations as ozone. Smog is hazardous to health, causes damage to vegetation and to materials, and reduces visibility. During the past five years, measurements of average ambient levels of ozone in Ventura County show consistant concentrations as high as three to four times the National Ambient Air Quality Standards (NAAQS) during the "Smog Season" (May through October). Still other areas (such as Simi and Ojai Valleys) have ozone concentration 80 to 100 percent of the days during the smog season in violation of NAAQS.

Total Suspended Particulates (TSP) by NAAQS are also frequently exceeded in Ventura County. Some particulates, such as lead and sulfates are more harmful than others because of their chemical content, particularly if the particle size is small enough to be retained in the human respiratory system.

The ambient levels of the other pollutants for which there are NAAQS (Nitrogen Dioxide, Nonmethane Hydrocarbons, Carbon Monoxide, and Sulfur Dioxide) are usually below the standards.

The California standards for Sulfate, Nitrogen Dioxide, and lead have been exceeded on rare occasions and for short periods in the southern fourth of the county.

10.6.2 Ventura County Air Monitoring Network

The Air Pollution Control District (APCD) has developed an air monitoring network throughout the county since 1969, the current network is depicted in Figure 16. The principal pollutants monitored are Hydrocarbons (HC),

emissions is also projected. It should be further noted that the same control strategies (RACM's) which show a significant reduction in the county wide inventory will also require significant reduction in emission from the proposed project as new control technology becomes available. It can therefore be concluded that the proposed project will have a very small impact on ambient air quality.

Figure 16

Ventura County APCD Air Quality Instrumentation

December 1977

STATION LOCATION	OZONE	NITRIC OXIDE/ NITROGEN DIOXIDE	SULFUR DIOXIDE	CARBON MONOXIDE	TOTAL HYDRO-CARBONS/ METHANE	TOTAL SUSPEND-ED PARTICULATE	PARTICULATE: LEAD, SULFATES NITRATES	PARTICULATE: COEFFICIENT OF HAZE	WIND SPEED AND DIRECTION	TEMPERATURE, HUMIDITY	TELEMETRY
Camarillo	DAS	ACR				MIS			CL		RCP
Lockwood Valley						MIS					
Ojai Valley	DAS		TE43			MIS			CL		RCP
Oxnard						MIS					
Piru	DAS										RCP
Port Hueneme	DAS	TE14			*400	MIS					RCP
Santa Paula	DAS					MIS			CL		RCP
Simi Valley	DAS	TE14	TE43	IR	*400	MIS	MIS	RAC	CL		RCP
Thousand Oaks	DAS					MIS					RCP
Ventura	DAS			IR		MIS			CL		RCP

ACR: Beckman K-76 Acralyzer
*400: Beckman 400 Analyzer (Total Hydrocarbons Only)
IR: Beckman 315 I.R.
6800: Beckman Chromatograph, Model 6800
301A: Byron Instrument Co.

CL: Climet Instrument Corp.
DAS: Dasibi Ozone Meter
MEC: McMillian 100 Ozone Meter
MET: "MET SET 4" Weather System Components
MIS: Microchemical Specialties Co., Series 600

RAC: Research Appl. Co. Model G-a Sampler
TE14: Thermo Electron Cor: Model 14
TE43: Thermo Electron Cor: Model 43

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9/20/78

Carbon Monoxide (CO), Nitrogen Dioxide (NO_2), Sulfur Dioxide (SO_2), total Suspended Particulates (TSP), and Ozone (O_3). Emphasis is placed on measurements of O_3 and TSP. A matrix showing locations of the instruments in 1977 is given in Figure 17

10.6.3 Smog Formation and Transport in Ventura County

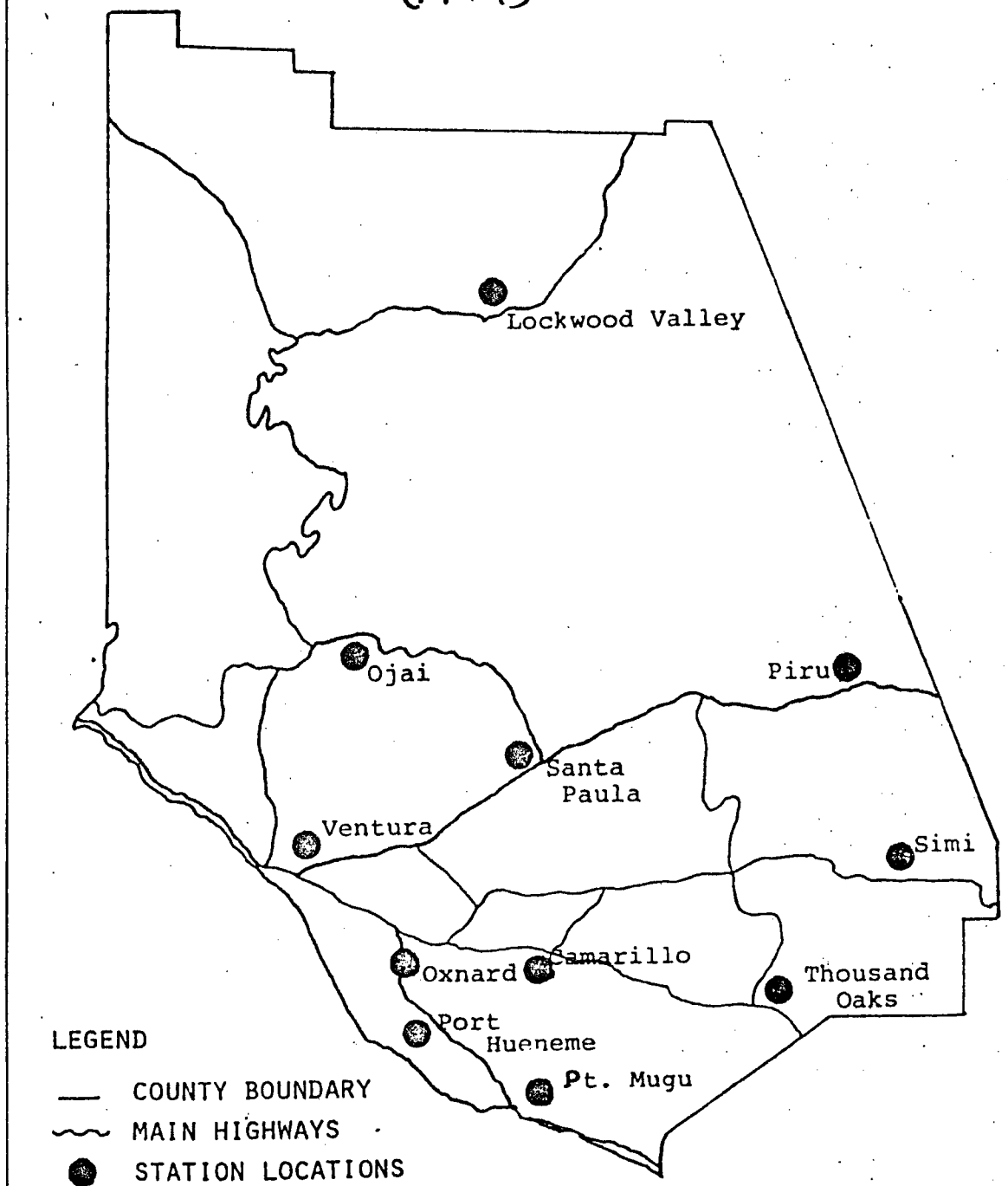
Photochemical Oxidants (smog) are formed in a complex chemical reactions and transformations in sunlight involving Reactive Hydrocarbons (RHC) and Nitrogen Oxides (NO_x). RHC and NO_x are emitted by motor vehicles, industrial, commercial, institutional, and domestic activities. The reaction of RHC, NO_x and sunlight takes several hours and is dependent principally on the ambient temperature, ultraviolet intensity, and the type and quality of reactive emissions. The concentration and distribution of smog is largely dependent on parameters which tend to influence dispersion (i.e., inversion height, temperature, wind speed and direction, and topography). Prevailing sea breezes during the "smog season" tend to funnel air pollutants into the inland areas. While the sea breeze carries air pollutants inland they also go through the photochemical reaction previously described. Two inland areas are of particular concern because of their topography, the Simi and Ojai Valleys where the highest ozone concentrations have been recorded. An air monitoring station was installed in the Piru area in 1977 which concluded that the inland portion of the Santa Clara River Valley also suffers from high ozone levels. Figure 18, depicts the prevailing winds and the one thousand foot contour for Ventura County.

Transport of air contaminants is also known to occur, however, the magnitude of this problem is not known. Figure 19, depicts the transport of air

VENTURA COUNTY APCD MONITORING STATIONS

Figure 17

AIR MONITORING STATION LOCATIONS (1977)



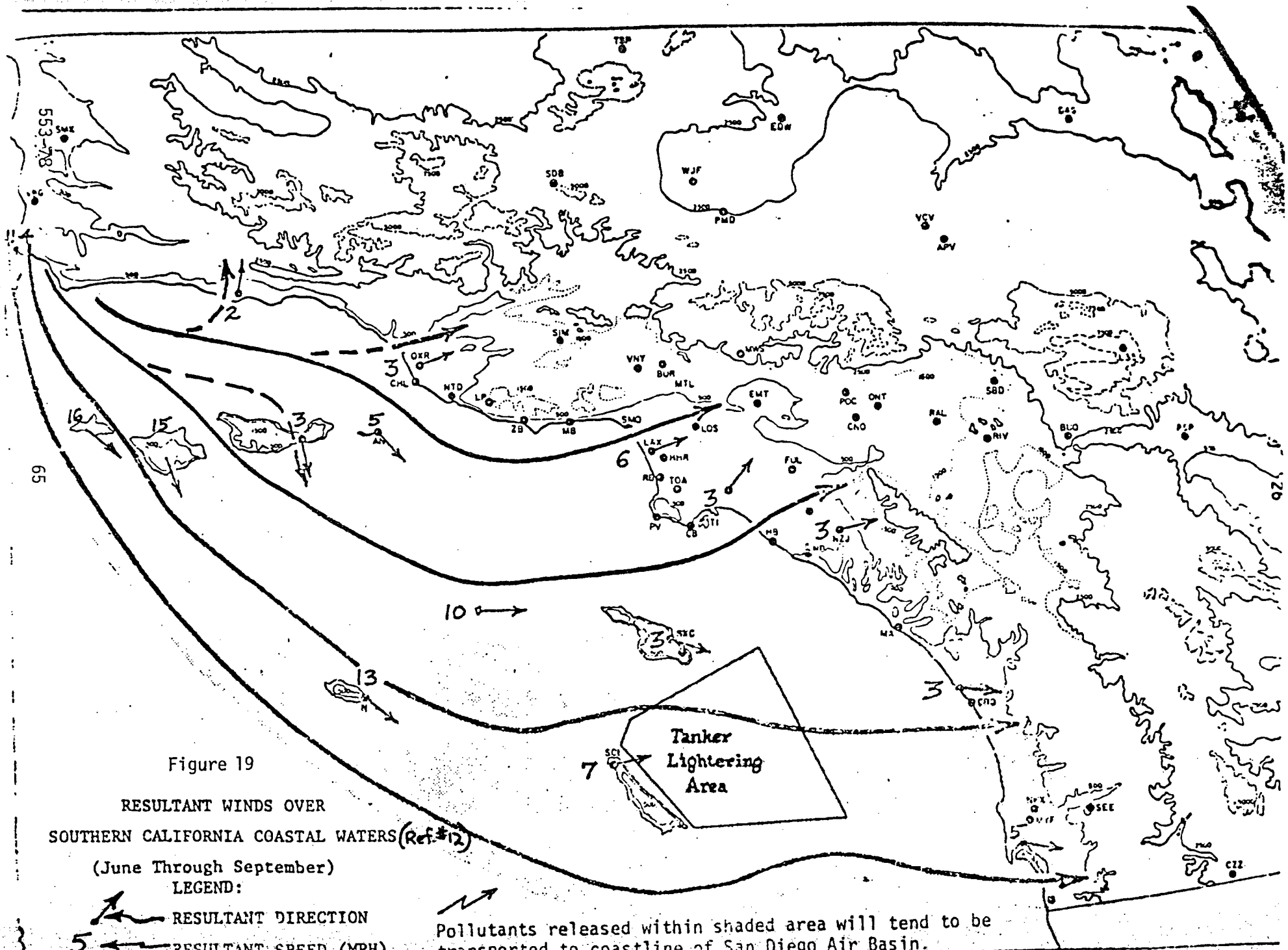


Figure 19

RESULTANT WINDS OVER

SOUTHERN CALIFORNIA COASTAL WATERS (Ref. #12)

(June Through September)

LEGEND:

RESULTANT DIRECTION

5 RESULTANT SPEED (MPH)

Pollutants released within shaded area will tend to be transported to coastline of San Diego Air Basin.

contaminants from areas to the north of Ventura County. Transport from the Los Angeles area also occurs across the Santa Susana Pass (San Fernando and Simi Valleys) and along the coast during "Catalina Eddies" following Santa Ana Wind conditions. On the other hand, studies and wind patterns also indicate that transport of air pollution from Ventura County into the Los Angeles Basin also occurs.

10.6.4 Sources of Air Pollution in Ventura County

Sources of man-made emissions are traditionally separated into two categories: mobile and stationary sources. Figure 19, depicts the relative breakdown of the five major air pollutants by source categories. Detailed discussion of the various sources of air pollutants, health effects, health costs and agricultural damage is contained in the Draft Air Quality Management Plan prepared by the Ventura County APCD, dated Sept. 1978.

10.7 Impact on Water Quality

The most serious impact that the proposed project could have on water quality is the potential for inadvertant spills of oil and waste materials. As described in other sections of this report most spills occur from equipment failure or human error. Because, of the "accident character" of spills, predictions of the aftermath become nebulous. Extensive studies of the adverse impacts of oil spills on the marine and littoral environments are inconclusive, moreover, the local effect are not completely understood.

10.7:1 Waste Disposal at Channel OCS Platforms

Four of the five Santa Barbara Channel OCS platforms now are treating produced water for ocean dischargeing under NPDES permits. The five existing OCS platforms have sewage treatment systems in accordance with the Pacific Area OCS Orders requirements. All solid trash is disposed of onshore (Ref 4, P II416).

10.7.2 Impact of Platform and Pipeline Construction

Platform and pipeline construction will effect bottom sediments. Underwater placement of equipment will increase suspended solids in the general area of construction. The effect of this trubid condition is short-lived, although because of allutriation, the finer particles (especially fine organic materials) may be carried a considerable distance by underwater currents before settling to the bottom again. This condition is temporary and would have minor affect upon localized flora and fauna (Ref 2, P. V-6).

10.8 Impacts on Benthic Organisms

During construction of the offshore platform and installation of the underwater pipelines there will be some very short-term and highly localized impact on bottom dwelling biota. The impact will be related in proportion to the area utilized and to the abundance, diversity, and biomass of the benthos. (Ref P. III-223).

Below the photic zone (about the 100 foot depth) bottom dwelling biota become rather sparse. Above the photic zone repopulation of those biota affected, normally would be rapid. During the operational (long term) phase, platforms and pipelines offer additional habitat.

10.9 Impacts on Commercial Fishing

Platforms and pipelines contribute additional habitat for fish and other marine organisms as man-made reefs. From this view point their existance can be beneficial.

10.10 Impacts on Marine Mammals

Numerous species of marine mammals occur along the coast of California. Their migratory habits are such that their appearance in the Channel waters is mostly during the winter and early spring months coinciding with the upwelling of rich nutrient water and the related increase in biomass as a food source. The presence of the platform or of the pipeline will not adversely affect the marine mammal population. (Ref Composite information).

11.0 Contingency Plans and Equipment

Potential marine sources of oil spills off California include production facilities, tankers and other vessels, pipelines, and marine terminal and transfer operations. On a world wide basis, spills from offshore facilities account for less than 3% of all oil entering the ocean from marine sources. (Ref 5, P. 51). A secondary source of oil pollution in southern California waters is the result of natural oil seeps. Estimates of seepage rates in the Santa Barbara Channel range from 40 to 670 barrels per day, however, there is insufficient information available from which to quantify this information

The wind, waves and tidal currents in the Santa Barbara Channel are such that most spills tend to move toward the mainland or island coasts. Time and distance-to-shore patterns for oil spills, or natural seeps, are important criteria in determining their impact upon ocean terrestrial boundries. Remarkable as it may seem, natural, physical, chemical and biological forces exist which can disperse and degrade spilled oil, but this self cleaning action is contingent upon the magnitude of the spill and its nearness to coastlines. Major oil spills, although very infrequent, are highly publicized. Less publicized, but more frequent, are the small spills that occur during normal operations. These spills generally are no more than a few barrels of oil and effect only the localized area.

11.1 Reducing Oil Spills

After the 1969 Santa Barbara Channel oil spill, both industry and government have taken steps to reduce the likelihood of future oil spills. Industry has been particularly responsive in their effort to improve, producing equipment

technology, operating procedures and more stringent training of operating personnel for prevention of spills. Government at both the federal and state levels have increased the frequency of inspection programs, and increased the scope for approval requirements. This concerted effort on the part of both government and industry has reduced the "spill potential".

11.2 Contingency Plans

Oil spills can occur as a result of natural disasters, equipment failure, or human error. For this reason, OCS Order No. 7 sets forth a reporting procedure for notifying appropriate persons and agencies and requires that immediate action be taken in the event of a spill. Further, it requires that all OCS operators have a spill contingency plan which includes on-site spill cleanup and containment equipment. In further response, a group of 15 oil companies operating in the Santa Barbara Channel area have formed a non-profit company called Clean Seas, Incorporated; a mutual assistance organization to be used in combating a major spill should one occur. The membership agreement allows the member companies involved to supplement their individual contingency plans by utilizing all or any part of the CSI organization. In addition, other like-organizations on the west coast provide additional back-up for CSI in the event of a major disaster. An inventory of CSI's equipment inventory is included as Exhibit O.

11.3 Pacific Area OCS Orders

There are 12 Pacific Area OCS orders which have been established as federal regulations. Germane to this discussion is OCS Order No. 7,"Pollution and Waste Disposal". In keeping with this order, Union will train all personnel associated with the proposed offshore platform and onshore facility to respond expeditiously in the event of oil, oil-associated or other waste spills using individual or group instruction, and to perform "emergency drills" routinely as a mitigation.

12.0 Alternatives to the Proposed Action

12.1 Operational Alternatives

12.1.1 Alternatives to Offshore Platform

The alternatives to the proposed drilling and production offshore platform consist of:

Directional Drilling from Shore Sites

Subsea and Subterranean Drilling Chambers

Individual Subsea Completions

Clustered Multiwell Subsea Completions

Underwater Platforms

Floating or Semi-Submersible Drilling/Production Vessels.

Although several of these alternatives would not be appropriate in this case, each will be discussed.

12.1.2 Directional Drilling from Shore Sites

The proposed production site lies 4.5 miles offshore, consequently the minimum horizontal throw of 24,000 feet would be required. Assuming a drilling depth of 6,000 to 8,000 feet the bore angle would exceed 70^{o} (90^{o} is horizontal) and the length of the well bore would exceed 26,000 feet (5 miles). This type of drilling exceeds the known drilling techniques because of the depth (world's deepest well is 30,050 feet) and the extreme bore angle (80^{o} wells in Redondo Beach, California is considered upper limit, depth was only 8,400 feet). (Ref. 4, VIII-2).

12.1.3 Subsea or Subterranean Drilling Chambers

The construction of subsea or subterranean drilling chambers is a possible

alternative to drilling platform. This alternative consists of an underground drilling chamber connected to shore by an underground tunnel. A preliminary study by Esso Production Research Company in 1968 was conducted to determine the feasibility of such an alternative. The final Environmental Statement for the proposed development of the Santa Ynes unit, Santa Barbara Channel prepared by U.S. Geological Survey concluded "These methods (Subsea or Subterranean Drilling Chambers) might become alternatives at some unknown future time, but, at the present time, technological feasibility rules them out as viable alternatives to the use of platforms to develop oil and gas fields."

12.1.4 Individual Satellite Subsea Completions

Individual subsea completions are wells drilled from mobile floating or jack-up type drill ships with the wellhead equipment located beneath the water surface, generally near the ocean floor. The individual wells are connected to a nearby platform or other surface production facility. This alternative would be viable in the case of a project which might necessitate multiple drill platforms by reducing the number of platforms to one. However, in the case of the proposed project, one production platform would still be required. Additionally, because of the high cost of such an alternative (maintenance, work-over etc) it would necessitate early cutoff and abandonment of the wells if permitted. This waste of natural resources would not be in the public interest and could be considered an adverse impact.

12.1.5 Clustered Multi-well Subsea Completions

This alternative entails the drilling of several wells through a subsea template. The template would normally include manifold piping. A floating drill ship

would drill directional wells through the template. Completed wells would be connected to the manifold and control system and produce through a common pipeline to production facility on a nearby platform for processing. It was concluded in the above referenced Final Environmental Statement for the Santa Ynez unit that: ".....present submerged production systems require a nearby surface facility (within 3 miles) to process production. Also, to date none of the clustered well systems have been operated on live production wells in the ocean, therefore, the risks maybe greater". Once again, a surface production platform would be required with this alternative.

12.1.6 Underwater Platforms

Underwater platforms could create conditions hazardous to navigation due the relative shallow depth of the site. The underwater platform has the disadvantage of increasing costs without compensating environmental advantages.

12.1.7 Floating or Semi-Submersible Drilling/Production Vessel

Over all, the floating vessel concept does not offer any environmental advantages over conventional platforms and, in fact, adds the additional safety risks during adverse weather and navigational hazards due to the potential need for spread mooring.

12.2 Alternatives to Onshore Treating and Storage Facilities

The alternatives to the proposed oil and gas pipelines and onshore facility to treat oil and gas produced from offshore leases include the following:

Separate and store on an offshore platform

Treat crude oil on a platform, store in a submerged facility

Treat and store on a floating storage and terminal vessel

Alternatives for handling natural gas if crude oil is stored offshore

Alternative coastal sites for onshore facilities

Transpost untreated oil and gas to remote locations

12.2.1 Separate and Store on an Offshore Platform

This alternative would consist of adding crude oil storage capacity to the proposed drilling platform, thus eliminating the need for an oil pipeline to shore and the onshore oil treating and storage facilities. This alternative would necessitate the use of transport vessels to transport the produced oil to refineries.

It was concluded in the Humble Oil & Refining Co., 1973 Environmental Assessment Santa Ynez Unit and concurred by the U.S.G.S. that this alternative was not viable because of higher aesthetic impact and cost without compensating environmental advantages. In addition, the increased risk of oil spills and increased air pollutant due to tanker loading excludes this alternative from further consideration.

12.2.2 Treat Crude Oil on a Platform, Store in a Submerged Facility

This alternative would have some of the same effect as separation and storage on a platform in that the onshore facility would not be required. However, the size of the platform would be increased and would necessitate a submerged open bottom storage tank. This type of storage presents a greater risk of a sizable spill than from a floating facility or a platform. The need for a gas pipeline to shore is not eliminated. The increased environmental and and aesthetic impact is without compensating advantages.

12.2.3 Treat and Store on a Floating Storage and Terminal Vessel

This alternative is similar to the previous alternative with the exception of the use of a Terminal Vessel to treat and store rather than on platform treatment and submerged storage. As in the previous alternative the increased cost, greater aesthetic impact and increased risk of a major spill is without compensating advantages.

12.2.4 Alternatives for Handling Natural Gas if Crude Oil is Stored Offshore

As an alternative to the proposed pipeline bringing the produced oil, water and gas onshore for treatment and storage, only the natural gas could be brought onshore which would minimize the adverse environmental impacts. This would result from the elimination of transporting the produced oil and water onshore, thus eliminating the risk of an oil pipeline rupture or leak. A natural gas leak would have substantially less adverse environmental impact.

Furthermore, three alternatives to the onshore gas facility might be considered: Flare the gas; reinject into the reservior; or liquefy the gas offshore and transport it to market in marine vessels. Because of the physical and economic waste (and to some extent the resulting air pollution) the U.S.G.S. does not allow flaring under normal operating conditions. Reinjection of the gas into the reservior could result in higher production and shorten life of the oilfield. The gas could be recovered at a later date with some loss due to use of gas to drive compressors to reinject. This alternative however, deprives the California population of much needed clean burning fuel until ultimate installation of a onshore gas line. Liquefying the gas and transporting it by tanker to a sales market is technically feasible but it is wasteful and uneconomical for a short haul because approximately 20% of the gas would

be needed to liquify the remaining gas. Additionally, this alternative would require one or more added platforms for the processing and loading. Liquifation thus would result in reduced gas sales, increased cost to consumer, additional tanker traffic and offshore platforms, and onshore facilities.

12.3 Alternative Coastal Sites for Onshore Facilities

Virtually any onshore location adjacent to the initial development area could be considered as a potential facility site. Due to the limited size requirement of the onshore facility (1.5 acres) numerous alternative sites are possible. Two parameters were used to evaluate alternative sites:

1) Proximity to existing oil and gas pipeline with adequate excess capacity, and 2) close proximity to coastline in order to minimize adverse onshore impact of pipeline construction. To the south of the proposed onshore facility the extensive existing and future residential development limits the potential sites to: 1) area between the Edison Canal and Harbor Blvd, north of the Channel Island Marina, 2) area between Harbor Blvd. and Pacific Ocean, north of Hollywood Beach and south of Oxnard Shores and 3) adjacent to Ormond Beach South California Edison Power Generating Facility. To the north of the proposed onshore facility, existing residential and commercial development would limit the potential sites to: 1) area immediately north of the McGrath State Beach, south of the Ventura River mouth, 2) area adjacent to Ventura Sewage Treatment Facility, and Rincon coastal area northwest of the City of Ventura.

In the case of the sites south of the proposed onshore site, both sites 1) and 2) are areas which are planned for future residential and commercial develop-

ment which would result in incompatible adjacent land uses. Site 3) area adjacent to the Ormond Beach Southern California Edison Facility would require the construction of an onshore pipeline to tie into existing pipelines. This alternative would result in greater adverse environmental impacts without corresponding advantages.

Sites to the north of the proposed onshore site which would not result in extensive additional offshore pipeline length (with correspondingly greater adverse impacts), would exclude potential sites along the Rincon area. The alternative sites 1) and 2) would result in the same adverse environmental impacts except that use of warm effluent from the Mandalay Power Generating Facility as a source of heat for oil treatment would not exist, therefore, resulting in additional air pollution and use of natural gas. Consequently, the available alternative sites would result in similar or greater environmental impacts without corresponding benefits.

12.3.1 Treatment of Oil and Gas at Separate Existing Facilities

Oil and gas, as produced, requires treatment before they can be marketed. Oil must be dehydrated to a water content of less than 3 percent. Gas must be treated to a level acceptable to the purchasing company. This alternative is not viable in the case of the proposed project since no existing coastal treatment or storage facilities, between the Ventura River and Point Mugu, exist with adequate excess capacity to handle the projected oil and gas to be produced. The alternative of expanding an existing facility has virtually the same adverse environmental impacts as the proposed onshore facility. Furthermore, use of existing (and expanded) facilities would necessitate additional pipeline length with greater resulting impacts.

12.3.2 Transport Untreated Oil and Gas to Remote Locations

Treatment of the produced is required prior to marketing. Cost of the resulting oil and hazards to the environment are increased during the transport of crude containing an appreciable percentage of water by tanker or by long pipelines for treatment at remote facilities. Increased risk of pipeline failure is probably roughly proportional to it's length. Due to friction losses in pipelines, additional length requires greater pumping pressures and larger pipelines. This would increase the possibility of line failure due to pressure and would increase the volume of oil contained in the pipeline which could contaminate the environment in the event of a failure.

Transport of production oil by tanker would substantially increase marine traffic, air contaminates associated with loading the oil and tanker operation, and the risk of a major spill. Furthermore, during later stages of development the mixture of oil and water may contain as much as equal parts of oil and water, consequently doubling the tanker movements per unit of treated oil produced.

This alternative substantially increases the cost and environmental hazards without corresponding benefits.

12.4 Alternatives for Product Transportation

Alternatives to the use of the existing onshore pipeline immediately adjacent to the proposed onshore facility would include: 1) use of a marine terminal, and 2) transportation by highway tank trucks or railroad tank cars,

12.5 Transportation by Highway Tank Trucks or Railroad Tank Cars

The alternative use of highway or rail transport vessels would result in the following: 1) increased air contaminants associated with operation of trucks and trains, 2) increased safety hazards associated with transporation, 3) increased rail and highway traffic, and 4) increased risk of onshore oil spills. No benefits would result from these alternatives.

12.6 Alternatives for the Disposal of Produced Water

Alternatives to the proposed reinjection of produced water would include: 1) surface or subsurface disposal from the platform, 2) ocean disposal, and 3) disposal at onshore liquid waste land fills.

All three alternatives would result in an adverse impact on either the ocean water quality or surface and aquifer water quality without corresponding benefits.

12.7 Deny, Modify or Postpone the Proposal

The Secretary of the Interior will be asked to approve the proposed plan for development and production, there are four basic responses other than approval: 1) deny the project as submitted, 2) deny in part and approve in part the project as submitted, 3) postpone at this time the project as submitted, and 4) approve the project on condition that it be modified by any of the operational alternatives discussed earlier.

12.7.1 Deny the Project as Submitted

Denial of the project would be based on technological features and/or its potential environmental impact. The effect of this decision would be the preservation, at least temporarily, of the existing environment surrounding the proposed project. Any new plan for development would be contingent on the environmental assessment associated with it. Correspondingly, the denial would result in the unavailability of 6,000 BBLS/day of crude oil and 1.2 MCF/day of gas to the consumer. Recognizing that the demand for energy at present in this country is greater than known reserves readily available in United States, this loss of reserve capacity would require increased production from other sources or a reduction in demand for energy.

12.7.2 Deny in Part and Approve in Part the Project as Submitted

The proposal is an integral plan for Development/Production of the subject lease with each component depending in part upon the approval and implementation of the other components. However, this does not preclude partial approval of the proposed project. The section on Environmental Impacts addresses the impacts associated with each component of the project as proposed. It should be recognized that the need to replace an unapproved component would result in impacts associated with that revision. To the extent that deficiencies resulting in excessive adverse impacts would be corrected, the revision could result in decreased environmental impact.

12.7.3 Postpone at this Time the Project as Submitted

The proposed project is within the presently known technology for development and production of crude oil, consequently postponement would afford the opporunity for development of any needed but unavailable technology. The decision to postpone approval would eliminate any adverse environmental impacts for the duration of the postponement period. Should additional technology become available during this period which would lessen any associated risks, the adverse environmental impacts due to the proposed project could be reduced.

12.7.4 Approve the Project on Condition that it be Modified by any of the Operational Alternatives

The environmental impacts of each component have been previously described. The cumulative impacts of each component or alternative to that component would be the combination of the individual impacts. However, selection of an alternative which was unacceptable to the unit operator could result in the project not going forth.

12.7.5 Energy Alternatives

In light of the extensive discussion necessary to adequately describe and evaluate energy alternative, such discussion is beyond the scope of this report. Detailed discussion of this issue is contained in numerous Environmental Assessements for similar or larger projects in the Santa Barbara Channel. Consequently, the following outline describes the Energy Alternative Description contained in the Final Environmental Statement prepared by U.S.G.S. for the proposed plan for development of the Santa Ynez Unit, Santa Barbara Channel.

1. Increased Energy Impacts
   a. Oil Imports
   b. Gas Imports
2. Increase Onshore Oil and Gas Impacts
3. Increased Nuclear Power
4. Increased Use of Coal
5. Increase Hydroelectric Power
6. Modification of FPC Natural Gas Pricing
7. Modification of Market Demand Prorationing System
8. Oil Shale Production
9. Wellbore Stimulation for Recovery from known Deposits
10. Increase Liquefied Natural Gas (LNG) Imports
11. Synthetic Natural Gas and Oil
12. Tar Sands
13. Geothermal Energy
14. Reduction in Demand
15. Combinations of Alternatives

13.0 Leaseholder and Petitioner

UNION OIL COMPANY OF CALIFORNIA

13.1 Person Responsible for Proposed Project

Richard Gillen, Project Manager

c/o Union Oil Co of California

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Ventura, California 93030

Telephone: (805) 659-0130

HUENEME OFFSHORE PLATFORM

AND ONSHORE FACILITY

LIST OF EXHIBITS

Exhibit	Description
A	Proposed Project Orientation Plot
B	Related Facilities to the Proposed Project
C	Platform - Side Elevation
D	Platform Drill Floor - Plan
E	Proposed Onshore Lease Parcel
F	Proposed Onshore Facility
G	Proposed Pipeline Route
H	Popular Skin and Scuba Diving Sites
I	Commercial and Recreational Shell Fishing Sites
J	Popular Sport Fishing Sites
K	Reservoir Natural Gas Analysis
L	Geological Regional Map and Section, Bathymetry, Etc.
M	Regional Seismicity Map
N	Geotechnical Section
O	Clean Seas Inc. Equipment Roster

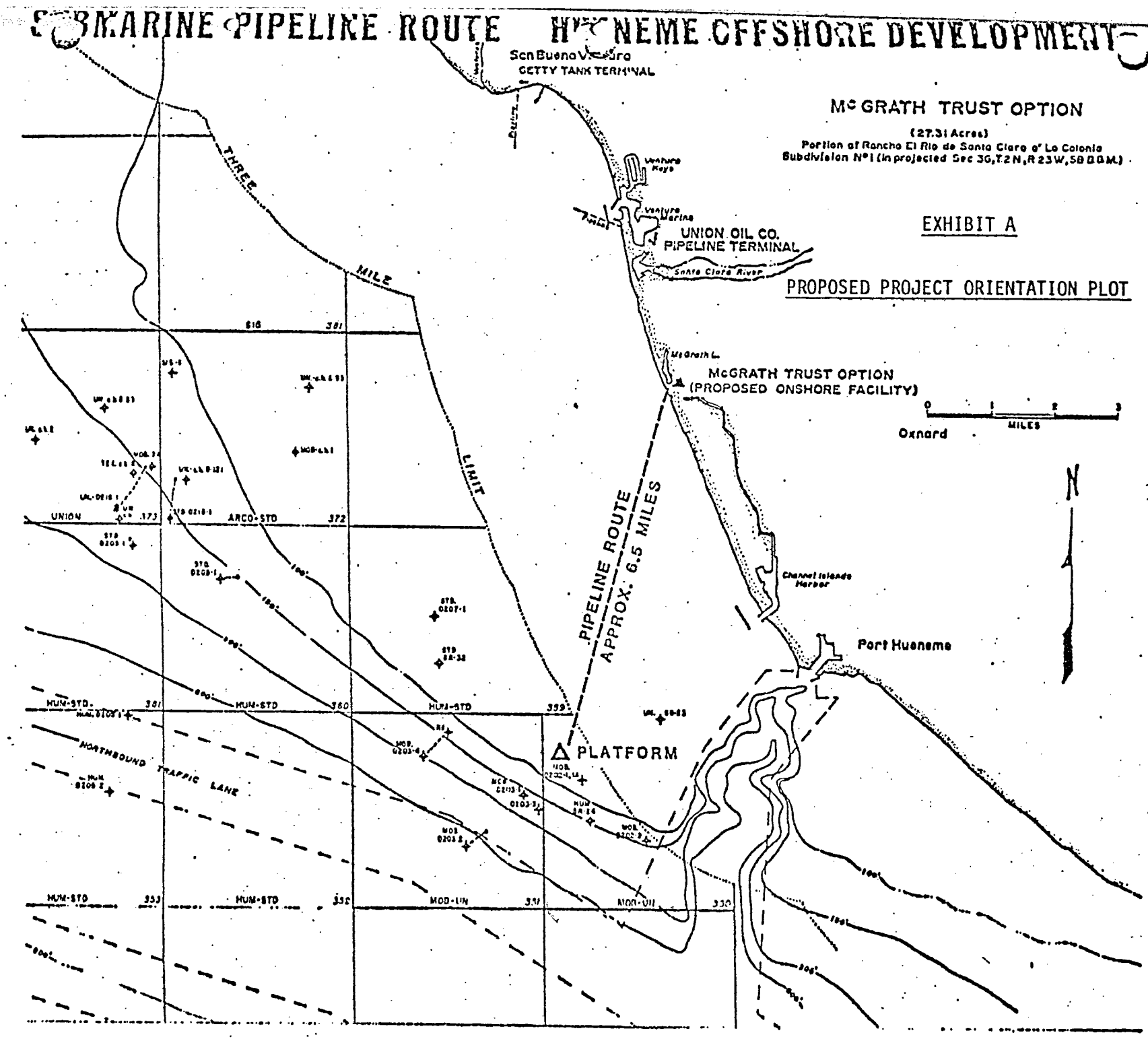
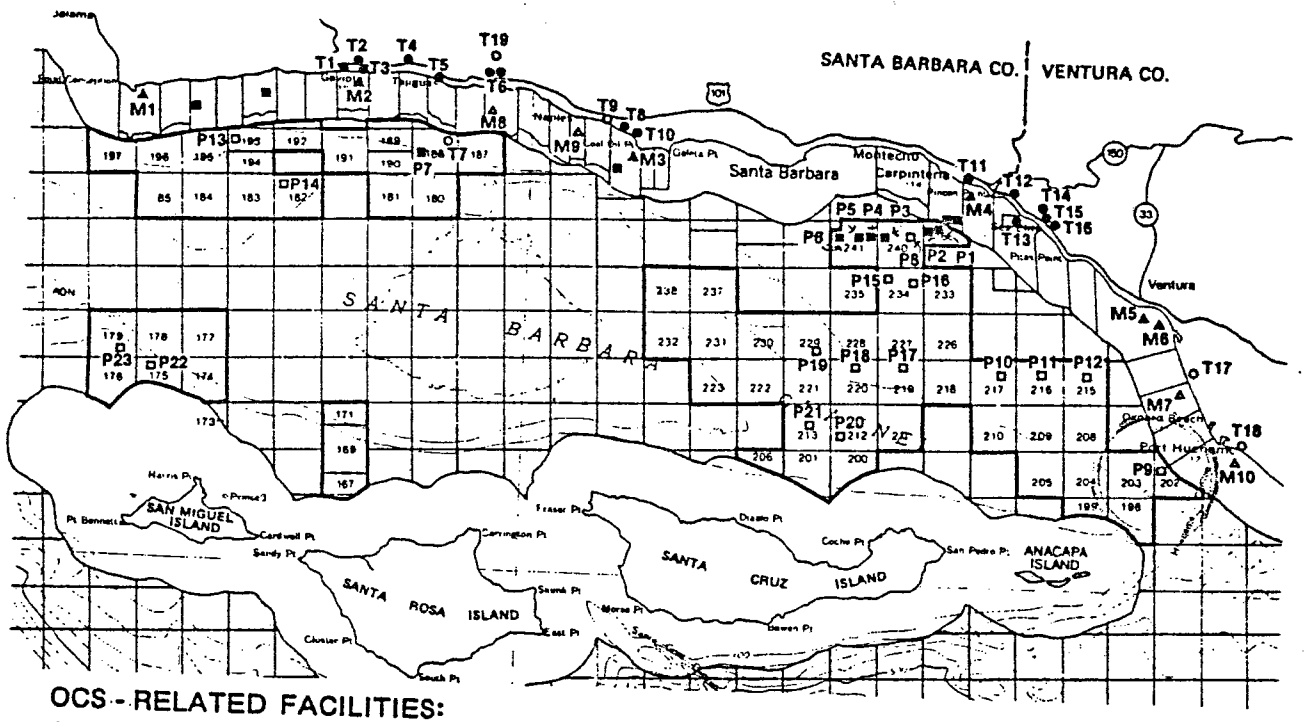

SUBMARINE PIPELINE ROUTE HUENEME OFFSHORE DEVELOPMENT
McGRATH TRUST OPTION
(27.31 Acres)
Portion of Rancho El Rio de Santa Clara o' La Colonia
Subdivision No 1 (in projected Sec 30, T.2 N., R 23 W., SB B.&M.)
EXHIBIT A
PROPOSED PROJECT ORIENTATION PLOT
San Buenaventura
GETTY TANK TERMINAL
UNION OIL CO.
PIPELINE TERMINAL
Santa Clara River
McGRATH TRUST OPTION
(PROPOSED ONSHORE FACILITY)
Oxnard
MILES
N
THREE MILE LIMIT
PIPELINE ROUTE
APPROX. 6.5 MILES
Channel Islands Harbor
Port Hueneme
PLATFORM
NORTHBOUND TRAFFIC LANE
UNION
ARCO-STD
HUM-STD
MOD-LIN
MOD-UII

EXHIBIT B



OCS - RELATED FACILITIES:
SANTA BARBARA CHANNEL

Figure

- Leased Area
- ■ Existing Platform
- □ Proposed or Possible Platform
- ● Existing Processing Plant
- ○ Proposed or Possible Processing Plant
- ▲ Existing Marine Terminal
- △ Proposed or Possible Marine Terminal

NORTH
April 1977

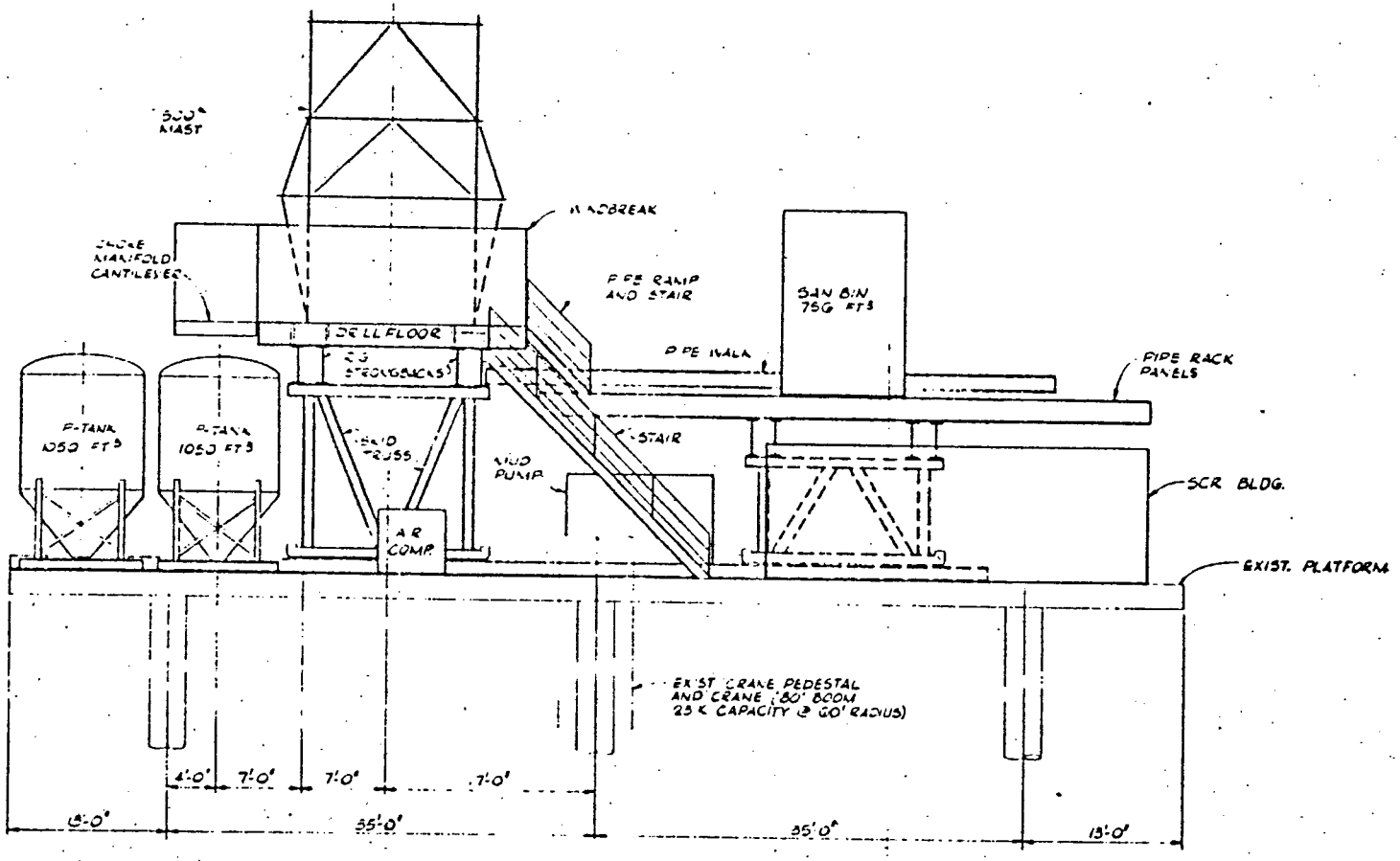
0 3 5 10 KILOMETERS
0 3 5 10 MILES
SCALE 1:600000 DEPTH CURVE in FATHOMS

OCS Tract 5760 ACRES

California Governor's Office of Planning and Research
OCS PROJECT

Reprinted from: State of California Coastal Management Program and
Final Environmental Impact Statement, August 1977, P.G-2

RDA



SIDE ELEVATION

EXHIBIT C

POOL

6 PILE 9

SIDE

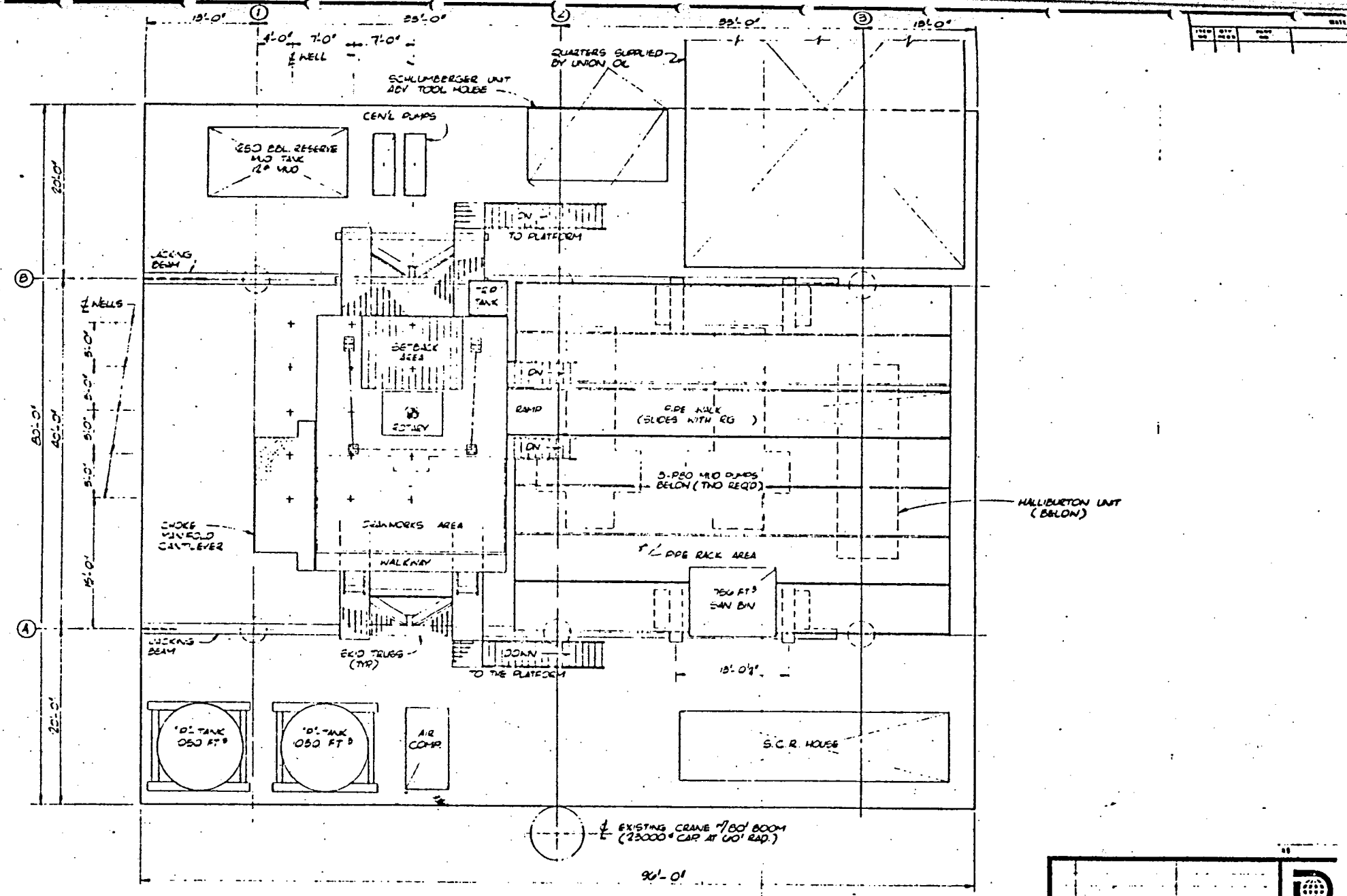
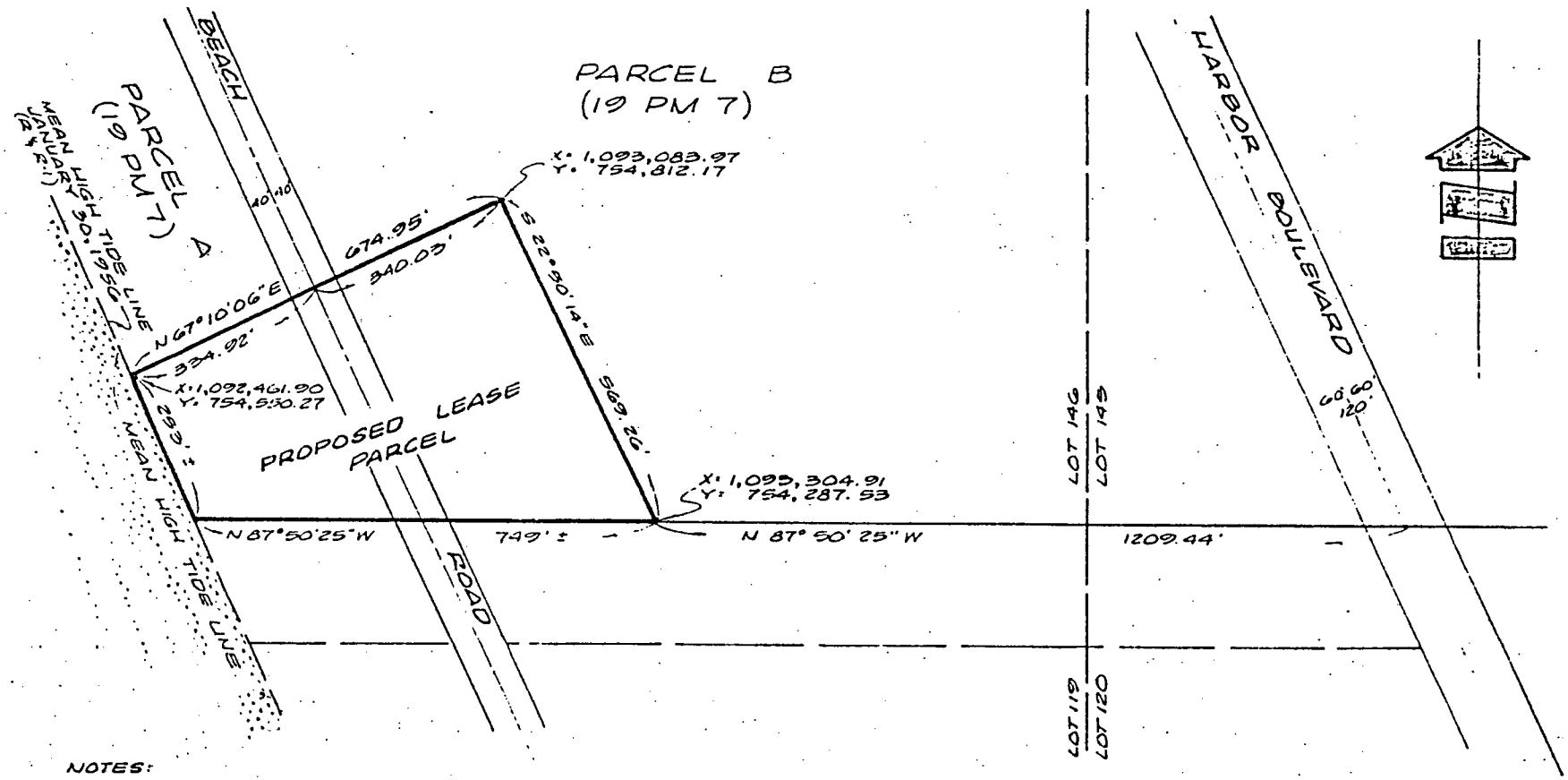

SCHLUMBERGER UNIT ADV TOOL HOUSE
QUARTERS SUPPLIED BY UNION OIL
CENT PUMPS
250 BBL RESERVE MUD TANK 12# MUD
TO PLATFORM
JACKING BEAM
SET-BACK AREA
SUBSTRUCTURE
RAMP
PIPE RACK (SLOPES WITH EG)
3-PBO MUD PUMPS BELOW (TWO REQD)
HALLIBURTON UNIT (BELOW)
CHOKE MANIFOLD CANTILEVER
DRAWWORKS AREA
WALKWAY
PIPE RACK AREA
750 FT³ SAN BIN
SKID TRUGS (TYP)
TO THE PLATFORM
'D' TANK 050 FT³
'D' TANK 050 FT³
AIR COMP
S.C.R. HOUSE
℄ EXISTING CRANE W/80' BOOM (23000# CAP AT 60' RAD.)
90'-0"

EXHIBIT D



NOTES:
R = 20 RS 32
R-1 = 19 PM 7

BEARINGS, DISTANCES AND COORDINATES SHOWN ON THIS SKETCH CONFORM WITH THE CALIFORNIA COORDINATE SYSTEM (LAMBERT PROJECTION) ZONE VI. ZONE VI COORDINATES WERE CALCULATED FROM DATA SHOWN ON 18 RS 22 & 28 RS 86.

LEWIS & LEWIS INC

EXHIBIT E

UNION OIL COMPANY OF CALIFORNIA

SKETCH SHOWING

PROPOSED LEASE PARCEL

PORTION OF LOT 146
PATTERSON RANCH SUBDIVISION
(8 MR 1)

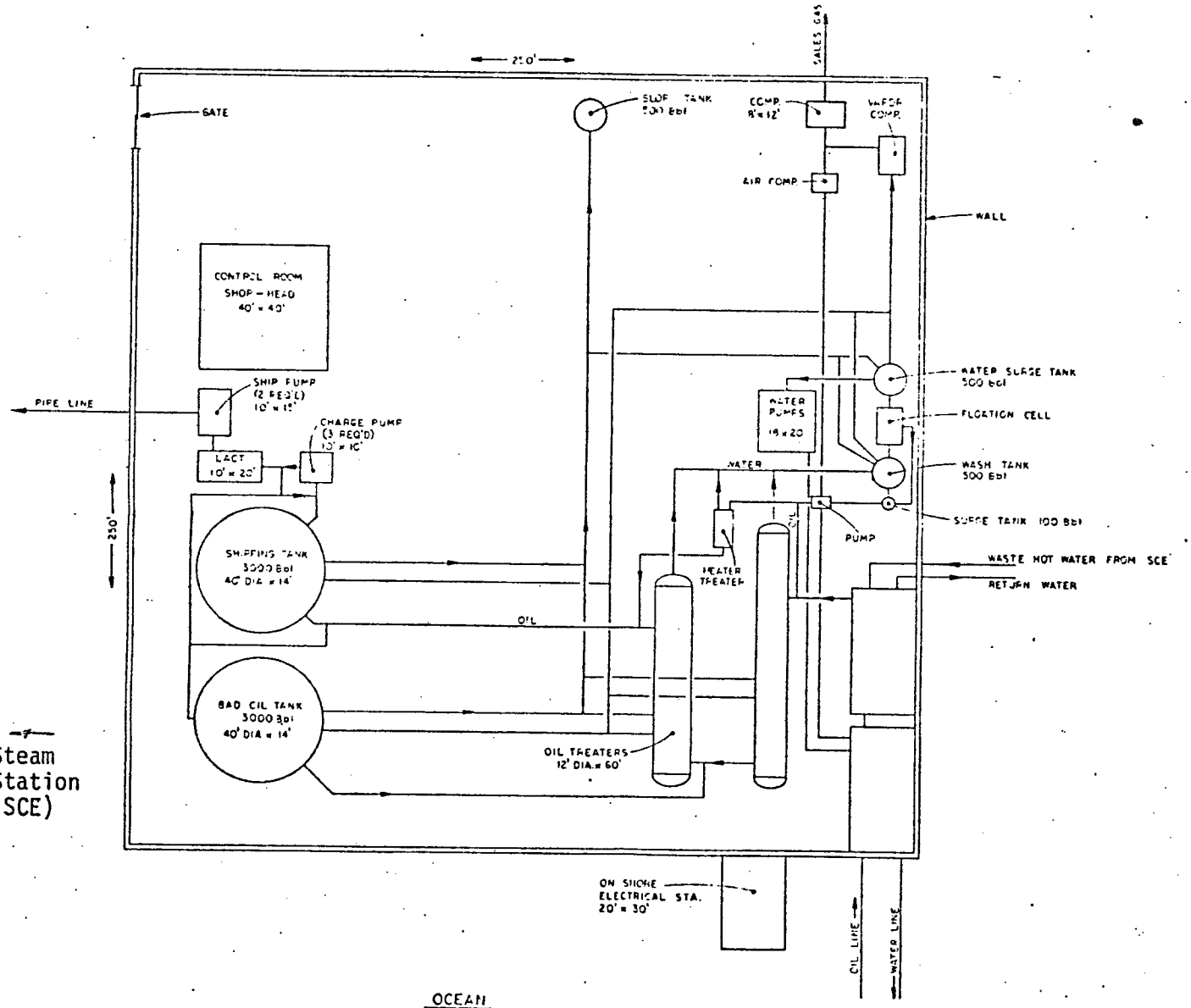


EXHIBIT F

Proposed Onshore Facility
-Plan-

ASSOCIA
DESIG

L. NEHU

SCALE: 1/1

100

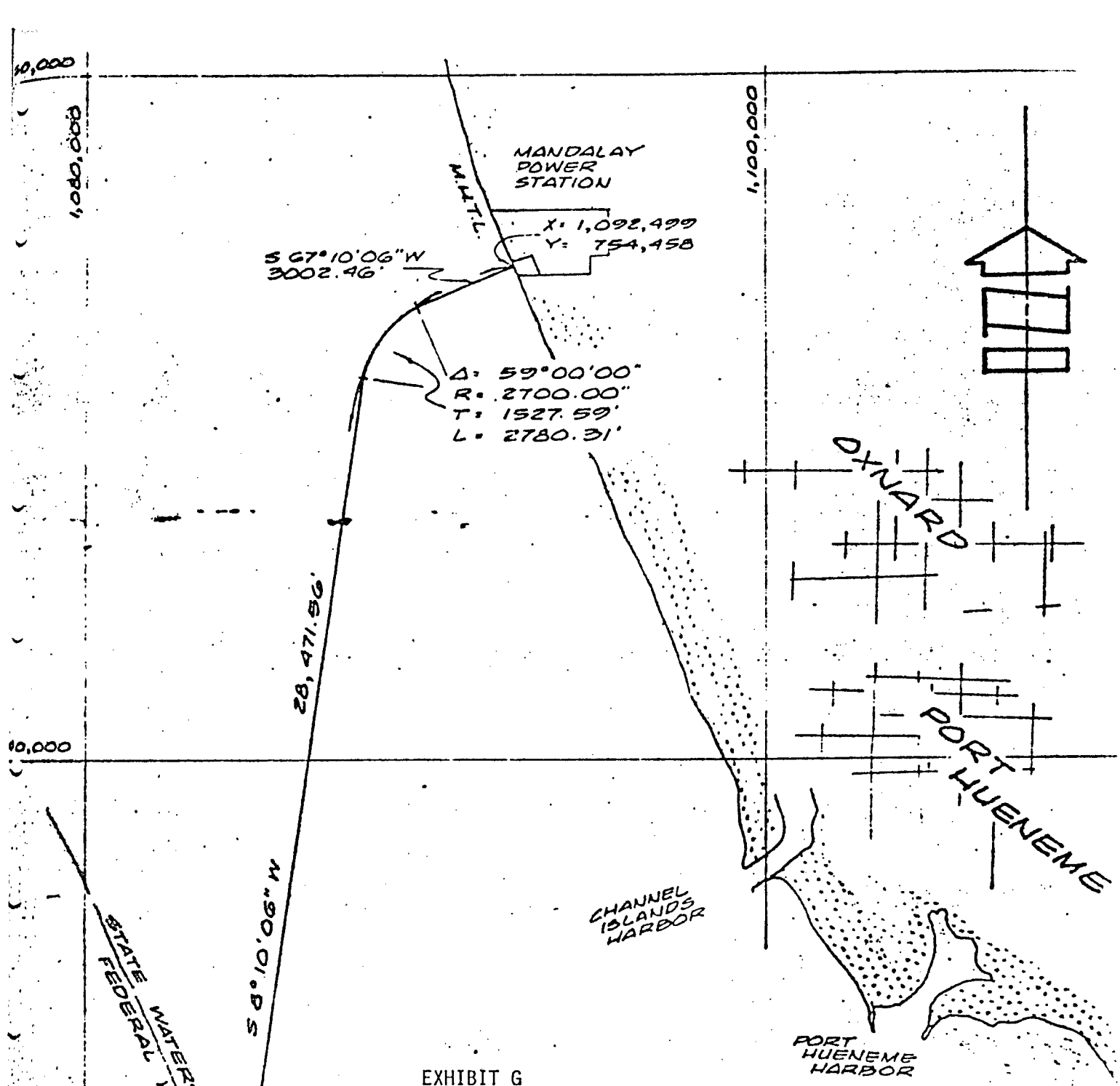


EXHIBIT G

Proposed Pipeline Route

UNION OIL COMPANY OF CALIFORNIA

SKETCH SHOWING

PROPOSED PIPELINE ROUTE O.C.S. P-0202

SANTA BARBARA CHANNEL CALIFORNIA

NOVEMBER, 1978 SCALE: 1"=4000

NOTE: BEARINGS, DISTANCES AND COORDINATES SHOWN ON THIS SKETCH CONFORM WITH THE CALIFORNIA

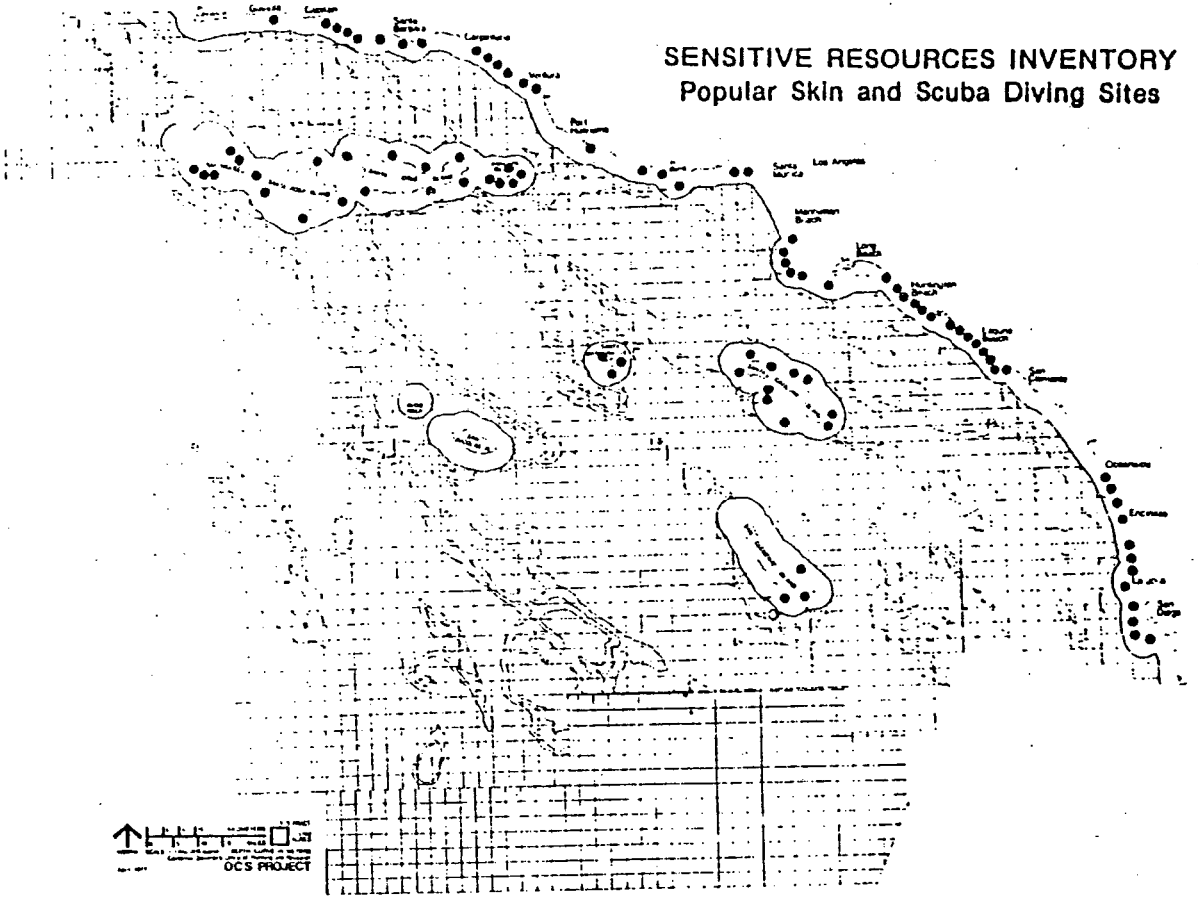
LEWIS & LEWIS, INC.
surveyors

Information Redaction Statement

Pursuant to the Freedom of Information Act (5 U.S.C. 552) and its implementing regulations (43 CFR Part 2) and as provided in 30 CFR 550.199(b), some information has been redacted from this document and was deleted from the public information copy of this submission.

Proprietary Information Redacted

Not for Public Release



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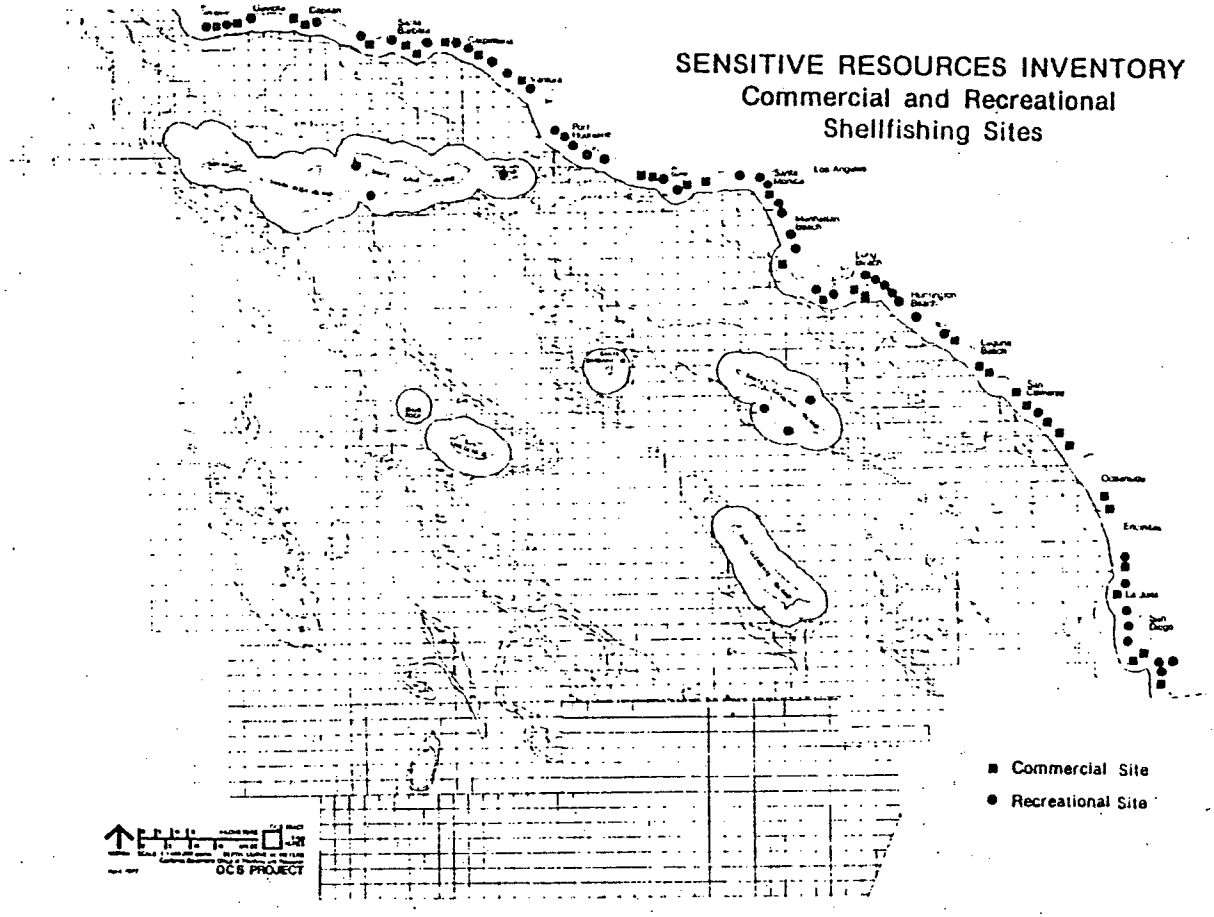
and Final Environmental Impact Statement, August 1977, P.G-14

RDA

Exhibit H



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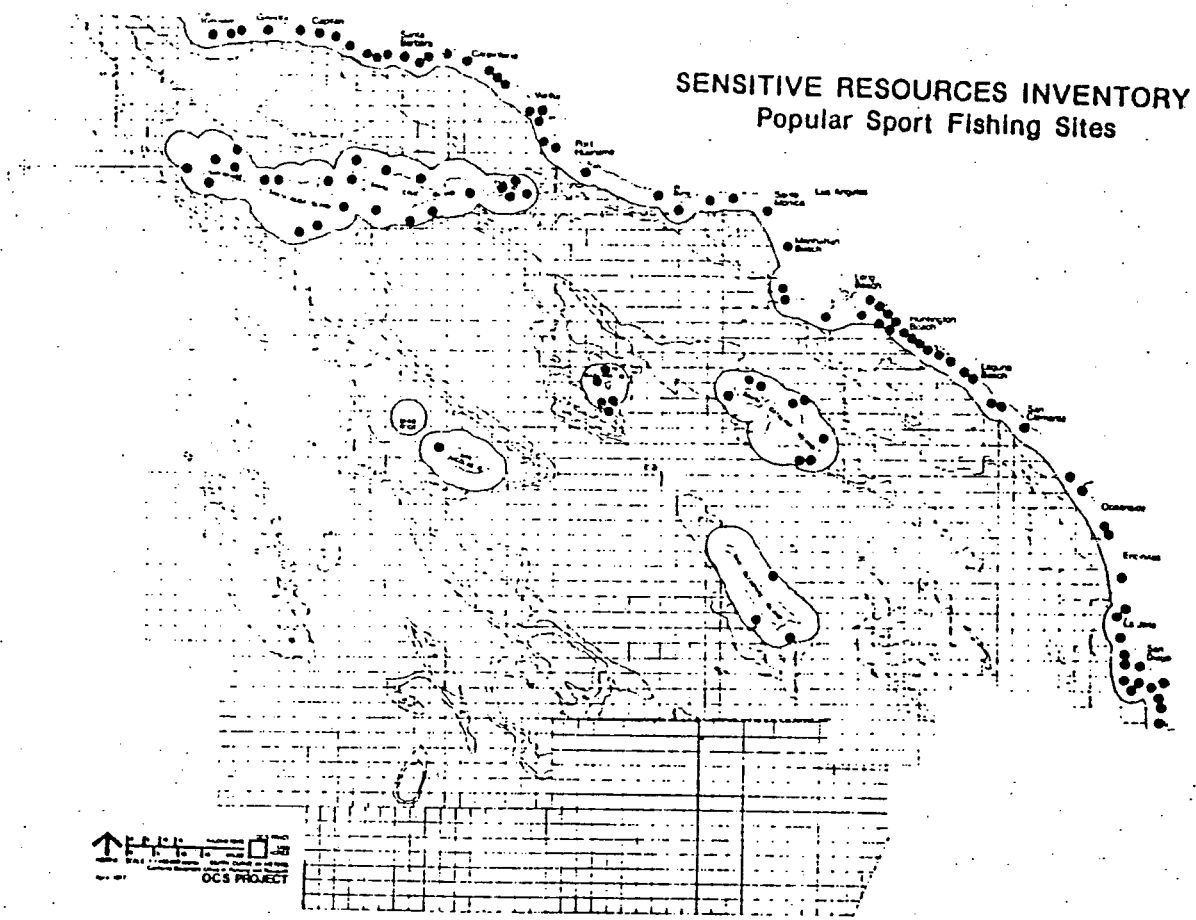
Final Environmental Impact Statement, August, 1977, P.G-13

RDA

Exhibit I



Reprinted from: State of California Coastal Management Program and
Final Environmental Impact Statement, August,1977, P.G-14

RDA

Exhibit J

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

File RFL 5851

Company Mobil Oil Corporation — Formation Hueneme Sand

Well OCS-P-0202 No. 1A — County Santa Barbara Channel

Field Hueneme Offshore — State California

HYDROCARBON ANALYSIS OF Separator GAS SAMPLE

COMPONENT	MOL PER CENT	GPM	
Hydrogen Sulfide			
Carbon Dioxide	0.19		
Nitrogen	1.19		
Methane	96.34		
Ethane	1.74	0.438	
Propane	0.26	0.071	
iso-Butane	0.08	0.026	
n-Butane	0.11	0.034	.166
iso-Pentane	0.02	0.007	
n-Pentane	0.02	0.007	
Hexanes	0.02	0.008	
Heptanes plus	0.03	0.013	
	100.00	0.604	

Calculated gas gravity (air = 1.000) = 0.576

Calculated gross heating value = 1021 BTU
per cubic foot of dry gas at 14.696 psia at 60° F.

Collected at 167 psig and 81 °F. in the field.

EXHIBIT K

Core Laboratories, Inc.
Reservoir Fluid Analysis

P. L. Moses
Manager

CLEAN SEAS INCORPORATED

Inventory of Equipment and Materials

Status as of October 1978

I Containment

A. 2000' Bottom-Tension Boom

This is a heavy duty, open ocean containment boom with 4'x 13' floats and 8' curtains, extending 3-1/2' above water line and 4-1/2' below water line. usually stored on land and deployed from beach, requiring 24 hours for 1000' length if unassembled. At the present time we are working on an assembled mode storage on land for 2000'.

Capability: Will contain oil in 6-8 foot significant waves and winds to 25 knots at currents up to 1-1/4 knots.

B. 1600' Vikoma Seapack and Seaboom
2 Units

For very fast response to oil spill. The Vikoma Seapack is based on a 23 foot hull and contains 1600' of Seaboom connected at one end to a diesel driven fan and ducted propeller water pump. The Vikoma Seapack unit can be transported by road trailer, towed by a small vessel or carried on a work boat or tanker. It could also be transported by aircraft.

Capability: Experience over the past several years indicates this boom can be on a scene and deployed in less than an hour. it is effective in preventing spread of oil in significant waves up to 6 feet and winds of 20 to 25 knots. In the mode in which this boom is used, there is little or no current across boom which could cause loss of oil due to underflow. CSI exercises with this boom would parrallel this in response and deployment time. Response is the major factor. Deployment is instantaneously accomplished on arrival at the site, 10-12 minutes.

C. Harbor Protection Boom

.. 2000 feet medium duty boom (16"x 12" Skirt Kepner Sea Curtain) for harbor protection.
.. 2000 feet light duty (8"x 12" skirt Kepner Sea Curtain) for secondary harbor protection.
.. 1210 feet Goodyear Sea Sentry medium duty boom (14-1/2"x 24" without fence in 55 foot sections) for harbor protection.
.. 5565 feet Expandi light duty oil boom, Model 3000. This boom may be used for offshore rapid deployment for containment as well as harbor protection.
.. 9100 feet Expandi medium duty oil boom, Model 4300. This boom would primarily be used for offshore rapid deployment and containment.

EXHIBIT O (2 of 6)

II Recovery

A. CSI Skimmer System:

One (1) CSI Skimmer System consisting of 45' x 17' a 6' catamaran-type adjustable weir skimmer barge, two 240' lengths of 30" Kepner Sea Curtain boom, a 2000 GPM pumping system and two 100 barrel oil-water, separation tanks or 5000 floating storage bag. For fast response, the skimmer with boom, floating storage bag, pumps, etc. on board is anchored in Santa Barbara harbor.

Capability: This system is capable of recovering all grades of oil from light to bunker C at rates up to 2000 GPM plus some debris and sorbent material in moderate sea states. Modification to this skimmer eliminates the necessity of the tanks by installing a pump onboard and a 5000 gallon floating storage bag. Also, may be pumped directly into the TM-VIII barge.

B. Mark-II Skimmer:

Two (2) Mark-II Skimmers, 14' x 30' weir type are available in Carpinteria Yard. These may be used, one on each side of a vessel, singularly with a vessel, or may be used independently with O/B Motors in a harbor situation. Recovery system can be either an 80 barrel, skid-mounted vacuum tank or compressed air driven Wilden pumps and 100 bbl. oil-water separation tanks, or a self-contained pump and floating 1200 gallon storage bag, all of which are available.

Capability: These are very simple skimmers and may be used in a number of ways to solve the particular problem at hand. All grades of oil from light to bunker C can be recovered plus small amounts of debris. Fluid recovery rates from 50 GPM to 200 GPM are available. These skimmers are limited to light winds and light sea states. Trailers capable of carrying these skimmers on the highway have been constructed.

C. Komara Miniskimmer:

One (1) Floating Disk Skimmer, hydraulically driven disk and pump. This pump is designed to collect oil in concentrated areas; ideal for containment booms. Will recover oil in open ocean in light sea conditions.

Capability: Fluid recovery rate 15 to 76 bbl/hr. Light weight, can be handled by manpower.

D. Floating Weir Skimmers:

Three (3) Floating Weir Skimmers, compressed air driven Acme-type pump. These were designed to collect oil concentrated in the B-T boom area and work in harbor areas and quiet waters.

Capability: These skimmers will handle light to fairly heavy oil with no debris in 2-3 foot waves. Fluid recovery rates are up to 300 GPM for each skimmer.

E. One (1) Acme 39T weir skimmer: Gasoline or air driven pump. This pump is designed to collect oil in somewhat heavy concentration. Ideal for harbor areas. Will recover oil in open ocean in light seas. Fluid recovery rates up to 340 GPM. Light in weight can be handled by two men.

Five (5) Acme 51T weir skimmers: Same as above and will recover oil in open ocean in light to moderate seas.

F. Tide-Mar VII Barge:

One (1) 641 ton tank barge, Tide-Mar VII, for collecting oil picked up by skimmers as they work in an oil spill. This is a 160' x 39' x 13' ocean going barge with 10 tanks, capacity of 7840 barrels, and six diesel engine driven pumps. Presently moored in the harbor at Ventura, California.

G. Air Driven Pumps:

Two (2) M15 Wilden double diaphram pumps used with MK-II Skimmers and miscellaneous equipment.

H. Floating Storage Bags:

2 - 5000 gallon Kepner Floating Storage Bags
6 - 1200 gallon Kepner Floating Storage Bags

These bags to be used as interim storage awaiting arrival of the Tide-Mar VII or similar tank barge/vessels.

I. Cyclonet 050:

One (1) Cyclonet 050 skimmer fitted to a Zodiac Mark V inflatable dinghy. This skimmer is primarily for protected and semi-protected waters but may be used in the open ocean in light sea conditions.. This skimmer is self-propelled, contains a pump system and small oil storage.

Capability: The system is capable of recovering up to 100 gallons per minute; may be towed or carried onboard a vessel enroute to area of use.

EXHIBIT O (4 of 6)

III Miscellaneous

A. Absorbents & Chemicals:

A large inventory of absorbents, including Conwed: sweeps, blankets, booms, rugs; 3M Company: sweeps, sheets, booms and Dow Imbiber bags and blankets; also, smaller quantities of Oil Herder are kept in the Carpinteria Warehouse.

Included are: 101 boxes of booms (3376'), 138 boxes sweeps and sheets, 100 per box; 9 rolls of blankets, 300' each; 7 rolls of rugs, 300' each' 18 boxes of sweeps, 100' each. The above are from Conwed and 3M Company.

199 Dow Imbiber blankets.

11 boxes of Oil Snare.

Additional quantities are available as "back-up" from warehouses in the Los Angeles area.

B. Work Boat:

One (1) 19' Larson skiff with 75 HP Johnson motor, kept in Santa Barbara Harbor or CSI's yard, for use as work boat around skimmers and barge.

Three (3) 14' aluminum skiffs w/OB, (1) Van in Carpinteria, (1) Van in Ventura, 1 Van in Avila Beach.

One (1) 21' Monark Utility Boat with O/B for use as a work boat, stored at Carpinteria.

One (1) 10' Avon rubber raft w/OB, stored at CSI's yard.

C. Truck:

One (1) 2-1/2 ton, used to tow Vikoma Seapcak, boats, haul boom, absorbents, etc.

D. Compressor:

One (1) Gardner-Denver 600 CFM rotary, diesel engine driven wheel mounted compressor stored in Carpinteria Yard. Usually used with air tools and to drive the Exxon Floating Weir skimmers, Acme skimmers or the Wilden pumps.

E. Lines, Hoses, Tools:

Complete set of all necessary sizes of nylon and poly lines for deploying and towing booms and skimmers. All hoses are fitted with Camlock fittings. Air hoses for compressors and complete sets of tools for all equipment.

EXHIBIT O (5 of 6)

F. Radio Communications System:

A complete, clear channel, radio system on 40.04-48.62 MHz., provides solid communication throughout the CSI area of interest. This system consists of:

1	base station in Santa Barbara office
1	base station in Carpinteria Warehouse
1	portable base station (installed in Mobile Communication Center)
1	repeater on Santa Ynez Peak
2	mobile unit in Manager's car, all trucks
20	portable Handie-Talkie Units.

G. Oil Mop MK-II-9

Two (2) MK-II-9 Oil Mop Systems each consisting of a two-wheel trailer, oil mop machine, tail pulleys and 400' of 9" mop.

Capability: This system is primarily used in protected waters, will recover all grades of oil. Maximum capacity 100 bbls/hr.

H. 40' Enclosed Trailer Vans:

Eight (8) Trailers stocked with booms, absorbents, small skimmer, miscellaneous cleanup equipment . Will be stored in strategic locations in our area of interest.

One (1) 36' Flatbed Trailer for use with 100 bbl vacuum tank.

I. 25' Mobile Communications Center:

Has mobile base station, portable radios, auxiliary electrical power and all other equipment for self-containment.

J. 100 bbl. Skid-Mounted Vacuum Tank:

1 - 100 bbl. Vacuum Tank used with MK-II skimmers or may be used independently.

K. 100 bbl. Oil/Water Recovery Tanks:

2 - Oil/Water Recovery Tanks, Coast Guard approved. Use with CSI or other skimmer systems.

L. 100 bbl. Flat Storage Tanks:

4 - 100 bbl. Flat Storage Tanks. Used with all skimmer systems.

EXHIBIT O (6 of 6)

M. 1 Bridger Shoulder Line Gun w/ rewinding machine, Model N w/ accessories, for use with Vans in boom launching operations.

N. 6 M-3 Scare-Away Exploders, bird frightening devices. Operates automatically on LP-gas.

O. 1 Wiggins Model WD 44 Forklift 4000#.

P. 1 Vikoma Seaboom Vulcanizer machine. (Repair of boom)

Q. 1 Power Block for Vikoma Boom recovery.

R. 25 Drums Corexit #9527

S. 2 Helicopter Chemical Dispersant Spray Units, Simplex Model 2000, w/150 gal. buckets and 32' boom

T. 1 Surface Chemical Dispersant Spray Unit, pump, booms and mountings for different types of vessels.

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