

FINAL
ENVIRONMENTAL STATEMENT

Proposed
Installation of Platforms C and Henry
on Federal Oil and Gas Leases OCS-P 0241 and 0240 issued under
the Outer Continental Shelf Lands Act,
Santa Barbara Channel area off the Coast of California

Issued by
the
Department of the Interior

August 27, 1971

SUMMARY SHEET

(Check one) () Draft. (X) Final Environmental Statement

Department of Interior, Geological Survey

1. (X.) Administrative Action () Legislative Action
2. Approval of installation of two drilling and production platforms on Federal oil and gas leases P-0240 and P-0241 issued under the Outer Continental Shelf Lands Act, Santa Barbara Channel area off the Coast of Santa Barbara, California.
3. These platforms will be used to complete development of the Dos Cuadras and Carpinteria Offshore oil fields. Under normal conditions, the additional platforms will have little effect on the marine environment. The possibility of subsidence of the ground surface over the reservoirs can be minimized by water injection. The scenic nature of the Channel will be further modified by the addition of two platforms, 4 to 5 miles offshore, to the existing 14. If a serious accident of malfunction occurred during drilling or producing operations, oil pollution of the marine environment could result. Under unfavorable weather or sea conditions an oil spill could also cause extensive short-term damage to beaches and wildlife. The long-term or permanent effects of a major oil spill are still unknown, though some danger obviously exists. More stringent safety requirements have decreased the possibility of the occurrence of accidents. Improved methods of containment are also available should a spill occur.
4. Alternatives to the proposed action which were considered:
 - a. Other production methods -- 1. Directional drilling, 2. Seafloor completion, and 3. Unitization.
 - b. No action.
5. Comments on the draft statement were received from the following:

Federal Government

Department of Commerce
Department of Transportation
Department of Defense
Department of Army
Environmental Protection Agency

State and Local Government

California Resources Agency
California State Lands Commission
County of Santa Barbara
Environmental Quality Advisory Board,
City of Santa Barbara

Other Sources

General public (12 individual letters)
Industry (5 oil companies and 1 industry association
submitted comments)
Other associations (2 non-industry associations submitted
comments)

In addition to the above, 68 comments on the environmental statement were received from the general public after the closing date for comments. Of these, 66 were in favor of the proposal and 2 were opposed.

6. Draft environmental statement was sent to the Council on Environmental Quality on May 10 and released to the public on May 10.

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SUMMARY

Permits to install two fixed marine platforms designed for drilling and production of petroleum and natural gas have been requested of the Department of the Interior by two groups of companies operating producing Federal leases in the Santa Barbara Channel, California. One of these, Platform C on Lease OCS-P 0241, has been requested by the Union Oil Company acting for itself and its co-lessees, Mobil Oil Corporation, Texaco, Inc., and Gulf Oil Company. The other, Platform Henry on Lease OCS-P 0240, has been requested by the Sun Oil Company, acting for itself and its co-lessees, Superior Oil Company and Marathon Oil Company.

Platform C would be the fourth and final platform needed to complete development of the Dos Cuadras field, now producing about 83,300 barrels of oil and 47,900,000 cu. ft. of gas daily. Platform Henry would be the fifth and final platform needed to complete development of the Carpinteria Offshore field, now producing about 14,500 barrels of oil and 10,700,000 cu. ft. of gas daily (includes State production). Both fields lie on the seaward extension of the Rincon Structural Trend, a prolific producer onshore for many years.

The proposed platforms will be four to five miles from the nearest shoreline point and will be the final components of a line of nine platforms westward from Rincon Point originally designed for production prior to the blowout accident that occurred in early 1969. Their approval has been deferred by the Department pending actions in keeping with the spirit of the National Environmental Policy Act of 1969.

Public Hearings on the proposed platforms were held on January 13-14, 1971, in Santa Barbara, California, and a preliminary draft environmental impact analysis for public comment was issued by the Geological Survey on May 10, 1971. The two Federal leases involved were part of a general competitive sale of 71 leases conducted by the Bureau of Land Management in February 1968. The lease acquisition carried legal rights to development and production should discovery be made.

Installation of the two proposed platforms, in addition to the 13 existing platforms and 1 drilling island and 3 piers on State and Federal leases, will further modify the scenic nature of the Santa Barbara Channel and this has been considered to be an adverse factor in the preferred development of the coast by some as a tourist and retirement area. These and other platforms are easily visible from the shore.

Drilling and producing operations from the platforms should not adversely affect the marine environment, but would have a minor effect on unrestricted use of the sea surface for boating. Marine support activity would increase to service the platforms. Sea floor pipeline connections would have to be completed to already existing pipelines to shore facilities. New shore facilities are not needed in view of existing receiving stations. Additional refineries are not contemplated.

The most serious impacts on the environment would be those resulting from accidents that would produce a spill of crude oil. The effect of an oil spill on the plant and animal life in the area would vary according to the location of the spill, the time of the year, the weather, and the currents. It is believed that short-term effects would be the more severe in terms of present knowledge. Studies undertaken after the oil spill in 1969 have found little evidence so far to indicate that the long-term productivity of marine flora and fauna were significantly affected. Studies of crude oil spills in other areas indicate potential damage but are inconclusive as to long-term effects.

A major spill would cause extensive short-term damage to beaches. Recreational and commercial uses of land and water in the area of the spill would probably be curtailed until cleanup of the oil was completed, as was demonstrated after the drilling accident in early 1969.

Geologic conditions at the proposed platform sites are such that they provide less chance of a blowout such as occurred in 1969 at Platform A. The oil-producing Repetto Formation in the vicinity of Platform C is about 200 feet structurally lower than around Platform A and approximately 900 feet lower at Platform Henry.

Steps have been taken to minimize the possibility of accidents. The platforms are designed to resist wind and wave forces generated by a hurricane type storm with maximum sustained wind speeds of 100 miles per hour and to withstand an earthquake of 7.5 Richter scale magnitude without catastrophic damage.

Drilling operations since the blowout are being conducted under more stringent regulations. If a blowout should occur at Platform C or Henry, the flow of hydrocarbons would be confined to the well bore, and could be controlled through the surface shut-in equipment or, ultimately, a relief well. Production operations are now rigidly controlled by new safety and warning devices designed to operate automatically should a malfunction occur.

Federal inspection efforts have been greatly intensified since the Platform A accident and all critical operations on the platform would be under essentially continuous review and surveillance.

Location of the proposed platforms in the Santa Barbara Channel is a temporary intrusion in the environment. It is estimated that production from these platforms will be completed within a period of 10 to 30 years. Upon completion of production from the proposed platforms, the lessees are required to dismantle and remove the platforms from the Channel under Federal regulations.

Alternative methods of development from existing platforms do not permit complete recovery of reserves. Reservoirs could not be fully developed by directional drilling. Existing platforms were not designed for and would not be adequate to handle additional production from sea floor completions. Unitization of P-0240 and 0166 would not alter this situation.

California is in a short-fall area in domestic source of oil and gas. Currently only about two-thirds of its annual needs for petroleum are met by production from onshore and offshore fields. The proposed platforms would permit substantial and needed resources to the economy. Platform C would assist in pressure draw-down of the Dos Cuadras field and Platform Henry would protect drainage loss to the adjoining lease operation. Both platforms are designed in full compliance with State and Federal regulations.

PROPOSED ACTION

Two additional drilling and production platforms are proposed for installation on Federal leases in the Santa Barbara Channel, California: Platform C on Lease OCS P-0241 and Platform Henry on the adjacent Lease P-0240. Both platforms would be four to five miles from the nearest shoreline point.

The proposed location of Platform C is $34^{\circ} 19' 58.424''$ North latitude, $119^{\circ} 37' 50.781''$ West longitude, Lambert Zone VI coordinates $X = 979,353$ $Y = 804,770$. The platform will be 6,887 feet from the east line and 3,070 feet from the north line of the lease, and approximately 2,800 feet west of existing Platform B.

The proposed location of Platform Henry is $34^{\circ} 19' 54.8''$ North latitude, $119^{\circ} 33' 38.2''$ West longitude, Lambert Zone VI coordinates $X = 1,000,580$ $Y = 803,740$. The platform will be 1,500 feet from the east line and 4,100 feet from the north line of the lease, approximately 13,000 feet east of existing Platform Hillhouse and 2,700 feet west of Platform Houchin.

Platforms C and Henry are required to complete development of the Dos Cuadras and Carpinteria Offshore fields which are in an advanced development stage. Approval for installation of Platform C was, in fact, granted by the U.S. Geological Survey in September 1968 and the Corps of Engineers, U.S. Army, issued a navigational permit on December 24, 1968. Installation of this platform was planned for March 1969 but was deferred by the Secretary of the Interior following the blowout on January 28, 1969.

By terms of the leases which were issued in 1968, the lessees have "the right to construct or erect and to maintain within the leased area all artificial islands, platforms, fixed or floating structures . . . necessary or convenient to the full enjoyment of the rights granted by this lease." In keeping with the spirit of the National Environmental Policy Act of 1969, however, the environmental considerations pertaining to these platform installations are being reviewed at this time.

Santa
Barbara

Carpinteria

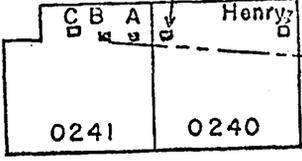
3 Mile Limit

Hope

Haidi

Hillhouse

PL.



Hogan

PL.

Houchin

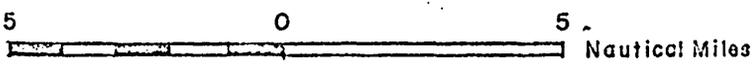
Ventura

← SHIPPING LANE

SHIPPING LANE →

SANTA CRUZ ISLAND

ANACAPA ISLAND



THE SANTA BARBARA CHANNEL REGION

The Santa Barbara Channel proper is an area of approximately 1,750 square miles off the southwestern coast of California, with an east-west dimension of about 70 miles between Port Hueneme on the east and Point Conception on the west, and a north-south dimension of approximately 25 miles between the mainland and the Channel Islands of San Miguel, Santa Rosa, Santa Cruz, and Anacapa. The channel floor is basin-shaped; its deepest part is an area some 12 to 15 miles in diameter somewhat west of its geographical center where the water depth is greater than 1,800 feet.

Santa Barbara County on the mainland north of the channel also includes the three westernmost Channel Islands of Santa Cruz, Santa Rosa and San Miguel, which form part of the southern boundary of the Channel. Ventura County, including Anacapa Island, forms the eastern and rest of the southern margin of the Channel. Nearly three-quarters of the Channel, however, or about 1,300 square miles, is beyond three geographical miles seaward from the mainland and three geographical miles landward from the Channel Islands and is therefore under federal jurisdiction by the terms of the Outer Continental Shelf Act (P.L. 83-212).

Geology

The Santa Barbara Channel region is in the westernmost part of the Transverse Range province in which the principal structural trend is westward, rather than northwestward as in most of California. The Channel itself is the submerged western half of the Ventura sedimentary basin, an elongate westerly trending syncline.

Stratigraphy

Rocks in the western part of the Ventura basin, and in the Santa Ynez Mountains north of the Channel, range in age from Early Cretaceous to Holocene (Recent). On the north they unconformably overlie, or are faulted against Franciscan-type rocks of pre-Cretaceous (?) age. Santa Cruz Island, south of the Channel, is composed of basement rocks of a different type.

It is possible that there are thick successions of Cretaceous rocks deep in the subsurface beneath much of the Channel region, for enormous thicknesses of Cretaceous rocks are known in the San Rafael Mountains to the north and Cretaceous rocks are also exposed on San Miguel Island, south of the Channel. However, these rocks are not known to contain petroleum in this area.

Early and middle Tertiary sedimentary rocks have been penetrated at depth beneath the Channel and are exposed at various places on land in the Channel area. The total thickness of these rocks is in the range of 11,500 to 13,000 feet and units within them contain reservoirs of petroleum. The Miocene also includes sections of volcanic rocks.

The late Tertiary rocks, rather poorly consolidated marine sedimentary rocks of Pliocene age, contain the largest known accumulations of petroleum in the Ventura basin. These rocks are not exposed in either the Santa Ynez Mountains or on the Channel Islands but attain a thickness of as much as 12,000 feet onshore a few miles northeast of the city of Ventura. This section of Pliocene rocks thins westward beneath the Channel but is nonetheless presumed to be wide-spread under the Channel floor and is known to be on the order of 5,000 feet thick in places.

The major reservoirs of petroleum occur in the lower part of the Pliocene section, the Repetto Formation. In places the reservoirs are shallow. The top of the shallowest major reservoir in the Dos Cuadras field is overlain by less than 300 feet of interbedded siltstone, claystone and minor sandstone, but the Dos Cuadras field is the only area in the channel known to have such a very shallow stratigraphic cover.

Pleistocene and Holocene deposits unconformably overlie Pliocene and older rocks near Santa Barbara and perhaps under the Channel. Less than 4 feet of unconsolidated sand, silt, and mud of Holocene age locally masks the shelf along the mainland coast.

Structure

Within the Ventura basin and on its north and south margins numerous faults and folds indicate intense deformation. The dominant structural feature north of the channel is the west-trending Santa Ynez fault, its south side apparently raised 5,000 to 10,000 feet relative to the north side. Some geologists have suggested that this is a major active fault zone with left lateral oblique slip. Along the mainland coast of the channel, younger and less competent late Tertiary rocks are cut by many faults that generally trend westward, parallel to the range front. These strata are also folded into complex anticlines and synclines ranging in size from a few inches to the size of the Ventura anticline, which is nearly 17 miles long and 4 miles wide. In the Channel Islands at the southern margin of the basin, faults with a westerly or northwesterly trend are the principal structural features. Some of the largest are believed to have a component of left-lateral displacement.

These features have been studied directly onshore, but in areas covered by the oceans only indirect methods, such as geophysical techniques, shallow coring, and deep stratigraphic drilling, are available to decipher the geology. Some offshore areas, such as the Montalvo and Rincon trends, are fairly well known, but information about other offshore areas is scant or, at least, unavailable. Many offshore areas undoubtedly have structures as complicated as those on the adjoining mainland.

Oil seeps

Onshore and offshore oil, gas, and asphalt seeps are common in the Channel region, particularly along the northern coast. The location of more than 60 seeps in the Santa Barbara Channel is known. Seepage rates from the natural seeps off Coal Oil Point alone have been estimated to be 50 to 70 barrels a day. There are also seeps of significant size at Point Conception, Goleta, and Carpinteria as well as many lesser seeps. Those on San Miguel and Santa Cruz Islands have not been active recently.

It is probable that most natural seeps of oil and gas are along fractures in the poorly consolidated cap rock, although some may be through pore spaces in the cap rock. There is evidence for fracture control in the observed alinement of asphalt domes parallel to geologic structure in some areas, in the alinement of gas boils in an east-west trend near Platform A when the 1969 blowout occurred, and in the east-west alinement of gas bubbles parallel to major fault trends offshore near Malibu Point after the San Fernando earthquake in 1971.

Seismicity

The Santa Barbara Channel region is within the seismically active circum-Pacific belt. Within recent historic time there have been three large earthquakes in the area. In 1812 there was a shock that may have been of magnitude 7. In 1925 there was an earthquake of magnitude 6.3, and in 1941 a shock of magnitude 6.0. Recent studies have shown that there were some 200 earthquakes of magnitude 3.0 or greater during the period 1934-1967. Though the epicenters were scattered over much of the region there was a concentration in the eastern part of the Channel and the adjacent land. Between June and August 1968, a swarm of 68 earthquakes of magnitude 2.8 or greater occurred in the east central part of the Channel between Santa Cruz Island and the mainland. The largest caused minor damage in the towns of Goleta and Carpinteria.

Strong earthquakes from more distant epicenters also affect the Channel region. Recent studies have indicated that on the average an earthquake of magnitude 6.1 may occur each year in southern California, and an earthquake of magnitude 8.0 may occur once in 52 years. Such a great earthquake anywhere in the southern California area would undoubtedly have destructive effects in the Channel region.

Natural History and Archeology of the Channel

The Santa Barbara Channel lies near the northern extreme of the northward flowing currents from the equator and the southern extreme of the southward flowing cold coastal currents. As a result there is a mixture of northern and southern marine floral and faunal components in the Channel.

The route of migration of gray whales is through or to the west of the Channel. The major periods of migration are February and March, as they move northward, and November and December on their southward trek. It is believed that these animals do not feed when migrating.

San Miguel Island has a significant resident sea mammal population. It contains one of the largest known colonies of sea elephants as well as sea lions, seals, the San Miguel fox, and numerous species of birds. The estimated population of the California sea lion is 15,000 to 20,000 and of the Northern elephant seal, 5,000. Stellar sea lions, Southern fur seals, Northern fur seals, and Harbor seals are also present in numbers ranging from a few to about 100. San Miguel Island also contains some 50 ancient village sites, dating back perhaps 5,000 years.

In 1963, the Department of the Navy and the National Park Service completed a cooperative agreement by terms of which the National Park Service assumes responsibility for the natural, historical and archeological resources of San Miguel, provides the Navy consulting services concerning these resources, and screens applicants who wish to conduct scientific research there.

Anacapa Island is part of the Channel Islands National Monument. These islands are also frequented by the sea lions. The giant coreopsis is reported to bloom in such profusion on these islands in the spring that it is visible ten miles away.

During the 92nd Congress several proposals were introduced to establish a Channel Islands National Park or to study the feasibility of including Santa Cruz, Santa Rosa, and San Miguel with Santa Barbara and Anacapa Islands as a national park.

Commercial and Industrial Use of the Channel

Commercial fishing

Commercial fish landings in the Santa Barbara area during 1968 amounted to 20,551,000 pounds, or 4.6 percent of the total for the State. In 1969 this figure increased to 34,615,000 pounds and amounted to 6.0 percent of the State total.

Shipping

The main shipping lanes leading northward from Long Beach traverse the Santa Barbara Channel. The traffic separation scheme provides for a one-mile-wide traffic lane for northbound and southbound ships with a two-mile separation between the lanes.

Oil production

The principal industrial use of the Channel is for oil and gas production. Currently there are 45 active State oil and gas leases covering 132,058 acres in the Channel. These have been essentially fully developed for production from 8 platforms, 3 piers, and one artificial island. As of June 30, 1970, there were 372 wells producing from these leases at a daily average rate of about 16,000 barrels of oil and 967 million cubic feet of gas. A state sanctuary was established in 1955 offshore from the city of Santa Barbara between Goleta and Summerland. Oil and gas development is excluded from this area except under certain conditions. Following the oil spill in the Channel in 1969 the State cancelled all existing drilling on State offshore lands, pending development of effective containment and recovery devices. State legislation in 1970 prohibits further leasing of State lands in the Channel unless it may be determined that the lease will not result in the seepage or spillage of oil or the destruction of scenic or esthetic values.

There are presently 70 Federal leases in effect in the Channel. Three are now producing, and as of May 1971, 172 development wells had been completed from five existing platforms. Current production from these wells is approximately 90,000 barrels of oil and 50 million cubic feet of gas per day.

Mainland communities

Santa Barbara County north of the Channel covers a total land and inland water area of nearly 2,750 square miles. Much of the county is mountainous, with a maximum elevation of 6,828 feet at the summit of Big Pine Mountain in the Los Padres National Forest which occupies the northeastern third of the county. There are many fertile areas, including the Santa Maria, Cuyama, Lompoc, and Santa Ynez Valleys and the Southeast Coastal Plain where the land has been developed and most of the people reside.

The population of the County in the 1970 census was 264,324. At the time of the census more than 25 percent of the County's population, 70,215 people, lived in the city of Santa Barbara. The city, named for the petron saint of miners, has long been known for its extensive landscaped estates, the predominant Spanish flavor of its architecture, and its careful preservation of the beauty of its waterfront. The Santa Barbara Mission is the best preserved and architecturally one of the finest of the old Spanish missions. A yacht harbor, a bird refuge built on land reclaimed from a swamp, and an extensive botanic garden are also well known.

Ventura County, including Anacapa Island, covers a total area of 1,857 square miles. It, too, is mountainous, with a maximum elevation of 8,826 feet at Mt. Pinos in the northern part of the County. The population of Ventura County on January 1, 1970, was 384,000, an increase of more than 89 percent over the previous decade. Its largest city is Oxnard,

about 30 miles southeast of Santa Barbara. The city began as a single beet sugar refinery, but now many of its citizens are employed at the Naval Construction Center at Port Hueneme, the Naval Air Missile Test Center, and the Oxnard Air Force Base. The city of Ventura, 7 miles north of Oxnard, is the second largest in the County with a population in 1970 of 56,250. Ventura is an exporting center for oil and agricultural products of the County.

The even climate which prevails along the Channel throughout the year closely resembles that of the Mediterranean. The city of Santa Barbara has frequently been called the "Riviera of the Pacific." The climate is equable, with temperatures ranging from a mean minimum of 48° to a mean maximum of 72°, and rainfall averages about 18 inches a year.

The tourist business is of prime importance to the economy of the area. Tourists are drawn year-round by the mild climate and ocean-side location. Beaches, fishing piers, marinas and shoreline parks are available and the harbor area of the city of Santa Barbara is a popular center for boating, deepsea fishing, and other water sports. The nearby mountains contain various forms of wildlife as well as campgrounds and fishing areas.

The Santa Barbara Chamber of Commerce reported that the city's income from tourism during 1968 was \$53,373,200.

Agriculture is also an important factor in the economy. The value of the agricultural output in Santa Barbara County in 1969 was a record \$92.9 million and preliminary indications are that 1970's output was very close to that level.

The largest source of income in the two counties, however, is the mineral industry. In 1969, Santa Barbara County was the fourth largest producer of minerals in the State, accounting for 6 percent of the State total. Mineral production in 1969 was valued at \$113,979,419. Major mineral products of the County are petroleum, natural gas, diatomite, natural gas liquids, sand and gravel, and mercury. Natural gas, gas liquids, and petroleum were valued at \$82,937,000. In that same year Ventura County was the sixth largest producer of minerals in the State. Ventura County's mineral production in 1969 was valued at \$83,142,348. More than 90 percent of the production was petroleum, natural gas, and natural gas liquids.

ENVIRONMENTAL IMPACT OF PROPOSED PLATFORMS

History of Oil Production in Channel to 1969

State leases

Offshore oil exploitation began in the Santa Barbara Channel region in 1896 with the extension seaward of the Summerland oil field by wells located onshore and on piers. After 1921, when the State of

California introduced regulations governing offshore development, many exploration permits and leases were granted, and the offshore parts of the Rincon field were discovered in 1927, the Capitan and Elwood fields in 1929 and 1932.

Intensive development of the offshore region did not begin, however, until after World War II when several major oil companies engaged in extensive geologic and geophysical exploration. In 1958, new and accelerated development of the tideland part of the Rincon field followed the completion of Rincon Island, 2,800 feet offshore. In that same year, an important new offshore discovery was made in the Channel about 2 miles off the coast in the Summerland Offshore Oil Field, and Platform Hazel was installed southeast of Santa Barbara to provide production facilities. Platform Hilda was constructed about 2 miles west of Hazel in August 1960.

Other offshore fields were discovered on state leases west of the Santa Barbara Oil Sanctuary: the Gaviota gas field in 1958, the Cuarta Offshore Field and the Conception Offshore Field in 1959, the Naples gas field in 1960, the Coal Oil Point Field in 1961, the Alegria, Caliente, and Molino Fields in 1962, and the Point Conception Field in 1965. Platform Helen was installed in 1960 to produce oil from the Cuarta Offshore Field, and Platforms Harry in 1961 and Herman in 1963 for development of the Conception Offshore Field.

In 1966 the South Elwood Offshore Field was discovered about 4 miles west of the Oil Sanctuary and the Carpinteria Offshore Field was discovered some 4 miles south of Carpinteria and to the east of the Oil Sanctuary. Platform Holly was erected to exploit the South Elwood Field and Platforms Hope and Heidi to develop the Carpinteria Field.

Federal leases

Development of the Carpinteria Offshore Field led to the first development on Federal lands. The Carpinteria Offshore Field extends about 4 miles from the State tideland tract westward into Federal OCS tracts. About half the producing area is in State tidelands and half in Federal lands, and the development in the State part of the field resulted in drainage of Federal lands. Accordingly, on December 15, 1966, the Federal Government held its first lease sale in the Santa Barbara Channel. Lease OCS-P 0166, comprising 1,995.48 acres in Blocks 51 N., 63 W., and 52 N., 63 W., was issued effective January 1, 1967, as the result of a high bonus bid of \$21,189,000. This lease is owned jointly by Continental Oil Company, Cities Service Oil Company, and Phillips Petroleum Company. Phillips Petroleum Company is the designated operator of the lease.

Initial production from Lease OCS-P 0166 occurred on June 10, 1968, and development of the lease was completed in November 1969. A total of 67 development wells were drilled from Platforms Hogan and Houchin, of

which 56 were producing in January 1971, 5 were shut in, and 6 had been suspended or abandoned. Cumulative production to December 31, 1970, has amounted to about 14 million barrels of oil and 8.6 billion cubic feet of gas. The daily average production during January 1971 was 10,465 barrels of oil and 8,273,000 cubic feet of gas.

In February 1968 the Federal Government held a major lease sale, offering 110 tracts in the Santa Barbara Channel. Tracts within a general 5-mile limit of Santa Barbara were excluded at that time, in effect extending the oil sanctuary seaward an additional 1½ miles. An additional 71 leases were issued following the sale, including the two leases on which the proposed platforms are to be installed.

Lease OCS-P 0241, comprising 5,400 acres in Block 51 N., 65 W., was issued effective February 1, 1968, as the result of a record high bonus bid of \$61,418,000.00. The lease is owned equally by Gulf Oil Company - U.S., Union Oil Company of California, Mobil Oil Corporation, and Texaco Inc. Union Oil is the designated operator of the lease.

The Dos Cuadras Offshore Field, with an estimated reserve of more than 100 million barrels, was discovered one month later. Approximately 70 percent of the field underlies the northern part of Lease OCS-P 0241. Platforms A and B were installed in the fall of 1968 to develop the field.

Lease OCS-P 0240, comprising 5,760 acres of Block 51 N., 64 W., was issued effective April 1, 1968, as the result of a high bonus bid of \$38,380,032.00. The lease is owned jointly by Sun Oil Company, Superior Oil Company, and Marathon Oil Company. Sun Oil Company is the designated operator of the lease. The western part of this lease overlies the eastern third of the Dos Cuadras Field, and the eastern part overlies the west end of the Carpinteria Offshore Field.

Oil spill of 1969

On January 28, 1969, Union Oil Company of California lost control of its fifth development well on Platform A (Well A-21) and a blowout occurred. Although the blowout preventer was promptly activated and effectively controlled the flow of mud and gas from the casing of the well, the overlying beds were hydraulically fractured after the blowout preventers were closed. Fluids from the deeper formations flowed up the hole to shallower formations of the Dos Cuadras structure and thence to the ocean floor. The well was brought under control on February 8, 1969, by forcing high-density mud and cement down the well bore.

About 10,000 barrels of oil escaped into the waters of the Santa Barbara Channel during the initial 10-day period while well A-21 was being brought under control, according to Geological Survey estimates. Other estimates

of the flow range from approximately 23,800 barrels to 71,500 barrels according to the First Report of the President's Panel on Oil Spills. The Resources Agency of California has quoted estimates as ranging from 5,000 barrels to 160,000 barrels.

As a result of the oil spill, the deaths of 3,686 birds were recorded, some marine organisms were killed at the water line, there was temporary damage to property and beaches, and temporary restrictions on fishing and recreational activities.

DuBridge Panel study

Immediately following the blowout, the Department ordered all drilling and producing operations on Federal leases shut in. The California State Lands Commission cancelled existing drilling on State offshore lands. A scientific and engineering study of the Santa Barbara Channel was begun by Departmental Task Forces and by the Presidentially-appointed DuBridge Panel.

In its report, dated May 27, 1969, the Panel stated its belief that it would be less hazardous to proceed with development of the lease than to attempt to seal the structure with its oil content intact. The Panel was of the opinion that withdrawal of the oil from the Repetto zone is a necessary part of any plan to stop the oil seep and to insure against recurrence of oil seeps on the crest of the structure, and concluded that it would be hazardous to withdraw from this lease at that time.

The Panel went on to say that it would be inappropriate for it to recommend a detailed program to stop the seepage and reduce the formation pressures, or to attempt to manage such a program. They, however, recommended the following order of priorities:

1. Contain and control present oil seepage through the use of underwater receptacles or other suitable methods.
2. Seal off, or reduce as much as possible, the flow from existing seeps through a program of shallow drilling (above the "C" marker), pumping and grouting.
3. Review the possible earthquake hazards and take necessary actions.
4. Attempt, through an oil withdrawal program, to determine the degree of interconnection between levels of the Repetto formation.
5. Reduce pressures throughout the reservoir to hydrostatic or less and maintain pressures with water injection, if needed, to minimize subsidence.

6. Deplete all Repetto reservoirs as efficiently and rapidly as possible consistent with safe practices.

The Panel also noted that "this oil structure underlies the adjoining Sun Oil Company lease as well as the Union Oil Company lease. Good conservation practices require that the development of these leases be considered together. The Panel strongly recommends that unitization be practiced. Consideration should be given to pressure reduction from operations at the western end of the Sun Oil lease."

Development since the blowout

On June 9, 1969, the Department, implementing the recommendations of the DuBridge Panel to deplete the Repetto reservoirs efficiently and rapidly as possible consistent with safe practices, authorized Union Oil Company to commence additional drilling and producing operations to withdraw fluids from the Repetto formation in the Dos Cuadras structure. The fluid withdrawal reduces the pressure of the fluids in the several oil sands, so that oil, gas, and other fluids are inhibited from rising in the flow channels in the fractured overlying formations.

Since June 1969 development of Lease OCS-P 0241 has been in accordance with the recommendations of the DuBridge Panel with approval on a well-by-well basis at Departmental level. As of May 1971, 84 development wells had been drilled and completed, and Repetto zones A through H in the central portion of the Dos Cuadras Field have been developed. Development of the reservoirs that can be reached from Platforms A and B is now essentially complete. Cumulative production from the lease to December 31, 1970, was approximately 21.7 million barrels of oil and 8.8 billion cubic feet of gas. In May 1971 the wells were producing approximately 53,000 barrels of oil and 18 million cubic feet of gas per day.

On August 11, 1969, Sun Oil Company was authorized to place Platform Hillhouse on the adjacent Lease OCS-P 0240 to depressurize the eastern portion of the Dos Cuadras structure, in accordance with the recommendations of the DuBridge Panel. As of May 1971, 21 wells had been completed on Platform Hillhouse, and an additional 39 well slots were available for further drilling. Cumulative production from the lease to December 31, 1970, is approximately 1.2 million barrels of oil and 367 million cubic feet of gas. In May 1971 the wells were producing approximately 22,000 barrels of oil and 9 million cubic feet of gas per day.

There has as yet been no development on the eastern portion of Lease OCS-P 0240. During the course of development of the adjacent Lease OCS-P 0166, ten line wells were drilled from Platform Houchin which

offset Lease OCS-P 0240. Of these, nine were productive wells with eight of them producing in January 1971 and one shut in. Because of the proximity of these wells to the eastern boundary of Lease OCS-P 0240, they are draining the portion of the reservoir of the Carpinteria Offshore Field which is beneath Lease OCS-P 0240.

A broad review of regulations and orders governing oil and gas operations on the Outer Continental Shelf was also initiated by the Secretary of the Interior following the blowout. The review resulted in the issuance of new and revised operating regulations and orders incorporating additional provisions for control and safety of all drilling and development operations. These revised regulations also include provisions for pollution control and cleanup responsibility. Revisions of the regional orders pertaining to Federal oil and gas drilling and producing operations in the Santa Barbara Channel area were made effective June 1, 1971.

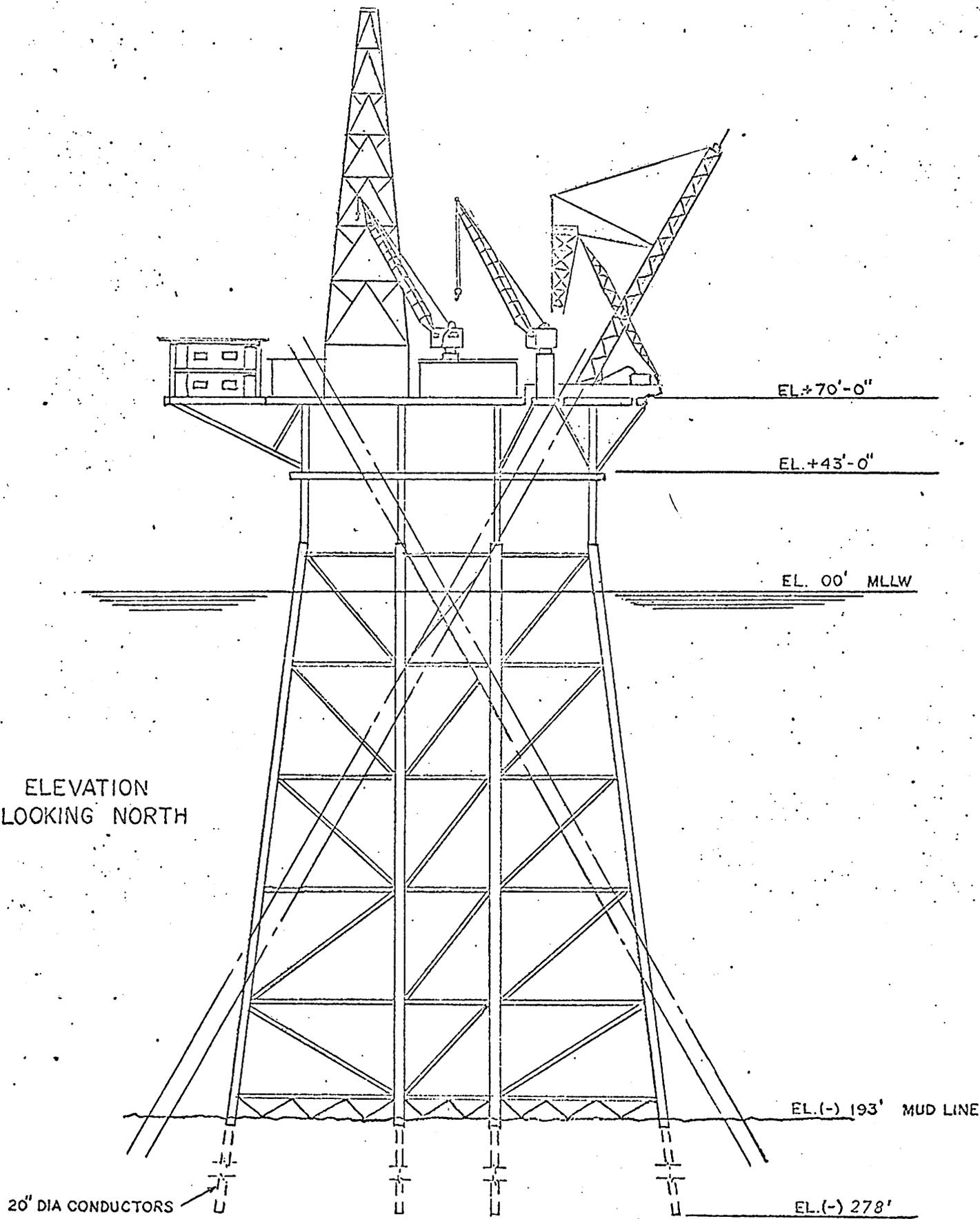
On March 1, 1969, the Secretary of the Interior required all lessees in the Santa Barbara Channel to submit geological and engineering data for evaluation from the standpoint of exploratory drilling safety. Data were evaluated on a lease-by-lease basis. As of June 1, 1971, 45 leases had been cleared. Permission has since been given to resume exploratory drilling operations on all leases except those withdrawn for the Federal Ecological Preserve, the Federal Buffer Zone, and the proposed National Energy Reserve.

Successful exploratory drilling normally leads to production. Installation of other production platforms or other actions that may have an impact on the environment will be evaluated when that particular phase of action is ready for consideration.

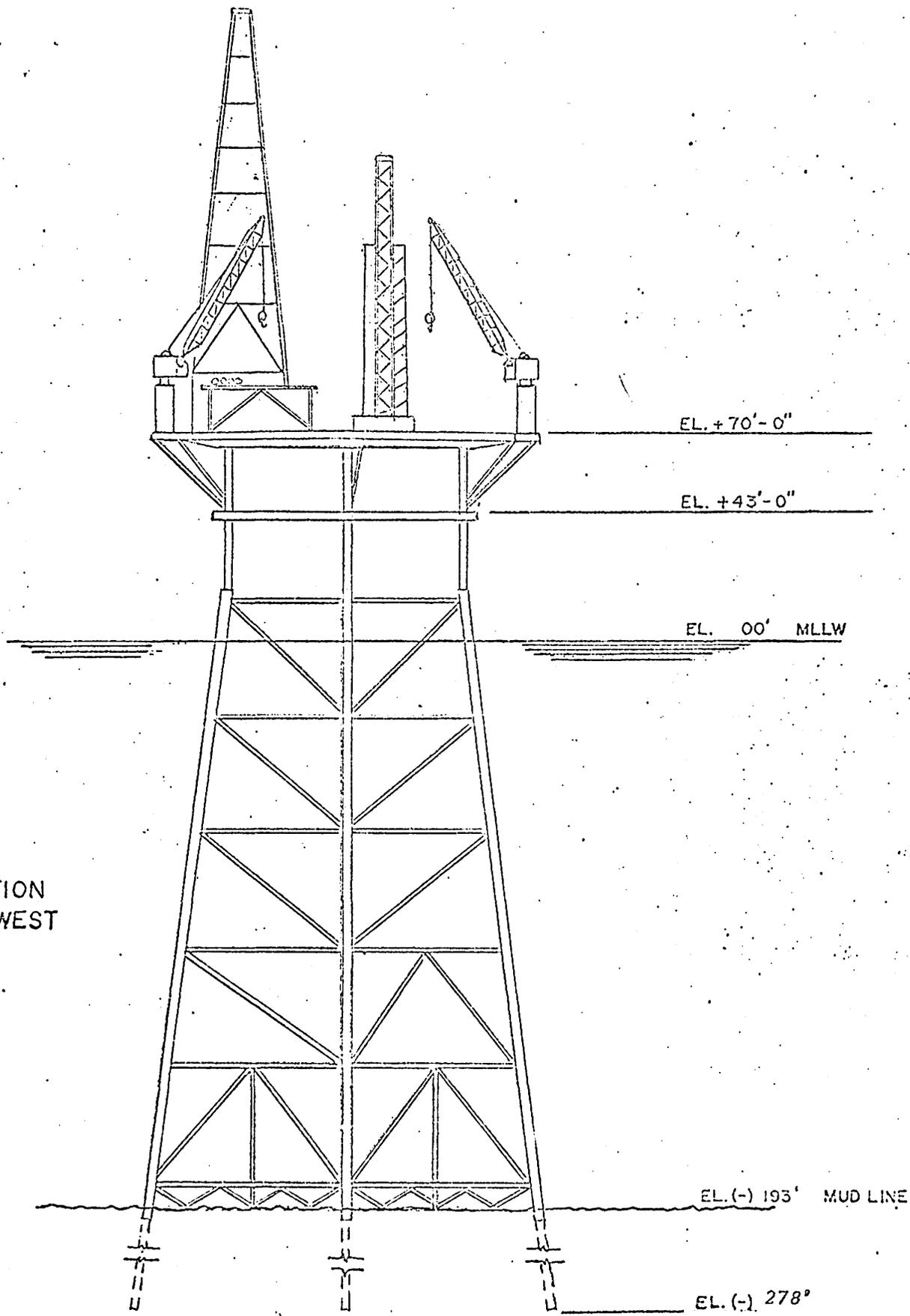
The Platforms

Platform C

Union Oil Company's proposed Platform C is a 56-well, fixed drilling and production platform. At the proposed site, the water depth has been recorded as 193 feet with respect to mean low low water. The structure will be supported by twelve 44-inch platform legs and will be anchored to the ocean floor with twelve 40-inch steel pilings driven through platform legs to an approximate depth of 85 feet below the mud line. Available data indicate that these pilings will not penetrate any oil-bearing beds which could cause additional seepage. The pilings will be grouted to the platform jacket legs from the ocean floor back to sea level and then welded together, thereby tying the jacket securely to its support piles. The production deck will be located 43 feet above mean low low water and the drilling deck 70 feet above the same reference. The drilling deck will be 112 feet by 134 feet. The top of the drilling derrick will be about 215 feet above the water level.



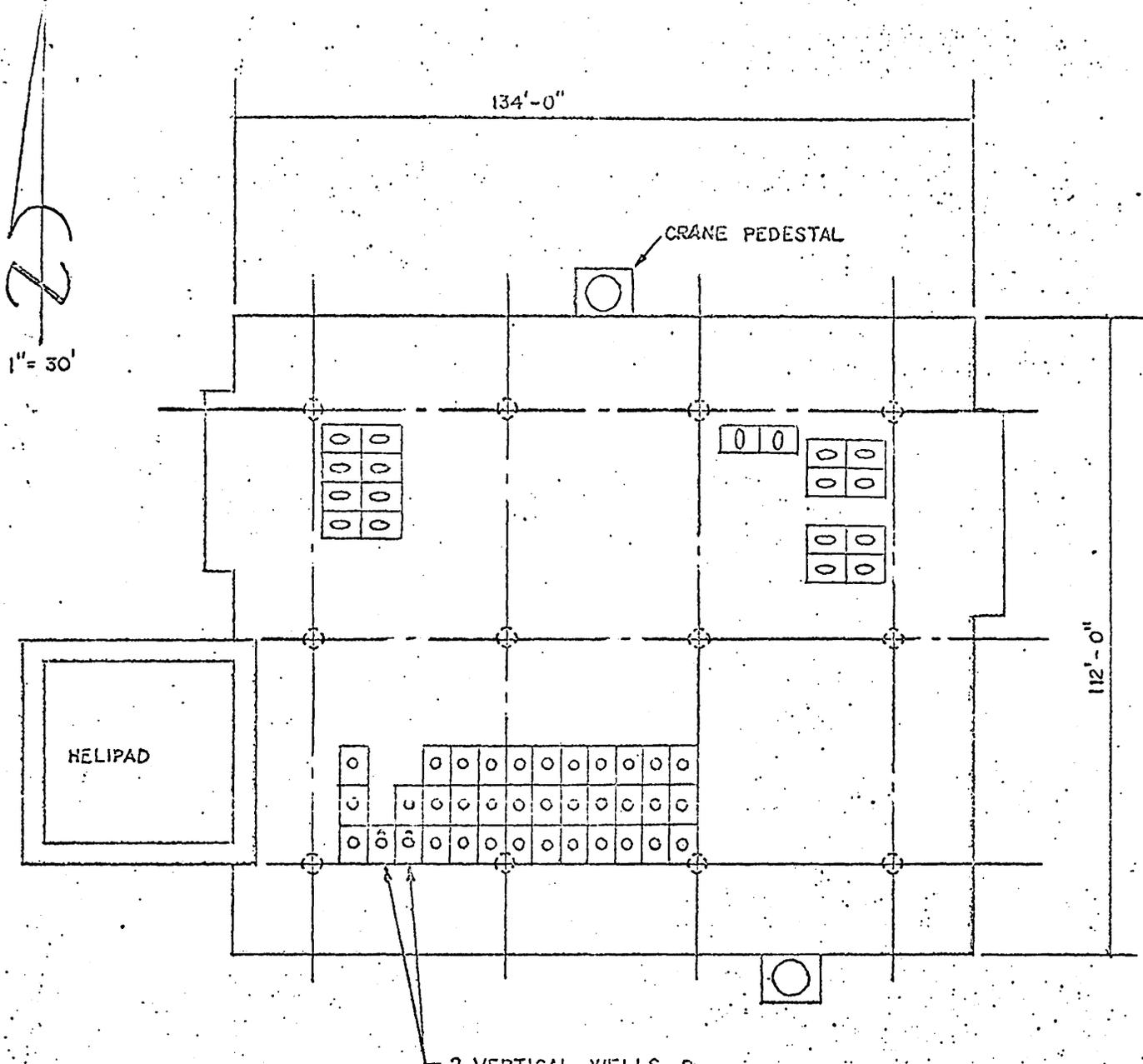
PROPOSED DRILLING & PRODUCTION PLATFORM "C"
 SANTA BARBARA CHANNEL, CALIFORNIA
 BY UNION OIL COMPANY OF CALIFORNIA
 DATE AUGUST 20, 1968 SHEET 2 OF 4



ELEVATION
LOOKING WEST



PROPOSED DRILLING & PRODUCTION PLATFORM "C"
 SANTA BARBARA CHANNEL, CALIFORNIA
 BY UNION OIL COMPANY OF CALIFORNIA
 DATE AUGUST 20, 1963 SHEET 3 OF 4



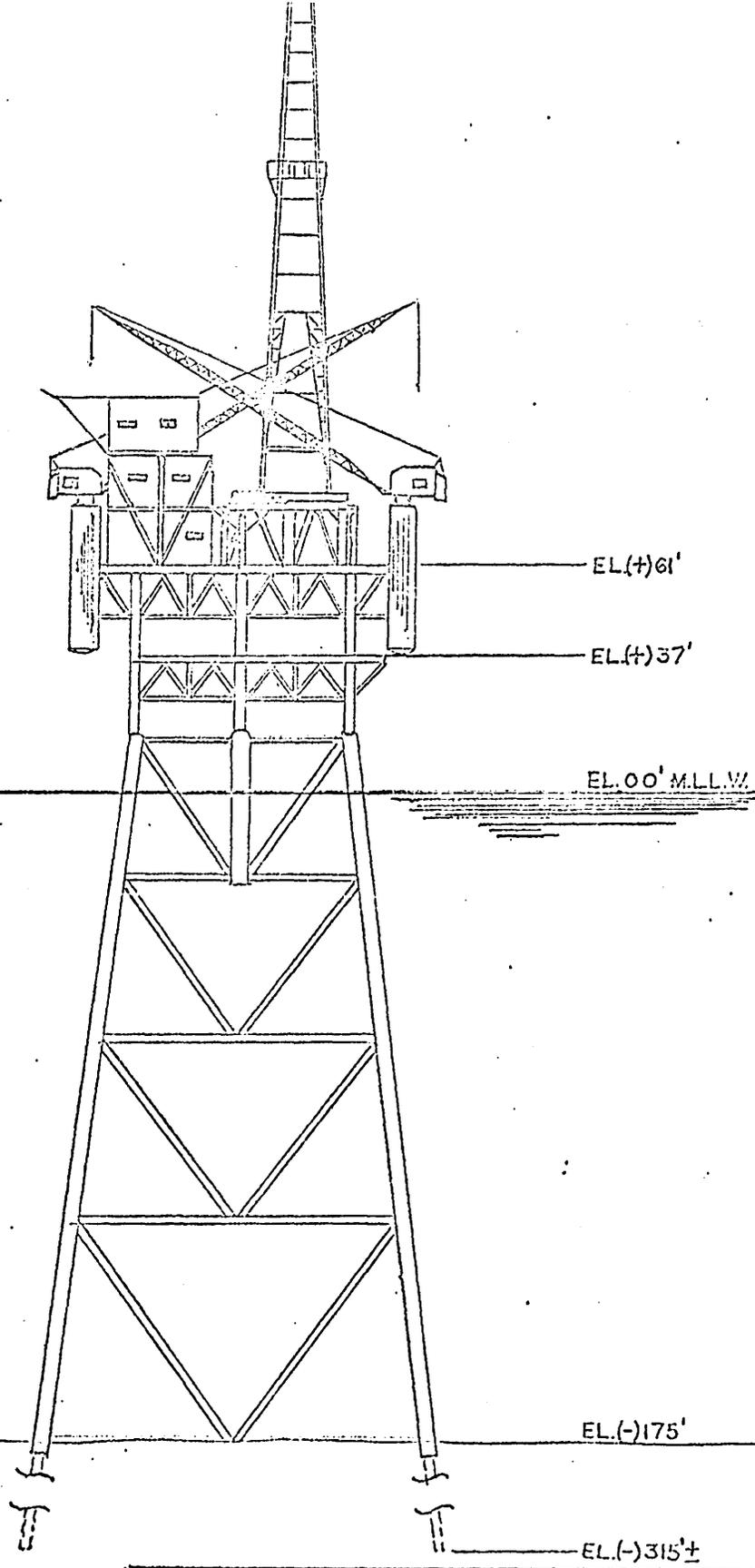
2 VERTICAL WELLS &
2 SLANTED WELLS FROM
EACH OF THESE 2 LOCATIONS

DRILLING DECK PLAN

PROPOSED DRILLING & PRODUCTION PLATFORM "C"
 SANTA BARBARA CHANNEL, CALIFORNIA
 BY UNION OIL COMPANY OF CALIFORNIA
 DATE AUGUST 20, 1968 SHEET 4 OF 4

Platform Henry

Sun Oil Company's proposed Platform Henry is a 30-well, self-contained drilling and production platform. The water depth at the proposed location is 175 feet with respect to mean low low water. The structure is very similar in design to Platform Hillhouse, but will be a scaled-down version. It will be supported by eight platform legs through which large diameter pilings will be drive to refusal which is expected to be about 45 feet below the mud line. These large piles will extend above the ocean surface and will be grouted and welded to the jacket leg. Inside these large piles a somewhat smaller hole will be drilled to a depth of about 200 feet below the mud line. A second pile will be installed in this drilled hole and the annular space between the two concentric piles grouted. Again, available data indicate that no oil-bearing beds will be encountered at this depth. The production deck will be located 37 feet above mean low low water and the drilling deck located 61 feet above the same reference. The drilling deck will be 80 by 125 feet. The top of the drilling derrick will be at an elevation of 223 feet above the water level.

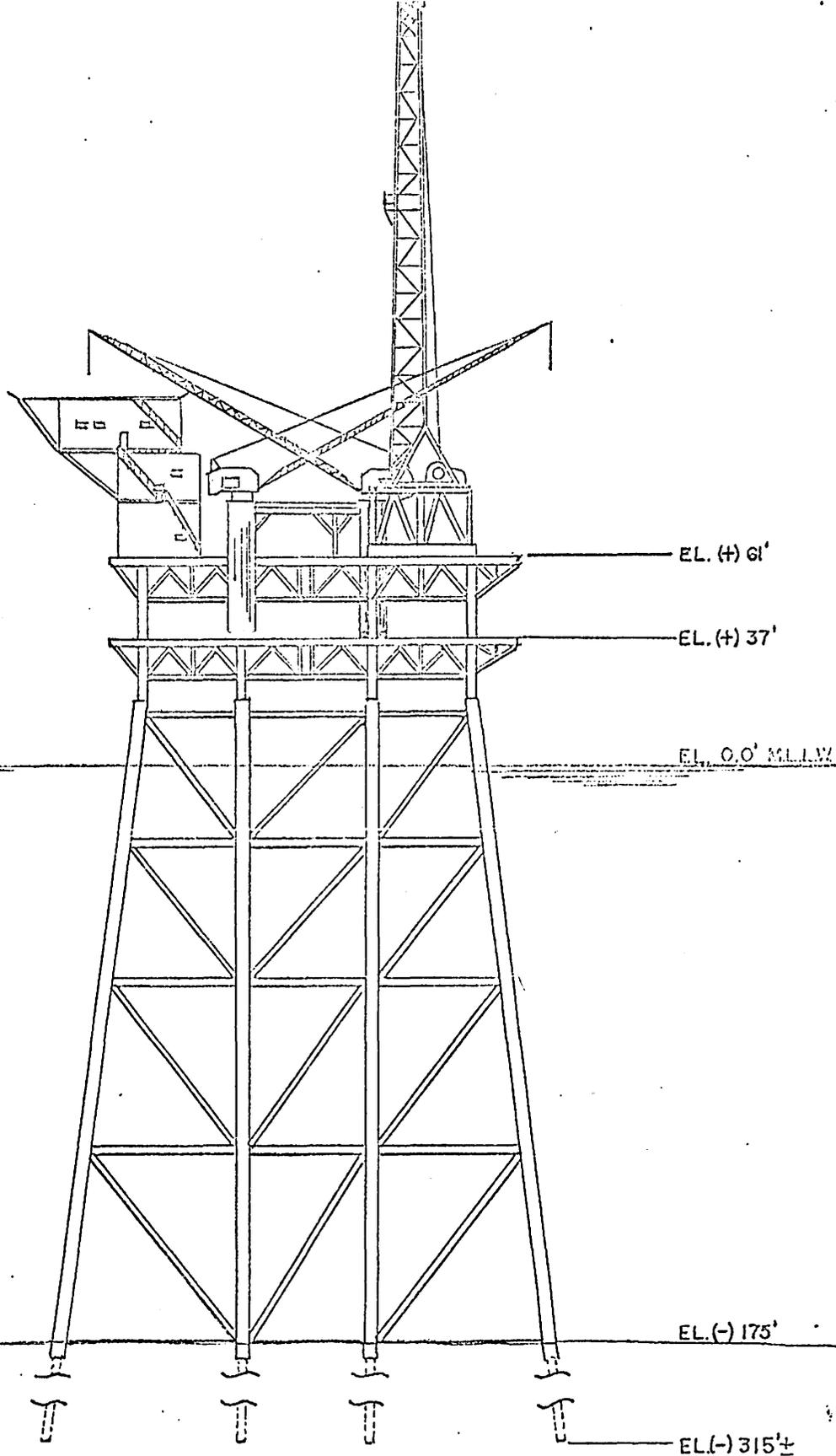


ELEVATION
LOOKING WEST

SUN OIL COMPANY et al
 OCS-P-0240
 Ventura

SSM GROUP
 California

Proposed Drilling & Production
 Platform "Henry"



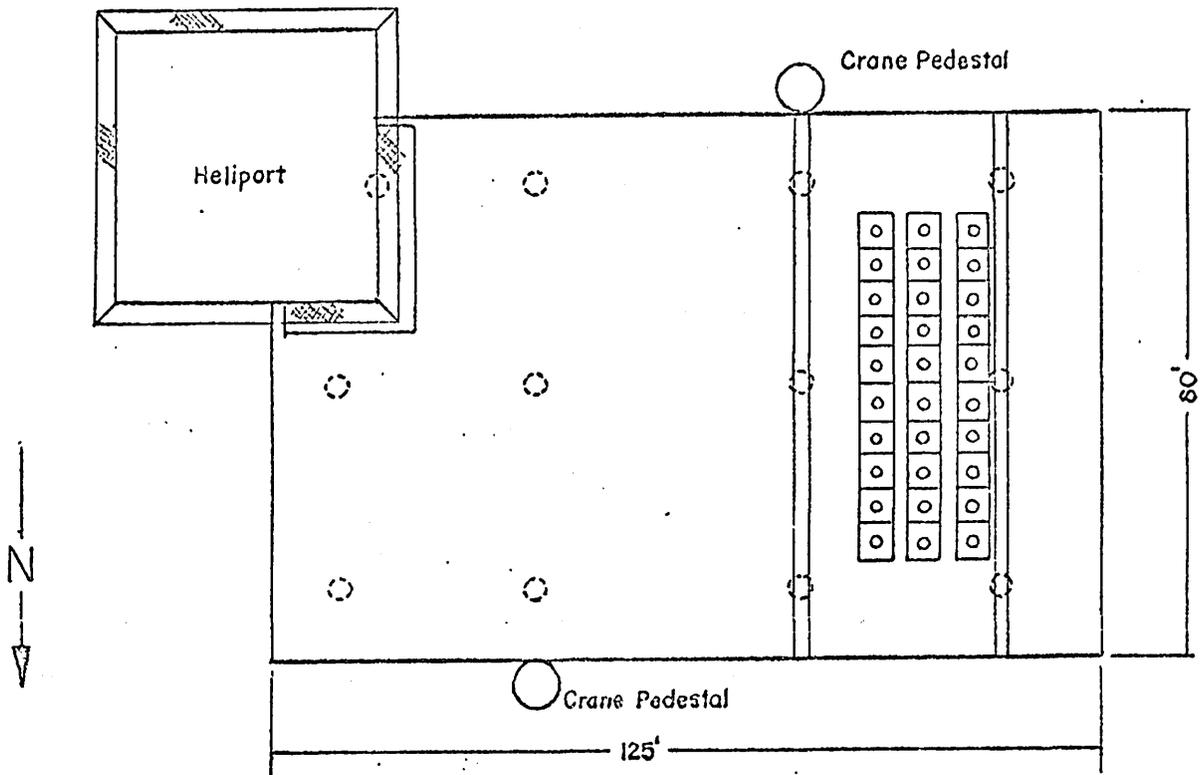
ELEVATION
LOOKING SOUTH

SUN OIL COMPANY et al

OCS-P-0240
Ventura

SSM GROUP
California

Proposed Drilling & Production
Platform "Henry"



DRILLING DECK PLAN

<p>SUN OIL COMPANY et al</p>	
<p>OCS-P-0240 Ventura</p>	<p>SSM GROUP California</p>
<p>Proposed Drilling & Production Platform "Henry"</p>	
<p>23</p>	<p>Scale 1" = 30'</p>
<p>7-11-69</p>	

Effects of Platforms on Environment

Scenic value of Channel

Installation of Platforms C and Henry will increase the number of platforms on Federal leases from five to seven and the total number of platforms and drilling islands in the Channel from 14 to 16. They will thus further modify the scenic nature of the Channel area.

Drilling and production platforms are utilitarian and not beautiful, and there is little or nothing that can be done to camouflage them. Similar facilities have been disguised in the Los Angeles area as apartment or office buildings, but there are no appropriate structures for use in the marine situation. An effort to minimize the visual impact by painting the structure a marine blue to blend with the surroundings has at best a limited success.

Many people believe that the platforms will decrease the value of the Santa Barbara Channel Region as a tourist and retirement area. Others, however, find the lights across the waters attractive at night, and welcome the platforms as sport fishing reefs, or as an aid to navigation for pleasure boating.

Sea surface use

Sea-surface use is restricted to the area in which the platforms are located, plus traffic created by work and crew boats which provide logistic support to the structures. These structures will be equipped to conform to applicable Coast Guard regulations covering personnel safety, lighting, marking, signalling communications, emergency equipment, etc. Their locations are disseminated by the Coast Guard in their "Local Notice to Mariners". The Corps of Engineers, U. S. Army, issues the navigational permits for the location of platforms.

The proposed location of Platform C is approximately ten miles from the nearest point of the northbound San Francisco - Long Beach shipping lane. Platform Henry would be located approximately eleven miles from this shipping lane. At these distances, the structures offer little hazard to ocean-going traffic. Because of the lighting and signalling requirements imposed by the Coast Guard, a platform can serve as a navigational aid and a haven during inclement weather for smaller commercial and pleasure craft.

Sea floor

The removal of large volumes of fluids from an oil and gas reservoir can result in differential subsidence of the ground surface over and around the reservoir. Water injection into the productive

horizons would be a method of minimizing the possibility of subsidence and would also result in additional oil being produced rather than remaining in the reservoir. Higher producing rates can result through better control of reservoir pressures thereby decreasing the time necessary to deplete the reservoirs.

Until all recoverable oil is depleted from the upper sands of the Dos Cuadras structure, it will be necessary to maintain reservoir pressures slightly below normal hydrostatic pressures. This will prevent (1) additional discharge to the sea floor through the fractured caprock, and (2) possible collapse of the caprock.

Marine life

Discharge of hydrocarbons into the ocean waters in any form is prohibited by OCS Orders and regulations. Discharge of drilling fluid is permitted only if it is free of oil or other substances toxic to the marine biota of the area. Waters produced from wells and other waste water are extensively treated for oil removal by use of flotation cells and other separation equipment prior to discharge into the channel.

Each platform deck is sealed and equipped with drain gutters so that any spilled liquids will flow to the flotation system where a system of separating tanks, recirculation and aeration removes all hydrocarbons which are then put in the pipeline to shore. The flotation system will not be handling any produced water. Produced water will be pumped to shore with the oil for treatment.

Spillage and wash-down water from Platform Henry will be collected and processed with produced water through a settling and skimming system and then to a flotation cell system where it will be aerated to remove oil. The clean processed water will then be disposed of from the platform at a depth of 140 feet.

It has been postulated that the discharge of washed drill cuttings may be harmful to aquatic life. The California Department of Fish and Game made a 3-year study of the effects on marine life of offshore drilling, platforms, and other man-made structures, as well as the discharge of washed drill-cuttings, in part in the Santa Barbara Channel. The washed drill-cuttings had no apparent effect on the marine life. It was found that encrusting organisms rapidly covered the exposed underwater areas of the platforms, and either provided food for fish or sheltered forms that did. Fish populations grew rapidly during the first year the installations were in place and thereafter fluctuated according to temperature, season, or other natural causes. A similar relationship has been found in the Gulf of Mexico. The platforms may, therefore, be considered a boon to the fisherman.

Shore facilities

No additional land use or shore facilities are involved in the installation of Platforms C and Henry, although greater use of existing facilities may increase the possibility of accidents. The onshore processing facility and the pipelines to shore from Leases OCS-P 0240 and 0241 are already in operation. Additional pipelines will be necessary to connect these platforms to other platforms in the area.

Accidents

The most serious impacts on the environment would be those resulting from accidents, caused either by natural forces or by malfunctioning equipment or human error. Most serious would be an accident resulting in a spill of crude oil.

Effects of oil spills

Plant and animal life

The effect of an oil spill on the plant and animal life in the area cannot be predicted, though the experience of the 1969 spill has provided much information on the subject. The mortality rate of flora and fauna would vary depending on the location of the spill, the time of the year, the weather, and the currents. Short-term and long-term effects also differ.

Studies by the Federal Government, universities, and private foundations after the Santa Barbara spill in 1969 have found little evidence so far to indicate that the long-term productivity of marine flora and fauna were seriously affected, though perhaps sufficient time has not elapsed for full assessment.

The problem of determining damage from the oil spill was also complicated by the presence of active natural oil seeps in the area and by the fact that the spill occurred during a period of unusually heavy rain.

The comprehensive study of the Santa Barbara oil spill compiled by Dale Straughan for the Allen Hancock Foundation, University of Southern California, indicated that except for pelagic birds and certain species of barnacles, there was very little mortality in the Santa Barbara Channel due to the direct toxic effects of the spilled oil. The oil did not deplete the fish population, and there was no large scale mortality among the marine mammal population as a result of the oil spill.

The U.S.C. study concluded that "1. It is often difficult to isolate the effects of oil pollution from other phenomena, 2. Damage to flora and fauna in the Santa Barbara Channel was much less than predicted, 3. The area is recovering well."

The study of the 1969 Santa Barbara oil spill conducted at the University of California, Santa Barbara, for the Federal Water Quality Administration found that biological damage occurred in intertidal surf grass and barnacle populations as a result of the oil pollution. The report concluded that overall damage was definitely related to the initial dose of pollution from the blowout. The California Department of Fish and Game reported some species growing again in some damaged areas in the late summer of 1969.

The Dillingham Corporation studied the effects of major spills throughout the world between 1956 and 1969 (including the Santa Barbara Spill) and concluded in its report to the American Petroleum Institute, Analysis of Oil Spills and Control Materials, February 1970, stated that "Isolated oil spills do not appear to present a major environmental threat resulting in lasting damage in that their effects tend to be dissipated naturally within a relatively short time."

Max Blumer (Woods Hole Oceanographic Institution) has pointed out that oil pollution damages the marine ecology not only through direct kill and destruction of food sources but also through incorporation of sublethal amounts of oil and oil products into organisms resulting in reduced resistance to infection, the incorporation of carcinogenic and potentially mutagenic chemicals into marine organisms, and low level effects that may interrupt any of the numerous events necessary for the propagation of marine species and for the survival of those species which stand higher in the marine food web. An oil spill left within the marine environment may blanket bottom sediments and have long-lasting and widespread effect. Oil pollution of the ocean is becoming an increasingly serious problem.

However, as Blumer and other scientists have pointed out, spectacular accidents such as the wreck of the Torrey Canyon in 1967 or the Santa Barbara blowout in 1969 contribute only a small fraction of the total oil that enters the ocean. Chronic pollution resulting from smaller day-to-day spills, vessel discharges, waste disposal, and similar causes is much greater and probably more severe in biological consequences.

Beaches

After the initial cleanup of oil from the beaches, which was complicated by the presence of flood debris, a residue of oil remained on the sands. According to Ronald Kolpack, this oil on the beaches south of the Ventura River was removed by normal beach processes within a matter of months. North of the Ventura River, some of the oil was buried and remained buried until November 1969, but only isolated remnants were still present at the end of February 1970.

The impact of oil spills on attendance at beaches in the area is also difficult to evaluate. Attendance figures are affected by variables such as weather, publicity, and admissions fees. Carpinteria State Beach attendance in 1968-69 was down about 15 percent, compared to visitor attendance of 1967-68, and revenues for 1968-69 were off about 14 percent, as compared to 1967-68. El Capitan State Beach, about 27 miles upcoast in Santa Barbara County, reported a 5 percent loss in attendance and revenues in 1968-69, as compared to 1967-68. Ventura County beaches also reported attendance losses of 16 to 40 percent. Goleta beaches, however, had greatly increased attendance in 1969.

Prevention of accidents from natural forces

Winds and waves

Both of the proposed platforms have been designed to resist wind and wave forces generated by a hurrican type of storm with maximum sustained wind speeds of 100 miles per hour. Such a storm has the potential to build storm waves in the Santa Barbara Channel with a maximum trough-to-crest height of 35 feet and a crest-to-crest period of 11 seconds. The probability of a storm of this magnitude occurring in the Santa Barbara Channel is once in a hundred years.

Earthquakes

Seismic forces acting on structures in this area can produce stresses which are much greater than the stresses caused by the foregoing assumed winds and waves. For this reason, these seismic forces govern the design of the jacket and piling. All platform structures in the Santa Barbara Channel are constructed to withstand a major earthquake (7.1 Richter Scale magnitude) with no damage and a 7.5 magnitude earthquake without catastrophic damage. There have been two earthquakes centered in the Channel with a known magnitude of 6 or over: the 1925 earthquake of 6.3 and the 1941 earthquake of 6.0.

The design of the proposed structures for seismic forces is based on a horizontal acceleration of 15 percent of the normal acceleration due to the force of gravity (32 feet per second per second). This relationship results in a seismic force that would be the equivalent of 15 percent of the entire weight of the structure. In computing the seismic forces, the entire mass of the system, including the virtual mass of the water within the jacket legs, is considered. The total mass of the structure includes that of the structure itself with the platform decks, all equipment installed on the structure, storage areas which are considered to be filled or loaded to their capacity, the conductor casing for the wells, live loads on the platform decks during both the drilling and producing periods, and all other appurtenances to the structure. The pipe of each producing well on the platforms will be firmly cemented into

the ocean floor thereby re-enforcing the attachment of the structures to the ocean floor. The 15 percent design factor is in keeping with the lateral force requirements of the Seismology Committee of the Structural Engineer Association of California.

Union's Platform C was designed by Brown and Root, Inc., and Sun's Platform Henry was designed by J. Ray McDermott and Company, Inc. Both designs were independently checked by a consulting engineering firm, Earl and Wright, of San Francisco. That firm concluded that no member in the structure would be stressed above 75 percent of the allowable working stress as established by the American Institute of Steel Construction. In some members, seismic loadings were as low as 15 percent of the allowable. Under maximum loading conditions, the stress on the piles would vary between 76 percent and 88 percent of the allowable working stress. Accordingly, these structures should be adequate to withstand the destructive forces of nature, far better than most other structures in the general area.

In the past, both onshore and offshore in Southern California, oil wells have been damaged by subsurface faulting during earthquakes, but no surface spills have been recorded as a result. Crude oil was extruded through beach sand at several points along the Santa Barbara coast about 3 hours before the main shock of the Santa Barbara Channel earthquake of 1925 and at approximately the same time as a series of slight foreshocks (Nunn, 1925) began. However, the earthquake caused no known damage to the wells in the nearby Summerland oil field, most of which were located on piers out into the Channel. In July 1968 an earthquake in the Channel with a magnitude of 5.2 caused minor damage in Goleta and Carpinteria. No damage was experienced at Platforms Hogan and Houchin, lease OCS-P 0166, or at any other oil field facilities or wells in the Channel. The February 9, 1971, earthquake centered north of San Fernando had a Richter magnitude of about 6.5. This earthquake caused no apparent damage to the oil-producing facilities or wells in the Santa Barbara Channel area. However, three new natural seeps were activated near the LaBrea tar pits in Los Angeles and some marsh gas was liberated offshore near Malibu about 30 miles from the epicenter.

Geologic conditions

The reservoirs in the Dos Cuadras and Carpinteria offshore fields occur in the upper part of the Repetto Formation of Pliocene age. For convenience, the producing sands are divided into zones and given letter designations. At Platform A, Repetto Zone B crops out on the ocean floor, and Zone H is approximately 3,000 feet below the ocean floor. Below Zone H the Repetto lithology is mostly claystone with an occasional thin sandstone stringer.

Pressures in the Dos Cuadras field are hydrostatic in all Repetto reservoirs above and including Zone H. In the crestal area of the Dos Cuadras anticline there are some thin sands in Zone H which contain gas and some of the Sandstone stringers below the Zone H also have gas. Some of these stringers probably had virgin pressures slightly higher than hydrostatic pressure. It is believed that one or more of these gas sands furnished the energy to "pressure-up" the shallow oil reservoirs around Platform A before the oil spill of January 28, 1969. The possibility of oil spill at the proposed platform sites, caused by the escape of hydrocarbons from a deep reservoir to a shallow one, is remote because of the lower structural positions and because of drilling and engineering practices now required by the Government.

The presence of highly porous and permeable Repetto sands near the ocean floor was another contributing factor to the oil spill at Platform A. The Repetto Formation in the vicinity of Platform C, however, is about 200 feet structurally lower than around Platform A. This means there are at least 200 feet of additional sediments between the sea floor and the potential hydrocarbon reservoirs. At Platform Henry approximately 900 feet of lower Pico sediments overlie the potential Repetto reservoirs. Even though this additional rock section overlying the potential Repetto reservoirs at Platforms C and Henry may be considered thin for protective purposes, yet its present is an additional safety factor making the escape of any hydrocarbons to the ocean floor more unlikely.

Faults, both normal and reverse, are common all along the Rincon trend (the trend upon which the Carpinteria offshore and Dos Cuadras fields are located). It is probable that along some of these faults there has been some post-Pliocene movement. All available evidence suggests, however, that these faults are (1) overlain by impermeable rock strata, and therefore not potential avenues for escape hydrocarbons to the surface, or (2) sealing faults for vertical hydrocarbon migration.

Faults may be sealed to fluid movement along the plane of the fault face or they may constitute a barrier to lateral movement of fluid if the throw of the fault is greater than the thickness of the zone in question. Even though the throw of the fault is less than the thickness of a particular zone it may be a barrier under virgin conditions which will break down by creation of a pressure differential across the fault face.

Inasmuch as a considerable amount of oil has been rapidly produced in the northern part of the Channel, it is possible that a strong earthquake could cause settling along one or more faults and that seeps could be stimulated or reactivated. However, to suspend production operations in the Dos Cuadras Field would negate the benefits obtained, to date, by the pressure drawdown through fluid withdrawal as recommended by the DuBridge Committee. In December 1969, a temporary cessation of production for only five days to repair a leak in the riser pipe at Platform A resulted in reactivation of one of the seep areas easterly from the platform. After production resumed, the seep subsided.

Prevention of accidents in drilling and producing operations

Drilling operations since the blowout in the Santa Barbara channel are being conducted under more stringent regulations which require additional strings of steel casing. Under these conditions, if a future blowout should occur, the flow of hydrocarbons would be confined to the well bore, and could normally be controlled through the surface shut-in equipment required by the regulations.

Production operations are also more rigidly controlled by the installation of safety and warning devices designed to operate automatically should a malfunction occur (OCS Order No. 5).

Regulations and safety devices

The drilling program consists of drilling and cementing large structural casing at 100 feet below the ocean floor. The well will then be drilled to at least 300 feet and a second casing string will be set and cemented between 300 to 500 feet below the ocean floor. The blowout preventers will be installed on this casing string before drilling deeper and penetrating the productive zones. Depending on the proposed well depth, a third casing string will be set and cemented in a competent shale bed at depths between 1,000 and 1,500 feet, as required by Geological Survey OCS Order No. 10.

All wells capable of flowing oil or gas are required by OCS Order No. 5 to have a downhole safety device.

The more common subsurface safety device is not surface controlled, but is designed to shut-in wells automatically when abnormal differential tubing pressures exist, such as under blowout conditions. More recently, a surface-or remote-controlled subsurface safety valve has been used. The surface-controlled device is considered to be more reliable in that it can be activated from the platform floor. A better known valve of this type, which is being used on the majority of Federal wells in the Channel, has an activating mechanism that is hydraulically operated by a separate line going downhole with the tubing to the valve. This hydraulic line system incorporates a heat-sensitive fuseable plug tied in to the surface safety controls and is designed to hold the subsurface safety device in the open position so long as the hydraulic pressure is maintained.

In the event the valve cannot be manually activated at the surface by bleeding off the pressure in the hydraulic line, the well will automatically shut-in when this line is broken or the fuseable plug is destroyed by fire.

The hole will be kept full of heavy drilling mud at all times so that mud pressure is greater than the fluid pressure in the various zones. Alarms will be installed to signal abnormal changes in the mud pit level.

and flow in the flowline. Drilling will be conducted with a back-pressure float valve installed in the drill sting to prevent flow of wellbore fluids up the drill pipe. Blowout prevention equipment will remain on the well until it is completed. This equipment consists of two pressure-tight valves, one which completely shuts in the well when the drill pipe is out of the hole and the other which closes around the drill pipe. An automatic choke is preset to keep the pressure in the wellbore from exceeding the pressure integrity of the weakest formation exposed in the hole.

Upon completion, production tubing will be run in the well and pressure control wellhead equipment installed. A safety valve will be placed in the tubing at about 100 feet below the ocean floor. The valve is remotely controlled and is designed to shut in the well in the event of an emergency.

The flow of produced fluids at the surface is controlled by numerous high-low liquid level and pressure safety valves designed to shut in the wells or equipment should an abnormal situation develop. Production from the well passes through a production header into an oil-gas separator. The oil flows from the separator through an oil surge tank to the shipping pumps and into the pipeline to shore. Gas from the separator goes into a scrubber for liquids removal and then is compressed and sent to shore.

A new system for detection of small pipeline leaks was developed in early 1970 and is operational in the Channel. On a recent test of this equipment, a leak of one barrel per minute was simulated on a pipeline carrying 58 barrels per minute. The equipment responded immediately and warned the operating personnel that a differential existed between the input and the output of the line.

Flame detector devices will continually monitor the platform and automatically start the fire water pumps and sprinkler system. Fire hoses will be mounted on reels and thirty dry-type fire extinguishers will be located in conspicuous places on the platform.

A pollution control system with 1,000 feet of oil containment boom and an approved oil skimmer will be stored on the platform. A large mobile skimmer will also be maintained in the immediate area.

The underwater pipeline system between platforms and between platforms and shore has a protective coating and is monitored externally by plane and boat and inspected internally with a sonic device designed to record the wall thickness. Provisions have been made to switch the oil flow into the gas line should such a condition be necessary. The pipelines are protected with automatic pressure sensors which will shutdown the platform or pipeline if necessary. All of the oil is measured in and out of the pipeline through meters on the pipeline and at shore. An

instant comparison of the total oil in and out of the line is continuously monitored by electronic equipment. Multiple telephone lines and radio communication link the platform with onshore operations.

Inspections and enforcement

Increased Federal personnel have made it possible to intensify inspection efforts. The present staff of eight engineers and technicians, assigned to the California offshore area, is capable of providing essentially continuous review and surveillance of all critical operations.

Existing Platforms A, B, and Hillhouse are inspected daily by technical personnel of the Geological Survey to assure that all drilling and producing operations are conducted in accordance with the regulations and OCS orders. Immediate corrections of any incidents of malfunction or non-compliance is required. Surface safety systems are checked for operation at least weekly. Fire control equipment and water treatment facilities are also inspected in detail. Each drilling operation on Platforms A, B, and Hillhouse is inspected in detail at least once a week. These inspections include checking that proper blowout prevention equipment is installed and in good working condition, that the mud measurement and circulation equipment is in proper working condition, and that all operations are conducted in accordance with the regulations and orders. Drilling and production operations on the proposed platforms will be inspected with equal thoroughness and frequency.

Casing is now set and cemented in accordance with OCS Order No. 2 of June 1, 1971. A temperature and/or cement bond survey is required unless good cement returns are obtained. All casing, except the initial drive or structural casing, is pressure tested after cementing in accordance with OCS Order No. 2 prior to drilling below the casing. Remedial action is required for any casing or cementing operation which is believed to be inadequate.

There is always the possibility, in spite of all precautions, that a major accident could occur during drilling and producing operations for oil and gas. The record shows, however, that the incidence of such accidents with respect to the number of wells which have been drilled on Federal OCS leases since 1953 is small. From 1957 through 1970, more than 8,000 wells were drilled in the Outer Continental Shelf of the United States and only ten major spill incidents involving 1,000 barrels or more were recorded, or one such major spill incident for every 800 wells drilled.

Containment of spills

Regulations governing the control of pollution from Federal oil and gas leases on the Outer Continental Shelf are in Title 30 of the Code of Federal Regulations, part 250.43, and are further defined by Outer Continental Shelf Order No. 7 for the Pacific Region.

These regulations place complete responsibility on the lessee to control promptly and remove any pollution resulting from his operations. Stand-by pollution control equipment is required to be available to the lessee for his immediate use, if needed. Such equipment is already stockpiled at strategic locations in the Santa Barbara Channel. In addition to equipment owned or controlled by Union and Sun, an organization called Clean Seas, Inc., has recently been formed as a joint subsidiary of fourteen oil companies operating in the Santa Barbara Channel. This organization is acquiring the best equipment and material available for the containment and cleanup of marine oil spills, including booms and skimmers. This equipment will be stored at Port Hueneme and will be available for rapid deployment should a spill occur.

The Western Oil and Gas Association in response to the May 10 draft release advised that Clean Seas, Inc. "is presently readying for sea test a new 40-foot by 17-foot skimmer which is expected to physically remove oil from seas in excess of 2 feet. In addition, Clean Seas, working with the manufacturer, has developed and had constructed a new 'sea curtain' boom which will also work in advanced sea states to physically contain spilled oil. It is apparent that Clean Seas will continuously develop new and improved booms and oil recovery equipment. New designs, beyond those mentioned above, are even now coming off the drawing boards and will be sea tested later in 1971. Clean Seas is also tying all operators in the channel together with a radio network so as to provide immediate clear channel communication in case of a spill emergency. Experience with other spills has demonstrated that good communications are essential to rapid and effective containment and recovery of spilled oil."

To date, no systems or equipment have been developed which are completely effective in controlling and removing pollution under all weather and sea conditions. However, much research has been conducted by Government and industry since the Santa Barbara blowout and this research is continuing at accelerated levels. Though much work remains to be done, the state of the art is improving. Preliminary reports from the scene of the recent Shell fire in the Gulf of Mexico indicate that, under relatively favorable seascape conditions, more than 30 percent of the spilled oil was recovered, or about 15,000 barrels of the estimated 53,000 barrels spilled on the water surface. Containment devices and control procedures helped to keep the oil away from oyster beds. This was accomplished with improved equipment for prompt skimming near the spill and by booms across passes through barrier beaches. This compares to the negligible recovery and containment at Santa Barbara in 1969 and the approximate 10 percent recovery and limited containment by Chevron Oil Company at the Main Pass Block 41 oil spill in 1970.

ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

Installation of two additional development platforms to the 14 existing platforms and drilling islands will further modify the scenic nature of the Channel. Normal drilling and producing operations from these platforms should not adversely affect the marine environment, sea surface use, or the sea floor.

Although Federal regulations and enforcement procedures minimize the possibility of a major oil spill, oil pollution of the Channel could result if a serious accident or malfunction occurred, or if another buildup of formation pressure in the upper sands of the Dos Cuadras structure resulted in a major spill of oil upon the water. Such a spill could cause extensive short-term damage to beaches and wildlife under unfavorable weather or sea conditions. Recreational and commercial uses of land and water in the area of the spill would probably be curtailed until the oil cleanup had been completed. The long-term or permanent effects of a major oil spill are still unknown. Some danger to marine and littoral species does exist, but chronic pollution from other sources is probably more serious.

ALTERNATIVES TO THE PROPOSED ACTION

Other Production Methods

Directional drilling

The art of directional drilling has reached a high degree of sophistication, but the lateral extent of directional drilling to shallow reservoirs is limited. Drilling, completing, and producing wells drilled at angles greater than 50° from vertical is generally troublesome and can involve hazardous problems with stuck drill string, setting of casing, and cementing operations.

The proposed location for Platform Henry is 1/2 mile from Platform Houchin and more than 2 miles from Platform Hillhouse. The oil zones at the Henry site are believed to be from less than 2,500 feet to 5,000 feet deep. It would not be technically feasible to drill wells from Platform Hillhouse to develop the eastern portion of the Sun lease. Less than half of the Repetto reservoir underlying Lease OCS-P 0240 could be developed with any degree of practicality from Platform Houchin by directional drilling. An added complication would be the maintenance of directional control in drilling past the 15 wells which have already been drilled westerly of Platform Houchin.

Subsea completions

The technique of completing oil and gas wells with ocean floor wellheads has been used in the Channel and elsewhere. While this method could provide for the orderly development on a relatively uniform pattern

consistent with good conservation practices to obtain maximum recovery, the feasibility of seafloor completions is questionable for the specific cases involved.

Ocean floor completions technology is continuously improving and providing better safety features, and it will be used more extensively in deep waters. However, the proposed wellhead completions from Platforms C and Henry have a safety advantage over subsea completions because platforms provide a better ability to monitor and control operations visually and a better means of containing any leakage and correcting any mishaps.

Seafloor completions several miles offshore do not eliminate the need for a production platform. Seafloor wellheads are operated and serviced from a central platform. The existing Platforms Hillhouse and Houchin are not designed for and would not be adequate to handle separately the additional production needed to recover the oil in the east half of Lease OCS-P 0240. Houchin, with a previously designed fluid handling capacity of 21,000 barrels per day, is already using a substantial amount of its designed capacity.

Unitization

Under the provisions of Section 5(a) (1) of the Outer Continental Shelf Lands Act, the Secretary is authorized, in the interest of conservation, to provide for unitization. Where unitization is deemed necessary, it may be required under the authority delegated by Title 30 CFR Part 250.50. Unitization of Leases OCS-O 0240 and OCS-O 0166 is not truly an alternative. It has already been shown that it is not technically feasible to develop the Carpinteria field fully from Platform Houchin in order to obtain maximum ultimate recovery. Therefore, even with unitization Platform Henry would appear to be necessary for proper development.

No Action

The alternative of no action in these circumstances breaks into two subsidiary alternatives: (1) no action now or in the future; and (2) deferral of action for the present time. Either of these alternatives will probably result in legal consequences adverse to the United States and a potential loss of revenue from Treasury.

The Federal leases on the Outer Continental Shelf portion of the Santa Barbara Channel were issued under the competitive bidding provisions of Section 8 of the OCS Lands Act. As a result of bidding for Leases OCS-P 0240 and OCS-P 0241, the government received bonus payments in 1968 amounting to \$99,798,032.00. In return, the government signed lease contracts which granted the "*** Lessee the exclusive right and privilege to drill for, mine, extract, remove, and dispose of all oil and gas deposits except helium gas in or under the following described area of the Outer Continental Shelf (as that term is defined in the act) of the United States." The purpose of leasing, as stated in the Act, Sec. 8(a), is "to meet the urgent need for further exploration and development of the

oil and gas deposits of the submerged lands of the Outer Continental Shelf"; the Act, Sec. 5(a) (1) also requires "the prevention of waste and conservation of the natural resources." The lease granted "the right to construct or erect and to maintain within the leased area all artificial islands, platforms, *** necessary or convenient to the full enjoyment of the rights granted by this lease,***." The lease is a valid and binding contract on the part of both the lessee and the United States. As a contract its provisions are subject to legal enforcement.

In addition, no action now or in the future would result in the waste of prime oil and gas reserves that are otherwise recoverable and are located close to the market place.

While a deferral of action would probably result in unfavorable legal consequences, it will allow additional time for the possible improvement of equipment to minimize the adverse environmental effects of a major oil spill. Such equipment has become considerably more efficient during the past few years. No reliable estimate can be made as to the degree of improvement in such equipment which could be achieved in the foreseeable future.

A deferral of action on Platform C would be contrary to the recommendations of the DuBridge report that all reservoirs in the Repetto zone be depleted as rapidly as possible consistent with safe practices. Deferral of action on Platform C might permit additional seepage in the event production from the existing platforms now located in the Dos Cuadras field were stopped for any reason. In such an event, the formation pressure in the Dos Cuadras field would increase rapidly, resulting in substantial seepage from the sea floor.

RELATIONSHIP BETWEEN LOCAL SHORT-TERM USE OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Installation of Platforms C and Henry and development drilling programs will probably take at least 2 years to complete. The production phase could then take an additional 10 years. Thus these platforms should be considered a short-term use of the environment. Extraction of the oil and gas will thereby lower the long-term productivity of the oil and gas resources of the Santa Barbara Channel.

Accidents could result in a spill of crude oil that would affect plant and animal life in the area. The long-term effects of a spill in the marine environment are not clearly understood, but oil pollution from such accidents is less and presumably causes less biological damage than chronic oil pollution from other sources. The possibility of an accident has been lessened by the adoption of strict operating regulations.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

The development and production of these oil fields will result in the depletion of a natural resource which is irreplaceable within a time frame comparable to the time that man has existed on this planet. However, these platforms will make possible the maximum recovery of oil and gas from these fields which might otherwise be irretrievably lost through inefficient development.

There is no evidence that oil and gas production in the Channel has had an irreversible effect on the marine resources in the area. Chronic low-level oil pollution of coastal waters from many sources should be investigated.

COORDINATION AND REVIEW PROCEDURES

Public hearings were conducted by the Department of the Interior in Santa Barbara, California, on January 13 and 14, 1971, to receive factual information for consideration in order to assist the Department in determining whether special conditions or stipulations should be imposed, should approval be given to install these two platforms. These hearings were not scheduled under the provisions of the National Environmental Policy Act of 1969 or under Part 516 of the Departmental Manual. However, comments received from State and local agencies, as well as other individuals and private groups, were reviewed in preparing the draft statement released on May 10, 1971, and now have been used in this final statement. In conjunction with these hearings some 205 written statements were submitted for incorporation into the official records. Of this total, 164 were in favor of the installation of the two platforms and 41 opposed.

Geographical distribution of the comments by states is as follows: California - 160 commenting in favor and 40 against installation; Texas - 3 commenting in favor; Minnesota - one in favor; and Arizona - one against. The transcript of those hearings is available for public inspection at the Survey's offices in Washington and at the Oil Spill Information Center of the Library of the University of California at Santa Barbara.

A further partial analysis of the comments, received from persons in Santa Barbara, California, and its near vicinity is as follows:

Santa Barbara - 20 commenting in favor of installation of the platforms and 17 commenting against; Carpinteria - 13 in favor and 3 against; Goleta - 3 for and 1 against; and Santa Maria - 5 against. This results in a total of 36 for and 26 against installation of these platforms.

An additional fifteen comments which were opposed to the installation of the platforms were distributed as follows: two each from Los Angeles, Ventura, and Lompou, California; one each from Laguna Hills, Pasadena, Arcata, Sacramento, Pacific Palisades, Costa Mesa, San Francisco, and Encino, California; and one from Flagstaff, Arizona.

A preliminary draft report on installation of these platforms was released on May 10, 1971, for review and comment by other Federal agencies, industries, state and local governments, and the general public in order to secure more extensive and appropriate opinions or facts from all who may be affected by the results of any decision on such platform installations in the Santa Barbara Channel.

A draft environmental impact statement regarding exploratory drilling in the Santa Barbara Channel, released for comments on February 23, 1971, covered similar background information pertaining to the general environmental aspects in the Channel. In this regard, appropriate comments received on that February draft statement were also considered in this final statement, as well as in the final statement on exploratory drilling issued July 30, 1971.

The majority of individual comments received on the February and May draft statements were principally in favor of administrative approval for continued development. The proponents' arguments centered around the need for future energy, the livelihood provided by these operations, and the economic gain connected therewith. Conversely, since the possibility of an accident occurring with respect to producing and development operations on these platforms will always exist to some degree and the environment would be somewhat aesthetically altered, the opponents' comments argued principally against the proposal until more reliable and better techniques are developed to carry out the aims of oil and gas development while, at the same time, assuring better protection of the environment.

The Environmental Quality Advisory Board of the City of Santa Barbara proposed that a moratorium be sought on all drilling on State and Federal lands in the Santa Barbara Channel -- other than that necessitated to deplete the Repetto sands in the Dos Cuadras structure -- until proven technology is available to contain massive oil spills and also until it has been proven technically and economically feasible to install ocean floor completion facilities. This and other recommendations were approved by the City Council of Santa Barbara.

The County of Ventura did not comment on the draft statement on the installation of Platforms C and Henry. However, the County Board of Supervisors voted unanimously to urge the Department to resume issuance of permits for exploratory drilling.

Comments were also received from the Department of Commerce (the National Marine Fisheries Service and the National Ocean Survey), the Department of Transportation, the Department of the Army, the Environmental Protection Agency, the California State Lands Commission, and the California Resources Agency. All questions and suggestions were answered by text revisions insofar as possible without identifying the specific source or sources.

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