The maximum credible earthquake, the largest earthquake capable of occurring under the present known tectonic framework, for the offshore Santa Barbara Channel region is reported to be a 7.5 magnitude event on the North Channel-Pitas Point-Ventura fault zone (SLC 1981). However, the major onshore fault nearest the site is the More Ranch-Arroyo Parida fault system which appears capable of generating a magnitude 7.5 event (SLC, 1981). The maximum level of shaking that can be reasonable expected on the basis of reported strong motion data is on the order of 0.47g to 0.73g (SLC, 1981). Therefore, the maximum ground shaking at the site that would effect structures such as pipelines and surface installations could reach accelerations in the 0.4g to 0.7g range. The Santa Ynez fault is classed as active and is located about 8 miles from the seep site at its closest point. A maximum credible earthquake of magnitude 7.5 may cause estimated peak horizontal-bedrock acceleration of 0.75g near the project area (SLC, 1981).

Earthquakes and their secondary associated effects such as ground motion, ground rupture, tsunamis, sediment liquification, and landslides represent the principal natural geological hazards of the Santa Barbara Channel region. Fault rupture could occur along the potentially active More Ranch fault onshore; however, no documented damage has occurred in the area as a result of ruptures along this fault. The probability of bedrock or sediment slope failure is low because of the relatively low slope angle (gradient) within the site. At the offshore site area a relatively thin layer of sediments is reported to be chiefly unconsolidated, dense silty sands which may have a tendency for liquification. Differential settlement may result from compaction of the sediments as a result of shaking. Since the site is in water depths of about 200 feet (60m), a potential tsunami wave height should not be greater than storm waves in the region and not effect the seafloor device.

SEEPS/GENERAL

Marine hydrocarbon seeps are almost always found associated with and in sedimentary rocks. High seepage areas worldwide show a strong correlation with deformed areas of the crust. By their very nature, hydrocarbon seepage implies that there is a physical pathway connecting a petroleum reservoir/source with the surface. Seismic records from the Coal Oil Point Offshore Seep area suggest that the gas seep is associated with a fault that apparently created a conduit through which hydrocarbons readily migrate upward to the seafloor.

Natural oil and gas seeps and shallow hydrocarbon occurrences are common both onshore and offshore in California. Over 2,000 seeps have been reported in the offshore area. Calif-

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ornia Indians used tars from surface seeps to waterproof canoes, baskets, and water jugs at least 7,000 years ago in the Santa Barbara area. Spanish explorers observed the seeps in the late 1700's and Vancouver in 1793 described offshore seep effects. The majority of reported California offshore seeps are located on the northern side of the Santa Barbara Channel. Seeps in the Santa Barbara Channel area are commonly associated with anticlinal crests and faults. Intense seepage frequently occurs near the intersection of faults. Most offshore seeps occur where recent sediment cover is thin or lacking over the sources of the seepage.

Where sediment cover is thicker, the seepage is frequently limited primarily to gas and small quantities of oil as at the Seep. Seeps in the region most likely developed as a result of uplift and erosion during late Pleistocene time (about 100,000 years Before Present) and have continued to the present. The State Lands Commission's report "California Offshore Gas, Oil and Tar Seeps" (1978) discusses in detail both regional and local conditions pertaining to the Coal Oil Point seeps in the vicinity of Platform Holly.

The primary geologic factors controlling natural oil and gas seep locations are the presence of a near-surface source and/or reservoir beds, faults/fractures, and a minimum of unconsolidated sedimentary cover. Seeps may originate from either source or reservoir rocks. Seeps and high seepage rates tend to occur in areas having a high degree of current tectonic/seismic activity including earthquakes and faulting. Natural seepage rates may be related to tidal influences. Seepage rates vary with time and the generation, migration, entrapment, and seepage of oil is a dynamic process that appears to have been continuous throughout much of geologic time. Studies of natural seeps show no lasting detrimental effects on the marine environment.

Considerable amounts of hydrocarbon escape into the marine environment through natural seeps. Hydrocarbons belonging to the ligher fractions from oil and gas seeps will rise to the surface of the water and be dispersed into the atmosphere or form a film on the water as at the proposed containment site. Local oceanographic and meteorological conditions will control the actual dispersion of the hydrocarbons. Some of the heavier fractions may end up on local beaches; the rest will be volatilized, biodegraded, and dissolved in the water column.

COAL OIL POINT OFFSHORE SEEP

The Coal Oil Point Offshore Seep was located initially by bubbles visually sighted from the air and the sea surface, and eventually studied by a manned submersible and a remote

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controlled TV camera system. (See Figure 7) Later the seep was located on the seafloor by geophysical evidence from sub-bottom seismic profiles and side-scan sonar records.

Oil released from the Coal Oil Point area natural oil and gas seeps typically pollutes about one square mile of surface water in the Santa Barbara Channel. Because of prevailing current and wind patterns, the oil slicks usually drift in a westerly direction, and have been observed to extend continuously for distances of 15 to 20 miles. The fate of this oil is not completely known although undoubtly some washes ashore and some sinks.

The Seep located in 220 feet of water, 2 miles south of Coal Oil Point lies along the South Ellwood-Rincon anticlinal trend. The axial trend of this structure is offset by cross-or tear-faulting. Thinning of unconsolidated sediments over the offshore anticlines in the area imply Late Quaternary or Holocene (Recent) uplift. Active hydrocarbon seepage at the site is believed to emanate from the underlying late Miocene Sisquoc Formation which subsequently passes through a relatively thin layer (approximately 16 feet) of unconsolidated sediment. Cores from the Sisquoc and Monterey Formations are reported to be extensively faulted and fractured. Other potential sources of the oil is believed by some geologists to be in the underlying Miocene to Eocene Formations which are both source and reservoir rocks in the region.

The Seep, sometimes referred to as the "New Seep" or "Holly Seep" or "East Seep" was first observed to be active in July, 1970 by the California Department of Fish and Game and has continued to flow oil and gas since that time. Early studies by Mikolaj and Allen (1972), estimated the volume flow rate at approximately 60 barrels of oil per day. Schlueter (1973) estimated the volume flow rate as between 35 to 80 barrels of oil per day.

The Seep appears to fluctuate widely in its activity. Recent data by North American Weather Consultants (1981) indicated the gas emitted by the seep comprises approximately 76% methane and 24% nonmethane by weight (90% and 10% by volume, respectively). Measured emission rates for the seep varied from 6 to 12 tons per day of reactive hydrocarbon or a mean of 8.2 tons. This figure reportedly represents approximately 25% of Santa Barbara County's hydrocarbon air emission inventory. ARCO has calculated the total gas emitted from the Seep as being upwards of 2,000 MCF/day and estimated that the seep emits approximately 40 to 50 barrels of oil per day.

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A recent geophysical survey of the Seep area (ARCO and SLC 1980) indicated that the water depths throughout the area vary from approximately 47 to 75 metres, with a uniform slope towards the south. The seabed surface is smooth and relatively featureless. Approximately 5 metres of unconsolidated sediments of Holocene and Pleistocene (?) age unconformably (angular) overlie a series of interbedded shales and claystones of the folded Pliocene Sisquoc Formation. The highest concentration of seepage from the seabed occurs over an elongated northeast-southwest trending zone with a maximum length of the order of 150-200 feet. A transverse fault system and fractures in the Sisquoc Formation is believed to be the channel way for the migration of hydrocarbons into the overlying sediment.

During the month of October 1981, a manned submersible survey of the seep area was run by SLC to document the environment of the site prior to the proposed containment of the seep.

Containment of the Seep should have no effect or increase nearby seep activity. Insufficient data are presently available to support or negate any causal relationship between natural seeps in the area. Also, drilling activity in the area shows no apparent relationship between the seep(s) and the present producing formations.

SEEP PETROLEUM HYDROCARBONS

In order to better understand the nature of pollutants from the seeps, it is necessary to know the composition of the oil and gas emitted. The crude oil and gas from the Seep is a complex mixture of hydrocarbon and nonhydrocarbon molecules with a wide range of molecular weights. Analyses of the Seep oil and gas are shown in Tables I, II, and III. These data indicate that seep gas and oil are dissimilar to those of the production from Platform Holly or other leases in the general vicinity.

The three states of oil in seawater important with respect to the impacts of oil on the environment are: evaporation, emulsification, and to a much lesser degree dissolution (solubility). The lighter fraction of the crude and other volatile fractions (i.e., those of lower molecular weight) will evaporate into the air dependent primarily upon the vapor pressure of the oil, winds, sea state and atmospheric conditions. The heavier fractions remaining form the visible surface slick. Oil-water emulsions form which can become stable and become persistent slicks that move in response to the prevailing winds, currents and diffusive processes. Hydrocarbon solution in seawater is only a temporary phenomenon because dissolved hydrocarbons generally come out of solution,

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TABLE I

OFFSHORE COAL OIL POINT SEEP

COASTAL SEEP GAS FROM FLOOR OF OCEAN

Sample Date 6-27-73 8-3-73

Sample Description Samples by the

Sampled by the

Atlantic Richfield Co.

State Lands Commission

COMPOSITION:	6-27-73 MOLE PERCENT	8-3-73 MOLE PERCENT
Nitrogen	0.23	1.09
Carbon Dioxide	11.50	9.66
Methane	78.635	80.250
Ethane	5.566	4.919
Propane	2.703	2.713
Iso-Butane	0.300	0.302
Normal-Butane	0.678	0.603
Iso-Pentane	0.131	0.128
Normal-Pentane	0.090	0.098
Hexane	0.072	0.086
Heptane +	0.095	0.151
Hydrogen Sulfide	less than 1 ppm.	less than 1 ppm.
Total	100.00	100.00
Calc. Specific Gravity	0.742	0.731
Calc. Btu/SCF	1019	1026
Dew Point	20°F @ 74.7 PSIG 41.3°F @ 1000.0 PSIG	

*Hydrogen Sulfide (H_2S) not detectable by Unico - Kitagawa Method.

0.4% O_2 backed out of 8-3-73 sample.

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ANALYSIS OF COASTAL PRODUCED CRUDE OILS AND NATURAL SEEP OILS

Table II

SAMPLE LOCATIONS	COMPOSITION AND PHYSICAL PROPERTIES								
	VANDIUM MG/L	NICKEL MG/L	Ni/V RATIO	SULPHUR WT.%	NITROGEN WT.%	VISCOSITY SUS 50 F°	70 F°	100 F°	API GRAVITY 60 F °
Holly Monterey Zone	(1) 175	66	0.38	3.72		362	190	106	26.1
	195	71	0.36	2.92					
Holly Rincon Zone	2	10	—	0.29					27.9
Holly Sisquoc Zone	(1) 160	63	0.39	3.37					
	135	57	0.42	2.82		346	186	92	27.0
Monterey-Rincon Composite	90	42	0.47	1.86					28.1
State 308	2	5	—						29.4
State 2793	2	5	—						38.1
Hobson, Miley Zone	(1) 134	82	0.61	2.20					27.4
	150	78	0.52						
Rincon State 1466	68	48	0.71						27.0
Signal Oil & Gas	2	9	—						
Nearshore Coal Oil Point Seep	300	60	0.20	5.02	0.71				12.5
Offshore Coal Oil Point Seep	(1) 170	69	0.41	2.15					
	115	35	0.30	1.80	0.275	190,000	60,000	10,817	10.4 & 14.2
	*167	*43	0.26						16.3 & 17.4
3120-2 Tent	--	—	—	3.03	—	273	159	87	24.3

(1) Kreider - 540° Residue - 6/19/73
Watson - Analysis of second sample

Note: A sample of crude from the ocean surface in the area of the Offshore Coal Oil Point Seep showed a gravity of 15.8 API° at 60°F on 3-9-76.

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TABLE III

OIL COMPOSITION
OFFSHORE COAL OIL POINT SEEP

COMPONENT	SEPARATOR LIQUID MOLE PERCENT
Nitrogen	Trace
Carbon Dioxide	0.44
Methane	4.87
Ethane	0.69
Propane	2.54
Iso-Butane	1.13
Normal-Butane	2.83
Iso-Pentane	1.70
Normal-Pentane	1.57
Hexane	2.96
Heptane +	18.27
Hydrogen Sulfide	NIL
TOTAL	100.00
API gravity @ 60°F	19.8
Special gravity @ 60/60°F	0.935
Molecular weight	314

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volatilize and evaporate rather rapidly, especially during transit in the rapidly changing physical-chemical environment from sub-seabottom hydrocarbon reservoirs into the water column and up to the water-atmospheric interface.

Since the Seep is primarily a gas seep with minor amounts of oil, the evaporative process is the most important factor effecting the atmosphere and marine environment in the area.

Much has been written about the various harmful effects of petroleum products on the marine ecosystem, but a recent study from the Lawrence Livermore Laboratory (Spies, 1981) of the Goleta-Coal Oil Point area indicated that marine life has adapted to the polluted environment and is abundant at a nearshore seep area studied by Spies. The effects of oil and gas on marine ecosystems in scientific/technical literature indicates that the biological impacts of a minor crude oil leak at the containment site after capture is not likely to be significant or even measurable in the long term, provided the oil cleanup is effective. Much of the volatile, toxic fraction of the crude will evaporate within a few hours, and some of it may go into solution. There would be local, temporarily and spatially scattered patches of the heavier fractions of the crude floating in the ocean surface moved by local winds and currents as they presently are today. Any gas leak will dissipate into the atmosphere in a relatively short time depending on the degree of wave and wind agitation. A small portion of the gas will go into solution but it is unlikely that the volatile hydrocarbons will have any measurable or significant impact on the biological communities; especially since organisms presently live in the polluted environment.

An important question regarding the marine environmental system is "what is the total effect of the seeps on the environment?" The ability to evaluate the specific effects of hydrocarbons, especially quantitatively, is in its early stages. It is also difficult to predict accurately the total chemical behavior of specific hydrocarbons. A pioneering study on the ecosystem of seeps by Spies (1981) near Coal Oil Point indicates that low intensity, persistent introduction of hydrocarbons through relatively long periods of time into the ecosystem has not been deleterious to the marine environment. Furthermore, not only does the ecosystem influenced by the seepage continue to be biologically active, it appears to contain a large biomass which doesn't seem to be irreparably harmed.

PHYSICAL OCEANOGRAPHY/GENERAL

The oceanographic data presented in the study were abstracted from available reports listed in the reference section;

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SLC Draft EIR's are the primary source of oceanographic data. Regional data were extrapolated into the local area to provide site specific information needed for the initial study.

The oceanographic environment of the area reflects conditions in the central part of the Santa Barbara Channel, a semi-restricted body of water influenced by major ocean circulation, wind patterns, and thermohaline regime affecting the California coast south of Point Conception. Bathymetric sills at either end of the channel control the vertical distribution of water properties in the channel; the sills together with passes between the Channel Islands affect the lateral motions of water within the channel. The Channel Islands and the configuration of the mountains along the mainland coast determine the pattern of winds, hence waves, within the channel.

CURRENTS

Circulation in the Santa Barbara Channel is complex since the mean circulation patterns of the coast of California affect the water motions in the channel. The dominant currents affecting the channel circulation pattern include the California Countercurrent. These currents external to the channel cause flow of surface water to move in a general counter-clockwise gyre. Seasonal changes in the circulation are not readily discernible; however, currents do flow parallel to the shoreline along the northern shelf of the Santa Barbara Channel. The average speeds are over 0.5 knots (maximum speeds between 0.9 to 1.7 knots) and reflect a dominant northwestward flow.

Prevailing surface currents off the Coal Oil Point area is generally westerly with speeds averaging 0.5 to 0.75 knots during strong tidal phases. This system may be completely reversed by strong westerly winds which generate a southeasterly flow of the surface waters.

Bottom currents in the area are probably related to tidal controlled surface flows. Subsurface tidal currents may vary from less than 0.1 to 0.5 knots near the bottom.

WAVES

The wave climate of the Santa Barbara Channel is relatively mild when compared with that of the open ocean. The orientation and geography of the Channel limit the entry of swell from outside the Channel, except from westerly and southeasterly directions. The most severe wave conditions in the channel occur during storm periods, when swell enters the Channel at the same time seas are being generated. Waves are usually

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less than 2 feet high and have periods less than 9 seconds. Winter waves tend to be higher (6 feet or less) and have a higher proportion of periods exceeding 8 seconds. The annual modal wave at the site is about 3 feet high with a period of 8 seconds. The waves having the greatest impacts on the proposed site are swells approaching from the west or southeast combined with locally generated seas. Hindcast data for the 100 year period indicate that the area may experience significant storm wave heights approaching 20 to 25 feet from a dominant westerly direction and possibly 15 to 20 feet from the southeast.

Tsunamis could occur at the site, however, their heights should not exceed that of a 100 year storm wave. Earthquake generated tsunamis within the channel area might produce a noticeable wave with a run-up elevation of less than 10 feet. Calculated wave heights for projected 100-year and 500-year tsunamis are about 6 feet and 12 feet, respectively (SLC, 1981).

TIDES

Tides in the area are mixed with a diurnal inequality. The tidal wave in the Santa Barbara Channel moves from southeast to northwest and generates tidal currents moving in a counterclockwise direction up to 0.5 knots at the bottom. The tidal currents vary depending upon water depths and shoreline configuration. The direction of the flood and ebb currents at the site is approximately 275° True from the flood and 95° True for the ebb. The range between mean high tide and mean low tide is 3.6 feet and the range between maximum low and high observed water is 9.6 feet. Maximum observed high water is +7.3 (MLLW) feet; maximum observed low water is -2.3 feet (MLLW). The cited values are predicted from the Santa Barbara Harbor shore station; ranges and heights should be somewhat smaller at the seep containment site.

	Santa Barbara Harbor	Gaviota
(Mean High Water	4.6 feet	4.6 feet
3.6 ft - Mean Range		
(Mean Low Water	1.0 feet	1.0 feet
(Max. Low Obs. Water	-2.3 feet	-2.5 feet
9.6 ft - Obs. Max.		
9.6 ft (Max. High Obs. Water	+7.3 feet	+7.5 feet

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CHEMICAL OCEANOGRAPHY

Few direct measurements of temperature and other parameters have been made at or near the site and those that have been made did not examine temporal or spatial variations. Water in the Santa Barbara Channel stratifies in summer with a five degree thermocline present at about 20 to 40 feet depth during May to October. During the winter, the thermocline disappears due to wind mixing. Surface water temperatures near the site range from 14 to 19 degrees Centigrade annually. Temperatures at a depth of 100 feet are about 4 degrees Centigrade lower than at the surface in summer, and 2 degrees Centigrade lower in winter.

Surface water salinity is fairly constant at 33.5 percent, ranging from 33.2 percent in winter to 33.9 percent in summer. Bottom salinities near the area range between 33.9 percent and 34.5 percent. Densities (sigma - t) are reported to be 24.4 $\pm$ 0.5 at the surface, 24.6 $\pm$ 0.7 at 98 feet and 25.5 $\pm$0.3 at 295 feet.

Dissolved oxygen levels near the site show variability in the upper 25 feet of water. Surface waters are saturated to nearly saturated with seasonal values varying between 5.17 to 13.7 mg/l. Below the thermocline depth, the values are between 6.4 and 13.2 mg/l, and near the bottom (200 feet) the values lie between 4.9 and 7.1 mg/l.

NUTRIENTS

The primary nutrients that have been studied in the Santa Barbara Channel area include phosphate, silicate, and nitrate. These nutrients enter the area through advective processes, upwelling of deeper waters, and surface runoff. Mixing of these components within the water column is by various physical processes. Representative data within the area indicate that nutrients appear to increase with depth with minimum values following the increased phytoplankton productivity of late summers and fall. Maximum nutrient values occur in May and minimum values in December. During the winter, January to March, nutrient concentrations are more or less uniform with depth due to storm wave mixing.

Water in the Santa Barbara Channel is typical of ocean waters in that nitrate concentration ranges from 0.01 to 0.40 mg/l, phosphate ranges from 0.03 to 0.2 mg/l, and silicate ranges from 0.04 to 1.5 mg/l. Dissolved nitrate ranges from 0.01 mg/l at the surface to less than 0.4 mg/l at the bottom (295 feet). Dissolved silicate values range from 0.1 mg/l in winter to 1.5 mg/l at 100 feet in April to June. Phosphate levels range from 0.05 mg/l in the winter to about 0.15 mg/l at 295 feet depth in summer.

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HYDROGEN ION CONCENTRATION (pH)

Values of pH for ocean water along the southern California mainland shelf range from 6.5 to 8.6, with an average of 8.1 which is typical of oceanic waters.

From about 200 to 300 feet in depth, pH values range from 7.6 to 7.8. Values of pH and Eh in the sediment are not known for the Seep area.

TRACE ELEMENTS

Trace metal concentrations in the area are within the ranges found in the world's oceans and similar variability and low levels are likely in the area. The importance of trace metal concentrations is that at low values they are essential to organic productivity; however, at high concentrations, they can be toxic. Trace metals found in the water column are eventually deposited in the bottom sediments where their concentration levels will be higher. Most of the trace metals are believed to have maintained stable concentrations within the past 100 years, with the exception of mercury, lead, and possibly silver and zinc. Trace metal chemistry of the waters and sediment at the seep site is not known. However, heavy metals concentrations measured in microgram-atoms/liter for surface water off southern California by SCCWRP (1973) indicated that a range in values for copper (1.6-9.0), cobalt (0.1-0.2), iron (1.9-44.3), nickel (0.4-2.5), lead (0.4-18.2), and zinc (1.1-41.2).

WATER QUALITY

The quality of ocean water is determined by its chemical characteristics. However, it is important to note that standards for ocean-water quality are based on biological habitats in ocean water and on aesthetic considerations.

During the installation phase of the project, sanitary waste from the support vessels will be treated on board and discharged in compliance with federal and state regulations. Amounts of discharge involved are relatively small and the effect on the environment should be minor and of short duration.

Once the containment device is installed and operative, any oil leakage from the containment device would result in a surface oil slick less than the present time and would not affect the quality of the surrounding waters because of the small quantity of oil available from the seep. Presently, the waters in the seep area contain large quantities of floating oil slicks. The containment device leakage would not pose an important impact since it would be controlled in a short time frame.

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Inputs of non-hydrocarbon fluids from the seep will continue to be emitted into the water column from the containment device since it is a natural occurring phenomena. Certain of the biota associated with the seep may be disturbed by the containment operation. The effect on organisms dependent upon the seep such as bacteria is not known.

No water quality impact is expected from the onshore processing facility. Containment of the seep will increase the water clarity, improve the water quality, and enhance the surface waters in the area by eliminating the floating slick associated with the seep.

ATMOSPHERIC ENVIRONMENT/METEOROLOGICAL SETTING

The climate in the Santa Barbara area is a Mediterranean-type with warm, dry summers and mild, wet winters. The local coastal topography and temperature of the oceanic waters has a strong influence upon air temperatures, precipitation, and wind flow. Strong sea breezes occur during the summer. The maritime influence including Pacific air masses and the California current moderates the temperature, producing small daily and annual variations in the area. Mean daily temperatures in the region range from 11°C in the winter to 18°C in the summer. Precipitation is primarily a winter phenomenon with about 90 percent occurring between November to April. The average precipitation at the Santa Barbara Airport is approximately 15 inches per year. Because of an inversion condition, fog and low stratus clouds are prominent during the summer months. Although nights and mornings are often cloudy and foggy in the summer, the afternoons are clear, cool, and usually sunny.

The site area is exposed to southerly, westerly, and southwesterly winds. Wind flow patterns in the area are influenced by both the large-scale Pacific high pressure system and by local effects. A land/sea breeze circulation causes variations in the wind regime. Sea breezes that flow onshore during the daytime are stronger and more persistent during the summer. The nocturnal offshore wind flow system is generally weaker than the onshore daytime flow. During the winter, Pacific frontal systems move through the region with winds of 25 to 45 knots. During the winter months, a Santa Ana condition may exist, when warm, dry, strong and gusty winds from desert basins sweep down through the inland valleys, and out to sea. These southeasterly winds at the site may reach 20 mph. Occasionally, tropical storms moving northwestward from Baja California may generate a persistent wave action that impinges on south facing headlands.

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AIR QUALITY

Air quality for a particular area is a function of the local topography, the prevailing meteorological conditions, and the quantity and quality of effluents emitted into the atmosphere. The project area is located in the South Coast Air Basin where the persistent temperature inversion and local topography tend to trap surface generated emissions within the marine air layer. Air pollutant data in the Santa Barbara area indicates high hydrocarbon levels.

In 1976, the Environmental Protection Agency (EPA), adopted an Emission Offset Policy. This policy set forth preconstruction review regulations designed to limit and reduce emissions from new and modified stationary sources in non-attainment areas. Under the Offset Policy requirements, two of the important conditions that must be met prior to source approval are:

(1) Emission reduction (or "offsets") from existing sources in the area of the proposed source must be obtained, such that the net total emissions from the proposed source represent reasonable progress toward attainment of the applicable national standard. Only intrapollutant emission effects will be acceptable; and

(2) Emission effects must provide a positive net air quality benefit in the affected area.

EMISSIONS

The 8.2 tons per day of NMHC (mean value) and the 40-80 B/D of oil at the containment site could be considered for emission-tradeoffs, and "banked" for future needs since current regulations require that emissions from proposed offshore exploratory/developmental drilling projects be "offset" by a reduction of existing emissions.

ARCO proposes to contain the Seep and use the emissions eliminated from the environment as "offsets" to emissions caused by subsequent exploration and development of ARCO offshore leases in the Santa Barbara Channel.

BIOLOGICAL SETTING

The flora and fauna of the marine environment of the mainland shelf area of the Santa Barbara Channel have been studied as part of several large-scale investigations. Numerous studies have been made on the effect of oil spills upon the marine environment of the region, however, they deal

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mostly with the short-term effects and not on the important long-term effects. Organisms normally occurring near the seep containment site are documented by a variety of investigators (SLC, 1974, 1980, 1981). Plankton data for the Santa Barbara region are generally lacking and what available data we have, come from stations that have neither been regularly sampled nor have all the planktonic species been analyzed.

The mainland shelf in the vicinity of Coal Oil Point and Goleta Point is relatively narrow, averaging about 5 km and is characterized by a complex bottom sediment textural pattern. Bedrock crops out locally and bottom sediments exhibit a general gradation from, coarse to fine in a seaward direction. Silty sands and sandy silt dominate the substrate near the seep containment site.

PLANKTON

Planktonic communities consisting of suspended plants and animals are highly variable in both type and number, depending upon ocean currents for dispersal, nutrients, light, and season of the year. In any specific area they are transient inhabitants. The most abundant microplanktonic forms near the proposed containment site are generally diatoms and dinoflagellates. Copepods, thaliacians, and a variety of invertebrate and fish larvae have also been reported in the area.

BENTHIC FAUNA

A variety of variable macrobenthic, infaunal, and meiofaunal assemblages occur in the sandy-silt bottom near the proposed seep containment site. The common macrobenthic species would include a variety of dimersal fish, echinoderms, crustaceans, and molluscs.

Infaunal samples from the vicinity of the proposed site indicate a Amphiodia-Cardita (a brittle star and clam) associated assemblage.

Six faunal associations have been established for the Santa Barbara region by Jones, 1969, from the University of Southern California (SLC, 1974, 1981). Of these, three more or less distinct communities are reported to exist offshore of Coal Oil Point: Diopatra ornata, Northria-Tellina and Amphiodia-Cardita. The inshore sediments near the site are dominated by Diopatra ornata (a polychaete worm) association, which extends down to depths of 90 feet and occurs where kelp and rubble are prominent.

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The Northria-Tellina (polychaete worm-bivalve) association extends from the nearshore area out into deeper offshore depth of about 180 feet. The proposed project site lies within the Amphiodia-Cardita (brittle starfish-bivalve) association as depicted by Jones (1969) in waters between 180 to about 280 foot depths. Seaward of the Amphiodia-Cardita association, the bottom of the deeper shelf and slope are populated by associations in which the common organisms are polychaetes, ophiuroids, echinoids, and bivalves.

NEKTON

The nekton group includes both free swimming fishes, some crustaceans, and marine mammals. The number, type, and spatial distribution of marine fishes are governed by various physical and biological parameters such as water temperature, currents, larvae dispersion, food and competition.

MARINE FISH

Over 550 species of shallow water inshore marine fish have been recorded along the California coast. Of these, probably less than a few hundred may occur near the seep containment area. Flatfish, croakers and surf perches are characteristically found in shallow, low relief (sand and mud) areas of the Santa Barbara channel. A more diverse fauna including rock fish, kelp and sand bass, wrasses, greenlings, and perches are supported by the nearshore high relief (rocky) areas.

The project sites lie within California Fish and Game Fish Block Number 654. California Fish and Game data for the 1975 commercial catch was 283,475 lbs. for Fish Block 654.

The major commercial fishing port nearest to the proposed project site is located at Santa Barbara. Abalone, rockfish, Pacific bonito, and English sole account for the majority of the commercial fish landings at the Port of Santa Barbara.

Mackerel, shark, white sea bass, salmon, Pacific sardine, Northern anchovy, Pacific halibut and lingcod are other commercial fish also caught in the region.

Transient commercial fish include barracuda, yellowtail and jack mackerel which are present during the summer. Besides the red abalone, crustaceans such as spiny lobsters and rock crabs are also commercial catches in the area.

The dominant sport fishing catch in the area include various rockfish. Rock bass, Pacific Bonito, and salmon comprise the other dominate sport fish caught. Sea bass, ling cod, California sheephead and flatfishes account for a small

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percentage of the sport fish catch. California Fish and Game data for sport fish catch in 1978 was 14,793 lbs. for Fish Block 654.

MARINE MAMMALS

No site-specific data on marine mammals are available, however, sightings of California gray whales, harbor seals and California sea lions have been observed near Coal Oil Point. Since the temperate water of southern California is reported to have the largest and most diverse marine mammal population in the world, a variety of cetaceans, whales, dolphins, porpoises, and pinnepeds, seasonally pass through these waters. Of these, Harbor seals, California sea lions, and Pacific bottlenosed and whitesided dolphins are more likely to occur inshore in the Santa Barbara region.

BIRDS

A variety of marine and terrestrial birds, including shore birds, sea gulls, sea ducks, and other diving species utilize the coastal environment near the seep containment site. The most common species in the region include three species of loons, the western grebe, four species of gulls, the California brown pelican (an endangered species), two species of cormorants, and various sea ducks such as murres, scooters, auklets, and murrelets. Shorebird species include the most common probing bird of the adjacent sandy beaches, the sanderline, and plovers, willets, turnstones, killdeers, godwits, and sandpipers. These species rely on interstitial invertebrates along the sandy beaches and adjacent wetlands for their food. The precipitous cliffs and offshore rocks in the area commonly provide nesting and roosting sites for shorebirds.

RARE, ENDANGERED, OR PROTECTED WILDLIFE

Five endangered and two rare species of wildlife are reported in the region of the Santa Barbara Channel. The endangered species include the California gray whale, which feeds in or rests on the open water areas; the California least tern, which feeds on small fish in the nearshore marine area; and the light-footed clapper rail and Belding's savannah sparrow, which are found in the salt marshes habitats along the Santa Barbara coast. The California black rail, found in salt marshes, and the Guadalupe fur seal, usually found in the offshore areas and around the Channel Islands are the two rare species found in the region.

Of the endangered species, only the California gray whale has been observed near Coal Oil Point.

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KELP BEDS AND ASSOCIATED ROCKY SUBTIDAL

Benthic algal studies in and near the proposed containment site are lacking. Regionally, an almost continuous band of kelp exists offshore of the Santa Barbara area between Ventura and Point Conception. Some of the largest and most dense stands of kelp in southern California occur between Coal Oil Point and Point Conception. These kelp stands are dominated by Macrocystis angustifolia which exist in turbid waters on sandy bottoms. Macrocystis pyrifera, another giant kelp, also occurs in the area. Various brown algae dominate the understory algal community. Shoreward of the kelp stands on the rocky bottoms, the dominant algae is Egregia lavigata. The surf grass, Phyllospadix torrevi, is the conspicuous member of the rocky bottom flora. Various corraline and non-corraline algae are present on the rocky bottoms.

A diverse faunal assemblage is supported by the complex structure of the kelp stands and rocky bottoms shoreward of the seep containment site. Almost 92 species of organisms common to kelp beds are expected to occur in the Santa Barbara region.

The nearshore kelp beds off Goleta Point and Coal Oil Point is harvested by KOPCO from Kelp Bed Number 27. This bed, extending 3 miles seaward between a line 176° true from Goleta Point to a line 210° true from Coal Oil Point is currently under lease to KOPCO, located in Oxnard. Harvesting data is confidential, however, the combined total production from the adjacent "Open Bed" to the west, Number 28 and Bed Number 27 for the years 1975 to 1978 was 22,288 tons.

CULTURAL/ARCHAEOLOGICAL RESOURCES

A review of the available literature of the area indicated that--prehistoric sites occur nearshore of the project area, but none are known to exist within the containment site or along the pipeline corridors. Geophysical surveys in and around the seep site by the State Lands Commission and ARCO in 1980 indicated some evidence of previous drilling such as well heads, casing, and possible drilling debris, but no anomalies of archaeological origin. A geophysical pipeline route survey to the existing pipeline bundle by ARCO (1980) also did not reveal any anomalies of archaeological origin. A recent discovery of four cannons along the beach below the cliff at Goleta Point suggests the possibility of an ancient shipwreck offshore. However, no evidence of a ship has been found to date. Side-scan sonar and magnetometer surveys along the pipeline route to the existing Coal Oil Point pipeline bundle did not indicate any shipwrecks in the area.

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Submerged artifacts may occur offshore as indicated by finds closer nearshore made in association with rocky bottoms. The sediment bottom which occurs at the seep site is considered to be a low probability environment for aboriginal artifacts on the seafloor. Furthermore, if gas were emitting during exposure in late Pleistocene or Holocene times the area would have been highly undesirable for a human habitat.

POTENTIAL ENVIRONMENTAL CONSEQUENCES OF PROPOSED ACTION

The proposed project meets all current State regulations. Production of oil and gas from the natural seep will be minimal in comparison with productive wells in the area. The seep containment device as well as the subsea gas flowline, and installation of the containment device and flowline, including the right-of-way, design criteria, corrosion control, burial, and safety devices will be in compliance with the requirements of the State Lands Commission and other regulatory agencies to minimize environmental impact.

The previously discussed site specific physical, biological, and other information provides sufficient data for a reasonably accurate evaluation of potential environmental effects caused by the emplacement of the seep containment device and pipeline to shore.

Although the proposed project includes a slight modification to the seafloor topography, no significant impact is anticipated on the rates of sedimentation and erosion. A minor temporary disturbance of the bottom sediments will occur during the setting of the containment device and the gas flowline. Approximately 20,000 square feet (0.46 acre) of the seafloor wil be occupied by the containment structure.

The subsidence potential resulting from the containment of the seep will only reflect that resulting from the natural outgassing process in the area and is considered negligble.

The areal influence of the structure will cover about 0.46 acres and cut off a small segment of the benthic community. There will be no apparent effect on the planktonic community since a large majority of plankton, especially the phytoplankton is located well above the depth of the seafloor structure. The containment structure will afford an additional substrate to the area and a new fauna could occupy this site.

Formational waters entering the containment device from the seep would produce the same condition as if the seeps were naturally flowing into the ocean and consequently

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is not a pollution issue. A controlled depletion of a petroleum resource will result from the caputure of this natural seep.

The process of natural oil and gas seepage is poorly understood and it is not possible at this time to accurately assess the potential effects of containment of the seep other than it will reduce pollution in the area and not effect oil or gas drilling or production in the area.

Principal geologic processes that could result in environmental impacts are earthquakes and possible tsunamis. There are no recognized active faults at the proposed site and the shallow faults detected by geophysical surveys in the site area do not appear to offset Holocene (Recent) strata. The flexible pipeline may cross some of these small subsurface faults, but this should not cause adverse environmental impacts because if fault rupture occurred the safety features built into the system would control the impact. Special caution has been exercised in the design of the containment device and pipeline as well as in the placement of these systems. Also, any oil and gas that escape from the pipeline or containment device is that which would have been emitted from the seep under naturally occurring conditions.

Tsunamis may represent a potential hazard to nearshore and coastal facilities along the beach. However, no significant effects have ever been reported to offshore platforms or ships in water depths comparable to that at the site and therefore tsunamis should have no impact on the operation.

Seismic shaking should not damage the containment device; however, the effects of shaking may have an impact on oil-gas separation and storage system or could cause a rupture of the gas pipeline. Rupture at any point in the system could produce potential gas or gas/oil leakage into the environment; however, safety design features built into the system would preclude any significant impact and the amount leaked would be negligible.

Sediment and shelf gradient conditions necessary for liquification, submarine slumping/landsliding, or turbidity currents, apparently do not exist within the site area and the occurrence of such phenomena is not anticipated. The exact engineering properties at the proposed site are not known; however, there is no evidence of past seafloor instability due to liquification or differential settling or compaction as indicated from geophysical and manned submersible surveys in the area.

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Other potential hazards or potential impacts may result from flooding of the onshore gas facility during the torrential rain-fall period of October to March and landslides or beach erosion which could occur during the laying of the pipeline. However, these impacts are not expected because proper engineering safety measures have been and will be taken to eliminate these potential problems.

SUMMARY

It is believed that implementation of the proposed action within the existing State, Federal and local regulatory framework will not have any significant adverse effect on the seafloor with its epifauna and infauna or the water column and life contained therein or the surrounding offshore and onshore environment. The structure may offer an insignificant threat to bottom fisheries; however, there is no important impact on the water column fisheries or on other users. Furthermore, the containment device will become an artificial reef and enhance the fisheries in the area.

The loss of the small area (0.46 acres) covered by the containment structure does not represent an irreversible or irretrievable loss, since recolonization of the new substrate will bring the site into equilibrium with the surrounding ecosystem.

No significant emissions will be generated but significant pollutants will be captured and deleterious emissions reduced in the region by implementation of this project.

UNAVOIDABLE ADVERSE EFFECTS

Potentially unavoidable adverse effects associated with the proposed project are expected in relation to installation of the system, (increased boat and shore work activity), the normal operations (accidents due to human error, increased barge transport, leaks) and possible accidents (onshore leaks, fires or explosions associated with the release of gas). The significance of potential impacts will be reduced by mitigating measures.

The near-term major unavoidable adverse impacts will be 1) a localized smothering of relatively immobile benthic infauna and meiofauna beneath the containment structure and along the pipeline route, and 2) loss of 0.46 acres of benthic habitat at the seep site, and 3) a localized change in seafloor relief. Earthquakes could cause damage to the system resulting in a short-term leakage of gas and oil in the marine or terrestrial environment. A short-term noise level and aesthetic effect will occur during the

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installation of the containment device, the pipeline, and modification to the onshore facility. The likelihood or probability of occurrence of some of the adverse impacts is variable and considered very low.

The ARCO onshore facility has a safety contingency plan and the oil barge used in transporting the oil from the site will comply to agency regulations and accepted oil spill contingency plans. The fate of the oil and gas during a possible leak will follow its previous natural movement and complex degradation pattern in the water and air environment thereby not causing any new adverse impact to an existing contaminated environment.

POTENTIAL ENVIRONMENTAL IMPACTS, BIOLOGICAL

Clearly, at first hand, the potentially significant adverse impacts would occur as a result of an oil spill or a gas discharge at the containment site or along the pipeline or onshore. Potential impacts on the marine biological environment are the most important, although marine water quality, air quality, existing socio-economic conditions and the effects of oil-spill cleaning operations are also a concern. Since the general area which is proposed to be captured, is now polluted by oil and gas, any leakage from the system would not produce a significant deleterious impact on an already polluted area, but rather would be insignificant.

Little impact to the marine life is anticipated since only a small local seafloor area (0.46 acres) will be utilized in the project. Installation of the containment structure and laying of the flowline, actual burial where required and other potential impacts to the marine environment are considered insignificant. The pipeline will be buried the last 50 feet to shore which presents an environmental concern to the benthic environment; namely, the sub- and inter-tidal communities however, the size of the area disturbed is negligible and the effect is temporary since the ecosystem will reach its former equilibrium in a short time. Should anchoring devices be necessary during the installation of the containment-structure, then a relatively small part of the benthic environment adjacent to the seep may be slightly altered by relatively small anchor scars which will be covered in time by normal sedimentation and/or submarine erosion processes, consequently only a temporary disturbance would occur. The installation of the flowline may result in the destruction of a small portion of the offshore kelp; however, ARCO will avoid the offshore kelp bed if possible, or at least confine the installation activities as to minimize the area to be disturbed.

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A spatially and temporally limited disturbance of the fish population near the containment site and along the pipeline corridor is expected. Commercial and sportfishing activities should be affected only by the presence of the installation barges, pipeline-laying vessels, and other support ships for a short period of time. Also, the pipeline will only potentially interfere with any trawling or other bottom fishing activity for a short distance before connecting to the existing pipeline bundle. However, this impact should be minimal due to the presence of the existing flowline bundle nearby the project which may already preclude this fishing activity.

The two proposed gas transmission line routes will follow along the existing flowline corridors which greatly lessens the potential impact. Furthermore, the landward extension of the pipeline as well as the pipeline staging area will not disturb the vegation to any significant degree since it will follow existing pipeline routes.

Construction sounds during the installation phase of the project may alter the behavior of marine mammals and birds, but is only temporary in nature. None of the nearby unique marine environments as well as mammals passing through these waters should be effected by the project.

WATER QUALTIY IMPACTS

Physical and chemical oceanographic parameters are not expected to be significantly impacted. Conversely, light transmissivity and oxygen content, in the water column should increase in the area while odor should decrease since oil slicks and hydrocarbon particulate and gasous matter will be captured and eliminated at the site. It is possible that the present fauna and flora at the site may be slightly reduced and the biomass level lowered as a result of the seep containment due to a reduction of bacteria and nutrients.

No detrimental effects to the water quality are anticipated. Corrosion of the steel containment structure should not produce any adverse impact.

AIR QUALITY IMPACTS

Emissions associated with the proposed seep containment project would occur in two phases--phase I, minor increase in atmospheric emissions during the emplacement of the containment structure, laying of the gas pipeline, modification of the onshore gas processing facility if the Coal Oil Point site is used, and phase II, decreased atmospheric emissions during the operation of the seep containment

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system with both a beneficial impact of lowering the atmospheric as well as the oceanic pollution in the area. The various installation activities would occur over a 30 day period. Phase one is a near-field short-term impact and would include the movement and positioning of the seep containment unit, lowering and emplacement of the structure on the seafloor and move-out. The emission levels, mostly nitrogen oxides, offshore and carbon monoxide onshore, associated with the emplacement and support vessels at the site and in transit is considered to be negligible because they will be dispersed over a wide area offshore and also due to the relatively low power requirement needed and the short time at the sites to accomplish the task. Laying of the subsea flowline will produce minor emissions from the lay barge and equipment used onshore. Emission from land support vehicles and the gas processing facility are also considered to be insignificant.

Phase two includes a very insignificant long-term impact of any potential pollutants from the increased production levels at the processing plant; however, this is a minor concern which is more than balanced out by the containment of the offshore seeps which will result in a significant lowering of offshore emissions. The Ellwood ARCO Gas Processing Plant, which is located less than 1,000 feet from the shoreline is presently processing 8,000,000 SCF. Only minor modifications at the Ellwood processing facility are required. At the Coal Oil Point Gas Processing Facility a 40 ft. by 24 ft. area will be modified by new construction as a consequence of this project.

The emissions from the processing equipment and electric motor driven transfer compressors associated with the additional increased production is considered negligible and well within the SBCAPCD permitted capacity. No major pollutant will be emitted from either Gas Processing Facility.

MITIGATING MEASURES PROPOSED TO MINIMIZE IMPACTS

Mitigating measures to minimize potential adverse effects, for the most part, deal with installation methods, oil and gas leakage prevention, and control procedures. All work will be conducted in accordance with the applicable codes and regulations of federal, state, and local regulatory agencies. ARCO proposes to use the best acceptable practices and latest technology and will be guided by the requirements of the pertinent regulatory agencies effecting the design, installation, and operation of system. Safety equipment has been included in the design of the equipment in compliance with regulatory agencies recommendations to minimize the probability of accidental leakage. The State Lands Commission will actively provide surveillance and strict enforcement

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of good safety, operating and management practices to insure that accidental leakage of oil or gas should not occur. This is accomplished by State Lands personnel inspecting and monitoring the area by periodic helicopter flights. Should oil leakage be observed ARCO will activate the Holly Platform oil spill contingency plan and use the equipment available to control and physically clean up the oil.

The gravity-type containment device has been designed under all required design codes to insure the stability of the structure in place, in tow and during installation for storm, earthquake, geotechnical and operating conditions. A copy of the design report is available for review at the State Lands Commission office in Long Beach. The system can be refloated and relocated, if required. Concrete weight blocks will be used to resist any wave uplift overturning moment and buoyancy forces and still be light enough not to sink into the sediment under the combined dead load and downward component of wave load. Breathing slots in the structure will preclude the effect of wave upward and downward and horizontal forces on the containment device. The system will be operating at very low working pressures and the gas will be conveyed to shore, a distance of about 2 1/4 miles, under its own energy. The oil will be transferred to a surface barge from the oil storage tank in the structure using the hydrostatic head of the seawater as a driving force. Pressure relief valves are furnished on all pressure vessels. A pressure controller located on the pipeline of the onshore compressor facility will control the vapor/liquid interface in the collection tank. Check floats on the separator will prevent the entry of liquid into the gas pipeline.

The presently operating onshore facilities have met all the governmental agencies design and safety requirements for the additional processing of the relatively small quantity of gas it will receive. The plants operate under an approved integrated safety control system.

Other appropriate agencies, such as the U.S. Coast Guard as well as public and local fishing groups will be notified so that potential space-use conflicts will be minimized.

ALTERNATIVES TO THE PROPOSED PROJECT

A no project alternative would result in the continuance of the natural oil and gas polluting the oceanic and atmospheric environment in the Coal Oil/Goleta Point/Santa Barbara area. A vital natural resource will continue to be lost as a result of no action or maintaining the status quo. Also, an experience factor would be lost should other natural/-man-made seeps be considered for potential containment. The no project alternative could result in ARCO's abandoning their resumption of drilling on their offshore leases thereby causing a potential loss of jobs, loss of potential income

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to ARCO, loss of potential State revenues, deteriorations of local tax base, and the reduction in the source of a valuable nonrenewable petroleum resource underground and also presently being wasted at the seep.

Deferring action on the proposed project would result in delay, and not mitigation, of all the related impacts, both positive and negative in nature. The impacts of this alternative are essentially the same as those of the proposed project, except that they will occur at a later date. Postponement would mean a continuation of air and oceanic pollution from the seep. Postponement could also eliminate the applicant's economic incentive to implement the project, especially if ARCO's commitment to a drillship can't be met. Potential production from the successful containment and processing of the seep gas and oil would account for an increase in production from the offshore area while providing a decrease in pollutants at the same time, resulting in a highly desirous situation.

Various alternative seep containment techniques were considered. Two viable alternatives considered were a subsea canvas/fiberglass tent similar to the system used at the Platform "A" blowout of January 28, 1969, and a seep cap blanket system. The canvas and fiberglass tent concepts were rejected primarily due to the disadvantages that they can easily suffer damage and tend to deteriorate in the marine environment. The sand-filled seep cap blanket system was not considered because of potential physical drawbacks such as the initial buoyancy problem in installation of the lightweight blanket prior to filling with sand, unknown material longevity, tendency for tears, potential back pressure effect resulting in gas and oil channeling around the blanket and the unproven use of the system as a containment device.

Alternate seep sites were reviewed but none had the high degree of economic or physical potential for seep containment as does the Offshore Coal Oil Point Seep. Also, other seeps do not offer the significant environmental advantages that would make them preferable to the proposed project. All of these alternatives were rejected due to economic reasons, potential performance, feasibility, and/or more adverse environmental effects than from the proposed project.

THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The major short-term use associated with the proposed project is the containment of natural oil and gas from seepage into the environment as well as afford ARCO emission

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tradeoffs for proposed exploration and development projects to increase present and future petroleum production. This containment on the short-term and also on the long-term basis would decrease atmospheric and oceanic pollutants, add more potential petroleum into the economy, generate additional revenue and other financial benefits for companies, local, and state government. These potential uses represent immediate benefits and may also provide long-term benefits. The short-term effects will be relatively temporary with localized changes in the benthic communities.

Its most direct effects on the maintenance and enhancement of long-term productivity would be 1) reduction of local and regional water and air-borne pollution, 2) controlled depletion of a natural petroleum reservoir with subsequent economic benefits from its production, 3) establish a data base on natural seep output, and 4) furnish valuable information concerning the economic and practical feasibility for future seep containment projects in the nearby area or elsewhere where oil and gas seeps are environmental concerns.

Ultimately, completion of oil and gas extraction at the site in the future will result in the removal of the containment device. Presumably, the device would be set on other seeps in the area. The positive stress caused by the containment of the natural seepage from being transferred to the environment and its effect on the tolerance level of the ecosystem is not presently known. The negative stress effect of a potential oil spill or gas leakage in an already, polluted area would make it difficult to determine the possible long-term effects on the ecosystem which apparently is in equilibrium with present pollution levels.

ARCO believes that implementation of the proposed project is justified at this time because of the need to fulfill the nation's and the state's current energy requirements. The emission tradeoffs and financial benefits will have short-term and long-term implications for both the applicant for further oil exploration and development and provide a source of funding for the state and local governments.

ANY IRREVERSIBLE ENVIRONMENTAL CHANGES THAT WOULD BE INVOLVED IF THE PROPOSED ACTION SHOULD BE IMPLEMENTED

Under the proposed action, minor modification of the seafloor topography, localized changes in the biological community, and the extraction of oil and gas will probably occur. A minor quantity of energy resources and materials committed to the proposed project for the construction, installation, and operation of the system may be considered irretrievable.

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THE GROWTH INDUCED IMPACT OF THE PROPOSED ACTION

There will be no apparent growth-inducing impact directly due to the implementation of the proposed action, since only a relatively small amount of oil and gas will be produced from the seep with only slight modifications to existing onshore gas processing facilities. The installation of the seep containment structure and pipeline will involve an already existing labor force with few short-term impacts and no immediate growth potential. There would be no increase in large ship traffic in the local area except the small barge unloading the oil approximately once a week at the site.

Assuming that the project is successful there is the possibility that other significant natural oil and gas seeps in the region could be contained. This expansion in seep containment would produce a positive beneficial impact and would be a minor negative impact when compared to the number of other present manmade features on the seafloor in the region. Success in the project may also cause an indirect impact by providing a stimulus for governmental agencies to require oil companies to capture seeps for emission tradeoffs in their offshore exploratory or developmental programs, thus leading to increased beneficial offshore activity.

The direct cummulative negative effect of the activity on the environment in the long-term is negligible since the area impacted is small and the resulting containment is beneficial; however, in the long-term the direct positive cumulative effect can be large due to the potentially significant cumulative amounts of oil and gas that will be captured and not allowed to pollute the environment.

ECONOMIC AND SOCIAL FACTORS (Social Environment)

The economic and social impact is negligible since the increased oil and gas production is minor and not anticipated to affect existing socio-economic patterns in the area. There will be no apparent social or aesthetic effects caused by implementation of the proposed activity. No increase in population is expected from this proposed operation. Existing man-power in the area will be used in the project. No adverse impacts are expected upon any known historical and/or archeological resource in the offshore or onshore area. Minor modifications of the existing onshore facilities will be carried out within the existing plant areas to accommodate the gas processing and handling. The proposed pipeline will follow the existing offshore and onshore pipeline corridor which will produce a minimal impact upon the physical and social environment.

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