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Deepwater Ports in California

Assembly Select Committee on Deepwater Ports

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DEEPWATER PORTS IN CALIFORNIA

STAFF
REPORT
of the
SELECT COMMITTEE
ON
DEEPWATER PORTS



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.L500
D6
1974
no.1

AUGUST 30, 1974

394

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August 31, 1974

The Honorable Leo McCarthy
Speaker of the Assembly
State Capitol
Sacramento, California

Dear Mr. Speaker:

Transmitted herewith is the report of data collected by the staff of your Select Committee on Deepwater Ports in compliance with the Speaker's letter of November 8, 1973.

It has been submitted to members for response by mid-August. Because of the press of legislative business, the Committee has been unable to convene for an in-depth examination. Therefore it is submitted without action by the Committee because I consider it an important work project to be considered by any standing committee having jurisdiction of deepwater port questions. Members may later file individual observations on these issues.

It is recommended that the Select Committee be terminated on November 30, 1974.

Cordially,



MIKE CULLEN
Chairman

MC:dk

LS, 974

CALIFORNIA STATE DEPOSITORY

JUL 23 1975

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SUMMARY

In just three years (1977) the first trickle of Alaskan North Slope oil will arrive in California ports. By 1978, the trickle will grow to a flood supplying all the requirements of our State with the excess piped to the Southwest United States. Other low-sulphur content oil is and will continue to be imported from Indonesia in deepdraft ships exceeding 260,000 deadweight tons. One oil company serving the Alaska-California route desires to build three ships of that tonnage. In time, other companies will follow as smaller ships age and are phased out in favor of the larger, more economical deepdraft vessels.

Soon after the establishment of this Assembly Select Committee on Deepwater Ports, at least two such large ships arrived off the Channel Islands of Southern California, transferred their oil cargo at sea to smaller ships, and departed. By 1978, there will be at least one arrival daily. Yet, there is no port in the United States now capable of receiving these deepdraft vessels.

Environmental-economic tradeoffs dictate that imported oil be delivered to refineries at the nearest point consistent with nautical safety and safeguards against oil spillages during transfer operations.

The locations of existing refineries and siting of new required refineries, taken together with ocean depths, comprise the formula for judging optimum locations for bringing ashore in California

millions of barrels of imported oil daily. Jurisdiction of California submerged tidal lands comes under the State Lands Commission, two constitutional officers elected statewide and the Director of Finance appointed by the Governor. Necessary permits for planned refinery sites are required by a multitude of public agencies with similar, overlapping and duplicative social, environmental, and economic concerns. Refineries, as power plants, are a link in the energy chain.

In the area of public interest, there are subsidiary considerations. At present, one oil company plans to permit several other oil companies to use its planned deepdraft facility midway between San Francisco and Los Angeles in Estero Bay and its pipelines to refineries in the Richmond-Martinez complex by San Francisco Bay. If the State, by statute, were to designate intra-state oil lines as "common carriers", this friendly accommodation could not be terminated in the event of a falling out among the oil companies. Common carriers are under the jurisdiction of the Public Utilities Commission which designates and regulates common carriers based upon certification of convenience and necessity.

Another consideration is the effect of pending federal legislation providing for the regulation of deepwater port siting and the tax levy upon imported oil flowing through such ports. The congressional conference committee draft presently only contemplates buoy-pipeline terminals outside the three mile limit. Authorities in all coastal states are monitoring the legislation

and this Select Committee has and is providing analysis and evaluation as amendments are proposed. The States of Washington, Oregon and California have planned to convene a symposium on petroleum developments through their executive branches of government. A Sacramento symposium of these States and the Gulf States would be useful in supplementing the efforts of the State of Texas in mobilizing congressional delegations to resisting encroachments on planned state development of deepwater ports.

DEEPWATER PORTS
PRELIMINARY STAFF
REPORT

FINDINGS:

1. History of Deepwater Ports.

The United State's dependency on foreign petroleum imports has been on a steady increase, rising from 18% of the total supply in 1960 to 29% by 1972. Projections have this figure at 43% by 1975 and 57% by 1985.¹ In order to realize transportation cost savings, there has been a desire to use Very Large Crude Carriers (VLCC's) to bring this oil to the United States.

Ten years ago, there were no ships in the world of more than 100,000 deadweight tons (dwt). By 1975 it is expected that there will be more than 800 tankers of this tonnage.² Ships of this size reduce the transportation costs of crude oil roughly in proportion to the size of ship and distance travelled.³ Increasing tanker size from 70,000 dwt, a class commonly used on the West Coast, to 250,000 dwt can result in a substantial lowering of the per ton cost. While the transportation costs to the shipper may be reduced, the price difference to the consumer (about one cent per gallon of gasoline)

1 See Reference 1.
2 See Appendix A.
3 See Appendix B.

is relatively insignificant.

There are presently some 300 oil tankers afloat that are too large to be handled by U. S. ports. However, unlike the Gulf and Atlantic Coasts, some of the major West Coast port complexes have sufficient water depths to receive medium draft tankers. The Puget Sound area currently outranks all U. S. ports in the size vessels it is able to handle. There, tankers up to 150,000 dwt, which draw 60 feet of water, can be accommodated. California ranks second in the nation with the Port of Long Beach able to handle tankers up to 138,000 dwt, which draw 55 feet, and the Port of Los Angeles able to receive 125,000 dwt tankers which draw 51 feet.¹

Where channel depths are limiting, many countries have turned to offshore oil terminals for handling large tankers. The single point mooring system (monobuoy) has been well developed for the industry and except for the United States, is in use world-wide. There are slightly over 100 monobuoy installations in use throughout the world with some 13 or more on order for 1974 delivery.² In addition to monobuoys, other offshore facilities in use or being considered for use include: single point mooring piers, marginal piers and sea island terminals.³ All of these facilities require a pipeline to onshore storage facilities.

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- 1 See Appendix C.
 - 2 See Appendix D.
 - 3 See Appendix E.

2. Existing Facilities in California.

No existing California tanker terminal can accommodate conventional draft tankers larger than 138,000 dwt. This limit could be increased in the Los Angeles-Long Beach area to 150,000 dwt with minor dredging and expansion of onshore receiving facilities. The Port of Long Beach, with a dockside depth of 55 feet, could berth (3) 200,000 dwt tankers having a proposed wide-beam configuration.¹

Facilities at the Richmond Longwharf in San Francisco Bay allow berthing of light-loaded 130,000 dwt tankers. Because the sandbar outside the Golden Gate has a limited channel depth of 55 feet, 130,000 dwt tankers must be lightened before they proceed to Bay area refineries. The depth alongside Standard Oil's Richmond Longwharf is 38 feet and the channel to other oil company berths in the northern Bay is 35 feet.²

In addition to oil offloading facilities alongside piers, several offshore buoy moorings are in use along the California coast. There are presently 18 conventional buoy moorings (CBM's) off the coast ranging from Monterey Bay to near San Diego.³ Situated relatively close to shore, some CBM's have been in continuous use for over 40 years. These moorings, which range from 5 to 7 anchored buoys, serve both electrical utility companies and oil companies.

1 See Appendix F.

2 See Appendix G.

3 See Appendix H.

Some receive tankers which supply fuel oil to power plants, others berth tankers delivering crude oil to refineries.

The conditions offshore Southern California are well suited for CBM's. The maximum size tanker which can be routinely moored at a CBM is 130,000 dwt. Two moorings at El Segundo receive these tankers which supply Standard Oil's large Southern California refinery. If placed in slightly deeper water and with fortified buoy anchoring, CBM's off California could accommodate 150,000 dwt tankers.

3. Events in California that Influence the Need for Deepwater Ports.

According to current plans, oil produced on Alaska's North Slope will be carried to West Coast ports by tankers ranging up to 150,000 dwt. While this size tanker is not properly considered a "supertanker", it still carries approximately one million barrels of oil. Several member companies of the Alyeska consortium, who will bring Alaskan oil to California starting in late 1977 or early 1978, have stated a desire to use tankers larger than 200,000 dwt for this trade. One company would use tankers as large as 260,000 dwt if facilities were provided.¹ Presently only Los Angeles and Long Beach berths are deep enough to accommodate the 120,000-130,000 dwt tanker.

In addition to facilities for Alaskan deliveries, there is a continuing requirement for imported low-sulfur crude oil from Indo-

1 See Appendix I.

nesia. Because of the distance involved, there would be an incentive to use large tankers and deepwater ports would be required for their accommodation.

4. Projected Imports of Crude Oil.

Several state agencies, private consulting firms, and oil companies have projected the crude oil import levels for 1985. Although there are many uncertainties in the price of foreign crude, degree of domestic production, energy conservation measures and utility company requirements for power plant fuel, a reasonable level seems to be 2.0 million barrels per day.¹

With 90% of the ultimate 2.0 million barrels per day headed for California from the North Slope, it appears that the State's increased petroleum import needs can be met by this source. Until Middle East imports are "backed-out" and the deficit filled by the Alaskan oil beginning late 1977, foreign imports could continue to be delivered by two-porting² tankers or by offshore lightering³ operations.

Transportation of low-sulfur crude from Indonesia could be accomplished in medium sized tankers with a minimal increase in consumer prices. Larger vessels used in this trade could be two-ported or lightered offshore.

1 See Reference 2.

2 Partial off-loading at a deepwater port - remainder off-loaded in a more shallow depth port.

3 Ferrying cargo ashore by use of barges or smaller vessels (See Appendix J).

5. Current Facilities and Proposals by Utility and Oil Companies for Expanded and New Facilities.

The Pacific Gas & Electric Company (PG&E) has plans to modify terminal facilities at the Morro Bay, Moss Landing, Pittsburg, and Antioch power plants in order to handle increased oil deliveries.

a. Morro Bay. Presently, oil is delivered in T2 tankers (16,000 dwt) and unloaded at a 5-point CBM which is 3,600 feet offshore in 55 feet of water. Application has been filed to increase the existing mooring to a 7-point CBM so that it can handle tankers up to 50,000 dwt. At a later date, PG&E plans to construct a mooring in deeper water to handle 130,000 dwt tankers.

b. Moss Landing. The present 5-point CBM is 3,600 feet offshore in 55 feet of water. An application is now pending for permits to build a new 7-point mooring 5,600 feet offshore in 90 feet of water to handle 130,000 dwt tankers.

c. Pittsburg and Antioch. There is presently a dock at Pittsburg which can accommodate 16,000 dwt tankers. Some oil is barged from Pittsburg to supply the Antioch plant. Plans are formulated to improve the Pittsburg dock to handle partially lightered tankers up to 70,000 dwt. Some 56,000 cubic yards of material will be dredged to provide a channel depth of 31 feet to the dock. After 1975, a 42 mile pipeline is planned for construction to deliver oil from Richmond to the Pittsburg and Antioch plants.

A marine terminal is also proposed near Benicia so that tankers can discharge additional quantities of oil into the 42 mile pipeline and so oil from the pipeline can be loaded into barges or tankers for transport to other San Francisco Bay area power plants.

d. Other PG&E power plants. The Potrero and Hunter's Point power plants will have oil delivered by barge from the Pittsburg dock. The Humboldt Bay plant has a dock in 30 feet of water where oil is delivered by ocean-going barge or small tanker.

The Southern California Edison Company has plans to improve tanker moorings and terminals at several of its power plants in the Southern part of the State.

a. Mandalay Generating Station. This CBM is 4,500 feet offshore from Oxnard in 45 feet of water. Modifications were completed in March 1974 to strengthen the facility making it a 7-point mooring capable of receiving light-loaded 70,000 dwt tankers.

b. Port Hueneme. The Company has 1,800 feet of dock space with a 35 foot depth alongside. Although some dredging is scheduled for the third quarter of 1974, the size of vessels which can be received is limited to 35,000 dwt. A pipeline from the dock supplies the Ormond Beach Generating Station which is 2½ miles away. The Company has reviewed alternative plans for an offshore deepwater port off Ormond Beach.

c. Terminal Island. The Company presently has throughput agreements with Texaco and Arco which permit the utilization of their dockside facilities. The berths have approximately 55 feet of water and can accommodate 135,000 dwt tankers. SoCalEd is currently reviewing alternative configurations for a dockside facility to be constructed in the Long Beach Harbor. The facility would be immediately adjacent to the Long Beach generating station and would receive 150,000 dwt tankers.

d. Huntington Beach. The generating station at this location is supplied through Gulf Oil Company's offshore 7-point CBM. The facility is 7,250 feet offshore in 55 feet of water and can handle 85,000 dwt tankers. There are no present plans to modify this mooring.

There are presently three proposals for liquified natural gas (LNG) receiving facilities in California.

a. Port Hueneme. Southern California Gas plans to deliver Indonesia natural gas in special LNG tankers to a marine terminal in the Port of Hueneme Harbor. A special offloading, pipeline and re-vaporization system will be required.

b. Terminal Island. Southern California Gas plans a similar facility in the Los Angeles Harbor where Alaskan Cook Inlet gas will be received. The LNG tankers which will be used draw 38 feet of water.

c. Point Conception. The El Paso Natural Gas Company plans to bring liquefied Alaskan North Slope gas to a 1,000 foot finger pier just south of Point Conception. This project depends on the approval of an Alaskan Gas pipeline to Valdez.

In addition to the dredging plans in Long Beach Harbor for 150,000 dwt tankers, the Port of Los Angeles is considering a proposal to build a marginal pier at the middle breakwater to accommodate tankers up to 250,000 dwt.¹

Standard Oil of California has plans to add 750 feet to the Richmond Longwharf in San Francisco Bay. This is being done to berth (2) 35,000 dwt and (2) 100,000 dwt tankers simultaneously. In place of the fully loaded 100,000 ton tankers, (2) 130,000 light-loaded tankers could be berthed.

Standard Oil also has the only proposal in the State to construct a true deepwater port. The Company plans a monobuoy 2.6 miles off the coast in Estero Bay in 150 feet of water. Here tankers ranging from 200,000 - 400,000 dwt would be offloaded. The crude oil would be piped 277 miles north to the Richmond refinery.²

1 See Appendix K.

2 See Appendix L.

6. Utilization of Existing Berths.

Most existing onshore tanker terminals are owned and operated by single companies or leased from port districts by single tenants. This restricts use of the facility and results in an under-utilization of the berth. An exception to this is the joint use by Mobil and Union Oil Companies of a berth in the Port of Los Angeles. Multi-company sharing of tanker terminals would improve overall efficiency and reduce the need for new or expanded terminals.

7. Economic Impact of Deepwater Ports.

Petroleum related industrialization generated by a deepwater port may increase employment and yield additional revenues and other economic benefits in some areas. A major issue surrounding the development of deepwater terminal facilities concerns the on-shore impacts from induced refining and petrochemical industrial growth.

A major factor in decisions to permit deepwater terminal facility development may be the readiness and ability of State and local jurisdictions to prepare and carry out comprehensive planning for land use and economic development.

Most sources agree that while not necessarily required from a technological point of view, there is significant economic incentive to locate petroleum transportation, processing and related

facilities in areas where such facilities or access to such facilities already exist.¹ Some degree of governmental controls will be necessary in order to minimize any possible adverse economic and environmental effects of this secondary growth. Public vs. private financing and ownership of deepwater ports and related facilities must be examined.

The future use of existing facilities and the siting of new tanker terminals will be influenced by several factors. Because of the many uncertainties, petroleum imports in California will be affected by the following:

- a. Increased California domestic oil production.
- b. The extent of Alaskan North Slope reserves.
- c. Plans for OCS drilling in Southern California.
- d. Increased oil prices.
- e. Reduction in consumer demands through energy conservation measures.
- f. Development of alternative energy sources.
- g. California's regional (PAD V) energy role.
- h. Plans to transship Alaskan oil through California to the Midwest.
- i. A proposal in the State of Washington to build up a petroleum industry and supply California.
- j. The national energy policy (i.e. self sufficiency by 1980).

1 See Reference 3.

k. Future refinery capacities.¹

8. Environmental Impact of Deepwater Ports.

The major direct environmental effects of a deepwater port facility include those related to:

- a. Siting and constructing the port facility.
- b. Potential oil spillage during transfer operations.
- c. Potential oil spillage resulting from vessel casualties.
- d. Rupture of port-to-shore pipeline due to earth movements, anchor dragging, etc.

The actual number and type of terminals used, and the associated facilities, such as pipelines, storage areas and new refineries, will determine the extent of the above impacts. Although specific sites will have unique environmental conditions, there are certain impacts that will attend deepwater port construction regardless of location.²

Estuaries and coastal wetlands, the most biologically productive areas of the marine ecosystem, are probably the most environmentally sensitive to impacts of deepwater port development. The type of oil, the size of the spill and the distance from shore plays

1 See Appendix M.

2 See References 3-5, Appendix N.

a significant role in determining what the total impact on estuaries and wetlands might be.

Nearly all forms of marine life in the vicinity of a deepwater port facility are affected to some degree by its construction and operation. The greatest threat to marine life other than cyclical water temperature changes is from oil spills that may occur through accidental discharge or tanker casualties along coastal areas or estuaries. Properly located terminals would lower this environmental risk.

Regardless of the source and size of an oil spill, several effects on marine organisms are of concern:

- a. Immediate lethal toxicity.
- b. Lethal or sublethal effects of direct coating by oil.
- c. Altered behavioral activities.
- d. Chronic effects on physiology and reproduction processes.
- e. Incorporation of aromatic hydrocarbons into the food chain.
- f. Changes in habitat, especially for attached organisms, due to the deposition of oil on rocks or sediment.

Deepwater port operations affect water quality due to dredging operations and tanker movement; air quality from evaporated oil spills and associated refinery operations; and beaches and recreational activities from oil spills.

9. Improvements in Tanker Design.

Technological advances have been made that improve safety features and make tanker operations less hazardous. The Coast Guard reports that the following design features reduce the risk of oil spills:¹

- a. "Load-on-top" allows oil and water to be effectively separated and reduces the flushing of oil into the ocean.
- b. Segregated ballast tanks keeps oil and water separated.
- c. Double hulls and bottoms safeguard against tank pucture.
- d. Twin propellers and rudders assist in ship handling.
- e. Auxiliary power backs up main engines in emergency situations.

A bill pending in the U. S. Congress requires that a certain percentage of all oil imported into the United States be carried in U. S. flag tankers. The Senate version of the bill requires additional environmental safeguards on new U. S. tankships including double bottoms.²

10. Lack of an Oil Spill Damage Fund in California.

The State of California has no funding program to guard against or pay the cost of oil spill damage. Other states have instituted

1 See Appendix O.

2 See Reference 6.

a per-barrel levy to offset spill damage. The State of Maine has imposed a half-cent levy on each barrel of oil landed by tanker and Alaska will impose a four-cent per barrel tax on oil leaving the Port of Valdez. This money is earmarked for oil spill prevention measures and clean-up operations.

11. Governmental Agencies Having Authority Over Activities Related to Deepwater Ports.

Several State agencies in California have an interest in deepwater port activities.¹ However, there is no central coordination point in our State government with respect to these issues. The primary agencies which have responsibility in the area include:

- a. State Lands Commission,
- b. Coastal Zone Conservation Commission,
- c. Department of Transportation,
- d. Department of Navigation and Ocean Development,
- e. Department of Fish and Game, and
- f. Department of Commerce.

12. Deepwater Port Activities in Other Coastal States.

In the course of evaluating and formulating policies toward deepwater port development, several coastal states have established special agencies and have conducted studies to assess potential

¹ See Appendix P.

port-generated economic and environmental impacts. The States of Massachusetts, New Jersey, Delaware, Mississippi, Alabama, Louisiana, Texas, Washington, and the New England Regional Commission and the Coastal Plains Regional Commission have all appropriated substantial amounts of money to conduct studies on deepwater oil facilities.¹ In most cases such studies have concluded that substantial economic benefits will accrue to the state if environmental and secondary growth impacts are effectively controlled.

1 See Appendix Q.

POLICIES:

1. Encourage the Use of U. S. Built Tankers for Oil Delivery to California.

Because modern tanker design can reduce the probability of oil spills, California oil importers should be encouraged to use U. S. built ships or foreign built tankers which have:

- a. "Load-on-Top" capabilities.
- b. Segregated ballast tanks.
- c. Double bottoms.
- d. Twin propellers and rudders.
- e. Auxiliary power system.

The California Legislature should support Federal Legislation that requires 20% of all oil imported into the United States to be carried in U. S.-flag tankers. The U. S. Senate version of the bill requires double bottoms on all new U. S. built tankships. This is a very important measure as all of the Alaskan North Slope oil coming to California must be carried in U. S.-flag ships.

2. Establish State Oil Spill Plan and Import Fee Program.

A rigorous Oil Spill Contingency Plan should be adopted for the State. The current Department of Fish and Game plan should be amplified to include specific responsibilities. New Coast Guard regulations which went into effect on July 1, 1974 should be considered in the plan.

To ensure that all oil spill damages and clean-up costs are settled, the State should require that tanker owners and terminal operators assume strict liability. To guarantee funds for coastal zone protection, a Petroleum Import Fee Program should be established which would levy a per-barrel fee on oil entering the State. Alaska will impose a four cent per-barrel tax on oil shipped from Valdez. California should do no less to offset the cost of oil spill prevention and clean-up.

3. Encourage Development of the Coast Guard Vessel Traffic System (VTS).

The State should require that a Vessel Traffic System be commissioned for all ports in California where there is substantial tanker traffic. The Coast Guard estimates a 7% reduction in collisions, rammings, and groundings in San Francisco Bay through the use of this radar system.¹

4. State Should Take an Active Role in Deepwater Port Planning.

California is lagging behind the rest of the nation's coastal states in deepwater port planning. With over 1,000 miles of coastline and one-tenth of the nation's population, our State should do no less than others in insuring that an adequate supply of oil is

1 See Appendix P, Page 85.

received while proper safeguards are taken to protect the environment.

5. California Should Become Actively Involved in Coastal State Symposia Related to Deepwater Ports.

Appropriate steps should be taken to join Coastal State Organizations related to deepwater ports and thereby have a voice in these national forums. At the 1974 annual meeting of the Coastal States Organization, held in Washington, D. C., the topic of Deepwater Ports was the principal item on the agenda.¹

1 See Appendix R.

REFERENCES CITED

1. Kupree, W. G. and West, J. A. United States Department of Interior. United States Through the Year 2000. December 1972.
2. Stanford Research Institute. Meeting California's Energy Requirements, 1975-2000. 1973.
3. Reed, C. S. Deepwater Port Policy Issues. U. S. Senate Committee on Interior and Insular Affairs. July 1974.
4. Porricelli, J. D. et al. Tankers and the Ecology. Soc. Naval Architects and Marine Engineers. No. 4, November 1971.
5. Porricelli, J. D. and Keith, V. F. Tankers and the U. S. Energy Situation - An Economic and Environmental Analysis. Intersociety Transportation Conference. Denver, Colorado. September 1973.
6. U. S. Senate Bill S.2089, 93rd Congress, June 27, 1973.

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WORLD TANKER FLEET

Year	<u>Vessel Size in Thousands of DWT</u>							Total No. of Vessels
	10 - 60	60 - 80	80 - 100	100 - 150	150 - 200	200 - 250	Over 250	
1963	2608	23	15	4				2650
1964	2588	38	26	4				2656
1965	2574	77	48	5				2704
1966	2567	136	65	14				2792
1967	2544	198	86	34	1	1		2864
1968	2510	229	110	59	8	2		2918
1969	2479	244	142	83	16	16	2	2982
1970	2426	243	157	96	31	54	9	3016
1971	2406	245	163	112	35	113	18	3092
1972	n.a.							
1973	n.a.							

n.a. = not available.

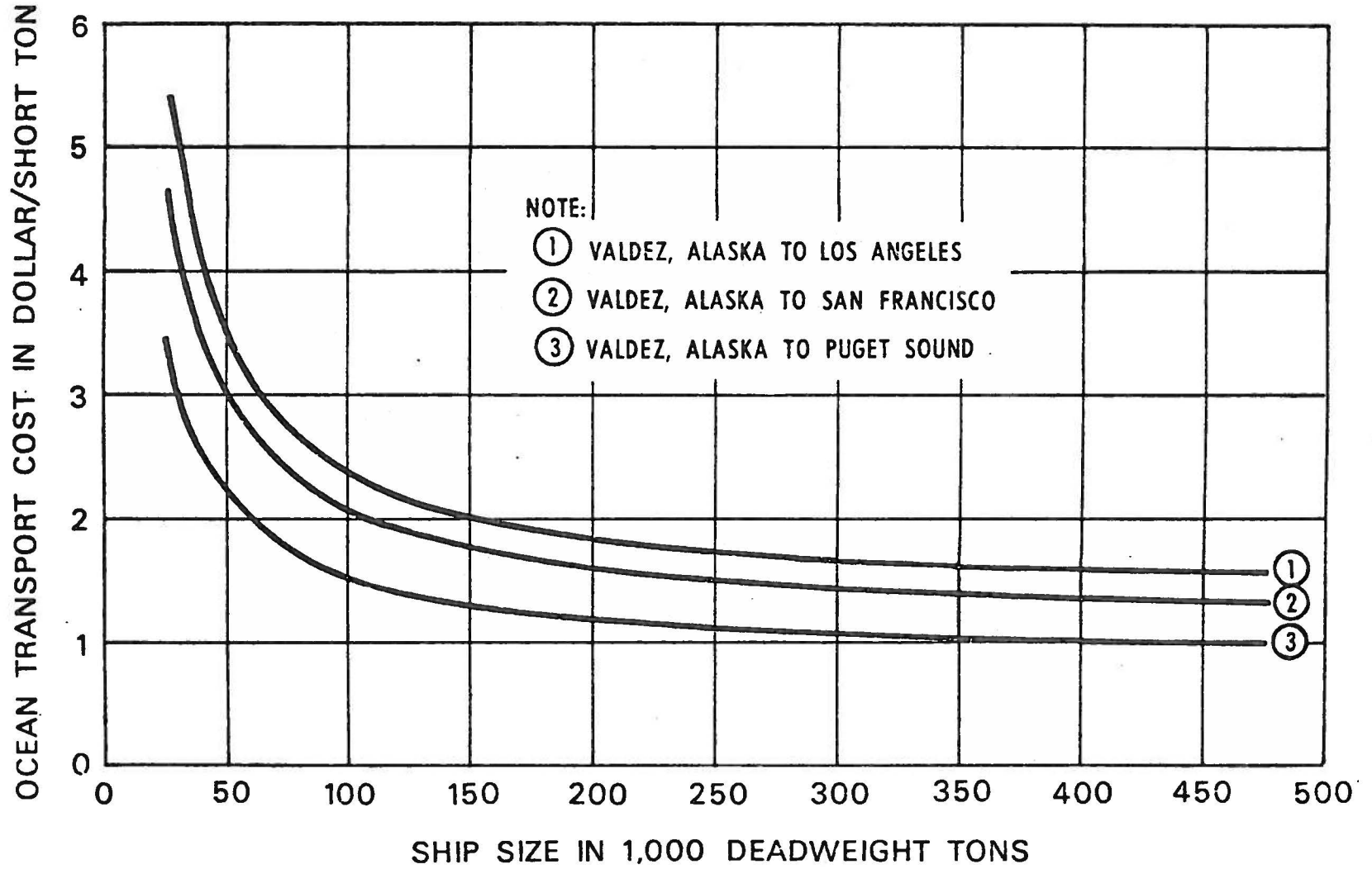
Source: Fearnley & Egers Chartering Co. Ltd., Large Tankers, January 1971 (Oslo, June 1971), and Review 1971 (Oslo, January 1972).

TRANSPORTATION COSTS

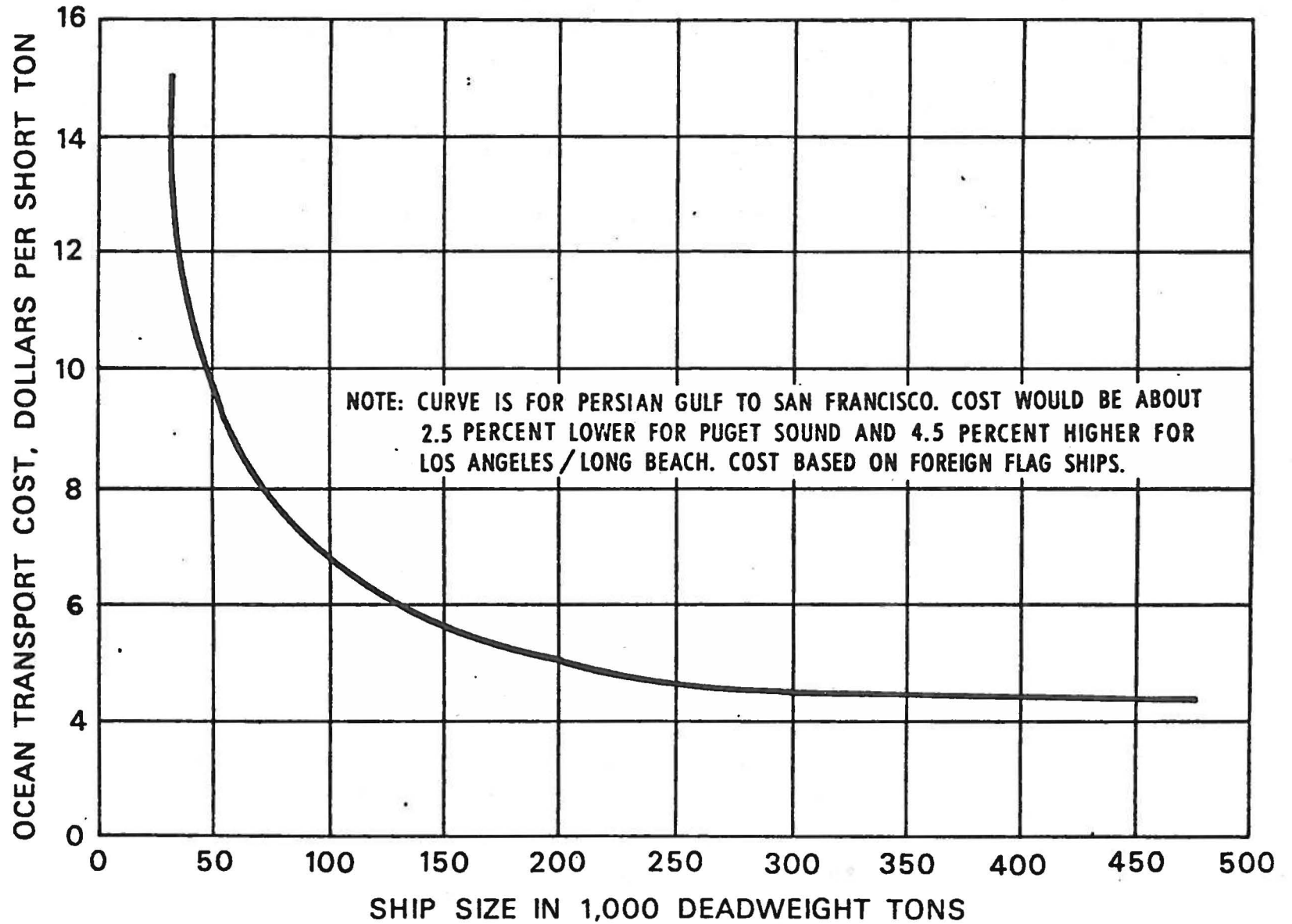
Freight Cost in Dollars Per Ton

Ship Size in DWT	<u>Round-trip Distance in Miles</u>		
	4,000	8,000	24,000
65,000	\$1.90	\$3.50	\$9.05
250,000	1.40	2.50	6.55
326,000	1.25	2.30	6.15
500,000	1.00	1.90	5.45

Source: Corps of Engineers



CRUDE PETROLEUM TRANSPORT COST FOR VARIOUS SIZE TANKERS FROM ALASKA TO WEST COAST PORTS.



CRUDE PETROLEUM TRANSPORT COST VERSUS SIZE OF SHIP,
MIDDLE EAST TO WEST COAST.

VESSEL DRAFT vs TONNAGE

<u>DWT (x 1000)</u>	<u>MEDIAN DRAFT (feet)</u>	<u>DRAFT RANGE (feet)</u>
25	34.5	32.0 - 36.5
30	35.0	33.0 - 37.5
35	36.0	34.0 - 38.5
40	37.0	35.0 - 39.5
45	38.0	35.5 - 40.5
50	39.0	36.5 - 41.5
55	40.0	37.0 - 42.5
60	41.0	38.0 - 43.0
65	41.5	39.0 - 44.0
70	42.5	40.0 - 45.0
75	43.5	40.5 - 46.0
80	44.0	41.0 - 46.5
85	45.0	42.0 - 47.5
90	45.5	42.5 - 48.0
95	46.5	43.5 - 49.0
100	47.5	44.0 - 50.0
110	49.0	45.5 - 51.5
120	50.0	47.0 - 53.0
130	52.0	48.5 - 54.5
140	53.0	50.0 - 56.0
150	54.5	51.5 - 57.5
160	56.0	52.5 - 59.0
170	57.0	54.0 - 60.0
180	58.0	55.0 - 61.0
190	59.5	56.5 - 62.5
200	61.0	58.0 - 64.0
220	63.0	60.0 - 66.5
240	66.0	62.0 - 69.0
260	68.0	64.5 - 72.0
280	70.0	66.5 - 74.0
300	73.0	69.0 - 77.0
350	78.5	74.0 - 83.0
400	84.5	79.5 - 88.5
450	89.5	84.5 - 94.0
500	94.5	89.5 - 99.5

Source: Army Corps of Engineers. West Coast Deepwater Port Facilities Study. Appendix C. June 1973.

SUMMARY OF INSTALLED OR PLANNED
SINGLE POINT MOORING INSTALLATIONS

No.	Year Installed	Country	Port	Owner	Designer	Max. Vessel Size
1*	1959	Sweden	Dolaro	Swedish Navy	IMODCO	3,000
2	1960	Malaysia (Sarawak)	Miri	Shell	SBM	45,000
3*	1961	Italy	Ravena	SAROM	IMODCO	75,000
4	1961	Japan	Niiagata	Shell	SBM	65,000
5	1961	Spanish Sahara	El Aaiun	CEPSA	IMODCO	5,000
6	1962	Germany	Cuxhaven	West German Navy	IMODCO	2,500
7*	1962	Italy	Fiumicino	Purфина	IMODCO	65,000
8*	1962	Libya	Brega	Esso	Esso, F. R. Harris	100,000
9*	1963	Japan	Oita	Kyushu Oil	IMODCO	100,000
10	1963	Malaysia	Port Dickson	Shell, Esso	SBM	90,000
11	1963	Spanish Guinea	Bata	CEPSA	IMODCO	20,000
12*	1964	Italy	Fiumicino	Purфина	Dalmine	100,000

*See Notes

Source: U. S. Department of Interior. Environmental Impact Statement,
Deepwater Ports. April 1974.

No.	Year Installed	Country	Port	Owner	Designer	Max. Vessel Size
13	1964	Japan	Yokkaichi	Shell	Mitsubishi	120,000
14	1964	Japan	Yokkaichi	Shell	Mitsubishi	200,000
15	1964	Malaysia	Miri	Shell	SBM	45,000
16*	1964	Malaysia	Miri	Shell	SBM	65,000
17*	1965	England	Nore Estuary	British Pet.	B.P. Harlan Wolff	100,000
18	1965	Gabon	Gamba	Shell	SBM	100,000
19	1965	Japan	Chiba	Maruzen Oil	IMODCO	120,000
20*	1965	Libya	Es Sider	Oasis Oil	SBM	100,000
21*	1965	Qatar	Halul	Shell	SBM	200,000
22	1966	Korea	Ulsan	Gulf	IMODCO	75,000
23	1966	Oman	Mina Al Fahal	Shell	SBM	225,000
24	1966	Oman	Mina Al Fahal	Shell	SBM	225,000
25	1967	Bangladesh	Chittagong	Chittagong Port Auth.	IMODCO	45,000
26	1967	Japan	Koshiha	U.S. Navy	IMODCO	100,000
27	1967	Kuwait	Ras Al Kaffje	Arabian Oil	McDermott	150,000
28*	1967	Nigeria	Apapa	Nidogas	IMODCO	4,500

* See Notes

No.	Year Installed	Country	Port	Owner	Designer	Max. Vessel Size
29*	1967	Oman	Mina Al Fahal	Shell	SBM	100,000
30	1967	Philippines	Subic Bay	U.S. Navy	IMODCO	108,000
31	1967	Spain	Huelva	Gulf	SBM	100,000
32*	1967	Taiwan	Tai-Chung	U.S. Army	IMODCO	50,000
33*	1967	USA (Louisiana)	Gulf Coast	Kerr-McGee	McDermott	8,000
34	1968	Angola	Cabinda	Gulf	SBM	100,000
35	1968	Egypt	Ras-el-Shaqiq	WEPCO	SBM	100,000
36	1968	Japan	Hakozaki	U.S. Navy	IMODCO	100,000
37	1968	Japan	Kawasaki	Showa-Mitsubishi Oil	Mitsubishi	250,000
38	1968	Japan	Hakodate	Asia Oil	IMODCO	35,000
39	1968	Japan	Yokkaichi	Daikyo Oil	Mitsubishi	200,000
40	1968	Korea	Yosu	Honom Oil, Caltex	IMODCO	100,000
41	1968	Korea	Ulsan	Korea Oil	IMODCO	200,000
42	1968	Libya	Zuetina	Occidental	SBM	100,000
43	1968	Nigeria	Escravos	Gulf	IMODCO	100,000

* See Notes

No.	Year Installed	Country	Port	Owner	Designer	Max. Vessel Size
44	1968	Taiwan	Kaohsiung	Chinese Pet.	IMODCO	100,000
45*	1968	Taiwan	Tai-Chung	U.S. Air Force	IMODCO	75,000
46	1968	Venezuela	Moron	CVP	SBM	100,000
47	1969	Brazil	Tramandai	Petrobras	SBM	105,000
48	1969	Japan	Toyama	Japan Sea Oil	IMODCO	150,000
49	1969	Japan	Yokohama	Asia Oil	Mitsubishi	200,000
50*	1969	Libya	Brega	Esso	Esso, Van Houten	300,000
51	1969	Libya	Zuetina	Occidental	SBM	150,000
52	1969	Libya	Zuetina	Occidental	SBM	150,000
53	1969	Nigeria	Forcados	Shell, B.P.	SBM	240,000
54	1969	Nigeria	Forcados	Shell, B.P.	SBM	240,000
55*	1969	S. Vietnam	TanMy	U.S. Navy	McDermott	20,000
56	1969	United Arab Emirates	Dubai	Continental	SBM	150,000
57	1970	Argentina	Puerto Rosales	YPF	IMODCO	40,000
58	1970	Canada	Saint John, N.B.	Irving Oil	SBM	350,000
59*	1970	Indonesia	Pangkalan Susu	Pertamina	IMODCO	100,000

* See Notes

No.	Year Installed	Country	Port	Owner	Designer	Max. Vessel Size
60*	1970	Iran	Cyrus Field	IPAC	SBM	130,000
61	1970	Iran	Iman Hassan	SIRIP/AGIP	IMODCO	150,000
62	1970	Israel	Ashkalon	Elat-Ashkalon Pipeline		65,000
63	1970	Japan	Atsumi	Chubu Electric	Mitsubishi	200,000
64	1970	Japan	Hemeji	Idemitsu Oil	IMODCO	220,000
65	1970	Japan (Okinawa)	Nakagusuku Bay	Toyo Oil, Caltex	IMODCO	100,000
66	1970	Japan (Okinawa)	Tengan	U. S. Army	IMODCO	55,000
67	1970	Japan	Toyama	Nihonkai Oil	IMODCO	100,000
68	1970	Japan	Ube	Seibu Oil	Mitsubishi	200,000
69*	1970	Libya	Es Sider	Oasis Oil	SBM	255,000
70	1970	Libya	Ras Lanuf	Mobil	SBM	300,000
71	1970	Morocco	Mohammedia	RAPC	IMODCO	100,000
72	1970	Singapore	Singapore	Esso	IMODCO	250,000
73	1970	South Africa	Durban	Shell	SBM	200,000
74	1971	Australia	Botany Bay	Maritime Services Board	SBM	120,000
75	1971	Brazil	Tramandai	Petrobras	SBM	200,000

* See Notes

No.	Year Installed	Country	Port	Owner	Designer	Max. Vessel Size
76	1971	Brunei	Seria	Shell	SBM	250,000
77	1971	Chile	Quintero Bay	ENAP	SBM	209,000
78	1971	Indonesia	Balikipappan	Union Oil	SBM	250,000
79	1971	Indonesia	Java Sea	ARCO	McDermott	45,000
80	1971	Indonesia	Java Sea	IIAPCO	IMODCO	55,000
81	1971	Italy	Porto Torres	Sardoil	SBM	255,000
82*	1971	Japan (Okinawa)	Nakagusuky Bay	Esso	Esso Van Houten	250,000
83*	1971	New Zealand	Waipipi Point	Marcona Corp.	IMODCO	75,000
84	1971	Nigeria	Qua Iboe	Mobil	IMODCO	255,000
85*	1971	Norway	North Sea	Phillips	SBM	150,000
86*	1971	Norway	North Sea	Phillips	SBM	60,000
87	1971	Taiwan	Kaohsiung	Chinese Petroleum	SBM	250,000
88	1971	United Kingdom	Humber River	Continental	SBM	210,000
89	1972	Dominican Republic	Santo Domingo	Shell	SBM	-
90	1972	United Arab Emirates	Das Island	BP	IMODCO	300,000

* See Notes

No.	Year Installed	Country	Port	Owner	Designer	Max. Vessel Size
91	1972	Ecuador	Porto Baleo	Gulf/Texaco	SBM	100,000
92	1972	Ecudor	Porto Baleo	Gulf/Texaco	SBM	250,000
93	1972	Indonesia	Java Sea	ARCO	IMODCO	145,000
94	1972	Kuwait	Ras al Kaftje	Arabian Oil	McDermott	250,000
95	1972	New Zealand	Tahora	N.Z. Steel Corp.	IMODCO	70,000
96	1972	Nigeria	Escravos	Gulf	SBM	326,000
97	1972	Qatar	Halul	Shell	McDermott	300,000
98	1972	Qatar	Um Said	Qatar Pet. Co.	IMODCO	300,000
99	1972	Saudi Arabia	Zuluf	ARAMCO	SBM	250,000
100	1972	Saudi Arabia	Zuluf	ARAMCO	SBM	250,000
101	1972	Tanzania	Dar es Salaam	E. African Port Auth.	SBM	100,000
102	1972	Trinidad	Galiota Pt.	AMOCO	SBM	250,000
103	1972	United Arab Emirates	Dubai	Dubai Pet.	McDermott	300,000
104	1972	Spain	Amposta	Shell	SBM	60,000
105*	1972	Italy	Genoa	Port Authority	CIDONIO	500,000
106	1972		North Sea	Gulf	SBM	60,000
107	1972	Tunisia	Gulf of Gabes	Aquitaine	SBM	-

* See Notes

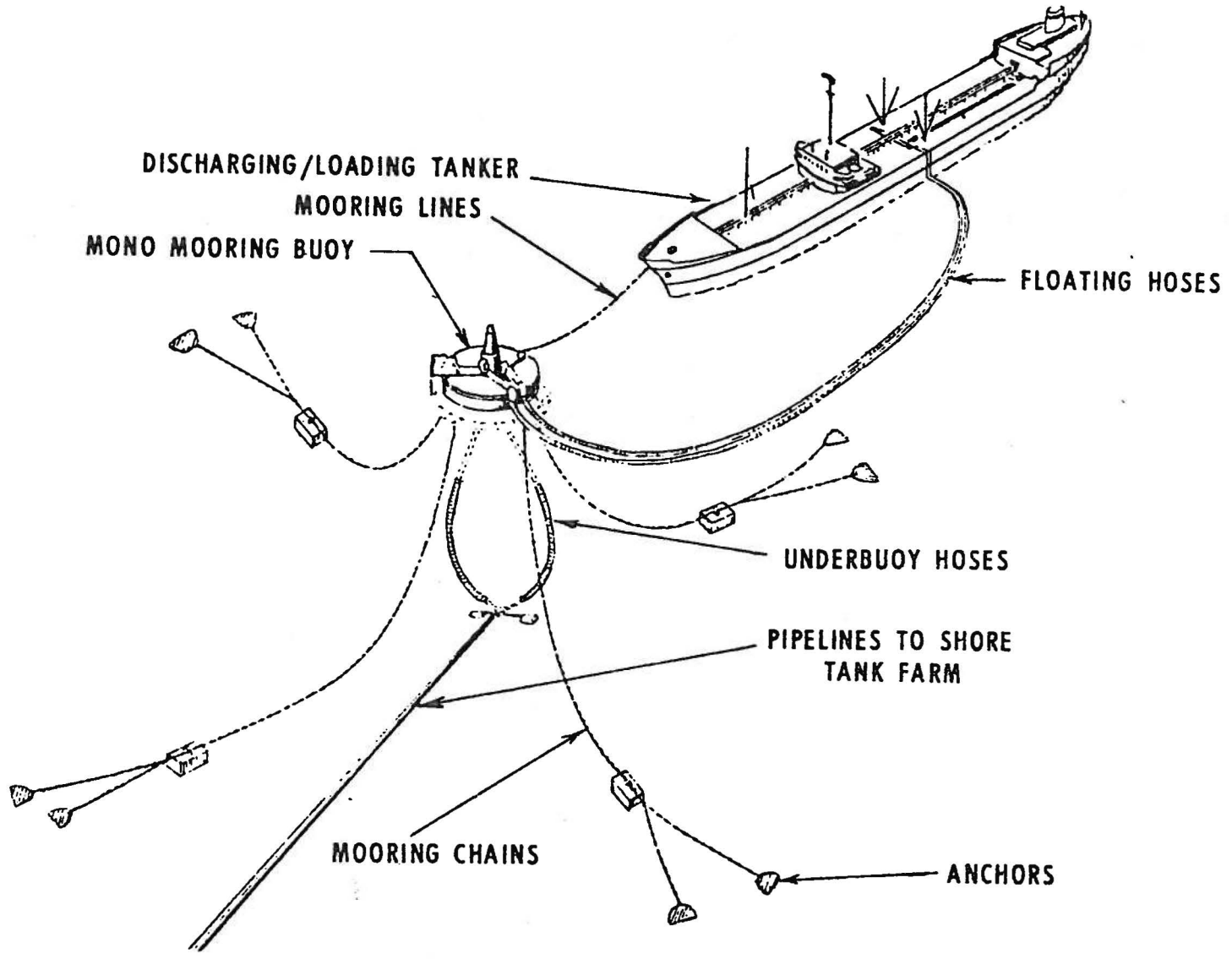
No.	Year Installed	Country	Port	Owner	Designer	Max. Vessel Size
108	1972	England	North Sea	Shell	SBM	50,000
109	1972	England	North Sea	Shell	SBM	50,000

* See Notes

SINGLE POINT MOORING INSTALLATIONS

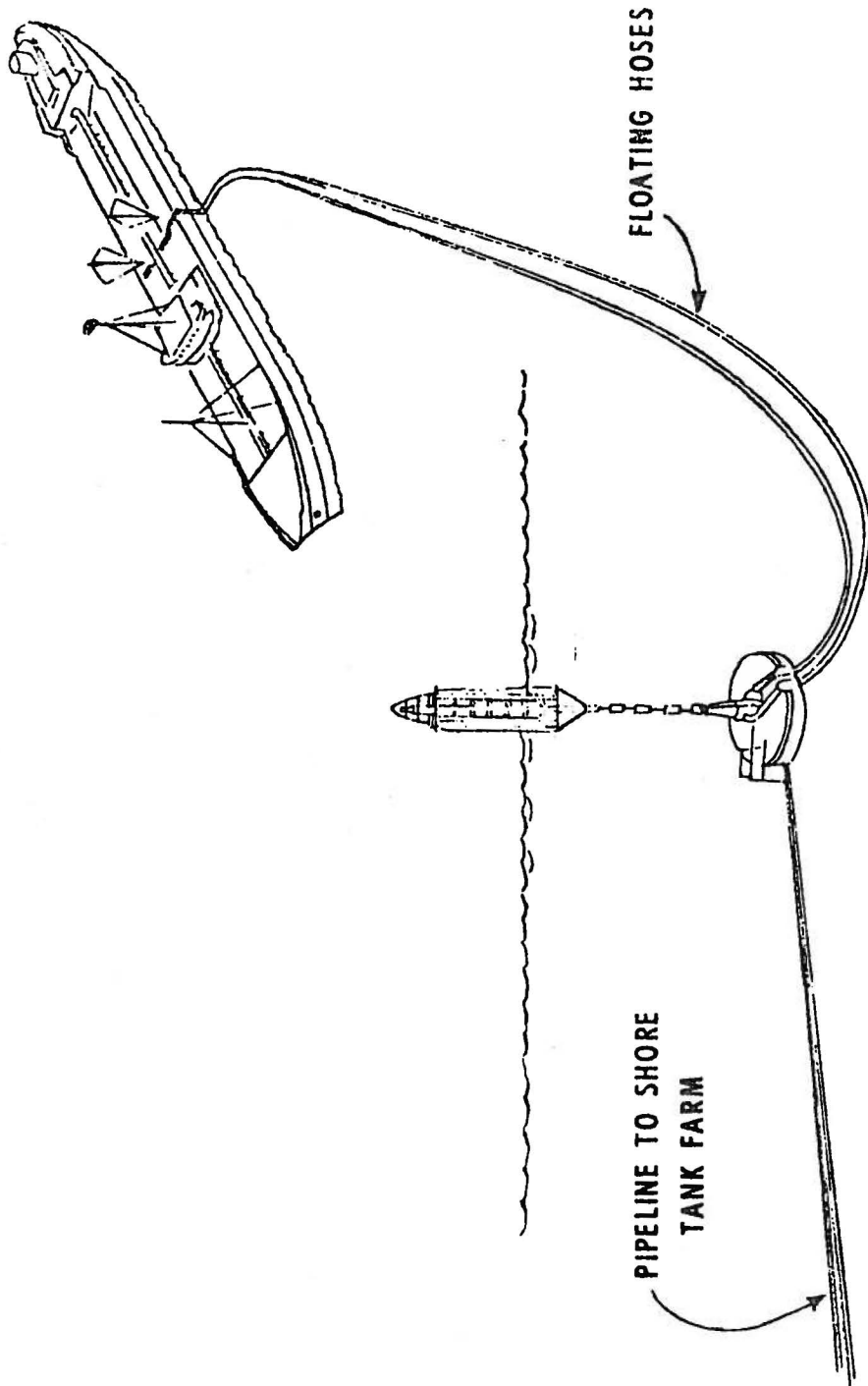
NOTES

- 1 Out of service
- 3 Out of service, now used as part of multi-buoy berth
- 7 Out of service
- 8 Fixed mooring tower, underwater loading arm
- 9 Out of service, transferred to 59
- 12 Fixed mooring tower
- 16 An extra buoy was furnished to replace 2, 15 and 16 for maintenance.
- 17 Experimental, 4 taunt anchor legs, out of service
- 20 Out of service, replaced by 69
- 21 Storage vessel, out of service
- 28 Liquid petroleum gas facility
- 29 To be replaced in 1973 by SPM designed for 500,000 dwt
- 32 Out of service, replaced by 45 designed for larger vessel
- 33 Storage barge, out of service
- 45 Out of service
- 50 Single anchor leg mooring
- 55 A second buoy was delivered for installation but was not installed
- 59 Transferred from 9
- 60 Storage vessel Pazagrad
- 69 Replaces 21
- 82 Single anchor leg mooring

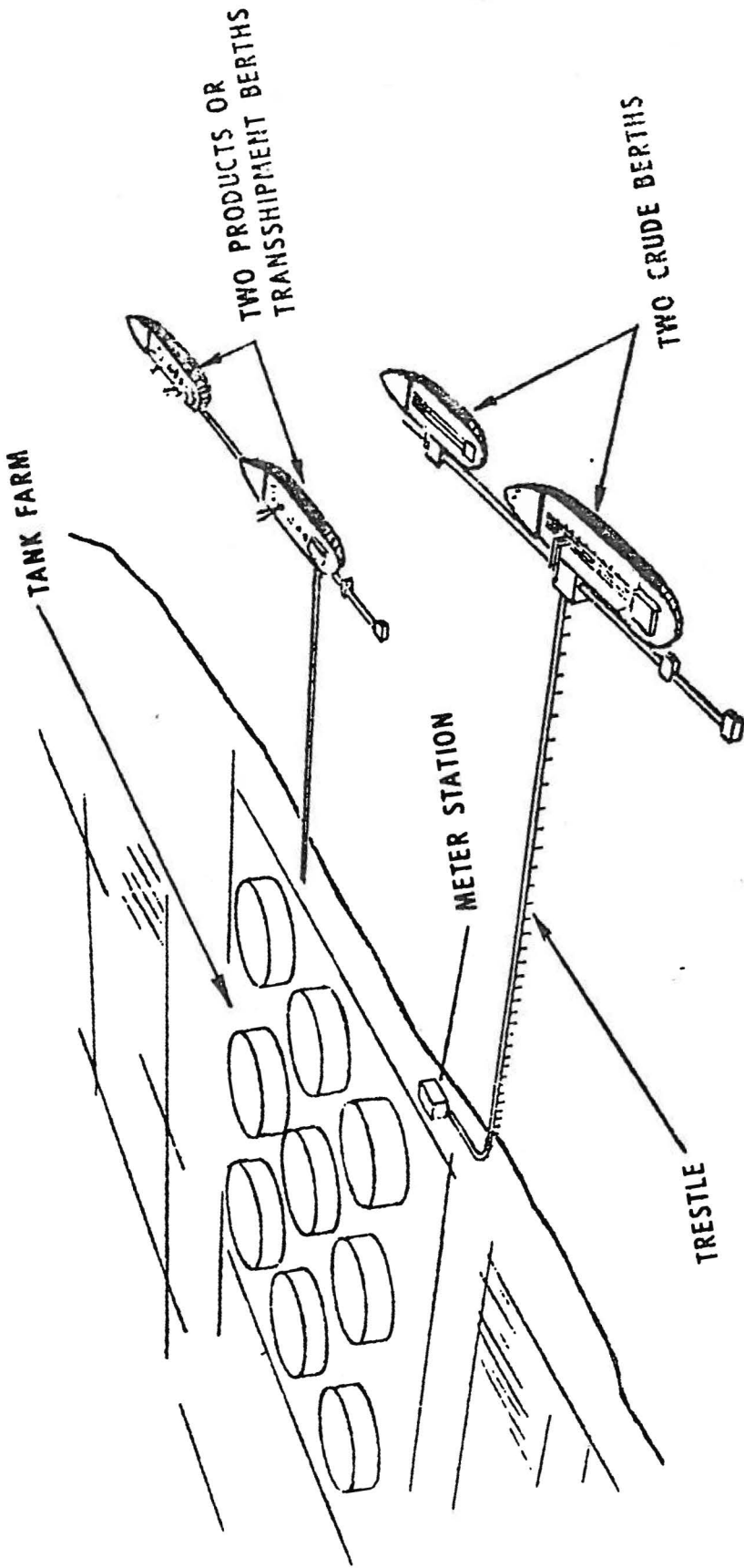


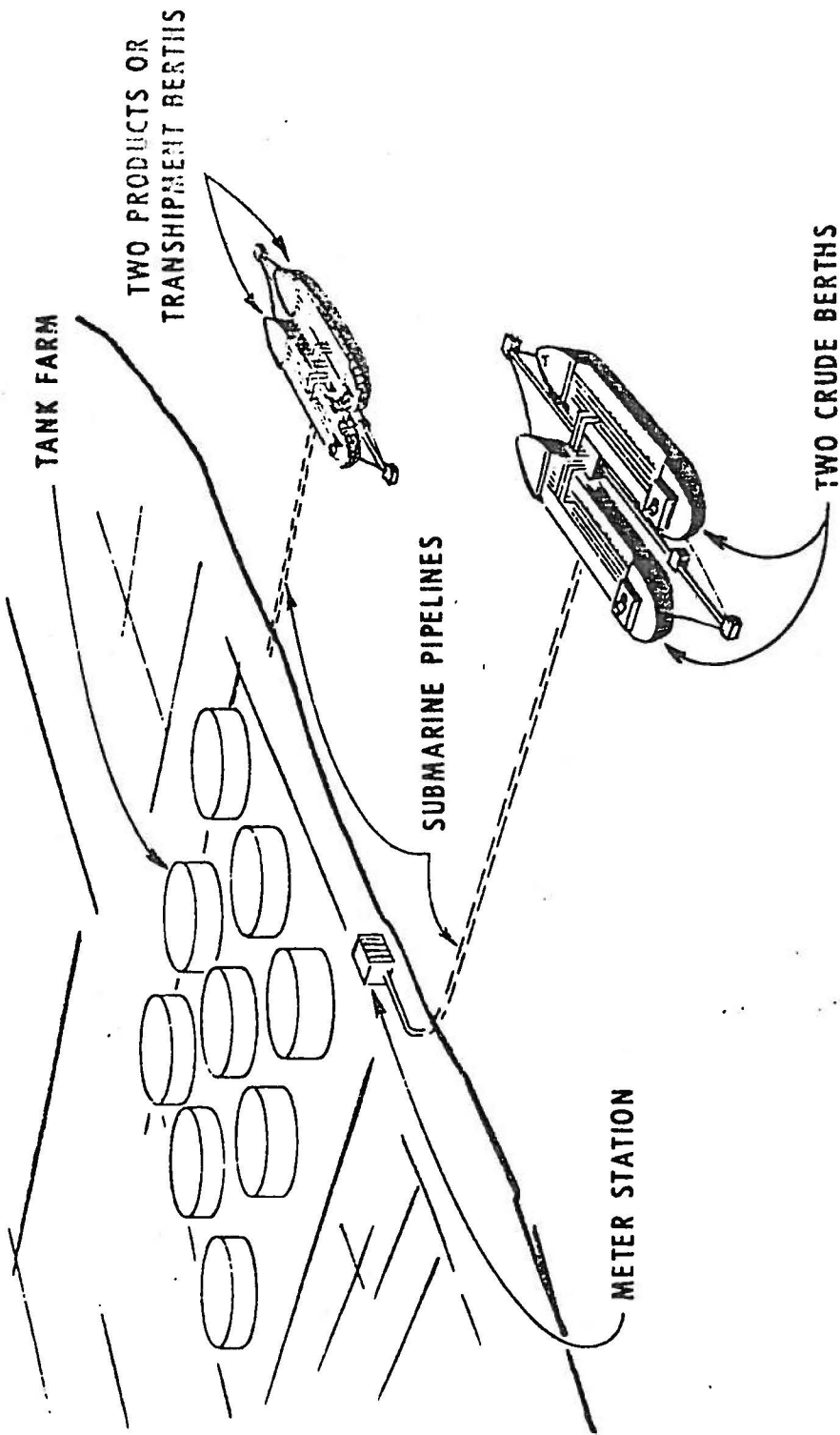
SINGLE POINT MOORING FACILITY.

Source: U. S. Department of Interior. Environmental Impact Statement, Deepwater Ports. April 1974.



SINGLE ANCHOR LEG MOORING.





SEA ISLAND.

DESCRIPTION OF EXISTING RECEIVING FACILITIES

Los Angeles/Long Beach Area. There are fifteen refineries within the Los Angeles-Long Beach region, twelve of which presently receive some waterborne crude oil; of these, two are supplied through separate marine terminals, while the others use terminals within Los Angeles and Long Beach Harbors. These receiving facilities are shown on the following map and discussed in the following paragraphs.

Los Angeles Harbor. The Union Oil Company of California and the Mobil Oil Company receive crude oil at a wharf in the outer harbor. The controlling channel depth is about 50 feet. The maximum vessel that can be handled fully loaded is on the order of 100,000 dwt; vessels as large as 120,000 dwt have been handled, light-loaded. Under favorable conditions, vessels as large as 210,000 dwt could be handled, light-loaded.

The Mobil Oil Company also receives crude oil at two berths along the east side of the Main Channel, about one mile inside the entrance from the outer harbor. The controlling channel depth is about 35 feet. This facility presently handles vessels on the order of 32,000 dwt, fully loaded.

The Carson-Golden Eagle and Edgington Oil Companies receive crude oil at a wharf on the northeast side of Slip 1, beyond the turning basin at the head of the Main Channel. The controlling

channel depth is, as at all inner harbor berths, about 35 feet. Vessels of 40,000 dwt, fully-loaded, now use the facility.

The Shell Oil Company receives crude oil at a wharf along the southeast side of Slip 1. The controlling channel depth is 35 feet. The typical vessel is 27,000 dwt; but vessels of 62,000 dwt, light-loaded, have been received. Lightened vessels as large as 90,000 dwt could be accommodated.

The Douglas Oil Company (a subsidiary of the Continental Oil Company) and the MacMillan Oil Company receive crude oil at a wharf on the northerly side of the East Basin Channel in the inner harbor. The controlling channel depth is 35 feet. The typical vessels now using the facility are on the order of 45,000 dwt. Vessels as large as 120,000 dwt, light-loaded, have been received.

Long Beach Harbor. The Atlantic-Richfield Corporation receives crude at a 3-unit marginal wharf on the Terminal Island site (west side) of the Inner Harbor Entrance Channel. The controlling channel depth is about 55 feet. Vessels as large as 130,000 dwt, fully loaded, have been received and lightened vessels as large as 210,000 dwt could be accommodated. The Atlantic-Richfield Corporation also receives crude oil at a berth on the north side of Channel 2 in the inner harbor. The depth alongside is 42 feet. Vessels using this berth are on the order of 60,000 dwt fully loaded.

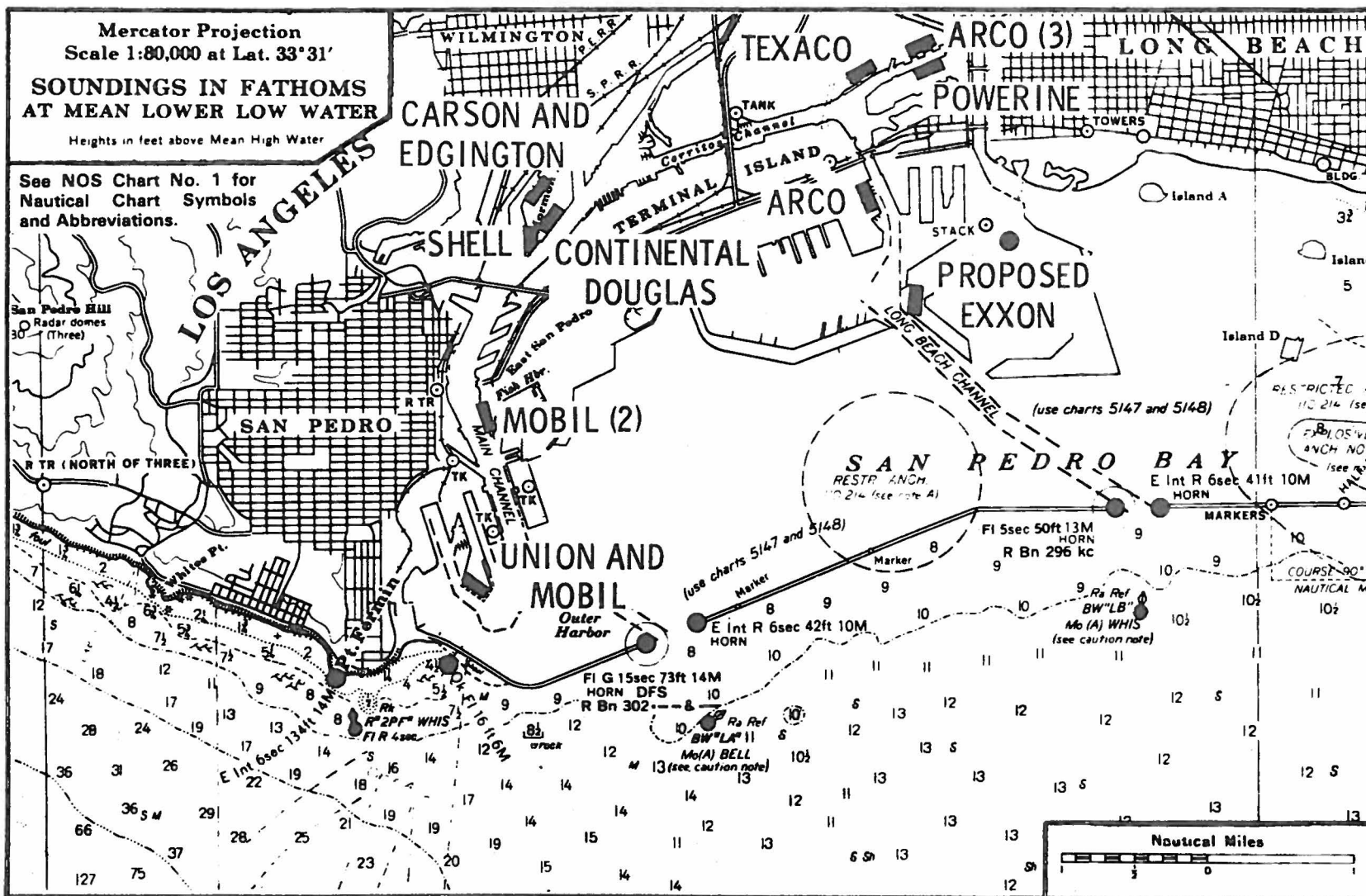
Texaco, Inc. receives crude oil at a wharf adjacent to the turning basin at the head of the Inner Harbor Entrance Channel. The controlling channel depth is about 55 feet. Vessels of 130,000 dwt, fully loaded, have been received and lightened vessels as large as 210,000 dwt could be accommodated.

The Powerine Oil Company receives crude oil at a berth on the north side of Channel 2. The depth alongside is about 36 feet. Vessels in the 40,000 dwt class are received, fully loaded, and 60,000 dwt vessels have been received, light-loaded.

El Segundo. The Standard Oil Company of California Refinery at El Segundo, the largest on the Pacific Coast of the United States, receives crude oil from a nearby marine terminal, located on the open coastline. Two crude oil berths (conventional buoy moorings) are connected by a 36-inch submarine pipeline to shore facilities. Depths at the berths range from 60 to 75 feet. Vessels of up to 130,000 dwt, fully loaded, have used the terminal and vessels up to 150,000 dwt, fully loaded, could be handled.

Huntington Beach. The Gulf Oil Corporation receives crude oil at a single berth (conventional buoy mooring). Connection to shore facilities is made by a 24-inch submarine pipeline, 1.3 miles in length. The depth at the berth is about 50 feet. The typical vessel is about 40,000 dwt, fully loaded; vessels as large as 75,000 dwt, fully loaded, have been received.

Source: Army Corps of Engineers. West Coast Deepwater Port Facilities Study. June 1973.



Vicinity Map of Los Angeles/Long Beach Harbor Showing Existing Petroleum Terminals.

Source: Battelle Pacific Northwest Laboratories. Environmental Assessment West Coast Deepwater Port Study. June 1973.

DESCRIPTION OF EXISTING RECEIVING FACILITIES

San Francisco Bay Area. There are six major refineries located in the San Francisco Bay Area. The receiving facilities serving these refineries are shown on the following map and discussed in the following paragraphs. The controlling depth of channels to these facilities is about 35 feet.

Standard Oil Company of California receives crude oil shipments primarily at the Richmond Longwharf. This facility is located approximately one and one-third miles northeast of Point Richmond and south of the Richmond-San Rafael Bridge. It has a length of 2,460 feet and can accommodate up to four tankers at one time. Tankers ranging in size from 17,000 dwt to 100,000 dwt have been unloaded; however, the facility could receive tankers of approximately 130,000 dwt (light-loaded).

Sequoia Refining Corporation (a part of Gulf Oil Corporation) receives crude oil shipments at a wharf located about one-half mile northwest of Davis Point in Contra Costa County. This facility has unloaded tankers up to 50,000 dwt. It could accommodate tankers of approximately 130,000 dwt (light-loaded).

Union Oil Company of California receives crude oil at an offshore wharf located at Davis Point, Oleum, California. This facility, which has a length of 1,250 feet, receives tankers ranging

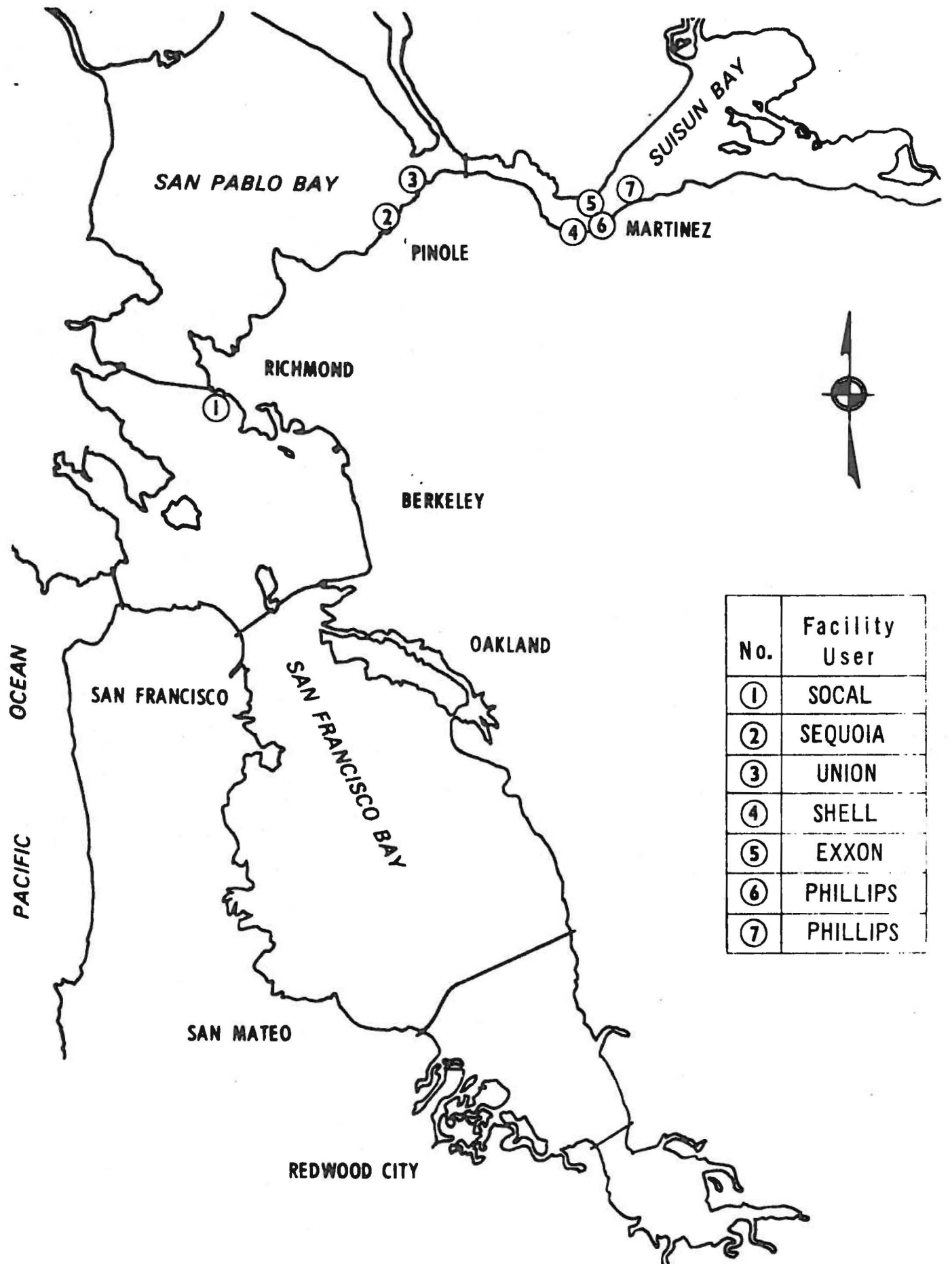
in size up to 50,000 dwt. Tankers of approximately 130,000 dwt (light loaded) could be accommodated by this facility.

Exxon (formerly Humble) Oil & Refining Company receives crude oil at a dock located at Benicia, on the north side of Carquinez Strait and immediately westward of the Benicia-Martinez Bridge. This facility with a usable berthing space of more than 1,000 feet receives tankers up to 70,000 dwt in size. It could receive tankers of approximately 130,000 dwt (light-loaded).

Shell Oil receives crude oil at the Martinez Refinery Wharf. This facility has about 1,800 feet of usable berthing space serving two berths. Tankers of approximately 40,000 dwt are now received at the facility. If used as one berth, the wharf could accommodate 130,000 dwt tankers (light-loaded).

Phillips Petroleum Company receives crude oil shipments at both the Amorce Wharf and the Avon Refinery Tanker Wharf located westerly and easterly of the Benicia-Martinez Bridge, respectively, on the southern side of Carquinez Strait. Tankers of about 90,000 dwt are now received at the facilities after lightering part of their loads into 17,000 dwt tankers in Central San Francisco Bay. Both facilities could receive tankers of up to 130,000 dwt (light-loaded).

Source: Army Corps of Engineers. West Coast Deepwater Port Facilities Study. June 1973.



CRUDE PETROLFIUM BERTHING FACILITIES. SAN FRANCISCO BAY AREA

Source: Army Corps of Engineers. West Coast Deepwater Port Facilities Study. June 1973.

CONVENTIONAL BUOY MOORING

The Conventional Buoy Mooring (CBM) is an offshore mooring system using a tanker's two bow anchors together with 5 to 7 permanently anchored mooring buoys to hold a tanker in a relatively fixed position while it is loading or unloading. Transfer of oil is through one or more hoses to an underwater pipeline leading to shore. CBM's are particularly suited to open sea terminals where sea conditions would severely limit the mooring of tankers at a fixed wharf structure. A flat or gently sloping bottom, free of projections and with good natural anchor-holding conditions are preferred, although CBM's have been located in areas with coral bottoms. Considerable space must be available for multi-berth terminals as a spacing of at least one-half mile is generally desired between berths for maneuvering and locating anchors. The CBM is most practical where only one or two different types of cargos are to be handled.

Because of the tanker's fixed heading, the forces on a moored tanker caused by current, wind and waves can be very high when their directions are at an angle to the heading of the tanker (the heading is usually designed to coincide with prevailing conditions). Since the size of a tanker's mooring lines is limited to what can be practically handled, the size of a tanker which can be routinely moored at a CBM is limited. The limitation at any particular location de-

pende on the magnitude and direction of currents, wind and waves. For conditions offshore southern California, which is well suited for CBM's, the maximum size of tanker which can be moored routinely at a CBM is in the range of 130,000 to 150,000 dwt.

Source: U. S. Department of Interior. Environmental Impact Statement, Deepwater Ports. April 1974.

C. B. M. INSTALLATIONS - CALIFORNIA

<u>TERMINAL</u>	<u>OWNER</u>	<u>TYPE</u>	<u>PRODUCT</u>	<u>MAXIMUM DWT (X 1,000)</u>	<u>MAXIMUM DRAFT</u>
MOSS LANDING	PACIFIC GAS & ELECTRIC	5 BUOY	FUEL OIL	50	38 FT.
ESTERO BAY	SOCAL	5 BUOY	CRUDE OIL	50	38 FT.
ESTERO BAY	SOCAL	7 BUOY	CRUDE OIL	80	38 FT.
ESTERO BAY	PACIFIC GAS & ELECTRIC	5 BUOY	FUEL OIL	50	38 FT.
ESTERO BAY	UNITED STATES NAVY	5 BUOY	REFINED	50	38 FT.
ESTERO BAY	TEXACO	5 BUOY	REFINED	50	38 FT.
GAVIOTA	GETTY	5 BUOY	CRUDE OIL	40	36 FT.
ELWOOD (ISLA VISTA)	SIGNAL	5 BUOY	CRUDE OIL	30	40 FT.
CARPENTERIA	SOCAL	7 BUOY	{ REFINED CRUDE OIL	80	55 FT.
VENTURA	UNION	5 BUOY	CRUDE OIL	35	35 FT.
VENTURA	GETTY	5 BUOY	CRUDE OIL	40	32.5 FT.
MANDALAY BEACH (OXNARD)	SOUTHERN CALIFORNIA EDISON	5 BUOY	FUEL OIL	50	35 FT.
EL SEGUNDO	SOCAL	5 BUOY	REFINED	50	42 FT.
EL SEGUNDO	SOCAL	6 BUOY	REFINED	35	27 FT.
EL SEGUNDO	SOCAL	7 BUOY	CRUDE OIL	130	54 FT.
EL SEGUNDO	SOCAL	7 BUOY	CRUDE OIL	130	56 FT.
HUNTINGTON BEACH	GULF	5 BUOY	{ FUEL OIL CRUDE OIL	125	42 FT.
ENCINA	SAN DIEGO GAS & ELECTRIC	7 BUOY	FUEL OIL	80	36 FT.

All vessel drafts and deadweight information approximate.

Source: U. S. Department of Interior. Environmental Impact Statement,
Deepwater Ports. April 1974

ALYESKA PIPELINE SERVICE COMPANY	% Ownership		Number of Tankers	(1) Tankers in use (2) To Be Delivered (3) To Be Constructed or Chartered			DWT x 1,000	Draft ft	Port of Entry	Comments
	pipe line	oil		(1)	(2)	(3)				
SOHIO Pipeline Company	49.18	54.00	6	2	2	2	(2) 60 (2) 80 (2) 120	--	Puget Sound Estero Bay LA-LB Plan Pipeline to Midwest	Need 6 or 7 more 120-150,000 dwt or (3) - 260,000 dwt. Draft: 54-57 ft. vs 66-69 ft.
ARCO Pipeline Company	21.00	20.00	10	6	1	3	(3) 120 (2) 70 (1) 53 (1) 50 (3) 120- 150	52 43.5 40.5 40 50	Ferndale, Washington / Long Beach, California	Long Beach should dredge for 150,000 dwt.
EXXON Pipeline Company	20.00	20.00	5	All Currently in Use			52-75	39-42	2 Tankers to Benicia, Ca., 3 to Other Refineries	San Francisco water depth limits to 75,000
MOBIL Alaska Pipeline Company	5.00	1.50	1 or 2	Mobil Arctic (1972) Mobil Meridian (1960)			129 49	55 40	Ferndale, Wash. / Los Angeles, Ca.	If Los Angeles dredged to 65 ft., would consider using 210,000
PHILLIPS Petroleum Company	1.66	1.50	1	Chartered; Will Construct in Future			100	--	Avon Refinery Martinez, Ca.	Offshore DWP needed near San Francisco Bay
UNION Alaska Pipeline Company	1.66	1.50	3 maybe 4	2	0	1	70 35 150	43.5 34 54	Los Angeles Harbor / San Francisco Bay	Favor LA dredging to 60 ft. Off- shore DWP needed near SF Bay. Would like to use 250,000 for foreign imports
AMERADA HESS Corporation Source: Personal	1.50	1.50			NO PLANS YET FOR NORTH SLOPE OIL	

VLCC LIGHTERING - SAN CLEMENTE ISLAND
APRIL 28 TO MAY 4, 1974

BACKGROUND

On Tuesday, April 23, 1974, Patrol Inspector W. H. Putman of the Department of Fish and Game met with representatives of Chevron Shipping and U.S. Coast Guard in Long Beach to review the operation and spill contingency plans concerning the lightering of approximately 1.5 million barrels of crude oil into smaller tankers. The operational area was designated as no closer than three nautical miles off the leeseide of San Clemente Island. Since the area is outside of the territorial jurisdiction of both federal and state governments, the Coast Guard's and Inspector Putman's reviews were cooperative in nature. Both Inspector Putman and the Coast Guard requested a readily deployable oil spill boom (Vikoma Sea Pack) be added to the spill contingency plan. The request was granted.

On April 29, 1974, Inspector Putman was assigned to monitor the operation for the State Operating Authority and to prepare a report to the Assembly Select Committee on Deep Water Ports.

MONITORING

The Coast Guard monitored the entire operation from the Very Large Crude Carrier E HORNSBY WASSON.

Since the State's primary interest is pollution containment and removal, Inspector Putman elected to monitor the operation from a Department of Fish and Game fixed-wing aircraft. A total of ten flight hours were flown over the VLCC on four different flights.

VLCC

E. HORNSBY WASSON UK REGISTRY
217,545 Dead Weight Tons
109,522 Gross Rated Tonnage
1,068' Length
160' Beam
62.5' Assigned Summer Draft
1,627,745 BBLs Full Load Capacity

LIGHTERS

CHEVRON MISSISSIPPI and Sister Ship CHEVRON CALIFORNIA
US REGISTRY
70,200 Dead Weight Tons
35,588 Gross Rated Tonnage
810' Length
105' Beam
43.5' Assigned Summer Draft
548,600 BBLs Full Load Capacity

CARGO

1,244,783 barrels of Arabian light crude. API gravity of 33.8. This crude contains 32% of C¹ through C¹². This entire cargo was delivered to the Standard Oil refinery at El Segundo in three shipments.

329,119 barrels of Berri crude. API gravity of 38.6. This crude contains 34% of C¹ through C¹². This entire cargo was delivered to the Standard Oil refinery at Richmond in one shipment.

Both crudes came from the Persian Gulf Port of Ras Tannurah, Saudi Arabia.

LIGHTERING OPERATION

MONDAY 4-29

0400 hours - WASSON arrived at staging area, four miles east of Santa Catalina Island where she received five Yokahama fenders, two 90' lengths of 12" hose, Vikoma Sea Pack, and stores.

2100 hours - MISSISSIPPI lashed portside to WASSON starboard side and took on approximately 410,000 barrels of Arabian light crude at 43,000 bph.

TUESDAY 4-30

1530 hours - MISSISSIPPI dropped mooring lines and departed for El Segundo.

2130 hours - CALIFORNIA lashed to WASSON and took on approximately 410,000 barrels of Arabian light crude at 45,000 bph.

WEDNESDAY 5-1

1400 hours - CALIFORNIA dropped mooring lines and departed for El Segundo.

THURSDAY 5-2

0300 hours - MISSISSIPPI lashed to WASSON and took on approximately 329,000 barrels of Berri crude at 53,000 bph.

1230 hours - MISSISSIPPI dropped mooring lines and departed for Pittsburgh.

FRIDAY 5-3

0300 hours - CALIFORNIA lashed to WASSON and took on approximately 414,000 barrels of Arabian light crude at 46,000 bph.

1730 hours - CALIFORNIA dropped mooring lines and departed for El Segundo. The WASSON then offloaded the support gear in the staging area and departed.

OTHER OPERATIONAL TIME

Approach time of the lighters to final lashings averaged about three hours. Hose connections and disconnections averaged about two hours each.

WEATHER

The weather throughout the operation was ideal: seas calm, wind light and variable with some local clouds between 300 to 2500 feet.

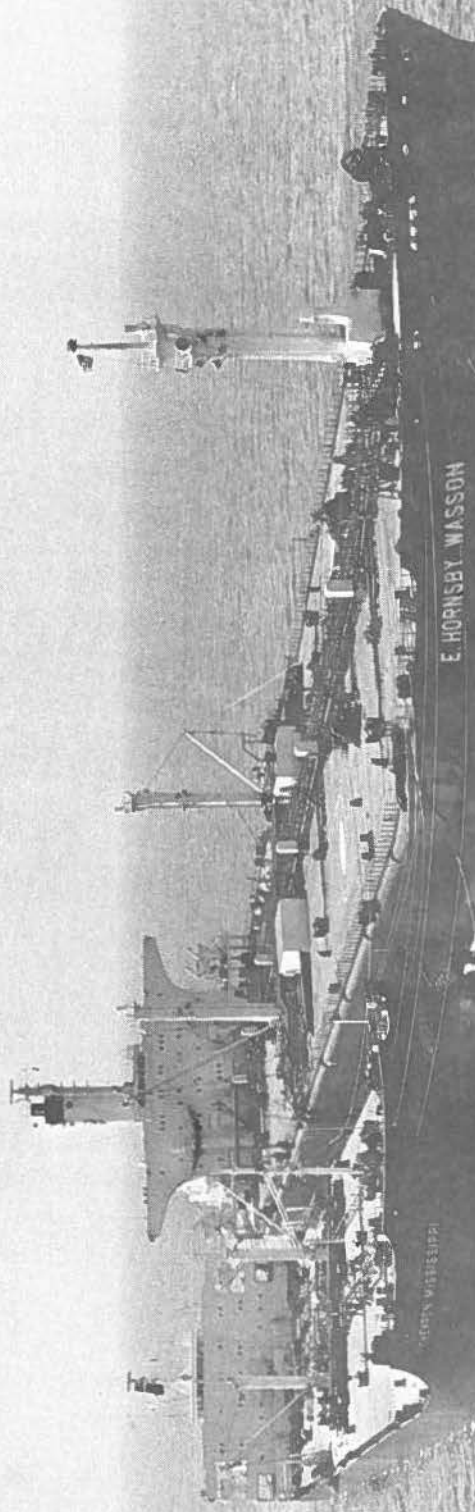
SUMMARY

The lightering of 1,573,902 barrels of crude from a VLCC in four transfer operations was completed without the spillage of oil.

RECOMMENDATIONS:

In future lightering operations of this nature, the industry should expand their containment and recovery contingency plans to include the staging of equipment for immediate response in case of oil spillage consistent with the state of the art.

Source: California Department of Fish and Game.



Source: Standard Oil Company of California.

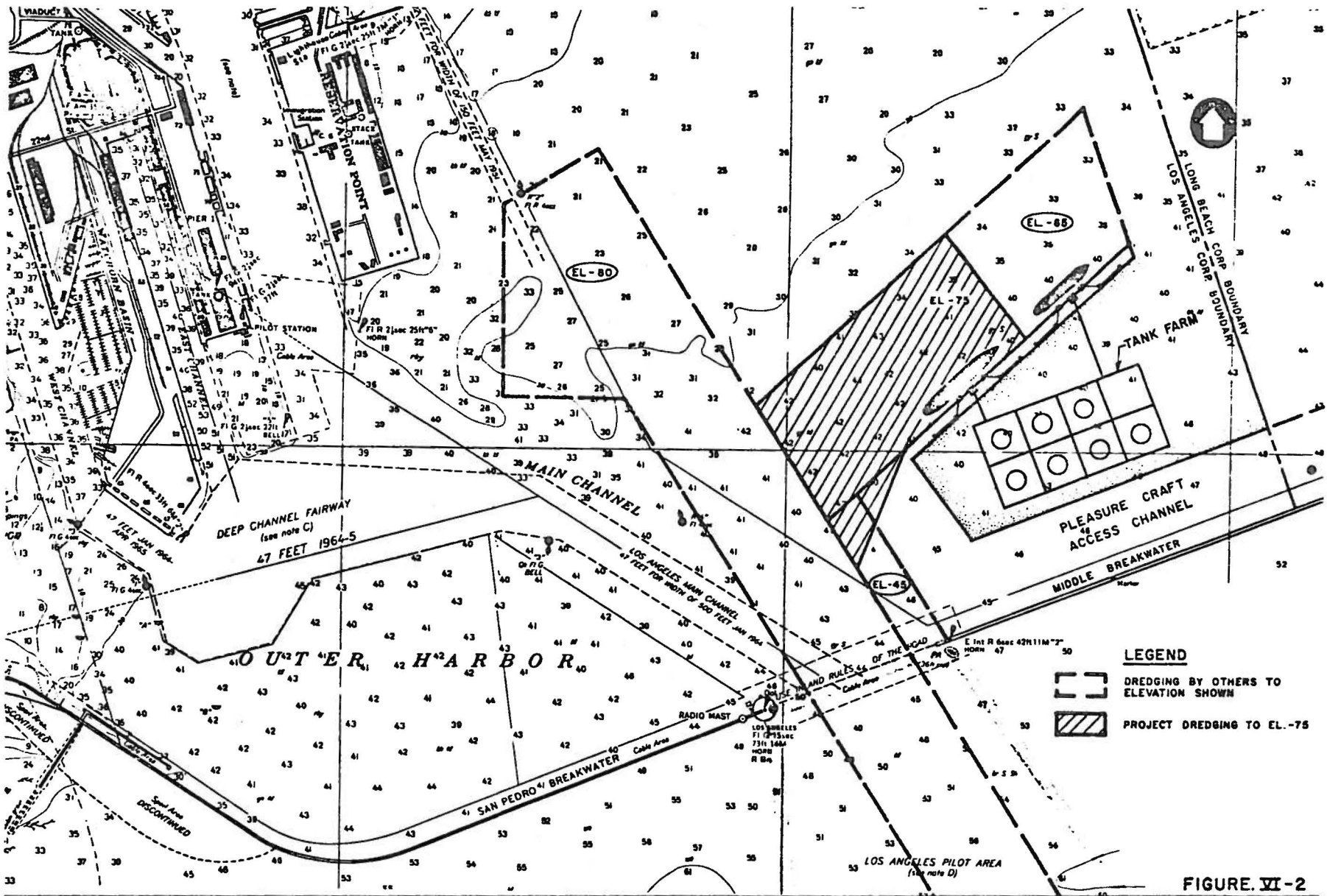


FIGURE VI-2

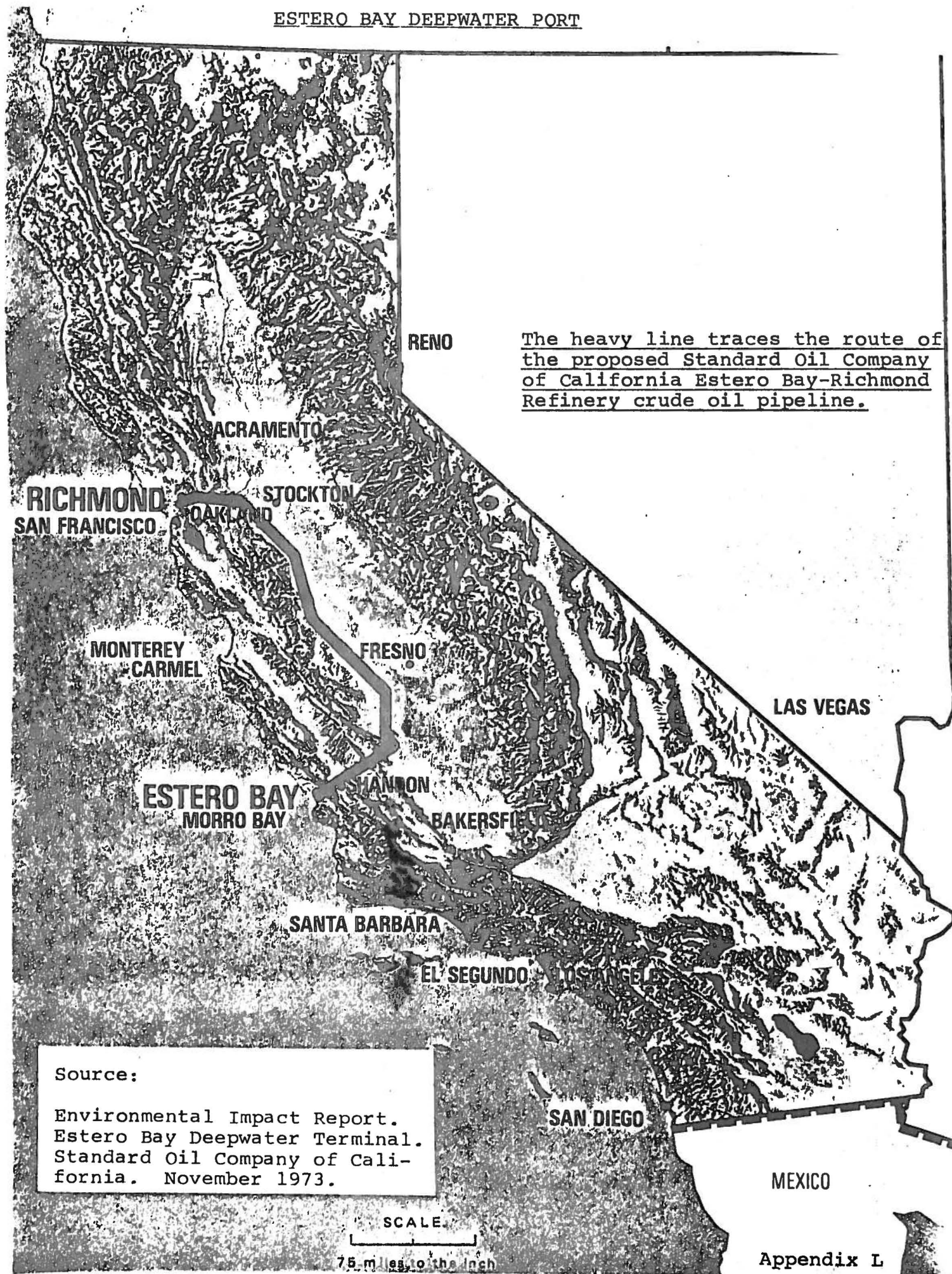


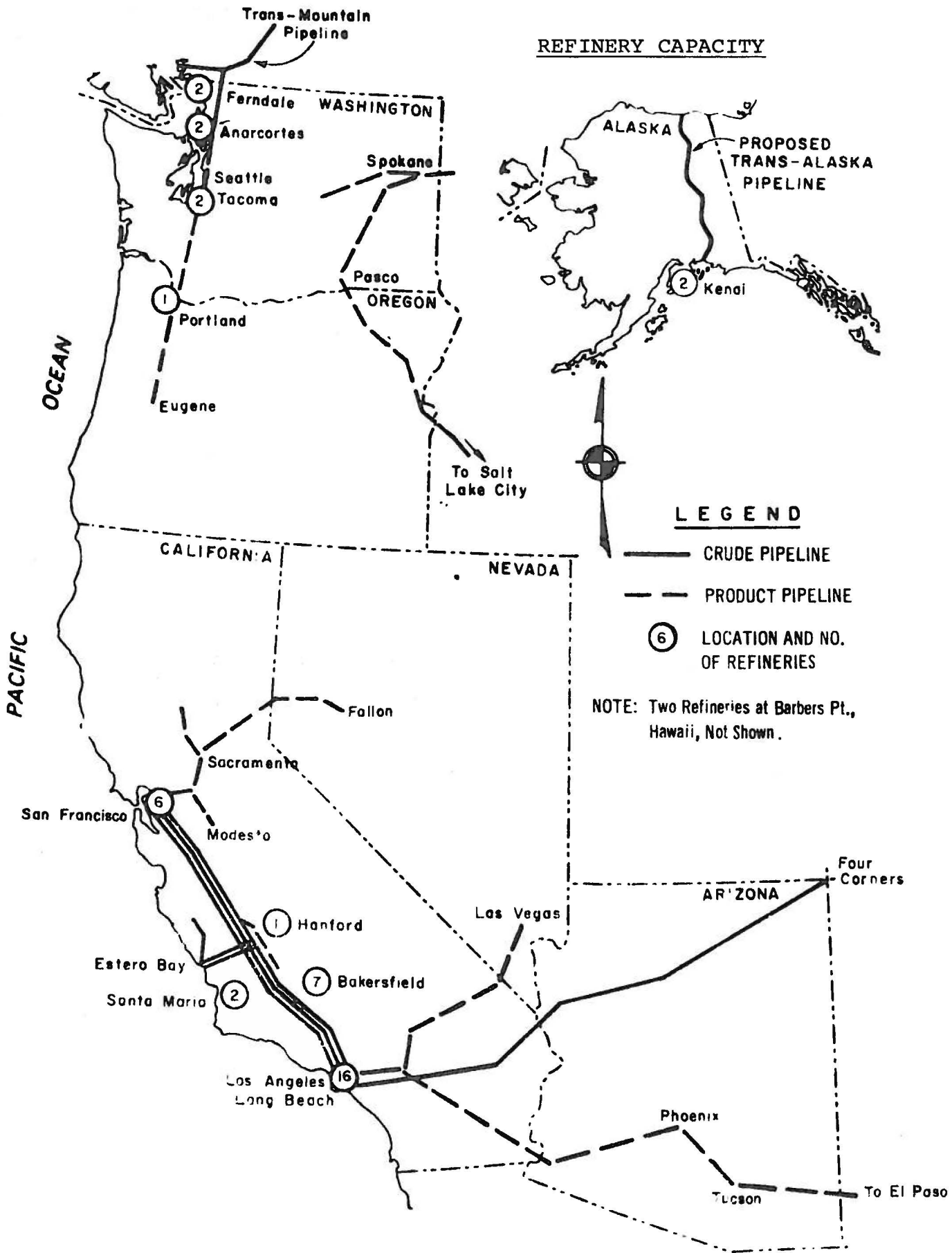
MARGINAL PIER ALTERNATE
MIDDLE BREAKWATER



Source: Frederic R. Harris, Inc. Deepwater Oil Terminal Facilities, Los Angeles Harbor.

ESTERO BAY DEEPWATER PORT





EXISTING REFINERIES, CRUDE AND PRODUCT PIPELINES, PAD V

Source: Army Corps of Engineers. West Coast Deepwater Port Facilities Study. June 1973.

HISTORICAL AND CURRENT REFINERY CAPACITIES - CALIFORNIA

(Barrels Per Calendar Day)

SERVICE AREA / REFINERY	LOCATION	1960	1970	1973
<u>SAN FRANCISCO BAY AREA</u>				
Exxon	Benicia	0	72,000	86,000
Phillips	Avon	135,000	110,000	110,000
Sequoia	Hercules	0	22,000	27,000
Shell	Martinez	55,000	97,000	100,000
Standard of California	Richmond	210,000	190,000	190,000
Union	Rodeo	46,000	60,000	60,000
Other		0	0	0
Subtotal		<u>446,000</u>	<u>551,000</u>	<u>573,000</u>
<u>LOS ANGELES-LONG BEACH AREA</u>				
Atlantic Richfield	Carson	165,000	165,000	165,000
Champlin	Wilmington	0	0	29,000
Douglas	Paramount		1/ 25,000	35,000
Gulf	Santa Fe Springs	32,000	49,000	50,000
Mobil	Torrance	125,000	124,000	124,000
Powerine	Santa Fe Springs		1/ 28,000	28,000
Shell	Wilmington	68,000	86,000	86,000
Standard of California	El Segundo	150,000	200,000	220,000
Texaco	Wilmington	60,000	60,000	77,000
Toscopetro	Bakersfield	0	0	26,000
Union	Wilmington	109,000	104,000	104,000
Union	Santa Maria	26,000	35,000	35,000
Standard of California	Bakersfield	26,000	26,000	26,000
Other		135,000	162,000	180,000
Subtotal		<u>896,000</u>	<u>1,064,000</u>	<u>1,185,000</u>
GRAND TOTAL - CALIFORNIA		<u>1,342,000</u>	<u>1,615,000</u>	<u>1,758,000</u>

1/ Capacity listed below 25,000 b/cd and therefore included in "Other."

CALIFORNIA REFINERY EXPANSION AND NEW CONSTRUCTION

(under construction or planned)

<u>Company</u>	<u>Location</u>	<u>Current Capacity (b/d)</u>	<u>Expanded Capacity</u>	<u>Year Completed</u>	<u>Added Capacity</u>
ARCO	Carson	173,000	193,000	1974	20,000
ARCO	Carson	New Ref. (So Cal Ed)	125,000	1977	125,000
Douglas Oil Co.	Paramount	36,000	50,000	1975	14,000
Kern County Ref. Inc.	Bakersfield	12,900	15,900	1975	3,000
Newhall Ref. Co.	Newhall	8,000	20,000	1975	12,000
Pacific Resources, Inc.	Carlsbad	New Ref. (SDG&E)	100,000	1977	100,000
Standard Oil Co.	El Segundo	230,000	405,000	1975	175,000
Standard Oil Co.	Richmond	190,000	365,000	1975	175,000
Sunland Ref. Corp.	Bakersfield	6,000	19,000	1974	13,000
					<hr/> 637,000 b/d

Reference: Oil and Gas Journal, 1 April 1974.

ADDITIONAL CALIFORNIA REFINERY EXPANSION

(personal communication)

<u>Company</u>	<u>Location</u>	<u>Current Capacity (b/d)</u>	<u>Expanded Capacity</u>	<u>Year Completed</u>	<u>Added Capacity</u>
Cal.Oil Purification Co.	Ventura	New Ref.	15,000	1977	15,000
Urich Independent Ref.	Martinez	New Ref.	110,000	1977	110,000
					125,000 b/d
					+637,000 b/d
					762,000 b/d
EXXON	Benecia	95,000	300,000	Future	

(NOTE: Once a supply of crude is assured EXXON will expand their refinery to an ultimate 300,000 b/d)

Refinery capacity in California as of January 1, 1974 = 1,800,000 b/d
 added capacity = 762,000
 expected capacity by end of 1977 = 2,562,000 b/d

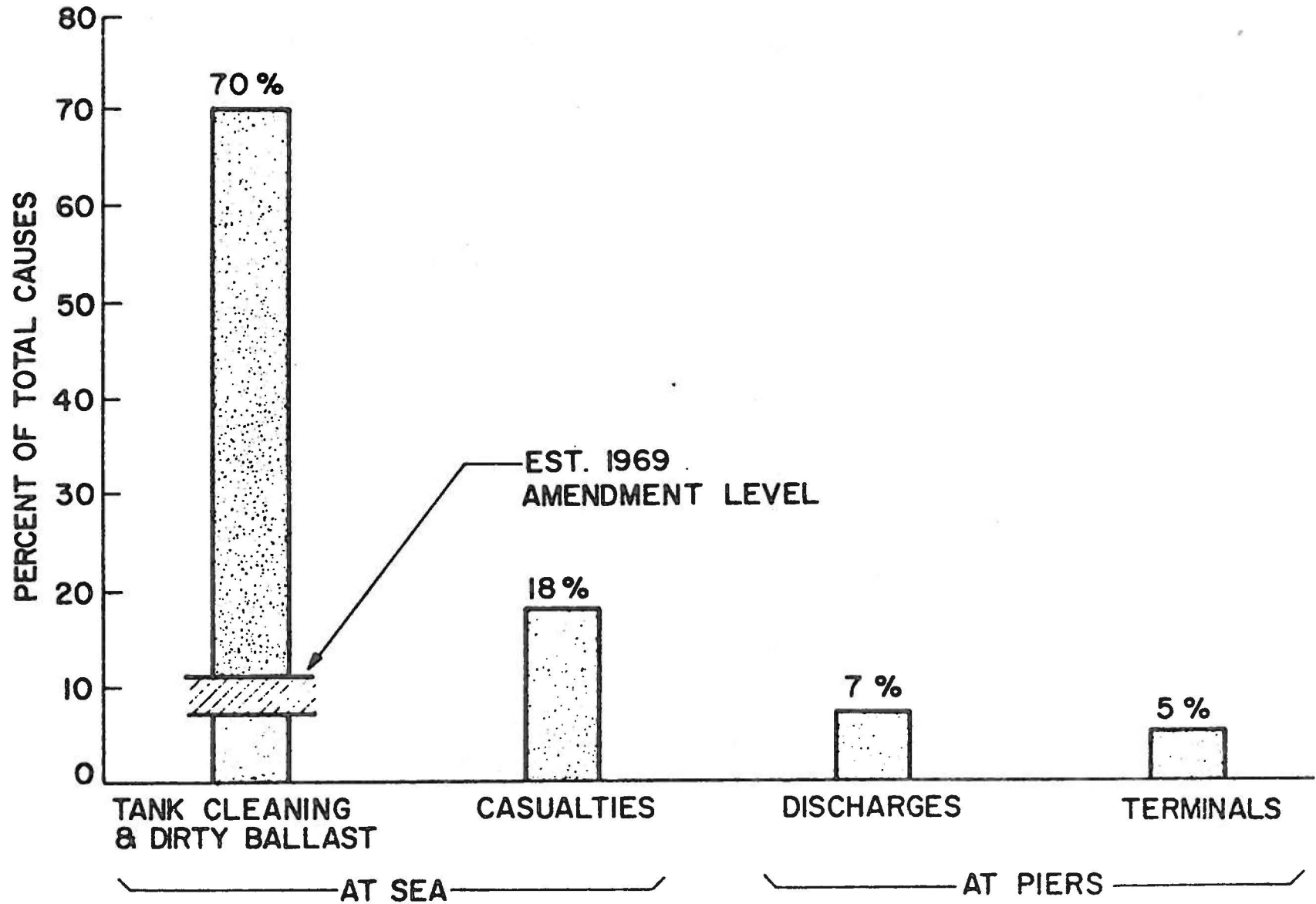
ESTIMATED ANNUAL OIL POLLUTION OF THE OCEANS

Marine Operations <u>1/</u>	Metric Tons	Percent
Tankers	1,387,000	28.32
1) LOT (Load-on-Top) tank cleaning operations	265,000	5.41
2) Non-LOT tank cleaning operations	702,000	14.34
3) Discharge due to bilge pumping, leaks and bunkering spills	100,000	2.04
4) Vessel casualties	250,000	5.11
5) Terminal operations	70,000	1.43
Tank Barges	70,000	1.43
1) Discharge due to leaks	20,000	0.41
2) Barge casualties	32,000	0.65
3) Terminal operations	18,000	0.38
All Other Vessels	850,000	17.36
1) Discharge due to bilge pumping, leaks and bunkering spills	600,000	12.25
2) Vessel casualties	250,000	5.11
Offshore Operations	100,000	2.04
NON-MARINE OPERATIONS		
Refineries and Petrochemical plants	300,000	6.12
Industrial Machinery	750,000	15.31
Highway Motor Vehicles	1,440,000	29.41
TOTAL	4,897,000	100.00

1/ Marine Operations make about 49% of the total estimated annual Oil Pollution of the Oceans.

Source: Poricelli, Keith and Storch, 1971.

RELATIVE MAGNITUDE OF OIL INFLUX FROM VARIOUS TANKER SOURCES



Source: Gray, William O., 1972.

MARINE POLLUTION CONTROL EFFORTS

The load-on-top technique was developed with the aim of minimizing the release of oily wastes to the sea and recovering the maximum amount of persistent oil from washings and dirty ballast. After unloading a cargo of oil, a significant amount of oil -- a fraction of 1 percent of the total load on the average -- clings to the surface of the tank compartments. In a 250,000 dwt tanker, this may amount to as much as 650 tons.

At current prices, this could mean a recovery of \$20,000 in oil at an expense of only several hundred dollars. Thus, in addition to governmental control there are economic incentives not to pump oil over the side.

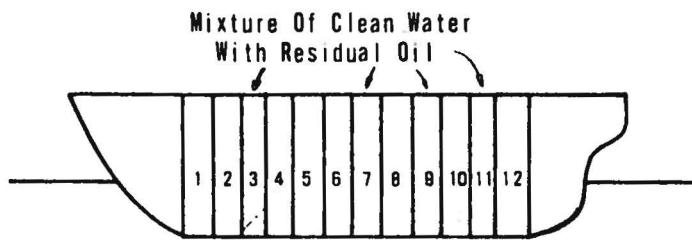
Tanks being prepared for clean ballast are thoroughly washed before ballasting and the oily mixture collected in slop tanks. This mixture is allowed to settle in these tanks until most of the water settles to the bottom. The bottom water is then pumped overboard until the oily level is approached. Discharge of the ballast water is then halted. Tanks which may not have been cleaned before being filled with ballast water are later decanted in the same manner as are slop tanks. After separation and discharge of the clean ballast water, oily residues are then pumped to the slop tanks for further settling and subsequent decanting of the water. The retained oil or oily wastes remaining in the bottom of the

slop tanks become a part of the new cargo.

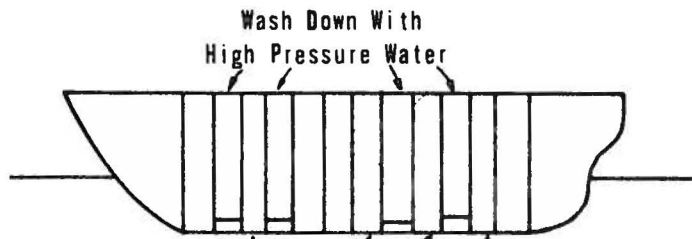
Although LOT is a major advance in reducing oil discharges into the sea, it is not 100 percent effective on tankers using it and is not yet in use on at least 20 percent of the world's crude carriers. It requires a reasonably long voyage to provide the time necessary for effective settling and separation and the effectiveness of separation is reduced by rough seas. Thus, small vessels on short hauls cannot use LOT and thus, they account for the bulk of oil pumped over the side.

Further, it is difficult to determine with precision the oil-water interface during decanting, resulting at times in some oil discharge before pumping is halted.

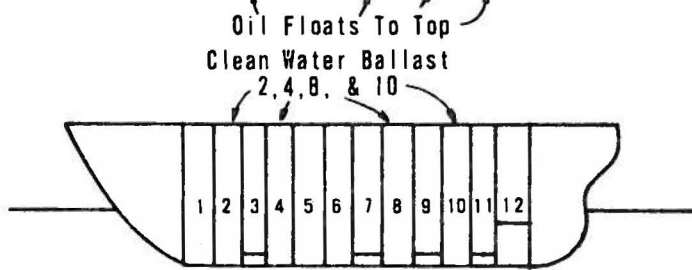
Other alternatives for reducing oil discharges from normal tanker operations include the following: shore ballast reception and treatment facilities, segregated ballast tankers, on-board oil-water separators and waterless washing of cargo tanks in a controlled atmosphere.



AS SHIP EASES OUT TO SEA, TANKS 3, 7, 9, & 11 ARE FILLED WITH SEA WATER BALLAST



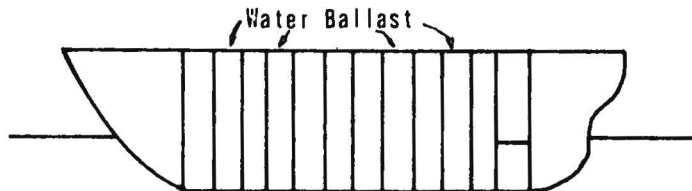
TANKS 2, 4, 8, & 10 ARE CLEANED WITH HIGH PRESSURE HOSES.



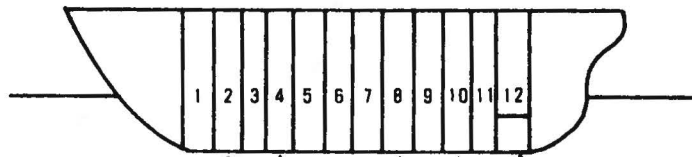
SEA WATER-OIL MIXTURE FROM WASHING COLLECTED IN THE SLOP TANK (No. 12)



Wash Down Water And Slop Pumped Into No. 12



OIL FROM TANKS 3, 7, 9, AND 11 IS PUMPED TO TANK 12



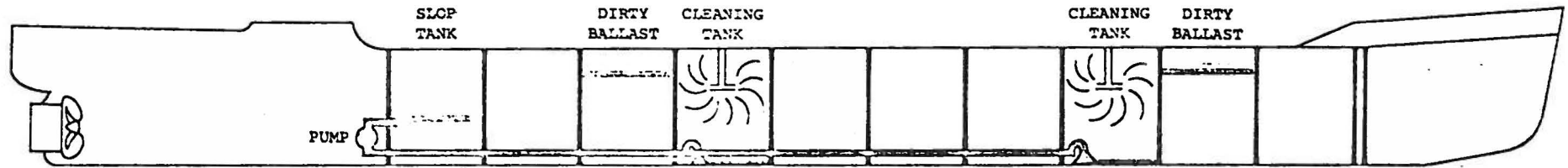
CLEAN WATER BENEATH OIL IN TANK 12 (WITH EXCEPTION OF SMALL LAYER) IS DISCHARGED TO SEA

Load-on-Top Procedure

Source: MarAd

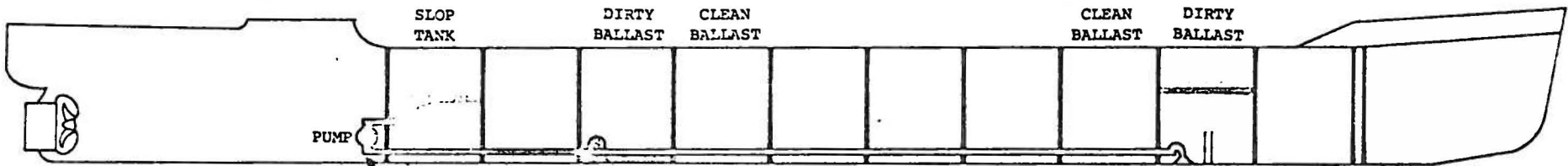
HOW LOAD-ON-TOP WORKS

A CRUDE OIL TANKER USING THE LOAD-ON-TOP SYSTEM OF ANTIPOLLUTION



▲ SLOP FROM TANK CLEANING TO SLOP TANK

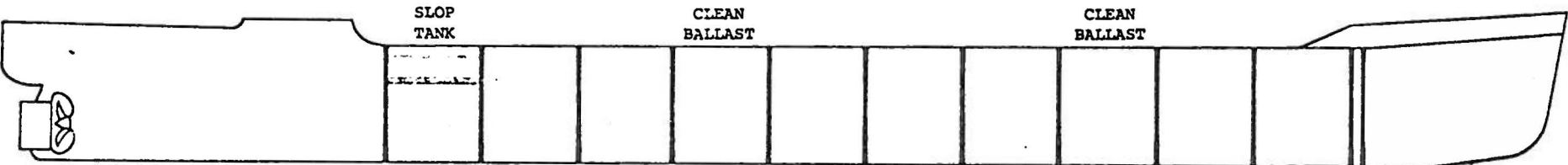
- 1 Vessel at sea in dirty ballast condition and cleaning tanks. All oily washings are transferred to the slop tank, aft -- Oil in the dirty sea water ballast floats to the top.



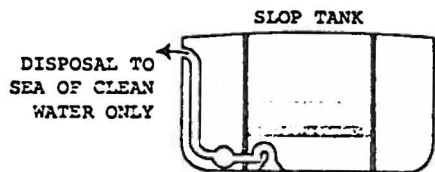
▲ DISPOSAL OF OILY WATER AND OIL TO SLOP TANK

▼ DISPOSAL TO SEA OF CLEAN WATER ONLY

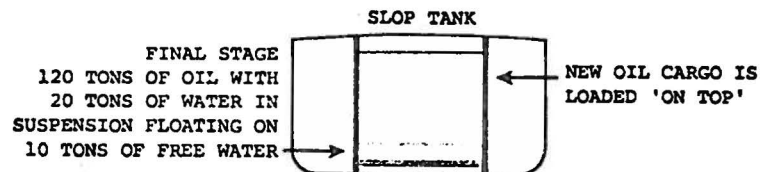
- 2 Vessel at sea when tank cleaning complete and with clean ballast in washed tanks. Disposing of dirty ballast. Clean sea water under the floating oil is returned to the sea from the dirty ballast tanks. Oily slops from the dirty ballast tanks are pumped to the aft slop tank.



- 3 Vessel at sea in clean ballast condition, all polluted water and oil secured in slop tank. The oil in the slop tank is given time to separate from the water.



- 4 The water under the oil in the slop tank is carefully pumped into the sea.



- 5 At the loading port oil cargo is loaded 'on top' of the oil in the slop tank.

OIL
 SEA WATER
 OILY SLOP

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GOVERNMENTAL AGENCIES HAVING AUTHORITY
OVER ACTIVITIES RELATED TO
DEEPWATER PORTS

STATE OF CALIFORNIA

EXECUTIVE BRANCH

RESOURCES AGENCY

Under the California Environmental Quality Act of 1970 (CEQA), the Resources Agency is delegated responsibility for formulating statewide environmental guidelines which are implemented by state and local agencies. Constituent units of the agency review proposed developments in the State as to their impact on land, air, and water resources.

The Secretary of the Resources Agency exercises general supervision over several constituent departments, boards, and commissions. He is responsible for bringing their diverse programs together in order to accomplish longrange coordinated planning. In the event of a conflict between units over areas of expertise or jurisdiction, the Secretary settles the differences and advises the Governor on the adoption of State policy.

The Governor's Office of Planning and Research (OPR) resolves lead agency disputes in connection with the preparation of Environmental Impact Statements as required under CEQA. In addition, OPR has two legislative mandates: (1) to prepare and submit to the Governor an Environmental Goals and Policy Report for transmittal to the

State Legislature and (2) to formulate a State land use policy. Although an environmental report was completed in June 1973, OPR has no enforcement or implementation powers in either the environmental or land use areas.

The principal constituent units of the Resources Agency which would have a role regarding the location, size and intensity of deepwater port development in California are:

State Lands Commission

This body has exercised a more responsible role in the development of maritime facilities in California than any other agency at the State level. The Commission has jurisdiction and permit authority over the use of tidal and submerged lands. Under this authority, the Commission controls the disposition and use of state-owned tidelands and submerged lands along the California coast, extending three miles seaward from the low water mark.

Policies of the Commission are implemented by the State Lands Division of the Department of Conservation. Under the policy direction of the Commission, the State Lands Division controls the sale, lease, construction in, or other use of these State holdings. The Division cannot lease any lands under the Commission's jurisdiction until all requirements of CEQA are fulfilled.

Prior to the enactment of the Coastal Zone Conservation Act of 1972, the State Lands Commission possessed exclusive state-wide authority in the coastal zone. Since that time the Coastal Zone Conservation Commission has assumed concurrent jurisdiction over uses

of the coastal area and proposals are now subject to overlapping planning and approval. The State Lands Commission is currently monitoring and assisting the Coastal Commission in the preparation of its comprehensive state plan. One element of the plan involves a joint review of offshore marine terminals to handle crude oil.

Coastal Zone Conservation Commission

The statewide commission and six regional commissions, formed after passage of an initiative measure in November 1972, are responsible for developing a state plan for the preservation, protection, restoration, and enhancement of the coastal zone. Among the considerations of concern in the waterborne transportation element are: (1) the economic need for deepwater ports; (2) the need for coastal land to support offshore facilities; and (3) the environmental impact of ocean shipping and port facilities.

Each regional commission deals with each plan element, holding public hearings on issues of local concern. The regions submit their review to the State Commission which must adopt the coastal zone plan by December 1, 1975, and submit it to the Legislature for subsequent adoption and implementation.

In addition to developing a comprehensive coastal zone plan, the commissions exercise permit authority over construction in an area between the seaward limits of State jurisdiction and 1,000 yards landward from the mean high tide line.

Water Resources Control Board

The Board is responsible for protecting the quality of California waters including those ocean waters within the State jurisdiction. The State Board has the primary responsibility for setting waste discharge standards, which Regional Water Quality Control Boards implement and enforce.

Part of a required planning and regulatory program concerns the effect of proposed navigation improvements on water quality. A primary interest involves potential adverse effects of channel dredging on aquatic biota.

Air Resources Board.

The Board and Regional Air Pollution Control Districts prescribe air quality standards and regulate emissions into the atmosphere. The Board would only have a role in deepwater port development in regards to the relationship between refinery siting and oil delivery sites.

Department of Fish and Game

The Department is responsible for maintaining all species of fish and wildlife for their intrinsic and ecological values as well as for the direct benefits to man. The Department is empowered to enforce standards established for wildlife protection.

Having similar concerns as the Water Resources Control Board, the Department reviews navigation developments in relation to their impact upon commercial and sport fishing and wildlife refuges.

Dredging projects and construction of breakwaters and terminals are of primary concern.

The Department has principal responsibility for directing the State Oil Spill Contingency Plan. The purpose of the plan is to carry out the Department's statutory obligations of protecting fish and wildlife resources during times of disaster caused by oil or hazardous materials. This responsibility will become all the more important as deepwater oil terminals are developed in state waters.

Department of Navigation and Ocean Development

The Department (DNOD) is the principal state agency with responsibility for navigation planning. Presently, DNOD is primarily involved in programs and facilities for recreational boating, with overview responsibility for commercial navigation.

As a major project DNOD developed a Comprehensive Ocean Area Plan (COAP) which was turned over to the Coastal Zone Conservation Commission. In addition, with the approval of Proposition 20 in November 1972, all coastal zone planning activities formerly claimed by the Department are now under the jurisdiction of the Coastal Zone Commission.

The Department's program to develop a Marine Terminal and Navigation Plan has been terminated and all materials and information transferred to the Department of Transportation. DNOD is now expected to assist Caltrans in its review of the regional waterborne elements of the California Transportation Plan.

San Francisco Bay Conservation and Development Commission

BCDC serves to plan and regulate development along the shoreline of San Francisco Bay. In this capacity it has assumed an important overview role for navigation planning. BCDC has joint regulatory jurisdiction with the U.S. Army Corps of Engineers in matters pertaining to the dredging of ship channels in the Bay.

The Commission controls, by permit, dredging and filling in the Bay and shoreline property land use within a 100-foot strip. A high priority item in this area is port and water-related industry development. A provision of the Coastal Zone Conservation Act expressly excludes the Coastal Zone Commission from permit authority in the area under BCDC jurisdiction.

BUSINESS AND TRANSPORTATION AGENCY

The State Transportation Board advises and assists the Secretary of the Business and Transportation Agency and the Legislature in formulating State policy and plans for transportation programs. In April 1973, the Board adopted guidelines for the preparation of Regional Transportation Plans including the incorporation of existing planning programs.

Department of Transportation

Legislation enacted in 1972 created the California Department of Transportation (Caltrans) which is required to prepare a Transportation Plan embracing all modes of transportation, including a

deepwater ports element.

Regional Planning Agencies

Regional agencies are to prepare regional transportation plans including maritime transport by April 1, 1975. Regional plans are to be based on local governing bodies statements of goals, objectives and policies. Agencies involved in this aspect of the planning vary with the coastal counties and are as follows:

- a) Local Transportation Commissions - Del Norte and Monterey Counties.
- b) Council of Governments - Humboldt, Mendocino, San Luis Obispo, Santa Barbara and San Diego Counties.
- c) Metropolitan Transportation Commission - San Francisco Bay Area Counties.
- d) Southern California Association of Governments - Ventura, Los Angeles and Orange Counties.

The State Transportation Plan is to be based upon regional goal objectives and plans after reconciling areas of inter-regional differences. The plan is to be submitted for adoption to the State Transportation Board and transmitted to the California Legislature by January 1, 1976.

AGRICULTURE AND SERVICES AGENCY

Department of Commerce

The Department serves as staff agency to the Commission for Economic Development. The mission of the Department is to administer

programs and to recommend appropriate executive or legislative action regarding development of the California economy.

Within the Department, the Division of Business and Industrial Development is concerned with disincentives to economic development, such as the inventory tax and coastline development restrictions. It is also involved in the economic implications of decisions on deepwater port development and is a major source of input on State policy.

Commission for Economic Development

The Commission provides bipartisan legislative, executive branch, and private sector support and guidance for the overall economic development of the State. By legislative mandate the Commission is charged with discovering declining areas in the State Economy, evaluating the extent of unemployment and designing programs to assist local communities to create jobs and tax revenues.

OTHER UNITS IN THE EXECUTIVE BRANCH

Energy Planning Council

The Council was established in October 1973, by Executive Order of the Governor and was charged with the following:

- a) coordinate all state activities regarding energy resources;
- b) recommend policy alternatives to the Governor;
- c) coordinate a program of research and development of energy resources; and

- d) propose new legislation regarding energy matters.

The Council's position on deepwater ports was that the State would support the construction of a facility on the West Coast and it would coordinate such activity with the U. S. Army Corps of Engineers. Since the energy "crisis" of the Fall and Winter of 1973-74, the Council has not played a role in reviewing oil delivery systems and the need for deepwater ports.

Public Utilities Commission

The Commission has broad authority to regulate the rates and services of intrastate common carriers. Jurisdiction extends to all transportation modes operated within the State including land, air, rail, and water.

Under this authority, vessels transporting cargo within the State are subject to permit procedures. State policy encourages the use of harbors and requires that in rate fixing, preferential consideration be given to vessels over other modes of transportation.

LEGISLATIVE BRANCH

Although the State has played a limited role in navigation planning and development, recent actions of the Legislature seek to define the State's interest in this field. Significant changes in the role of the State have been initiated in connection with pro-

grams to formulate and implement plans that include deepwater ports.

Through the enactment of AB 69 in 1972, the Department of Transportation is playing a role in water transportation planning. Their plan, which will be submitted to the Legislature in January 1976, will look at issues relating to deepwater terminals.

Through the initiative process, Proposition 20 was passed by the people of California in November 1972, thus establishing the California Coastal Zone Conservation Commission. The Coastal Zone Plan, which will be submitted to the Legislature in December 1975, will contain an element on tanker terminals.

The Mandates of both AB 69 and Proposition 20 require that the Legislature adopt and implement the plans through necessary legislation. In addition, the Legislature established two Select Committees in the Fall of 1973 to conduct studies on related matters. Recommendations will be made in the Committee reports regarding appropriate legislation.

ASSEMBLY SELECT COMMITTEE ON DEEPWATER PORTS

The Assembly Select Committee on Deepwater Ports was established by the Speaker in November 1973. The Committee was charged to assess the major issues which might arise in regards to the future oil delivery plans for California. This report constitutes the findings and recommendations of the Committee.

SENATE SELECT COMMITTEE ON MARITIME INDUSTRY

The Senate Select Committee on Maritime Industry was established

by Senate Resolution 38 to study and investigate all aspects relating to California's maritime industry. The Committee is mainly concerned with the economic impact and physical requirements of maritime development. A report of the Committee's findings is to be submitted by late summer, 1974.

REGIONAL GOVERNMENTAL AGENCIES

METROPOLITAN TRANSPORTATION COMMISSION

Pursuant to its original charter under AB 363 in 1970, MTC has conducted a study of existing harbor access facilities in the San Francisco Bay area. An ad hoc Seaport Technical Advisory Committee, including representatives of the Coast Guard, U. S. Maritime Administration, Army Corps of Engineers, Caltrans, BCDC and local ports, was formed and is now being expanded to deal with the broader objectives of the Transportation Plan prescribed in AB 69.

SOUTHERN CALIFORNIA INSTITUTIONS

Where Northern California has BCDC and MTC planning future port developments in the San Francisco Bay area, no such interest appears in the Southern portion of the State. The Southern California Association of Governments (SCAG) might include this subject in their planning, but to date no such port planning has been done.

LOCAL INSTITUTIONS

PORT COMMISSIONS

Most of the major ports in California are municipally-owned and are administered by independent port commissions under city charter provisions enabling each port to operate with substantial autonomy. Ports in this category, which formulate their own plans for dredging deep draft channels and building oil terminals include: San Francisco, Oakland, Richmond, Port Hueneme, Los Angeles, Long Beach, and San Diego.

CITY COUNCILS AND BOARD OF SUPERVISORS

Local governmental entities play an important role in port planning. Members of the City Council in Richmond actually serve as Port Commissioners. In Oakland the Port Commissioners are appointed by the City Council whereas in San Francisco, the Commissioners are appointed by the Mayor and confirmed by the Board of Supervisors.

In Southern California, the Board of Harbor Commissioners for the Port of Los Angeles is appointed by the Mayor with approval of the City Council. The Board of Harbor Commissioners for the Port of Long Beach is appointed by the City Manager, subject to confirmation by the City Council.

UNITED STATES GOVERNMENT

FEDERAL INSTITUTIONS

PRIMARY DEVELOPMENT AND OPERATIONAL AUTHORITIES

Because of the importance of waterways to the national economy and defense, the Federal Government has played a dominant role in the field of navigation. Primary federal development and operational authority is vested in the Army Corps of Engineers, the Maritime Administration, the Coast Guard, the Bureau of Land Management, and the Interstate Commerce Commission.

Pending Federal Deepwater Port legislation will give the Departments of Interior and Transportation added responsibilities in the licensing and operation of offshore oil terminals.

U. S. Army Corps of Engineers

Navigable waters are any water which are, have been, or can be used for interstate or foreign commerce. The body of water need not cross state lines to fall within the definition, since if goods transported on the water have been brought from or eventually may go to another state, interstate commerce is involved.

Any individual, firm or agency who plans to build a structure in, on, under or over the navigable waters of the United States must first obtain a permit from the Army Corps of Engineers. Similar permits are required for dredging, and the disposal of the dredged material. The permit from the Corps is required in addition to any

other permits, licenses or other authority required by state or local laws or regulations.

U. S. Maritime Administration

MARAD is the principal federal agency responsible for aiding and promoting the domestic shipping industry. Operating within the Department of Commerce, MARAD provides diverse financial and technical aids to the maritime industry and promotes a regional approach to the planning, development and operation of ports. To implement this policy, MARAD is actively supporting a regional approach to port planning on the West Coast. In addition to negotiating for a study with the Ports of Los Angeles and Long Beach, MARAD is pursuing similar activities in the San Francisco Bay area.

In implementing the provisions of the Merchant Marine Act of 1970, MARAD administers construction and operating subsidies to domestic builders and operators to offset the competitive advantages of foreign countries. Construction subsidies are based on the difference between U. S. and foreign shipbuilding prices. Many of the large tankers being built in the U. S. are presently subsidized under this program. A bill pending in Congress requires that 20% of all oil entering the U. S. by tanker be carried on U. S. flag vessels.

U. S. Coast Guard

As the principal maritime safety and law enforcement arm of the Federal Government, the Coast Guard is charged with the protection of vessels, harbors, and waterfront facilities. In recent years it

has also gained substantial authority and responsibility over port planning.

Operating within the Department of Transportation, Coast Guard rules and regulations govern the design and construction as well as the maintenance and operation of vessels. The Ports and Waterways Safety Act of 1972 extended this authority to the regulation of cargo handling, means of preventing and mitigating damage to the marine environment, vessel operations, and the qualifications of officers and crew. Penalties are established for ship owners and operators who do not comply with the regulations.

All ports are subject to inspection by the Coast Guard to test for compliance with the new pollution regulations. Where there is a danger of oil spills, the Coast Guard can close down a facility. Included in the new regulations, effective July 1, 1974, is that bilge waters be discharged from tankers into facilities at the port.

The Coast Guard is considering amending the pollution regulations by adding interim regulations that govern the design and operation of U. S. tank ships certified to carry oil in the domestic United States trade. These requirements would provide additional environmental safeguards for the transportation of Alaskan oil to the West Coast.

The San Francisco Vessel Traffic System (VTS) was commissioned in 1972. The Coast Guard estimates a 7% reduction in collisions, rammings and groundings in San Francisco Bay through the use of this radar system. A similar system came into operation in Puget Sound, Washington at about the same time. It was decided that the San Pedro Harbor area did not need such a system for traffic control.

Bureau of Land Management

Operating within the Department of Interior and under the Outer Continental Lands Act of 1953, BLM has licensing authority over the construction of deepwater port pipelines in a zone extending from 3 miles to 20 miles offshore. In California, proposed developments within the three-mile limit would fall under the jurisdiction of the State Lands Division.

Interstate Commerce Commission

Among the many modes of transportation under ICC's jurisdiction are water carriers and oil pipelines. Although ICC has no direct involvement in the planning of maritime facilities, overlapping jurisdiction with the Federal Maritime Commission creates some conflicts. Shipments within California and not part of an interstate or foreign movement are regulated by the Public Utilities Commission.

ENVIRONMENTAL AGENCIES

Federal agencies concerned with environmental impacts have an indirect role in harbor and port development. The primary agencies that would have a responsibility for oil terminals include (1) the Federal Maritime Commission, (2) the Environmental Protection Agency, (3) the National Oceanic and Atmospheric Administration, and (4) the U. S. Fish and Wildlife Service, and (5) the Council on Environmental Quality.

Federal Maritime Commission

The Federal Maritime Commission (FMC) is an independent agency to

regulate foreign and domestic waterborne shipping of the United States. One responsibility of FMC involves assuring financial responsibility for water pollution clean-up. FMC administers a provision of the Water Pollution control Act of 1970 requiring the owner or operator of every vessel over three hundred gross tons to establish and maintain evidence of financial responsibility for assuring the cost of removing oil discharged into navigable waters. Actual supervision of the cleanup is administered by the Coast Guard.

Environmental Protection Agency

EPA is an independent regulatory agency established by the Executive Branch pursuant to the provisions of the National Environmental Protection Act of 1970 (NEPA). Under this act and a more recent Ocean Dumping Act, EPA is responsible for developing criteria which the Corps of Engineers applies in issuing permits for the disposal of dredged material. If the dumping operation is non-federal and is within the three-mile limit of California, jurisdiction certification of a State Regional Water Quality Control Board is required.

National Oceanic and Atmospheric Administration

NOAA, operating within the Department of Commerce, is the center of technical expertise in the oceanic, atmospheric and marine biological sciences. Under the Coastal Zone Management Act of 1972, NOAA administers a new federal program designed to encourage and assist coastal states to develop and administer coastal zone management programs. Grants are allocated to states to assist in their coastal

zone planning which includes deepwater ports. MARAD and NOAA have a joint role of technical assistance in the review of the port and navigation development portions of coastal zone management programs.

U. S. Fish and Wildlife Service

Operating within the Department of the Interior the agency reviews navigation projects to prevent or minimize any adverse effects of dredging and disposal of dredged materials. The Service's jurisdiction coincides with the Army Corps of Engineers in that it extends to the navigable waters of the U. S.

Council on Environmental Quality

Operating as the President's environmental arm, CEQ has reviewed several proposals for the construction of deepwater ports. CEQ feels that the principal impact of a deepwater port and associated facilities such as pipelines, storage tanks, refineries, and other industry will occur on adjacent land areas rather than in the marine environment.

We wish to credit Harry Erlich, U. S. Army Corps of Engineers, for sections of this Appendix.

DEEPWATER PORT ACTIVITIES

IN OTHER COASTAL STATES

MAINE

The State Planning Office, Coastal Planning Group, commissioned the Research Institute of the Gulf of Maine to conduct a study on the Impacts of Deepwater Ports. A special state committee was established to evaluate a deepwater site for heavy industrial activity.

MASSACHUSETTS

The Massachusetts Port Authority (Massport) hired Frederic R. Harris, Inc., Arthur D. Little, Inc., and Raytheon, Corp. to conduct a deepwater port study for the Greater Boston area.

NEW JERSEY

The State is considering legislation to create an agency to build and operate a deepwater port.

DELAWARE

Through a House Joint Resolution in 1971, the State established the Delaware Bay Oil Transport Committee. The Legislature then appropriated \$130,000 in March 1972 to commission Bechtel Corporation to assist the Committee in a deepwater port study.

MISSISSIPPI/ALABAMA

The two States joined to form the Ameraport Commission for the purpose of developing a deepwater port in the Gulf of Mexico. The Battelle Columbus Laboratories was commissioned to prepare environmental and economic assessments of the project.

LOUISIANA

The Governor created a Superport Task Force which commissioned Kaiser Engineers to prepare an economic impact report for a Louisiana offshore oil port. Subsequently, the Legislature enacted the Deep Draft Harbor and Terminal Authority which also contracted Kaiser Engineers to prepare a superport environmental protection plan. The State had appropriated \$422,860 through June 1974 for this study and will spend an additional \$200,000 to \$340,000 in the coming fiscal year.

TEXAS

Legislation created the Texas Offshore Terminal Commission in 1972. A report, which included an environmental and socio-economic assessment was submitted to the Legislature in January 1974.

WASHINGTON

Senate Resolution established a Task Force to study deepwater ports. The Legislature appropriated \$427,150 to conduct the eight-month study which is to be completed by January 1975.

NEW ENGLAND REGIONAL COMMISSION

The six New England States are conducting a regional study on the Effects on New England of Developing a Petroleum Industry. Requests for proposals went out to consulting firms in July 1974. A major part of the project will involve deepwater ports and associated facilities.

COASTAL PLAINS REGIONAL COMMISSION

The States of Georgia, South Carolina and North Carolina have jointly appropriated \$300,000 to conduct a deepwater port study. A report is to be released in September 1974.

COASTAL STATES ORGANIZATION

POSITION STATEMENT -

DEEPWATER PORTS

The Coastal States Organization supports federal legislation on Deep Water Ports which would provide a strong state role in the licensing aspects of any such port and attendant facilities.

BACKGROUND

Congress is currently working on a Deepwater Port (DWP) licensing bill, and final action is expected before Congress adjourns. In June the House passed a bill (H.R. 5898 , Merchant Marine and Fisheries Committee) which gives coastal states very little "say" in the granting of a federal license for such a facility off their coast. The House rejected another bill (H.R. 10701 Public Works Committee) which would have allowed adjacent states a major voice in the licensing procedure by providing a veto provision and establishing preferential ownership system giving first choice to a state-owned, public facility. In the Senate, three Committees (Commerce, Interior and Insular Affairs, and Public Works) are jointly preparing a bill and it is expected during July. Their proposal will provide a stronger state role than the House-passed version.

Most parties, including federal agencies (Council on Environmental Quality, NOAA, EPA, and the Department of Interior), industry, environmentalists, and others agree that the principal impact of a Deep Water Port and the associated facilities such as pipelines, refineries, petrochemical plants, etc. will occur on adjacent land areas rather than in the marine environment. Furthermore, it is generally

agreed that the principal responsibility for minimizing the adverse impact of such facilities falls on state and local governments. Thus it seems logical that since state government will have major responsibilities in coping with the impact, the states should play a major role in the licensing process.

COASTAL STATES ORGANIZATION POSITION

The Coastal States Organization urges the Congress to enact Deep Water Port Legislation that will give the adjacent coastal state a strong role in what is done off and/or along its coastline. Such a role should include a strong state voice concerning (a) the type of Deep Water Port to be constructed, (b) the location of such a Deep Water Port, and (c) operational aspects. Furthermore, such legislation should explicitly require that such a Deep Water Port and associated facilities be in compliance with all state and local regulations concerning water, air, and land uses. The Coastal States Organization believes that legislation which does not provide these provisions is not in the best public interest.

Draft Statement Approved in Substance Unanimously by Delegates attending the Annual Meeting, July 8, 1974.

A CRITIQUE

OF

THE STAFF REPORT OF THE

ASSEMBLY SELECT COMMITTEE ON DEEPWATER PORTS:

By Assemblyman Charles Warren, Chairman, Assembly
Committee on Energy and Diminishing Materials

The Staff Report from the Deepwater Ports Select Committee fails to take note of several vital underlying questions relative to energy policy and provides little analysis of even the narrow deepwater port issues involved.

The specific deficiencies in the report are:

- A lack of documentation of the need for deepwater ports in California rather than (1) deepwater ports in other West Coast states with overland lines of supply into California, or (2) use of existing port facilities in the state by smaller, shallower draft tankers.
- The misleading representation of the amounts of oil likely to be imported and its relation to the need for deepwater ports.
- The absence of consideration of the linkage between Alaskan imports to California and offshore oil development, in terms of the possible delay of OCS drilling.
- The lack of consideration of associated pipeline and transportation facilities through the state necessitated by the huge surplus of oil over intra-state demand projected in the report.

- The absence of discussion of a long-lived oil surplus in the state overpowering energy conservation efforts.
- The inadequate consideration of the relative advantages and disadvantages of onshore and offshore port facilities and terminal designs.
- The insufficient treatment and documentation of oil spill hazards stemming from supertanker traffic and deepwater port offloading, and the relative risks of alternatives.
- The lack of emphasis on the efficient use of facilities through multiple company access.
- The scanty discussion of ownership and financing (public vs. private) of the port facilities themselves, e.g., revenue formulae, role of government, liability, and multiple use.
- The absence of discussion of impacts on independent refiners of the various schemes for offloading and pipelining oil.
- The cursory treatment of the serious adverse impacts of onshore secondary impacts, i.e., the clustering of refineries in critical air and water zones, and land use conflicts in the coastal zone or in non-industrialized areas.
- The insufficient consideration of the adequacy of existing institutions for the control and elimination of adverse consequences of the construction and use of deepwater ports and associated facilities.

- The failure to discuss the major attributes of pending federal legislation and the impact of this legislation on the state.

In sum, the report appears to be an agglomeration of bits and pieces of information, some of it quoted verbatim without citing the source, which lacks any unifying thread. After reading the report one would scarcely know that the debate over a deepwater port is quite heated. No hint of this controversy is given. The report could have been devoted to laying out a framework for the consideration of the components of the issue and analyzing the merits of the arguments on each side, pointing out erroneous data, conjecture, etc. Of particular importance is placing the discussion of deepwater ports in a broader energy policy context. As was the case with the siting of powerplants, the construction of deepwater ports, rather than involving only land use or environmental protection elements, will be a key determinant of the future state energy system. Instead, with a slack treatment of a number of critical problems, the report presents a misleading assessment of the implications of the deepwater ports decision in California. Even more importantly, this report will have an impact on emerging federal legislation. In its present form, this cursory report does not represent the interests of this state well. To support this conclusion, each of the deficiencies noted are treated in detail below.

A. Economic benefits

1. Reduced transportation costs to oil companies

The argument is often raised that supertankers are vastly superior in economic terms to smaller vessels. This is true, of course, only for long hauls of crude oil. The report notes two sources of oil for tanker delivery into California: Alaska and Indonesia. For the Alaskan haul there is no great economic advantage to using tankers above the 200,000 dwt range. In fact, the report notes that present plans call for the use of 150,000 dwt tankers. For the Indonesian oil, larger tankers would be clearly superior. But how much oil will likely be imported from Indonesia or from an exporting country similarly distant? Will only one small port be required for offloading Indonesian crude? No data is presented. Is there then a real need for the port, or is it merely for convenience?

2. Reduced costs to consumers for refined products

Presumably, reduced tanker costs to the oil companies will be reflected in lower costs to consumers. However, the report cites the cost differential to the consumer to be one cent per gallon of gasoline for tankers of 70,000 dwt vs. 250,000 dwt. Is this cost difference worth the risks engendered by a deepwater port and an extensive traffic of highly unmaneuverable super-tankers?

B. Physical Necessity

1. Increased volume of oil deliveries to California ports

The report states that by 1985 the U.S. will be importing 57% of its oil. This figure is unbelievably high and was taken from an Interior Department bulletin published in 1972. It is now clear that increased prices for oil from the exporting countries, continuing energy conservation, and Project Independence will substantially reduce oil imports over pre-embargo estimates. The figure of 35% imports is now looked upon as a high projection for 1985, with the figure gradually lowering as Project Independence is implemented. Furthermore, what is the validity of the average U.S. figure quoted in the report for framing the need in California? As indicated previously, the major increase in tanker traffic would be in shipping Alaskan oil. The report states that 90% of the total two million barrel per day (bpd) flow from Alaska will come into California. This is one of the highest estimates available. Others have projected one million bpd to the State of Washington and one million bpd to California as the more likely result. For this lesser volume of traffic, smaller tankers may

indeed be feasible. The report then has relied to heavily on high import estimates.

2. Inadequacies of present ports.

The report points out that the several ports in California can already handle large tankers: Los Angeles, 125,000 dwt; Long Beach, 138,000 dwt (or 200,000 dwt for a wide beam tanker configuration); San Francisco Bay, 100,000 dwt. With some dredging these ports could handle even the projected traffic. To quote the report, "one company would use tankers as large as 260,000 dwt if facilities were provided (emphasis added)". This indicates the requirement is for convenience, not absolute.

3. Absence of out-of-state alternatives.

The need for a deepwater port in California is tacitly assumed in the report. It is noted, however, that the State of Washington has proposed to construct deepwater port facilities off its shores and pipeline crude and refined products to California. This whole proposal discounts the "need" for a California port, but is never given further consideration. This is a major alternative especially for dealing with Alaskan oil shipments and must be given careful thought.

C. Environmental superiority of Supertankers and Superports

1. Reduced spill hazards due to fewer tankers.

Several companies have argued that shipping more oil in fewer tankers reduces the spillage hazard. This argument is nowhere addressed in the report although it has ignited a considerable controversy. The real question to be addressed would have been whether supertankers might increase the oil spill hazard because of their unmaneuverable bulk and the much larger quantities of oil spilled at any one time. No data is presented in any context on the spill hazard of tanker operations.

2. Reduced spill hazards owing to fewer oil transfers at sea

One major alternative to deepwater terminal is the offloading of oil from supertankers to small barges or tankers which bring the oil into shore ("lightering"). This involves some tricky ocean-going transfers, assuming supertankers will arrive in California in any event. Which involves fewer hazards -- a deepwater terminal or lightering? The report hints that lightering is the more dangerous, but never presents the documentation to make the case.

3. Relative advantages of onshore vs. offshore deepwater port facilities

In this state, we have the rare option of dredging an existing port or providing terminals 1 to 3

miles at sea to accommodate deep draft ships. Faced with this basic choice, though, the report does not even attempt an analysis of the relative advantages and disadvantages of each approach. At one point the report notes: "Estuaries and coastal wetlands, the most biologically sensitive areas of the marine ecosystem, are probably the most environmentally sensitive to impacts of deepwater port development." That quote is almost a verbatim from page 24 of the North Atlantic Regional Study Preliminary Report of the Army Corps of Engineers, but without citing the source. The remainder of the paragraph of the Corps of Engineers report goes on, however, to conclude that offshore facilities are preferable -- a conclusion neither accepted nor rejected in the committee's report. While the report goes on to list a number of environmental considerations involved in the onshore offshore assessment, it does not even present the skeleton of such an assessment. It may be true that there was little time for such analysis, but the need to attack this question is essential in recommending the appropriate deepwater port decision for the state. Since substantial information already exists on this point, the main features of the debate should have been at least identified. Instead the facit conclusion is that an onshore facility (in Los Angeles or Long Beach) is probably the summary

choice

II. CONSIDERATIONS IN EVALUATING DEEPWATER PORTS OPTIONS

A. Impacts on the state energy system

1. Intrastate oil surplus and trans-shipment facilities

Because of the large increment of Alaskan oil potentially to be arriving in California by 1978 or 1979, a surplus of oil beyond even high estimates of future demand within the state will develop. If this surplus remains within the state, it could have adverse effects through (1) encouraging a rapid expansion of consumption and thereby increasing air pollution burdens, (2) encouraging refinery expansions, adding further air and water pollution burdens, (3) removing the desire to conserve oil, leading to a more rapid depletion of the resource, and (4) removing the impetus to employ secondary and tertiary recovery in intrastate oil fields resulting in a reduced recovery rate and the abandonment of oil fields with much of the original oil still in place. Several authorities do not expect there to be a surplus long in the state since facilities will be constructed to ship crude oil and refined products

eastward to more oil-starved areas. What is the status of these pipeline projects? Are the pipeline decisions fully linked with the port decision? Which component is leading the other? Does the port determine where the pipeline go or are pipelines already in the works that will necessitate an associated port? Are the various governmental agencies involved in each project even aware of the linkage?

2. Offshore oil development and deepwater ports

The Interior Department has proposed a lease sale for Outer Continental Shelf (OCS) areas adjacent to Santa Monica - Los Angeles - Long Beach. These potential lease areas are large and include some of the most promising OCS oil fields. They also involve some of the worst environmental impacts since they are near shore.

Industry estimates show no significant production from these areas until the early 1980's -- at exactly the same time the state will be glutted with Alaskan oil. The amount of oil from the OCS leases could be equal to or half again as much as Alaskan oil off-loaded in the state. This will intensify the glut and necessitate even more pipelines for transshipment. Are pipelines plans taking into account both sources of surplus?

If California brings onshore both Alaskan oil and oil from OCS leases, it will probably become a major refining center for the entire western U.S., involving large refinery additions most likely in critical air and water quality areas of Southern California. Could this be avoided by locating deepwater ports in the State of Washington, shifting the refinery burden out-of-state? How could the state control the location of intrastate refineries

to insure avoidance of sensitive areas. Must, therefore, the deepwater port decision be tied to refining siting decisions? The report is silent on this point.

On the other hand, would it be advisable to press for postponement of OCS drilling until the Alaskan glut has disappeared? What impact would this have on the energy system in other, non-coastal Western States?

To answer the type of questions raised under this heading requires the report to go into the role of California in the National and PAD District V context in relation to energy supply. While it legitimately can be argued that this was beyond the scope of the select committee report, an attempt should have been made to set forth these considerations in some sort of energy policy framework.

3. The position of independent refiners vs. the majors.

Is the construction of a deepwater port facility sufficiently great that even medium size independent refiners could not afford to build one? If so, deepwater port terminals controlled by the majors solely for their own use could deprive the independent refiners of crude oil, reducing their market share in the sale of refined products. But even if the terminal were dedicated to common use, the crude oil pipelines from the terminal could be situated in

such a way as to make access by the independents difficult or could not be dedicated as carrier pipelines, allowing the owner (a major) to refuse to ship oil for independent refiners. In this case it appears the transportation facilities associated with the terminal must be scrutinized to insure equitable treatment of smaller or competing companies. This consideration is not, however, discussed in the report.

B. Environmental impacts.

1. Oil spills.

The scanty treatment of oil spill impacts has already been mentioned in the discussion of the onshore offshore issue. But beyond that issue, the elements for assessing the relative environmental/social advantages and disadvantages of various locations of either type facility along the coast in terms of oil spill sensitivity are not presented. Again this is a crucial aspect of the port decision and must be addressed. It is not necessary to present an assessment of the detail expected in an EIS or EIR on a specific project, but only to indicate the magnitude or range of oil spill hazards, the general areas able to withstand spills better than others, sensitive areas to avoid, and measures advisable for mitigating impacts.

2. Construction impacts.

Whether the terminal is onshore or offshore, dredging, pipeline laying, etc. will be necessary. A range of impacts identifying major problems and mitigating measures, similar to that noted above, is not set forth. Information on these two causes of major environmental impacts are necessary components for determining from the outset whether deepwater port facilities are worth the risk. The Corps of Engineers' reports indicate insubstantial adverse impacts, while environmentalists point out serious problems. The pros and cons of the position of each side is at least worth discussion.

C. Relation to associated facilities

1. Proximity to refineries.

The report states that: "Environmental-economic trade-offs dictate imported oil be delivered to refineries at the nearest point consistent with nautical safety and safeguards against oil spillage during transfer operations." On the surface, this statement would seem to imply the need for close proximity, i.e., a few miles. This interpretation must be tempered, since later in the report it is noted that Southern California is planning to locate a deepwater terminal off Estero Bay and connect it to the Richmond refinery with a 277-mile pipeline. "Nearest point consistent with nautical safety and oil spill safeguards " is therefore a

relative term. In considering the impact of these refineries it becomes important to know how near they must be to the terminal and whether they can be dispersed to prevent pollution overloads. The report leaves the reader with no information to look into that question, though a U.S. Department of Transportation study suggests that refineries located at more favorable inland sites removed from the deepwater port would be tenable and perhaps even preferable.¹ Since one of the major arguments in favor of a Long Beach or Los Angeles deepwater port is the need to be near existing refineries, an evaluation of how "near" is "near enough" becomes essential.

2. Use of terminals for other goods.

The report points out that the suggestion has been made to use deepwater terminals for offloading liquefied natural gas (LNG) and dry cargo from deep draft ships. But there is no mention of the complications of such an arrangement. Others have pointed out greater dangers of oil spills and tanker accidents due to increased traffic at proposed multiple cargo terminals. It does little good to make mention of such a topic unless some analysis of the implications, positive and negative is presented.

¹Deepwater Port Policy Issues, Staff Analysis, Senate Committee on Interior & Insular Affairs, p. 14.

D. Secondary impacts.

Deepwater port development will produce both secondary economic and environmental impacts, both beneficial and adverse. In consideration of this issue the report quotes verbatim a study of the U.S. Senate Interior and Insular Affairs Committee (without citing the study): "Petroleum related industrialization generated by a deepwater port increases employment and yield additional revenues and other economic benefits in some areas". The report in using this statement out of context, failed to include the qualification to that remark: "However, the anticipated environmental impacts of such growth include --

1. Increased land requirements for petroleum storage facility, refinery, and petrochemical industry sites;
2. Degradation and despoilation of wetlands, estuarine areas, wildlife habitats and recreation values;
3. Increased burdens on water supply from both industrial and residential growth;
4. Increased industrial and municipal discharge of polluting effluents into waterways and a subsequent decline in water quality;
5. Increased polluting emissions into atmosphere and subsequent decline of air quality;
6. Increased pressure for land development to provide roadways, housing, and municipal services such as schools and hospitals to accomodate population increases induced by industrial growth." (p. 11, Deepwater Port Policy Issues)

Further, the Senate study notes on page 11:

A number of sources agree that, in the absence of specific controls, deepwater port development have already experienced significant industrial development, the incremental burdens placed on the environment by land requirements and effluents associated with petroleum-related industrialization could be particularly severe.

According to the Department of Interior:

* * * location of deepwater port facilities in areas where there are existing refineries and petrochemical industries might only initially require expansion of existing storage, handling, and refining facilities to process the incoming crude. . . . The essence of the situation lies in the fact that even minor incremental refinery production could add pollutants to an environment that may already be stressed to its limits by previous industrial and commercial activity. For example, concentration of a high level of oil imports through one site in the highly developed and densely populated Mid-Atlantic area, could be expected to result in significant environmental impacts.

And on page 15 of the same Senate study:

Although it has been argued that the secondary economic benefits of deepwater port development outweigh the risks of adverse secondary environmental impacts, some studies of the secondary economic impacts of deepwater port development suggest that the cost of providing additional public services required by accelerated growth may, in some cases, render the relative benefits of new industrialization to State and local governments only marginal.

Clearly, secondary impacts especially in an area with existing serious pollution and land use problems are of foremost importance, perhaps even beyond the primary impacts of the port itself. The necessary conclusion is that the port decision must be tied to decisions on refinery location (non-coastal, dispersed, etc.), pipeline construction, and other support facilities. Some form of institutional arrangement, with sufficient regulatory powers, must then be devised to coordinate these decisions. This insight might have been the single most important contribution of the report of the select committee. Instead five sentences form the entire analysis of the issue.

E. Institutional arrangements

1. Joint use of common facilities

Because of the potential adverse consequences of deepwater port development, it may be advisable to keep down the number of such facilities, insuring the optimum use of those which are eventually constructed. This is only alluded to in the report and never considered in detail. A single sentence is the only mention of the issue.

Questions to be answered are:

Will common terminal facilities aggravate onshore secondary impacts through concentration?

How can the terminal be made a common facility under existing law? (e.g., permit requirements, conditions of lease, etc.)?

Is legislation necessary?

Is it a state role or is the ICC the more appropriate agency?

What do the oil companies see as the problems?

Similar questions should be raised about the use of pipeline facilities out of the terminal:

How can independents be assured access to pipelines?

Should the PUC intervene to regulate intrastate pipelines or common carriers?

How could the post development be tied to pipeline development?

2. Adequacy of existing institutions

Several impacts of a deepwater port have been noted to have broad effect. Given the limited, sometimes overlapping, jurisdiction and the varied abilities of the existing agencies responsible for control of these impacts, will this control be sufficient? At the root of this question is an analysis of the nature and extent of the impacts, an identification of the steps which must be taken to effectuate proper controls, and an assessment of the performance and authority of existing institutions in comparison to the goals which are to be met. In contrast, the committee report does not attempt to give even a ballpark estimate of the impacts involved, only lists the agencies involved with a brief description of the responsibilities, recommends no levels of control or goals for regulation of the impacts, and no measurement of agency performance against the goals. The absence of sufficient analysis on regulatory adequacy is especially clear on the secondary impacts issue. Here there seem to be obvious gaps in authority necessary to avoid dangerous consequences. For example, even if the Coastal Commission excludes refineries from the coastal zone, what is to preclude a refinery being located 1001 yards from the mean high tide level? Will the one yard setback really eliminate the adverse impact? More generally, is the

Coastal Commission even cognizant of its pivotal role in regulating the future state energy system? Is it performing its task responsibly?

Without some sort of consolidated authority, won't companies just follow the path of least regulatory resistance? Is this outcome acceptable or not? Only one new feature is proposed -- an oil spill fund collected from each barrel of oil coming through the port. Even this raises constitutional questions over unreasonable interference with interstate commerce.

The question of whether or not existing agencies can deal effectively with deepwater port problems is in no way illuminated by such an approach. This question should have been basic, though, to the select committee report. Its only conclusion? -- "Some degree of environmental control will be necessary..."

3. Ownership and financing

In full, the discussion of the report on this topic is: "Public vs. private financing and ownership of deepwater ports and related facilities must be examined." In Texas and Louisiana, the most bitter controversy over their deepwater ports focused on the public vs. private ownership question.

What are the advantages and disadvantages of operating a deepwater port terminal in a fashion similar to that of an airport, i.e., government ownership, docking fees, etc.? Should state or local government be the owner? What are the problems or merits of other arrangements, for example, joint public-private ownership, regulated private ownership, or franchised private ownership? Should the financing be wholly private, a government-backed loan, or government bonds? Will the federal government provide capital? How are existing ports and port authorities operated and controlled in California? How would the deepwater terminal be integrated with these existing institutions? To answer some of these questions a review of the experience in other states would be helpful. Substantial time must be spent examining present law, present arrangements, and the models from other states in order to present alternatives rationally. The abbreviated treatment in the report really serves none of these purposes.

4. Federal legislation

Congress has agonized for two years now over the appropriate federal role in deepwater ports. The approaches have ranged from total pre-emption to

almost total delegation to the states, from federal port authorities to unregulated private control. Legislation now pending sets up a federal system for granting port construction certificates, upon application, for facilities beyond the three-mile limit. States are given veto powers since they will have to bear the brunt of the onshore secondary impacts. For California, this approach was less significant than it was for Gulf Coast or Atlantic Coast states. The steepness of our West Coast Continental Shelf requires most deepwater ports to be within the three-mile limit and under state control. However, on recommending arrangements at the state level, the requirements of federal law, in effect or likely, must be considered, especially if it has undesirable effects or serious deficiencies. No mention is made in the report of any such considerations, and in fact, the reader is not even warned that any complications of this kind exist.

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1. Aalund, L. R., "Cherry Point Refinery: A Story of Air, Water and Fuel," Oil and Gas Journal, 24 January 1972.
2. Adams, F. G. and J. M. Griffin, "An Economic Linear Programming Model of the U. S. Petroleum Refining Industry," Journal of the American Statistical Association, September 1972.
3. Adelman, M. A., "The World Petroleum Market," Resources for the Future, Inc., The Johns Hopkins University Press, Baltimore, Maryland, 1972.
4. Alexander, Lewis M., ed., "The Law of the Sea," Ohio State University, Columbus, Ohio, 1967.
5. Allen, Alan A., "Santa Barbara Oil Spill," U. S. Senate Subcommittee on Minerals, Materials and Fuels, 20 May 1969.
6. Allen, Alan A. and Roger S. Schueter, "Estimates of Surface Pollution Resulting from Submarine Oil Seeps at Platform A and Coal Oil Point," Santa Barbara County Administration, November 1969.
7. Allen, Heather, "Effects of Petroleum Fractions on the Early Development of a Sea Urchin," Marine Pollution Bulletin, Vol. 2, No. 9, 1971.
8. Alpine Geophysical Associates, Inc., "Oil Pollution Incident, Platform Charlie, Main Pass Block, 41 Field, Louisiana," Water Pollution Control Series, No. 15080EB212/70, Environmental Protection Agency, Washington, D. C., December 1970.
9. Alyakrinskaya, I. O., "Experimental Data on the Oxygen Consumption of Sea Water Contaminated by Petroleum," Oceanology, Vol. 6, 1966.
10. Ameraport Council, "Alabama-Mississippi Superport Preliminary Study," Vicksburg, Mississippi, December 1972.
11. American Association of Port Authorities Committee on Ship Channels and Harbors, "Merchant Vessel Sizes in United States Offshore Trades by the Year 2000," June 1969.
12. ---"National Channel Capability Study (Through the Year 2000)," September 1970.
13. ---"Ship Channel Capabilities for Merchant Vessels in United States Deepwater Seaports Through the Year 2000 (No. Atlantic Region)," June 1970.
14. American Petroleum Institute, "Oil Spills Cleanup Cooperatives," Committee on Environmental Affairs, February 1973.
15. ---"One Answer to the Energy Crisis," Am. Pet. Inst., Washington, D. C., 1972.
16. ---"Petroleum Facts and Figures," Am. Pet. Inst., Wash., D. C., 1971.

17. American Petroleum Institute, "The Energy Supply Problem," Committee on Public Affairs, Am. Pet. Inst., Washington, D. C., 1970.
18. American Petroleum Institute and Federal Water Pollution Control Administration, proc. Joint Conference on Prevention and Control of Oil Spills, 15-17 December 1969.
19. ---Joint Conference on Prevention and Control of Oil Spills, Washington, D. C., 1970.
20. American Petroleum Institute, Independent Petroleum Assoc. of America and Mid-Continent Oil and Gas Assoc., "Joint Association Survey of the U. S. Oil and Gas Producing Industry," 1971 Volume, Annual, 29 November 1972.
21. American Petroleum Institute and the U. S. Department of the Interior, Industry-Government Seminar on Oil Spill Treating Agents, April 1970.
22. Amundsen, Paul A., "Who Should Operate Offshore Terminals, What Are the Options," 5th Natl. Sea Grant Conf., Texas A and M Univ., Center for Marine Resources, Dept. of Marine Resources Info., Assoc. of Sea Grant Program Institutions, 1973.
23. Anderson, E. W. and Shigeaki Mabuchi, "Information Theory Approaches to Navigation," J. Navig., Vol. 25, No. 2, April 1972.
24. Anderson, Wayne, "Are We Nearing the Bottom of the Barrel," Automotive Industry, August 1972.
25. Angfartygs Ab Tirfing, "Sweden Will Build Giant Dry-Cargo Ship," Eur. Chem. News, Vol. 17, No. 414, 9 January 1969.
26. Arabian American Oil Co., "Aramco Readies New Port at Jua Aymah Saudi Arabia," Oil and Gas Journal, Vol. 71, No. 10, 5 March 1973.
27. Arctic Lifelines, Ltd., "Arctic Supertanker Terminals Studies," Oil and Gas Journal, Vol. 68, No. 10, 9 March 1970.
28. Arnal, R. E. and L. C. Leopold, "A Short Survey of the Environment at the Dumping Site for Santa Cruz Harbor Dredging and a Study of Seaward Dipping Internal Structures in Marine Ripple Marks at Whaler's Cove, California," Tech. Pub. No. 72-6, Annual Report, A National Sea Grant Project, Moss Landing Laboratories, August 1972.
29. Asia Oil Co., "Three Tanker Transfer Terminals Being Built at Japanese Ports," World Petrol., Vol. 39, No. 11, October 1968.
30. Atack, D. C. and W. Kohring, "Mooring Systems for Mammoth Ships," Dock and Harbor Authority, October 1970.
31. Atlas, R. M. and R. Bartha, "Stimulated Biodegradation of Oil Slicks Using Oleophilic Fertilizers," Environ. Sci. Tech., June 1973.

32. Atkins, Graham, "Petroleum Refinery Capacity, West Coast United States," South Pacific Division, U. S. Army Corps of Engineers, February 1973.
33. Bahamas Development Corp., "Tanker Port in the Bahamas," Pet Inf., No. 1254 (in French), 8 December 1972.
34. Baker, J. M., "Seasonal Effects of Oil Pollution on Salt Marsh Vegetation," Oikos, Vol. 22, 1971.
35. Ball, Stewart M., "Interview," Office of Management Information, U. S. Department of Commerce, Maritime Administration, 21 Sept 1972.
36. Bartha, R. and R. M. Kitlas, "Stimulated Biodegradation of Polluting Oil at Sea," Ocean Abstracts, Vol. 9, No. 6, December 1972.
37. Bastard, Giauffret, Vleugels, "Supertanker Facilities at the Northern European Ports - Ports of Antwerp, Dunkirk, Le Havre," Rev. Ass. Fr. Tech. Petrole, No. 203, Sept-Oct 1970.
38. Battelle Columbus Laboratories, "Draft Report on Environmental Assessment of the Ameraport Development," Research Report for the Ameraport Corporation, August 1973.
39. Bayside Pipeline Co., "New Combine to Build Delaware Bay Terminal," Oil and Gas Journal, Vol. 70, No. 49, 4 December 1972.
40. Beattie, J. H., "Operational Research into Marine Traffic and Collisions," J. Navig., Vol. 21, No. 4, October 1968.
41. Bellamy, D. J., P. H. Clarke, D. M. John, D. Jones, A. Whittick and T. Darke, "Effects of Pollution from the Torrey Canyon On Littoral and Sublittoral Ecosystems," Nature, Vol. 216.
42. Benkert, Rear Adm. W. M. and Cdr. R. C. Hill, "U. S. Coast Guard Vessel Traffic Systems," July 1972.
43. Bendix Marine Advisers, Inc., "Oceanographic Survey for the Proposed Marine Terminal at Cherry Point, Washington for ARCO," May 1969.
44. Benkert, W. M., Rear Admiral, USCG, "Prevention and Control of Oil Spills," Office of Marine Environment and Systems, Washington, D. C., 14 March 1973.
45. Berridge, S. A., R. A. Deam, R. G. Fallows and A. Fish, "The Properties of Persistent Oils at Sea," Journal of the Institute of Petroleum, November 1968.
46. Black, R. W., "Current Status of Alternative Deep Water Terminal Feasibility," 5th Natl. Sea Grant Conf., Texas A and M Univ., Center for Marine Resources, Dept. of Marine Resources Info., Assoc. of Sea Grant Program Institutions, 1973.
47. Bland, W. F. and R. L. Davidson, ed., "Petroleum Processing Handbook," McGraw Hill, New York, 1967.

48. Blumer, Max, "Hydrocarbons in the Digestive Tract and Liver of a Basking Shark," Science, Vol. 156, 1967.
49. ---"Oil Contamination and the Living Resources of the Sea," FAO Technical Conference on Marine Pollution and its Effects on Living Resources and Fishing, Rome, December 1970..
50. ---"Oil Pollution of the Sea," Oil on the Sea, David P. Hoult, ed., Plenum Press, New York, 1969.
51. ---"Scientific Aspects of the Oil Spill Problem," Environmental Affairs, Vol. 1, No. 34, 1971.
52. Blumer, M., H. L. Sanders, J. F. Grassle, and G. R. Manson, "A Small Oil Spill," Environment, Vol. 13, 1971.
53. Blumer, M. and J. Sass, "Oil Pollution: Persistence and Degradation of Spilled Fuel Oil," Science, Vol. 176, 1972.
54. ---"The West Falmouth Oil Spill, II. Chemistry," WHOI-72-19, Woods Hole Oceanographic Institution, Tech. Rept. No. 72-19, 1972.
55. Blumer, M., J. Sass and G. Souza, "Hydrocarbon Pollution of Edible Shellfish by an Oil Spill," Marine Biology, Vol. 5, No. 2, 1970.
56. Blumer, M., J. Sass, G. Souza, H. L. Sanders, J. F. Grassle and G. R. Hampson, "The West Falmouth Oil Spill," Woods Hole Oceanographic Institute, Tech. Rept. Ref. No. 70.44, 1970.
57. Bognaes, R., "The Design of an 88,000 Cu M LNG Carrier with Spherical Cargo Tanks and No Secondary Barrier," 2nd Intl. Conf. Exhibit. Liquefied Natural Gas, 19-23 October 1973.
58. Bordeaux Port Autonome De, "The Port Autonome de Bordeaux," Pet. Inf., No. 1227 (in French), 28 April 1972.
59. Bourne, W. R. P. and Caughton Johnston, "The Threat of Oil Pollution to North Scottish Seabird Colonies," Marine Pollution Bulletin, Vol. 2, No. 8, 1971.
60. Bradley, James R., "Deep Water Terminals - The Challenge of the Seventies," 5th Natl. Sea Grant Conf., Texas A and M Univ., Center for Marine Resources, Dept. of Marine Resources Info., Assoc. of Sea Grant Program Institutions, 1973.
61. Bragg, Daniel M. and James R. Bradley, "The Economic Impact of a Deepwater Terminal in Texas," Texas A and M Univ. Sea Grant Program, November 1972.
62. ---"Work Plan for a Study of the Feasibility of an Offshore Terminal in the Texas Gulf Coast Region," Texas A and M Univ., Sea Grant Program, College Station Texas, June 1971.
63. Brandenburg, H. J., "Port and Terminal Navigation and Control," Journal of Navigation, Vol. 25, No. 1, January 1972.

64. British Docks Board, "Study Recommends Deeper Humber Estuary," Eur. Chem. News, Vol. 22, No. 559, 17 November 1972.
65. British Petroleum Co., Ltd., "New Gdansk Refinery Encourages Massive Port Expansion," Pet. Times, Vol. 76, No. 1950, 1 December 1972.
66. Brodhead, W. C., "Mammoth Tanker Operation," 15th Annual API Tanker Conference, 28 April 1970.
67. Browes, W. A., D. C. Sisk and R. C. Quayle, "Environmental Guide for Seven U. S. Ports and Harbor Approaches," National Oceanic and Atmospheric Admin., Natl. Climatic Center, Asheville, North Carolina, February 1972.
68. Bureau of Mines, "Oil Availability by Sulfur Levels," NTIS, PB-202, Springfield, Virginia, August 1971.
69. Bureau of Mines, Minerals Yearbook: 1970, "Crude Petroleum and Petroleum Products."
70. Bury, R. B., "The Effects of Diesel Fuel on Stream Fauna," California Fish and Game, Vol. 58, No. 4, 1972.
71. Business Week, "Canada's Superport for Superships, 27 September 1969.
72. ---"No Superports for Supertankers," 20 May 1972.
73. California Department of Fish and Game, "Santa Barbara Oil Leak," Interim Report, 15 December 1969.
74. California Division of Oil and Gas, "Summary of Operations California Oil Fields Production Statistics," Calif. Div. Oil and Gas, 1970.
75. ---"Summary of Operations California Oil Fields - Oil, Gas, and Geothermal Production Statistics," Calif. Div. Oil and Gas, 1971.
76. California Public Utilities Commission, "California Gas Report," Calif. Pub. Ut. Comm., 1971.
77. ---"Report on Ten-Year and Twenty-Year Forecasts of Electrical Utilities' Loads and Resources," Calif. Pub. Ut. Comm., 1972.
78. ---"Summary Report, Ten-Year Forecast on Gas Utilities' Requirements and Supplies 1972-1981," Calif. Pub. Ut. Comm., 1972.
79. California Regional Water Quality Control Board, San Francisco Bay Region, "Self-Monitoring Program for Hydraulic Dredging and Fill at Oakland International Airport by the Port of Oakland, Alameda Co.," October 1972.
80. California Resources Agency, Department of Conservation, "Energy in California, It's Supply...Demand...Problem," January 1973.
81. California State Air Resources Board, "California Air Quality Data, 1971-1972," Vol. III, No. 4; Vol. IV, Nos. 1, 2, 3, 1972.

82. California State Air Resources Board, "The State of California Implementation Plan for Achieving and Maintaining the National Ambient Air Quality Standards," Emmission Factors, Appendix IV, 72.
83. ---"The State of California Implementation Plan for Achieving and Maintaining the National Ambient Air Quality Standards," Chapter 5: Ambient Air Quality Compared to Ambient Air Quality Standards, January 1972.
84. California State Department of Public Health, "Recommended Air Quality Standards Based on Health Effects," submitted to the California Air Resources Board, November 1968.
85. California State Division of Mines and Geology, "Provisional Fault Map of California," Seismic Safety Information Map 72-1, July 67.
86. ---Preliminary Earthquake Epicenter Map of California, 1934-1971," Seismic Safety Map 72-3, July 1972.
87. ---"Tsunami Hazards in California," July 1972.
88. California State Division of Oil and Gas, California State Department of Navigation and Ocean Development, "California Comprehensive Ocean Area Plan," Appendix V., Vol. 2, Non Living Resources, Oil and Gas in the Onshore Coastal Zone, 1971.
89. California State Water Quality Control Board, "Investigation of the Effects of Discharged Wastes on Kelp," Pub. No. 26, 1964.
90. ---"Investigation on the Fate of Organic and Inorganic Wastes Discharged into the Marine Environment and Their Effects on Biological Productivity," Pub. No. 29, 1965.
91. ---"Oceanographic and Biological Survey of the Southern California Mainland Shelf," Pub. No. 27, 1965.
92. California State Water Resources Control Board, "San Francisco Bay-Delta Water Quality Control Program," Final Report, March 1969.
93. ---"A Comprehensive Study of San Francisco Bay," Final Report, Pub. No. 42, 1971.
94. ---"Clean Water for San Francisco Bay," Report to the California Legislature, April 1971.
95. ---"Water Quality Control Plan for Ocean Waters of California," 6 July 1972.
96. Canadian Department of Public Works, "Arctic Study Says Oil Port Feasible," Oil and Gas Journal, Vol. 69, No. 46, November 1971.
97. Canadian Ministry of Transport, "Pilotage Act," 30 June 1971.
98. ---"Report of the Task Force - Operation Oil," (Cleanup of the Arrow oil spill in Chedabucto Bay), Vol. I, 1970.

99. Center for Wetland Resources, "Louisiana Superport Studies Report No. 1: Preliminary Recommendations and Data Analysis," Pub. No. LSU-SG-72-03, Louisiana State University, Baton Rouge, August 72.
100. Chadwick, Harold K., "Toxicity of Tricon Oil Spill Eradicator to Striped Bass," California Fish and Game, Vol. 46, No. 3, 1960.
101. Chan, Gordon, "The Effects of the San Francisco Oil Spill on Marine Life, Part I," College of Marin, Kentfield, California 1972.
102. Chantiers de l'Atlantique, "The Shell View of the Potential and the Limits of Giant Tankers," Ind. Petrole, Vol. 37, No. 402, Oct 69.
103. Chapon, J. P., J. M. Gouze and G. Jousseau, "Prospects for the Use of Large Ships: Port Facilities, Economics of Large Oil Tankers, and Economics of the Use of Large Ships," Rev. Ass. Fr. Tech. Petrole, No. 198, 6th Assoc. Fr. Petrole Nat. Petrol Cong., La Baule, Nov-Dec 1969.
104. Chase Manhattan Bank, "Outlook for Energy in the United States to 1985," Chase Manhattan Bank, New York, 1972.
105. Chem. Eng. News, "French Port Complex to Rival Europoort," Vol. 47, No. 39, 15 September 1969.
106. Chem. Week Journal, "Cost of Operating a Refinery," 19 August 1970.
107. Chia, Fu-Shiang, "Killing of Marine Larvae by Diesel Oil," Marine Pollution Bulletin, Vol. 4, No. 2, 1970.
108. Cicchetti, Charles J., "Alaskan Oil: Alternative Routes and Markets," Resources for the Future, Inc., The Johns Hopkins University Press Baltimore, Maryland, 1972.
109. Clark, A. F., Jr., "A Supertanker Terminal Should Be Constructed in Lower Delaware Bay," Oil and Gas Journal, Vol. 68, No. 18, 4 May 1970.
110. Clark, Allen P., "The Impact of Increasing Vessel Sizes on the Ports of the United States," presented to the 15th Annual API Task Conference, April 1970.
111. Clark, R., et al., "Recommended Treatment of Oiled Seabirds," Advisory Committee on Oil Pollution of the Sea, Research Unit on the Rehabilitation of Oiled Seabirds, University of Newcastle upon Tyne, Dept. of Zoology, June 1972.
112. Clean Air Act, (42-USC 1857) et. seq.
113. Clogston, F., and R. Sylvester, "Reinspection of the Intertidal Zone in the Vicinity of the Ferndale, Washington Refinery," General Petroleum Corporation, September 1958 and October 1959.
114. Cobet, A and H. Guard, "Effects of a Bunker Fuel on the Beach Bacterial Flora," Proc. Conf. in Prevention and Control of Oil Spills American Petroleum Institute, Washington, D. C., 1973.

115. Code of Federal Regulations, Title 40, Part 51, (Regulations Pursuant to Section 110 of Clean Air Act).
116. ---Part 81 (Air Quality Control Regions).
117. Coffey, Joseph B., "Maine's Deepwater Harbors," Department of Economic Development, Augusta, Maine, March 1971.
118. Cohen, Arthur I., et al, "Pollution in the Marine Environment: A Study of Maritime Pollution in New York Harbor," Report No. 10 238, National Bureau of Standards, U. S. Department of Commerce, Washington, D. C., May 1970.
119. ---"An Initial Investigation and Analysis of Economic Benefits of Maritime Aids of Short Range Navigation in Ports and Waterways," Report No. 10 532, National Bureau of Standards, U. S. Department of Commerce, Washington, D. C., January 1971.
120. Collins, J. A., "Problem of Inadequate U. S. Ports Needs Quick Solution," Oil and Gas Journal, Vol. 69, No. 44, 1 November 1971.
121. Commission on Marine Science, Engineering and Resources, "Our Nation and the Sea: A Plan for National Action," U. S. Government Printing Office, Washington, D. C., 1969.
122. Committee on Multiple Use of the Coastal Zone National Council for Marine Resources and Engineering Development, Interdepartmental Ad Hoc Task Group, "Conceptual Plan for Harbor and Port Development Studies," April 1968, revised November 1968.
123. Commoner, Barry, "This Nation's Supply of and Demand for Fuel and Energy Resources," Hearings of the House of Representatives Committee on Interior and Insular Affairs, Washington, D. C., 10 April 1972.
124. Compagnie Algerienne de Methane Liqu, "French Recent Accomplishments and Prospects with Respect to Natural Gas Liquefaction and Storage and Marine Transport of Liquefied Natural Gas," Paper No. PD-26(3), 7th World Petrol Congress, Mexico City, 2-8 April 67.
125. Compagnie Industrielle Maritime, "Development of the Port at Le Havre for the Reception of Petroleum Supertankers," Rev. Ass Fr. Tech. Petrole, No. 199, Jan-Feb 1970.
126. ---"The Expansion of Harbor Facilities for the Reception of Crude Oil," Ind. Petrole, Vol. 39, No. 1-2, Jan-Feb 1971.
127. Computer Sciences Corporation, "Data Collection and Analysis Techniques for a Planned Experimental Harbor Advisory Radar (HAR) System," Contract No. DOT-CG-93175-A, 1969.
128. Connel, D. W., "Kerosine-Like Tainting in Australian Mullet," Marine Pollution Bulletin, Vol. 2, No. 11, 1971.

129. Connell, J. H., "A Review of Straughan D., 1971, 'Biological and Oceanographic Survey of the Santa Barbara Channel Oil Spill I - Biology and Bacteriology', Allan Hancock Foundation, Univ. of Southern California, and 'A Guide to the Proper Method of Investigation of the Effects of Oil Pollution on Marine Organisms'," May 1971.
130. Conover, R. J., "Some Relations Between Zooplankton and Bunker C Oil in Chedabucto Bay Following the Wreck of the Tanker Arrow," J. of the Fisheries Research Board, Canada, Vol. 28, No. 9, 1971.
131. Continental Oil Co., "E. Canada to Get Another Supertanker Terminal," Oil and Gas Journal, Vol. 69, No. 48, 29 November 1971.
132. Cook, Jerry E. and Norman Padelford, "New Dimensions of U. S. Marine Policy," M.I.T. Sea Grant Program, Cambridge, Mass., April 1971.
133. Cooke, Robert F., "Modern Concepts of Ocean Transportation of Petroleum," ASME, 1 June 1967.
134. Cooper, K. B., "Deep Water Ports, How Do We Get There from Here," 5th Natl. Sea Grant Conf., Texas A and M Univ., Center for Marine Resources, Dept. of Marine Resources Info., Assoc. of Sea Grant Program Institutions, 1973.
135. Corner, E. C. S., A. J. Southward and E. C. Southward, "Toxicity of Oil Spill Removers (Detergents) to Marine Life, An Assessment Using the Intertidal Barnacle Seminius modestus," Journal Marine Biology Assoc., Vol. 48, No. 1, University of Kansas, 1968.
136. Corrigan, Richard, "Japan May Get Some Alaskan Oil: Foreign Flag Shipping of Exports is Likely," National Journal, Vol. 3, No. 31, 31 July 1971.
137. Costa, Vasco, "These Big Ships Need Brakes," The Dock and Harbor Authority, August 1970.
138. COTP NY, "Guidelines for a New York Vessel Traffic System," undated.
139. Council of Economic Advisor, "The Economics of U. S. Deepwater Ports, Final Report, Energy Subcommittee Working Group on Deepwater Ports 2 March 1973.
140. Council on Environmental Quality, "Environmental Quality," Annual reports of the Council, 1970-1972.
141. ---"Oil Spill Probabilities and Analysis of Environmental Controls," Interagency Task Force Report, 1972.
142. ---"Short-Term Report on Superport Environmental Issues," Nov 1972.
143. Cowell, E. B., ed., "The Ecological Effects of Oil Pollution on Littoral Communities," Zoological Soc. of London, 30 Nov-1 Dec 70.

144. Crapp, G. B., "The Biological Effects of Marine Oil Pollution and Shore Cleansing," Annual Report 1969, Field Studies Council, Oil Pollution Research Unit, Orielton Field Centre, 1969.
145. Cronin, L. Eugene, et al, "Preliminary Analysis of the Ecological Aspects of Deep Port Creation and Supership Operation," report submitted to the U. S. Army Engineer Institute for Water Resources, Springfield, Virginia, October 1971.
146. ---"Preliminary Analysis of the Ecological Aspects of the Puget Sound Trough in Western Washington," U. S. Geol. Survey Prof. Paper 525-B, 1965.
147. Cross, James S., "Analysis of the Market for U. S. Flag Tankers," Div. of Transportation of API, at Annual Tanker Conference of the Central Comm. on Transportation by Water, 12-14 May 1969.
148. Davenport, J., "A Comparison of the Effects of Oil, B. P. 1100, and Eleophilic Fluff upon the Porcelain Crab Procelana platycheles," Chemoshpere, Vol. 2, No. 1, 1973.
149. Davis, C. C., "The Effects of Pollutants on the Reproduction of Marine Organisms," FAO Technical Conference on Marine Pollution and Its Effects on Living Resources and Fishing, Rome, December 1970.
150. Dawson, G. W. and A. J. Shuckrow, "Spillage of Hazardous Polluting Substances," Journal Water Pollution Control Federation, Vol. 44, No. 6, June 1972.
151. Deaser, Val J., "Shore Based Radar Q.T.P.," Port of Long Beach, undated.
152. Deepwater Terminal in Delaware Bay, proc. Public Meetings, Dover, Delaware, 31 March 1970, and Philadelphia, Pennsylvania, 1 April 1970.
153. deFrondeville, Bertrand L., et al, "Foreign Deep Water Port Developments - A Selective Overview of Economics, Engineering and Environmental Factors," Arthur D. Little, Inc. for U. S. Army Engineer Institute for Water Resources, Alexandria, Virginia, Dec 71.
154. Degler, Stanley E., ed., "Oil Pollution: Problems and Policies," BNA Environmental Management Series, 1969.
155. Delaware Bay Feasibility Study Group, "Delaware Bay Terminal Complex Pushed," Oil and Gas Journal, Vol. 69, No. 4, 25 Jan 1971.
156. Delaware Bay Oil Transport Committee, "Energy, Oil and the State of Delaware," 2 Vols., Dover, Delaware, 15 January 1973.
157. Delaware Bay Transportation Company, "Cost Study and Design for Marine Transportation Facilities," June 1968.
158. Deller, Stanley, "Oil Pollution, Problems and Policies," U. S. Bureau of National Affairs, 1969.

159. Departments of Interior and Transportation, "A Report on Pollution of the Nation's Waters by Oil and Other Hazardous Substances," February 1968.
160. Deser, R. F., "Improving the Ocean Environment Through Tanker Operational Techniques," 17th Annual Tanker Conference, May 1972.
161. Dilling, T., "Separation of Traffic at Sea...Its Value in Reducing Collision Risks and Thus Potential Oil Pollution," Intl. British Adv. Comm., et al, Oil Pollution of the Sea Conference, Rome, 7-9 September 1968.
162. Dillingham Corporation, "System Study of Oil Spill Cleanup Procedures," Report, 2 Volumes, to Committee on Air and Water Conservation, American Petroleum Institute, February 1970.
163. Dillon, E. Scott, "Ship Design Aspects of Oil Pollution Abatement," Department of Commerce, Washington, D. C., March 1971.
164. Dinkins, Carol E., "Texas Seashore Boundary Law: The Effect of Natural and Artificial Modifications," 10 Houston Law Review, 1972.
165. Dock and Harbor Authority, "The Battle Against Oil Pollution - New Method of Cleaning Up Ocean Oil Spills," April 1970.
166. Donohue, G. L. and J. W. Hoyt, "Harbor Pollution from Large Ships," Naval Undersea Center, Pasadena Laboratory, June 1973.
167. Drewny, H. P., Ltd., "Crude Oil Ports of Western Europe...Six Major Trunk Ports," Pet. Times, Vol. 76, No. 1937, 5 May 1972.
168. ---"London Shipping Statistics and Economics," May-October 1972.
169. ---"Trend to Supertankers Picks up Steam," Oil and Gas Journal, Vol. 70, No. 31, 31 July 1972.
170. Duckham, H. E., "LNG Import Terminals - Design Consideration," Gas Abstract, Vol. 28, No. 10, October 1972.
171. Edison Water Quality Research Laboratory, Oil Pollution Newsletter, U. S. Environmental Protection Agency, July 1971, September 1971, March 1972.
172. Ehrhardt, Petroleum Hydrocarbons in Oysters from Galveston Bay," Environ. Pollut., Vol. 3, 1972.
173. Eliason, J. R. and H. P. Foote, "Physical and Chemical Oceanographic Characterization of the Cherry Point Site and Vicinity," Battelle-Northwest, May 1972.
174. ---"Long Beach Generating Station; Thermal Transport Modeling Study," Battelle-Northwest, November 1972.
175. Ely, Allen L. and John M. Nichol, "Congestion in Small Craft Harbor Entrance Channels," Natl. Transportation Engineering Meeting Preprint 1771, Am. Soc. of Civil Engineers, Milwaukee, Wis. July 72.

176. Emery, Richard M., "The Comparative Toxicity of Dresol to Two Benthic Crustaceans," Water Research, Vol. 4, No. 7, 1970.
177. Engerrand, J., "The Classification of Tankers Transporting Liquid Gases," Ind. Petrole, Vol. 37, No. 11, November 1969.
178. Engineering News-Report, "Joint Search for Deepwater Port Begins," 29 October 1970.
179. Enright, Joseph F., "An Economic Evaluation of the Use of Omega Navigation by Merchant Ships," Navigation, Vol. 16, No. 2, Summer 1969.
180. Environmental Protection Agency, Office of Water Programs, "Control of Oil and Other Hazardous Materials," Washington, D. C., 1971.
181. Esso Standard Libya, Inc., "Esso Speeds Big Libyan Harbor Project," Oil and Gas Journal, Vol. 66, No. 35, 26 August 1968.
182. Eur. Chem. News, "Europort to Handle Bigger Vessels," Vol. 23, No. 576, 23 March 1973.
183. Fairplay International Shipping Journal, "World Ships on Order," pub. quarterly.
184. Farrington, James and James G. Quinn, "Studies on Fatty Acids and Hydrocarbons in Recent Sediments and Benthic Animals from Narragansett Bay, Rhode Island," 2nd Coastal and Shallow Water Conf., Rhode Island, 1971.
185. Farrington, John, C. S. Giam, George R. Harvey, P. Parker and John Teal, "Analytical Techniques for Selected Organic Compounds," Marine Pollution Monitoring, U. S. Department of Commerce, NOAA, October 1972.
186. Fay, J. A., "Physical Processes in the Spread of Oil on a Water Surface," Proc. Joint Conf. on Prevention and Control of Oil Spills, Sponsored by American Petroleum Industry, Environmental Protection Agency and United States Coast Guard, Wash. D. C., June 1971.
187. Fay, James A. and David P. Hoult, "Unusual Fire Hazard of LNG Tanker Spills."
188. Fauchald, K., "Benthic Fauna in the Santa Barbara Channel Following the January 1969 Oil Spill," Biological and Oceanographical Survey of the Santa Barbara Channel Oil Spill, 1969-1970, Vol. I, Dale Straughan, ed., Allan Hancock Foundation, University of Southern California, 1971.
189. Fearnley and Egers Chartering Co., Ltd., "Trades of World Bulk Carriers in 1969," Oslo, Norway.
190. ---"Large Tankers in World Trade in 1969," Oslo, Norway.

191. Flajser, S. and E. Wenk, "The Impact of Alaskan Oil Transport on Puget Sound," The Trend in Engineering, Vol. 24, No. 4, Oct 72.
192. Fortune, "Tankers in World Trade in 1969," Oslo, Norway.
193. Foster Associates, Inc., "An Analysis of the Regulatory Aspects of Natural Gas Supply," Washington, D. C., 1973.
194. Foster, M., A. C. Charters and M. Neushul, "The Santa Barbara Oil Spill Part 1, Initial Quantities and Distribution of Pollutant Crude Oil," Environmental Pollution, Vol. 2, No. 2, 1971.
195. Foster, M., M. Neushul and R. Zingmark, "The Santa Barbara Oil Spill Part 2: Initial Effects on Intertidal and Kelp Bed Organisms," Environmental Pollution, Vol. 2, No. 2, 1971.
196. Foster, William C., "The Analysis of Marine Casualties," Journal of Navigation, Vol. 20, No. 3, July 1967.
197. Fournier, P., "Port Equipment for Transferring Petroleum and Chemical Products," Ind. Petrole, Vol. 38, No. 7, July 1970.
198. Frankel, Commander Bernard, "Needed: Supertanker Sanctuaries," Oil and Gas Journal, 17 April 1961.
199. Frankel, E., "Ecological Factors in Offshore Port Design and Operations," Paper No. 19D, 74th AICHE Natl. Meeting, New Orleans, 11-15 March 1973.
200. ---"Studies on the Future of Atlantic Ports: A Review of the Status and Analysis of Characteristics," MIT Publ No. MIT-SG-72-18, 73.
201. Frankenfeld, J. W., "Factors Governing the Fate of Oil at Sea; Variations in the Amounts and Type of Dissolved or Dispersed Materials During the Weathering Process," proc. Joint Conf. on Prevention and Control of Oil Spills, Washington, D. C., 13-15 March 1973.
202. Fraser, Donald, "Roberts Bank: America's First Outerport," The Dock and Harbor Authority, August 1970.
203. Fulton, R. P., "Marine Pollution Abatement Laws, Problems, and Commentary Concerning Large Vessels," Soc. of Naval Architects and Marine Engineers, New York, 1971.
204. Fujii, Yahei and Reijiro Shiobara, "The Analysis of Traffic Accidents," Studies in Marine Traffic Engineering, (reprint from J. Inst. Nav., Vol. 24, No. 4, Oct 1971) The Institute of Navigation, Royal Geographical Society, London, 1972.
205. ---"Traffic Capacity," J. Navig., Vol. 24, No. 4, October 1971.
206. Gardenier, J. S., II, "Concepts for Analysis of Massive Spill Accident Risk in Maritime Bulk Liquid Transport," Dec 1971 in Notice of Request for Proposals, CG-22, 326-A, U. S. Coast Guard, 25 February 1972.

207. Garretson, Albert, "The Land-Sea Interface of the Coastal Zone of the United States: Legal Problems Arising Out of Multiple Use and Conflicts of Private and Public Rights and Interests," NTIS, Springfield, Virginia, September 1968.
208. GazOcean SA, "LNG Tankers of 200,000 Cu M Capacity," Petrol Inform., No. 1180, 16 April 1971.
209. General Petroleum Corporation, "Report on the Reinspection of the Intertidal Zone in the Vicinity of the Ferndale, Washington, Refinery," September 1958.
210. Genoa Port Authority, "Genoa Offshore Platform Will Boost Port's Throughput," Petrochem. Int., Vol. 11, No. 11, November 1971.
211. George, David J., "The Effects of Pollution by Oil and Oil Dispersants On the Common Intertidal Polychaetes Cirriforma tentaculata and Cirratulus cirratus," Journal of Applied Ecology, Vol. 35, No. 40, 1971.
212. Gibson, A. E., "U. S. ...Must Ports for Giant Tankers be Constructed," Pet. Inf., No. 1210 (in French) 10 December 1970.
213. Gilmore, E. A., et al, "Systems Study of Oil Spill Cleanup Procedures," Dillingham Corp. for Am. Pet. Institute, February 1970.
214. Gladstone Associates, "Potentials for a Delaware Deepwater Port," Washington, D. C., October 1969.
215. Goldberg, E. G., ed., "A Guide to Marine Pollution," Chapter 2, Petroleum, Gordon and Breach, 1972.
216. Gooding, R. "Oil Pollution on Wake Island from the Tanker 'R. C. Stoner'," National Fish Service Special Science Report - Fisheries, U. S. Department of Commerce, NOAA, 1971.
217. Goodwin, C. L., "Evaluation of the 1969 Dredge Spoil Disposal Area of Bellingham Bay," State of Washington Department of Fisheries, Management and Research Division, for U. S. Army Corps of Engineers, 1972.
218. Goss, J., "Solid-Waste Disposal in the San Francisco Bay Region, California," Department of the Interior, U. S. Geological Survey, to accompany Map MF-430, 25 July 1972.
219. Graham, Frank Jr., "Oil and the Maine Coast, Is It Worth It," National Resources Council of Maine.
220. Gray, William O., "Tanker Design and Pollution Mitigation," 17th Annual Tanker Conference, May 1972.
221. Greene, H. G., et al, "Faults and Earthquakes in the Monterey Bay Region, California," Basic Data Contribution No. 58, U. S. Department of Interior, Geological Survey, San Francisco Bay Region Environment and Resources Study, 1973.

222. Grigalunas, Thomas A. and Bruce Mattox, "Regional Impact of Potential Offshore Oil Activity, Economic and Institutional Consideration and the Implication," 8th Annual Conf. New England Marine Technology Soc.
223. Griner, Lynn A. and Robert Herdman, "Effects of Oil Pollution On Waterfowl: A Study of Salvage Methods," Water Pollution Control Research Series, No. 15080EB212/70, U. S. Environmental Protection Agency, Water Quality Control Office, December 1970.
224. Groves, Brig. Gen. R. H., "Impact of Increasing Vessel Sizes on U. S. Ports," 15th Annual API Tanker Conference, April 1971.
225. Governor's Task Force, "Report on Energy, Heavy Industry and the Maine Coast," Augusta, Maine September 1972.
226. Gruen, Gruen and Associates, "Approaches Toward a Land Use Allocation System for the California Coastal Zone," prepared for Dept. of Navigation and Ocean Development, Sedway/Cook, 22 Oct 1971.
227. Gryce, George, "Summary of Potential Petroleum Resources of Region 1 - Alaska," Memoir 15, American Assoc. of Pet. Geologists, 1971.
228. Guard, Harold and Andre Cobet, "Fate of Petroleum Hydrocarbons in Beach Sand," Naval Biomedical Research Laboratory, Oakland, California, May 1972.
229. ---"The Fate of a Bunker Fuel in Beach Sand," proc. Conf. on Prevention and Control of Oil Spills, Am. Pet. Institute, Washington D. C., 1973.
230. Gulf Oil Canada, Ltd., "Canada. A Refinery (on the Canso Strait) in Nova Scotia," Pet. Inf. No. 1251 (in French), 17 November 1972.
231. Gulf Oil Company, "Bantry Bay Terminal Information."
232. Gulf Oil Corporation, "Bantry Bay...A Difficult Project Nearly Completed," World Petrol., Vol. 39, No. 10, September 1968.
233. ---"Big Kuwait Tanker Terminal Job Pushed," Oil and Gas Journal, Vol. 66, No. 17, 22 April 1968.
234. Hallman, G. F. and E. Nelson, "Northwest Air Pollution Authority Proposed Sulfur Compounds Emissions Regulations," Northwest Air Pollution Authority, Mt. Vernon, Washington, 1971.
235. Hammon, A., "Supertanker Ports Urged for U. S. East Coast," Oil and Gas Journal, Vol. 69, No. 26, 28 June 1971.
236. ---"The Growing Supership Problem in U. S. Harbors - The Ship and Harbor Problem," AAPA Convention, November 1968.
237. Hammon, Alfred, Matthew Carrol and Gerhardt Muller, "Ocean Petroleum Tanker Size and Traffic Forecast - Port of New York 1975," The Port of New York Authority, May 1970.

238. Hampson, G. R. and H. L. Sandars, "Local Oil Spill," Oceanus, Vol. 15, No. 2, 1969.
239. Hann, Roy W. Jr. and Wesley P. James, "Environmental Aspects of a Texas Superport," 5th Natl. Sea Grant Conf., Texas A and M Univ., Center for Marine Resources, Dept. of Marine Resources Info., Assoc. of Sea Grant Program Institutions, 1973.
240. Harlow, E. J., "Offshore Storage," 15th Annual API Tanker Conference 27 April 1970.
241. Harrison, Elizabeth A., "Supertankers and Superports: A Bibliography with Abstracts," NTIS No. WIN-73-064, 1973.
242. Hartung, Rolf, "Some Effects of Oil on Reproduction in Ducks," Journal of Wildlife Management, Vol. 29, No. 4.
243. Hartung, Rolf and George S. Hunt, "Toxicity of Some Oils to Waterfowl," Journal of Wildlife Management, Vol. 30, No. 3, 1966.
244. Havre Port Autonome Du, "Le Havre, A European Project," Ind. Pet., Vol. 40, No. 12, December 1972.
245. ---"The Deep-Water Port of Le Havre...Antifer," Pet. Inf., No. 1263 (in French), 2-8 March 1973.
246. Heaver, Trevor D., "The Cost of Large Vessels - An Examination of the Sensitivity of Total Vessel Costs to Certain Operating Conditions," Research and Technical Bulletin No. 7, British National Ports Council, 1970.
247. ---"The Economics of Vessel Size: A Study of Shipping Costs and Their Implications for Port Investments," National Harbors Board, Ottawa Canada, 9 July 1968.
248. Henager, C. H., "Mechanical and Physical Aspects of Water Pollution by Oil Spillage," Journal Water Pollution Control Federation, Vol. 44.
249. Hendricks, T. A., "Resources of Oil, Gas and Natural-Gas Liquids in the United States and the World," U. S. Geological Circular 552, 1965.
250. Herbich, John B., "Control of Oil Spills," Texas A and M, Sea Grant Program, March 1972.
251. Hershey, J., "(U. S.) Need for Superports (For Crude Oil Supertankers)," Chem. Eng. Prog., Vol. 69, No. 3, March 1973.
252. Hidu, Herbert, "Effects of Synthetic Surfactants on Larvae of Clams (M. mercenaria) and Oysters (C. virginica)," Journal Water Pollution Control Federation, Vol. 37, No. 2, 1965.
253. Hite, James C., and James M. Stepp, eds., "Coastal Zone Resources Management," Praeger, New York, 1971.

254. Hittman Associates, Inc., "Study of the Future Supply of Low Sulfur Oil for Electrical Utilities," NTIS, PB-209 257, Springfield, Va.
255. Hoffman, John F., "Man-made Islands Can Solve Many of Our Problems," Ocean Industry, February 1970.
256. Hooper, R., "A Semi-Submerged Stable Platform as an Offshore Port," Petrol. Abstr., Vol. 2, No. 21, 3rd Offshore Tech. Annual Conf., Houston, 1971.
257. Horn, M. N., J. M. Teal and R. H. Backus, "Petroleum Lumps on the Surface of the Sea," Science, Vol. 168, 1970.
258. Hault, David P., ed., "Oil on the Sea," M.I.T. and Woods Hole Oceanic Institute, Plenum Press, Cambridge, Mass., 16 May 1969.
259. Humbert-Basset, R., "The Nantes Station After Ten Years' Service," Gas Abstr., Vol. 27, No. 4, 2nd Int. Conf. Exhibit Liquefied Natural Gas, Paris, Proc. VI Session, April 1971.
260. Huth, Tom, "Delaware Chooses Conservation Over Big Business," Washington Post, 26 June 1971.
261. Iberpuerto Co., "Spain Gives Go-Ahead to Iberpuerto (Port for Super-tankers)," Eur. Chem. News, Vol. 18, No. 451, 25 September 1970.
262. Institute of Civil Engineers, "Tankers and Bulk Carrier Terminals," London, U. K., November 1969.
263. Insurance Company of North America, "A Guide to Cargo Loss Control, Ports of the World," Ninth Edition.
264. Interagency Council on Natural Resources and the Environment, "Texas Coastal Resources Management Program," A comprehensive report to the 63rd Texas Legislature, prepared by the Governor's Office, Division of Planning Coordination, Austin, Texas, December 1972.
265. Intergovernmental Maritime Consultative Organization, "An Analysis of Oil Outflows Due to Tanker Accidents," Document DE/3/2, 8 Nov 1972.
266. Intergovernmental Maritime Consultative Organization Secretariat, "Activities of the Intergovernmental Maritime Consultative Organization in the Field of Marine Pollution," Special Paper, Washington, D. C., 1973.
267. Internation Engineering Co., "All Weather Harbor Navigation Model," Contract No. DOT-CG-94,638-A, Arlington, Virginia, 1969.
268. Intersea Research Corp., "Calculated Wave Heights and Wave-Induced Longshore Current for the Moss Landing Fuel Oil Terminal Extensions," 1973.
269. Interstate Oil Transport Co., "Economic Study of Integrated Deep-water Tanker and Barge Lightering System in the Lower Delaware Bay," for Delaware Bay Transportation Co., New York, New York, 12 May 1970.

270. Irish Hydro Carbon Co., Ltd., "Planning Permission Sought for Bantry Bay Refinery," Eur. Chem. News, Vol. 22, No. 547, 25 Aug 72.
271. Irving Oil Co., Ltd., "Canaport," Can. Petrol., Vol. 10, No. 10, October 1969.
272. Jacobs, John J. and Co., Ltd., "World Tanker Fleet Review," pub. annually, London.
273. Jacobsen, Richard J., "The San Pedro Bay Ship Traffic Control System: A Logical Approach to Marine Safety," Jacobsen Pilot Service, Inc., undated.
274. Jacobson, S. M., "The Effect of a Seawater Soluble Fraction of Kerosine on Chemotoxis in a Marine Snail Nassarius obsoletus," Nature, Vol. 24, London, 1973.
275. James, W. P., et al, "Environmental Aspects of a Supertanker Port on the Texas Gulf," Sea Grant NOAA, Texas A and M University, 1972.
276. Janson, Donald, "Delaware Bars Heavy Industry From Coasts to Curb Pollution," New York Times, 29 June 1971.
277. Japan Ministry of International Trade, "Techno-Economics of Liquefied Natural Gas (LNG) Imported with Marine Transport," Bull. Jap. Pet. Inst., Vol. 14, No. 2, November 1972.
278. Jeffery, P. G., "Large-Scale Experiments on the Spreading of Oil at Sea and Its Disappearance by Natural Factors," Proc. Joint Conf. on Prevention and Control of Oil Spills, Washington, D. C., March, 1973.
279. Jewett, Stanley P., W. P. Taylor, W. T. Shaw and J. W. Aldrich, "Birds of Tanker Accidents," Proc. Joint Conf. on Prevention and Control of Oil Spills, Washington, D. C., 1973.
280. Johannes, R. E., James Maragos and Stephen L. Coles, "Oil Damaged Corals Exposed to Air," Marine Pollution Bulletin, Vol. 3, No. 2, 1972.
281. Johcom, Robert W., "Oil in the Ecosystem," Science, Vol. 166, 1969.
282. Jones, K. D., "The Computer Movement of Shipping in a Port," Journ. Navig., Vol. 25, No. 2, April 1972.
283. Jones, Roger M., "Ocean Bulk Shipping in the 1970's," presented at the 1968 Mining Show, Am. Mining Congress, 7-10 October 1968.
284. ---"The Port Planner and Future Developments," World Ports, Sept 69.
285. Journal of Commerce, "Cite Need for Deep Channels at Major Port Areas in U. S.," 17 November 1961.
286. Juge, D. M., "A Study of the Bacterial Population of Bottom Sediments in the Santa Barbara Channel after the Oil Spill," Bio. and Oceanographical Survey of the Santa Barbara Channel Oil Spill 1969-70, Vol. I, Dale Straughan, ed., Allan Hancock Found. Univ. of Southern California, 1971.

287. Kanter, Robert and Dale Straughn, "Effects of Exposure to Oil on Mytilus californianus from Different Localities," University of Southern California, Sea Grant Program.
288. Karl, R. D., "Single Buoy Moorings," Maritime Reporter, 15 Jan 1971.
289. Keith, V. M. and J. D. Porricelli, "An Analysis of Oil Outflows Due to Tanker Accidents," proc. Joint Conf. on Prevention and Control of Oil Spills, Washington, D. C. 1973.
290. Kimon, P. M., R. K. Kiss and J. D. Porricelli, "Segregated Ballast VLCC's - An Economic and Pollution Abatement Analysis," The Soc. of Naval Architects and Marine Engineers, Washington, D. C., 11 January 1973.
291. Kinkaid, T., M. P. Wennekens and R. O. Sylvester, "A Study of the Oceanographical and Biological Characteristics of Southeast Georgia Strait Prior to Operation of the General Petroleum Corporation Refinery at Ferndale, Washington," December 1954.
292. Kinney, P. J., D. K. Button and D. M. Schell, "Kinetics of Dissipation and Biodegradation of Crude Oil in Alaska's Cook Inlet," Proc. of Joint Conf. on Prevention and Control of Oil Spills, Am. Pet. Institute and Federal Water Pollution Control Admin., New York, December 1969.
293. Kirby, J. H., "Recent Developments in the Marine Transport of Oil (Relating to Water Pollution Control)," Prod. Equip. and Methods for Water Purification Meeting, Genoa, 18-26 October 1969.
294. Knetsch, Jack L., "The Use of Bids for Allocating Deep Water Port Improvements," Seminar on Multiple Use of the Coastal Zone, 13-15 November 1968, Natl. Council on Marine Resources and Engineering Development, 1969.
295. Knight, H. Gary, "The 1971 United States Proposals on the Breadth of the Territorial Sea and Passage Through International Straits," 51 Oregon Law Review, Summer 1972.
296. Koisch, Francis P., "Supercarriers versus U. S. Harbor Dimensions," ASCE National Meeting on Transportation Engineering, 21-25 July 1969.
297. Kolpack, Ronald, "Biological and Oceanographical Survey of the Santa Barbara Channel Oil Spill, 1969-70," Vol. 2, Physical, Chemical and Geological Studies, Allan Hancock Foundation, University of Southern California, 17 February 1971.
298. ---"Summary of Physical, Chemical and Geological Studies of the Santa Barbara Oil Spill," Department of Geological Sciences, University of Southern California, 17 February 1971.
299. Kontogiannis, John E. and Craig J. Barnett, "The Effect of Oil Pollution on the Survival of the Tidal Pool Copepod Tigriopus californicus," Environmental Pollution, Vol. 4, No. 1, 1971.

300. Kuwait Oil Co., Ltd., "Kuwait Oil Co., Ltd. Prepares for Mammoth Tankers," World Petrol., Vol. 39, No. 7, July 1968.
301. Larocke, Gilles, Ronald Eisler and Clarence M. Tarzwell, "Bioassay Procedures for Oil and Oil Dispersant Toxicity Evaluation," Journ. nal, Water Pollution Controllers Federation, Vol. 42, No. 11, 1970.
302. Law, C. E., et al, "Railway to the Arctic: A Study of the Feasibility of a Railway to Move Arctic Slope Oil to Market," Canadian Institute of Guided Ground Transportation, Queen's Univ., July 1972.
303. Lee, R. F., R. Sauerheber and A. A. Benson, "Petroleum Hydrocarbons: Uptake and Discharge by a Marine Mussel Mytilus edulis," Science, Vol. 177, 1972.
304. LeBoeuf, B., "Oil Contamination and Sea Elephant Mortality," Biological and Oceanographical Survey of the Santa Barbara Channel Oil Spill, 1969-70, Vol. I, Dale Straughan, ed., Allan Hancock Foundation, University of Southern California, 1971.
305. Leotta, J. V. and A. J. Taylor, "Coast Guard Transfer Monitoring Program," Proc. Joint Conf. on Prevention and Control of Oil Spills, Washington, D. C., March 1973.
306. Levy, E. M., "Evidence for the Recovery of the Waters Off the East Coast of Nova Scotia from the Effects of a Major Oil Spill," Water, Air, and Soil Poll., Vol. 1, 1972.
307. Lewis, John B. "Effect of Crude Oil and An Oil Spill Dispersant on Coral Reefs," Marine Pollution Bulletin, Vol. 2, No. 4, 1971.
308. Liquid Gas Anlagen Union GMBH, "Offshore Liquefaction of Natural Gas," Shipbldg. Shipp. Rec., Vol. 117, No. 5-6, 29 Jan-5 Feb 1971; Petrol. Abstr., Vol. 11, No. 20, Abstr. No. 145 023, 15 May 1971.
309. Little, Arthur D., Inc., "Combatting Pollution Created by Oil Spills," Vol. 1, 30 June 1969.
310. ---"Foreign Deepwater Port Developments: A Selective Overview of Economics, Engineering and Environmental Factors," IWR Report 71-11, 3 Vols., for the Institute of Water Resources, Dept. of the Army Corps of Engineers, Natl. Tech. Information Svc., Springfield, Virginia, December 1971.
311. ---"Foreign Deep-Water Ports: Lessons for America," Gryphon House, Washington, D. C., 19 February 1973.
312. ---"Machias Bay - Environmental Management," for Atlantic World Port, Inc., December 1969.
313. ---"Potential Onshore Effects of Deepwater Oil Terminal-Related Industrial Development," Executive Summary, Vol. I, Part I, Cambridge, Mass., 1973.
314. ---"The Timing and Size of OCS Petroleum Lease Sales," June 1970.

315. Litton Systems, Inc., Advanced Marine Technology Division, "Ocean-borne Shipping: Demand and Technology Forecasts," Culver City, California, June 1968.
316. Logan, J. W. M. and E. J. Perkins, "Toxicity of Essolvane," Marine Pollution Bulletin, Vol. 3, No. 10, 1972.
317. Long, Tania, "Lloyd's Register Plans 500,000-Ton Tanker," N.Y. Times, 1 January 1967.
318. Loop, Inc., "Plans Advance for Gulf of Mexico Oil Superports," Oil and Gas Journal, Vol. 71, No. 15, 9 April 1973.
319. Los Angeles Co. Air Pollution Control District, "Profile of Air Pollution Control," 1971.
320. ---"Rules and Regulations," 1973.
321. Louisiana Advisory Commission on Coastal and Marine Resources, "Louisiana Government and the Coastal Zone -- 1972," Louisiana State University, Baton Rouge, Louisiana, 31 March 1972.
322. Louisiana State University Center for Wetland Resources, "Louisiana Superport Studies, Report No. 1, Preliminary Recommendations and Data Analysis," August 1972.
323. ---"Louisiana Superport Studies, Report No. 2, Preliminary Assessment of the Environmental Impact of a Superport on the Southeastern Central Coastal Area of Louisiana," 1972.
324. ---"Louisiana Superport Studies, Report No. 3, Recommendations for the Environmental Protection Plan," Draft, 31 October 1972.
325. ---"Draft Environmental Atlas and Multi-Use Management Plan for South Central Louisiana," November 1972.
326. Louisiana Superport Task Force, "A Superport for Louisiana," Louisiana Superport Task Force, Baton Rouge, June 1972.
327. Lynch, Bill, "To Dig or Not to Dig - A Bulky Problem," Delaware River Port Authority Log, May 1968.
328. Maasvlakte Olieterminal CV, "Contracts Awarded for Giant Rotterdam Oil Terminal," Pet. Times, Vol. 77, No. 1957, 23 March 1973.
329. MacDonald, J. A., LCDR, USCG, "Brief Study of the Port of Valdez," September 1971.
330. ---"History of Marine Traffic Management in the U. S. 1700's to Present," 27-29 June 1972.
331. ---"Implementation of Vessel Traffic Systems Upon Passage of the Ports and Waterways Safety Act of 1971," 21 October 1971.
332. ---"The Economic Effects of an Arctic Railway," Railway to the Arctic Supplementary Report No. 2, Canadian Inst. of Guided Ground Trans. Queen's University, August 1972.

333. MacDonald, R. W., "(U. S.) East Coast (Deepwater) Terminal Will Cut Consumer Oil Costs," Oil and Gas Journal, Vol. 71, No. 9, 26 February 1973.
334. Mackin, J. G., "A Review of Significant Papers on Effects of Oil Spills and Oil Field Brine Discharges on Marine Biotic Communities," Project 737, Texas A and M Research Foundation, Feb 1973.
335. Mackin, J. G. and A. K. Sparks, "A Study of the Effects on Oysters of Crude Oil Lost from a Wild Well," Institution of Marine Science, Vol. 7, University of Texas, 1962.
336. Marcus, H. S., "The U. S. Superport Controversy," Technical Review, March-April 1973.
337. Marine Advisers, "Underwater Topography, Bottom Characteristics, Waves and Weather for a Proposed Marine Terminal at Moss Landing, California, 1962.
338. Marine Advisers, Inc., "Oceanographic Survey for the Proposed Marine Terminal at Cherry Point, Strait of Georgia, Washington," for Atlantic Richfield Company, Los Angeles, California, May 1969.
339. Mar. Eng. Rev., "PLA (Port of London Authority) Gets Go-Ahead for Malin Terminal," 16 June 1972.
340. Marine Exchange of La/LB Harbor, "Daily Vessel 3-Day Advance Arrival Report," undated.
341. Maritime Administration, "Merchant Type Ships of 100,000 Tons Deadweight and Over," 31 December 1969.
342. ---"New Ship Construction," Part I - Deliveries During Calendar Year; Part II - Under Construction and/or on Order as of End of Year, published annually.
343. ---"World's Merchant Fleets," Statistical Analysis, as of 31 Dec 68.
344. Marsden, Howard J., "Impact of Increasing Vessel Sizes on U. S. Ports," presented to the 15th Annual API Tanker Conf., April 1970.
345. ---"The Federal Interest," 57th Annual Convention on AAPA, Panel on Growing Supership Problem in U. S. Harbors, 12 November 1968.
346. ---"The Regional Approach to Port Development Planning," National Meeting on Transportation Engineering, ASCE, Panel on Proposed Regional Port Studies by the Federal Government, 22 July 1969.
347. Marshall, T. R., "Recommended Draughts for Transit of the Delaware River," The Pilots' Assoc. for the Bay and River Delaware, Jan 71.
348. Martin, E., "Safety Aspects of LNG Transportation with Special Consideration of Inland Waterways at Coastal Ports," Inst. Gas Eng. Journal, Vol. 13, No. 1, January 1973.

349. Martin, Roscoe, Guthrie S. Birkhead, Jesse Burkhead and Frank J. Munger, "River Basin Administration and the Delaware," Syracuse University Press, Syracuse, New York, 1960.
350. Marx, Wesley, "Oil Spill," A Sierra Club Battlebook, 1971.
351. Mascenick, J., "Offshore Deepwater Crude-Oil Terminals," The Oil and Gas Journal, March 1973.
352. Massachusetts Institute of Technology, "The Georges Bank Petroleum Study, Vol. II, Impact on New England Environmental Quality of Hypothetical Regional Petroleum Development," Report No. MIT-SG 73-5, Offshore Oil Task Group, 1 February 1973.
353. Matson Research Corp., "Transocean Tug-Barge Systems: A Conceptual Study," San Francisco, California, July 1970.
354. Maurer, Don and Hsiang Wang, "Environmental Vulnerability of the Delaware Bay Area to Deep Water Ports," 5th Natl. Sea Grant Conf., Texas A and M Univ., Center for Marine Resources, Dept. of Marine Resources Info., Assoc. of Sea Grant Program Institutes, 1973.
355. McAuliffe, C., "Solubility in Water of Normal C₉ and C₁₀ Alkane Hydrocarbons," Science, Vol. 158, 1969.
356. ---"Solubility in Water of Paraffin, Cycloparaffin, Olefin, Acetylene, Cycloolefin, and Aromatic Hydrocarbons," Journal of Physical Chemistry, Vol. 70, No. 4, 1966.
357. McEwan, E. H. and A. F. C. Koelink, "The Heat Production of Oiled Mallards and Scaup," Con. J. Zool., Vol. 51, 1973.
358. McGinnis, D. R., "Observations on the Zooplankton of the Eastern Santa Barbara Channel from May, 1969 to March, 1970," Biological and Oceanographical Survey of the Santa Barbara Channel Oil Spill, 1969-70, Vol. 1, Dale Straughan, ed., Allan Hancock Foundation, University of Southern California, 1971.
359. McKenzie, Arthur, "The Training of Masters and Pilots in Ship Handling in Grenoble, France," Navigation, Vol. 16, No. 2.
360. McPhee, W. S., "Crude Oil Transshipment Terminals," Society of Marine Port Engineers, Maritime College, Fort Schuyler, New York, N. Y., 1 March 1969.
361. Mead, W. J. and P. E. Sorensen, "The Economic Cost of the Santa Barbara Oil Spill," for Santa Barbara Oil Symposium, 17 Dec 1970.
362. Miget, R. J., C. H. Oppenheimer, H. I. Kator and P. A. LaRock, "Microbial Degradation of Normal Paraffin Hydrocarbons in Crude Oil," Proc. Joint Conf. on Prevention and Control of Oil Spills, Am. Pet. Institute and Federal Water Pollution Control Administration, December 1969.

363. Ministry of Transportation, "Report of the Task Force - Operation Oil Cleanup of Arrow Oil Spills at Chedabucto Bay," 2 Volumes, Canadian Government, 1970.
364. Mironov, O. C., "Hydrocarbon Pollution of the Sea and Its Influence on Marine Organisms," Helgolander Wissenschaftler Meeresunters, Vol. 17, 1968.
365. ---"The Development of Some Black Sea Fishes in Sea Water Polluted by Petroleum Products," Problems of Ichthyology, Vol. 9, No. 6, Russia, 1969.
366. ---"The Effect of Oil Pollution Upon Some Representatives of the Black Sea Zooplankton," Zoologicheskii Zhurnal, Vol. 48, No. 7, Russia, 1969.
367. ---"The Effects of Oil and Oil Products Upon Some Mollusks in the Littoral Zone of the Black Sea," Zoologicheskii Zhurnal, Vol. 46, No. 1, Russia, 1967.
368. ---"Viability of Larvae of Some Crustacea in Sea Water Polluted with Oil Products," Zoologicheskii Zhurnal, Vol. 48, No. 1, 1969.
369. Mironov, O. C. and L. A. Lanskaya, "Survival of Some Marine Plankton and Benthoplanktonic Algae in Sea Water Polluted with Petroleum Products," Bot. Zh., Vol. 53, No. 4, 1968.
370. Mitchell, Charles T., Elinar K. Anderson, Laurence G. Jones and Wheeler J. North, "What Oil Does to Ecology," Journal Water Pollution Controllers Federation, Vol. 42, No. 5, 1970.
371. Mitre Corp., "International Issues," Symposium on Energy, Resources and the Environment, Vol. I, Rev. 2, NTIS PB-213 037/5, Springfield, Virginia, 12 April 1972.
372. Monterey-Santa Cruz County Unified Air Pollution Control District, "Annual Report," 1972.
373. Moore, S. F., R. L. Dwyer and A. M. Katz, "A Preliminary Assessment of the Environmental Vulnerability of Machias Bay," Report No. MIT SG 73-6, Massachusetts Institute of Technology, 15 Jan 1973.
374. Moore, Stephen F., "Some Aspects of Deep Water Terminal Site Selection - Northern New England Coastal Areas," 5th Natl. Sea Grant Conf., Texas A and M Univ., Center for Marine Resources, Dept. of Marine Resources Info., Assoc. of Sea Grant Program Institutions, 1973.
375. Morris, R. J., "Uptake and Discharge of Petroleum Hydrocarbons by Barnacles," Mar. Poll. Bull., July 1973.
376. Mosher, J. C., W. G. MacBeth, M. J. Leonard, T. P. Mullins and M. F. Brunelle, "The Distribution of Contaminants in the Los Angeles Basin Resulting from Atmospheric Reactions and Transport," Journ. of the Air Pollution Control Assoc., Vol. 20, No. 1, 1970.

377. Mostert, Noel, "Profiles - Supertankers - I," The New Yorker, 13 May 1974.
378. ---"Profiles - Supertankers - II," The New Yorker, 20 May 1974.
379. Moulder, David S. and Allen Varley, "A Bibliography on Marine and Estuarine Oil Pollution," Laboratory of the Marine Biological Assoc., University of Kansas, 1971.
380. Munday, J. C., et al, "Oil Slick Motions Near Chesapeake Bay Entrance," Water Resources Bulletin, J. Am. Water Res. Assoc., Vol. 6, 1970.
381. Murphy, T. A., "Environmental Effects of Oil Pollution," Edison Water Quality Laboratory for ASCE Session on Oil Pollution Control, Boston, Mass., 13 July 1970.
382. Murray, S. P., "Turbulent Diffusion of Oil in the Ocean," Journal Limnology and Oceanography, Vol. 17, No. 5, 1972.
383. Murray, S. P. et al, "Oceanographic Observations and Theoretical Analysis of Oil Slicks during the Chevron Spill, March 1972," Coastal Studies Institute Report No. 87, Louisiana State Univ., 1970.
384. Murty, T. S. and M. L. Khandekar, "Simulation of Movement of Oil Slicks in the Strait of Georgia Using Simple Atmosphere and Ocean Dynamics," Proc. Joint Conf. on Prevention and Control of Oil Spills, Washington, D. C., 15 March 1973.
385. Nadeau, R. J. and T. H. Roush, "Biological Effects of Oil Pollution," Edison Water Quality Research Laboratory, New Jersey, 1972.
386. ---"Biological Effects of Oil Pollution, Selected Bibliography 2," National Environmental Research Center, Office of Research and Monitoring, U. S. Environmental Protection Agency, November 1972.
387. Nadeau, Royal J. and Richard T. Dewling, "Hazardous Material Spills vs. Oil Spills, Common Biological Denominator," Proc. 1972 Natl. Conf. of Hazardous Material Spills, Edison Water Quality Research Div., U. S. Environmental Protection Agency, 1972.
388. Nash, A. E. Keir, Dean E. Mann and Phil G. Olsen, "Oil Pollution and the Public Interest," Institute of Governmental Studies, Univ. of California at Berkeley, 1972.
389. Nathan, Robert R. Associates, Inc., "Institutional Implications of U. S. Deepwater Port Development for Crude Oil Imports," IWR Rpt. 73-4, for U. S. Army Engineer Institute for Water Resources, June 1973.
390. ---"U. S. Deepwater Port Study," 5 Vols., IWR Report 72-8, for Inst. Water Resources, Dept. of Army Corps of Engineers, NTIS, Springfield, Va, August 1972.

391. National Academy of Sciences, "Merchant Marine Casualty Data," Washington, D. C., July 1973.
392. ---"Wastes Management Concepts for the Coastal Zone," National Academy of Engineering, Committee on Oceanography and Committee on Ocean Engineering, 1970.
393. National Air Pollution Control Administration, "U. S. Department of Health, Education and Welfare Air Quality Criteria for Hydrocarbons," Pub. No. AP-64, NAPCA, Washington, D. C., 1970.
394. National Council on Marine Resources and Engineering Development, "Report on the Seminar on Multiple Use of the Coastal Zone," Williamsburg, Virginia, 13-18 November 1968, NTIS, Springfield, Virginia 1968.
395. National Marine Consultant's Report, "Wave Statistics for the Twelve Most Severe Storms Affecting Three Selected Stations off the Coast of Northern California, During the Period 1951-1960."
396. ---"Wave Statistics for the Twelve Most Severe Storms Affecting Three Selected Stations Off the Coast of Washington and Oregon, During the Period 1950-1960."
397. National Oceanic and Atmospheric Administration, "Environmental Guide for Seven U. S. Ports and Harbor Approaches," Feb 1972.
398. ---"Narrative Climatological Summary - Long Beach, California. Local Climatological Data. Annual Summary with Comparative Data." Environmental Data Service, Asheville, North Carolina, 1971.
399. ---"Narrative Climatological Summary - Oakland, California. Local Climatological Data. Annual Summary with Comparative Data." Environmental Data Service, Asheville, North Carolina, 1971.
400. ---"Narrative Climatological Summary - San Diego, California. Local Climatological Data. Annual Summary with Comparative Data." Environmental Data Service, Asheville, North Carolina, 1971.
401. National Petroleum Council, "Future Petroleum Provinces of the United States," Washington, D. C., 1970.
402. National Marine Fisheries Service, "The Effects of Waste Disposal in the New York Bight," Final Report, National Marine Fisheries Center, Sandy Hook Laboratory, Highlands, N. J., February 1972.
403. National Transportation Safety Board, "Analysis of the Safety of Transportation of Hazardous Materials on the Navigable Waters of the United States," Report NTSB-MSS-72-2, U. S. Department of Transportation, Washington, D. C., March 1972.
404. ---"Collisions of Radar-Equipped Merchant Ships and Preventive Recommendations," 18 December 1968.

405. National Transportation Safety Board, "Fatality Rates for Surface Freight Transportation," Report No. NTSB-ST-71-4, 1963-1968.
406. ---"Special Study of Collisions Within the Navigable Waters of the United States," Report No. NTSB-MSS-72-1, 2 February 1972.
407. ---"Special Study, Risk Concepts in Dangerous Goods Transportation Regulations," NTSB No. PB-198 264, 27 January 1971.
408. N.A.T.O., Committee on the Challenges of Modern Society, "Coastal Water Pollution, Pollution of the Sea by Oil Spills, Colloquium in N.A.T.O. Headquarters, Brussels, 2-6 November 1970.
409. Naviaux, James L., "Aftercare of Oil-Covered Birds," rev. ed., National Wildlife Health Foundation, California, December 1972.
410. Navships, "The Recovery of Bunker 'C' Fuel Oil from the Sunken Tanker 'S.S. Arrow' and Concurrent Measures Used to Control Oil Pollution in Chedabucto Bay, Nova Scotia, During the Winter of 1970," Navships Report 0094-008-1010, 1970.
411. Nelson-Smith, A., "Oil Pollution and Marine Ecology," Plenum Press, New York, 1973.
412. ---"The Problem of Oil Pollution of the Sea," Advances in Marine Biology, Vol. 9, 1970.
413. Netherlands Pilots' Association, "Collisions in the River Scheldt," Journal Navig., Vol. 21, No. 4, October 1968.
414. Newton, E., "Where Will the Big Tankers Go," Dock and Harbor Authority, October 1967.
415. Nippon Steel Co., "Iraq Port Expansion to Nippon Steel Co.," Eur. Chem. News, Vol. 22, No. 543, 28 July 1972.
416. Nitta, Tadao, Kiyoshi Arakawa, Katsuwo Okubo, Takaka Okibo and Kenji Tabata, "Studies on the Problems of Offensive Odors in Fish Caused by Wastes from Petroleum Industries," Bulletin of the Tokai Regional Fish Research Laboratory, No. 42, April 1965.
417. Noble, Brig. Gen. Charles, "Long Range Planning for Port Development," U. S. Corps of Engineers, AAPA Convention, Vancouver, British Columbia, 19 September 1967.
418. Norgaard, R. B., "Alaska Petroleum Development and West Coast Demand: 1980-2000," Preliminary Draft, January 1973.
419. ---"Alaska Petroleum Development and Supply to the Lower West Coast: 1980-2000," Revised Draft, April 1973.
420. ---"Petroleum Development in Alaska: Prosepects and Problems," Natural Resources Journal, Vol. 12, No. 1, January 1972.

421. Norris, D. P., L. E. Birke, Jr., R. T. Cockburn and D. S. Parker, "Marine Waste Disposal - A Comprehensive Environmental Approach to Planning," Journal WPCF, Vol. 45, No. 1, January 1973.
422. North Atlantic Ports Association, "Ad Hoc Committee Report on Off-shore Mooring Buoys," 22nd Annual Meeting, North Atlantic Ports Assoc., Providence, R. I., 11 June 1970.
423. North, W. J., "Tampico^{MAY} - Study of Destruction and Restoration," Sea Frontiers, Vol. 13, No. 4, 1967.
211-217
424. North W. J., M. Neushul and K. A. Clendenning, "Successive Biological Changes Observed in a Marine Cove Exposed to a Large Spillage of Mineral Oil," Symposium de la Commission Internationale pour l'Exploration Scientifique de la Mer Mediterranee, Monaco, April 1964.
425. Oceanographic Institute of Washington, "Risk Analysis of the Oil Transportation System," Pacific Northwest SEA, Vol. 5, No. 4, 72.
426. O'Donnell, J. P., "SLAM is Gulf Superport Candidate," The Oil and Gas Journal, 19 March 1973.
427. Office of Sea Grant Development, "Louisiana Coastal Law," Advisory Service Report, Louisiana State University, Baton Rouge, La.
428. Offshore Technology Conference, "Oil Pollution, Ports (Deep Water)," Houston, Texas, 1973.
429. Oguri, M. and R. Kanter, "Primary Productivity in the Santa Barbara Channel," Biological and Oceanographical Survey of the Santa Barbara Channel Oil Spill, 1969-1970, Vol. I, Dale Straughan, ed., Allen Hancock Foundation, University of Southern California, 1971.
430. O'Hagen, M., "Marine Traffic Surveillance with Shipborne Monitoring Equipment," J. Navig., Vol. 25, No. 2, April 1972.
431. Oil and Gas Journal, "Annual Refining Survey - 1973."
432. ---"Crude-Oil Pipeline Atlas," Vol. 69, No. 41, 11 October 1971.
433. ---"El Paso Pushes Two More Big Gas Deals: Plans for Study of Pipeline-and-Tanker Project to Move North Slope Gas to California," 11 December 1972.
434. ---"Forecast for the Seventies," Vol. 67, No. 45, 1969.
435. ---"Government Badly Split on Supertanker Ports," 1 May 1972.
436. ---"Industry May Build First U. S. Superport," 1 May 1972.
437. ---"North Slope Oils Score High With Hydroprocessing," 17 May 1971.
438. ---"Oil Spill Control: A Hard Fight But Industry is Slowly Winning," 23 August 1971.

439. Oil and Gas Journal, "Picking Site for New Port Facilities is Problem," 29 May 1972.
440. ---"Soviets Beef Up Far East Oil Port," Vol. 67, No. 52, 29 Dec 1969.
441. ---"Urgent Priority Urged for Superport," 6 November 1972.
442. ---"Where Oil is Headed in Next 40 Years," Vol. 61, No. 13, 1963.
443. ---"World's Tankers Grow in Size, Number," 27 September 1971.
444. Oil Companies Institute for Marine Pollution Compensation, Ltd., "CRISTAL," Hamilton, Bermuda, 4 July 1973.
445. Oliver, Capt. E. F., "Gargantuan Tankers: Privileged or Burdened," U. S. Naval Institute Proceedings, September 1970.
446. Oliver, John and Peter Slattery, "Dredging, Dredge Spoil Disposal and Benthic Invertebrates in Monterey Bay," Final Report of Dredge Spoil Dumping Study, Moss Landing Marine Laboratory, 1973.
447. O'Neal, G. and J. Sceva, "The Effects of Dredging on Water Quality in the Northwest," Office of Water Programs, Region X, Environmental Protection Agency, Seattle, Washington, July 1971.
448. Organization for Economic Co-operation and Development, Special Committee for Oil, "Pipelines in the United States and Europe and Their Legal and Regulatory Aspects," OECD, Paris, 1969.
449. O'Sullivan, A. J. and Alison J. Richardson, "The Torrey Canyon Disaster and Intertidal Marine Life," Nature, Vol 214, London, 1967.
450. Oudet, L., "The Ordering of Seaborne Traffic," J. Navig., Vol. 22, No. 1, January 1969.
451. Pacific Gas and Electric Company, Moss Landing Power Plant, "Operation of Fuel Oil Transfer Facilities Operating Manual," June 73.
452. Pacific Northwest River Basins Commission, "Comprehensive Study of Water and Related Land Resources - Puget Sound and Adjacent Waters State of Washington," Appendix VIII, Navigation, Puget Sound Task Force, 1970.
453. ---"Comprehensive Study of Water and Related Land Resources - Puget Sound and Adjacent Waters, State of Washington," Appendix X, Puget Sound Task Force, 1970.
454. ---"Comprehensive Study of Water and Related Land Resources - Puget Sound and Adjacent Waters, State of Washington," Appendix XI, Fish and Wildlife, Puget Sound Task Force, 1970.
455. ---"Comprehensive Study of Water and Related Land Resources - Puget Sound and Adjacent Waters, State of Washington," Appendix XIII, Water Quality Control, Puget Sound Task Force, 1970.

456. Pacific Southwest Interagency Committee, "Comprehensive Framework Study, California Region," Appendix V, Water Resources, California Region Framework Study Committee, June 1971.
457. ---"Comprehensive Framework Study, California Region," Appendix XVII, Navigation, California Region Framework Study Committee, June 71.
458. Padelford, Norman J., ed., "Public Policy for the Seas," M.I.T. Press, Cambridge, Massachusetts, 1970.
459. Panitz, George, "Offshore Facility Case Pursued," Journal of Commerce, 21 August 1969.
460. ---"Supertanker Use on East Coast Held Uncertain," Journal of Commerce, 13 August 1969.
461. Paoli, A. D., "LNG From Libya," 2nd Intl. Conf. Exhibit. Liquefied Natural Gas, Paris, 19-23 October 1970.
462. Parker, C. A., M. Freearde and C. E. Hatchard, "The Effect of Some Chemical and Biological Factors on the Degradation of Crude Oil at Sea," Water Pollution by Oil, Peter Hepple, ed., Institute of Petroleum, London, 1971.
463. Pearce, Dr. A. W., "Towards the First Million Tonner," Dock and Harbor Authority, October 1969.
464. Perthuis, De, "Tankers and Ports," Pet. Inf., No. 1227, (in French), 28 April 1972.
465. Petro. Chem. Engineer, "A Petro. Chem. Engineer Special Report: R/E/D (Rotterdam/Europoort/Delta)...Europe's Largest HPI Complex Gets Bigger...And Bigger...And Bigger," Vol. 40, No. 6, June 68.
466. Pet. Inf., "(A Survey of Five) French Petroleum Ports," No. 1198 (in French), 17 September 1971.
467. Petrole Inform., "The Harbor Problems of Benelux," No. 1180, 16 April 1971.
468. Petrol. Times, "Development of European Oil Ports and Terminals," Vol. 75, No. 1912, 23 April 1971.
469. Philpel, N., "Measures for Dealing with Oil Pollution of the Sea," Fairplay, 6 July 1967.
470. Platt, E. H. W., "Marine Transportation (of Petroleum)," 8th World Petrol. Congr., Moscow, 13-19 June 1971.
471. Porricelli, J. D. and V. F. Keith, "Tankers and the U. S. Energy Situation - An Economic and Environmental Analysis," Intersociety Transportation Conference, Denver, Colorado, 24-27 September 1973.

472. Porricelli, J. D., V. M. Keith and R. L. Storch, "Tankers and the Ecology," Soc. Naval Architects and Marine Engineers, No. 4, November 1971.
473. ---"Tankers and the Ecology," Soc. Naval Architects and Marine Engineers, Vol. 79, 1971.
474. Port of Le Havre, "Offshore Mooring of Large Tankers," Rev. Ass. Fr. Tech. Petrole, No. 206, Mar-Apr 1971.
475. Port of Milford Have, "Anti-Oil Pollution Plan," September 1973.
476. ---"Emergency Plan," (as amended 23 February 1973).
477. Port of New York Authority, "Ocean Petroleum Tanker Size and Traffic Forecast, Port of New York 1975," May 1970.
478. "Ports and Waterways Safety Act of 1972," Report No. 92-1178, 92nd Congress, 2nd Session, Conference Report ordered to be printed 26 June 1972.
479. Potts, Walter B., "Navigation Systems and Insurance," Navigation, Vol. 16, No. 2, Summer 1969.
480. Premack J. and G. A. Brown, "Predictions of Oil Slick Motions in Narragansett Bay," Proc. Joint Conf. on Prevention and Control of Oil Spills, 13-15 March 1973, Washington, D. C., sponsored by Am. Pet. Industry, Environmental Protection Agency and United States Coast Guard, 1973.
481. Presidential Message, "Control of Hazardous Polluting Substances," House Document No. 92-70, 17 March 1971.
482. Procon Inc., "Study Says Nicaragua Refinery Feasible," Oil and Gas Journal, Vol. 70, No. 30, 24 July 1972.
483. Puerto Rico Economic Development Administration, "Puerto Rico Plugs for Superport, Refineries," Oil and Gas Journal, Vol. 70, No. 51, 18 December 1972.
484. Puget Sound Air Pollution Control Agency, "Regulation I," 1968.
485. Quint, Jim, "America's Nightmare in the New Age of Super Ships," San Francisco Sunday Examiner and Chronicle, California Living, Week of December 7, 1969.
486. Radcliff and Thomas A. Murphy, "Biological Effects of Oil Pollution, Bibliography, A Collection of References Concerning the Effects of Oil on Biological Systems," Federal Water Pollution Control Administration, 1969.
487. Ranken, M. B. F., "Can We Delay the Next Major Tanker Disaster?" Ocean Industry, June 1971.

488. Read, R. G., "Marine Air Penetration of the Monterey Bay Coastal Strip and Salinas Valley, California," Technical Publication 71-2, Moss Landing Marine Laboratories, 1971.
489. ---"Air Flow Land-Sea-Air Interface Monterey Bay, California - 1971," Technical Publication 72-4, CASUL-MLML-TP-72-04, 1972.
490. Regan, G. A., "Nova Scotia Eyes Big U. S. Oil-Supply Role," Oil and Gas Journal, Vol. 71, No. 14, 2 April 1973.
491. Renzoni, A., "Influence of Crude Oil, Derivatives, and Dispersants on Larvae," Marine Pollution Bulletin, Vol. 4, No. 1, Jan 1973.
492. Resources Technology Corporation, "Fate and Effect Studies of Shell Oil Spill, December 1970," U. S. Environmental Protection Agency, Office of Water Programs, January 1972.
493. Rice, Richard A., "The Transportation of North Slope Oil and Long-Range Alaska Transport Needs," Transportation Research Institute, Carnegie-Mellon University, Pittsburgh, Pennsylvania, June 1972.
494. Rintoul, B., "Valdez is Planned Terminal," Offshore, Vol. 33, No. 2, February 1973; Pet. Abstr., Vol. 13, No. 14, Abstr. No. 172, 7 April 1973.
495. Roberts, Keith, "Machiasport, Oil and the Maine Coast," Eastern New England Group of the Sierra Club, August 1969.
496. Robertson, B., S. Arhelger, R. A. T. Law and D. K. Button, "Hydrocarbon Biodegradation in Port Valdez," Port Valdez Environmental Studies, Institute of Marine Sciences Report, University of Alaska, 1973.
497. Robichaux, T. J., and H. H. Myrick, "Chemical Enhancement of the Biodegradation of Oil Pollution," 3rd Annual Offshore Technical Conference, American Institute of Mining, Metal and Petroleum Engineering, 1971.
498. Robinson, C. W., "What's Ahead in Transportation," Min. Eng. (N.Y.), Vol. 23, No. 12, December 1971.
499. Rosselli, Albert T., "Environmental Considerations in Marine Terminal Development," presented at ASCE Annual Environmental Engineering Meeting, New York, October 1970.
500. Rounsefell, George A., "Ecological Effects of Offshore Construction," University of Alabama for Coastal Engineering Research Center, Department of the Army, Washington, D. C.
501. Royal Institute of Navigation and the Royal Institute of Naval Architects, "Marine Traffic Engineering," J. Navig., Vol. 25, No. 3, July 1972.
502. Salin, R., "Climate and Weather, A Description of Existing Environment: Port Valdez, Alaska, to West Coast and Other Ports," CSC, undated.

503. Sandberg, J. S., W. J. Walker and R. H. Thuillier, "Fluorescent Tracer Studies of Pollutant Transport in the San Francisco Bay Area," Journal of the Air Pollution Control Association, Vol. 20, No. 9, 1970.
504. Sanders, H. L., J. F. Grassle and G. R. Hampson, "The West Falmouth Oil Spill, I. Biology," Tech. Rept. No. 72-20, Woods Hole Oceanographic Institution, 1972.
505. San Francisco Bay Area Air Pollution Control District, "Source Inventory of Air Pollutant Emissions in the San Francisco Bay Area," 1971.
506. ---"Air Pollution and the San Francisco Bay Area," 1972.
507. San Francisco Bay Conservation and Development Commission, "San Francisco Bay Plan," January 1969.
508. Sartor, J. D. and C. Foget, "Evaluation of Selected Earthmoving Equipment for the Restoration of Oil-Contaminated Beaches," Program No. 15080EOS10/70, by URS Research Co., for Federal Water Quality Administration, 1970.
509. Schad, Harry G., "Super-Size Ships and Channels," Policy Committee on Waterway Improvements, American Merchant Marine Institute, 16 November 1961.
510. Schimmel, "Safety of Shipping in Harbours and Waterways; Control and Surveillance," Nederlands Radar Proefstation, N. V., 26 Sept 1972.
511. Schwartz, M. L., R. C. Fackler, E. A. Hoerauf, C. E. Larsen, K. L. Lingbloom and M. A. Short, "A Preliminary Study of the Nearshore Currents in the Vicinity of Birch Bay and Cherry Point, Washington Geology Department, Western Washington State College, June 1971.
512. Schwartzberg, H. G., "Spreading and Movement of Oil Spills," Water Pollution Control Research Services, Department of the Interior, 1970.
513. Schwartzlose, R. A. and J. L. Reid, "Nearshore Circulation in the California Current," CALCOFI Reports No. 16, Calif. Mar. Res. Comm., 1973.
514. Seabulk International Corp., "Supership Era Ahead," Chem. Eng., Vol. 80, No. 4, New York, 19 February 1973.
515. Seadock, "'Seadock' A Proposal for a Texas Offshore Oil Unloading Facility," Mimeograph, September 1972.
516. Sea Sovereign, "Cargo Handling Automation for VLCC's (Very Large Crude Carriers)," Marine Engineers Review (Special Suppl. Shipboard Autom. and Control), March 1973.

517. Secretary of the Interior and Secretary of Transportation, "Oil Pollution: A Report to the President," U. S. Government Printing Office, Washington, D. C., 1968.
518. Shannon Petroleum Ltd., "Transshipment Site, Refinery Being Considered for Ireland," Oil and Gas Journal, Vol. 70, No. 27, 3 July 72.
519. Shell Nederland Raffinaderij Nv, "Pernis Capacity is Not World's Largest," Oil and Gas Journal, Vol. 67, No. 49, 8 December 1969.
520. Shell Oil Co., "Energy Forecast for the West Coast," Shell Oil Co., Houston, Texas, 1972.
521. Shelton, R. G. J., "Effects of Oil and Oil Dispersants on the Marine Environment," B, Vol. 177, Proc. Royal Society London, 1971.
522. Shimkin, Michael B., B. Kenneth Kie and L. Zechmeister, "An Instance of the Occurrence of Carcinogenic Substances in Certain Barnacles," Science, Vol. 113, No. 2944, 1950.
523. Sierra Club, "Oil Spill," Sierra Club Bulletin, Vol. 56, No. 2, February 1971.
524. Sivadier, H. O. and P. G. Mikolaz, "Measurement of Evaporation Rates from Oil Slicks on the Open Sea," Proc. Joint Conf. on Prevention and Control of Oil Spills, Washington, D. C., 13-15 March 1973.
525. Slattery, Peter and John Oliver, "The Study of the Effects of Dredge Spoil Dumping on the Benthic Marine Environment," Moss Landing Marine Laboratories, 1972.
526. Small, Sam W., "What's Next in Super Terminals," 5th Natl. Sea Grant Conf., Texas A and M Univ., Center for Marine Resources, Dept. of Marine Resources Info., Assoc. of Sea Grant Program Institutions, 1973.
527. Smith, F. M., "Developing a Total Oil Spill Cleanup Capability in the San Francisco Bay Area," Proc. Joint Conf. on Prevention and Control of Oil Spills, Washington, D. C., 13-15 March 1973.
528. Smith, J. E., ed., "Torrey Canyon Pollution and Marine Life," Cambridge University Press, Cambridge, England, 1968.
529. Smith, J. W., "Occurrence, Cause and Avoidance of the Spilling of Oil by Tankers," Proc. Joint Conf. on Prevention and Control of Oil Spills, Washington, D. C., 13-15 March 1973.
530. Societe Dequipement Petrolier Du Por, "Petroleum Storage at Brest," Petrole Inform., No. 1187, 4 June 1971.
531. SOFEC INC., "SALM is Gulf Superport Candidate," Oil and Gas Journal, Vol. 71, No. 12, 19 March 1973.

532. Soros Associates, Inc., "Evaluation of Offshore Terminal System Concepts," 4 Vols., for the Department of Commerce, Maritime Administration, National Technical Information Service, Springfield, Virginia, November 1971.
533. ---"Offshore Marine Terminals and the Feasibility of a North Atlantic Deepwater Oil Terminal," Executive Paper, pub. by the Dept. of Commerce, Maritime Administration, July 1972.
534. ---"Picking Sites for New Port Facilities is Problem," Oil and Gas Journal, Vol. 70, No. 22, 29 May 1972.
535. Soros, Paul, "Delaware Transfer Terminal System," presented to the Washington, D. C., Coal Club, 15 December 1970.
536. Southern California Coastal Water Research Project, "Ecology of the Southern California Bight: Implications for Water Quality Management," Southern California Coastal Water Research Report, SCCWRP TR104, March 1973.
537. Southern California Gas Co., "Southern California LNG Import Plans," Gas Abstr., Vol. 28, No. 12, 3rd Liquefied Nat. Gas Int. Conf., Washington, D. C., December 1972.
538. South Texas Regional Export Expansion Council, "The Long Arm of REEC," Bulletin, November 1972.
539. Spangler, Miller B., "New Technology and Marine Resource Development," Praeger, New York, 1970.
540. Spanish Ship Research Assn., "Determining the Optimum Ship," Ing. Nav., Vol. 40, June 1972; B.S.R.A. Journal (British Ship. Res. Assoc.), Vol. 28, No. 2, February 1973.
541. Spinelli, F., "Technical Developments in Sea-Going Shipping," Paper 30P, 18th Int. Conf. on Communications, Genoa, 12-16 October 1970.
542. State University of New York, "Possible Effects of Construction and Operation of a Supertanker Terminal on the Marine Environment in New York Bight," Marine Science Research Center, Stony Brook, New York, November 1972.
543. Steenmeyer, "Open-Sea Floating Mooring Facilities for Giant Tankers," Rev. Ass. Tech. Petrole, No. 206, Mar-Apr 1971.
544. Stilz, J. E., "Climatological Summary - The Climate of Oxnard (1931-1960)," Climatology of the United States No. 20-04, U. S. Weather bureau and Oxnard Chamber of Commerce, San Francisco, Calif., undated.
545. Stone, J. H., "Louisiana Superport Studies, Report 2: Preliminary Assessments of the Environmental Impact of a Superport on the Southeastern Coastal Area of Louisiana," Report LSU-SG-72-05, Center for Wetland Resources, Louisiana State University, 1972.

546. Straughan, Dale, "Biological and Oceanographical Survey of the Santa Barbara Channel Oil Spill, 1969-1970, Volume 1, Biology and Bacteriology," Allan Hancock Foundation, University of Southern California, 1971.
547. ---"Summary of Biological Effects of Oil Pollution in the Santa Barbara Channel, Part I," Department of Biological Sciences, University of Southern California, 17 February 1971.
548. Stratton, Andrew, "Navigation, Traffic and the Community," J. Navig., Vol. 24, No. 1, January 1971.
549. Stratton, A. and W. E. Silver, "Operational Research and Cost Benefit Analysis on Navigation with Particular Reference to Marine Accidents," J. Navig., Vol. 23, No. 3, July 1970.
550. Study Group on Interoceanic and Intercoastal Shipping, Report, submitted to the Atlantic Pacific Interoceanic Canal Study Commission, April 1970.
551. Sun Oil Co., "Analysis of World Tank Ship Fleet," Economics Department, published annually.
552. Surveyor, "SPM's - Offshore Ports for Deep-Draft Tankers," Nov 1970.
553. ---"The Combination Bulk Carrier," August 1970.
554. Sylvester, R. O. and F. L. Clogston, "A Report on the Reinspection of the Intertidal Zone in the Vicinity of the Ferndale, Washington, Refinery for the General Petroleum Corporation," University of Washington, April 1956.
555. Sylvester, R. O. and W. I. Aron, "A Report for the General Petroleum Corporation on the Intertidal Beach Zone in the Vicinity of the Ferndale, Washington, Refinery," University of Washington, July 57.
556. Sylverster, R. O., "A Report on the Reinspection of the Intertidal Zone in the Vicinity of the Ferndale, Washington, Refinery," Rpt. for the General Petroleum Corporation, Los Angeles, Calif., 1959.
557. Symonds, Edward, "The Future Supership Problem in U. S. Harbors - A Glimpse at Oil Logistics Ahead," AAPA Convention, Nov 1968.
558. T1-3 Petroleum Committee, "Control of Atmospheric Emissions from Petroleum Storage Tanks," Journal of the Air Pollution Control Association, Vol. 21, No. 5, 1971.
559. Tagatz, Marlin E., "Reduced Oxygen Tolerance and Toxicity of Petroleum Products to Juvenile American Shad," Chesapeake Science, Vol. 2, 1961.
560. Tarzwell, C., "Toxicity of Oil and Oil Dispersant Mixtures to Aquatic Life," Water Pollution by Oil, Peter Hepple, ed., Institute of Petroleum, London, 1971.

561. Templeton, W. L., "Ecological Effects of Oil Pollution," Journal of the Water Pollution Control Federation, Vol. 44, No. 6, June 1972.
562. Tendron, G., "Contamination of Marine Flora and Fauna by Oil and Biological Consequences of the 'Torrey Canyon' Incident," Proc. International Conf. on Oil Pollution at Sea, Rome, 1968.
563. Texas A and M University, "Environmental Aspect of a Supertanker Port on the Texas Gulf Coast," Publ. No. TAMU-SG-73-201, 1973.
564. ---" Work Plan for a Study of the Feasibility of an Offshore Terminal in the Texas Gulf Coast Region," Industrial Economics Dept., Texas A and M University, College Station, Texas, June 1971.
565. Texas Instruments, Inc., "Biological Assessment of Diesel Spill in the Vicinity of Anacortes, Washington, May 1971," Final Report for Environmental Protection Agency, 1971.
566. Texas Law Institute of Coastal and Marine Resources, "Recent Environmental Developments in Maritime and Offshore Activities," 9 Houston Law Review, Proc. Conf. held at Bates College of Law, Univ. of Houston, 11 November 1971, 1972.
567. ---"Regulation of Activities Affecting Bays and Estuaries: A Preliminary Legal Study," Bates College of Law, University of Houston March 1972.
568. ---"Summary of Selected Legislation Relating to the Coastal Zone," Bates College of Law, University of Ouston, February 1972.
569. The American Waterways Operators, Inc., "Big Load Afloat," 1966.
570. The Dock and Harbor Authority, "Liverpool Looks to Million Ton Tankers," undated.
571. The Catholic University of America, "A Literature Survey of Ocean Pollution," Washington, D. C., 1971.
572. The International Tanker Owners Pollution Federation, Ltd., "TOVALOP, London, U. K., January 1973.
573. The Scottish Council (Development and Industry), "Oceanspan 2 - A Study of Port and Industrial Development in Western Europe," Edinburgh, U. K., October 1971.
574. Thomas, M. L. "Effects of Bunker 'C' Oil on Intertidal and Lagoonal Biota in Chedabucto Bay, Nova Scotia," Journal Fish Res. Bd. Canada, Vol. 30, 1973.
575. Thorburn, T., "Oil Shippers Determine Oil Port Development," Petrol. Times, Vol. 74, No. 1895, 8 May 1970.
576. Timpson, James, "Practicality and Potential of Offshore Artificial Island Shipping Terminals," Preprints, 7th Annual Marine Technology Society Conference, Washington, D. C., August 1971.

577. Toyoda, Seiyo and Yahei Fujii, "Marine Traffic Engineering," Journ. Navig., Vol. 24, No. 1, January 1971.
578. Train, R. E., "Offshore Supertanker Ports," Sea Technology, August 1973.
579. Turner, O. M., "Oil Spill Prevention Practices in Pipelines and Terminals," Proc. Joint Conf. on Prevention and Control of Oil Spills, Washington, D. C. 13-15 March 1973.
580. U. K. National Ports Council, "Impact of North Sea Oil on U. K. Ports," Tanker Bulk Carrier, Vol. 19, No. 6, October 1972.
581. United Nations Conference on Trade and Development, "Development of Ports - Improvement of Port Operations and Connected Facilities," TD/B/C.4/42/Rev. 1, Geneva, 1969.
582. United States of America, "An Analysis of Oil Outflows Due to Tanker Accidents," undated.
583. University of California at Santa Barbara, Department of Biological Sciences, "Santa Barbara Oil Spill, Short-Term Analysis of Macroplankton and Fish," February 1971.
584. University of California at Santa Barbara, Marine Science Institute and National Science Foundation, Santa Barbara Oil Symposium, Offshore Petroleum Production, An Environmental Inquiry, 16 Dec 1970.
585. University of Delaware, "Environmental Vulnerability of the Delaware Bay Area to Supertanker Accommodation," submitted to Council on Environmental Quality, December 1972.
586. University of Michigan, "Tanker Preliminary Design Economics," British Ship. Res. Ass. Journal, Vol. 26, No. 2, February 1971.
587. U. R. S. Research Corporation, "Evaluation of Selected Earthmoving Equipment for the Restoration of Oil-Contaminated Beaches," Proc. Am. Pet. Institute Conf., 1971, Federal Water Pollution Control Admin., U. S. Dept. of the Interior, 1971.
588. U. S. Army Engineer Institute for Water, "A Preliminary Analysis of the Ecological Aspects of Deep Port Creation and Supership Operation," NTIS No. 732-465, October 1971.
589. U. S. Bureau of Mines, "Transportation Costs of Fossil Fuels," NTIS PB-202, June 1971; Pet. Abstr., Vol 11, No. 52, Abstr. No. 155, 25 December 1971.
590. U. S. Coast Guard, "Background Material on Existing Harbor Traffic Systems and General VHF-FM Communications Information," VTS IS No. 19, undated.
591. ---"Draft Environmental Impact Statement on Oil Pollution Regulation," NTIS No. PB-206 592, 15 December 1971.

592. U. S. Coast Guard, "Eleventh Coast Guard District Coastal Survey - Coastline Characteristics of Southern California - National Oil and Hazardous Substances Pollution Contingency Plan - Region 9," 1973.
593. ---"Marine Transportation Systems of the Trans-Alaskan Pipeline System," NTIS No. PB-206 592, 15 December 1971.
594. ---"Navigation in Navigable Waters," Federal Register, Part 2, Title 33, Subchapter O, Pollution Prevention - Vessels and Oil Transfer Facilities, 21 December 1972.
595. ---"Oil and Hazardous Substances Pollution Contingency Plan," Sixth Coastal Region, New Orleans, La., March 1972.
596. ---"Oil Pollution Control for Tankermen," February 1973.
597. ---"Polluting Spills in U. S. Waters - 1970," Commandant (WEP) U. S. Coast Guard, Nassif Building, Washington, D. C., September 1971.
598. ---"Preliminary Analysis of Tanker Collisions and Groundings," NTIS AD-757-175, 1973.
599. ---"Report on Part 2 of Study I, Segregated Ballast Aboard Product Tankers and Smaller Crude Carriers," Merchant Marine Technical Division, February 1973.
600. ---"Report on Study I, Segregated Ballast Tankers," Merchant Marine Technical Division, undated.
601. ---"Segregated Ballast Tankers Employing Double Bottoms," for IMCO, undated.
602. U. S. Committee on Government Operations, "Protecting America's Estuaries, Puget Sound and the Strait of Georgia and Juan De Fuca, 18 September 1972," U. S. Gov. Printing Office, 1972.
603. U. S. Comptroller General, "Capability of the Naval Petroleum Reserve and Oil Shale Reserves to Meet Emergency Oil Needs," U. S. General Accounting Office, Washington, D. C., 1972.
604. U. S. Congress, House Committee on Interior and Insular Affairs, "Oil Import Controls," Statement of Phillips Petroleum Company, Hearing before Subcommittee on Mines and Mining, 91st Cong., 2nd Session, 1972.
605. U. S. Council on Environmental Quality, "National Oil and Hazardous Substances Pollution Contingency Plan," Federal Register, Vol. 38, No. 155, 13 August 1973.
606. U. S. Dept. of Army, Corps of Engineers, "Comprehensive Survey of San Francisco Bay and Tributaries, California," Hydraulic Model Studies, Appendix H, Vol. I-III, March 1963.

607. U. S. Dept. of Army, Corps of Engineers, "Development of Coastal Zones - Channel and Harbor Development and Protection," 26 September 1967.
608. ---"Domestic Council Superport Study, Pacific Coast," U. S. Army Engineer Division, South Pacific, August 1972.
609. ---"Draft Environmental Impact Statement - Extension of Entrance to Islais Creek Channel, San Francisco Harbor, California," U. S. Army Engineer District, San Francisco, December 1972.
610. ---"Draft Environmental Impact Statement - Oakland Outer Harbor, Maintenance Dredging, Alameda County, California," U. S. Army Engineer District, San Francisco, September 1972.
611. ---"Environmental Evaluation - Richmond Inner Harbor, Maintenance Dredging, Contra Costa County, California," U. S. Army Engineer District, San Francisco, February 1972.
612. ---"Experts Call U. S. Oil Superports Vital," Oil and Gas Journal, Vol. 70, No. 43, 23 October 1972.
613. ---"Final Environmental Impact Statement - Oakland Inner Harbor, Alameda County, California," U. S. Army Engineer District, San Francisco, February 1973.
614. ---"Final Environmental Statement, Port Hueneme Harbor," U. S. Army Engineer District, Los Angeles, December 1972.
615. ---"Foreign Deep Water Port Developments," IWR Report 71-11, 3 Vols., December 1971.
616. ---"Harbor and Port Development: A Problem and an Opportunity," July 1968.
617. ---"Harbor, Port and Terminal Development," for National Technology Projects Task Force, Committee for Policy Review of the Marine Science Council, October 1969.
618. ---"Outlook/ The Case for Deep Port Construction (Off-Shore Alabama)," Environ. Sci. Technol., Vol. 6, No. 9, September 1972.
619. ---"Preliminary Analysis of the Ecological Aspects of Deep Port Creation, and Supership Operation," U. S. Army Engineers, IWR Report 71-10, October 1971
620. ---"Preliminary Draft Environmental Statement, Los Angeles-Long Beach Harbors," U. S. Army Engineer District, Los Angeles, California, 1972.
621. ---"Public Hearing on ARCO Application for Outfall Pipe at Cherry Point," 1971.
622. ---"Public Hearings on Proposed Offshore Supertanker Terminal in Lower Delaware Bay," 31 March 1970, Dover, Delaware; 1 April 1970, Philadelphia, Pa.

623. U. S. Dept. of Army, Corps of Engineers, "Rationale for Preliminary Findings on Pacific Northwest Deepwater Port Study," U. S. Army Engineer District, Seattle, April 1973.
624. ---"Report on Gulf Coast Deep Water Port Facilities, Texas, Louisiana, Mississippi, Alabama and Florida," Appendix F, Volume IV, June 1973.
625. ---"San Francisco Bay, California - Disposal of Dredge Spoil," Committee on Tidal Hydraulics, U. S. Dept. of the Army, Vicksburg, Miss., December 1965.
626. ---"San Francisco Harbor Project - Main Ship Channel (San Francisco Bar); San Francisco Bay to Stockton, California Project (John F. Baldwin and Stockton Ship Channel)," U. S. Army Engineer District, San Francisco, California, March 1971.
627. ---"Superport Options and Their Costs Are Spelled Out," Chem. Eng. News, Vol. 50, No. 47, 20 November 1972; Chem. Week, Vol. III, No. 21, 22 November 1972.
628. ---"U. S. Deep Water Port Study, Summary and Conclusions, Volume I," IWR Report 72-8, August 1972.
629. ---"U. S. Deep Water Port Study, Commodity Studies and Projections, Volume II," IWR Report 72-8, August 1972.
630. ---"U. S. Deep Water Port Study, Physical Coast and Port Characteristics, and Selected Deep Water Port Alternatives, Volume III," IWR Report 72-8, August 1972.
631. ---"U. S. Deep Water Port Study, The Environmental and Ecological Aspects, Volume IV," IWR Report 72-8, August 1972.
632. ---"U. S. Deep Water Port Study, Transport and Benefit-Cost Relationships, Volume V," IWR Report 72-8, August 1972.
633. ---"Waterborne Commerce of the United States," New Orleans (1969-71).
634. ---"West Coast Deepwater Port Facility Study," June 1973.
635. ---"Workshop Presentation - West Coast Deepwater Port Facilities Study," U. S. Army Engineer District, San Francisco, California, March 1973.
636. ---"West Coast Deepwater Port Facilities Study," Pub. Workshop, San Diego, 21 March 1973; Ventura, 28 March 1973; San Luis Obispo, 29 March 1973; Long Beach, 30 March 1973; Seattle, 3 April 1973.
637. U. S. Department of Commerce, "Delaware Bay Seen Best for Tanker Terminal," Oil and Gas Journal, Vol. 70, No. 11, 13 March 1972.

638. U. S. Department of Commerce, "Draft Environmental Impact Statement on the Maritime Administration Tanker Construction Program," NTIS No. EIS 730392D, 2 Vols., Springfield, Virginia, 1973.
639. ---"Feasibility of a North Atlantic Deepwater Oil Terminal," Exec. Summary, Dept. of Commerce, Maritime Admin., July 1972.
640. ---"Final Environmental Impact Statement - Maritime Administration Tanker Construction Program," NTIS Report EIS 730725-F, Maritime Administration, 1973.
641. ---"The Economics of Deepwater Terminals," Dept. of Commerce, Maritime Administration, Division of Ports and Intermodal Systems, U. S. Government Printing Office, Washington, D. C., November 71.
642. U. S. Department of the Army, Office of the Chief of Engineers, Office of the General Counsel, "Attorney's Supplement: Definition of Navigable Waters of the United States," 9 September 1972.
643. U. S. Department of the Interior, "An Analysis of the Economic and Security Aspects of the Trans-Alaska Pipeline," Vol. I - Summary; Vol. II Supporting Analyses; Vol. III - Supplement, Energy and Policy Alternatives, NTIS Report PB-205 744-745, Dept. of the Interior, Office of Economic Analysis, Springfield Va., March 1972.
644. ---"Final Environmental Impact Statement - Proposed Trans-Alaska Pipeline," Vol. I, Introduction and Summary, 1972.
645. ---"Final Environmental Impact Statement - Proposed Trans-Alaska Pipeline," Vol. III, Environmental Setting Between Port Valdez, Alaska, and West Coast Ports, 1972.
646. ---"Draft Environmental Impact Statement - Deepwater Ports," June 73.
647. ---"Mineral Industry Surveys, Annual Summary of Crude Petroleum, Petroleum Products, and Natural Gas-Liquids for 1969."
648. ---"Oil Pollution, A Report to the President," February 1968.
649. ---"Projections for Superport Requirements," Dept. of the Interior, Office of Oil and Gas, August 1972.
650. U. S. Environmental Protection Agency, "Biological Effects of Oil Pollution, Selected Bibliography II," Edison Water Quality Research Laboratory, November 1972.
651. ---"Control of Oil and Other Hazardous Materials," Office of Water Programs, December 1971.
652. ---"Symposium on Oil Pollution, The Environment and Puget Sound," with the National Oceanic and Atmospheric Administration, and the Washington State Department of Ecology, 23-24 February 1972.

653. U. S. Environmental Science Services Administration and Coast Geodetic Survey, "U. S. Coast Pilot 7, Pacific Coast: California, Oregon, Washington and Hawaii," January 1972.
654. U. S. House Committee on Merchant Marine and Fisheries, "Offshore Ports and Terminals," No. 93-15, U. S. Government Printing Office, 1973.
655. ---"Oil Pollution, H. R. 6495, 6609, 6791 and 7325," February, March and April 1969.
656. U. S. House Committee on Public Works, "Laws of the United States Relating to Water Pollution Control and Environmental Quality," U. S. Government Printing Office, Washington, D. C., July 1970.
657. ---"To Guarantee Affected States an Equal Voice in the Construction of Deepwater Ports," Serial No. 93-15, 19-21 June 1973.
658. U. S. Maritime Administration, "Superport Study Hints at Possible Sites," Chem. Eng. News, Vol. 50, No. 49, 4 December 1972; Oil and Gas Journal, Vol. 70, No. 49, 4 December 1972.
659. ---"Volume I - Draft Environmental Impact Statement - Maritime Administration Tanker Construction Program," NTIS Report No. EIS 730392D, 1973.
660. U. S. News and World Report, "U. S. Boom Coming in Ships to Haul Gas, Oil," 4 September 1972.
661. U. S. Senate Committee on Commerce, Subcommittee on Merchant Marine, "Hearings on S. 3241, 3335 and 3404, Measures Affecting Various Marine Programs, 18 April, 1-3 May 1972," U. S. Government Printing Office, Washington, D. C., 1972.
662. U. S. Senate Committee on Foreign Relations, Subcommittee on Oceans and International Environment, "Conventions and Amendments Relating to Pollution of the Sea by Oil, 20 May 1971," 92nd Cong., 1st Session, Washington, D.C., U. S. Government Printing Office, 1971.
663. U. S. Senate Committee on Interior and Insular Affairs, "Deep Water Port Policy Issues, 25 April 1972," Washington, D. C., U. S. Government Printing Office, 1972.
664. ---"Oversight on Outer Continental Shelf Lands Act, Hearings, 23-24 March and 11-18 April 1972, Parts I, II and III, U. S. Government Printing Office, Serial No. 92-27, 1972.
665. U. S. Senate Committee on Public Works, "Oil Pollution of the Marine Environment: A Legal Bibliography," Washington D. C., U. S. Government Printing Office, 1971.
666. ---"IMCO Civil Liabilities Convention, 21-22 July 1970," Subcommittee on Air and Water Pollution, 91st Cong., 2nd Session, Washington, D. C., U. S. Government Printing Office, 1970.

667. Vagners, Juris and Paul Mar, "Oil on Puget Sound," A Washington Sea Grant Publication, distributed by University of Washington Press, Seattle and London, 1972.
668. Van Cleave, H. D., "Spills Prevention---Phase II," Proc. Joint Conf. on Prevention and Control of Oil Spills, Washington, D. C., 13-15 March 1973.
669. Van Houten Associates, Inc., "Economic and Engineering Analysis for Delivery of Refined Petroleum Products," NTIS Report AD-759 511, Springfield, Virginia, March 1973.
670. Van Houten, L. E. and G. A. McCammon, "The Buoy Mooring for Berthing Tankers," Civil Engineering, March 1964.
671. ---"Study of the Motion of Seagoing Vessels Under the Influence of Waves, Winds and Current in Order to Determine the Minimum Depth Required in Port Approaches and Along Offshore Berthing Structures for Tankers and Oil Carriers," Section 11-2, Ocean Navigation, XXI International Navigation Congress in Stockholm, 1965.
672. van Kampen, D. M., "Successful Cleaning of Oiled Birds in Holland," Mar. Poll. Bull., September 1971.
673. Ventura County Planning Department, "Statement of Policy for Location of On-Shore Oil Facilities," 16 January 1968.
674. Water and Waste Engineering, "Bacteria Eat Oil Sludge," June 1973.
675. Weller, John L., "The Greatest Shipping Revolution - Part 2," Handling and Shipping: The Physical Distribution Management Magazine, October 1970.
676. Wells, Robert R., Herbert G. Blecker, and Bruce L. McDonald, "Estimating the Dangers Presented to Ports and Waterways from the Marine Transportation of Hazardous Cargoes: An Analytical Model," U.S.C.G., 12 December 1969.
677. Wenk, Edward Jr., "The Politics of the Ocean," University of Washington Press, Seattle and London, 1972.
678. Wentzel, David E., and Dean Lytle, "Automated Marine Traffic Advisory Systems, Their Need and Implementation," Document 2330, Honeywell Marine Systems Center, Seattle, Washington, 29 July 71.
679. Wepster, A., "The Future of Merchant Marine Navigation," Journal Navig., Vol. 22, No. 1, January 1969.
680. Wertenbaker, William, "Anatomy of An Oil Spill," MTS Journal, Vol. 8, No. 3, reprint from The New Yorker Magazine, Inc., 1973.
681. Wheeler, R. J. McKenna, Taylor and Linehand, "A Floating Pipeline - Producing Ekofisk Crude into Tankers," 5th Annual Offshore Technology Conference, April 1973.

682. Wilkinson, Elbert R., "California Offshore Oil and Gas Seeps," California Division of Oil and Gas, January 1971.
683. Williams, John D., "U. S. Ships Get Bigger But Firms Face Hurdles in Bids to Enlarge Ports," Wall Street Journal, 30 June 1971.
684. Williams, J. T., "The Changing Design of Ports (for Changing Sizes and Kinds of Oil Tankers and Other Ships)," Chem. Ind. (London), No. 14, 15 July 1972.
685. Wilson, Douglas P., "Temporary Absorbtion On a Substrate of an Oil Spill Remover (Detergent), Tests with Larvae of Sasellaria spinulosa," Journal, Marine Biology Association, University of Kansas, Vol. 48, No. 2, 1968.
686. Wilwerding, J. S., "United States Oil Imports, The Challenge of the Seventies," 5th Natl. Sea Grant Conf., Texas A and M Univ., Center for Marine Resources, Dept. of Marine Resources.
687. ---"U. S. Oil Superports (are) Vital," Oil and Gas Journal, Vol. 70, No. 43, 23 October 1972.
688. Wise, Harold F. Associates, "Intergovernmental Relations and the National Interest in the Coastal Zone," National Technical Information Service, Springfield, Virginia, 1969.
689. Woodin, Sarah A., Carl F. Nyblade and Fu-Shiang Chia, "Effect of a Diesel Oil Spill on Invertebrates," Marine Pollution Bulletin, Vol. 3, No. 9, 1972.
690. World Petrol., "Very Large Oil Tankers Bring Maneuvering and Other Problems," Vol. 41, No. 2, February 1970.
691. World Tanker Fleet Feview, Jon J. Jacobs and Co., Ltd., London, published annually.
692. Yamaguchi, Atsutoshi and Shozo Sakaki, "Traffic Surveys in Japan," Journ. Navig., Vol. 24, No. 4, October 1971.
693. Zannetos, Zenon S., "The Theory of Oil Tankship Rates," M.I.T. Press, Cambridge, Massachusetts and London, 1966.
694. Zein, Charles, "The Growing Supership Problem in U. S. Harbors," AAPA Convention, November 1968.
695. Zeldin, Marvin, "Audubon Black Paper No. 1: Oil Pollution," Audubon, May 1971.
696. Zobell, C. E., "Microbial Modification of Crude Oil in the Sea," Proc. Joint Conf. on Prevention and Control of Oil Spills, Am. Pet. Institute and Federal Water Pollution Control Administration, New York, December 1969.

697. Zobell, C. E., "The Occurrence, Effects and Fate of Oil Polluting the Sea," Adv. Water Poll. Res., Proc. 1st Intl. Conf. Water Poll. Res., Vol. 3, Pergamon Press, Oxford, England, 1964.
698. Zobell, C. E. and J. F. Prokop, "Microbial Oxidation of Mineral Oils in Barataria Bay Bottom Deposits," Zeitschrift fur Allgemeine Mikrobiologie, Vol. 6, 1966.
699. Zumbo, Paul, "Wave of Protest Hits Plan for Oil Depots Off New Jersey Coast," New York Sunday News, 27 July 1969.

- ABBOTT, M. B., 1961. "Containing Oil Spills With a Pneumatic Barrier." Dock Harb. Auth., 42, 259-260.
- ADAM, N. K., 1936. "The Pollution of the Sea and Shore by Oil;" Report to Council. Royal Society, London.
- American Petroleum Institute, 1964. "Manual for the Prevention of Water Pollution During Marine Oil Terminal Transfer Operations." Washington.
- Anon., 1962. "Floating Oil-Spill Booms; Their Use for Counter-acting Spillages." Dock Harb. Auth., 42, 401-404.
- Anon., 1967a. "Tanker of 500,000 dwt;" Feasibility study by Lloyd's Register of Shipping. Shipping World Shipbuild., 160, 257-258.
- Anon., 1967b. "A Way to Tackle the Oil Menace." New Scient., 35, 424.
- Anon., 1968a. "Transfer of Oil Cargo at Sea." Shipbuildg. Intern., 11(3), 28-32.
- Anon., 1968b. "Using Bark to Mop up Spilt Oil." New Scient., 38, 216.
- Anon., 1969a. "Single Buoy Mooring Systems." Ports Dredg., 62, 20-21.
- Anon., 1969b. "A Whole Ocean Polluted?" Oceanus, 15, 1.
- Anon., 1970a. "Oil Under the Ice." New Scient., 45, 62.
- Anon., 1970b. "Foam for Absorbing Oil." Mar. Pollut. Bull., 1(N. S.), 51.
- Anon., 1971. "Dubai's Offshore Facility...A Preview of Future Systems?" Ocean Industry, 6(3), 42-43.
- BAKER, Jenifer M., 1969. "Annual Report of Oil Pollution Research Unit (botony), 1-11." Field Studies Council, Orierton (Pemb.).
- BAKER, Jenifer M., 1970a. "Annual Report of Oil Pollution Research Unit, 3-26." Field Studies Council, Orierton.
- BAKER, Jenifer M., 1970b. "The Effects of Oil on Plants." Environ. Pollut., 1, 27-44.
- BAKER, Jenifer M., 1971a. "The Effects of a Single Oil Spillage; pp. 16-20 in 'The Ecological Effects of Oil Pollution on Littoral Communities'." Institute of Petroleum, London.

- BAKER, Jenifer M., 1971b. "Successive Spillages (ibid.);" pp. 21-32.
- BAKER, Jenifer M., 1971c. "Seasonal Effects (ibid.);" pp. 44-51.
- BAKER, Jenifer M., 1971d. "Effects of Cleaning (ibid.);" pp. 52-57.
- BAKER, Jenifer M., 1971e. "Oil and Salt-Marsh Soil (ibid.);" pp. 62-71.
- BAKER, Jenifer M., 1971f. "Growth Stimulation Following Oil Pollution (ibid.);" pp. 72-77.
- BAKER, Jenifer M., 1971g. "Comparative Toxicities of Oils, Oil Fractions and Emulsifiers (ibid.);" pp. 78-87.
- BAKER, Jenifer M., 1971h. "The Effects of Oils on Plant Physiology (ibid.);" pp. 88-89.
- BAKER, Jenifer M. and CRAPP, G. B., 1971. "Predictions and Recommendations (ibid.);" pp. 217-220.
- BARCLAY-SMITH, Phyllis, 1958. "Oil Pollution of the Sea." Rapp. Commiss. Intern. Explor. Scient. Mer Mediterr., 14, 553-556.
- BARDACH, J. E., FUJIYA, M. and HOLL, A., 1965. "Detergents: Effects on the Chemical Senses of the Fish Ictalurus natalis (le Sueur)." Science, N. Y., 148, 1605-1607.
- Batelle-Northwest Institute, 1967. "Oil Spillage Study;" Report to U. S. Coast Guard. Richland, Washington.
- BEATTIE, J. H., 1963. "Traffic Regulation in the Dover Strait: Appendix C. Locality of Collisions and Shipping Density." J. Inst. Navig., 16, 15-46.
- BEAUMONT, F. N., 1968. "Organization to Control Beach Pollution by Oil; pp. 149-160 in 'Pollution Prevention'." Institute of Petroleum, London.
- BEER, J. V., 1968a. "Post-mortem Findings in Oiled Auks Dying During Attempted Rehabilitation." Fld. Studies, 2 (suppl.), 123-129.
- BEER, J. V., 1968b. "The Attempted Rehabilitation of Oiled Sea Birds." Wildfowl, 19, 120-124.
- BEER, J. V., 1970. "Treating Oiled Birds." Mar. Pollut. Bull., 1 (N. S.), 84-85.

- BERRIDGE, S. A., THEW, M. T. and LORISTON-CLARKE, A. G., 1968. "The Formation and Stability of Emulsions of Water in Crude Petroleum and Similar Stocks; pp. 35-59 in 'Scientific Aspects of Pollution of the Sea by Oil'." Institute of Petroleum, London.
- BES, J., 1963. "Tanker Shipping." Barker & Howard, London.
- BEYNON, L. R., 1968. "Cleaning Up." Hydrospace, 1(2), 17-27.
- BEYNON, L. R., 1971a. "Dealing with Major Oil Spills at Sea; pp. 187-193 in 'Water Pollution by Oil'." Institute of Petroleum, London.
- BEYNON, L. R., 1971b. "Oil Spill Dispersants." J. Inst. Petrol., 57, 1-6.
- BIGGS, A. I., 1971. Special Discussion Session - "Ultimate Disposal of Waste Oil; pp. 123-126 in 'Water Pollution by Oil'." Institute of Petroleum, London.
- BINGHAM, Eula, HORTON, A. W. and TYE, R., 1965. "The Carcinogenic Potency of Certain Oils." Arch. Environ. Health, 10, 449-451.
- BLOKKER, P. C., 1964. "Spreading and Evaporation of Petroleum Products on Water;" paper read at 4th Intern. Harb. Conf., Antwerp.
- BLOKKER, P. C., 1971. "Prevention of Water Pollution from Refineries; pp. 21-36 in 'Water Pollution by Oil'." Institute of Petroleum, London.
- BLUMER, M., 1969. "Oil Pollution of the Ocean." Oceanus, 15, 3-7.
- BLUMER, M., BLOKKER, P. C., COWELL, E. B. and DUCKWORTH, D. F., 1970. Report of Panel 2 (Petroleum). FAO Tech. Conf. Mar. Pollut., Rome.
- Board of Trade, 1970. "Dealing with Oil at Sea." Mar. Pollut. Bull., 1(N.S.), 136-137.
- BOARDMAN, G. and DAWSON, F., 1968. "Permanent Emulsification of Polluting Surface Oil Films." Compte Rend. Congr. Intern. Detergence, 5(3), 369-373.
- BONE, Q. and HOLME, N. A., 1968. "Oil Pollution - Another Point of View." New Scient., 37, 365-366.

- BONEY, A. D., 1968. "Experiments with Some Detergents and Certain Intertidal Algae." Fld. Studies, 2 (suppl.), 55-72.
- BONEY, A. D., 1970. "Toxicity Studies with an Oil Spill Emulsifier and the Green Alga Prasinocladus marinus." J. Mar. Biol. Ass. U. K., 50, 461-473.
- BOSWELL, J. L., 1950. "Experiments to Determine the Effect of a Surface Film of Crude Oil on the Absorption of Atmospheric Oxygen by Water." Texas A & M Research Foundation, College Station.
- BOURNE, W. R. P., 1968a. "Oil Pollution and Bird Populations." Fld. Studies, 2 (suppl.), 99-121.
- BOURNE, W. R. P., 1968b. "Observation of an Encounter Between Birds and Floating Oil." Nature, Lond., 219, 632.
- BOURNE, W. R. P., 1970. "Special Review - After the 'Torrey Canyon' Disaster." Ibis, 112, 120-125.
- BOURNE, W. R. P. and DEVLIN, T. R. E., 1969. "Birds and Oil." Birds, 2, 176-178.
- BOURNE, W. R. P. and DEVLIN, T. R. E., 1971. "The Pollution Plot Thickens." Birds, 3, 190-192; 207.
- BOURNE, W. R. P., and MEAD, C., 1969. "Seabird Slaughter." Brit. Ornithol. News, 36, 1-2.
- BOWETT, D. W., 1971. "The English Channel, Collisions and Coastal States' Jurisdiction: A Tentative Proposal." Intern. Relations, 3, 953-965.
- BOYD, H., 1970. "Oil Poses Urgent Problems in Canada." Mar. Pollut. Bull., 1(N.S.), 69-71.
- BOYLAND, E., 1950. "The Biological Significance of Metabolism of Polycyclic Compounds." Biochem. Soc. Symp., 5, 40-54.
- BOYLAND, E., 1964. "Polycyclic Hydrocarbons." Brit. Med. Bull., 20, 121-126.
- BROWN, R. B., 1971. "Treatment of Oil Spills by Sinking - A Review of Requirements and Progress." J. Inst. Petrol., 57, 8-11.
- BROWN, S. O. and REID, B. L., 1951. "Experiments to Test the Diffusion of Oxygen Through a Surface Layer of Oil." Texas A & M Research Foundation, College Station.

- BROWNELL, R. L., 1971. "Whales, Dolphins and Oil Pollution;" pp. 255-276 in Straughan (1961a).
- BROWNELL, R. L. and LeBOEUF, B. J., 1971. "California Sea Lion Mortality; Natural or Artifact?" pp. 287-306 in Straughan (1971a).
- BRUMMAGE, K. G., 1968. "The Consequences of Load-On-Top in Petroleum Refining." Proc. Intern. Conf. Oil Pollut. Sea, Rome, 183-189.
- BRUMMAGE, K. G., MAYBOURN, R. and SAWYER, M. F., 1967. "How LOT Affects Refinery Costs." Petrol. Refiner, 46, 116-120.
- BRUNNOCK, J. V., DUCKWORTH, D. F. and STEPHENS, G. G., 1968. "Analysis of Beach Pollutants; pp. 12-27 in 'Scientific Aspects of Pollution of the Sea by Oil'." Institute of Petroleum, London.
- BUCHANAN, D., 1971. "Decontamination of Oil from Non-Tidal Waters; pp. 103-112 in 'Water Pollution by Oil'." Institute of Petroleum, London.
- BYROM, June A. and BEASTALL, Sally, 1971. "Microbial Degradation of Crude Oil with Particular Emphasis on Pollution; pp. 73-85 in 'Microbiology'." Institute of Petroleum, London.
- BYRON, June A., BEASTALL, Sally and SCOTLAND, Sylvia, 1970. "Bacterial Degradation of Crude Oil." Mar. Pollut. Bull., 1 (N.S.), 25-26.
- CABIOCH, L., 1971. "The Fight Against Pollution by Oil on the Coasts of Brittany; pp. 245-249 in 'Water Pollution by Oil'." Institute of Petroleum, London.
- CABIOCH, L. and LACASSAGNE, M., 1969. "How Roscoff Won the Torrey Canyon Battle." Dock Harb. Auth., 50, 6-8.
- CAHNMANN, H. J. and KURATSUNE, M., 1957. "Determination of Polycyclic Aromatic Hydrocarbons in Oysters Collected in Polluted Water." Anal. Chem., 29, 1312-1317.
- California Department of Fish and Game, 1969. "Cruise Reports: Inshore Survey of Santa Barbara Oil Spill." State Fisheries Laboratory, Terminal Island.
- CANEVARI, G. P., 1969. "The Role of Chemical Dispersants in Oil Cleanup; pp. 29-51 in 'Oil on the Sea'." Plenum Press, New York.

- CANEVARI, G. P., 1971. "Oil Spill Dispersants - Current Status and Future Outlook." Proc. Conf. Prevent. Control Oil Spills, Washington, 263-270.
- CARLBERG, S. R. and SKARSTEDT, C. B., 1970. "Determination of Small Amounts of Non-Polar Hydrocarbons (Oil) in Sea Water." Medd. Havs fiskelab. Lysekil, 96, 1-10.
- CARRUTHERS, W. and DOUGLAS A. G., 1961. "1,2-Benzanthracene Derivatives in a Kuwait Mineral Oil." Nature, London., 192, 256-257.
- CARPENTER, C. E., BUTCHER, L. F. and HUXLEY, A. S., 1969. "Laboratory Examination of Materials Submitted for Treating the Torrey Canyon Oil Spill." Admiralty Oil Laboratory (rep. 51), Cobham (Surrey).
- CARTER, L., 1962. "Bioassay of Trade Wastes." Nature, London, 196, 1304.
- CARTER, L., 1963. "Toxicity of Trade Wastes to Fish." Effluent Water Treat. J., 3, 206-208.
- CASTELLANOS, E., 1968. "Paraffin for Oil Pollution of the Sea." Proc. Intern. Conf. Oil Pollut. Sea, Rome, 239-241.
- CHIPMAN, W. A. and GALTSOFF, P. S., 1949. "Effects of Oil Mixed With Carbonised Sand on Aquatic Animals." U. S. Fish and Wildlife Service (Spec. Sci. Rep. 1), Washington.
- CLARK, R. B., 1968. "Oil Pollution and the Conservation of Seabirds." Proc. Intern. Conf. Oil Pollut. Sea, Rome, 76-112.
- CLARK, R. B., 1970. "Oiled Seabird Research Unit." Mar. Pollut. Bull., 1(N.S.), 22-24.
- CLARK, R. B., 1971. "Changing Success of Coastal Sport Fishing." Mar. Pollut. Bull., 2, 153-156.
- CLARK, R. B. and GREGORY, K. G., 1971. "Feather-Wetting in Cleaned Birds." Mar. Pollut. Bull., 2, 78-79.
- CLARK, R. B. and KENNEDY, R. J., 1968. "The Rehabilitation of Oiled Seabirds." University of Newcastle-upon-Tyne.
- CLENDENNING, K. A. and NORTH, W. J., 1960. "Effects of Wastes on the Giant Kelp Macrocystis pyrifera." Proc. Intern. Conf. Waste Dispos. Mar. Environ., 1, 82-91.

- CLINGAN, T. A., 1969. "Oil Pollution - No Solution?" Proc. U. S. Naval Inst., 95, 63-75.
- CLYNE, R. W., 1968. "Mechanical Retrieval of Waste Oils and Solids from Water;" paper read at Amer. Soc. Lubrication Engrs. annu. Meet., Cleveland.
- CONDER, P., 1968. "To Clean or Kill." Birds, 2, 56.
- COOKE, R. F., 1969. "Oil Transportation by Sea; pp. 93-102 in 'Oil on the Sea'." Plenum Press, New York.
- COOPER, L. H. N., 1968. "Scientific Consequences of the Wreck of the 'Torrey Canyon'." Helgoland. wiss. Meeresunters., 17, 340-355.
- COWAN, E., 1968. "Oil and Water - The Torrey Canyon Disaster." Lippincott, New York.
- COWELL, E. B., 1969. "Effects of Oil Pollution on Salt-Marsh Communities in Pembrokeshire and Cornwall." J. Appl. Ecol., 6, 133-142.
- COWELL, E. B., 1971. "Oil Pollution in Perspective; in 'The Ecological Effects of Oil Pollution on Littoral Communities';" pp. 224-234 in Institute of Petroleum, London.
- COWELL, E. B. and BAKER, Jenifer M., 1969. "The Recovery of a Salt-Marsh in Pembrokeshire, South Wales, from Pollution by Crude Oil." J. Biol. Conserv., 1, 291-295.
- CRAPP, G. B., 1969. "Annual Report of Oil Pollution Research Unit (Zoology), 1-24." Field Studies Council, Orielton.
- CRAPP, G. B., 1970. "The Biological Effects of Marine Oil Pollution and Shore Cleansing." Annu. Rep. Oil Pollut. Res. Unit, 27-42. Field Studies Council, Orielton.
- CRAPP, G. B., 1971a. "Monitoring the Rocky Shore in 'The Ecological Effects of Oil Pollution on Littoral Communities';" pp. 102-113. Institute of Petroleum, London.
- CRAPP, G. B., 1971b. "Field Experiments with Oil and Emulsifiers (ibid.);" pp. 114-128.
- CRAPP, G. B., 1971c. "Laboratory Experiments with Emulsifiers (ibid.);" pp. 129-149.
- CRAPP, G. B., 1971d. "Biological Consequences of Emulsifier Cleansing (ibid.);" pp. 150-168.

- CRAPP, G. B., 1971e. "Ecological Effects of Stranded Oil (ibid.);" pp. 171-186.
- CRAPP, G. B., 1971f. "Chronic Oil Pollution (ibid.);" pp. 187-203.
- CROSBY, E. S., RUDOLFS, W. and HEUKELEKIAN, H., 1954. "Biological Growths in Petroleum Refinery Waste Waters." Industr. Engng. Chem., 46, 296-300.
- CURRIER, H. B. and PEOPLES, S. A., 1954. "Phytotoxicity of Hydrocarbons." Hilgardia, 23, 155-173.
- DAVIS, J. A. (ed.), 1968. "Kuwait to Bantry." Oil Gas Intern., 8 (11), 69-100.
- de JAGER, S. and BELTERMAN, T., 1970. "Treatment of Oiled Eider Duck in Holland." Mar. Pollut. Bull., 1 (N.S.), 156-157.
- DENNIS, J. V., 1959. "Oil Pollution Survey of the United States Atlantic Coast." American Petroleum Institute, Washington.
- DENNIS, J. V., 1961. "The Relationship of Ocean Currents to Oil Pollution off the South-Eastern Coast of New England." American Petroleum Institute, Washington.
- Department of Scientific and Industrial Research (DSIR), 1961. "Oil Pollution of Beaches. The Use of Emulsifier/Solvent Mixtures for the Removal of Liquid Oil Pollution." Warren Spring Laboratory (rep. RR/ES/17), Stevenage (Herts.).
- DSIR, 1963a. "The Removal of Oil from Contaminated Beaches." Warren Spring Laboratory (rep. RR/ES/39), Stevenage.
- DSIR, 1963b. "The Treatment and Disposal of Floating Oil." Warren Spring Laboratory (rep. RR/ES/40), Stevenage.
- DIAZ-PIFERRER, M., 1962. "The Effects of an Oil on the Shore of Guanica, Puerto Rico." Ass. Island Mar. Labs., 4th Meet., Curacao, 12-13.
- DIETZ, D. N., 1971. "Pollution of Permeable Strata by Oil Components in 'Water Pollution by Oil'." pp. 127-139. Institute of Petroleum, London.
- DIXON, T. and DIXON, T., 1967. "South-East Kent Oil Pollution Group Report for 1966-67." Dover.
- DODD, E. N., 1971. "Report of Working Party on the Effects of Natural Factors on the Movement, Dispersal and Destruction of Oil at Sea." Ministry of Defense (Navy Department).

- DREW, E. A. et al, 1967. "Torrey Canyon" report. Rep. Underwater Ass., 1966-67, 53-60.
- DRINKWATER, B., LEONARD, M. and BLACK S., 1971. "Santa Barbara's Oiled Birds;" pp. 313-324 in Straughan (1971a).
- DUCKWORTH, D. F., 1971. "Aspects of Petroleum Pollutant Analysis in 'Water Pollution by Oil'." pp. 165-179. Institute of Petroleum, London.
- DUDLEY, G., 1968. "The Problem of Oil Pollution in a Major Oil Port." Fld. Studies, 2 (suppl.), 21-29.
- DUDLEY, G., 1969. "Oil Pollution and Methods of Dealing With It;" paper read at 6th Meet. Harbourmasters NW Europe, Antwerp.
- DUDLEY, G., 1971. "Oil Pollution in a Major Oil Port in 'The Ecological Effects of Oil Pollution on Littoral Communities'." pp. 5-15. Institute of Petroleum, London.
- Dundee Corporation, 1968. "Report of Technical Advisory Committee on Oil Pollution in the Tay Estuary." Dundee.
- DUNN, L., 1956. "The World's Tankers." Adlard Coles, London.
- EDWARDS, M. N., 1968. "Oil Pollution and the Law." Proc. Intern. Oil Pollut. Sea, Rome, 290-299.
- EDWARDS, M. N., 1969. "The Role of the Federal Government in Controlling Oil Pollution at Sea in 'Oil on the Sea'." pp. 103-112. Plenum Press, New York.
- ELMHIRST, R., 1922. "Investigations on the Effects of Oil Tanker Discharges." Annu. Rep. Scott. Mar. Biol. Ass., 8-9.
- ERICKSON, R. C., 1962. "Effects of Oil Pollution on Migratory Birds." Trans. Seminar Biol. Problems Water Pollut., 3, 177-181.
- FAY, J. A. 1969. "The Spread of Oil Slicks on a Calm Sea in 'Oil on the Sea'." pp. 53-63. Plenum Press, New York.
- FISHER, J., and CHARLTON, S., 1967. "A Tragedy of Errors." Audubon Mag., 69, 72-85.
- FISHER, J. and LOCKLEY, R. M., 1954. "Seabirds." Collins, London.
- FLETCHER, A., 1967. "Survey of Tanker Damages." Shipping World Shipbuild., 160, 183-186.

- Food and Agriculture Organisation (FAO), 1970. Final Report of Seminar on Methods of Detection, Measurement and Monitoring of Pollutants in the Marine Environment. Rome.
- FREEGARDS, M., 1970. "A Novel Oil Collection Device." Effluent Water Treat. J., 10, 203-206.
- FULLER, H. I., 1971. "The Use of Floating Absorbents and Gelling Techniques for Combating Oil Spills on Water." J. Inst. Petrol., 57, 35-42.
- GAINES, T. H., 1971. "Pollution Control at a Major Oil Spill." J. Water Pollut. Control Fed., 43, 651-667.
- GALTSOFF, P. S., 1936. "Oil Pollution in Coastal Waters." Proc. N. Amer. Wldl. Conf., 1, 550-555.
- GALTSOFF, P. S., PRYTHERCH, H. F., SMITH, R.O. and KOEHRING, Vera, 1935. "Effects of Crude Oil Pollution on Oysters in Louisiana Waters." Bull. Bur. Fish., Wash., 18, 143-210.
- GEORGE, M., 1961. "Oil Pollution of Marine Organisms." Nature, London., 192, 1209.
- GILL, C., BOOKER, F., and SOPER, T., 1967. "The Wreck of the Torrey Canyon." David & Charles, Newton Abbot.
- GILLESPIE, D. L., 1968. "A Summary of Oil Pollution in Newfoundland's Coastal Waters, 1949-1968." Canadian Wildlife Service, Ottawa.
- GLOSTEN, L. R., 1965. "Offshore Barge Transportation on the Pacific Coast." Trans. Soc. Nav. Architects Mar. Engrs., 73, 497-533.
- GLOYNA, E. F. and MALINA, J. F., 1963. "Petrochemical Wastes - Effects on Water." Water Sewage Works, 1963 Ref. Num., 262-285.
- GLUDE, J. B., 1970. "Information Requirements for Rational Decision-Making in the Control of Coastal and Estuarine Oil Pollution." FAO Tech. Conf. Mar. Pollut., Rome, pap. E-83.
- GOAD, C., 1968. "International Action on Oil Pollution Since the Loss of the 'Torrey Canyon'." Proc. Intern. Conf. Oil Pollut. Sea, Rome, 268-280.
- GOETHE, F., 1968. "The Effects of Oil Pollution on Populations of Marine and Coastal Birds." Helgoland. Wiss. Meeresunters., 17, 370-374.

- GOLDACRE, R. J., 1968. "The Effects of Detergents and Oils on the Cell Membrane." Fld. Studies, 2 (suppl.), 131-138.
- GOWANLOCH, J. N., 1935. "Pollution by Oil in Relation to Oysters." Trans. Amer. Fish. Soc., 65, 293-296.
- GREENWOOD, J. J. D., INGRAM, H. A. P., McMANUS, J. and WILLIAMS, D. J. A., 1970. "Combating Oil Pollution in Closed Waters - The Use of Waterproof Limestone Dust." Public Cleansing, 40, 178-180.
- GRIFFITH, D. de G., 1969. "Investigations into the Toxicity of Corexit - A New Oil Dispersant." Department of Agriculture & Fisheries (Fish. Leaf. 6), Dublin.
- GRIFFITH, D. de G., 1970. "Toxicity of Crude Oil and Detergents to Two Species of Edible Molluscs Under Artificial Test Conditions." FAO Tech. Conf. Mar. Pollut., Rome, pap. E-16.
- GUNKEL, W., 1968. "Bacteriological Investigations of Oil-Polluted Sediments from the Cornish Coast Following the 'Torrey Canyon' Disaster." Fld. Studies, 2 (suppl.), 151-158.
- GUTSELL, J. S., 1921. "Danger to Fisheries from Oil and Tar Pollution of Waters." Rep. U. S. Commnr. Fish., Append. 7. Washington.
- HANNA, J., 1963. "Factors in the Transportation of Petroleum by Tankers in 'Petroleum Transportation Handbook';" pp. 10:1-10:43. McGraw-Hill, New York.
- HARRISON, J. G., 1967. "Oil Pollution Fiasco on the Medway Estuary." Birds, 1, 134-136.
- HARTUNG, R., 1963. "Ingestion of Oil by Waterfowl." Pap. Mich. Acad. Sci., 48, 49-55.
- HARTUNG, R., 1965. "Some Effects of Oils on Waterfowl." Ph.D. Thesis, Univ. Michigan; Dissert. Abs., 25, 6866.
- HARTUNG, R., 1967. "Energy Metabolism in Oil-Covered Ducks." J. Wldl. Managemt., 31, 798-804.
- HARTUNG, R. and KLINGLER, Gwendolyn W., 1968. "Sedimentation of Floating Oils." Pap. Mich. Acad. Sci., 53, 23-27.
- HAWKES, A. L., 1961. "A Review of the Nature and Extent of Damage Caused by Oil-Pollution at Sea." Trans. N. Amer. Wldl. Nat. Resources Conf., 26, 343-355.

- HAXBY, L. P., 1971. "Oil Spill Mechanical Collection Devices." J. Inst. Petrol., 57, 23-34.
- HELLMANN, H. and MARCINOWSKI, H. J., 1970. "Experiments on Combatting Accidental Release of Oil." FAO Tech. Conf. Oil Pollut. Sea, Rome, pap. E-86.
- HENDERSON, E. M., 1967. "Oil Pipelines and Storage. I. Pipelines in 'Joint Problems of the Oil and Water Industries';" pp. 131-139. Institute of Petroleum, London.
- HILLYARD, H. E., 1968. "Recovery of Waste Oil Using Floating-Type Skimmers." Iron Steel Engr., 45, 77-78.
- HOFFMAN, D. and WYNDER, E. L., 1968. "Chemical Analysis and Carcinogenic Bioassays of Organic Particulate Pollution in Stern, A. C. (ed.), 'Air Pollution' (Vol. 2)," pp. 187-247.
- HOFMANN, R. E., 1949. "Control of Oil Pollution." Publ. Works, New York, 80, 26-27.
- HOGG, C., PETTET, A. E. J. and COLLETT, W. F., 1947. "Prevention of Pollution by Oil from Engineering Factories." J. Inst. Sewage Purif., 1947(2), 155-170.
- HOLDSWORTH, M. P., 1971. "Ballast and Wash Waters from Tankers in 'Water Pollution by Oil';" pp. 195-204. Institute of Petroleum, London.
- HOLME, N. A. and SPOONER, G. M., 1968. "Oil Pollution at Bovisand - An Interim Report." J. Devon Trust Nat. Conserv., 1968, 665-667.
- HOLMES, R. W., 1969. "The Santa Barbara Oil Spill in 'Oil on the Sea';" pp. 15-27. Plenum Press, New York.
- HOPE JONES, P., HOWELLS, Gwyneth, REES, I. and WILSON, J., 1970. "Effect of 'Hamilton Trader' Oil on Birds in the Irish Sea in May 1969." Brit. Birds, 63, 97-110.
- HOWE, R. E., 1968. "Single Point Mooring Activities." Proc. Annu. Tanker Conf. Amer. Petrol. Inst., 13, 212-227.
- Hydraulics Research Station, 1967. "'Torrey Canyon' Oil Pollution Boom Tests." Wallingford (Berks.).
- INESON, J. and PACKHAM, R. F., 1967. "Contamination of Water by Petroleum Products in 'Joint Problems of the Oil and Water Industries';" pp. 97-116. Institute of Petroleum, London.

- Intergovernmental Maritime Consultative Organisation (IMCO), 1964. "Pollution of the Sea by Oil." London.
- IMCO, 1971. "Ships, Routeing and Traffic Separation Schemes." London.
- JAGGER, H., 1971. "The Growth of Petroleum Production and Movement in 'Water Pollution by Oil';" pp. 5-11. Institute of Petroleum, London.
- JOHANNESSEN, J. K., 1955. "The Identification of Fuel Oils Polluting Coastal Waters." Analyst, London., 80, 840-841.
- JOHNSTON, R., 1970. "The Decomposition of Crude Oil Residues in San Columns." J. Mar. Biol. Ass., U. K., 50-925-937.
- JONES, L. G., MITCHELL, C. T., ANDERSON, E. K. and NORTH, W. J., 1969. "Just How Serious Was the Santa Barbara Oil Spill?" Ocean Industry, 1969(6), 53-56.
- JONES, W. M. C., 1971. "Prevention of Water Pollution from Oil Pipelines in 'Water Pollution by Oil';" pp. 47-51. Institute of Petroleum, London.
- KATOR, H., OPPENHEIMER, C. H. and MIGET, R. J., 1971. "Microbial Degradation of a Louisiana Crude Oil in Closed Flasks and Under Simulated Field Conditions." Proc. Conf. Prevent. Control Oil Spills, Washington, 287-296.
- KELLER, A., 1968. "Bahamas Beaches Saved from Oil Pollution." Dock Harb. Auth., 49, 100-102.
- KING, G. A. E., 1965. "Tanker Practice." Maritime Press, London.
- KINNEY, P. J., et al, 1970. "Quantitative Assessment of Oil Pollution Problems in Alaska's Cook Inlet." Institute of Marine Sciences rep R-69-16, University of Alaska.
- KIRBY, J. H., 1968. "The 'Clean Seas Code'." Proc. Intern. Conf. Oil Pollut. Sea, Rome, 201-212.
- KIRBY, J. H., 1969. "Oil Transfers at Sea." Mar. Pollut. Bull., 1(18), 16-18.
- KLUSS, W. M., 1968a. "Prevention of Sea Pollution in Normal Tanker Operations in 'Pollution Prevention';" pp. 101-117. Institute of Petroleum, London.
- KLUSS, W. M., 1968b. "Avoiding Accidental Sea Pollution from Tankers." Proc. Intern. Conf. Oil Pollut. Sea, Rome, 167-183.

- KOLPACK, R. L., 1969. "Santa Barbara Oil Pollution Project Progress Report; Marine Geology." Mar. Pollut. Bull., 1(18), 5-8.
- LANE, E. J., 1967. "The 'Sea Sweeper'." BP Shield, 9, 12-13.
- LARSSON, K. and ODHAM, G., 1970. "Larodan for Cleaning Oiled Sea-birds." Mar. Pollut. Bull., 1(N.S.), 122-124.
- LONG, C. L., STEVENS, J. L. and TOMPKINS, J. T., 1960. "Modern High-Speed Tankers." Trans. Soc. Nav. Architects Mar. Engrs., 68, 887-958.
- LUDWIG, H. F., CARTER, R. C. and SCHERFIG, J., 1965. "Characteristics of Oil and Grease Found in the Marine Environment." Symp. Pollut. Mar. Micro-Org. Prod. Petrol., Monaco. 1964, 71-76.
- LUDWIG, H. F. and RICH, L. G., 1964. "The Study of Oil-Tar Deposition on Beaches." Adv. Water Pollut. Res., 3, 113-116.
- LUNZ, R. G., 1950. "The Effects of Bleedwater and of Water Extracts of Crude Oil on the Pumping Rate of Oysters." Texas A & M Research Foundation, College Station.
- MACKIN, J. G., 1950a. "Effects of Crude Oil and Bleedwater on Oysters and Aquatic Plants." Texas A & M Research Foundation, College Station.
- MACKIN, J. G., 1950b. "A Comparison of the Effects of the Application of Crude Petroleum to Marsh Plants and to Oysters." Texas A & M Research Foundation, College Station.
- MACKIN, J. G., 1950c. "Report on a Study of the Effect of Application of Crude Petroleum on Saltgrass Distycklis spicata (L.) Texas A & M Research Foundation, College Station.
- MACKIN, J. G. and HOPKINS, S. H., 1962. "Studies on Oyster Mortality in Relation to Natural Environments and to Oil Fields in Louisiana." Publ. Inst. Mar. Sci. Univ. Texas, 7, 1-131.
- MARCHETTI, R., 1965. "Critical Review of the Effects of Synthetic Detergents on Aquatic Life." Stud. Rev. Gen. Fish. Coun. Mediterr., 26, 1-32.
- MARSHALL, J. M., 1967. "The Black Wake of the 'Torrey Canyon'." Proc. U. S. Nav. Inst., 93, 38-44.
- MARTIN, A. E., 1971. "Water Pollution by Oil - Some Health Considerations in 'Water Pollution by Oil';" pp. 153-158. Institute of Petroleum, London.

- MAYO, F., 1968. "Dealing with Oil Pollution on Water and Shores in 'Pollution Prevention';" pp. 165-179. Institute of Petroleum, London.
- McGECHAN, A. C., 1971. "Prevention of Oil Pollution During Storage and Distribution in 'Water Pollution by Oil';" pp. 53-67. Institute of Petroleum, London.
- McKAY, H. A. C., 1967. "Oil Pollution at Sea. Studies in Connection with the 'Torrey Canyon' Episode." U. K. Atomic Energy Authority (ref. R.5550), Harwell (Berks.).
- McMANUS, J., 1970. "Physical Methods of Clearing Oil." Rep. Conf. Tay Estuary Oil Pollut., Dundee, 29-32.
- MENSAH, T. A., 1971. "Legal Problems Relating to Marine Pollution by Oil in 'Water Pollution by Oil';" pp. 293-306. Institute of Petroleum, London.
- MENZEL, R. W., 1948. "Report on Two Cases of Oily Tasting Oysters at Baie Sainte Elaine Oilfield." Texas A & M Research Foundation, College Station.
- MERZ, R. C., 1959. "Determination of the Quantity of Oily Substance on Beaches and in Nearshore Waters." Publ. Calif. State Water Pollut. Control Bd., 21, 5-45.
- MEYER, R. R., 1967. "Survey of Current Pipeline Leakage Procedures in 'Joint Problems of the Oil and Water Industries';" pp. 117-129. Institute of Petroleum, London.
- MEYERS, S. P. and AHEARN, D. G., 1970. "Mycological Degradation of Petroleum Products in Marine Environments." FAO Tech. Conf. Mar. Pollut., Rome, pap. E-25.
- Ministry of Housing and Local Government, 1968. "Oil Pollution of Beaches." Circ. No. 34/68; Welsh Office No. 29/68. London and Cardiff.
- Ministry of Transport, 1953. "Report of the Committee on the Prevention of Pollution of the Sea by Oil." HMSO, London.
- MINTER, K. W., 1965. "Standing Crop Community Structure of Plankton in Oil Refinery Effluent Holding Ponds. Ph.D Thesis, Okla. State Univ.; Dissert. Abs., 26, 1840.
- MIRONOV, O. G., 1970. "The Effect of Oil Pollution on the Flora and Fauna of the Black Sea." FAO Tech. Conf. Mar. Pollut., Rome, pap. E-92.

- MOORE, T. W., 1968. "Dispersal of Oil Slicks in Ports and at Sea." Proc. Intern. Conf. Oil Pollut. Sea, Rome, 233-239.
- MUSKIE, Senator E., 1968. "The 'Ocean Eagle' Disaster." Congr. Record (Senate), 114, 631-632.
- Natural Environment Research Council, 1969. "Local Organization to Deal with Oil Pollution." London (see also Mar. Pollut. Bull., No. 12, 15-21).
- Nature Conservancy, 1970. "Oiled Birds - What to Do." NC/RSPCA/RSPB/CBP Advisory Group, London.
- NELSON-SMITH, A., 1968a. "The Effects of Oil Pollution and Emulsifier Cleansing on Marine Life in South-West Britain." J. Appl. Ecol., 5, 97-107.
- NELSON-SMITH, A., 1968b. "Biological Consequences of Oil Pollution and Shore Cleansing." Fld. Studies, 2 (suppl.), 73-80.
- NELSON-SMITH, A., 1968c. "Effects of Oil and Emulsifiers on Shores in South-West Britain." Rep. Challenger Soc., 3(20), 60.
- NELSON-SMITH, A., 1970. "Annual Report of Oil Pollution Research Unit" pp. 43-47. Field Studies Council, Orielton (Pems.).
- NELSON-SMITH, A., 1971. "Effects of Oil on Marine Plants and Animals in 'Water Pollution by Oil';" pp. 273-280. Institute of Petroleum, London.
- NEWMAN, D. E., 1971. "Oil Pollution Booms - The Probable Limits of Floating Barriers to Prevent the Spread of Oil on Water." J. Inst. Petrol., 57, 17-22.
- NEWMAN, D. E. and MACBETH, N. I., 1971. "The Use of Booms as Barriers to Oil Pollution in Tidal Estuaries and Sheltered Waters in 'Water Pollution by Oil';" pp. 225-235. Institute of Petroleum, London.
- NICHOLSON, Nancy L. and CIMBERG, R. L., 1971. "The Santa Barbara Oil Spills of 1969: A Post-Spill Survey of the Rocky Intertidal;" pp. 325-399 in Straughan (1971a).
- NORTH, W. J., 1961. "Successive Biological Changes Observed in a Marine Cove Exposed to Large Oil Spillage." Institute of Marine Resources, Univ. California (Rep.61/6), San Diego.
- O'CONNOR, R., 1967. "The Torrey Canyon. A Census of Breeding Auks in Cornwall." Seabird Bull., 4, 38-45.

- ODHAM, G., 1968. "Oiled Water Birds - New Possibilities for Rehabilitation." Goteborg University/Skandinavsk Oljeservis AB., Gothenburg.
- ORTON, J. H., 1925. "Possible Effects on Marine Organisms of Oil Discharged at Sea." Nature, London, 115, 910-911.
- O'SULLIVAN, A. J., 1971. "Some Aspects of the 'Hamilton Trader' Oil Spill in 'Water Pollution by Oil';" pp. 307-316. Institute of Petroleum, London.
- OTTWAY, Sheila M., 1971. "The Comparative Toxicity of Crude Oils in 'The Ecological Effects of Oil Pollution on Littoral Communities';" pp. 172-180. Institute of Petroleum, London.
- PARKER, C. A., FREEGARDE, M. and HATCHARD, C. G., 1971. "The Effect of Some Chemical and Biological Factors on the Degradation of Crude Oil at Sea in 'Water Pollution by Oil';" pp. 237-244. Institute of Petroleum, London.
- PERKINS, E. J., 1968a. "The Toxicity of Oil Emulsifiers to Some Inshore Fauna." Fld. Studies, 2 (suppl.), 81-90.
- PERKINS, E. J., 1968b. "Some Sub-Lethal Effects of BP 1002 Upon Marine Gastropod Molluscs." J. Devon Trust Nat. Conserv., 1968, 794-798.
- PERKINS, E. J., 1970. "Some Effects of 'Detergents' in the Marine Environment." Chem. Industry, 1970(1), 14-22.
- Permutit Co., 1966. "Report on Research and Development for a Shipboard Oil and Water Separation System." Paramus, New Jersey.
- PETROW, R., 1968. "The Black Tide." Hodder & Stoughton, London.
- PILPEL, N., 1954. "Oil Pollution of the Sea." Research, London, 7, 301-306.
- PILPEL, N., 1967. "Oil Pollution of the Sea." Science J., 3(6), 73-80.
- PILPEL, N., 1968. "The Natural Fate of Oil on the Sea." Endeavour, 27, 11-13.
- POIRIER, O. A. and THIEL, G. A., 1941. "Deposition of Free Oil by Sediments Settling in Sea Water." Bull. Amer. Ass. Petrol. Geol., 25, 2170-2180.

- Port of London Authority Joint Working Party, 1971. "Oil Spillages in the Tidal Thames: Report of Technical Subcommittee in 'Water Pollution by Oil';" pp. 317-340. Institute of Petroleum, London.
- PORTER, C. F., 1968. "Oil Pollution is Still a Problem." Dock Harb. Auth., 48, 279-283.
- PORTMANN, J. E. and CONNOR P. M., 1968. "The Toxicity of Several Oil-Spill Removers to Some Species of Fish and Shellfish." Mar. Biol., 1, 322-329.
- POTTS, G. W., GAGE, J. and FORSTER, G. R., 1967. "Diving Studies on the 'Torrey Canyon' Oil Pollution." J. Devon Trust Nat. Conserv., 1967 (suppl.), 22-24.
- PRAT, J. and GIRAUD, A., 1964. "The Pollution of Water by Detergents." OECD, Paris.
- PROKOP, J. F., 1950. "A Study of the Microbial Decomposition of Crude Oil." Texas A & M Research Foundation, College Station.
- RADFORD, J., 1962. "Handling Very Large Tankers." Shipping World, 146, 38-40.
- RAMSDALE, S. J. and WILKINSON, R. E., 1968. "Identification of Petroleum Sources of Beach Pollution by Gas - Liquid Chromatography in 'Scientific Aspects of Pollution of the Sea by Oil';" pp. 28-34. Institute of Petroleum, London.
- RANWELL, D. S., 1968a. "Extent of Damage to Coastal Habitats Due to the 'Torrey Canyon' Incident." Fld. Studies, 2 (suppl.), 39-47.
- RANWELL, D. S., 1968b. "Lichen Mortality Due to 'Torrey Canyon' Oil and Decontamination Measures." Lichenologist, 4, 55-56.
- REISH, D. J., 1964. "The Effect of Oil Refinery Wastes on Benthic Marine Animals in Los Angeles Harbor, California." Symp. Pollut. Mar. Micro-Org. Prod. Petrol., Monaco, 335-361.
- ROBERTS, C. H., 1926. "The Effect of Oil Pollution Upon Certain Forms of Aquatic Life." J. Cons. Perm. Intern. Explor. Mer, 1, 245-275.
- ROBERTS, L. E. A., 1967. "Treatment of Oil Pollution by Straw." U. K. Atomic Energy Authority, Harwell (Berks.).
- ROSE, R., 1959. "Contamination of Beaches in England and Wales." Proc. Intern. Conf. Oil Pollut. Sea, Copenhagen, 64-66.

- ROSEN, A. A., MUSGRAVE, L. R. and LICHTENBERG, J. J., 1959a.
"Characterization of Coastal Oil Pollution by Submarine Seeps."
Proc. Intern. Conf. Waste Disposal Mar. Environ., 1, 353-371.
- ROSEN, A. A., MUSGRAVE, L. R. and LICHTENBERG, J. J., 1959b.
"Characterization of Coastal Oil Pollution by Submarine Seeps."
Calif. State Water Pollution Control Board (publ. 21, pt. 2),
Sacramento.
- ROWAN, (Mrs) M. K., 1968. "Oiling of Marine Birds in South Africa."
Proc. Intern. Conf. Oil Pollut. Sea, Rome 121-124.
- Royal Society for the Prevention of Cruelty to Animals (RSPCA), 1967.
"Amended Procedure for Cleansing and Rehabilitation of Oiled
Seabirds." London.
- RUSSO, V. L., TURNER, H. and WOOD, F. W., 1960. "Submarine Tankers."
Trans. Soc. Nav. Archit. Mar. Engrs., 68, 693-742.
- RUTZLER, K and STERRER, W., 1970. "Oil Pollution Damage Observed
in Tropical Communities Along the Atlantic Seaboard of Panama."
Biosci., 20, 222-224.
- SCHEIDER, R. J. and BEDUHN, G. E., 1967. "Slick Tricks for Oil
Slicks." Navy Civ. Engr., 7, 22-23.
- SCOTT, J., 1969. "Perspective on Offshore Pollution." Petrol
Engr., 41(5), 61-68.
- Select Committee of the House of Lords, 1971. "Special Report on
the Anglesey Marine Terminal Bill." HMSO, London.
- SHACKLETON, L. R. B., DOUGLAS, E., and WALSH, T., 1960. "Pollution
of the Sea by Oil." Trans. Inst. Mar. Engrs., 72, 409-439.
- SHELL, 1971. TOVALOP and CRISTAL. Royal dutch/Shell Briefing Ser-
vice, London.
- SHELTON, R. J., 1971. "Two Recent Problems in Oil Pollution Re-
search." Paper read to Fisheries Improvement Committee, ICES.
- SIDHU, G. S., VALE, G. L., SHIPTON, J. and MURRAY, K. E., 1970.
"Nature and Effects of a Kerosine-Like Taint in Mullet (Mugil
cephalus)."
FAO Tech. Conf. Mar. Pollut., Rome, pap. E-39.
- SIMPSON, A. C., 1968a. "The 'Torrey Canyon' Disaster and Fisheries."
Ministry of Agriculture, Fisheries and Food (Lab. Leaflet 18),
London.

- SIMPSON, A. C., 1968b. "Oil, Emulsifiers and Commercial Shellfish." Fld. Studies, 2 (suppl.), 91-98.
- SPOONER, Molly F., 1967. "Biological Effects of the 'Torrey Canyon' Disaster." J. Devon Trust Nat. Conserv., 1967 (suppl.), 12-19.
- SPOONER, Molly F., 1968a. "Preliminary Work on Comparative Toxicities of Some Oil Spill Dispersants and a Few Tests with Oil and Corexit." Marine Biological Association, Plymouth.
- SPOONER, Molly F., 1968b. "Comments During Discussion in 'Scientific Aspects of Pollution of the Sea by Oil';" p. 67. Institute of Petroleum, London.
- SPOONER, Molly F., 1970. "Oil Spill in Tarut Bay, Saudi Arabia." Mar. Pollut. Bull., 1(N.S.), 166-167.
- SPOONER, Molly F. and SPOONER, G. M., 1968. "The Problem of Oil Spills at Sea, Illustrated by the Stranding of the 'General Colocotronis'." Marine Biological Association, Plymouth.
- STANDER, G. H. and VENTER, J. A. V., 1968. "Oil Pollution in South Africa." Proc. Intern. Conf. Oil Pollut. Sea, Rome, 251-259.
- STANDLEY, E., ACUFF, A. D. and SOLANAS, D. W., 1969. "Field Report on Union Oil Co. Platform A Well No. 21." U. S. Geological Survey, Los Angeles.
- STANTON, P. B., 1970. "Rehabilitation of Oiled Birds in Massachusetts." Mar. Pollut. Bull., 1(N.S.), 134-136.
- STEBBINGS, R. E., 1968. "'Torrey Canyon' Oil Pollution on Salt Marshes and a Shingle Beach in Brittany 16 Months After." Nature Conservancy, Furzebrook (Dorset).
- STEBBINGS, R. E., 1970. "Recovery of Salt Marsh in Brittany Sixteen Months After Heavy Pollution by Oil." Environ. Pollut., 1, 163-167.
- STONE, R. W., FENSKE, M. R. and WHITE, A. G. C., 1942. "Bacteria Attacking Petroleum and Oil Fractions." J. Bacteriol., 44, 169-178.
- STRAUGHAN, Dale, 1970. "Biological Effects of Oil Pollution in the Santa Barbara Channel." FAO Tech. Conf. Mar. Pollut., Rome, pap. R-17.

- STRAUGHAN, Dale (ed.), 1971a. "Biological and Oceanographical Survey of the Santa Barbara Channel Oil Spill 1969-70. I. Biology and Bacteriology." Allan Hancock Foundation, University of Southern California.
- STRAUGHAN, Dale, 1971b. "Breeding and Larval Settlement of Certain Intertidal Invertebrates in the Santa Barbara Channel Following Pollution by Oil in 'Straughan (1971a)';" pp. 223-244.
- STRAUGHAN, Dale, 1971c. "Oil Pollution and Fisheries in the Santa Barbara Channel;" pp. 245-254 in Straughan (1971a).
- STRAUGHAN, Dale, 1971d. "Oil Pollution and Sea Birds;" pp. 307-312 in Straughan (1971a).
- STRAUGHAN, Dale, 1971e. "What Has Been the Effect of the Spill on the Ecology in the Santa Barbara Channel?;" pp. 401-426 in Straughan (1971a).
- STRAUGHAN, Dale and ABBOT, B. C., 1971. "The Santa Barbara Oil Spill; Ecological Changes and Natural Oil Leaks in 'Water Pollution by Oil';" pp. 257-262. Institute of Petroleum, London.
- STROOP, D. V., 1930. "Behavior of Fuel Oil on the Surface of the Sea in 'Report on Oil Pollution Experiments';" pp. 41-49. U. S. House of Representatives Committee on Rivers and Harbors (Doct. 10625), Washington.
- STURMEY, S. G., 1967. "Shipping: The Next Hundred Years." J. & J. Denholm, Glasgow.
- SUESS, M. J., 1970. "Polynuclear Aromatic Hydrocarbon Pollution of the Marine Environment." FAO Tech. Conf. Mar. Pollut., Rome, pap. E-42.
- SURBER, E. W., ENGLISH, J. N. and McDERMOTT, G. N., 1962. "Tainting of Fish by Outboard Motor Exhaust Wastes as Related to Gas and Oil Consumption." Trans. Seminar Biol. Problems Water Pollut., 3, 170-176.
- SWABY, I. G. and FORZIATI, A. F., 1970. "Remote Sensing of Oil Slicks." Proc. Joint Conf. Prevent. Control Oil Spills, New York 1969, 297-311.
- SWEDMARK, M., BRAATEN, B., EMANUELSSON, E., and GRANMO, A., 1971. "Biological Effects of Surface Active Agents on Marine Animals." Mar. Biol., 9, 183-201.

- TANIS, J. J. C. and MORZER BRUIJNS, M. F., 1968. "The Impact of Oil Pollution on Sea Birds in Europe." Proc. Intern. Conf. Oil Pollut. Sea, Rome, 67-74.
- TOMS, R., 1971a. "The Threat to Inland Waters from Oil Pollution in 'Water Pollution by Oil';" pp. 13-20. Institute of Petroleum, London.
- TOMS, R., 1971b. "Prevention of Oil Pollution from Minor Users in 'Water Pollution by Oil';" pp. 89-95. Institute of Petroleum, London.
- TRACY, H. B., LEE, R. A., WOELKE, C. E. and SANBORN, G., 1969. "Relative Toxicities and Dispersing-Evaluations of Eleven Oil-Dispersing Products." J. Water Pollut. Control Fed., 41, 2062-2069.
- TRECCANI, V., 1962. "Microbial Degradation of Hydrocarbons." Progr. Indust. Microbiol., 4, 3-33.
- TRECCANI, V., 1965. "Microbial Degradation of Aliphatic and Aromatic Hydrocarbons." Zeitschr. Allg. Mikrobiol., 5, 332-341.
- TUCK, L. M., 1959. "Oil Pollution in Newfoundland." Proc. Intern. Conf. Oil Pollut. Sea, Copenhagen, 76-77.
- TULLY, P. R., 1969. "Removal of Floating Oil Slicks by the Controlled Combustion Technique in 'Oil on the Sea';" pp. 81-91. Plenum Press, New York.
- UKELES, Ravenna, 1963. "The Effect of Surface Active Agents on the Growth of Marine Phytoplankton." J. Protozool., 10 (suppl.), 10.
- United Nations, 1956. "Pollution of the Sea by Oil." Rep. ST/ECA/41, New York.
- U. S. Coast Guard, 1959. "Efforts to Reduce Oil Pollution." Proc. Merchant Marine Coun., 16, 199-203.
- U. S. Coast Guard, 1968. "Sunken Tanker Project Report." Washington.
- U. S. Department of Interior, 1967. "Report on Wastes from Watercraft." Congress Doct. 48, Washington.
- U. S. Public Health Service, 1939. "Industrial Waste Guide: Oil Refining." Ohio River Pollution Survey, Cincinnati.
- U. S. Public Health Service, 1944. "Ohio River Pollution Control. Industrial Waste Guide: Oil Industry." House Doct. 266, Washington.

- van DAM, J., 1967. "The Migration of Hydrocarbons in a Water-Bearing Stratum in 'Joint Problems of the Oil and Water Industries';" pp. 55-88. Institute of Petroleum, London.
- WARDLEY SMITH, J., 1968a. "Recommended Methods for Dealing with Oil Pollution." Warren Spring Laboratory (Rep. LR 79/EIS), Stevenage.
- WARDLEY SMITH, J., 1968b. "Problems in Dealing with Oil Pollution on Sea and Land in 'Scientific Aspects of the Pollution of the Sea by Oil';" pp. 60-68. Institute of Petroleum, London.
- WARDLEY SMITH, J., 1971. "Methods of Dealing with Oil Pollution on and Close to the Shore in 'Water Pollution by Oil';" pp. 205-215. Institute of Petroleum, London.
- WHEATLAND, A. B., 1971. "Prevention of Pollution from Industrial Use of Oil in 'Water Pollution by Oil';" pp. 69-75. Institute of Petroleum, London.
- WILSON, D. P., 1968. "Long-Term Effects of Low Concentrations of an Oil-Spill Remover ('detergent'): Studies with the Larvae of Sabellaria spinulosa." J. Mar. Biol. Ass., U. K., 48, 177-182.
- WILSON, K. W., 1970. "The Toxicity of Oil-Spill Dispersants to the Embryos and Larvae of Some Marine Fish." FAO Tech. Conf. Mar. Pollut., Rome, pap. E-45.
- WORSLEY, R., 1970. "Aerial Photography of Oil Slicks." Annu. Rep. Oil Pollut. Res. Unit, Orielton, 48-50.
- WYLLIE, D. and TAYLOR, W. E. L., 1967. "France and the Torrey Canyon." Admiralty Oil Laboratory (Tech. Note 31), Brentford (Mddx.).
- ZIMMERMANN, W., 1964. "Pollution of Water and Soil by Miscellaneous Petroleum Products." Proc. Intern. Water Supply Congr., Stockholm, B 1-88.
- ZISMAN, W. A. and PICKETT, L., 1942. "Wetting and Spreading Agents for Cleaning Water Surfaces of Oil Films." U. S. Naval Research Laboratory Report P-1930.
- ZOBELL, C. E., 1946. "Action of Micro-Organisms on Hydrocarbons." Bact. Rev., 10, 1-49.
- ZOBELL, C. E., 1959. "Microbiology of Oil." New Zealand Oceanogr. Mem., 3, 39-47.
- ZUCKERMAN, Sir S., 1968. "The Scientific Approach to the Problem of Oil Pollution." Proc. Intern. Conf. Oil Pollut. Sea, Rome, 143-159.

- ADLARD, E. R., CREASER, L. F., MATTHEWS, P. H. D. (1972), "Identification of Hydrocarbon Pollutants on Seas and Beaches by Gas Chromatography," Anal. Chem., 44, 64.
- ARCHER, J. N. (1973), "Prospects for the 1973 IMCO Marine Pollution Conference," Symposium on Marine Pollution, Royal Inst. of Naval Architects, 10-20.
- ATTAWAY, D., J. R. JADAMEC, and W. MCGOWAN (1973), "Rust in Floating Petroleum Found in the Marine Environment," In press.
- BEYNON, L. R. (1970), "Oil Spill Dispersants," Symposium on Oil Spill Prevention, Institute of Petroleum, London.
- BLUMER, M, ERHARDT, M, and JONES, J. H. (1973), "The Environmental Fate of Stranded Crude Oil," Deep-Sea Research, 20: 239-259.
- BROWN, D. H. (1972), "The Effect of Kuwait Crude Oil and a Solvent Emulsifier on the Metabolism of the Marine Lichen Lichina pygmaea," Marine Biology, 12(4): 309-315.
- BROWN, R. A., SEARL, T. D., ELLIOTT, J. J., PHILLIPS, B. G., BRANDON, D. E., and MONAGHAN, P. H. (1973), "Distribution of Heavy Hydrocarbons in Some Atlantic Ocean Water," Proceedings, Joint Conference on the Prevention and Control of Oil Spills, 505-519.
- BRUMMAGE, K. G. (1973), "Sources of Oil Entering the Sea," Background Papers, Workshop on Petroleum in Marine Environment, Ocean Affairs Board, NAS.
- BRYAN, D. E., GUINN, V. P., HACKLEMAN, R. P., LUKENS, H. H. (1971), "Development of Nuclear Analytical Techniques for Oil Slick Identification, Phase I," Prepared for U. S. Atomic Energy Commission, January.
- BURNS, K. A., and TEAL, J. M. (1971), "Hydrocarbon Incorporation Into the Salt Marsh Ecosystem from the West Falmouth Oil Spill," WHOI Tech. Report, No. 71-69, 14.
- CANEVARI, E. P. (1973), "Development of Next Generation Chemical Dispersants," Proceedings, Joint Conference on Prevention and Control of Oil Spills, 231-240.
- CLARK, R. C., JR, FINLEY, J. S., PATTEN, B. G., STEFANI, D. F., and De NIKE, E. E. (1973), "Interagency Investigations of a Persistent Oil Spill on the Washington Coast," Proceedings, Joint Conference on the Prevention and Control of Oil Spills, 793-808.
- COWELL, E. B. (1971), "Some Effects of Oil Pollution in Milford Haven, United Kingdom," Proceedings, Joint Conference on Prevention and Control of Oil Spills, 231-240.

- EHRIARDT, M., BLUMER, M. (1972), "The Source Identification of Marine Hydrocarbons by Gas Chromatography," Environmental Pollution, 3: 179-194.
- FELDMAN, M. H. (1970), "The 50-Mile Ballast-Oil Dumping Prohibited Zone Off Alaska, Reconsidered in the Light of Available Data Gleaned from Significant Incidents," Pacific Northwest Water Laboratory, Working Paper 77.
- FEUERSTEIN, D. L. (1973), "Input of Petroleum to the Marine Environment," Background Papers, Workshop on Petroleum in Marine Environment, Ocean Affairs Board, NAS, 39-49.
- FORRESTER, W. D. (1971), "Distribution of Suspended Particles Following the Wreck of the Tanker 'Arrow'," J. Marine Research, 29: 151-170, and J. Fish. Res. Bd. Canada, 28:1327-1330.
- FREEGARDE, M., and HATCHETT, C. G. (1970), "The Ultimate Fate of Crude Oil at Sea," Admiralty Materials Laboratory, U. K., Interim Report 7.
- GARRETT, W. D. (1969), "Confinement and Control of Oil Pollution on Water with Monomolecular Surface Films," Proceedings, Joint Conference on the Prevention and Control of Oil Spills, 257-262.
- GILES, L. A., and LIVINGSTON, J. (1960), "Oil Pollution of the Seas," Transactions, North American Wildlife and Natural Resources Conference, 25: 297-302.
- GORDON, D. C. and PROUSE, H, J, (1973), "The Effects of Three Different Oils on Marine Phytoplankton Photosynthesis," Marine Biology, In press.
- GREENWOOD, J. J. D., and KEDDIE, J. P. F. (1968), "Birds Killed by Oil in the Tay Estuary, March and April, 1968," Scottish Birds, 5: 189-196.
- HOLDSWORTH, M. P. (1971), "Oil Pollution at Sea," Symposium on Environmental Pollution, University of Lancaster.
- HOULT, D. P. (1972), "Oil Spreading on the Sea," Ann. Rev. Fluid Mech. 4: 341-368.
- IMCO. (1972), "Report on Study IV (Clean Tanks for Ballast Prior to Vessel Sailing)," IMCO Paper MPXIII/2(a)/6.
- IMCO. (1973), "Environmental and Financial Consequences of Oil Pollution from Ships - Report of Study VI," Preparations for International Marine Pollution Conference, 1973, IMCO, London, Appendix 1.

- KAWAHARA, F. K. (1969), Laboratory Guide for the Identification of Petroleum Products, U. S. Department of the Interior, FWPCA, Cincinnati, Ohio (Now U. S. Environmental Protection Agency, Office of Research and Monitoring National Environmental Research Center, Cincinnati, Ohio 45268).
- KREIDER, R. E. (1971), "Identification of Oil Leaks and Spills," Proceedings, Joint Conference on the Prevention and Control of Oil Spills, 119-124.
- LEVY, E. M. (1970), "A Shipboard Method for the Estimation of Bunker C in Sea Water," Presented at Symposium on Marine Sciences, Chemical Institute of Canada, Charlottetown, P. E. I., August 16-18.
- LEVY, E. M. (1972), "Evidence for the Recovery of the Waters Off the Coast of Nova Scotia from the Effects of a Major Oil Spill," Water, Air, and Soil Pollution, 1: 144-148.
- LUKENS, H. R., BRYAN, D. E., HIATT, N. A., SCHLESINGER, H. L. (1971), "Development of Nuclear Analytical Techniques for Oil-Slick Identification, Phase IIA," Prepared for U. S. Atomic Energy Commission, June.
- MEIJS, F. H., SCHMID, JONGBLOED, L. J., and TADEMA, H. J. (1969), "New Methods for Combating Oil Slicks," Proceedings, Joint Conference on Prevention and Control of Oil Spills, 263-269.
- MILLER, J. W. (1973), "A Multiparameter Oil Pollution Source Identification System," Joint Conference on Prevention and Control of Oil Spills, 195-203.
- MONAGHAN. P. H., SEELINGER, J. H., and BROWN, R. A. (1973), "The Persistent Hydrocarbon Content of the Sea Along Certain Tanker Routes," A Preliminary Report, API Tanker Conference, Hilton Head Island, S. C., May 7-9.
- MURPHY, T. A., and McCARTHY L. T. (1970), "Evaluation of the Effectiveness of Oil Dispersing Chemicals," Proceedings, Industry-Government Seminar on Oil Spill Treating Agents, American Petroleum Institute Publication 40: 55.
- NUZZI, R. (1973), "Effects of Water Soluble Extracts of Oil on Phytoplankton," Proceedings, Conference on Prevention and Control of Oil Spills, 809-814.
- OTTWAY, S. M. (1972), "A Review of World Spillages, 1960-1971," Oil Pollution Research Unit, Orielton Field Center, Pembroke, Wales.
- PARKER, C. A. (1970), "The Ultimate Fate of Crude Oil at Sea - Uptake of Oil by Zooplankton," AML Report, B.198(M).

- PORRICELLI, J. D., and KEITH, V. F. (1973), "An Analysis of Oil Outflows Due to Tanker Accidents," Proceedings, Joint Conference on the Prevention and Control of Oil Spills, 3-14.
- Programmes Analysis Unit (1973), "The Environmental and Financial Consequences of Oil Pollution from Ships, Appendix 2 - The Fate of Oil at Sea," Report of Study No. VI, Submitted to the Intergovernmental Maritime Consultative Organization by the United Kingdom, 10.
- RAMSDALE, S. J., WILKINSON, R. E. (1968), "Identification of Petroleum Sources of Beach Pollution by Gas Liquid Chromatography," J. Inst. Petrol., 54: 326.
- ROSENBERG, E., and GUTNICK, D. (1973), "Bacterial Growth and Dispersion of Crude Oil in an Oil Tanker During the Ballast Voyage," Unpublished manuscript communicated to Workshop on Petroleum in Marine Environment, Ocean Affairs Board, NAS.
- SCARRATT, D. J. and ZITCO, V. (1972), "Bunker C Oil in Sediments and Benthic Animals from Shallow Depths in Chedabucto Bay, Nova Scotia," J. Fish Res. Bd. of Canada, 29: 1347-1350.
- SOIKKELI, M., and VIRTANEN, J. (1972), "The Palvo Oil Tanker Disaster in the Finnish South-Western Archipelago, II." "Effects of Oil Pollution on the Eider Population in the Archipelagos of Kökar and Föglö, Southwestern Finland," Aqua Fenn. 1972: 122-128.
- SPOONER, M. (1969), "Some Ecological Effects of Marine Oil Pollution," Proceedings, Joint Conference on the Prevention and Control of Oil Spills, 313-316.
- U. S. Coast Guard (1973), Draft Environmental Impact Statement - for International Convention for the Prevention of Pollution from Ships, 1973, 89 pp. and 6 appendices.
- U. S. Coast Guard (1973), Summaries of Research Programs by the U. S. Coast Guard on Petroleum Residues in the Marine Environment - Progress Report Abstracts, Submitted to the National Academy of Sciences Workshop.
- VICTORY, G. (1973), "The Load On Top System, Present and Future," Symposium on Marine Pollution, Royal Inst. of Naval Architects, 10-20.
- ZAFIRIOU, O. C., MYERS, J., BOURBONNIERE, R., FREESTONE, F. J. (1973), "Oil Spill-Source Correlation by Gas Chromatography: An Experimental Evaluation of System Performance," Joint Conference on Prevention and Control of Oil Spills, 153-159.
- ZITKO, V. (1971), "Determination of Residual Fuel Oil Contamination by Aquatic Animals," Bull. Environ. Cont. Tox., 5: 559-564.

FEDERAL LAWS

Relevant to Development or Operation
of
Deepwater Port Facilities

Coastal Zone Management Act of 1972 (P.L. 92-583).

Coast Guard authority for aiding and controlling navigation (14 U.S.C. 81).

Federal Boat Safety Act of 1971 (P.L. 92-75, 46 U.S.C. Chapter 33, especially 1461(d)).

Marine Protection, Research and Sanctuaries Act of 1972 (P.L. 92-532).

National Environmental Policy Act of 1969 (P.L. 91-190, 42 U.S.C. 4321).

Oil Pollution Act of 1924 (P.L. 68-238, 33 U.S.C. 431).

Oil Pollution Control Act of 1961 (P.L. 87-167, 33 U.S.C. 1001), as amended.

Outer Continental Shelf Lands Act of 1953 (P.L. 83-212, 43 U.S.C. 1331) especially Section 4(f).

Ports and Waterways Safety Act of 1972 (P.L. 92-340).

Regulatory authority of the Department of Transportation in regard to pipeline safety (18 U.S.C. Chapter 39, 49 U.S.C. 1655).

Regulatory authority of the Federal Maritime Commission in regard to rates (46 U.S.C. 817).

Regulatory authority of the Interstate Commerce Commission in regard to rates (49 U.S.C. 903).

Rivers and Harbors Act of 1899 (33 U.S.C. 401), especially sections 9-20 (Section 13 is the Refuse Act).

Submerged Lands Act of 1953 (P.L. 83-31, 43 U.S.C. 1301).

Vessel Bridge-to-Bridge Radio Telephone Act of 1971 (P.L. 92-63, 33 U.S.C. 1201).

Federal Laws (cont.)

Water Pollution Control Act of 1948, as amended (originally P.L. 80-845, 50 U.S.C. 191), including:

Water Pollution Control Act Extension of 1952
(P.L. 82-579)

Amendments of 1956 (P.L. 84-660)

Federal Water Pollution Control Act of 1961
(P.L. 87-88)

Water Quality Act of 1965 (P.L. 89-234)

Clean Water Restoration Act of 1966 (P.L. 89-753)

Water Quality Improvement Act of 1970
(P.L. 91-224)

Amendments of 1972 (P.L. 92-340) especially
Section 311-12 and 401-03.

INTERNATIONAL LAWS

Relevant to Development or Operation
of
Deepwater Port Facilities

- Convention for the Prevention of Pollution of the Sea by Oil (1954 as amended), especially the proposed new Article 6 in the 1971 amendments to the Convention.
- Convention on Civil Liability for Oil Pollution Damage (1969).
- Convention on Load Lines (1966).
- Convention on Safety of Life at Sea (1960), also known as SOLAS.
- Convention on the Continental Shelf (1958), especially Article 5.
- Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (1971).
- Convention on the High Seas (1958), especially Articles 1 and 2.
- Convention on the Territorial Sea and the Contiguous Zone (1958), especially Article 24.
- Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties (1969), especially Articles 1, 3 and 5.
- International Regulations for Preventing Collisions at Sea (1960), especially Rule 1(c).

